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

Prism Embroidery

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YAESU FTdx3000 KENWOOD TS-590SG

IC-7300: £34.95. FTdx3000: £37.95. TS-590SG Ltd: £37.95

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Contents

February 2018

News and Reports

Regulars

Reviews

28

74

Technical Features

Features

Main cover image by Kevin Williams, M6CYB

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

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RadCom is published by the Radio Society of Great Britain as its official journal and is sent free and post paid to all Members of the Society. **The March 2018 edition of *RadCom* is expected to arrive with most Members by 21February 2018** although this can take up to a week longer in some cases; international deliveries can take longer still.

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 Articles for *RadCom* are accepted on the strict understanding that they are previously unpublished and not currently on offer to any other publication.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

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Abbreviations and acronyms we use are listed at http://tinyurl.com/RC-acronyms

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An active and thriving amateur radio community is what we need!

Part of our strategic goal for 2022 is to have an active and thriving amateur radio community. I'm going to explain this a little more and pose some questions for you, the Members.

The Strategy's narrative says this about the 2022 goal: "The inescapable truth is that the amateur radio community is ageing and we need to seek out and encourage new people if that community is to thrive. We also need it to be active to show that amateur radio is not only alive but healthy and vibrant; a strong justification for our continued use of the wireless spectrum." So where do we go to seek out new people and how do we plan to encourage them to join us?

The Society has made a real effort to give youngsters reasons to get involved. Through supporting initiatives like Tim Peake's Principia mission, Jamboree on the Air, Thinking Day on the Air and Youngsters on the Air (YOTA), we have shown that amateur radio can be fun and educational. Peter Barnes, MOSWN who was one of the UK's YOTA 2017 team members, has since gone on to Swansea University and has been busy re-starting the amateur radio club there, affiliating it to the RSGB and participating in YOTA month. So the events mentioned above act as springboards not only for youngsters to develop their own amateur radio interests but also to draw others in.

I was asked at the Convention "But what are you doing to attract older newcomers?" We have a promotional video in the pipeline intended to mirror the *21st Century Hobby* video (which is aimed at youngsters) to publicise amateur radio to a more mature audience. The idea is to show a range of amateur radio activities, demonstrate how they support lifelong learning and appeal to people whatever their skills and interests.

"Where do we go to seek out new people and how do we plan to encourage them to join the amateur radio community?"

However, finding the more mature audience is a challenge – some have suggested SAGA, the University of the 3rd Age (U3A), and the Men-In-Sheds movement. We'll pursue those, but has your club managed to tap into a new source of older newcomers?

Turning to the 'active' part of the 2022 goal, how can we show we are using our spectrum to best advantage?

One way is to have lots of people chasing awards. Chris Burbanks' revival of the RSGB Awards scheme (www.rsgb.org/awards) continues to make good progress with 64 successful claims from five continents processed during 2017. Acceptance of LoTW (Log Book of the World) confirmations as well as traditional QSL cards has proved very popular and made a significant impact in reducing the time span for someone working towards an Award. The IARU Region 1 Award has proved the most popular as it covers member countries in Europe, Africa and near Asia – the base level is confirmed contacts with just 40 member countries, making it quite achievable.

There are revitalised awards specifically for Foundation and Intermediate licence holders – could you encourage newcomers to those licence levels to spend a bit more time on the air and increase band activity?

For those who are a little more energetic, how about hosting an Amateur Radio Direction Finding (ARDF) event? Bob Titterington's team are always keen to help newcomers get involved and they have equipment Affiliated Clubs can borrow. Bob is proposing to run a series of monthly events from March to November, so look out for those and give it a go.

There are lots of other audiences we need to reach and ways of being active but these are just examples that you and your clubs could focus on to help implement the Strategy by building that thriving and active community.

Steve Hartley, G0FUW
Board Director

National Club of the Year 2017

As last year, the RSGB will be judging entries in two categories: clubs with fewer than 25 members and clubs with 25 or more members during 2017. There will be separate prizes for each category. The theme of the competition this year is 'Mentoring and Retention'. Taking exams and gaining a licence are just the first steps in the lifelong enjoyment of amateur radio. How does your club help to motivate people in their first years of being licensed or as they achieve the next licence level? What activities do you offer to help them try out different areas of amateur radio and to develop their knowledge and skills? The judges want to learn what your club does to encourage sustained practical enjoyment of amateur radio. Please use the entry form at http://rsgb.org/main/clubs/national-club-of-the-year/, which must be sent to your Regional Manager by 28 February 2018.

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

In order to determine regional winners, entries will be judged and ranked by a Regional Manager from outside of the region to ensure impartiality. These winners will be announced at the RSGB AGM on 21 April in Birmingham. The RSGB Board will judge the national winners, which will be announced at the National Hamfest in September.

Volunteers wanted

This is the time of year when we call for volunteers to step forward for election at the AGM that will take place at Jurys Inn in Birmingham on 21 April.

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

Regions 1 and 11 are open for volunteers whether the current RM is seeking re-election or not.

Nominations for elected Board Directors and Regional Managers require the supporting signatures of 10 RSGB Corporate Members. Nominations for the Regional Manager vacancies must come from Members who reside in the relevant region.

Further information about the election vacancies can be found on page 9 of the January 2018 *RadCom*. Completed papers, with their supporting signatures, or electronic nominations, must be received at HQ by 2359UTC on 31 January 2018.

Morse Competency Scheme

Phil Cragg, G3UGK had indicated that he is standing down as Morse Competency Project Lead. The Society wishes to thank him for his work on behalf of the Training and Education Committee.

The RSGB is now seeking a successor to take forward the Morse Competency Scheme including proposed changes that are at an advanced state of preparation to make the scheme more accessible to Members.

If you feel you can assist in this capacity and wish to discuss it further please contact Paul Whatton, G4DCV TEC Chair at tec.chair@rsgb.org.uk

HF DXpedition Fund

The RSGB assists HF DXpeditions to the rarer countries through a fund that is supported each year from proceeds of the raffle held at the annual RSGB Convention, as well as income from legacies and donations.

The Society is looking to appoint a 5th Trustee for the HF DXpedition Fund who, given the increasing number of applications, will also act as Secretary to the group. Duties include:

- Circulating to the Trustees all requests for funding submitted via the RSGB website
- Communicating with applicants to clarify any issues arising from their application and advise them of the Trustees' decisions
- Maintaining the HF DXpedition Fund web pages with the support of the RSGB IT team
- Liaising with the RSGB Finance team to request payments to successful applicants and to request occasional financial statements regarding the balance of the Fund.

Applicants should be enthusiastic HF DXers with an interest in DXCC and IOTA.

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.

New RSGB videos

The RSGB has released two IOTA-related 2017 Convention lectures on our video portal www.rsgb.org/videos *Latest developments in IOTA* by the IOTA management team (which is also on our YouTube channel to reach a wider audience) and *5ILYC Brings Pukapuka Atoll (OC-098) in North Cook Islands on the air* by Cezar Trifu, VE3LYC.

The RSGB Convention Raspberry Pi lecture by Mike Richards, G4WNC is also now available. Members can view it via the RSGB video portal. Mike's presentation includes a range of practical Pi projects to encourage people to get their Raspberry Pi out of the drawer and into use. These uses include a data modes terminal using FLDIGI and WSJT-X, a DVB-T dongle receiver and using the Pi to control things around the shack.

Gremlins

Gremlins struck again in the January 2018 *RadCom*. The article on the CW Boot Camp should have been entitled Essex CW ARC – Boot Camp 2017. Our apologies to Essex CW ARC for this editorial error. See https://sites.google.com/site/essexcw/ for more information on the club.

Train the trainers

Newton le Willows ARC is hosting a Train The Trainers event on Saturday 3 March. Places are strictly limited, so early booking is advised.

This is scheduled to be an all day event, running from 9am to 5pm approximately. Tea and coffee will be provided, though you will need to provide your own lunch – or use the chip shop just down the road from the club or a shop selling pies and cakes etc over the road.

The event is free to attend, although the club would appreciate any donation, no matter how small, to go towards covering costs.

The event will take place at Derbyshire Hill Family & Community Centre, Derbyshire Hill Rd, Parr, St Helens WA9 2LU. For more information please contact Lee, M0LGL on 0741 483 6945 (after 3.30pm please).

Congratulations list apology

We would like to apologise to Terry Robinson, GM3WUX, whose details should have appeared in the 50 Years Congratulations section in the January 2018 *RadCom*. His Membership record was in error (and has now been corrected) – thank you to him and the many other people of long-standing Membership, who we salute in the Old Timers' Honour Roll on page 14 of this edition. Please note that the Honour Roll covers continuous Membership of the RSGB *to 31 December 2017* and the monthly Congratulations section salutes Members' 50th, 60th, 70th or 80th *anniversary* month.

QSL Matters

At this time of year the QSL Bureau reviews its progress and its data. 2017 was a very different year in which consolidation of more sub groups into the standard alphabet sorting patterns began to speed throughput. After many years of trying, the goal of processing all outgoing cards from UK Members within 30 days was achieved and maintained.

As band conditions remain relatively poor, we've witnessed for the first time a reduction in card numbers arriving from overseas. In contrast, card numbers sent by UK Members remained high, mainly due to the ever-increasing number of special event and club stations. On this front, we made over 200 *'Help'* card requests, to GB's, clubs and Members to provide us with the correct NoV details, Club Affiliation or Membership/ renewal information, as it was not included with packages or their call was not listed on the database. See the *Yearbook* or website – http://rsgb.org/main/operating/qsl-bureau/ – for details.

We really appreciate the 80% of Members who use the recommended 140 x 90mm single page cards as that helps to keep costs down for everyone. Please think before you send over-size or over-weight cards to the bureau.

Congratulations

To the following Members whom our records show as having reached 80, 70, 60 or 50 years' continuous Membership of the RSGB.

80 years

Mr A J Hallett	G3CQ

70 Years

Mr D Oswald	GM3COQ
Mr E J Hatch	G3ISD

60 Years

Prof L W Barclay	G3HTF
Mr R E Piper	G3MEH
Mr C Thomas	G3PSM
Mr J Blackman	ZS1PM

50 Years

Mr R Cumming	G3NOI
Mr F J Chamberlain	G3XBN
Gloucester AR & ES	G4AYM
Mr A Levy	G4DEE
Dr N Taylor	G4HLX
Ballymena ARC	GI3FFF

2018 Band Plans

In this edition of *RadCom* are the 2018 Band Plans. These incorporate a number of changes from the September 2017 IARU Region 1 General Conference, as well as updates from RSGB-ETCC and feedback by Spectrum Forum members etc. They are also available on the RSGB website in various formats, where more detailed change notes can also be found to guide users. In summary the changes for 2018 are:

HF: Changes are confined to 5MHz. Revisions and in some cases removal of UK-specific designations are intended to improve compatibility with the WRC-15 band at 5351.5-5366.5kHz, to which the UK does not have full access. A new footnote refers users to the 5MHz section of the RSGB website where our HF Manager, Ian Greenshields, G4FSU, provides the latest detailed guidance. This makes 60m effectively a dynamic usage plan, rather than a traditional fixed band plan. The 5MHz band has also been formally added to the 'no-contests' provision that is normally associated with the 10, 18 & 24MHz WARC bands.

VHF/UHF: One of the more substantial changes is in the 144MHz narrowband section which was overhauled at the IARU R1 Conference. It now has a unified 2.7kHz bandwidth segment which includes MGM as well as SSB. The revisions include removal of some old specific designations such as PSK31 and a number of text changes to improve consistency. Another new feature is a new 2kHz wide sub-band for 'Personal Weak Signal MGM Beacons' at 144.491-144.493MHz. A similar change has also been added to 432 and 1296MHz for both WSPR, and future more optimum VHF/UHF successors. Other changes at 432MHz include further provisions for Digital Voice repeaters, gateways and personal 'Hot-spots'. At 50MHz and 434MHz are new provisions for wideband Digital Experimentation (which may be ~100kHz bandwidth).

Microwave: The changes at microwaves are more modest. Apart from the 1296MHz MGM addition, the main change is an overhaul of the 5GHz band plan. This has been reformatted, and the preferred 5760MHz narrowband centre clarified. A note on 2.4GHz narrowband use has been updated for other countries losing access to 2.3GHz. This will be supplemented later in the year, when the Society expands its guidance resources, including for amateur vs exempt use of 2.4 and 5GHz Wi-Fi etc.

As band plans do change over time, please ensure you only refer or link to the current ones on the RSGB website and remove any older ones you have locally. Unfortunately, we still note some websites and unofficial usage charts have obsolete information and urge that these are removed. The latest band plan information, including the master Excel files, can be found on the Operating section of the RSGB website – and if you are unsure, by all means contact either hf.manager@rsgb.org.uk, vhf.manager@rsgb.org.uk or microwave.manager@rsgb.org.uk

Murray Niman, G6JYB, RSGB Spectrum Chair

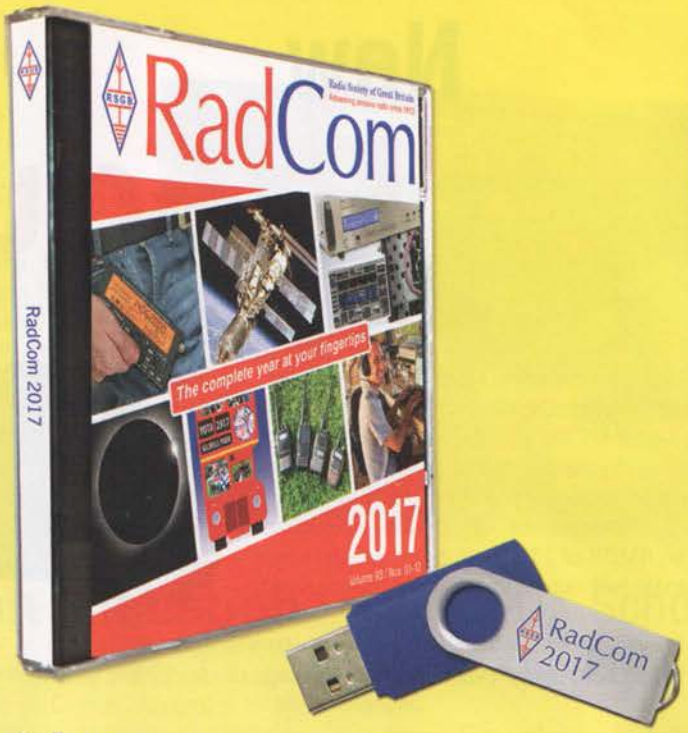
The RSGB would like to welcome to the RSGB family the following new Members who have joined their voice to ours and are helping to keep the RSGB strong.

Mr A Lawrence, 2OOCT
Mr G Spiers, 2E0GNH
Mr K McCarthy, 2E0KLA
Mr N Powis, 2E0OCV
Mr D Joiner, 315365
Mr N Cox, DO1AKM
Mr B Thomas, G0KOJ
Mr S Brackley, G0RFI
Mr T Lovas, G1TPA
Mr K Sykes, G6MPG
Mr P Hollyoake, G7IYY
Mr A Sutton, GM6ZAK
Mr G Mills, M0IKA
Mr M Jennings, M0XXM
Mr J Whiffin, M3DCJ
Mr R Madley, M6JQI
Mr J Miller, M6KQA
Mr M Rotheram, M6KRQ
Mr G Amos, M6KYZ
Mr J Herbert, M6KZJ
Mr P Bamber, M6LSN
Mr N K Griffin, M6LTV
Mr N Porter, M6LUH
Mr M Polles, M6LUO
Mr P Molloy, M6LVM
Mr J Clarke, M6LVQ
Mr G Ford, M6LWQ
Mr M O'Connor, M6LYC
Mr L Finlayson, M6NFO
Dr M Foster, M6PUH
Miss K Helm, M6SXU
Mr I Wagstaff, M6WGG
Mr D Watts, M6WXX
Mr C Smith, M6XHI
Mr G Bolshaw, M6YGG
Mr R Chegwin, MW6RQC
Mr J Ahvenainen, OH5YU
Mr H W Smits, PE1KFC
Veron Clubstation, PI4NYM
Mr G Klecha, RS315245
Mr K Jones, RS315262
Mr F Deschacht, RS315267
Mr M Kaarits, RS315325
Mr J Brown, RS315363
Mr A Rose, RS315364
Mr E Underwood, RS315400
Mr M Taylor, RS315402
Mrs K Underwood, RS315467
Mr E Underwood, RS315468
Mr M Underwood, RS315469
Mr J Underwood, RS315470
Mr T Batchford, RS315471
Mr D A Taylor, RS315472
Mr N Prater, RS315496
Mr E Underwood, RS315568
Miss S Underwood, RS315569
Mr A Fourie, RS315570
Mr M Watson, RS315571
Mr K Pollard, RS315593
Mr K Wit, RS315594
Mr T A Vens, RS315596
Mr. M Fudge, RS315619
Mr S Langton, RS315627
Mr P Marciniak, SP3MKS
Mr D Ross, VA3MJR
Mr F Daigneault, VE2AAY
Mr E Trimingham, VK2BET
Mr D Kiblinger, W9ZQR
Mr S Kendall, WA5LHM
Mr W Schaffer, WS3O
Mr S Horlock, ZL1DXP

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

Mr J Goodyear, 2E0CGS
Mr P G Fletcher, 2E0PGF
Miss J Miller, 2E1PJJ
Mr D Ridley, G0FHR
Mr R Rodgerson, G0OUC
Mr P Loch, G0TCF
Mr M El Sayegh, G0UCC
Mr G Nurse, G1GNQ
Mr G Cole, G1ODK
Mr C N Stephenson, G4DCD
Mr S P Grant, G6ENR
Mr H Bryan, G6TMN
Mr H Quinn, GI0WLW
City of Belfast RAS, GI2BX
Mr P E Gedvilas, K9MG
Mr S Smith, M0JTI
Mr D Simmons, M0RIU
Mr. P A Smart, M6AVL
Mr J Seporaitis, M6LYT
ETGD, RS166103
Mrs L Simmons, RS309728
Miss E Simmons, RS309729
Mr M Tromp, RS94853
Mr R Bainbridge, VK6RK

Spring
Sale
On Now
See pages 78 & 79 for details



NEW TITLE

RadCom 2017 Archive

2017 was another bumper year for the RSGB and *RadCom*. The over 1200 pages of *RadCom* we published in the year contained more feature articles than ever before all of which can be easily accessed and searched from the new *RadCom 2017 Archive*.

As always the *RadCom 2017 Archive* contains every page of the very best amateur radio information that *RadCom* produced in 2017. The easy to use and fully searchable PDF format allows you to look back over 65 Construction & Technical Features, 25 Antenna Features,15 Equipment Reviews and over 85 other Feature articles. The equipment reviews covered equipment releases such as the Elecraft KX2, Yaesu FT-891 and SDR equipment such as ANAN-8000DLE, SDRplay and much more. You will also find all the host of regular columns that *RadCom* features, from Antennas to VHF/UHF. Simply everything printed in *RadCom* in 2017 is included, even the adverts.

The *RadCom 2017 Archive* also contains a copy of Acrobat Reader DC and additional bonus material including samples from other Archive CDs and even some of the newer RSGB books *Antennas for MF and Above* and *Valve Amplifiers Explained*.

CD & USB Options
The *RadCom Archive 2017* is available as either the traditional CD version or in the USB Memory Stick version. Both versions are easy to use and contain the mass of material *RadCom* produced in 2017 along with plenty of bonus material too.

Non Members' Price: £14.99
RSGB Members' Price: £12.74

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FROM **FREE P&P**
on orders over £30. See Page 78

New Products

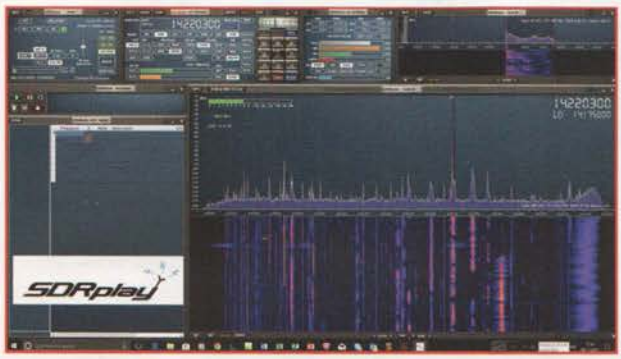
ANAN 7000DLE

The latest DDC (Direct Down Conversion) SDR transceiver from ANAN uses the latest choice of components and design to ensure leading edge performance. Many specifications have been improved over earlier models, based on the work of the OpenHPSDR community. The receiver has an ultra low phase noise clock that gives an RMDR of 116dB at 2kHz, which means that close in weak signals will not be masked by the receiver's phase noise.

The ANAN 7000DLE is available from ML&S Ltd, see www.HamRadio.co.uk
The ANAN 7000DLE is available from Nevada, see www.nevada.co.uk

ELAD Amplifier DUO ART

Elad are an Italian manufacturer of high-end commercial specialist test equipment that also have a popular ham radio division. Three years ago they introduced the very popular FDM-Duo, a beautifully constructed 5W QRP transceiver. They are now producing a matching 60W linear amplifier with a built-in PSU, 4-way antenna switch and clever control software. Whilst the unit is intended for operation with the FDM-Duo it will work with other QRP transceivers like Yaesu's FT-817ND. For more information see www.HamRadio.co.uk/DUOART



SDRuno for Windows

Right out of the box, SDRuno fills your Windows screen with the main panels nicely arranged for the beginner – the most popular amateur bands can be selected by a single click of the mouse. SDRplay have also released a whole series of video guides that can be accessed from their comprehensive SDRplay YouTube channel at www.youtube.com/c/SDRplayRSP and see the January 2018 *RadCom* for the review of the latest member of the SDRplay family – the RSP1A. Full details at www.sdrplay.com

UltraFlex-7 Crystal Coax

M&P has a huge range of 50Ω cables that has just been joined by the UltraFlex-7 Crystal. A clear sheath allows the user to view the design of the 83% coverage braid made up of 144 individual wires. This new lightweight design is lightweight (half the weight of URM-67) for reduced stress of hanging and swing when using around rotators. Priced at only £1.59p/m, for full details see the Martin Lynch & Sons website at www.HamRadio.co.uk/ultraflex7crystal

DC power supplies

Telonic Instruments now stock the new Kikusui PWR-01 series of wide-range benchtop programmable DC power supplies. The PWR-01 series are versatile instruments with models offering 400W, 800W and 1200W rated power output with maximum rated voltages up to 650V. Equipped with a 4-times voltage and current variable ratio the PWR-01 provides flexible current and voltage for a variety of applications. The PWR-01 is also equipped with a soft-start function that limits the inrush current, minimising any harmful effects to DUTs such as DC motors. The power supplies are also equipped with ergonomic power setting knobs, allowing the operator to control voltage and current independently, as well as front-facing banana plugs designed for safety and convenience. For full product details please visit www.telonic.co.uk/Kikusui-PWR01-Programmable-Bench-Power-Supplies-400W-1200W-s/2055.htm

Continued on page 12

Running Steps award

The San Donà di Piave (Venice) Chapter of the Italian Amateur Radio Association has organised an award for the 66th Bersaglieri National Rally held in San Donà di Piave in May. Bersaglieri Running steps is open to all. For the duration of the event, a special callsign II3B will be used. Qualification for the award runs between 1 March and 31 May. Only contacts on the 10, 15, 20, 40 and 80m bands are valid, using SSB, CW, BPSK31 and RTTY. Full rules (in English) can be found at www.ariportogruaro.org/wp-content/uploads/2017/12/Bersaglieri-award.pdf

Croatia confirms 60m allocation

On 24 November 2017, the Croatian Regulatory Authority published changes to the rules on amateur radio communications in the Republic of Croatia. According to these changes, Croatian radio amateurs now have access to the WRC-15 60m amateur secondary allocation of 5351.5 – 5366.5kHz under ITU Footnote 5.133B, ie with 15W EIRP.

They now also have access to the 160m band from 1810 – 2000kHz. Maximum power on 1810 – 1850kHz is 1.5kW; on 1850 – 2000kHz the maximum power reduces to 1kW.

Special event stations

Gloucester Amateur Radio & Electronics Society will be running a special event station, GB4QBP on Saturday 17 February, 1000 – 1600UTC, at Quedgeley Scout & Guide Hall, School Lane, Gloucester GL2 4PJ to celebrate Thinking Day On The Air. They plan to be transmitting on 80, 40 & 20m and also on VHF: look for them around the FM calling channel, 145.500MHz. Last year they helped 20+ Brownies gain their Communication badge. They also held some Morse workshops allowing the Brownies to send their name and get a certificate for doing it. It was an event that sparked interest in amateur radio both with the children and their parents.

Fifty years after the crash of an Aer Lingus Viscount airliner in the Irish Sea, special event station EI50AOM remembers this tragic event and honours the 61 lives lost. The station has been licensed to operate from January to March. The station will devote one day beginning 22 January to remember each of the four crew and 57 passengers who died, with operations culminating on the fiftieth anniversary of the crash, 24 March. QSL via EI2KA, direct with $2 and self-addressed envelope or via bureau. Log will be uploaded periodically to Logbook of The World for non-paper confirmations. www.qrz.com/db/EI50AOM

II4HRZ will be on the air in February celebrating the work of Heinrich Rudolf Hertz. Throughout 2018, twelve commemorative radio stations with special callsigns will operate in turn throughout the year: each month is associated with a specific scientist: Further details and award regulations are on the official website, www.arifidenza.it

Hearing Dogs for Deaf People

Connie, a Hearing Dog for Deaf people, who is in training, visited North Cheshire Amateur Radio Club as part of her 'socialising' skills. Hearing dogs must be relaxed and calm in all circumstances. The puppy attended with Caroline and Terry, G3RKF who train these dogs. For more information on the work of this charity see www.hearingdogs.org.uk

C5DX School DXpedition

The callsign C5DX has been granted and will be activated again between 9 and 16 February, as part of a school trip to The Gambia. A party of 18 sixth form students and three staff from Sandringham School in St Albans will visit their partner school, Farafenni Senior Secondary High. The two schools have worked in partnership for 10 years and Farafenni High is now one of the highest achieving rural schools in The Gambia.

Part of the visit is to see the progress of a major extension to the school library to create a dedicated learning space for students to use in and out of school hours. This has been achieved from fund raising at Sandringham School. Headteacher Alan Gray, G4DJX is part of this group and will lead the DXpedition aspect to the trip. He will operate mainly CW and four licenced students from the Sandringham School Amateur Radio Club who are also on the trip will operate SSB. It will be their first DXpedition and they will be learning how to operate from a semi-rare country so please bear this in mind and be patient with them as they learn the craft of DX operating.

They will be taking a K3, KPA500, KAT500 combination to run 400W into a multi-band dipole (the new Aerial-51 Model 807 ultra-light OCF dipole) kindly built and donated by Rick, DJ0IP of Aerial-51. SpiderBeam has also part-sponsored this DXpedition with a 12m SpiderPole and associated equipment. They will operate spilt and endeavour to upload logs whilst there. They also hope to update their QRZ page during the DXpedition.

Sandringham School Amateur Radio Club now has 17 licensed amateurs with more waiting to take either Foundation or Intermediate exams. Anyone who is licensed and interested in teaching at Sandringham should contact Alan, G4DJX directly. He would appreciate any and all offers of help!

Successful hog roast

Martin Lynch & Sons reported another successful hog roast in December (sponsored by Icom, Yaesu and Kenwood). There were plenty of crowds inside and outside the store and the crew from TX Factor were there with their cameras rolling.

Young Women Engineer of the Year

Ofcom recently supported the Institution of Engineering and Technology's (IET) Young Women Engineer of the Year awards, as part of their commitment to help increase the numbers of women in working in science, technology, engineering and mathematics (STEM). The six finalists for this year's award represented a variety of roles and reflected the increasing representation of women in engineering roles in the UK. This year's winner was Ozak Esu, an electrical engineer working at consultancy Cundall on building services. If you are interested in an engineering role at Ofcom, there are a range of graduate, apprentice and intern roles available.

Four Days in May

QRP enthusiasts have developed a great reputation for doing more with less. QRPARCI is presenting an opportunity to show off these QRP design skills with the Four Days in May 2018 event in Dayton, Ohio. Called the 2N2222 POWER CHALLENGE! you need to design and demonstrate a crystal-controlled 40m PA to make the highest sustained power for a period of one minute using only two 2N2222 transistors. This event will take place during Friday the 18th and the winner recognised at the QRPARCI Banquet on the 19th.
www.qrparci.org/fdim

5MHz Newsletter

The latest edition (No 19) of *The 5MHz Newsletter* is now available for free pdf download from the RSGB 5MHz page at http://rsgb.org/main/operating/band-plans/hf/5mhz/ This edition features news from 15 countries, Canada awaits WRC-15 Allocation plus Domestic Channels, 5MHz in the Hurricanes, New 60m portable linked-dipole antenna, Beware of the FAT and Readers' Feedback.

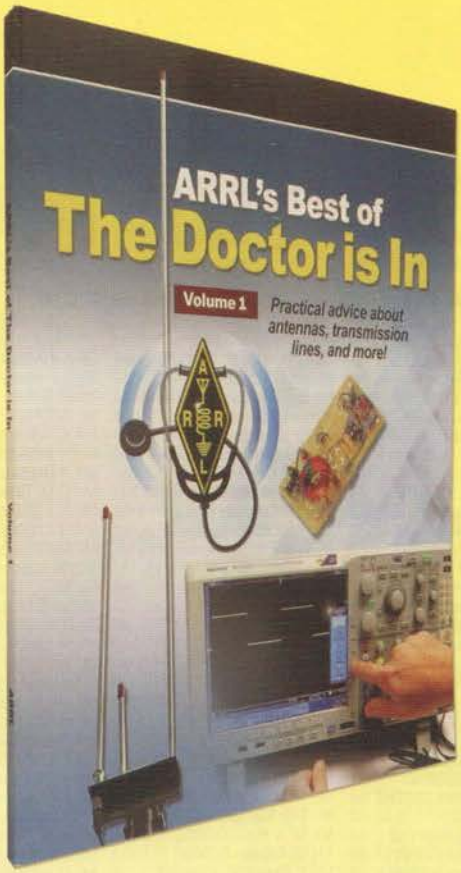
New look website for Moonraker

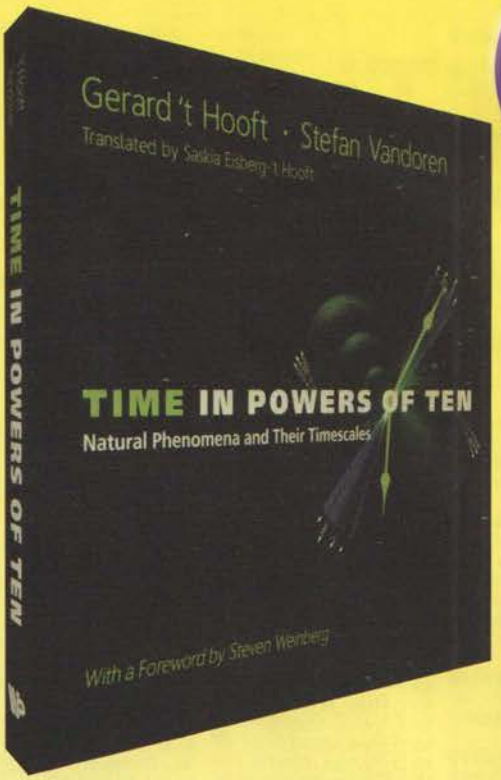
Moonraker has launched a new look faster website that is tablet and mobile friendly. With up to date 'live' stock information, the customer can order with confidence and with full tracking provided be able to know when their parcel is out for delivery. Also customers are able to easily subscribe to the newsletter for up to the minute information such as rallies, club talks and, of course, offers. Go to www.moonraker.eu

New Products continued from page 10

Log periodic antenna

Innovantennas has a new log periodic that covers 100MHz to 750MHz to replace the popular 100MHz to 600MHz log periodic. With rear mounting it is 1290mm long. Unlike the original, this one can be mounted in either horizontal or vertical plane. Additionally, the front of the log cell has three sets of twin parasitic elements through the booms/feed lines. These enhance top-end performance, a failing of more traditional log periodic antennas.
The new log has an introductory price of just £199.95l. Available now from stock, see www.innovantennas.com/.../virtuemart_category_.../75.html for further details.





NEW TITLES

Spring Sale On Now

See pages 78 & 79 for details

ARRL's Best of The Doctor is In

Practical advice about antennas, transmission lines, and more!

By Joel Hallas, W1ZR

If you have not yet discovered the regular *The Doctor is In* column in the ARRL magazine *QST* then this book is a revelation. Written in a question and answer format the column dispenses practical answers troublesome problems, myth busting and great ideas covering a range of topics.

The *ARRL's Best of The Doctor is In* distils more than a decade of the advice and ideas of Joel Hallas, W1ZR covering as it says in the sub title antennas, transmission lines and more. Readers will find masses of questions broken down into sections covering VHF/UHF Antennas, HF Wire Antennas, HF Vertical Antennas, HF Yagi Antennas and Transmission Lines. Each question is treated to an answer written an eminently readable form that informs, provokes and stimulates. There are dozens of designs, practical solutions to an array of antenna issues included from the pages of *QST*.

If you're puzzling over how to improve your station antennas, or solve a problem with your antenna system, chances are someone else has shared the same questions with – and received helpful answers from – The Doctor. Having *ARRL's Best of The Doctor is In* at hand is the next best thing to a visit from W1ZR himself!

128 pages, 184 x 229mm
ISBN 9781 6259 5074 1
Non Members' Price: £22.99
RSGB Members' Price: £19.54

Time in Powers of Ten

Natural Phenomena and Their Timescales

By Gerard 't Hooft and Stefan Vandoren

This richly illustrated and extraordinary book ranges from the unimaginably huge to the unimaginably tiny. Nobel Laureate Gerard 't Hooft and Theoretical Physicist Stefan Vandoren describe the enormous diversity of natural phenomena that take place at different time scales.

In the tradition of the bestseller *Powers of Ten*, the authors zoom in and out in time, each step with a factor of ten. Starting from one second, time scales are enlarged until processes are reached that take much longer than the age of the universe. After the largest possible eternities, the reader is treated to the shortest and fastest phenomena known. Then the authors increase with powers of ten, until again the second is reached at the end of the book.

At each time scale, interesting natural phenomena occur, spread over all scientific disciplines: orbital and rotation periods of planets and stars, decay times of elementary particles and atoms, biological rhythms and evolution processes, but also the different geological time scales.

Time in the Powers of Ten is an endlessly fascinating and enjoyable read for anyone interested in a deeper understanding of time, and how it shapes our lives.

232 pages, 267 x 254mm
ISBN 9789 8144 8981 2
Non Members' Price: £20.00
RSGB Members' Price: £15.99 (20% off)

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Old Timers' Honour Roll

On 31 December 2017, the following had unbroken Membership of the Society for 50 years or more.

83 Years
Mr V J Flowers, G8QM

79 Years
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Mr A J Hallett, G3CQ

78 Years
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Mr K I Procter, G3EPO
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Mr G A Errock, G3HCO
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Mr N R Pascoe, G3IOI
Mr R Franklin, G3ITH
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Mr R I Pryde, GM3LGU
Miss J G Fish, GM3NYG
Mr D A S Holmes, GW3JSV
Mr R Jones, GW3MDK
Mr M Addicott, RS19615
Mr J C P Sharp, RS21683

64 Years
Mr R J Appleby, G3INU
Mr H Hyman, G3IZQ
Mr N B Cottrell, G3JFR
Mr E W G Allen, G3JHP
Mr V E Brand, G3JNB
Mr G J McGee, G3MDM
Mr P E W Allely, GW3KJW
Mr A Ernest, GW3LQE
Mr M Probert, GW4HXO
Mr A Kightley, RS20103

63 Years
Mr J A Hardcastle, G3JIR
Mr D A Platt G3JNJ
Mr F G Whatley G3JOT
Mr G Voller G3JUL
W J Grainger G3JYO
Mr M Pharaoh G3LCH
Mr P J Aitchison G3LSQ
Mr A R Smith G3MPB
Mr P Sorab G3NDO
Mr A B Woolford G3SNN
Mr R J Pye G4IUH
Mr P Cohen GM3LKY

62 Years
Mr J E Mulye G0VEH
Mr M E Lambeth G2AIW
Mr J Hoban G3EGC
Mr R Page-Jones G3JWI
Mr J E Smith G3JZF
Mr G E Mackrell G3KAX
Mr R Bray G3KEL
Mr D Maclennan G3KGM
Mr B Alderson G3KJX
Mr D G Alexander G3KLH
Mr D G Enoch G3KLZ
Mr J Greenwood G3KRZ
Mr G P Rigby G3KTJ
Mr J B Butcher G3LAS
Mr M Hayward G3LGA
Mr G Taylor G3MDC
Mr C A Hogg G3NRZ
Mr R Scaife G3RSB
Dr T R Skrbic G3TOE
Mr J C Alford G4DOE
Mr A D Patterson OBE GI3KYP
Mr J H Birkett RS20842
Mr J H Reisert W1JR

61 Years
Mr P Craw G3CCX
Mr P C Cole G3JFS
Dr K L Smith G3JIX
Mr M Street G3JKX
Mr C H Noden G3JPB
Mr K G Grover G3KIP
Mr D H Plumridge G3KMG
Mr W T Addy G3KRX
Mr J T A Ault G3KTU
Mr J D Davies G3KZE
Mr D A Shepherd G3LCS
Mr R J Cooke G3LDI
Mr C B C Hill G3LGS
Mr D Webber G3LHJ
Dr M J Underhill G3LHZ
Mr O Jackson G3LKZ
Dr A Hodgkinson G3LLJ
Mr R Scrivens G3LNM
Mr G Dale G3MFH
Mr P Burt G3NBQ
Mr E N Cheadle G3NUG
Mr D W Stevens G3NWG
Mr A J Balmforth G3RKQ
Mr A R Stevenson G3YNT
Mrs B A Long G8FKY
Mr A Kettlety G8HTN
Mr H R Mesny GJ3LFJ
Mr F Claytonsmith GM3JKS
Mr V W Stewart GM3OWU
Dr J C Craig VO1FB

60 Years
Mr F L Wiseman G3GRY
Mr M Harrison G3HKH
Mr L J Loveland G3KZX
Mr R L Gerrard MBE G3LAZ
Mr B E Gee G3LDG
Mr R D Muir G3LHN
Mr B M Johnson G3LOX
Mr E Pickering G3LPS
Mr C H Evans G3LUO
Mr F Griffiths G3MED
Mr A V H Davis G3MGL
Mr D Johnson G3MPN
Mr K Ashcroft G3MSW
Mr F E Garrett G3MVZ
Mr R J Weaving G3NBN
Mr C R Burchell G3NKQ
Mr D Thom G3NKS
Mr M E Slater G3NML
Mr J Hogg G3NUA
Mr A B Plant MBE G3NXC
Mr S J Gilbert G3OAG
Mr R M G Maule, G3OEF
Mr D W Thompson, G3OXG
Mr D J Penny, G3PEN
Mr R W Fisher, G3PWJ
Mr D E Waller, G3SUL
Mr J E C Baldwin, G3UHK
Mr W J C Pinnell, G3XWK
Mr A V Evans, G3ZZX
Mr J Juleff, G4MXU
Mr W Clinton, G8KZN
Mr D B Whitfield, G8VMY
Mr J F Gray, GM3LRG
Mr M Williams, GW3LCQ
Mr G H Price, GW3LXI
Mr J E Orme, RS21408
Mr R N Jones, RS25982

59 Years
Mr G R Watts, G0EVW
Mr R J Oram, G0FXI
Mr P K Hamblett, G0TKT
Mr D Blake, G2FT
Mr RW Emery, G3FYX
Prof L W Barclay, G3HTF
Mr D G Pinnock, G3HVA
Mr P M Rackham, G3IRQ
Mr R T Bowden, G3IXZ
Mr J Cleeve, G3JVC
Mr J E Symes, G3LNN
Mr R Brown, G3LQP
Mr P K Blair, G3LTF
Mr P Buck, G3LWT
Mr M Scott, G3LYP
Mr J D Masters, G3MBM
Mr B Vaughan, G3MCV
Mr WJ Kennedy, G3MCX
Mr J S E Pearce, G3MEC
Mr R E Piper, G3MEH
Mr E J Landon, G3MHT
Dr T G Langdon, G3MHV
Mr G A Whiting, G3MMS
Mr H J Benjamin, G3MNB
Mr D L Byne, G3MRQ
Mr R A Strafford, G3MRT
Mr G F Gott, G3MUO
Mr D Beales G3MWO
Mr C K Richardson, G3NAE
Mr G Mallinson, G3NAK
Dr J E Larson, G3NBL
Mr C R Fry, G3NDI
Mr J T Leviston, G3NFB
C L Desborough, G3NNG
Mr M T George-Powell, G3NNO
Mr D Foster, G3NRU
Mr D Bemister, G3OBX
Mr R P Welch, G3OFX
Mr J Rose, G3OGE
Mr R A Hargreaves, G3OHH
Mr J Sleight, G3OJI
Mr M W Plaster, G3OJL
Mr A J Hobbs G3OJX
Mr D A Skye, G3PLR
Mr C Thomas, G3PSM
Mr I G Dufour, G3PWB
Mr R Parkes, G3REP
Rev J L Marshall, G3RKH
Mr M S Box, G3RZG
Mr M Shardlow, G3SZJ
Mr L P Best, G3THM
Mr J R Shewan, G3UZB
Mr R I Buckby, G3VGW
Mr M D Watson, G3WMQ
Mr R J Lister, G8IXP
Mr D Young, G8TVW
Mr T Sorbie, GM3MXN
Prof J D Last, GW3MZY
Mr L France, GW3PEX
Mr W J M Hume, RS26142
Mr A C Doty Jr, W7ACD
Mr J Blackman, ZS1PM

58 Years
Mr H Perkins, EA5SX
Mr E Chicken MBE, G3BIK
Mr M J Stevens, G3CPN
Mr R L Chidzey, G3IOM
Mr A Shannon, G3KKJ
Mr P Whitford, G3MME
Dr G H Grayer, G3NAQ
Mr W K Ginder, G3NAS
Mr L R Beckwith, G3NFP
Mr G L Quarterman, G3NHX
Mr G Munden, G3NIL
Mr H White, G3NKW
Mr E S Collin, G3NQV
Mr J W Heaviside, G3NYX
Mr R J Powell, G3OGP
Mr I Jackson, G3OHX
Dr R A Simpson, G3OMS
Mr J Denman, G3OND
Mr R Burns, G3OOU
Mr D Evans, G3OUF
Mr J G Wilcox, G3OYF
Mr G J Petrie, G3PDG
Mr B D Simpson, G3PEK
Mr A L Gray, G3RBG
Mr R G Dobdinson, G3RGD
Mr J A Strutt, G3SAS
Mr A Hewitt MBE, G3SVD
Lt Col J G Barber, G3TTJ
Mr H M Davison, G3TVW
Mr M D Leighton, G3UKM
Mr L S Margolis, G3UML
Mr M A Hall, G3USC
Mr M Foster, G3VOF
Mr P Beecroft, G3WVY
Mr P L A Burton, G3ZPB
Mr H R Perrin, G4AFY
Dr B Chambers, G8AGN
Mr M J Bonner, G8ALB
Mr M Hearsey, G8ATK
Mr M Wallace, G8AXA
Mr R H Chambers, G8BCA
Mr T Harrison, GM3NHQ
Mr A E Gwynne, GW3LNR
Dr B G Taylor, HB9ANY
Mr E J Kelly, KG6XF
Mr G G Gemmill, RS22502
Mr H J Randall, RS25603
Mr D M Willoughby, RS27261

57 Years
Mr A Prichard, G0CPA
Mr J Crerar, G3BYV
Mr G D Lively, G3KII
Mr S J W Freeman, G3LQR
Dr A E Wilson, G3MAE
Mr B C Gibbs, G3MBN
Mr R Wheeler, G3MGW
Mr E K Tunstall, G3MSO
Mr C R Bell, G3NIE
Mr K A Morgan, G3NWX
Mr A J Taylor, G3NYE
Mr A Melia, G3NYK
Mr T Haydu Jones, G3OAD
Mr W A Jeffs, G3OAF
Mr C Bowden, G3OCB
Mr D A G Martin, G3ODC
Mr M S Beer, G3OGZ
Mr G Badger, G3OHC
Mr J C G Parker, G3OLX
Mr P E Judkins, G3OMJ
Mr D S Moffatt, G3RAU
Mr D C Sylvester, G3RED
Mr D R Mullins, G3RGM
Dr A J Shepherd, G3RKK
Mr M J T Smith, G3RMN
Mr A Notschild, G3RSF
Mr A T James, G3RUV
Mr R W L Limebear, G3RWL
Mr P J Cort-Wright, G3SEM
Mr P Hart, G3SJX
Mr L P J Lethbridge, G3SXE
Mr R Mason, G3TDM
P W Myers, G3UWT
Mr J Greaves, G3UXM
Mr W McClintock, G3VPK
Mr P Barville, G3XJS
Mr J Kasser, G3ZCZ
Mr M Duce, G4BQF
Mr D H Squires, G4DAC
Mr N J L Lockett, G4EMB
Mr G P Gaunt, G4IJO
Mr L Arnold, G8AHE
Mr R A Fuller, G8CEZ
Mr J Pink, G8MM
Mr F C Thorogood, G8ORV
Mr G Hodgkinson, GI7TPO
Mr L D Woolf, GJ3RAX
Dr A J Masson, GM3PSP
Mr J F Kelly, GM3TCW
Mr G R Kelly, GM8MST
Mr A E Pritchard, GW3ODB
Mr K Robbins, GW3PFV
Mr R Howe, GW3PLB
Mr A Richards, GW3SFC
Mr D W Bowers, GW4AVC
Mr A J Richards, GW4RYK
Mr G Lander, HB9AJU
Mr D Gray, M0DLL
Mr M A Hoare, RS22800
Mr M J J Dawe, RS23071
Mr M T Bland, RS24640
Dr D Harvey, RS25435

56 Years
H Hensler, DL6DZ
Mr P O'Kane, EI5DI
Mr A Martin, F5VAI
Mr D G Dawkes, G0ICJ
Mr E L Masters, G0KRT
Mr D Beattie, G3BJ
Mr J W Swift, G3CTP
Mr J France, G3KAF
Mr A M Pomfret, G3LZZ
Mr C D Stephens, G3MGS
Mr B S Collins, G3MXA
Mr J R Vickers, G3ORI
Mr A G Rumbold, G3ORX
Mr R G Titterington, G3ORY
Mr D Westbury, G3OXL
Mr D Swainson, G3OXN
Mr B Davies, G3OYU
Mr J Holstead, G3OZC
Mr R E A German, G3OZT
Mr J J Davies, G3PAG
Mr J Rabson, G3PAI
Mr A J Baker, G3PFM
Mr H A Buckenham, G3PGN
Mr J J Morris, G3PHA
Mr P Day, G3PHO
Mr P Chandler, G3PID
Mr J E Hoare, G3PJI
Dr B Whelan, G3PJT
Mr R Cox, G3PLP
Dr R G Fenby, G3PLS
Mr J P Martinez, G3PLX
Mr A J Feist, G3PMV
Mr A Floyd, G3PNQ
Rev I S Partridge, G3PRR
Mr J L Green, G3PYF
Mr R J Parsons, G3RBP
Mr D C Griffiths, G3RDQ
Mr R V Southern, G3RST
Dr J S J Craig, G3SGR
Mr R G Pett, G3SHK
Dr J R Whittington, G3SHZ
Mr R L Turner, G3SMD
Mr W M Furness, G3SMM
Mr K F Jessop, G3TAA
Mr W B Bickham, G3TJH
Mr M J Nicholas, G3TOI
Mr G Grimshaw, G3TQX
Mr R T Collins, G3TRC
Mr A C L Coates, G3TVV
Prof M Harrison, G3USF
Mr J L Delves, G3VHH
Mr A Davis, G3VTR
Mr G Oakes, G3WRK
Mr C J Langley, G3XGK
Mr R G Davy, G3XVF
Mr R Cutbush, G4ADK
Mr R J Taylor, G4BEL
Mr R Wells, G8BNR
Mr H Skelhorn, G8BPU
Mr G F Wilks, G8DVJ
Mr M T Bowen, G8DWA
Mr D L Edmonds, G8EWN
Mr N E Brown, G8NCK
Mr A Foster, GM3OXA
Mr J Carson, GM3OXK
Mr C S Penna, GM3POI
Mr J G Walford, GM3POT
Mr G A Hunter, GM3ULP
Mr N J Dudman, GW8GGW
Mr P W Whipps, M0PWW
Mr D S Kendall, N6HEQ
Mr M E Kensdale, RS23278
Mr T G B Hobbis, RS24754
Mr T P Flinn, RS30993
Mr J A Fuge, VP9FI

55 Years
Mr D K McDermott, EI4DW
Mr B W N Harris, G3GTF
Mr B J Newman, G3MMN
Mr R Harris, G3OTK
Mr C J W Thomson G3PEM
Mr L G Sear, G3PPT
Mr L D Rooks, G3PUO
Mr J B W Braithwaite, G3PWK
Rev A Speight, G3PYW
Mr E D Hodgson, G3RAR
Mr A F Stagles, G3RBY
Mr H Neale, G3REH
Mr K Randall, G3RFH
Mr D Thomson, G3RGS
Mr D Carden, G3RIK
Mr N Ackerley, G3RIR
Mr C M Garland, G3RJT
Mr M Vann, G3RLV
Mr R Collins, G3ROC
Mr J Pennington, G3RTP
Mr M A Sanders, G3RWV
Mr A A Lawrance, G3RZV
Mr G D Aram, G3SET
Mr P J Casemore, G3SGF
Mr B Naylor, G3SHF
Mr I B Hamill, G3SMF
Mr P Torry, G3SMT
Mr R H Jennings, G3SOE
Mr R Smith, G3SVW
Mr P Whitchurch, G3SWH
M A Trundle, G3TCG
Mr O S Tillett, G3TPJ
Mr R Farrance, G3TRH
Mr N Cawthorne, G3TXF
Mr R Constantine, G3UGF
Mr M I Vincent, G3UKV
Mr P B Johnson, G3UMV
Mr M Farmer, G3VAO
Mr C W Westwood, G3VFD
Mr R Bailey,G3WCQ
Mr R Lapthorn, G3XBM
Mr F Bourne, G3YJQ
Mr M J Quee, G3ZWW
Mr D J Jarvis, G4CEU
Mr B J Payne, G4CJY
Rev J A Wardle, G4CVA
Mr D Berry, G4DFB
Mr M J Cooke, G4DYC
Dr J C Axe, G4EHN
Mr R Singleton, G7OXP
Mr R S Boardall, G8AJZ
Mr M R Perry, G8AKX
Mr C Towns, G8BKE
Mr J P Abbott, G8CWJ
Mr W S Steer, G8CYG
Mr H Parker, G8GUN
Mr R J C Davey, G8MRI
Mr C G Bristow, GI3PSQ
Mr D H Guest, GM3TFY
Dr R D Harkess OBE, GM3THI
Mr R H Weaver, GW3KXX
Mr J Jones, GW3TMP
Dr C G Potter, MODDT
Mr H R Tyreman, VK2BHT
Mr J Kaplan, W9QKE

54 Years
Mr L P Purcell, EI6D
Mr B J Giddings, G1JLG
Mr R G Heslop, G3KMQ
Mr R W Nolan, G3KWK
A R Preedy, G3LNP
Mr P W F Darragh, G3MNV
Mr S Kay, G3OMA
Mr D Beakhust, G3OSQ
Mr J Garrett, G3RHP
Mr B Turner, G3RLE
Mr W Hall, G3RMX
Mr T J Venn, G3RPV
Mr P Lewis, G3RQX
Mr P M Madagan, G3RQZ
Mr R H Crowe, G3RVA
Mr J M Walch, G3RVI
Mr C I B Trusson, G3RVM
Mr P N Henwood, G3RWF
Mr P Chadwick, G3RZP
Mr R C Marshall, G3SBA
Rev G A Stanton, G3SCV
Mr R Brown, G3SCZ
Mr J J Bottom, G3SDG
Dr B R H King, G3SGK
Mr R Cottrell, G3SHY
Mr J C Burbanks, G3SJJ
Mr G M Smith, G3SNO
Mr E Taylor, G3SQX
Mr P H McPherson, G3TEL
Mr P J Walters, G3THW
Mr E Ross, G3TJC
Mr G C Wynes, G3TLV
Mr M Smith, G3TRV
Dr R J Butcher, G3UDI
Mr D M Browning, G3UEY
Mr D G Mason, G3USD
Mr R A J Smith, G3VKT
Mr D Aslin, G3WGN
Mr J Hartley, G3WGQ
Mr Z Skrobanski, G3XDZ
Mr R G Harris, G3ZFR
Mr P D Hall, G4AQA
Mr T Giles, G4CDY
Mr J A Cobley, G4RMD
Mr J N Houldridge, G6KYD
Mr D Mann,G8ADM
Mr G Smith, G8AOJ
Mr G Swan, G8ASJ
Mr N D Fisher, G8ATO
Mr J D Bosworth, G8BAV
Mr R B Harbison, GI3PDN
Mr H A Sinclair, GI4GOS
Mr B B Nelson, GJ4KBM
Dr H Brash, GM3RVL
Mr I M G Miller, GM4JAE
Mr A Gordon, GM6RXQ
Mr D M Thomas, GW3RWX
Mr R Alban, GW3SPA
Mr S Hulme, GW3SRM
Mr B Carter, GW8AAG
Mr F R Hopwood, GW8BIA
Mr J H Tait, GW8MGF
Mr J Devoldere, ON4UN
Mr J Willerton, RS19211
Mr S B Harrison, RS20102
Mr C A Cooper, RS25672
Mr P V Lingham, RS38098
Mr D Dunn, VK3DBD

53 Years
Mr P Stepponat, DL7BAT
Mr R A Ball, GOINZ
Mr T H Gonsalves, GOOYJ
Mr S Revell, G3PMJ
Mr D M Gresswell, G3PWY
Mr I Walker, G3RJF
Mr S M Cherry, G3SJK
Mr P D Lee, G3SPL
Mr J J Jarvis, G3SUG
Mr D Coltart, G3SYM
Mr B C Ward, G3SZV
Mr C J Lambert, G3TA
Mr J C Boydell, G3TAX
Mr J D Cree, G3TBK
Mr A S Bye, G3TCI
Mr G F Kimbell, G3TCT
Mr C R Bonner, G3TGF
Mr D R Stimson, G3THC
Mr D R French, G3TIK
Mr P S Duncan, G3TKA
Mr G Parkhurst, G3TOZ
Mr R A W Stevens, G3TVI
Mr I D Brown, G3TVU
Mr D Fill, G3UBB
Mr J P H Burden, G3UBX
Mr D Houghton, G3UPY
Mr P Carey, G3UXH
Mr C Pedder, G3VBL
Mr R G Luckock, G3VDX
Mr D N Davison, G3VFX
B R G Hutchinson, G3VGH
Mr D Aldridge, G3VGR
Mr E J Harland, G3VPF
Mr D T M Clemens, G3VXM
Mr I Peterkin, G3WDU
Mr K Griffiths, G3WIC
Mr J W Hall, G3WLD
Mr P Smith, G3WPB
Mr S W Powell, G3WRA
Mr P G Brooker, G3WXC
Mr A Strong, G3WXI
Mr J K Gibson, G3WYN
Mr G J Bedwell, G3XYX
Mr F Wilson, G3YQA
Mr H Tabberer, G3YVK
Mr P J Marcham, G3YXZ
Mr J Yu, G3ZQT
Mr J P Billingham, G4AGQ
Mr D J Butler, G4ASR
Mr G E Austin, G4DPA
Mr T Jewell, G4ELM
Mr J M Butcher, G4GWJ
Mr B Coleman, G4NNS
Mr P Herman-Cranmer, G4TFP
Mr J O Haile, G8ADC
Mr P Helm, G8AEN
Mr C G Partridge, G8AUU
Mr K Rothwell, G8EAP
Mr G D Drinkwater, G8GCU
Mr E S Campbell, G8PHS
Mr AK Sinclair, GD3TNS
Mr M J W Hamilton, GM3TAL
Mr V T Budas, GM3VTB
Dr B W Flynn, GM8BJF
Mr R Volck, GW3RKV
Mr K Winnard, GW3TKH
Mr C S Carver, GW4EYO
Mr G Ferguson, RS26003
Mr W Inglis, RS26642
Mr E D Moustakas, SV1AN
Mr G M Potgieter, ZS5NK

52 Years
Mr A Cobb, G0WJK
Mr G F Brown, G2BJK
Mr R E McHenry, G3NSM
Mr T Boucher, G3OLB
Mr A Ash, G3PZB
Mr F L Curtis, G3SVK
Mr R W Thompson, G3TKF
A Robinson, G3TQA
Mr R D Allan, G3TQZ
Mr K M Orchard, G3TTC
J E Harknett, G3TVH
Mr M H Roach, G3TWJ
Mr B Tiffany, G3TXX
Mr T Morgan, G3UAS
Mr R Stansfield, G3UAX
Mr E A Sweetman, G3UAZ
Mr D I Gould, G3UEG
S V Knowles, G3UFY
Mr B T Davis, G3UJB
Mr R M M Heath, G3UJV
Mr P A Hopwood, G3UKH
Mr M Newton, G3UKW
Mr M Hibbitt, G3ULN
Mr J F Wilson, G3UUT
Mr M R G Simpson, G3UVM
Mr J S Curry, G3UVU
Mr P Kemble, G3UYK
Mr R Hemmings, G3VCT
Mr T Chipperfield, G3VFC
Mr M E Deutsch, G3VJG
Mr J E Longhurst, G3VLH
Mr M G Pritchard, G3VNQ
Mr J S Wright, G3VPW
Mr P R Lamb, G3VRW
Mr B E Ellis, G3VXF
Mr J Doswell, G3VYE
Mr R G Chamberlain, G3VYU
Mr J Crabbe, G3WFM
Mr D C Holland, G3WFT
Mr S Williamson, G3WGU
Dr G Bulger, G3WIP
Mr G Macnaught, G3WOV
Mr D Minet, G3WPP
Mr K A M Fisher, G3WSN
Mr M K Taylor, G3WTA
Mr J P Smith, G3WTS
Mr J M Teed, G3WWT
Mr D Dade, G3XCT
Mr G Everest, G3XUP
Mr PW Crust, G3XYC
Mr D Woodhall, G3ZGZ
Mr P Rodmell, G3ZRS
Mr R Dunham, G3ZSQ
Mr I Sneap, G3ZYC
Mr G Dover, G4AFJ
Mr D P Warner, G4AFQ
Mr K R Punshon, G4APJ
Mr P Bradshaw, G4CTE
Mr R A Harris, G4FFA
Mr C R Caine, G4IWS
Mr P Senior, G4JNL
Mr K Hancock, G4KIY
Mr D Ross, G4LOO
Mr S L Berry, G4LRT
Mr P Collett, G4LYC
Mr C Trayner, G4OKW
Mr T E J Toth, G4ORF
Mr D Fillingham, G4OVR
Mr B T Collins, G4ULA
Mr S Birkill, G8AKQ
Mr H Bate, G8AMD
Mr C D Plummer, G8APB
Mr I R G Gurton, G8ASP
Mr A J Whittaker, G8BFM
Mr A Marshall, G8BUR
Mr C D Jameson, G8CDJ
Mr M E Baxter, G8DHU
Dr J G Davies, G8EBJ
Mr G Diacon, G8EWT
Mr T G Lambert, G8EZL
Mr I Gracey, GI3WEM
Mr E K Dons, GM0AXY
Mr J McCall, GM3HGA
Mr C B Rattray, GM3HYX
Mr W G Cecil, GM3KHH
Mr I Drysdale, GM3TYS
Mr W P Wright, GM3UCH
Mr C Weston, GM3VAP
Mr D Cossar, GM3WIL
Mr M D Collar, GM8AGM
Mr J M Briscoe, GM8AOB
Mr D J Ozanne, GU3UMX
Mr P P le Boutillier MBE, GU3UOQ
Mr A E Peake, GW3SRG
Mr I Jones, GW3TLP
Mr K E Godfrey, GW3VEW
Mr M A Shelley, GW3XJQ
Mr R J Gregory, GW8FNO
Mr G Moda, I7SWX
Dr D A Nicole, M0CYJ
Mr D Earnshaw, NR3Y
Mr D D Kaye, RS26890
Mr H Pitchford, RS27350
Mr C R Baker, VK3GMR
Mr B Pope, VK4BAP
Mr C J Dodd, VK6DV
Mr M J Rogers, ZS1RZ

51 Years
Mr J Purfield, EI2CI
Mr Alex Wickham, G3IAZ
Mr R H Medcraft, G3JVM
Mr R Balister, G3KMA
Mr G F Firth, G3MFJ
Mr R Sykes G3NFV
Mr R Jones, G3NKL
Mr G Suggate, G3NPI
Mr C Draper, G3TSK
Mr R B Heaton, G3UGX
Mr D Hampton, G3UHU
Mr MJ Peake, G3UIJ
Mr F Bilke, G3UZD
Mr C P Haddock, G3UZM
S T E Boyce, G3VBV
Mr R L Pickles, G3VCA
Mr P A Kalas, G3VCN
Mr D Prout, G3VCV
Flt Lt R Evans, G3VHE
Mr H Buttress, G3VHL
Mr G Wood, G3VIP
Mr F Turner-Smith, G3VKI
Mr G H S Jones, G3VKV
Mr T W Beamond, G3VLF
Mr C Linnell, G3VLT
Mr C Davis, G3VMU
Mr E Searle, G3VMY
Mr D A Lane, G3VOM
Mr R B Cottrell, G3VOS
Mr M J Fereday, G3VOW
Mr H S Pinchin, G3VPE
Mr P J Lennard, G3VPS
Mr P Burgess, G3VPT
Mr JE Pitt, G3VRY
Mr G O Jones, G3VSB
Mr J A Arscott, G3VSL
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Introducing the virtual earth for a 160m antenna

I am not blessed with large real estate. I live in a bungalow with a total ground space of about 30 x 12m (100 x 40ft).

Top Band antennas have always been a problem to erect. I have a 36.5m (120ft) wire, the down lead runs up to about 12m (40ft) and the far end comes down to 7.5m (25ft). The radiation resistance of such a wire will be around 30Ω. This is borne out by modelling the antenna using antenna analysis software EZNEC 6.

The antenna current that I get for a 10W input peaks at around 0.3A using multiple earths. The RF ammeter should be reading nearer 0.6A. Earth resistance is responsible for the difference in readings. The earth resistance needs to be as close to zero as possible.

Scanning the internet for ways that I could reduce earth losses threw up an article called the K2AV Folded Counter Poise (FCP) by Guy Olinger. **Figure 1** shows the general arrangement. The FCP is fed by an isolation transformer – NOT a balun. The main structure is still quite large, being 20m (66ft) wide and 2.44m (8ft) high.

The FCP structure presents a low impedance to the antenna. This arrangement looked very promising but not all that practical for a small back yard.

The G3RED development

I wondered what alternative arrangements could be used that would be more practical. So I went back to basics. Let us have a look at the voltage and current distribution of a dipole, seen in **Figure 2**. Two things to notice: (1) The E (or voltage) falls to zero at the exact centre of the dipole and (2) the current I is at maximum at the dipole centre. This means that at the exact centre of a half wave wire, the impedance must be zero ohms since the voltage is at zero the value of the current is irrelevant since Z=V/I.

If this was to act as an earth then it must not radiate any E or H fields. As can be seen from Figure 2, a connection to the exact centre results in I and E being equal and opposite, so both resulting E

PHOTO 1: Basic arrangement of wire running down perimeter of property.

PHOTO 2: Wire attached to saddle clamp. Note how I used a cable tie to attach the wire to the top of the clamp, rather than mounting the clamp vertically and letting the wire run freely through the saddle, as this arrangement makes it easier to stop the wire sagging.

PHOTO 3: End of wire supported by a custom-made wooden support. The wire passes through a hole in the upright and is retained under tension using a spring clamp.

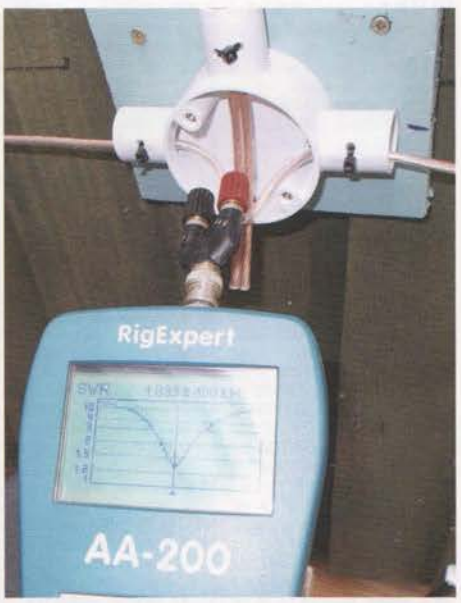

PHOTO 4: Checking the centre point with an antenna analyser. In use, the two arms are joined together and fed to the transformer via the wires through the top of the junction box.

and H fields will cancel and therefore no radiation. I concluded that this could form a virtual earth.

Modelling the idea in EZNEC 6 seemed to confirm this idea. Modelling a half wave wire at different heights above the ground showed that the wire length rapidly shortened the nearer it got to actual earth. I found that when the wire was about 600mm (2ft) off the ground, it still gave a shortening effect but much less than lower heights.

Enough of theory. I erected an antenna as shown in the EZNEC model of **Figure 3**. As you can see maximum antenna current should occur at the feed point. The first job was to construct the virtual earth bit. A half wave wire for Top Band is about 73m (240ft).

I cut two wires of exactly 36.57m (120ft) and mounted them at 600mm (2ft) above ground (see **Photo 1**). I used plastic electrical saddles to hold the wires (**Photo 2**) and a simple home-made wooden support for the end of the wire, with a spring clamp to provide tension (**Photo 3**). At the feed point I used a plastic electrical through conduit box to terminate the wires, which provided a convenient point to connect an antenna analyser (**Photo 4**).

By cutting exact lengths from each end and moving the bracket to tension the wires a resonance at 1.9MHz was achieved. The resonant frequency value was chosen as a best guess; it turned out to be correct.

After resonating, the analyser connecting wires were joined together with a third short wire creating a half wave wire with connecting point.

I decided to use the same feeding arrangement as used by the K2VA FCP. I used an AMIDON T300-2, is a big core measuring 76mm (2") diameter and 25mm (1") deep. To start with, I wrapped the core with PTFE tape. Next, I prepared two 2.4m (7.5ft) lengths of 16 gauge wire and slipped them inside 3mm Teflon tubing. Small bits of (yellow) heatshrink tubing were used every so often to keep the two parallel.

The wires were then wound, bifilar (side by side) onto the core, making 20 turns (this is not a critical number, plus or minus a couple is fine). **Photo 5** shows the completed transformer.

The finished transformer was mounted inside a waterproof black plastic box using a PTFE spacer and 8mm plastic bolt. Brass 6mm studding and nuts formed the connections to the outside. An N socket at the bottom (not visible in the photo) provides the coaxial cable connection to the transformer primary. I added an old spark plug to serve as an internal high voltage insulated terminal and protective spark gap to 'real' earth (left of **Photo 6**) and an old 820k 2W resistor (right) to leak away any static pickup on the radiating element. The value isn't critical.

Photo 7 shows the box in situ. Above it is another box for the RF ammeter. Both are mounted together on a backing board. The coax feed enters at the bottom of the black transformer box and its earthy-side output connects to the earth radial via the white conduit box just visible to its bottom left. On the bottom right is a connection via a reddish wire to a single earth stake. This is NOT an RF earth. The output of the secondary winding on the core is taken up to the RF ammeter above, which in turn connects to the 36.5m (120ft) long wire aerial.

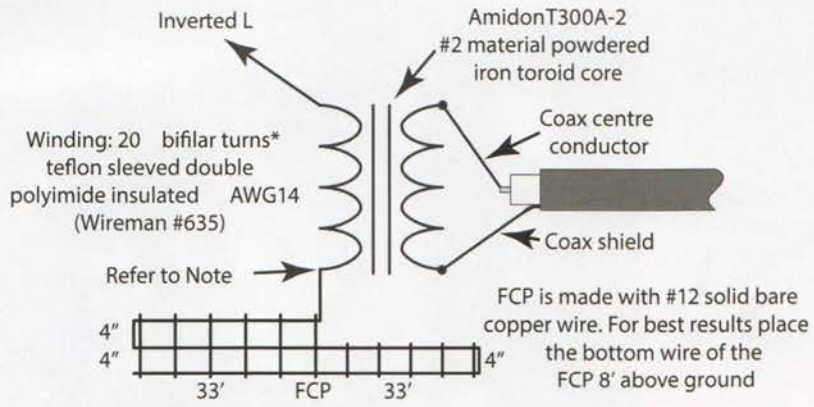

FIGURE 1: Complete arrangement for the FCP idea.

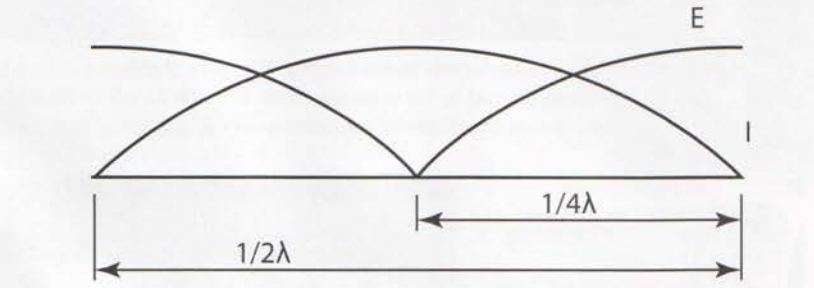

FIGURE 2: Current and voltage distribution on a dipole antenna.

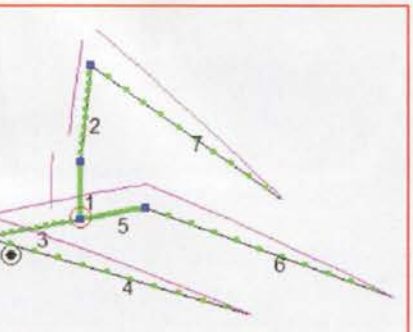

FIGURE 3: EZNEC model of antenna (see text).

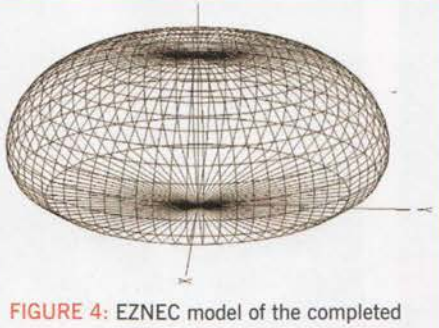

FIGURE 4: EZNEC model of the completed system radiation pattern.

The RF ammeter

This was a project on its own. In my junk box where I used to keep all my RF ammeters, I had just one left, which had an 0 – 300mA range. Using a suitable clip-on core I constructed a 2:1 current transformer

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and an on/off switch on the secondary to the ammeter, as seen in **Photo 8**. This gave me a new range of 0 – 1.2A.

The inset to Photo 8 shows the system operating with an RF input of 32W. The indicated aerial current is well over 1A. I checked the calibration using a known 50Ω load and the power meter built into my Palstar auto ATU. The calibration of the Palstar was further checked with a Bird Thruline meter. All measurements were well inside 10% of each other, suggesting that they agreed closely enough for normal amateur use.

Results

The virtual earth certainly improved the RF current to the long wire aerial. From the EZNEC model, the far field seems to show an omnidirectional radiation pattern, as shown in **Figure 4**, with no distortion being caused to the patern by the virtual earth wire.

The stations I have worked since installing the antenna suggest that the radiated signal is indeed omnidirectional.

I get good reports on Top Band phone, although I have mainly been using JT65, which has enabled me to work 32 countries (mainly European). Looking at the results from PSK Reporter, it also seems my signals are being heard in the States. I have also worked quite a few Asiatic Russian stations.

The 'U' shape of the virtual earth seems to be good, although I'm sure other shapes would work. I think verticals and other top band antennas would also probably benefit from being tuned against the virtual earth wire. Experiment, and see what works for you!

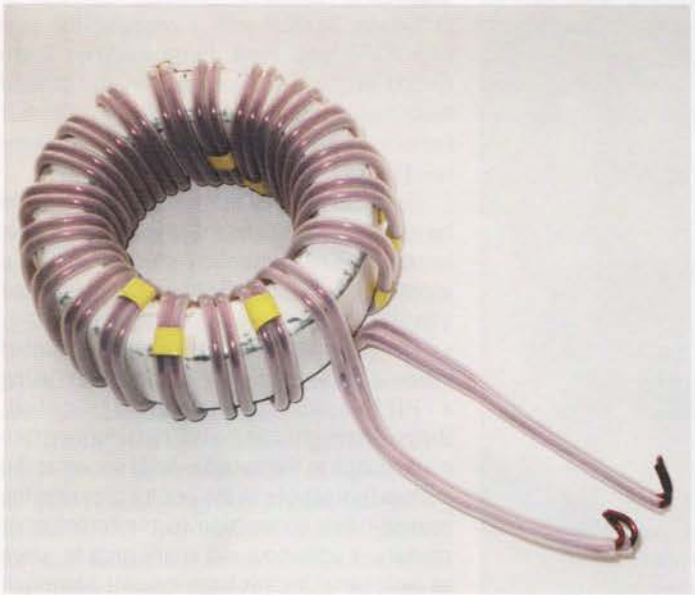

PHOTO 5: Completed 1:1 transformer.

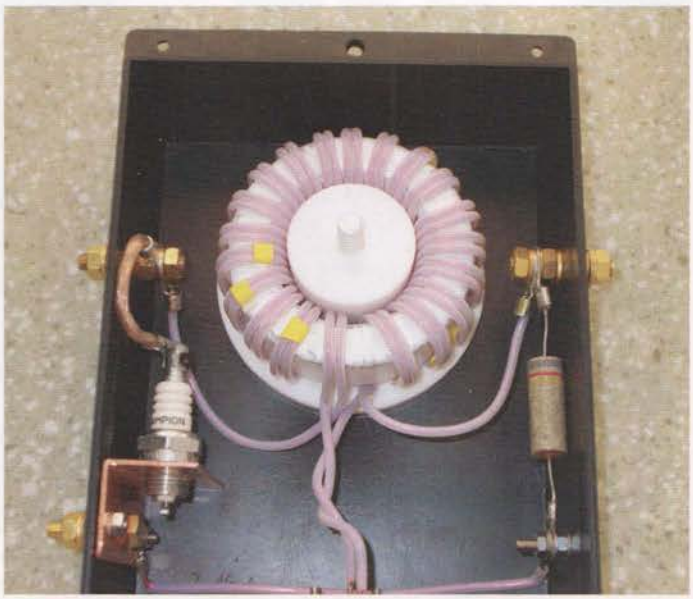

PHOTO 6: Transformer mounted in box. The spark plug forms a spark gap to 'real' earth (formed by the earth spike seen in Photo 7), whilst the 820k 2W resistor gives a bleed path for any static build-up, also to the 'real' earth.

PHOTO 7: The transformer in situ, with the RF ammeter above. The earth spike is at the bottom right of the photo.

PHOTO 8: The RF ammeter and (inset) front panel. Inside the box the black item connected to the blue wires is the on/off switch; the white item behind it is the 2:1 current transformer core.

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The Airspy HF+ SDR receiver

The Airspy HF+ is a completely new product from the Airspy team that has been designed to deliver the best possible performance using the latest in SDR techniques.

The receiver development has been part of a joint initiative between Airspy, Itead Studios and ST Microelectronics and the result is a high-performance receiver at a very attractive price.

The Airspy HF+ covers 9kHz to 31MHz and 60MHz to 260MHz via two antenna ports and boasts a minimum detectable signal (MDS) of -140dBm or better in 500Hz with +15dBm IP3 on HF and a 110dB blocking dynamic range. The receiver provides 660kHz of alias- and image-free reception bandwidth and can handle up to 10mW of RF at the antenna port.

Getting started

The Airspy HF+ is supplied in a very smart and high-quality cast metal box that has a real quality feel about it, see **Photo 1**. There are only three connectors and they comprise a pair of 50Ω SMA sockets for the HF and VHF antennas and a micro USB socket for connection to the host computer. The Airspy HF+ also takes its power from the USB connection, so it really *is* just the three connections. If you're using a Windows based PC you won't need any drivers because the Airspy HF+ uses standard Windows drivers that are pre-installed. Users of other operating systems will find drivers available for Linux and Mac. All SDR receivers need software to control them and the Airspy HF+ can be used with several popular applications. A good starting point is Airspy's own SDR Sharp as this is a very intuitive SDR application that has full support for the HF+. The SDR Sharp software also features customisation using a range of 3rd party plug-ins that are available to download directly from the Airspy site. A popular alternative application is Simon Brown's SDR-Console v3. Simon has worked very closely with the Airspy team and SDR-Console has been extended to support the HF+. In addition to their desire to create a state-of-the-art receiver, the Airspy team wanted to make the receiver simple to operate. As a result, you won't find RF and IF gain controls as the software optimises the performance for you.

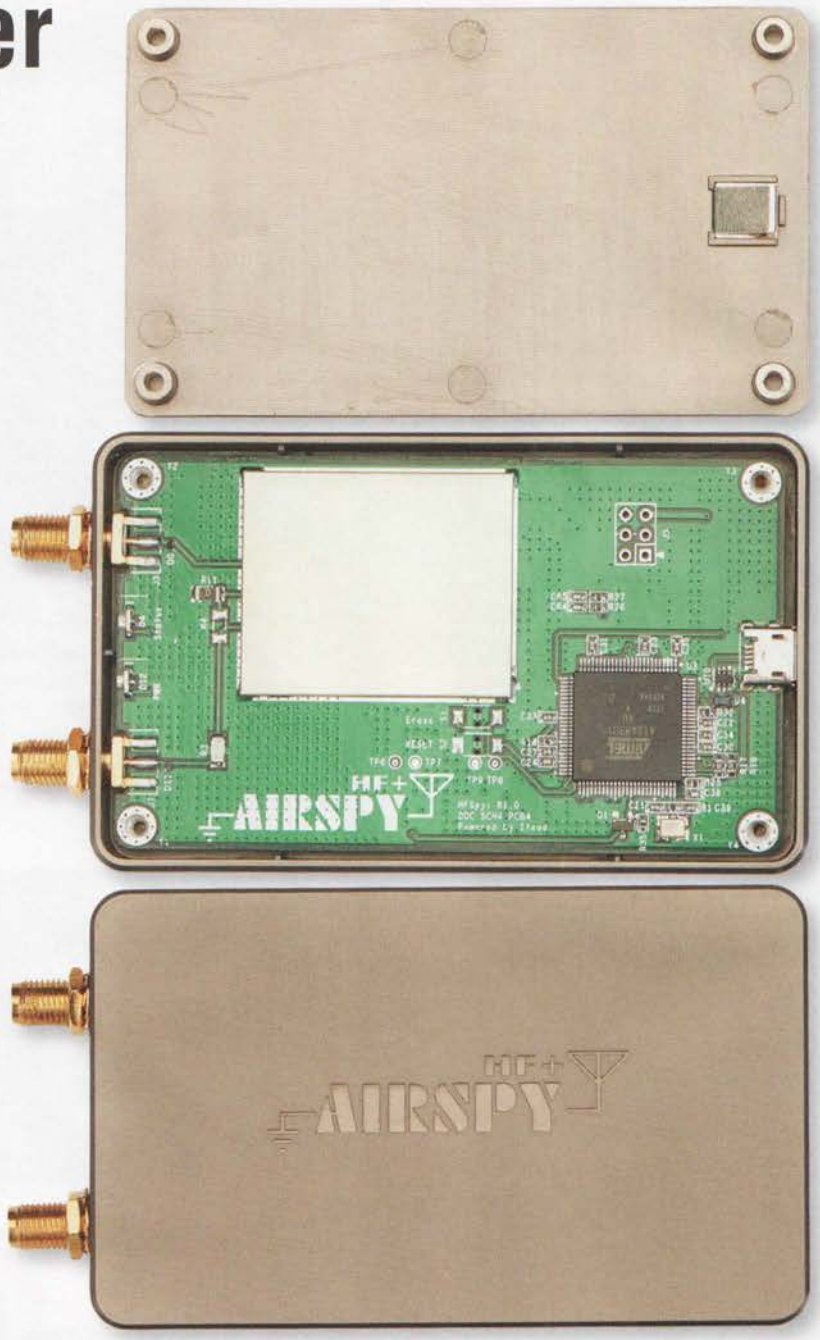

PHOTO 1: External and Internal views of the Airspy HF+.

SDR receivers today

As this receiver breaks new ground, I think it's appropriate to look a little more closely at what happens inside the Airspy HF+. But first, a bit of background. The development of SDR receivers has settled into two main camps, namely direct conversion or tuner based. The first of these is the direct digital conversion (DDC) architecture, where the incoming RF is digitised as close to the antenna as possible. In practical designs, that usually puts a roofing filter and a low noise amplifier (LNA) before the analogue to digital converter (ADC), see **Figure. 1**. The main difficulty with this approach is cost, due to the high-speed data processing that's required. In a typical HF to 6m receiver, you would digitise the 0-55MHz band with an ADC running a sample rate of 122MSPS (megasamples per second). If we assume

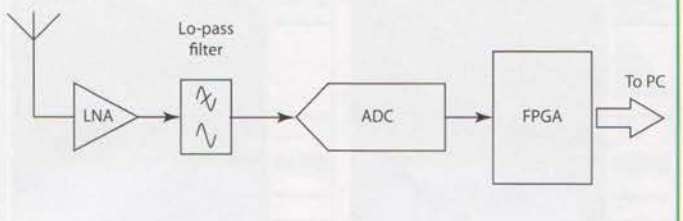

FIGURE 1: DDC receiver architecture.

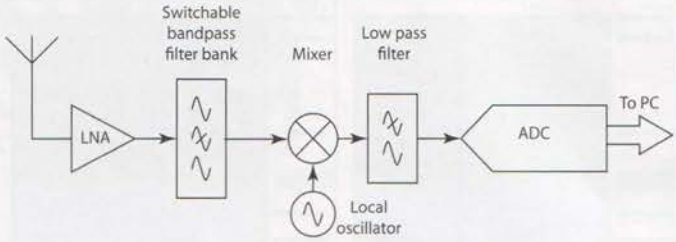

FIGURE 2: Tuner based receiver architecture.

16-bit samples, then the data output stream from the ADC would be just under 2Gb/s (122MSPS x 16). That data then needs to be processed and the only practical way to do that is to use the parallel processing capabilities of a field programmable gate array (FPGA). There are many examples of this approach on the market but receivers in this class generally cost £500+ because the fast ADC and FPGA devices are expensive. The development also needs specialist and expensive FPGA programming skills. If you want to extend the DDC approach into VHF or above, costs will rapidly escalate.

The other SDR architecture employs an analogue RF tuner to frequency shift the desired RF band down to baseband (0Hz IF) or a low IF, **Figure 2**. This approach has many benefits including a significant cost reduction. With a less demanding digitisation stage, we no longer need a high-speed ADC or FPGAs and the associated design skills, so the production and development cost reduces significantly. The other major benefit of this approach is the ability to cover any frequency band.

All the lower cost (below £250) SDRs on the market employ analogue RF tuners. This is also the approach used in many commercial multi-band radio applications such as mobile phones, TV receivers, etc.

The major problem with all tuner based SDRs has been controlling spurious signals. When you present a traditional mixer with a wide band of frequencies, non-linearities in the mixer (or any stages prior to the mixer) will produce noise and other spurious signals that will compromise the performance of the receiver. The most common way of dealing with this is to use complex, switched, analogue LC or surface acoustic wave (SAW) filters. However, these filters can introduce their own non-linearities. As you can imagine, the mixer output can easily turn into a complex soup of spurious signals. You can easily see this for yourself if you deliberately overload as RTL based SDR dongle.

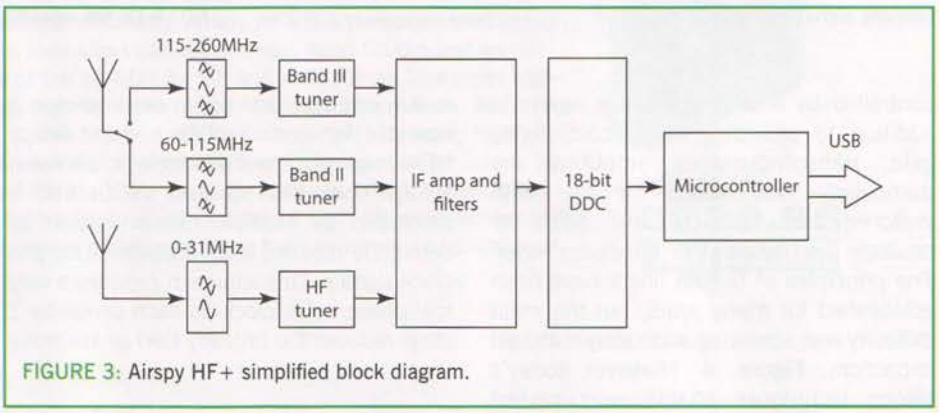

FIGURE 3: Airspy HF+ simplified block diagram.

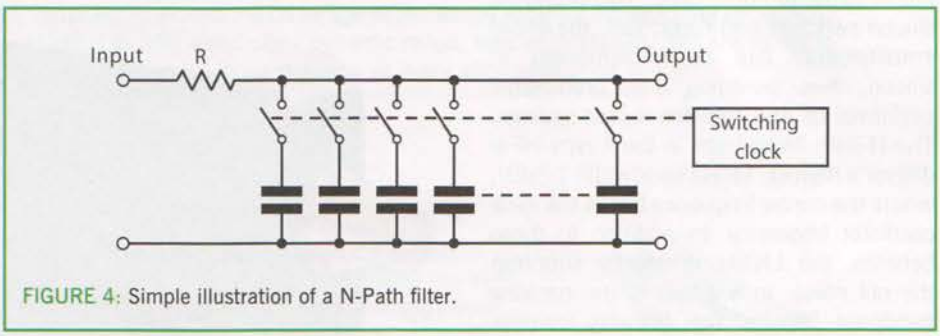

FIGURE 4: Simple illustration of a N-Path filter.

Airspy HF+ – a fresh approach

At the heart of the Airspy HF+ is a new tuner IC (STA709) that has been developed by ST Microelectronics, **Figure. 3**. In fact, it is so new, that the Airspy HF+ is the first commercial product to use the device. The ST709 has been designed specifically as an SDR tuner using state-of-the-art technology. One of the most important features of the STA709 is the inclusion of polyphase harmonic rejection mixers. This mixer design is based on a research paper developed at the University of Twente in The Netherlands and provides a step change in mixer performance. The full theory is too complex to cover here but the variants used in the ST709 employ a 16-phase local oscillator with 22.5° increments. These mixers are followed by multiple stages that combine the outputs in a specific way to achieve the harmonic rejection. The design provides rejection of all harmonics up to the 21st! Also, being a passive device, it is low loss and very robust when exposed to strong signals. This single component completely changes the design approach from previous tuner-based SDRs because the filtering constraints are much more relaxed, so the complex and lossy LC/SAW band filters that were used to tame conventional mixers are simplified and reduced to the minimum. The Airspy HF+ has just three analogue filters in the front end and these are used to tailor the frequency band presented to each tuner and perform some impedance matching. The ranges are 0-31MHz, 60-118MHz and 118-260MHz.

Due to the passive, low-loss mixer, the RF gain requirement is modest and is met using low noise transconductance amplifiers (LNTA). LNTAs operate by converting a voltage input into a current output whilst the gain can also be

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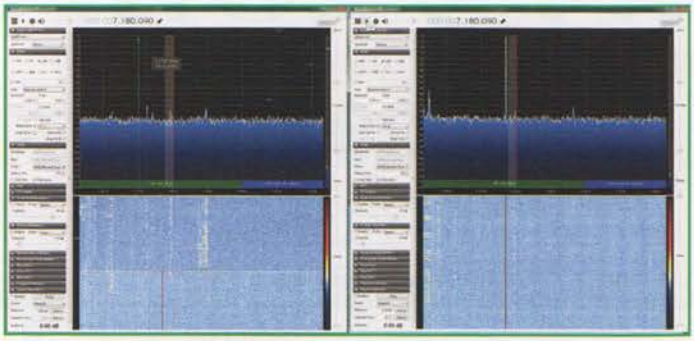

FIGURE 5: Screen shots showing the minimal effect of applying a FSD blocking signal spaced at 3kHz.

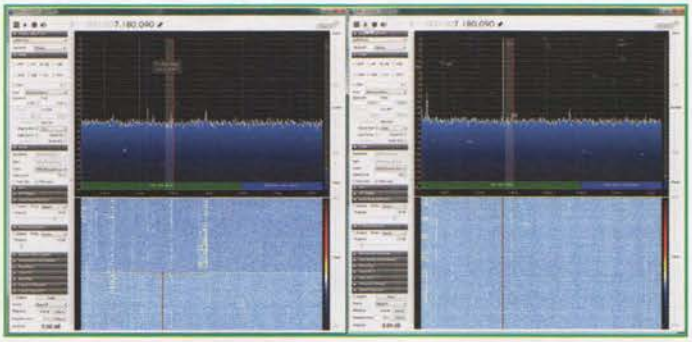

FIGURE 6: Screenshot showing the minimal effect of a pager signal on a NOAA-18 WX satellite signal.

controlled by a second current input. In addition to providing easily controllable gain, transconductance amplifiers are particularly well suited for use with switched capacitor (N-Path) filters to produce an active RF bandpass filter. The principles of N-Path filters have been established for many years, but the main difficulty was achieving accurately matched capacitors, **Figure. 4**. However, today's silicon techniques enable near perfect capacitor matching so N-Path filters are much easier to implement. By employing silicon switches and capacitors, the entire amplifier/filter can be implemented in silicon, thus providing both predictable performance and significant cost savings. The N-Path filters used in the Airspy HF+ deliver a high-Q, 1MHz bandwidth (-3dB), where the centre frequency tracks the local oscillator frequency. In addition to these benefits, the LNTAs inherently suppress the rail noise. In addition to the tracking bandpass filter, a high linearity lowpass filter reduces the harmonic responses higher than the 21st harmonic.

Let's finish this section by looking at the ADC technology. Traditional ADCs work by repeatedly measuring the input voltage and passing the reading as a binary number. The Nyquist rule comes to play here so you must sample the signal twice as fast as the highest frequency you want to digitise. The sigma-delta ADCs used in the Airspy HF+ are rapidly gaining favour as they are cheaper than the traditional ADCs and provide reduced aliasing and quantisation noise whilst delivering a high resolution. In a typical sigma-delta ADC, the sample rate will be many times the Nyquist requirement, but the sample resolution can be as low as 1 bit. The output bit-stream is applied to an internal, digital decimation filter that both reduces the sample rate and increases the resolution. In the Airspy HF+ the ADCs produce a 16-bit output to support the receiver's very high dynamic range. This is further decimated with an 18-bit digital down converter.

An accurate, low noise, clock source is essential for modern SDRs and the Airspy HF+ employs a low phase noise, microwave, voltage controlled oscillator (VCO) that is processed by multiple division stages to derive the required local oscillator (LO) and clock signals. This approach provides a very low phase noise clock as each divide-by-2 stage reduces the (already low) phase noise by a further 3dB. The reference oscillator is a high precision temperature compensated 0.5ppm unit with a very low phase noise.

HF+ in use

The first thing I noticed when I started the Airspy HF+ was the silence! With dummy loads connected to the antenna sockets,

There are a pair of 50Ω SMA sockets for the HF and VHF antennas.

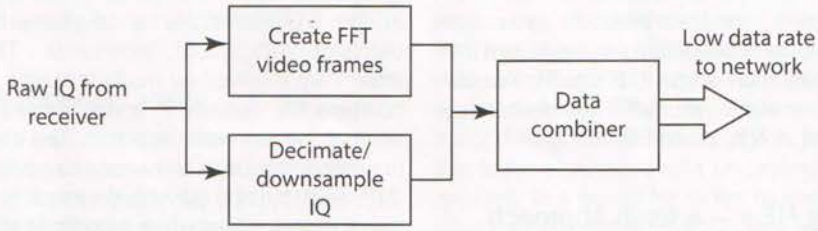

FIGURE 7: Architecture of the Spy Server application for Internet sharing.

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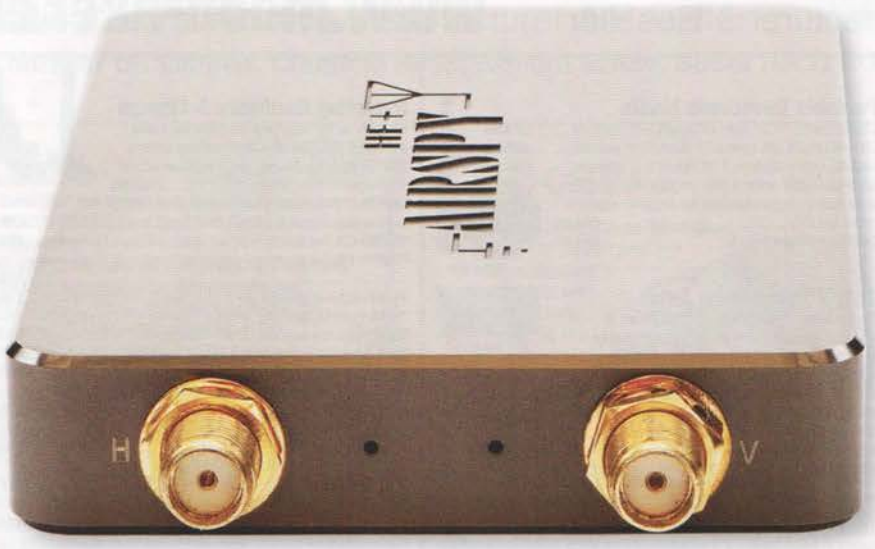

The Airspy HF+ is supplied in a smart and high-quality cast metal box.

there were very few spurious signals; those that were present were generally less then -90dBFS (dB full scale). Below 1MHz there were a few more spurii but these were also at a very low level. For my on-air testing, I used Airspy HF+ with the latest SDR Sharp and SDR-Console software as these two programs currently offer the best support for the HF+. Antennas used were a Wellbrook ALA1530 Imperium Low Noise and my Butternut HF9V vertical.

I started by tuning around the popular bands to get a general feel for the operation of the receiver. True to their word, it is a very easy to use because the software looks after performance optimisation for you. I was never comfortable with the manual gain selection of some SDRs as it was so easy to compromise the performance rather than enhance it. The Airspy HF+'s ease of use is helped by the bullet-proof mixer, LNTAs and superb AGC. A good example of this can be seen on the 40m band in the evening where broadcast stations were driving the ADC close to full scale, but I was still able to copy the weak SSB and CW signals and there were no obvious signs of lost sensitivity due to the presence of the strong broadcast signals. The AGC in the Airspy HF+ worked particularly well with no pumping or other signs of distress. The Airspy HF+'s ability to tolerate strong blocking signals was particularly impressive. As a practical test, I located a weak SSB signal on 40m that was just breaking the noise floor. I then injected a carrier mrelely 3kHz away from the wanted signal and increased the carrier level to 0dBFS. Despite the close proximity of the blocking carrier, I could detect no reduction in receiver sensitivity and the weak signal remained readable. I've shown screen shots of the test results in **Figure 5**. This is a pretty severe test and when I've applied this to other tuner based SDRs it's common to see at least a 10dB reduction in sensitivity when the blocking signal is applied. These results confirm the robustness of the Airspy HF+ front end and AGC, so it should excel under contest conditions. On VHF, a good test at my location is the polar orbiting satellites on the 137MHz band. I have some very strong paging transmitters that operate around 138MHz and can cause havoc when trying to receive NOAA 18 on 137.9125MHz. When I tried this with the HF+, the paging transmitters had no effect at all on the satellite signal, as shown in **Figure. 6.**

Like many of us, my home QTH is compromised with a very high HF noise floor, so I took the Airspy HF+ and Wellbrook antenna out into an RF quiet spot in the New Forest to see how it performed. The results were very impressive. I was seeing a near -90dBFS noise floor on 7MHz in the evening whilst the adjacent broadcast stations were close to 0dBFS. I repeated the test with the paging transmitters and NOAA-18 on the hilltop. In this location, the paging transmitters were a 2-mile direct line-of-sight path to my location so put in a very strong signal. Despite this, the NOAA-18 satellite signal was virtually unaffected. In attempt to let you experience the results for yourself, I have posted 2-minute I/Q recordings of 7MHz, 3.6MHz and 137MHz. These files can be played back using the free SDR Sharp software. I have also posted a few YouTube videos showing the spectrum displays for these recordings and you will find the links at the end of the review.

Internet sharing

Running parallel with the development of the Airspy HF+ has been the new Spy Server software that enables the sharing of Airspy and RTL-SDR receivers via the internet. The software is a free download from the Airspy site and can run on most popular platforms including the Raspberry Pi. Unlike other receiver sharing systems that just distribute the demodulated audio, Spy Server shares the I/Q data. As a result, you can use all the features of your SDR software to process the signal. It is not practical to send the full raw I/Q data over the Internet because the required bandwidth is just not available. The Airspy team have overcome the bandwidth problem by doing some of the processing in the server computer. I've shown a simplified diagram in **Figure. 7**. Here you can see that the server takes the raw I/Q data and creates video frames of the spectrum display. The server also down-samples the raw I/Q data and sends only the required bandwidth over the Internet link. When used with SDR Sharp or SDR-Console the user has the choice of bit-depth for the incoming I/Q data and this can be used to adjust the performance to match the available Internet bandwidth. I've been experimenting with Spy Server during its development and it really does give you the freedom to remotely locate the receiver in an RF quiet location and control it from the shack. You can experience this for yourself via the Airspy website where you will find a number of Airspy receivers, including the Airspy HF+, available to try via the server page of the Airspy site at https://airspy.com/spy-servers/

Summary

The new Airspy HF+ breaks new ground in SDR receiver technology and offers excellent performance at a very attractive price. I have been very impressed with its overall performance and it will certainly gain a place in my shack. The Airspy HF+'s robust front end and simple operation make this a receiver for all users and occasions so I'm sure it will prove very popular. The Airspy HF+ is available from UK distributors Moonraker (www.moonraker.eu) priced £229.96. My thanks to Airspy for their technical support and for supplying the review model.

Websearch

I/Q Files for download: See the *RadCom* section of the RSGB website (under *RadCom* downloads)

Airspy HF+ 7MHz in the evening using a Wellbrook loop at a quiet RF location (702MB)

Airspy HF+ receiving NOAA-18 satellite signals with nearby paging transmitters (702MB)

YouTube videos:

Airspy HF+ 3.6MHz evening: https://www.youtube.com/watch?v=OMepBstzpOI

Airspy HF+ 7MHz evening: https://www.youtube.com/watch?v=3Ja8HI1Dc-4

Airspy HF+ 137MHz WX sat reception: https://www.youtube.com/watch?v=6YKAVYOeWUk

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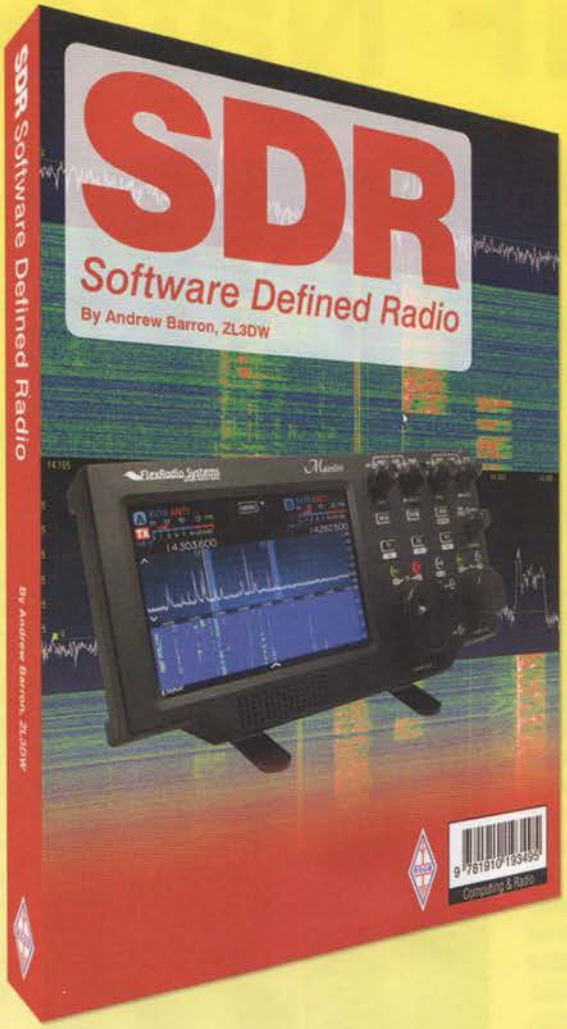

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VHF National Field Day

G3ZME/P VHF NFD QSL card.

The weather varied greatly over the UK during this contest on 1 and 2 July 2017. In the south, sun cream and sun hats were needed. Further north, entrants were not so lucky with rain and unsettled weather.

The entrants' comments on the conditions on 50MHz ranged from 'poor with heavy QSB' through 'some Sporadic-E but no QSOs resulted' to 'good inter-G propagation'. Conditions on 70MHz were reported variously as 'poor' and 'good' depending on where you were located. In contrast, conditions on 144MHz were reported by stations in the south as 'average'. Stations in the north did not fare so well with conditions reported as 'very poor'. Conditions on 432MHz were no better than on 144MHz and several entrants commented that making any QSOs was a hard slog. On 1.2GHz, several stations reported that making contacts by calling CQ was difficult and regarded having access to internet chat sites such as ON4KST essential.

There was repeated criticism from some entrants in the Sweeper section of a failure of some portable stations, mainly those in the MS and Low Power sections, to call CQ regularly. Sweeper section entrants are not permitted to 'call CQ' either on the air or via internet chat sites such as ON4KST so if portable stations don't call CQ, it makes it impossible for Sweeper stations to work them! Portable entrants please note!

The full results (available at www.rsgbcc.org/cgi-bin/vhfresults.pl?Contest=VHF%20NFD&year=2017) enable the eligible entrants to download their certificates and to see their station UBN report. The results also give the details of equipment and antennas used by each station.

Itchen Valley Radio Club operated G0IVR/P.

Rules

The rules were changed for 2017 to permit groups entering the Mix & Match and Restricted sections to operate on all five bands with the best four scores counting toward the group's total score. The Multi-band, Single Station (MS) section for portable entrants is now five years old and saw a welcome increase in entrants this year.

Inspections/complaints

Several site inspections were made and nothing untoward was found. Several complaints of interference/broad signals between portable entrants (on 144MHz and 432MHz) were received by the adjudication team. Some stations recorded the complaints and acted to resolve the issues. Other stations didn't record the complaints or take any action to investigate the complaint. If you receive a complaint/comment that your signal is less than perfect, you are required by the contest rules (VHF General Rule 2.e) to record the complaint/comment in your log. You also need to investigate if your signal is causing the reported issue; the complaining station is expected to assist in this investigation!

In contrast to last year, the band plan appeared to have been respected this year with no complaints about contest stations calling on the calling/centre of activity frequencies. Once again, no stations were observed to be operating within the segment of 50MHz reserved for Intercontinental working – thank you!

Portable numbers

Registrations: 62 Groups, comprising 212 stations registered. This was up 7 from the 205 doing so in 2016 {202 in 2015} (221 in 2014), [247 in 2013]. One group withdrew their registration before the start of the contest; thank you for letting us know.

Entries

Overall, Group entries totalled 62 (but not the same 62 that registered!), with station entries numbering 203 {184 in 2016}, (180 in 2015), [181 in 2014].

Numbers of Stations entering by Band is shown in **Table 1**. The overall number of entrants active was approximately 10% more than last year with 432MHz showing the greatest increase (27%) followed by 50MHz (17%), 70MHz (11%) and 144MHz (2%). The number of entrants active on 1.2 GHz was 10% less than last year.

Numbers of Groups entering by section is shown in **Table 2**. This year, the number of groups entering the Mix & Match section increased by 78% with corresponding decreases mainly in the Open and Restricted sections. The Multi-Single section also had a large increase in participants increasing from four in 2016 to ten in 2017.

The number of logs submitted for the Fixed Sweeper Open section (FSO) and the distribution of these logs across the five VHF NFD bands is shown in **Table 3**.

The number of logs submitted for the Fixed Sweeper Restricted section (FSR) and the distribution of these logs across the five VHF NFD bands is shown in **Table 4**.

Logging accuracy

As is unfortunately normal for VHF NFD, the standard of logging was again noticeably worse than for other RSGB VHF contests. Most errors were due to incorrectly logged callsigns (sometimes transposed letters or incorrectly recording the prefix eg MO for GO), serial numbers and locators that were wrong or implausible since they were incompatible with the callsign. Some entrants

even managed to transpose their Received and Sent reports or mixed them indiscriminately. The usual wet squares appeared, as did IO/JO transpositions. These are seen in other RSGB VHF contests but the number of errors relative to the number of entrants in VHF NFD is much greater.

Portable results

Open Section: (12 Entries): Last year's runner-up managed one better this year. This year's Overall Winner is Reigate ATS and Crawley ARC (JO01) with an overall normalised score of 3862 points. They win the Surrey Trophy. In the Runner-Up position with 3839 points is Colchester and A1 CG (JO01). In Open section results table at # position with 4024 points lies Wexford VHFG (IO62). Readers are reminded that only UK & Crown Dependency-based (UK&CD) entrants are eligible for Awards and all band-scores are normalised against the highest scoring UK&CD station. As a consequence, Wexford VHFG's scores on 50MHz and 70MHz are each greater than 1000. In 3rd place is Windmill CG (JO01) with 2820 points. The highest placed Scottish station is Aberdeen VHF Group (IO86), who win the Tartan Trophy as the Leading Resident Scottish group.

Restricted Section: (15 Entries): The Overall Winner is last year's runner-up, South Birmingham RS (IO92) with 3257 points. They win the Martlesham Trophy. In the Runner-Up position is Lothians RS (IO74) with 3043 points who win the Cockenzie Quaich as the highest placed Scottish Group. In 3rd place lies North Bedfordshire Gentlemen's CG (IO92) with 2283 points.

Low Power Section: (9 Entries): This year's Overall Winner is Warrington CG (IO93) with 3000 points (the maximum attainable). They win the Arthur Watts Trophy. Loch Fyne Kippers (IO75) is the Runner-up this year with 2256 points and, as highest placed Scottish station, retain the Scottish Trophy for another year. In 3rd place is Sutton Coldfield RS (IO92) with 746 points.

Mix & Match Section: (16 Entries): The Overall Winner is Trowbridge & DARC (IO81) with 3208 points and they receive the G5BY Trophy. The Runner-Up is Telford & DARS (IO82) with 2380 points. In 3rd place (for the third year) is Drowned Rats RG (IO91) with a score of 2118 points.

Multi-band, Single-station (MS) Section: (10 Entries): In the fifth running of the Multi-Single (MS) section, the Overall Winner is Lagan Valley ARS (IO74) with 2282 points and this group was the band leader on 70MHz and 144MHz. In the Runners-Up position is Tall Trees CG (IO93) with 2822 points and this group was the band leader on 50MHz. In 3rd place lies Workington & DARC (IO84) with 2169 points and this group was the band leader on 1.2GHz.

Fixed Sweepers Results

Certificates are awarded for top and runner-up best overall normalised score and, for each section, Band Leader and, if appropriate, Gold, Silver and Bronze awards for contacting 90%, 75% and 50%, respectively, of registered and active VHF NFD (Portable) stations. To facilitate this, a list of stations which had registered by the closing date was published on the RSGB CC website in advance of the Contest. The adjudicators have taken account of those registered stations that were not 'active' during VHF NFD.

G5LK/P in JO01 near Dover: G0VVE operating the 6m station.

Overall (52 Entries):

Overall Leader: G3XDY (JO02) with 3000 points from a 3-band entry and was Band Leader on 70MHz (FSO), 432MHz (FSO) and 1.2GHz (FSO).

Overall Runner-up: GW4SHF with 2134 points from a 4-band entry and was Band Leader on 144MHz (FSR).

Overall 3rd place: G3RLE with 1719 points from a 3-band entry and was Band Leader on 50MHz (FSR).

Band Awards

50MHz FSO (6 Entrants): Band Leader & Silver Award: G4ELJ (IO91).

50MHz FSR (23 Entrants): Band Leader & Silver Award: G3RLE (IO83). FSR Bronze Award: GW4SHF (IO82), G8FMC (IO91), G3MXH (JO02), M0CGL (JO03), G8LZE (IO91), G8PX (IO91).

70MHz FSO (4 Entrants): Band Leader & Silver Award: G3XDY (JO02). FSO Silver Award: G3MXH (JO02), G3NPI (IO92). FSO Bronze Award: G4KCT (IO93).

70MHz FSR (12 Entrants): Band Leader and Silver Award: G4YHF (IO92). FSR Silver Award: GW8ASD (IO83), G8FMC (IO91). FSR Bronze Award: G4HGI (IO83), G8LZE (IO91).

144MHz FSO (7 Entrants). Band Leader & Silver Award: M0CGL (JO03). FSO Silver Award: G1PPA (IO93). FSO Bronze Award: F1CBC (JN09), G4TSQ (IO90), GM3WOJ (IO77).

144MHz FSR (31 Entrants): Band Leader & Silver Award: GW4SHF (IO82). FSR Bronze Award: M0HOM (IO93), G4PDS (IO80), G4CTU (IO82), G8PX (IO91), G3RLE (IO83), G4XPE (IO92), GW8ASD (IO83), 2W0JYN (IO83), G4LPD (IO92), G0TAR (JO01), G8LZE (IO91), GW3ATZ (IO83), M0XAC (IO81), M0WGF (JO01), G8EOP (IO93), G4CIB (IO81), G1MZD (IO92), G4VPD (IO92), M0KEP (IO91).

432MHz FSO (4 Entrants): Band Leader & Silver Award: G3XDY (JO02).

432MHz FSR (21 Entrants): Band Leader & Bronze Award: G1PPA (IO93). FSR Bronze Award: G3YKI (IO92), G3UBX (IO82), G8LZE (IO91), G8PX (IO91).

1.2GHz FSO (3 Entrants): Band Leader & Silver Award: G3XDY (JO02). FSO Bronze Award: G4KCT (IO93).

1.2GHz FSR (4 Entrants): Band Leader: G8EOP (IO93).

Check logs

These were gratefully received from (50MHz) G8TA/P, G4BEE, G8CMU, G8MIA, 2E0WDX/P and G0UUU/P. (70MHz) GX0000/P, G8TA/P and G8CMU. (144MHz) M0IPU, M6LXF, GX0000/P, M0IMS, G8CMU, G8MIA, 2E0WDX, G0UUU/P, G3MEH, G3TCR/P, M6OPU, 2E0JZC, G8TA/P and G4BEE. (432MHz) G0UUU/P, G4BEE, G8HGN, G8TA/P, GX0000/P, M0HOM, M0IPU, M0XAC, M6LXF, M6OPU and 2E0WDX. (1.2GHz) G3MEH, G3TQF, M0BTZ and M0CGL.

Band results

50MHz Activity: 465 individual callsigns were worked {432 in 2016} (435 in 2015) [421 in 2014]. These comprised stations in the following

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VHF NFD station of G3PYE/P. Drone photo courtesy of M0TAZ.

G5LK/P in JO01 near Dover. The two towers on the right did not form part of the station.

countries: 9A, 9H, CT, EA, EI, F, G, GI, GM, GU, GW, I, LY, ON, PA and UA.

50MHz Band Leaders and Scores: Open: Numerical Leader, Position #: EI9E/P Wexford VHFG (IO62), Score 55,454. Open: 1st UK & CD: G5LK/P Reigate ATS and Crawley ARC (JO01), Score 44,949. Restricted: GM3HAM/P Lothians CG (IO74), Score 30,420. Low Power: GM3TAL/P Loch Fyne Kippers (IO75), Score 3810. MS: M1DDD/P Tall Trees CG (IO93), Score 15,604. FSO: G4ELJ (IO91) 39 QSO, Score 8800, Multipliers 36, Total 316,800. FSR: G3RLE (IO83) 28 QSO, Score 6214, Multipliers 31, Total 186,420.

70MHz Activity: 239 individual callsigns were worked {210 in 2016} (171 in 2015) [147 in 2014]. These comprised stations in the following countries: DL, EI, G, GD, GI, GM, GU, GW, ON, PA and SP.

70MHz Band Leaders and Scores: Open: Numerical Leader, Position #: EI9E/P Wexford VHFG (IO62), Score 31,944. Open: 1st UK & CD: G0VHF/P Colchester and A1 CG (JO01), Score 27,264. Restricted: GM3HAM/P Lothians RS (IO74), Score 25,988. Low Power: GM3TAL/P Loch Fyne Kippers (IO75), Score 7744. MS: GI4GTY/P Lagan Valley ARS (IO74), Score 14,240. FSO: G3XDY (JO02) 33 QSO, Score 8420, Multipliers 31, Total 261,020. FSR: G4YHF (IO92) 32 QSO, Score 6419, Multipliers 32, Total 205,408.

144MHz Activity: 1581 individual callsigns were worked {1500 in 2016} (1471in 2015) [1219 in 2014]. These comprised stations in the following countries: 5P, DL, EA, EI, F, G, GD, GI, GJ, GM, GU, GW, HB, LA, LX, OE, OK, ON, OZ, PA and SM.

144MHz Band Leaders and Scores: Open: G5LK/P Reigate ATS and Crawley ARC (JO01) Score 227,295. Restricted: G8OHM/P South Birmingham RS (IO92) Score 86,763. Low Power: G3CKR/P Warrington CG (IO93) Score 71,564. MS: GI4GTY/P Lagan Valley ARS (IO74), Score 21,423. FSO: M0CGL (JO03) 49 QSO, Score 15866, Multipliers 32, Total 507,712. FSR: GW4SHF (IO82) 49 QSO, Score 12511, Multipliers 31, Total 387,841.

432MHz Activity: 441 individual callsigns were worked {383 in 2016} (379 in 2015) [327 in 2014]. These comprised stations in the following countries: DL, EI, F, G, GD, GI, GM, GU, GW, HB, OK, ON, OZ and PA.

432MHz Band Leaders and Scores: Open: G0VHF/P Colchester and A1 CG (JO01), Score 49,883. Restricted: G8BNE/P North Bedfordshire Gentlemen's CG (IO92), Score 19,829. Low Power: G3CKR/P Warrington CG (IO93), Score 19,580. MS: G3RCV/P Cray Valley RS (JO01), Score 11,192. FSO: G3XDY (JO02) 44 QSO, Score 14091, Multipliers 26, Total 366,366. FSR: G1PPA (IO93) 18 QSO, Score 4270, Multipliers 15, Total 64,050.

1.2GHz Activity & Conditions: 152 individual callsigns were worked {147 in 2016} (111 in 2015) [94 in 2014]. These comprised stations in the following countries: DL, EI, F, G, GI, GU, GM, GW, HB, OK, ON, OZ and PA.

Band Leaders and Scores: Open: G0VHF/P Colchester & A1 CG (JO01) Score 34,650. Restricted: G2BQY/P Trowbridge & DARC (IO81) Score 16,253. Low Power: G3CKR/P Warrington CG (IO93) Score 13,653. MS: G4VFL/P Workington & DARC (IO84) Score 1624. FSO: G3XDY (JO02) 36 QSO, Score 13,368, Multipliers 14, Total 187,152. FSR: G8EOP (IO93) 6 QSO, Score 1177, Multipliers 6, Total 7062.

Congratulations to all recipients of Trophies and Certificates and thank you to all participants.

73 from the 2017 VHF NFD Adjudication Team: Ian, G0FCT, Mike, G0KAD, Stephen, GW4SHF and Jacqui, G6XSY.

TABLE 1: Number of Groups and Stations competing in VHF NFD by Band.

Year	2017	2016	2015	2014
Number of Registered Groups	62			
Number of Groups Entries	62	60	58	62
Number of Stations Registered	212	205	202	221
Number of Stations Active	203	184	180	181
Stations on 50MHz	49	42	41	46
Stations on 70MHz	39	35	38	35
Stations on 144MHz	53	52	50	46
Stations on 432MHz	42	33	40	40
Stations on 1.2GHz	20	22	11	21

TABLE 2: Number of Groups that entered VHF NFD by Section.

Year	2017	2016	2015	2014
Number of Groups Entries	62	60	58	62
Open	12	19	14	17
Restricted	15	18	18	18
Low Power	9	10	12	10
Mix & Match	16	9	10	10
Multi-Single (MS)	10	4	4	7

TABLE 3: Fixed Sweeper Open (FSO) Log Distribution.

Year	2017	2016	2015	2014
Total number of logs	23	32	23	24
50MHz	6	7	3	4
70MHz	4	7	6	6
144MHz	7	6	8	6
432MHz	3	7	4	4
1.2GHz	3	5	2	4

TABLE 4: Fixed Sweeper Restricted (FSR) Log Distribution.

Year	2017	2016	2015	2014
Total number of logs	91	108	56	60
50MHz	23	27	14	9
70MHz	12	9	3	8
144MHz	31	36	25	18
432MHz	21	26	19	16
1.2GHz	4	10	5	

EMC

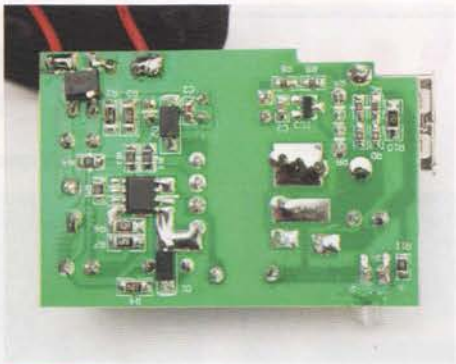

PHOTO 1: Charger 1 PCB solder side.

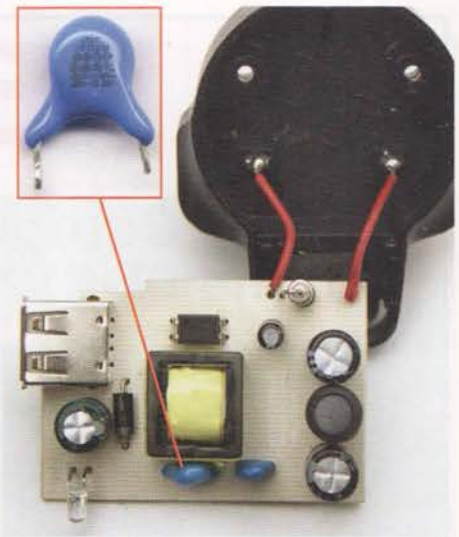

PHOTO 2: Charger 1 PCB component side and plug body, with (inset) the 1000pF Cy capacitor.

This month we look again at the EMC aspects of plug-in chargers.

Plug-in chargers

Direct plug-in chargers, sometimes known as 'wall warts', are widely used to charge mobile phones or other rechargeable devices and also for a many other purposes. These typically have a 5V output via one or more USB sockets or an attached flying lead. These almost universally use switching power supplies and some types can generate excessive levels of radio interference.

When looking at EMC issues, more serious electrical safety issues are sometimes found and selected issues are mentioned below. Please be aware that this article should not be regarded as a detailed guide to electrical safety. Further information can be found in [1] and [2]; the latter contains a useful link to download a BSI test report from 2009 but things do not seem to have improved since then.

The basic principle is that by operating at a frequency of around 50kHz instead of 50Hz, the transformer can be very much smaller and lighter. **Figure 1** shows a simplified circuit diagram of a typical plug-in charger. The incoming mains is rectified by a bridge rectifier and is smoothed by one or two capacitors, producing up to 325V DC.

A controller chip drives a pulse waveform into the gate a high voltage (800V) power FET, which is often in the same chip. The power FET drives the primary winding of a transformer. The output from the secondary winding is rectified and smoothed to provide the 5V DC output. Another secondary winding (not shown) is used to provide an auxiliary DC supply for the controller chip. The controller uses pulse width modulation (PWM) to regulates the main DC output voltage. The controller may receive feedback from the DC output via an optoisolator as shown or, in some cases, another winding on the transformer is used instead.

From an EMC viewpoint, the main problem is the switching waveform that drives the transformer primary. This has a large amplitude of about 300V peak to peak (p-p) (or more) and fast edges with literally thousands of harmonics that may extend up into the VHF band. L1 (if fitted) reduces the amount of HF interference that is conducted back into the mains but to be effective a second inductor L2 would be required in the negative line between the capacitors. A typical switching frequency is 45kHz and one type of controller chip applies frequency modulation at 167Hz with ±5kHz deviation. This spreads the interference around so that the 9th harmonic and above merge together. For example, the 42nd harmonic at 1.89MHz has ±210kHz deviation so it covers the whole 1.81-2MHz amateur band and more. This makes it easier for a manufacturer to meet applicable EMC standards but it also increases the probability of interference to radio reception.

The switching frequency and its harmonics are also coupled onto the DC output via Cstray, the inter-winding capacitance between the primary and secondary windings of the transformer. This happens on all switching power supplies and LED light drivers. If the power supply is Class 2 (non-earthed) with a two-wire mains cable, like most plug-in chargers, then a capacitor Cy is normally fitted to 'ground' the DC output to the primary side DC input supply at RF, as shown in Figure 1.

As Cy is connected across the primary to secondary isolation barrier, failure would cause a serious safety hazard to the user, which is equivalent to failure of 'double' or 'reinforced' insulation. It ***must*** be a safety-certified capacitor with the proper logo markings/symbols on the casing. In general Class Y1 capacitors are used in class 2 (not earthed) equipment.

If this capacitor is not fitted, then the PSU is likely to fail EMC testing and the DC output cable acts like a monopole antenna driven against mains as the RF 'earth'. This can cause severe interference on HF bands, including of course the amateur bands, and may also cause erratic operation of a capacitive touch screen on connected mobile phones or tablets.

A typical value for Cy is 4700pF (marked 472) but small switching PSUs of only a few watts may use 1000pF (marked 102).

Chargers on test

Three RF noisy chargers sent in by Members have been tested. This month, we are looking at what can be learned from purely visual inspection but future electrical and EMC tests are planned.

Charger 1 is a CE marked black-cased 5V 1A charger with a single USB output, as shown in **Photo 1** and **Photo 2**, with the 1000pF Cy capacitor shown inset at the top left of Photo 2. The logo markings/symbols show that it is a Class Y2 capacitor (it should be Class 1). The wires between the PCB and the Live and Neutral pins of the plug are attached by solder only, with no secondary securement. According to [2] this fails EN 61558-2-17:1997 Clause 21.

Charger 2 is a CE marked white 5V 1.2A charger with 'flying lead' output, as shown in **Photo 4** and **Photo 5**. This has a 1000pF Cy capacitor but this has no marking to indicate that it is a Class Y1 capacitor. It has no mains fuse (the zig-zag PCB track in the top left corner

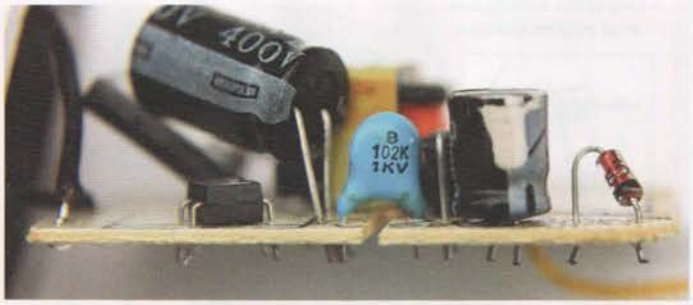

PHOTO 4: Charger 2 PCB component side.

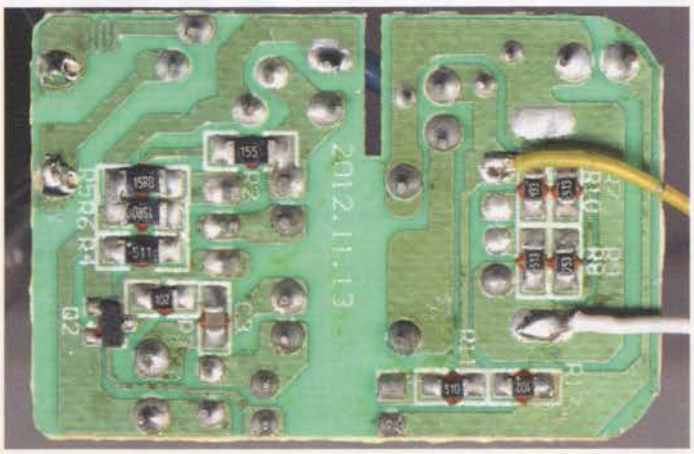

PHOTO 5: Charger 2 PCB solder side. Note the apology for a 'fuse', top left.

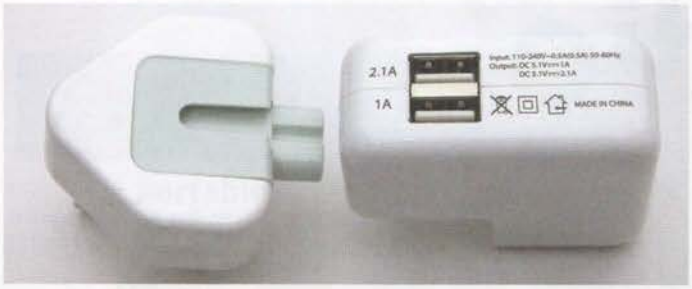

PHOTO 6: Charger 3 before dismantling.

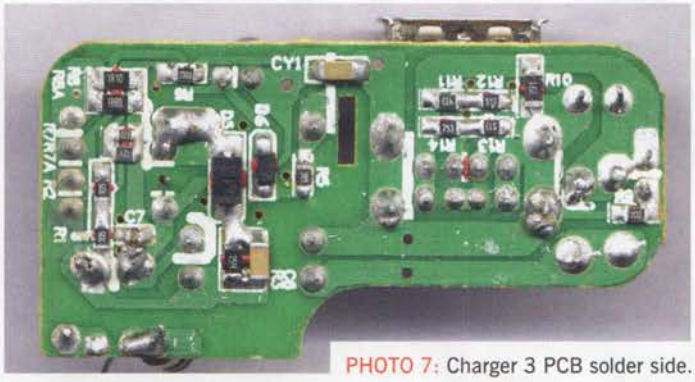

PHOTO 7: Charger 3 PCB solder side.

of Photo 4 is a poor substitute for a fuse). So it would appear to fail EN 61558-2-17:1997 Clause 15.

Charger 3 is a white 5V charger with detachable mains plug and dual 1A/2.1A USB outputs, shown in **Photo 6** and **Photo 7**. It has no manufacturer's name, no model number and no CE mark. Unlike chargers 1 and 2 this one was glued together, so the joints were split apart for examination using a one inch wood chisel.

Charger 3 has provision for fitting a through-board capacitor for Cy1 but a surface-mount capacitor is fitted instead. This has no marking and it cannot be a Class Y1 capacitor. Worse still, a PCB track has been routed under the surface mount CY1 so that the creepage distance across the PCB is further reduced, to approximately 1mm (compared to a minimum of 4.8mm required by EN 61558-2-17:1997 Clause 26). This charger was on sale in 2017 and has been reported to Trading Standards.

Checking your chargers

If you have a plug-in charger that generates RF interference (or even if it doesn't) then it is worth taking a close look at it. It must have a CE mark if sold in the EU – but does it? As shown earlier, not all CE-marked products actually meet the relevant standards. It shouldn't be possible to dismantle it using an ordinary screwdriver but if it is then it would be possible to check whether a Cy capacitor as shown in Figure 1 is fitted or missing. If it *is* fitted, does it have the sort of logo markings/symbols shown in Photo 3 but with Class Y1 rating not Y2? Are there any visible safety issues of the type described in [2]? It should be noted that there are also other potential safety issues such as the insulation of the transformer that cannot be found by visual inspection.

WARNING: if you dismantle any plug-in charger for any reason, it should not be used again. A plug-in charger that has been dismantled or broken open should be disposed of safely, ensuring that it can never again be plugged in to the mains, eg by cutting the pins off the plug and disposing of them appropriately (so they in turn can't be misused).

If you have an RF noisy plug-in charger then it may not be easy to get Trading Standards to take an interest purely for suspected EMC compliance issues but if it appears to have any of the safety issues described in [2] then that is a different matter. Nowadays, Trading Standards can be contacted via Citizens Advice. In the meantime, it would be advisable to stop using any suspect charger.

EMC begins at home

When looking for any source of RF interference, it is important to check your own house first, by switching everything off at the mains **[4]** (ie the big switch on the fusebox) and running a receiver on batteries if possible. Nowadays, there are many switching power supplies in places that you may not expect, including any appliance on standby plus central heating pumps, boilers, some types of fridge/freezer, mains sockets with built-in 5V DC USB outputs and TV aerial amplifiers. One Member found that an uninterruptable power supply (UPS) for his computer has started generating RF interference as its rechargeable battery needed replacing and the charger was trying to charge it all the time.

433MHz door bells

A new item on the Ofcom website **[3]** tells how Ofcom engineers were called to investigate why drivers couldn't get into their cars using their 433.92MHz radio key fobs outside a gym in Derry/Londonderry. One motorist was locked out of her car for more than an hour, while another had resorted to not locking her car any more.

The Ofcom engineers found that a 433.92MHz wireless doorbell had developed a fault and was transmitting all the time. These licence-exempt short-range devices should only transmit intermittently, to minimise the chance of interference.

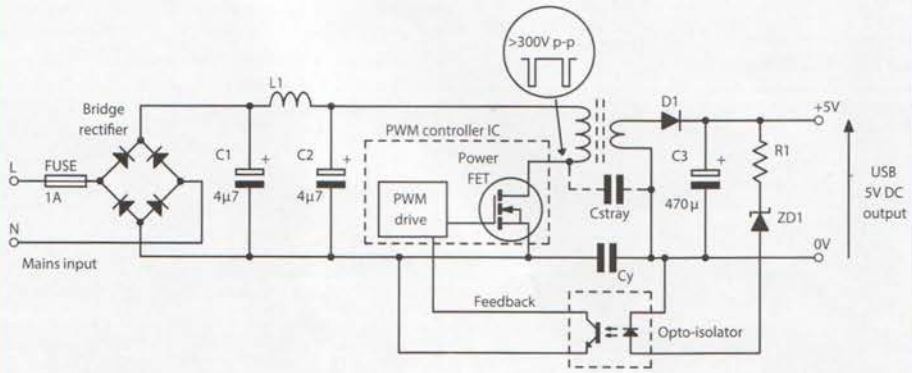

FIGURE 1: Simplified circuit of a USB charger.

Websearch

[1] Electrical Safety First – www.electricalsafetyfirst.org.uk/

[2] Electrical Safety First Plug-in Chargers (with downloadable report) – www.electricalsafetyfirst.org.uk/electrical-professionals/product-safety-unit/plug-in-chargers/

[3] *When ding-dongs go wrong* – www.ofcom.org.uk/about-ofcom/latest/features-and-news/doorbell-investigation

[4] Don't do this if any medical or safety-of-life equipment (or similar) might be affected.

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

Sport Radio

February marks the start of two series of contests on the 80m and 4m bands.

The 2018 80m Club Championship series starts this month. The first session is SSB on the 5th, datamodes on the 14th and CW on the 22nd. These are 10W/100W events and there are rule changes this year. The First 1.8MHz Contest is on the 10th.

70cm AFS takes place on the 4th. It is the seventh and final event of the current Super League series. David, G0GHZ/P was last year's Open section winner. You can see his decidedly soggy location in **Photo 1**. A REF (French) contest overlaps the start of this one, so try to work the French stations early on. Onto the Activity Contests, with the 2m FMAC and UKAC on the 6th, the 6m FMAC and UKAC on the 8th, the 70cm FMAC and UKAC on the 13th, the 4m FMAC and UKAC on the 15th, the 23cm UKAC on the 20th and the SHF on the 27th. Note the earlier start time The first of this year's five 4m Cumulative contests is on the 25th.

The UKEICC 80m series continues with SSB on the 7th. The WPX contests start on the 10-11th, with 48 hours of RTTY. The PACC (Dutch) Contest runs for 24 hours the same weekend on CW and SSB. The SSB leg of the ARRL DX Contest runs for the 48 hours of the 17-18th. There's a 1-hour 80m IRTS Evening Counties contest on the 20th. Only EI and GI QSOs count for points – Irish Counties (32 in all) act as multipliers. Starting at 2200 on the 23rd the CQ Worldwide 160m DX Contest runs for 48 hours. Due to propagation, the vast majority of activity takes place when it is dark. The SSB leg of the REF (French) Contest runs for 36 hours over the same weekend. Finally, there's a CW session of the UKEICC 80m series on the 28th.

PHOTO 1: G0GHZ/P location in the Cotswolds.

News snippets

After months of research by some of the RSGB Contest Committee, they have managed to gather the available data to list the winners of all RSGB contesting trophies – some of which go back to the 1930s. See www.rsgbcc.org/cgi-bin/trophies.pl The contests for which trophies are awarded are not included, because some have been reallocated.

A joint UKEICC / RSGB initiative has been started to encourage youngsters / newcomers / beginners into contesting. A series of one-hour Skype voice conferences, each with a maximum of 10 participants, is being hosted by Roger, G3LDI. It's essential to register your interest in advance by email to roger@g3ldi.co.uk The first session will be on 15 February.

Steve White, G3ZVW
steve.g3zvw@gmail.com

RSGB HF Events

Date	Event	Times (UTC)	Mode(s)	Band(s)	Exchange
Mon 5 Feb	80m Club Championships	2000-2130	SSB	3.5	RS + SN
Sat 10 Feb	1st 1.8MHz *	1900-2300	CW	1.8	RST + SN + District
Wed 14 Feb	80m Club Championships	2000-2130	Data	3.5	RST + SN
Thu 22 Feb	80m Club Championships	2000-2130	CW	3.5	RST + SN

RSGB VHF Events

Date	Event	Times (UTC)	Mode(s)	Band(s)	Exchange
Sun 4 Feb	432MHz AFS §	0900-1300	All	432	RS(T) + SN + Locator
Tue 6 Feb	144MHz FMAC	1900-2000	FM	144	RS + SN + Locator
Tue 6 Feb	144MHz UKAC	2000-2230	All	144	RS(T) + SN + Locator
Thu 8 Feb	50MHz FMAC	1900-2000	FM	50	RS + SN + Locator
Thu 8 Feb	50MHz UKAC	2000-2230	All	50	RS(T) + SN + Locator
Tue 13 Feb	432MHz FMAC	1900-2000	FM	432	RS + SN + Locator
Tue 13 Feb	432MHz UKAC	2000-2230	All	432	RS(T) + SN + Locator
Thu 15 Feb	70MHz FMAC	1900-2000	FM	70	RS + SN + Locator
Thu 15 Feb	70MHz UKAC	2000-2230	All	70	RS(T) + SN + Locator
Tue 20 Feb	1.3GHz UKAC	2000-2230	All	1.3G	RS(T) + SN + Locator
Sun 25 Feb	70MHz Cumulative #1	1000-1200	All	70	RS(T) + SN + Locator
Tue 27 Feb	SHF UKAC	1930-2230	All	2.3-10G	RS(T) + SN + Locator

Best of the Rest Events

Date	Event	Times (UTC)	Mode(s)	Band(s)	Exchange (info)
Wed 7 Feb	UKEICC 80m	2000-2100	SSB	3.5	4-character Locator
Sat/Sun 10/11 Feb	CQ WW WPX RTTY	0000-2359	RTTY	3.5-28	RST + SN
Sat/Sun 10/11 Feb	PACC Contest	1200-1200	CW, SSB	1.8-28	RS(T) + SN (PAs send Province)
Sat/Sun 17/18 Feb	ARRL International DX	0000-2359	CW	1.8-28	RST + Tx power (Ws send State, VEs Province)
Tue 20 Feb	IRTS 80m Evening Counties	2000-2100	CW, SSB	3.5	RS + SN (EIs and GIs also send county)
Fri-Sun 23-25 Feb	CQ WW 160m DX	2200-2200	SSB	1.8	RS + CQ Zone (Ws send State, VEs Province)
Sat/Sun 24/25 Feb	REF Contest	0600-1800	SSB	3.5-28	RS + SN (Fs send Dept No or overseas prefix)
Wed 28 Feb	UKEICC 80m	2000-2100	CW	3.5	4-character Locator

* HF Championship event + VHF Championship event § Super League event. For all the latest RSGB contest information and results, visit www.rsgbcc.org

WATERS & STANTON
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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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Portable Operation at its Best

KX3 160m - 6m

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	**KAT3A**	Automatic ATU £449.95
8 pole Roofing filters	20Hz-13kHz £184.95	**K144XV**	2m Transverter £449.95
MH2	Electret Microphone £79.95	**KBPF3**	Gen.f coverage BP Filter £229.95
KDVR3	Voice Recorder £179.95	**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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+ 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**

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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
- SD Card slot and I/Q output

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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.

- 100W HF Transceiver
- USB, LSB, CW, RTTY, PSK, AM, FM
- 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
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- Dual Receive (Separate bands)
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- SD slot for saving settings

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£599

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AR-DV-10

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- 10 Digital Modes
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- Auto Mode Detect
- Water Resistant
- Micro SD card backup
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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 Pre-order now **£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

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1200S

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

- 160m - 6m
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- Colour Data Display
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- 418 x 372 x 162mm
- Weight: 12kg (26.5lbs)

BEKO Amplifiers

HLV-770
70cms 770W Amplifier 25W Drive
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23cms 900W Amplifier 18W Drive
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YAESU DEALS

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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.

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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.

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FT-450D

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

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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.

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FT-DX5000MP

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2m/70cm Handheld Transceiver
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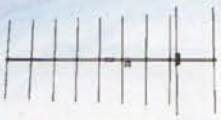

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MFJ-998BRT
1.5kW
1.8 - 30MHz

Upping the power to 600W, it is worth remembering that your end fed wire can be horizontal, vertical or an end fed inverted V. For a small garden (or a long garden) it is very easy to install. Just attach to wall or post and feed with coax. **£848.95**

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Here is a deal that will give you a complete antenna system **FREE** with any of the above three ATUs. We will give you 100ft of toughened Kevlar antenna wire and end insulator. Offer ends February 28th.

MFJ-993B 300W Auto ATU

Here is an auto antenna tuner that does just about all you could wish for. It is the perfect match for all the popular 100W transceivers. It covers 1.8 - 30MHz and will match all the popular types of antenna systems including coax, balanced wire and end fed wire. It also indicates impedanceand reactance. **£297.95**

MFJ-949 300W Auto ATU

Why is this our best selling manual ATU? Because it does just about everything and even includes an internal dummy load. You get 160m - 10m coverage rated at 300W. It will handle coax, wire or balanced feed. The clear cross needle display makes adjustment fast and precise. **£209.95**

MFJ-941E 300W Auto ATU

If you are looking for a low cost base station ATU, then this may well be your choice. It still includes the ability to match coax, end fed wire or balanced feeder. And it is rated at 300W. It's the ideal size to match modern, compact transceivers. **£297.95**

MFJ-991B Auto ATU

Similar to the MFJ-993BRT but without LCD display, antenna switch and balanced feed option. Ideal for coax or end fed wire. **£848.95**

MFJ-1106

A compact 6-way DC distribution box using power pole connectors. **£38.95**

MFJ-557 CW Trainer

This unit comprises CW key, oscillator and speaker unit. Great for CW sending practice. **£47.95**

MFJ-1835H Cobweb antenna

Here is a great new antenna for those with a small garden. You don't need to rotate it and it requires no radials. Just support it from a single mast. Covers 20, 17, 15, 12 and 10m and measuring a bit less than 3m x 3m it will handle up to 1,5kW. **£275.95**

MFJ-1835HK This option kit adds 30m and 40m to the above antenna and is approx 5m x 5m. **£139.95**

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A compact 2 element beam that will give your signal a boost yet takes up a smaller space than a traditional Yagi. The antenna is rated at 1.5kW and covers 20 17 15 12 and 10m. It measures approx 5m x 5m. **£589.95**

MFJ-1799
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Do you have an internal ATU in your radio that struggles or won't match your antenna. Just put this between your antenna and the radio and your problems is solved! **£88.95**

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Antenna Analyser

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Antennas

PHOTO 1: HMS *M33* main mast and antenna.

This month, we revisit the T-antenna design concept and operation. The T-antenna was devised over a century ago during the early development of radio systems and continues to be used by many amateurs, mostly on 160m and below.

Historical perspective

The T-antenna has its roots in the monopole antenna developed by Guglielmo Marconi around 1895. Marconi filed a patent for the new antenna with the United States Patents Office and US Patent 586193 was granted in 1897 [1]. This antenna was a vertical conductor that was worked against a ground plane system, making it an effective transmitter or receptor of electromagnetic radio frequency (RF) signals (compared to other antennas that were available at that time). When the centre of a horizontal wire span was connected to the top of the monopole, this improved the performance of the antenna and this configuration became known as the T-antenna, or Marconi-Tee. Another configuration of the T-antenna has each side of the wire span run downwards at a shallow angle from the monopole and this version is often referred to as an 'umbrella' antenna. This configuration of the antenna often has the wire span formed from several wires run from the top of the monopole. The monopole's top could also be connected to one end of the horizontal wire span and this became known as the inverted L-antenna. The addition of a wire span to the top of the monopole is often referred to as 'top-loading' and this increases the antenna's capacitance to earth, helping to improve its performance.

The T-antenna was often used in the early years of the 20th century in commercial and military maritime applications on frequencies typically around 500kHz to 1MHz. Many of the Edwardian ocean liners used a T-antenna strung between the fore and aft masts along the length of the ship, with the vertical section run downwards to the wireless telegraphy room, as shown in **Figure 1**. An example of a military radio system of this period has been reconstructed on HMS *M33*, in Portsmouth's Historic Dockyard [2], including the wireless telegraphy room, as shown in **Photo 1** and **Photo 2**. The ship's antenna looks to be the umbrella configuration, although some images of HMS *M33* show a T-antenna run from the main mast towards the aft of the ship.

Operation and radiation pattern

The Marconi vertical monopole antenna is a widely used LF/MF transmitting antenna, whose length is a small fraction of the wavelength in use. The antenna is worked against a ground plane, as shown in **Figure 2** and, because it is electrically short compared to the wavelength, the voltage along the vertical monopole is nearly equal at all points along its length. However, the RF current is at a maximum at the feed point and tapers to zero at the antenna's end. This is because the RF current flows to the ground plane through the monopole's distributed capacitance, as shown.

The non-uniform current distribution along the length of the antenna causes an effect where the RF radiated field takes on the form of a theoretically shorter vertical antenna. The length of this theoretical vertical antenna is referred to as the effective height (H_{eff}) of the real vertical antenna. The nearer H_{eff} is to the vertical antenna's actual length, so the better the performance of the antenna.

Adding a horizontal wire span to the top of the antenna has the effect of raising the H_{eff} and increases the RF current flowing in the vertical section. This results in an improvement in the RF signal strength radiated or received by the antenna. The concept of a T-antenna is shown in **Figure 3** and the following explanation outlines the antenna's operation when transmitting, however a similar analogy can be applied when receiving a signal.

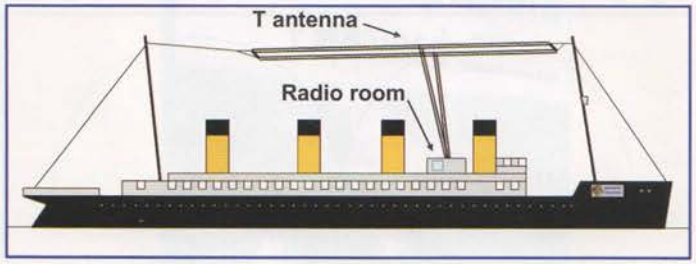


FIGURE 1: Concept of a T-antenna used on Edwardian ocean liners. Note the use of parallel wires forming the horizontal span.

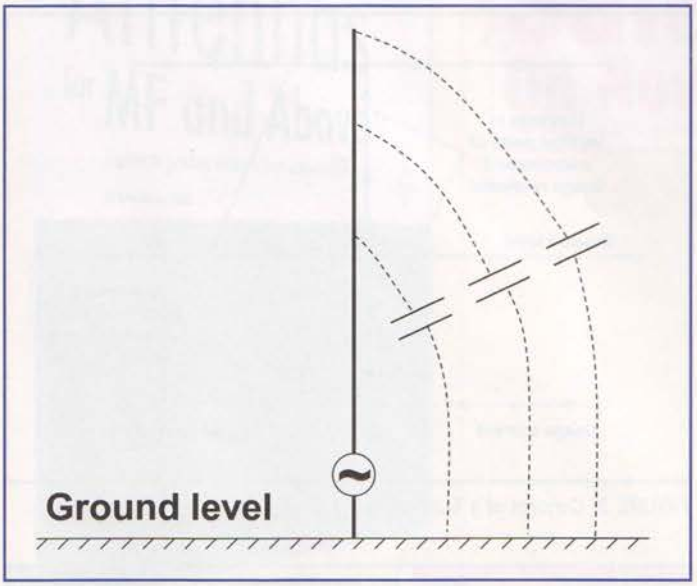


FIGURE 2: Concept of CV for a Marconi monopole antenna.

Initially, taking the case where the horizontal wire span is not connected, I_{ant} is the RF current supplied by the transmitter whose value depends upon the vertical section's capacitance to ground (termed C_V). Adding the horizontal wire span increases I_{ant} because the RF currents I_1 and I_2 now flow in each side of the wire span enhancing I_{ant}. In turn, the values of I_1 and I_2 are dependant on the wire span's capacitance to ground (termed C_H) and this is a function of the horizontal wire span's length. Thus, the longer the horizontal wire span, so the larger I_1 and I_2 can be made increasing the RF current I_{ant} supplied by the transmitter. Another method to improve the strength of the transmitted signal is to run additional wires in parallel with the horizontal wire span increasing the antenna's capacitance to ground, so further raising I_{ant}. Examples of this technique, used on the LF and MF bands, have been described by Dale Hughes, VK1DSK, based on reconfiguring an existing HF doublet set up at his suburban location [3].

Although the horizontal parts of a vertical antenna wire are often much longer than the vertical section, little horizontally polarised RF energy is radiated. This is because, when the height of the horizontal section is a small fraction of the wavelength above the ground plane, the effect of the horizontally-flowing current is almost completely cancelled out by the equal but opposite 'image' currents flowing in the ground plane, as shown in Figure 3. Consequently, the radiation produced by these antennas is almost entirely vertically polarised and they are classed as vertical antennas for this reason.

The radiation pattern is omnidirectional in the horizontal plane meaning the antenna radiates

PHOTO 2: HMS *M33*'s reconstructed wireless room.

Mike Parkin, G0JMI
email2mikeparkin@gmail.com

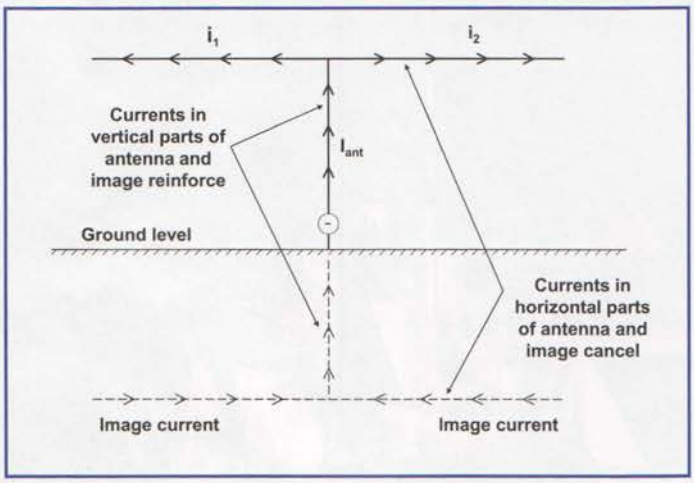


FIGURE 3: Concept of a T-antenna.

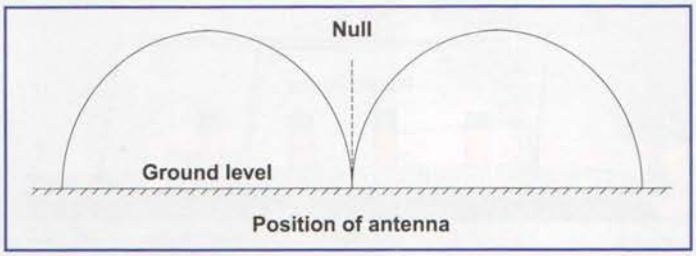


FIGURE 4: Concept a Marconi monopole antenna's vertical radiation pattern.

Capacitance Vertical (pF) =	63.84	Enter Vertical length (metres)	10.00
Capacitance Horizontal (pF) =	167.40	Enter Horizontal length (metres)	30.00
Effective Height (metres) =	8.62	Enter Frequency (kHz)	473.00
Radiation Resistance (ohms) =	0.29	Enter Antennae Current (amps)	1.00
Effective Radiated Power (watts) =	0.53	Enter Diameter of Antenna Vertical wire (metres)	0.0020
Effective Isotropic Radiated Power (watts) =	0.88	Enter Diameter of Antenna Horizontal wire (metres)	0.0020

FIGURE 5: Example of G4GIR's antenna calculation tool.

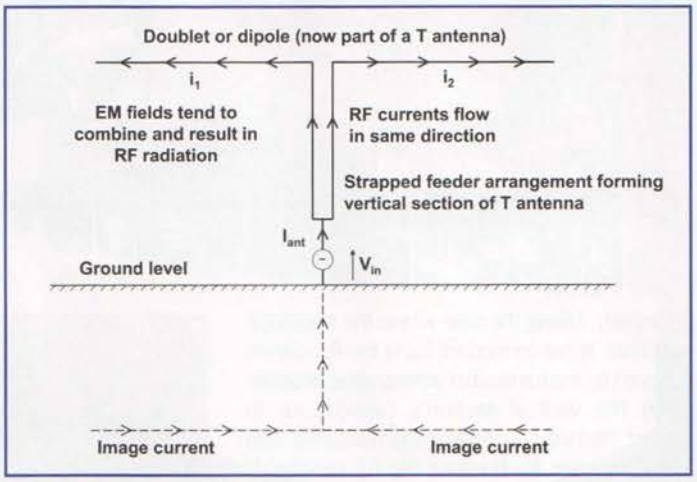


FIGURE 6: Concept of how a T-antenna can be formed by using a dipole, doublet or G5RV antenna by strapping together its feeder's ends.

uniformly in all directions and has a field strength that is proportional to the cosine of elevation. This gives rise to maximum radiation towards the horizon and a null vertically upwards. The concept of the vertical radiation pattern for an electrically short vertical antenna is shown in **Figure 4**. The directional gain of all electrically short vertical antennas is close to 2.62dB with respect to a dipole, or 1.83 as a power ratio, irrespective of their shape or size **[4]**. This makes the antenna suited to LF and MF broadcast applications where uniform coverage around the antenna is a desirable characteristic.

Antenna calculations tool

The September 2017 Antennas column described how the parameters associated with a T-antenna can be calculated including the effective height (H_{eff}), the radiation resistance (R_{rad}), the vertical section's capacitance (C_V) and the horizontal wire span's capacitance (C_H) **[5]**. Ian Frith, G4GIR, has produced a useful Excel spreadsheet tool to enable these parameters to be calculated for a T or L-antenna with a single horizontal wire span **[6]**.

An example of the use of the tool is shown in **Figure 5** for an antenna, operated on 473kHz, having a 10m long vertical section, a wire span length of 30m and the transmitter delivering 1A of antenna current (I_{ant}). The tool also calculates the effective radiated and effective isotropic radiated powers (ERP and EIRP) for reference. This tool is available on request via the Antennas column email contact address.

Using an existing dipole, doublet or G5RV as a T-antenna

An existing HF dipole, doublet or G5RV antenna whose horizontal wire span is installed between two high points could be used as the basis for a T-antenna for use on the 160m band and below. However, the practicalities mean that the horizontal wire-span should to be at least 20m in length. The HF antenna's feeder cable forms the vertical section of the T-antenna by shorting together the ends of the twin-conductor cable to give a single feeder wire that is connected to the matching arrangement. The effective height (H_{eff}) of a T-antenna depends upon the length of the HF antenna's vertical section (ie the shorted feeder cable) and the length of its horizontal wire-span. Consequently, the H_{eff}, R_{rad}, ERP and EIRP calculations can be applied for an HF antenna configured as a T-antenna.

Figure 6 shows the concept of a conventional HF antenna with its feeder cable's ends short-circuited to form the vertical section of a T-antenna. In the vertical section, the RF currents flow in the same direction as illustrated. As a result, the electric and magnetic fields associated with these RF currents become additive and so the feeder cable radiates a vertically polarised RF signal. As described, the effect of I_1 and I_2 is to enhance the RF current I_{ant} flowing from the transmitter improving the strength of the RF signal radiated by the antenna. The effect of I_1 and I_2 flowing in each section of the horizontal wire span is almost completely cancelled out by the equal but opposite 'image' currents as described previously.

Interestingly, if the ground conditions below the wire span vary then I_1 may not be equal to I_2. In practice, the 'generator' symbol shown in Figure 6 represents the radio equipment connected to the T-antenna, comprising the transceiver, SWR meter and ATU (Figure 1 in September 2017 Antennas). If you try this arrangement, it needs to be fed against an effective – and, ideally, extensive – ground system.

Conclusion

If you are thinking about operating on the 160m band, or below, then the T-antenna may provide a means to become active from a location where the space to install an aerial may be limited.

Websearch

[1] US Patent 586193: Transmitting Electrical Signals, filed by Guglielmo Marconi, London, on 7 December 1896 and granted by the US Patents Office on 18 July 1897

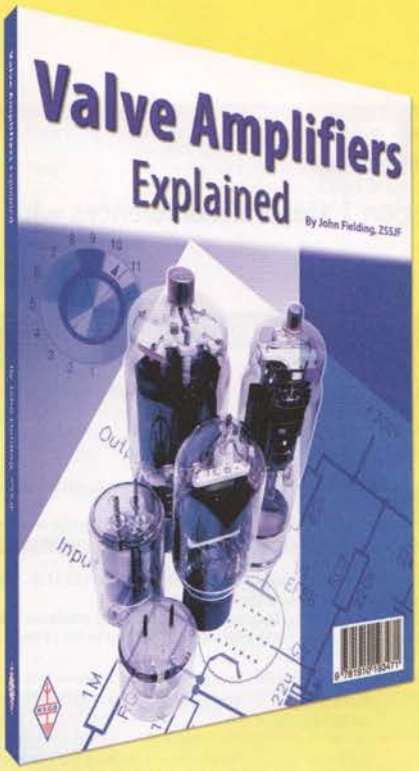
[2] HMS *M33*, Historic Dockyard, HM Naval Base, Portsmouth PO1 3LJ

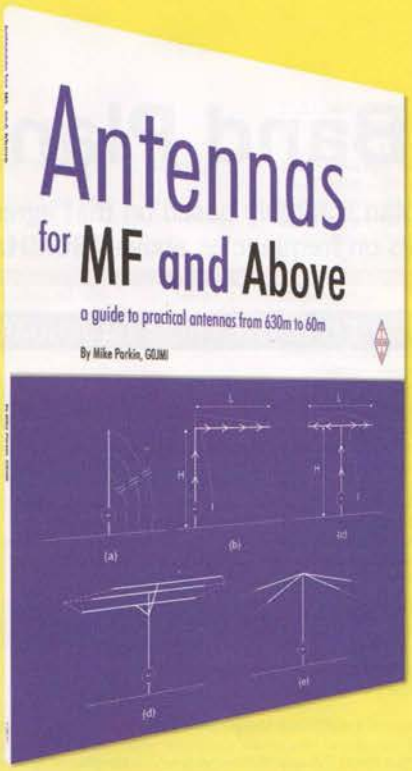
[3] *International Antennas*, edited by Stephen Appleyard, Reuse and Recycle section, pages 108 to 110

[4] The IEE Handbook of Antenna Design Volume 2, by A W Rudge, M Milne, A D Olver, P Knight; published by Peter Perigrinus Ltd, 1983; pages 554 to 556

[5] C_H and C_V source equations: *VLF Radio Engineering Volume 14*, by Arthur D Watt; published 1967 by Pergamon Press Inc; pages 40 to 42

[6] Antenna Calculations Tool, by Ian Frith, G4GIR, produced in 2017





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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
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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.

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RSGB Band Plan 2018

The following band plan is largely based on that agreed at IARU Region 1 General Conferences with some local differences on frequencies above 430MHz.

EFFECTIVE FROM 1st JANUARY 2018 UNLESS OTHERWISE SHOWN

136kHz	NECESSARY BANDWIDTH	UK USAGE
135.7-137.8kHz	200Hz	CW, QRSS and Narrowband Digital Modes

Licence Notes: Amateur Service – Secondary User. 1 watt (0dBW) ERP.
R.R. 5.67B. The use of the band 135.7-137.8kHz in Algeria, Egypt, Iran (Islamic Republic of), Iraq, Lebanon, Syrian Arab Republic Sudan, South Sudan and Tunisia is limited to fixed and maritime mobile services. The amateur service shall not be used in the above-mentioned countries in the band 135.7-137.8kHz, and this should be taken into account by the countries authorising such use. (WRC-12).

472kHz (600m)	NECESSARY BANDWIDTH	UK USAGE
IARU Region 1 does not have a formal band plan for this allocation but has a usage recommendation (Note 1).		
472-479kHz	500Hz	CW, QRSS and Narrowband Digital Modes

Note 1: Usage recommendation – 472-475kHz CW only 200Hz maximum bandwidth, 475-479kHz CW and Digimodes.
Note 2: It should be emphasised that this band is available on a non-interference basis to existing services. UK amateurs should be aware that some overseas stations may be restricted in terms of transmit frequency in order to avoid interference to nearby radio navigation service Non-Directional Beacons.
Licence Notes: Amateur Service – Secondary User. Full Licensees only, **5 watts EIRP maximum**. Note that conditions regarding this band are specified by the Licence Schedule notes.
R.R. 5.80B. The use of the frequency band 472-479kHz in Algeria, Saudi Arabia, Azerbaijan, Bahrain, Belarus, China, Comoros, Djibouti, Egypt, United Arab Emirates, the Russian Federation, Iraq, Jordan, Kazakhstan, Kuwait, Lebanon, Libya, Mauritania, Oman, Uzbekistan, Qatar, Syrian Arab Republic, Kyrgyzstan, Somalia, Sudan, Tunisia and Yemen is limited to the maritime mobile and aeronautical radionavigation services. The amateur service shall not be used in the above-mentioned countries in this frequency band, and this should be taken into account by the countries authorising such use. (WRC 12).

1.8MHz (160m)	NECESSARY BANDWIDTH	UK USAGE
1,810-1,838kHz	200Hz	Telegraphy
1,838-1,840	500Hz	Narrowband Modes
1,840-1,843	2.7kHz	All Modes
1,843-2,000	2.7kHz	Telephony (Note 1), Telegraphy 1,836kHz – QRP (low power) Centre of Activity 1,960kHz – DF Contest Beacons (14dBW)

Note 1: Lowest LSB carrier frequency (dial setting) should be 1,843kHz. AX25 packet should not be used on the 1.8MHz band.
Licence Notes: 1,810-1,850kHz – Primary User: 1,810-1,830kHz on a non-interference basis to stations outside of the UK. 1,850-2,000kHz – Secondary User. 32W (15dBW) maximum.
Notes to the Band Plan: As on page 48.

3.5MHz (80m)	NECESSARY BANDWIDTH	UK USAGE
3,500-3,510kHz	200Hz	Telegraphy – Priority for Inter-Continental Operation
3,510-3,560	200Hz	Telegraphy – Contest Preferred. 3,555kHz – QRS (slow telegraphy) Centre of Activity
3,560-3,570	200Hz	Telegraphy 3,560kHz – QRP (low power) Centre of Activity
3,570-3,580	200Hz	Narrowband Modes
3,580-3,590	500Hz	Narrowband Modes
3,590-3,600	500Hz	Narrowband Modes – Automatically Controlled Data Stations (unattended)
3,600-3,620	2.7kHz	All Modes – Automatically Controlled Data Stations (unattended), (Note 1)
3,600-3,650	2.7kHz	All Modes – Phone Contest Preferred, (Note 1). 3,630kHz – Digital Voice Centre of Activity
3,650-3,700	2.7kHz	All Modes – Telephony, Telegraphy 3,663kHz May Be Used For UK Emergency Comms Traffic 3,690kHz SSB QRP (low power) Centre of Activity
3,700-3,775	2.7kHz	All Modes – Phone Contest Preferred 3,735kHz – Image Mode Centre of Activity 3,760kHz – IARU Region 1 Emergency Centre of Activity
3,775-3,800	2.7kHz	All modes - Phone contest preferred Priority for Inter-Continental Telephony (SSB) Operation

Note 1. Lowest LSB carrier frequency (dial setting) should be 3,603kHz.
Licence Notes: Primary User: Shared with other user services.
Notes to the Band Plan: As on page 48.

5MHz (60m)	AVAILABLE WIDTH	UK USAGE
5,258.5-5,264kHz	5.5kHz	5,262kHz – CW QRP Centre of Activity
5,276-5,284	8kHz	5,278.5kHz – May be used for UK Emergency Comms Traffic
5,288.5-5,292	3.5kHz	Beacons on 5290kHz (Note 2)
5,298-5,307	9kHz	
5,313-5,323	10kHz	5,317kHz – AM 6kHz maximum bandwidth
5,333-5,338	5kHz	
5,354-5,358	4kHz	Within WRC-15 Band
5,362-5,374.5	12.5kHz	Partly within WRC-15 band, WSPR
5,378-5,382	4kHz	
5,395-5,401.5	6.5kHz	
5,403.5-5,406.5	3kHz	

Unless indicated, usage is All Modes (necessary bandwidth to be within channel limits).
Note 1: Upper Sideband is recommended for SSB activity.
Note 2: Activity should avoid interference to the experimental beacons on 5290kHz.
Note 3: Amplitude Modulation is permitted with a maximum bandwidth of 6kHz, on frequencies with at least 6kHz available width.
Note 4: Contacts within the UK should avoid the WRC-15 band (5351.5 - 5366.5 kHz) if possible For the latest current guidance refer to the RSGB website
Licence Notes: Full Licensees only, **Secondary User, 100 watts maximum.** Note that conditions on transmission bandwidth, power and antennas are specified in the Licence. For the latest current guidance, refer to the RSGB website
Notes to the Band Plan. As on page 48.

7MHz (40m)	NECESSARY BANDWIDTH	UK USAGE
7,000-7,040kHz	200Hz	Telegraphy – 7,030kHz QRP (low power) Centre of Activity
7,040-7,047	500Hz	Narrowband Modes (Note 2)
7,047-7,050	500Hz	Narrowband Modes, Automatically Controlled Data Stations (unattended)
7,050-7,053	2.7kHz	All Modes, Automatically Controlled Data Stations (unattended), (Note 1)
7,053-7,060	2.7kHz	All Modes, Digimodes
7,060-7,100	2.7kHz	All Modes, SSB Contest Preferred Segment Digital Voice 7,070kHz; SSB QRP Centre of Activity 7,090kHz
7,100-7,130	2.7kHz	All Modes, 7,110kHz – Region 1 Emergency Centre of Activity
7,130-7,200	2.7kHz	All Modes, SSB Contest Preferred Segment; 7,165kHz – Image Centre of Activity
7,175-7,200	2.7kHz	All Modes, Priority For Inter-Continental Operation

Note 1: Lowest LSB carrier frequency (dial setting) should be 7,053kHz.
Note 2: PSK31 activity starts from 7,040kHz. Since 2009, the narrowband modes segment starts at 7,040kHz.
Licence Notes: 7,000-7,100kHz Amateur and Amateur Satellite Service – Primary User.
7,100-7,200kHz Amateur Service – Primary User.
Notes to the Band Plan: As on page 48.

10MHz (30m)	NECESSARY BANDWIDTH	UK USAGE
10,100-10,130kHz	200Hz	Telegraphy (CW) 10,116kHz – QRP (low power) Centre of Activity
10,130-10,150	500Hz	Narrowband Modes Automatically Controlled Data Stations (unattended) should avoid the use of the 10MHz band

Licence Notes: Amateur Service – Secondary User.
Notes to the Band Plan: As on page 48.
The 10MHz band is allocated to the amateur service only on a secondary basis. The IARU has agreed that only CW and other narrow bandwidth modes are to be used on this band. Likewise the band is not to be used for contests and bulletins. SSB may be used on the 10MHz band during emergencies involving the immediate safety of life and property, and only by stations actually involved with the handling of emergency traffic. The band segment 10,120-10,140kHz may only be used for SSB transmissions in the area of Africa south of the equator during local daylight hours.

14MHz (20m)	NECESSARY BANDWIDTH	UK USAGE
14,000-14,060kHz	200Hz	Telegraphy – Contest Preferred 14,055kHz – QRS (slow telegraphy) Centre of Activity
14,060-14,070	200Hz	Telegraphy 14,060kHz – QRP (low power) Centre of Activity
14,070-14,089	500Hz	Narrowband Modes
14,089-14,099	500Hz	Narrowband Modes – Automatically Controlled Data Stations (unattended)
14,099-14,101		IBP – Reserved Exclusively for Beacons
14,101-14,112	2.7kHz	All Modes – Automatically Controlled Data Stations (unattended)
14,112-14,125	2.7kHz	All Modes (excluding digimodes)
14,125-14,300	2.7kHz	All Modes – SSB Contest Preferred Segment 14,130kHz – Digital Voice Centre of Activity 14,195 ±5kHz – Priority for DXpeditions 14,230kHz – Image Centre of Activity 14,285kHz – QRP Centre of Activity
14,300-14,350	2.7kHz	All Modes 14,300kHz – Global Emergency Centre of Activity

Licence Notes: Amateur Service – Primary User. 14,000-14,250kHz Amateur Satellite Service – Primary User.
Notes to the Band Plan: As on page 48.

18MHz (17m)	NECESSARY BANDWIDTH	UK USAGE
18,068-18,095kHz	200Hz	Telegraphy – 18,086kHz QRP (low power) Centre of Activity
18,095-18,105	500Hz	Narrowband Modes
18,105-18,109	500Hz	Narrowband Modes – Automatically Controlled Data Stations (unattended)

18,109-18,111		IBP – Reserved Exclusively for Beacons
18,111-18,120	2.7kHz	All Modes – Automatically Controlled Data Stations (unattended)
18,120-18,168	2.7kHz	All Modes, 18,130kHz – SSB QRP Centre of Activity 18,150kHz – Digital Voice Centre of Activity 18,160kHz – Global Emergency Centre of Activity

Licence Notes: Amateur and Amateur Satellite Service – Primary User. The band is not to be used for contests or bulletins.
Notes to the Band Plan: As on page 48.

21MHz (15m)	NECESSARY BANDWIDTH	UK USAGE
21,000-21,070kHz	200Hz	Telegraphy 21,055kHz – QRS (slow telegraphy) Centre of Activity 21,060kHz – QRP (low power) Centre of Activity
21,070-21,090	500Hz	Narrowband Modes
21,090-21,110	500Hz	Narrowband Modes – Automatically Controlled Data Stations (unattended)
21,110-21,120	2.7kHz	All Modes (excluding SSB) – Automatically Controlled Data Stations (unattended)
21,120-21,149	500Hz	Narrowband Modes
21,149-21,151		IBP – Reserved Exclusively For Beacons
21,151-21,450	2.7kHz	All Modes 21,180kHz – Digital Voice Centre of Activity 21,285kHz – QRP Centre of Activity 21,340kHz – Image Centre of Activity 21,360kHz – Global Emergency Centre of Activity

Licence Notes: Amateur and Amateur Satellite Service – Primary User.
Notes to the Band Plan: As on page 48.

24MHz (12m)	NECESSARY BANDWIDTH	UK USAGE
24,890-24,915kHz	200Hz	Telegraphy 24,906kHz – QRP (low power) Centre of Activity
24,915-24,925	500Hz	Narrowband Modes
24,925-24,929	500Hz	Narrowband Modes – Automatically Controlled Data Stations (unattended)
24,929-24,931		IBP – Reserved Exclusively For Beacons
24,931-24,940	2.7kHz	All Modes – Automatically Controlled Data Stations (unattended)
24,940-24,990	2.7kHz	All Modes, 24,950kHz – SSB QRP Centre of Activity 24,960kHz – Digital Voice Centre of Activity

Licence Notes: Amateur and Amateur Satellite Service – Primary User. The band is not to be used for contests or bulletins.
Notes to the Band Plan: As on page 48.

28MHz (10m)	NECESSARY BANDWIDTH	UK USAGE
28,000-28,070kHz	200Hz	Telegraphy 28,055kHz – QRS (slow telegraphy) Centre of Activity 28,060kHz – QRP (low power) Centre of Activity
28,070-28,120	500Hz	Narrowband Modes
28,120-28,150	500Hz	Narrowband Modes – Automatically Controlled Data Stations (unattended)
28,150-28,190	500Hz	Narrowband Modes
28,190-28,199		IBP – Regional Time Shared Beacons
28,199-28,201		IBP – World Wide Time Shared Beacons
28,201-28,225		IBP – Continuous-Duty Beacons
28,225-28,300	2.7kHz	All Modes – Beacons
28,300-28,320	2.7kHz	All Modes – Automatically Controlled Data Stations (unattended)
28,320-29,000	2.7kHz	All modes 28,330kHz – Digital Voice Centre of Activity 28,360kHz – QRP Centre of Activity 28,680kHz – Image Centre of Activity
29,000-29,100	6kHz	All Modes
29,100-29,200	6kHz	All Modes – FM Simplex – 10kHz Channels
29,200-29,300	6kHz	All Modes – Automatically Controlled Data Stations (unattended) 29,270kHz – Internet Gateways Channel 29,280kHz – UK Internet Voice Gateway (unattended) 29,290kHz – UK Internet Voice Gateway (unattended)
29,300-29,510	6kHz	Satellite Links
29,510-29,520	Guard Channel	
29,520-29,590	6kHz	All Modes – FM Repeater Inputs (RH1-RH8)
29,600	6kHz	All Modes – FM Calling Channel
29,610	6kHz	All Modes – FM Simplex Repeater (parrot) – input and output
29,620-29,700	6kHz	All Modes – FM Repeater Outputs (RH1-RH8)

Licence Notes: Amateur and Amateur Satellite Service – Primary User: 26dBW permitted. Beacons may be established for DF competitions except within 50km of NGR SK985640 (Waddington).
Notes to the Band Plan: As on page 48.

50MHz (6m)	NECESSARY BANDWIDTH	UK USAGE
50.000-50.100MHz	500Hz	Telegraphy Only (except for Beacon Project) (Note 2) 50.000-50.030MHz reserved for Synchronised Beacon Project (Note 2) Region 1: 50.000-50.010; Region 2: 50.010-50.020; Region 3: 50.020-50.030 50.050MHz – Future International Centre of Activity 50.090MHz – Inter-Continental DX Centre of Activity (Note 1)
50.100-50.200	2.7kHz	SSB/Telegraphy – International Preferred 50.100-50.130MHz – Inter-Continental DX Telegraphy & SSB (Note 1) 50.110MHz – Inter-Continental DX Centre of Activity 50.130-50.200MHz – General International Telegraphy & SSB 50.150MHz – International Centre of Activity
50.200-50.300	2.7kHz	SSB/Telegraphy – General Usage 50.285MHz – Crossband Centre of Activity
50.300-50.400	2.7kHz	MGM/Narrowband/Telegraphy 50.305MHz – PSK Centre of Activity 50.310-50.320MHz – EME 50.320-50.380MHz – MS
50.400-50.500		Propagation Beacons only
50.500-52.000	12.5kHz	All Modes 50.510MHz – SSTV (AFSK) 50.520MHz – Internet Voice Gateway (10kHz channels), (IARU common channel) 50.530MHz – Internet Voice Gateway (10kHz channels), (IARU common channel) 50.540MHz – Internet Voice Gateway (10kHz channels), (IARU common channel) 50.550MHz – Image/Fax working frequency 50.620-50.750MHz – Digital communications 50.630MHz – Digital Voice (DV) calling 50.710-50.890MHz – FM/DV Repeater Outputs (10kHz channel spacing) 51.210-51.390MHz – FM/DV Repeater Inputs (10kHz channel spacing) (Note 4) 51.410-51.590MHz – FM/DV Simplex (Note 3) (Note 4) 51.510MHz – FM Calling Frequency 51.530MHz – GB2RS News Broadcast and Slow Morse 51.650 & 51.750MHz – See Note 5 (25kHz aligned) 51.770 & 51.790MHz – See Note 5 51.810-51.990MHz – FM/DV Repeater Outputs (IARU aligned channels)

Note 1: Only to be used between stations in different continents (not for intra-European QSOs).
Note 2: 50.0-50.1MHz is currently shared with Propagation Beacons. These are due to be migrated by Aug 2014 to 50.4-50.5MHz, to create more space for Telegraphy and a new Synchronised Beacon Project.
Note 3: 20kHz channel spacing. Channel centre frequencies start at 51.430MHz.
Note 4: Embedded data traffic is allowed with digital voice (DV).
Note 5: May be used for Emergency Communications and Community Events.
Note 6: Digital experiments to support innovation may occur at 50.6, 51.0 or 51.7MHz with a 100kHz maximum bandwidth
Licence Notes: Amateur Service 50.0-51.0MHz – Primary User. Amateur Service 51.0-52.0MHz – Secondary User. 100W (20dBW) maximum. Available on the basis on non-interference to other services (inside or outside the UK).
Notes to the Band Plan: As on page 48.

70MHz (4m)	NECESSARY BANDWIDTH	UK USAGE (NOTE 1)
70.000-70.090MHz	1kHz	Propagation Beacons Only
70.090-70.100	1kHz	Personal Beacons
70.100-70.250	2.7kHz	Narrowband Modes 70.185MHz – Cross-band Activity Centre 70.200MHz – CW/SSB Calling 70.250MHz – MS Calling
70.250-70.294	12kHz	All Modes 70.260MHz – AM/FM Calling 70.270MHz MGM Centre of Activity
70.294-70.500	12kHz	All Modes Channelised Operations Using 12.5kHz Spacing 70.3000MHz 70.3125MHz – Digital Modes 70.3250MHz – DX Cluster 70.3375MHz – Digital Modes 70.3500MHz – Internet Voice Gateway (Note 2) 70.3625MHz – Internet Voice Gateway 70.3750MHz – See Note 2 70.3875MHz – Internet Voice Gateway 70.4000MHz – See Note 2 70.4125MHz – Internet Voice Gateway 70.4250MHz – FM Simplex – used by GB2RS news broadcast 70.4375MHz – Digital Modes (special projects) 70.4500MHz – FM Calling 70.4625MHz – Digital Modes 70.4750MHz 70.4875MHz – Digital Modes

Note 1: Usage by operators in other countries may be influenced by restrictions in their national allocations.
Note 2: May be used for Emergency Communications and Community Events.
Licence Notes: Amateur Service 70.0-70.5MHz – Secondary User: 160W (22dBW) maximum. Available on the basis of non-interference to other services (inside or outside the UK).
Notes to the Band Plan: As on page 48.

144MHz (2m)	NECESSARY BANDWIDTH	UK USAGE
144.000-144.025MHz	2700Hz	All Modes – including Satellite Downlinks
144.025-144.100	500Hz	Telegraphy (including EME CW) 144.050MHz – Telegraphy Centre of Activity 144.100MHz – Random MS Telegraphy Calling, (Note 1)
144.110-144.150	500Hz	Telegraphy and MGM EME MGM Activity (Note 7)
144.150-144.400	2700Hz	Telegraphy, MGM and SSB 144.175MHz – Microwave Talk-back 144.200MHz – Random MS SSB 144.250MHz – GB2RS News Broadcast and Slow Morse 144.260MHz – See Note 10 144.300MHz – SSB Centre of Activity 144.370MHz – MGM MS Calling

144.400-144.490		Propagation Beacons only
144.490-144.500		Beacon guard band 144.491-144.493 Personal Weak Signal MGM Beacons (BW: 500Hz max)
144.500-144.794	20kHz	All Modes (Note 8) 144.500MHz – Image Modes Centre (SSTV, FAX, etc) 144.600MHz – Data Centre of Activity (MGM, RTTY, etc) 144.6125MHz – UK Digital Voice (DV) Calling (Note 9) 144.625-144.675MHz – See Note 10 144.750MHz – ATV Talk-back 144.775-144.794MHz – See Note 10
144.794-144.990	12kHz	MGM Digital Communications (Note 15) 144.800-144.9875MHz – MGM/Digital Communications 144.8000MHz – Unconnected Nets – APRS, UiView etc (Note 14) 144.8125MHz – DV Internet Voice Gateway 144.8250MHz – DV Internet Voice Gateway 144.8375MHz – DV Internet Voice Gateway 144.8500MHz – DV Internet Voice Gateway 144.8625MHz – DV Internet Voice Gateway 144.9250MHz – TCP/IP Usage 144.9375MHz – AX25 Usage 144.9500MHz – AX25 Usage 144.9625MHz – FM Internet Voice Gateway 144.9750MHz, 144.9875MHz To Be Decided (Note 11)
144.990-145.1935	12kHz	FM/DV RV48-RV63 Repeater Input Exclusive (Note 2 & 5)
145.200	12kHz	FM/DV Space Communications (eg ISS) – Earth-to-Space 145.2000MHz – (Note 4 & 10)
145.200-145.5935	12kHz	FM/DV V16-V48 – FM/DV Simplex (Note 3, 5 & 6) 145.2250MHz – See Note 10 145.2375MHz – FM Internet Voice Gateway (IARU common channel) 145.2500MHz – Used for Slow Morse Transmissions 145.2875MHz – FM Internet Voice Gateway (IARU common channel) 145.3375MHz – FM Internet Voice Gateway (IARU common channel) 145.5000MHz – FM Calling (Note 12) 145.5250MHz – Used for GB2RS News Broadcast. 145.5500MHz – Used for Rally/exhibition Talk-in 145.5750MHz, 145.5875MHz (Note 11)
145.5935-145.7935	12kHz	FM/DV RV48-RV63 – Repeater Output (Note 2)
145.800	12kHz	FM/DV Space Communications (eg ISS) – Space-Earth
145.806-146.000	12kHz	All Modes – Satellite Exclusive

Note 1: Meteor scatter operation can take place up to 26kHz higher than the reference frequency.
Note 2: 12.5kHz channels numbered RV48-RV63. RV48 input = 145.000MHz, output = 145.600MHz.
Note 3: 12.5kHz simplex channels numbered V16-V46. V16 = 145.200MHz.
Note 4: Emergency Communications Groups utilising this frequency should take steps to avoid interference to ISS operations in non-emergency situations.
Note 5: Embedded data traffic is allowed with digital voice (DV).
Note 6: Simplex use only – no DV gateways.
Note 7: EME activity using MGM is commonly practised between 144.110-144.160MHz.
Note 8: Amplitude Modulation (AM) is acceptable within the All Modes segment. AM usage is typically found on 144.550MHz. Users should consider adjacent channel activity when selecting operating frequencies.
Note 9: In other countries IARU Region 1 recommends 145.375MHz.
Note 10: May be used for Emergency Communications and Community Events.
Note 11: May be used for repeaters in other IARU Region 1 countries.
Note 12: DV users are asked not to use this channel, and use 144.6125MHz for calling.
Note 13: Not used.
Note 14: 144.800 use should be NBFM to avoid interference to 144.8125 DV Gateways.
Licence Notes: Amateur Service and Amateur Satellite Service – Primary User. Beacons may be established for DF competitions except within 50km of TA 012869 (Scarborough).
Notes to the Band Plan: As on page 48.

146MHz IARU Recommendation	NECESSARY BANDWIDTH	UK USAGE
146.000-146.900MHz	500kHz	Wideband Digital Modes (High speed data, DATV etc) 146.500MHz Centre frequency for wideband modes (Note 1)
146.900-147.000MHz	12kHz	Narrowband Digital Modes including Digital Voice 146.900 146.9125 146.925 146.9375 Not available in/near Scotland (see Licence Notes & NoV terms) 146.9500 146.9625 146.9750 146.9875

Note 1: Users of wideband modes must ensure their spectral emissions are contained with the band limits.
Licence Notes: Full Licensees only, with NoV, 50W ERP max – not available in the Isle of Man or Channel Isles. Note that additional restrictions on geographic location, antenna height and upper frequency limit are specified by the NoV terms.
It should be emphasised that this band is UK-specific and is available on a non-interference basis to existing services. Upper Band limit 147.000MHz (or 146.93750 where applicable) are absolute limits and not centre frequencies. The absolute band frequency limit in or within 40km of Scotland is 146.93750MHz – see NoV schedule
Notes to the Band Plan: As on page 48.

430MHz (70cm) IARU Recommendation	NECESSARY BANDWIDTH	UK USAGE
430.0000-431.9810MHz	20kHz	430.0125-430.0750MHz – FM Internet Voice Gateways (Notes 7, 8)
All Modes		430.250-430.300 MHz UK DV 9 MHz reverse-split repeaters - Outputs 430.4000-430.7750 – UK DV 9MHz Split Repeaters – inputs
Digital Links 430.6000-430.9250		430.8000MHz – 7.6MHz Talk-through (Note 10)
Digital Repeaters		430.8250-430.9750MHz – RU66-RU78 7.6MHz Split Repeaters – outputs See Licence Exclusion Note; 431-432MHz 430.9900-431.9000MHz – Digital Communications 431.0750-431.1750MHz – DV Internet Voice Gateways (Note 8)
432.0000-432.1000 Telegraphy, MGM	500Hz	432.0000-432.0250MHz – Moonbounce (EME) 432.0500MHz – Telegraphy Centre of Activity
432.1000-432.4000 SSB, Telegraphy MGM	2700Hz	432.2000MHz – SSB Centre of Activity 432.3500MHz – Microwave Talk-back (Europe) 432.3700MHz – FSK441 Calling Frequency
432.4000-432.4900	500Hz	Propagation Beacons only
432.4900-432.9940	25kHz	432.491-432.493 MHz Personal Weak Signal MGM Beacons (BW: 500 Hz max) 432.5000MHz – Narrowband SSTV Activity Centre
All Modes Non-channelised	(Note 11)	432.6250-432.6750MHz Digital Communications (25kHz channels) 432.7750MHz 1.6MHz Talk-through – Base TX (Note 10)
432.9940-433.3810	25kHz	433.0000-433.3750MHz (RB0-RB15) – RU240-RU270
FM repeater outputs in UK only (Note 1)	(Note 11)	FM/DV Repeater Outputs (25kHz channels) in UK Only
433.3940-433.5810	25kHz	433.4000MHz U272 – IARU Region 1 SSTV (FM/AFSK)
FM/DV (Notes 12, 13) Simplex Channels	(Note 11)	433.4250MHz U274 433.450MHz U276 (Note 5) 433.4750MHz U278 433.5000MHz U280 – FM Calling Channel 433.5250MHz U282 433.5500MHz U284 – Used for Rally/Exhibition Talk-in 433.5750MHz U286
433.6000-434.0000 All Modes 433.8000MHz for APRS where 144.8000MHz cannot be used	25kHz (Note 11)	433.6250-6750MHz – Digital Communications (25kHz channels) 433.7000MHz-433.7750MHz (Note 10) 433.8000-434.2500 MHz Digital communications & Experiments 434.0000 Low Power Non-NoV Personal Hot-Spot usage
434.0000-434.5940	25kHz	433.9500-434.0500MHz – Internet Voice Gateways (Note 8)
	(Note 11)	434.3750MHz 1.6MHz Talk-through – Mobile TX (Note 10) 434.4750-434.5250MHz DV Internet voice gateways (Note 8)
434.5940-434.9810 FM repeater inputs in UK only & ATV (Note 4)	25kHz (Note 11)	434.6000-434.9750MHz (RB0-RB15) RU240-RU270 FM/DV Repeater Inputs (25kHz channels) in UK Only (Note 12)
435.0000-438.0000	20kHz	Satellites and Fast Scan TV (Note 4) 437.0000 Experimental DATV Centre of Activity (Note 14)
438.0000-440.0000	25kHz	438.8000 Low Power Non-NoV Personal Hot-Spot usage 438.0250-438.1750MHz – IARU Region 1 Digital Communications
All Modes	(Note 11)	438.2000-439.4250MHz (Note 1) 438.4000MHz – 7.6MHz Talk-through (Note 10) 438.4250-438.5750MHz RU66-RU78 – 7.6MHz Split Repeaters – inputs 438.6125MHz – UK DV calling (Note 12) (Note 13) 438.8000 Low Power Non-NoV Personal Hot-Spot usage 439.2500-439.3000MHz UK DV 9MHz reverse-split repeaters – inputs 439.6000-440.0000MHz – Digital Communications 439.4000-439.7750MHz – UK DV 9MHz split repeaters - Outputs

Note 1: In Switzerland, Germany and Austria, repeater inputs are 431.0500-431.8250MHz with 25kHz spacing and outputs 438.6500-439.4250MHz. In Belgium, France and the Netherlands repeater outputs are 430.0250-430.3750MHz with 12.5kHz spacing and inputs at 431.6250-431.9750MHz. In other European countries repeater inputs are 433.0000-433.3750MHz with 25kHz spacing and outputs at 434.6000-434.9750MHz, ie the reverse of the UK allocation.
Note 4: ATV carrier frequencies shall be chosen to avoid interference to other users, in particular the satellite service and repeater inputs.
Note 5: In other countries IARU Region 1 recommends 433.4500MHz for DV calling.
Note 7: Users must accept interference from repeater output channels in France and the Netherlands at 430.0250-430.5750MHz. Users with sites that allow propagation to other countries (notably France and the Netherlands) must survey the proposed frequency before use to ensure that they will not cause interference to users in those countries.
Note 8: All internet voice gateways: 12.5kHz channels, maximum deviation ±2.4kHz, maximum effective radiated power 5W (7dBW), attended only operation in the presence of the NoV holder.
Note 10: May be used for Emergency Communications and Community Events.
Note 11: IARU Region 1 recommended maximum bandwidths are 12.5 or 20kHz.
Note 12: Embedded data traffic is allowed with digital voice (DV).
Note 13: Simplex use only - no DV gateways.
Note 14: QPSK 2 Mega-symbols/second maximum recommended.
Licence Notes: Amateur Service – Secondary User. Amateur Satellite Service: 435-438MHz – Secondary User. Exclusion: 431-432MHz not available within 100km radius of Charing Cross, London. Power Restriction 430-432MHz is 40 watts effective radiated power maximum.
Notes to the Band Plan: As on page 48.

1.3GHz (23cm)	NECESSARY BANDWIDTH	UK USAGE
1240.000-1240.500MHz	2700Hz	Alternative Narrowband Segment – see Note 7 – 1240.00-1240.750MHz
1240.500-1240.750		Alternative Propagation Beacon Segment
1240.750-1241.000	20kHz	FM/DV Repeater Inputs
1241.000-1241.750	150kHz	DD High Speed Digital Data – 5 x 150kHz channels
All Modes		1241.075, 1241.225, 1241.375, 1241.525, 1241.675MHz (±75kHz)
1241.750-1242.000 All Modes 1242.000-1249.000	20kHz	25kHz Channels available for FM/DV use 1241.775-1241.975MHz TV Repeaters (Note 9)

ATV		New DATV Repeater Inputs Original ATV Repeater Inputs: 1248, 1249
1249.000-1249.250	20kHz	FM/DV Repeater Outputs, 25kHz Channels (Note 9)
		1249.025-1249.225MHz
1250.00		In order to prevent interference to Primary Users, caution must be exercised prior to using 1250-1290MHz in the UK
1260.000-1270.000		Amateur Satellite Service – Earth to Space Uplinks Only
Satellites		
1290.000		
1290.994-1291.481	20kHz	FM/DV Repeater Inputs (Note 5) 1291.000-1291.375MHz (RM0-RM15) 25kHz spacing
1291.494-1296.000	All Modes	
All Modes		Preferred Narrowband segment
1296.000-1296.150	500Hz	1296.000-1296.025MHz – Moonbounce
Telegraphy, MGM		1296.138MHz – PSK31 Centre of Activity
1296.150-1296.800	2700Hz	1296.200MHz – Narrowband Centre of Activity
Telegraphy, SSB & MGM		1296.400-1296.600MHz – Linear Transponder Input
(Note 1)		1296.500MHz – Image Mode Centre of Activity (SSTV, FAX etc)
		1296.600MHz – Narrowband Data Centre of Activity (MGM, RTTY etc)
		1296.600-1296.700MHz – Linear Transponder Output
		1296.741-1296.743MHz Personal Weak Signal MGM Beacons
1296.800-1296.994		1296.750-1296.800MHz – Local Beacons, 10W ERP max 1296.800-1296.990MHz – Propagation Beacons only
		Beacons exclusive
1296.994-1297.481	20kHz	FM/DV Repeater Outputs (Note 5) 1297.000-1297.375MHz (RM0-RM15)
1297.494-1297.981	20kHz	FM/DV Simplex ((Notes 2, 5 & 6)) 25kHz spacing 1297.500-1297.750MHz (SM20-SM30)
FM/DV simplex		1297.725MHz – Digital Voice (DV) Calling
(Notes 2, 5, 6)		(IARU recommended)
		1297.900-1297.975MHz – FM Internet Voice Gateways (IARU common channels, 25kHz)
1298.000-1299.000	20kHz	All Modes
All Modes		General mixed analogue or digital use in channels 1298.025-1298.975MHz (RS1-RS39)
1299.000-1299.750	150kHz	DD High Speed Digital Data – 5 x 150kHz channels
All Modes		1299.075, 1299.225, 1299.375, 1299.525, 1299.675MHz (±75kHz)
1299.750-1300.000	20kHz	25kHz Channels Available for FM/DV use
All Modes		1299.775-1299.975MHz
1300.000-1325.000		TV Repeaters (UK only) (Note 9)
ATV		New DATV Repeater Outputs Original ATV Repeater Outputs: 1308.0, 1310.0, 1311.5, 1312.0, 1316.0, 1318.5MHz

Note 1: Local traffic using narrowband modes should operate between 1296.500-1296.800MHz during contests and band openings.
Note 2: Stations in countries that do not have access to 1298-1300MHz may also use the FM simplex segment for digital communications.
Note 3: IARU Region 1 recommended maximum bandwidth is 20kHz. See also Note 7.
Note 4: deleted.
Note 5: Embedded data traffic is allowed with digital voice (DV).
Note 6: Simplex use only – no DV gateways.
Note 7: 1240.000-1240.750 has been designated by IARU as an alternative centre for narrowband activity and beacons. Operations in this range should be on a flexible basis to enable coordinated activation of this alternate usage.
Note 8: The band 1240-1300MHz is subject to major replanning. Contact the Microwave Manager for further information.
Note 9: Repeaters and Migration to DATV, inc option for new DATV simplex are subject to further development and coordination.
Note 10: QPSK 4 Mega-symbols/second maximum recommended.
Licence Notes: Amateur Service – Secondary User. Amateur Satellite Service: 1,260-1,270MHz – Secondary User Earth to Space only. In the sub-band 1,298-1,300MHz unattended operation is not allowed within 50km of SS206127 (Bude), SE202577 (Harrogate), or in Northern Ireland.
Notes to the Band Plan: As on page 48.

2.3-2.302GHz IARU Recommendation	NECESSARY BANDWIDTH	UK USAGE
Access to this band requires an appropriate NoV, which is available to Full licensees only. Please note that the current NoVs last for up to three years prior to expiry.		
2300.000-2300.400MHz	2.7kHz	Narrowband Modes (including CW, SSB, MGM) 2300.350-2300.400MHz Attended Beacons
2300.400-2301.800MHz	500kHz	Wideband Modes (NBFM, DV, Data, DATV, etc) Note 1
2301.800-2302.000MHz	2.7kHz	Narrowband modes (including CW, SSB, MGM) EME Usage

Note 1: Users of wideband modes must ensure their spectral emissions are contained within the band limits.
Note 2: Full licensees only with NoV, 400 watts maximum, not available in the Isle of Man. Note additional restrictions on usage are specified by the NoV terms. It should be emphasised that this is UK-specific and is available on a non interference basis to existing services.
Notes to the Band Plan: As on page 48.

2.3GHz (13cm) IARU Recommendation	NECESSARY BANDWIDTH	UK USAGE
2,310.000-2,320.000MHz		
(National band plans)	200kHz	2,310.000-2,310.500MHz – Repeater links 2,311.000-2,315.000MHz – High speed data Preferred Narrowband Segment
2,320.000-2,320.150	500Hz	2,320.000-2,320.025MHz – Moonbounce
2,320.150-2,320.800	2.7kHz	2,320.200MHz – SSB Centre of Activity
2,320.800-2,321.000		2,320.750-2,320.800MHz – Local Beacons, 10W ERP max 2,320.800-2,320.990MHz – Propagation Beacons Only
Beacons exclusive		
2321.000-2322.000	20kHz	FM/DV. See also Note 1
2,322.000-2,350.000		Wideband Modes including Data, ATV
2,390.000-2,400.000		All Modes
2,400.000-2,450.000MHz		2,435.000MHz ATV Repeater Outputs
Satellites		2,440.000MHz ATV Repeater Outputs

Note 1: Stations in countries which do not have access to the All Modes section 2,322-2,390MHz, use the simplex and repeater segment 2,320-2,322MHz for data transmission.
Note 2: Stations in countries that do not have access to the narrowband segment 2,320-2,322MHz, use the alternative narrowband segments 2,304-2,306MHz, 2,308-2,310MHz and 2400-2402MHz.
Note 3: The segment 2,433-2,443MHz may be used for ATV if no satellite is using the segment.
Licence Notes: Amateur Service – Secondary User. Users must accept interference from ISM users. Amateur Satellite Service: 2,400-2,450MHz – Secondary User. Users must accept interference from ISM users. Operation in 2310-2350 and 2390-2400 MHz are subject to specific conditions and guidance In the sub-bands 2,310.000-2,310.4125 and 2,392-2,450MHz unattended operation is not allowed within 50km of SS206127 (Bude) or SE202577 (Harrogate). ISM = Industrial, scientific and medical.
Notes to the Band Plan: As on page 48.

3.4GHz (9cm) IARU Recommendation	NECESSARY BANDWIDTH	UK USAGE
3,400.000-3,401.000MHz	2.7kHz	Narrowband Modes (including CW, SSB, MGM, EME) 3,400.100MHz – Centre of Activity (Note 1)
3,400.800-3,400.995		3,400.750-3,400.800MHz – Local Beacons, 10W ERP max 3,400.800-3,400.995MHz – Propagation Beacons Only
3,400.000-3,401.000MHz	200kHz	3,401.000-3,402.000MHz Data, Remote Control
3,402.000-3,410.000		Wideband Modes including DATV Repeater Outputs
All Modes (Notes 2, 3)		

Note 1: EME has migrated from 3456MHz to 3400MHz to promote harmonised usage and activity.
Note 2: Stations in many European countries have access to 3400-3410MHz as permitted by ECA Table Footnote EU17.
Note 3: Amateur Satellite downlinks planned.
Licence Notes: Amateur Service – Secondary User. Subject to specific conditions and guidance.
Notes to the Band Plan: As on page 48.

5.7GHz (6cm) IARU Recommendation	NECESSARY BANDWIDTH	UK USAGE
5,650.000-5,668.000MHz		All Modes
Satellite Uplinks		Amateur Satellite Service – Earth to Space Only
5,668.000-5,670.000	2.7kHz	5,668.200MHz – Alternative Narrowband Centre
5,670.000-5,680.000		All Modes
5,755.000-5,760.000		All Modes
5,760.000-5,762.000	2.7kHz	Narrowband Modes (including CW, SSB, MGM, EME) 5,760.100MHz – Preferred Centre of Activity
5760.800-5760.995		5,760.750-5,760.800MHz – Local Beacons, 10W ERP max 5,760.800-5,760.995MHz – Propagation Beacons Only
Propagation Beacons		
5,762.000-5,765.000		All Modes
5,820.000-5,830.000		All Modes
5,830.000-5,850.000		All Modes
Satellite Downlinks		Amateur Satellite Service – Space to Earth Only

Licence Notes: Amateur Service: 5,650-5,680MHz – Secondary User. 5,755-5,765 and 5,820-5,850MHz – Secondary User. Users must accept interference from ISM users. Amateur Satellite Service: 5,650-5,670MHz and 5,830-5,850MHz – Secondary User. Users must accept interference from ISM users. Unattended operation is permitted for remote control, digital modes and beacons, except in the sub-bands 5,670-5,680MHz within 50km of SS206127 (Bude) and SE202577 (Harrogate). ISM = Industrial, scientific and medical.
Notes to the Band Plan: As on page 48.

10GHz (3cm) IARU Recommendation	NECESSARY BANDWIDTH	UK USAGE
10,000.000-10,125.000MHz		Note 4
All Modes		10,065MHz ATV Repeater Outputs
10,225.000-10,250.000		
All Modes		10,240MHz ATV Repeaters
10,250.000-10,350.000		
Digital Modes		
10,350.000-10,368.000		10,352.5-10,368MHz Wideband Modes (Note 2)
All Modes		
10,368-10,370MHz	2.7kHz	10,368-10,370 Narrowband Modes (Note 3)
Narrowband Telegraphy		10,368.1MHz Centre of Activity
EME/SSB		
10,368.800-10,368.995		10,368.750-10,368.800MHz – Local Beacons, 10W ERP max 10,368.800-10,368.995MHz – Propagation Beacons Only
Propagation Beacons		
10,370.000-10,450.000		10,371MHz Voice Repeaters Rx
All Modes		10,425 ATV Repeaters
10,450.000-10,475.000		10,400-10,475MHz Unattended Operation
All Modes & Satellites		10,450-10,452MHz Alternative Narrowband Segment (Note 3)
		10,471MHz Voice Repeaters Tx

10,475.000-10,500.000 All Modes and satellites	Amateur Satellite Service ONLY

Note 1: Deleted.
Note 2: Wideband FM is preferred between 10,350-10,400MHz to encourage compatibility between narrowband systems.
Note 3: 10,450MHz is used as an alternative narrowband segment in countries where 10,368MHz is not available.
Note 4: 10,000-10,125MHz is subject to increased Primary user utilisation and NoV restrictions.
Note 5: 10,475-10,500MHz is allocated ONLY to the Amateur Satellite Service and NOT to the Amateur Service.
Licence Notes: Amateur Service – Secondary User. Foundation licensees 1 watt maximum. Amateur Satellite Service: 10,450-10,500MHz – Secondary User. Unattended operation is permitted for remote control, digital modes and beacons except in the sub-bands 10,000-10,125MHz within 50km of SO916223 (Cheltenham), SS206127 (Bude), SK985640 (Waddington) and SE202577 (Harrogate).
Notes to the Band Plan: As on page 48.

24GHz (12mm) IARU Recommendation	UK USAGE
24,000.000-24,050.000MHz Satellites	24,025MHz Preferred Operating Frequency for Wideband Equipment 24,048.2MHz – Narrowband Centre of Activity
	24,048.750-24,048.800MHz – Local Beacons, 10W ERP max
24,048.800-24,048.995 Propagation Beacons	24,048.800-24,048.995MHz – Propagation Beacons Only
24,050.000-24,250.000 All Modes	

Licence Notes: Amateur Service: 24,000-24,050MHz – Primary User: Users must accept interference from ISM users. 24,050-24,150MHz – Secondary User. May only be used with the written permission of Ofcom. Users must accept interference from ISM users. 24,150-24,250MHz – Secondary User. Users must accept interference from ISM users. Amateur Satellite Service: 24,000-24,050MHz – Primary User: Users must accept interference from ISM users. Unattended operation is permitted for remote control, digital modes and beacons, except in the sub-bands 24,000-24,050MHz within 50km of SK985640 (Waddington) and SE202577 (Harrogate).
ISM = Industrial, scientific and medical.
Notes to the Band Plan: As on page 42.

47GHz (6mm) IARU Recommendation	UK USAGE
47,000.000-47,200.000MHz	47,088.2MHz – Centre of Narrowband Activity
47,088.000-47,090.000 Narrowband Segment	47,088.8-47,089.0MHz – Propagation Beacons Only

Licence Notes: Amateur Service and Amateur Satellite Service – Primary User. Unattended operation is permitted for remote control, digital modes and beacons, except within 50km of SK985640 (Waddington) and SE202577 (Harrogate).
Notes to the Band Plan: As on page 48.

76GHz (4mm) IARU Recommendation	UK USAGE
75,500-76,000MHz All Modes (preferred)	75,976.200MHz – IARU Region 1 Preferred Centre of Activity
76,000.000-77,500.000 All Modes	
77,500-78,000 All Modes (preferred)	77,500.200MHz – Alternative IARU Recommended Narrowband Segment
78,000-81,000 All Modes	

Licence Notes:
75,500-75,875MHz Amateur Service and Amateur Satellite Service – Secondary User.
75,875-76,000MHz Amateur Service and Amateur Satellite Service – Primary User.
76,000-77,500MHz Amateur Service and Amateur Satellite Service – Secondary User.
77,500-78,000MHz Amateur Service and Amateur Satellite Service – Primary User.
78,000-81,000MHz Amateur service and Amateur Satellite Service – Secondary User.
Unattended operation is permitted for remote control, digital modes and beacons, except within 50km of SK985640 (Waddington) and SE202577 (Harrogate).
Notes to the Band Plan: As on page 48.

134GHz (2mm) IARU Recommendation	UK USAGE
134,000-134,928MHz All Modes	
134,928 -134,930 Narrowband Modes	IARU Region 1 Preferred Centre of Activity
	134,928.800-134,928.990 – Propagation Beacons Only
134,930 -136,000 All Modes	

Licence Notes: 134,000-136,000MHz Amateur Service and Amateur Satellite Service – Primary User. Unattended operation is permitted for remote control, digital modes and beacons, except within 50km of SK985640 (Waddington) and SE202577 (Harrogate).

THE FOLLOWING BANDS ARE ALSO ALLOCATED TO THE AMATEUR SERVICE AND THE AMATEUR SATELLITE SERVICE

122,250-123,000MHz – Amateur Service only, Secondary User
136,000-141,000MHz – Secondary User
241,000-248,000MHz – Secondary User
248,000-250,000MHz – Primary User
Notes to the Band Plan: As on page 48.

NOTES TO THE BAND PLAN

ITU-R Recommendation SM.328 (extract)

Necessary bandwidth: For a given class of emission, the width of the frequency band which is just sufficient to ensure the transmission of information at the rate and with the quality required under specified conditions.

Foundation and Intermediate Licence holders are advised to check their Licences for the permitted power limits and conditions applicable to their class of Licence.

All Modes: CW, SSB and those modes listed as Centres of Activity, plus AM. Consideration should be given to adjacent channel users.

Image Modes: Any analogue or digital image modes within the appropriate bandwidth, for example SSTV and FAX.

Narrowband Modes: All modes using up to 500Hz bandwidth, including CW, RTTY, PSK, etc.

Digimodes: Any digital mode used within the appropriate bandwidth, for example RTTY, PSK, MT63, etc.

Sideband usage: Below 10MHz use lower sideband (LSB), above 10MHz use upper sideband (USB). Note the lowest dial settings for LSB Voice modes are 1843, 3603 and 7043kHz on 160, 80 and 40m. Note that on (5MHz) USB is used.

Amplitude Modulation (AM): AM with a bandwidth greater than 2.7kHz is acceptable in the All Modes segments provided users consider adjacent channel activity when selecting operating frequencies (Davos 2005).

Extended SSB (eSSB): Extended SSB (eSSB) is only acceptable in the All Modes segments provided users consider adjacent channel activity when selecting operating frequencies.

Digital Voice (DV): Users of Digital Voice (DV) should check that the channel is not in use by other modes (CT08_C5_Rec20).

FM Repeater & Gateway Access: CTCSS Access is recommended. Toneburst access is being withdrawn in line with IARU-R1 recommendations.

Beacons Propagation Beacon Sub-bands are highlighted – please avoid transmitting in them!

MGM: Machine Generated Modes indicates those transmission modes relying fully on computer processing such as RTTY, AMTOR, PSK31, JTxx, FSK441 and the like. This does not include Digital Voice (DV) or Digital Data (DD).

WSPR: Above 30MHz, WSPR frequencies in the band plan are the centre of the transmitted frequency (not the suppressed carrier frequency or the VFO dial setting).

CW QSOs are accepted across all bands, except within beacon segments (Recommendation DV05_C4_Rec_13).

Contest activity shall not take place on the 5, 10, 18 and 24MHz (60, 30, 17 and 12m) bands.

Non-contesting radio amateurs are recommended to use the contest-free HF bands (30, 17 and 12m) during the largest international contests (DV05_C4_Rev_07).

The term 'automatically controlled data stations' include Store and Forward stations.

Transmitting Frequencies: The announced frequencies in the band plan are understood as 'transmitted frequencies' (not those of the suppressed carrier!).

Unmanned transmitting stations: IARU member societies are requested to limit this activity on the HF bands. It is recommended that any unmanned transmitting stations on HF shall only be activated under operator control except for beacons agreed with the IARU Region 1 Beacon Coordinator, or specially licensed experimental stations.

472-479kHz: Access is available to Full licensees only – see licence schedule for additional conditions.

1.8MHz: Radio amateurs in countries that have a SSB allocation ONLY below 1840kHz, may continue to use it, but the National Societies in those countries are requested to take all necessary steps with their licence administrations to adjust phone allocations in accordance with the Region 1 Band Plan (UBA – Davos 2005).

3.5MHz: Inter-Continental operations should be given priority in the segments 3500-3510kHz and 3775- 3800kHz. Where no DX traffic is involved, the contest segments should not include 3500-3510kHz or 3775-3800kHz. Member societies will be permitted to set other (lower) limits for national contests (within these limits). 3510-3600kHz may be used for unmanned ARDF beacons (CW, A1A) (Recommendation DV05_C4_Rec_12). Member societies should approach their national telecommunication authorities and ask them not to allocate frequencies other than amateur stations in the band segment that IARU has assigned to Inter-Continental long distance traffic.

5MHz: Access is available to Full licensees only – see licence schedule for additional conditions.

7MHz: The band segment 7040-7060kHz may be used for automatic controlled data stations (unattended) traffic in the areas of Africa south from the equator during local daylight hours. Where no DX traffic is involved, the contest segment should not include 7,175-7,200kHz.

10MHz: SSB may be used during emergencies involving the immediate safety of life and property and only by stations actually involved in the handling of emergency traffic.
The band segment 10120kHz to 10140kHz may be used for SSB transmissions in the area of Africa south of the equator during local daylight hours.
News bulletins on any mode should not be transmitted on the 10MHz band.

28MHz: Member societies should advise operators not to transmit on frequencies between 29.3 and 29.51MHz to avoid interference to amateur satellite downlinks.

Experimentation with NBFM Packet Radio on 29MHz band: Preferred operating frequencies on each 10kHz from 29.210 to 29.290MHz inclusive should be used. A deviation of ±2.5kHz being used with 2.5kHz as maximum modulation frequency.

146-147MHz & 2300-2302MHz
Access to these bands requires an appropriate NoV, which is available to Full licensees only.

430MHz
The use of Amplitude Modulation (AM) is acceptable in the all modes segments but users are asked to consider

1.3GHz
The band is subject to re-planning. It is also shared with air traffic radar.

2.3GHz (2310-2350 & 2390-2400MHz)
Operation is subject to specific licence conditions and guidance – see also the Ofcom PSSR statement.

3.4GHz (3400-3410MHz)
Operation is subject to specific licence conditions and guidance – see also the Ofcom PSSR statement.

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ML&S are the sole UK distributors for the DV Mega Range of products.

DVMEGA *is a collective name for digital voice and data related kits and modules. C4FM, DMR and D-STAR is supported with more digital voice and data modes added all the time.*

DV Dualband (VHF/UHF) radio shield
This shield is compatible with Arduino UNO or MEGA. This module has a 10mW UHF and VHF transceiver on board. In combination with an Arduino you make your own stand-alone dual band hot spot. This module, together with the AMBE3000 forms the basis for a self-assembly D-Star kit transceiver.

PHONEMA SPEAKERS

These hand-crafted high performance communications speakers from Spain are now available exclusively from ML&S. You might change your radio but you will keep your Phonema speaker for ever.

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X-510N	2/70 Fibre glass 8.3/11.7dB gain. 5.2m long "N"	**£129.95**
V-2000	6/2/70, 2.15/6.2/8.4dB, 2.5m Long	**£99.95**
X-7000	144/430/1200MHz (2m/70cm/23cm) 8.3dBi (144MHz), 11.7dBi (430MHz), 13.7dBi (1200MHz) 5m Long	**£184.95**

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NR-770RSP	100W, 2/70, 3/5.5dB, .98m long, spring loaded	**£36.95**
MR-77	Magnet mount/antenna combination. Includes 13' RG58 coaxial cable with BNC or SMA connector	From **£25.95**
SG-7500	2m/70cm, GAIN 3.5/6.0, 41" long	**£65.95**
SG-7700	1/2wave C-Load radialless(144MHz), 2x5/8wave radialless(430MHz), 3.5dB(144MHz),6.0dB(430MHz). 1.06m long	**£79.95**
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MX-62M	1.6-56/140-470MHz Duplexer	**£59.95**
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-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**

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R2010109	50LFA3 3 ele 6m beam	£119.95
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

R2010800	ea270j dual band vertical j pol	£39.95

HF Antennas

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
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Nissei power supplies

Switch-mode miniatures, compact in size, light-weight and ideal to take travelling.

These days we are all familiar with switch mode power supplies. They power personal computers, televisions, phone chargers and a plethora of other devices. In the field of amateur radio, a properly designed and constructed switch mode power supply offers a small, light and convenient alternative to a large, heavyweight linear power supply. But how small is it possible to make a 13.8V DC supply for a 100 watt transceiver? With the two models reviewed here – the NS-1230M and NS-1230B – Nissei seem to have the produced ones with the smallest footprint and volume yet.

The NS-1230M (top) and NS-1230B seem to have the smallest footprint and volume yet.

Delivery

The supplies arrived in identical brown cardboard boxes, except for a couple of black spots to indicate the variant. Upon opening each box there was a single A4 instruction leaflet. It was a different leaflet for each variant of supply, but each leaflet contained basically the same information and covered both of the variants. Under the leaflets each supply was protected with foam packaging, the supplies themselves being in strong polythene bags. IEC power cables were also supplied. The review samples were delivered with European power cables, but I am assured by the supplier that they will be shipped to customers with UK power cables.

Construction

Each supply is housed in a steel case. The top, sides and front are sprayed black, while the back and underside are pale grey. Each has four stick-on rubber feet.

Inside, each supply has a large printed circuit board, populated with wire-ended devices. The main board in the two variants appear to be the same, but the components fitted vary a little. In addition, each supply has six daughter boards, but they are not all the same in each variant. To produce such small supplies the manufacturer has absolutely crammed the components in. There isn't any appreciable unused space.

Other differences lie in what lives off the main PCB, but before I discuss the differences I would like to look at what's the same. The back of each supply is the same, with an IEC power socket, a 115/230V power switch, a fan and a pair of binding posts. Advertising on various websites says that these supplies have 'external fuse access', but I can assure you they don't! Fuse replacement requires you to remove six screws and then the lid.

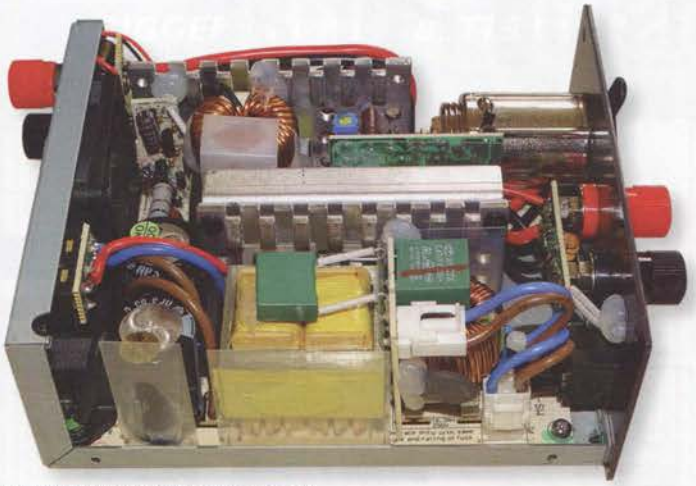
Now, the external differences. The front of the M version has a power switch, a green LED to indicate power, a red 'warning' LED, a moving coil meter, a switch to dedicate the meter to voltage or current and a potentiometer to set the output voltage. The front of the B version has a power switch and a green LED to indicate power, plus two additional outputs – a pair of binding posts and a cigar lighter socket. Its output is fixed at 13.8V.

Each supply has a temperature-operated cooling fan, which sucks air into the case through the side vents and blows it out the back. As I discovered when I used them, the fans are variable speed, so they don't suddenly switch on and make a lot of noise. Each supply also has over-voltage and short circuit protection.

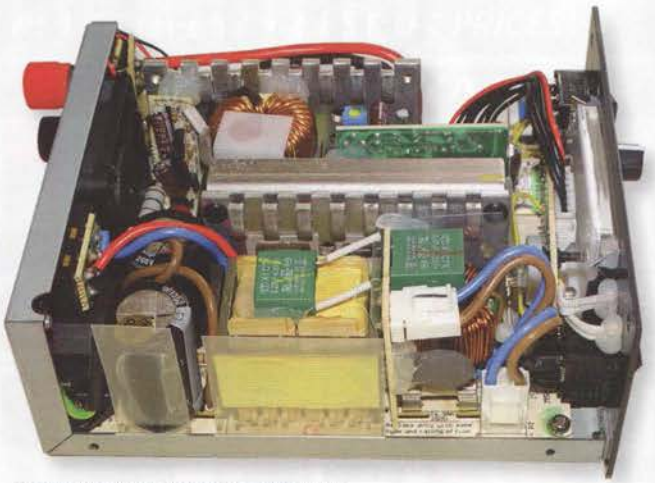
Regulation

I loaded up the supplies and **Figure 1** shows the output voltage for various currents. Each supply appears to have an over-voltage detector on the back of the binding posts, but not a voltage feedback loop. Consequently the voltage stability was good, but not perfect. There is a detent in the voltage control of the M version, making it easy to set the output to a nominal 13.8V. At the detent position I measured the review model at 13.75V offload. This was just a touch below the voltage of the B version, which I measured at 13.78V offload.

In terms of stability, the supplies have similar characteristics. The only thing I



Inside the NS-1230B power supply.



Inside the NS-1230M power supply.

found about the supplies is that if I applied power with a load of over 25 amps already attached, the supplies tripped out. If a load of under 25 amps was attached when the supplies were switched on, they did not trip out and I could then increase the load to over 25 amps. Although the supplies are rated up to 30 amps for intermittent use, I didn't load them to over 28 amps. This is more than enough for a 100 watt transceiver.

The readings on the meter of the M version were close to those of the external, higher precision meters used for reference.

EMC performance

Some switch-mode power supplies have a so-called 'noise' control. This can be used to change the master oscillator frequency used in them, to offset any inadvertent noise emissions away from a frequency of interest. Neither of the Nissei models have this facility, so I was interested to discover if there were any detectable noises emanating from them. I don't have a spectrum analyser, so what I do is use a battery powered portable AM radio and place is close by. I then tune around, listening for unexplained noises. I only need to switch the supply off to hear if such noises go away!

Somewhat to my surprise, the EMC performance of the Nissei supplies was not the same. In both cases there were noticeable emissions and resulting interference to long wave and medium wave broadcast stations, but nothing much in the HF part of the frequency spectrum. By moving the receiver around it was easy to determine where the noises were coming from. First, it was clear there was no noise being transmitted back into the mains supply, so this aspect of their filtering was very good. Incidentally, it is possible to see the mains EMC filtering components in the foreground of **Photos 2** and **3**. It was also easy to determine that there was only a little noise being transmitted from the DC output leads, so the filtering was good here too. Most emissions were direct from the electronics, but moving the receiver away by approximately 1m resulted in clear reception.

The major difference between the two supplies is that with no load on the output, there were definite buzzing and rasping sounds present on medium wave and long wave from the B version, especially on long wave.

FIGURE 1: The output voltage for the NS-1230M (black) and NS-1230B (red).

Conclusions

These little supplies performed adequately and should prove particularly useful for portable and DXpedition use. The voltage regulation isn't perfect, but it's absolutely adequate for amateur radio use.

One of the selling points of these supplies is the physical size. As **Table 1** shows, these Nissei supplies certainly are small. They compare favourably with supplies such as the Watson Power Mite (which is the same height), but the Power Mite weighs about 140g less, has a 20% larger footprint and a lower maximum output current.

To avoid any potential noise problems I would definitely spend the extra £5 for the M version.

Finally, I would like to thank Martin Lynch and Sons for the review models. Both are available ex-stock – for details, see www.hamradio.co.uk/

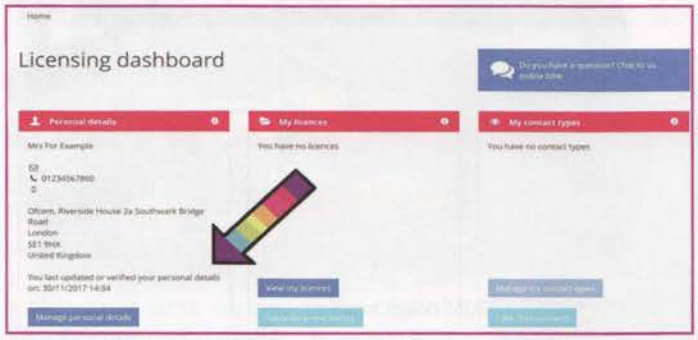
Table 1: Specification (some from the manufacturer's literature). Differences in bold type. Measured values in italics.

	NS-1230M	NS-1230B
Input voltage	110/230V, 47-63Hz	110/230V, 47-63Hz
Output voltage	**4-16V DC *(3.2-16.3V)***	**13.8V DC *(13.78V)***
Output current	30A max, 25A continuous	30A max, 25A continuous
Ripple	<0.3% pk-pk	<0.3% pk-pk
Over-voltage protection	Yes	Yes
Short circuit protection	Yes	Yes
Cooling fan	Yes	Yes
Meter	**Yes**	**No**
Dimensions (D x W x H)	154mm x 127mm x 63mm	154mm x 127mm x 63mm
Binding posts	**1 pair**	**2 pairs**
Cigar lighter socket	**No**	**Yes**
Weight	1350g *(1418g)*	1350g *(1415g)*
Price	£89.95	£84.95

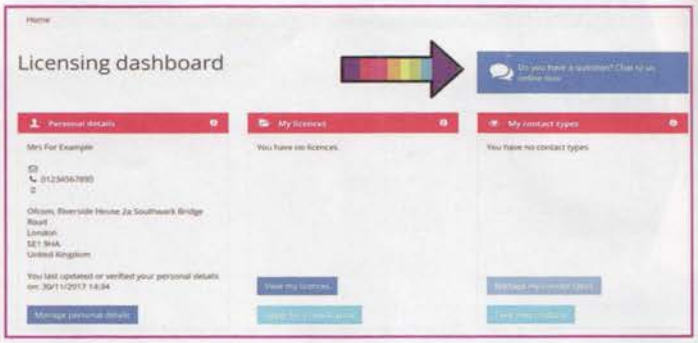
Steve White, G3ZVW
steve.g3zvw@gmail.com

Feature

Ofcom's Online Licensing Portal



The arrow on this diagram shows the last date on which your licence details were validated.



To access the Live Chat feature, click on the blue 'Do you have a question' box as arrowed here.

The RSGB asked Ofcom to provide us with an update on progress with the online licensing portal.

It's now 18 months since our Online Licensing Portal (https://ofcom.force.com/licensingcomlogin) went live and we have seen over 20,000 Amateur Radio Licensees registering and making use of the service;

Using the Online Licensing Portal, it's possible to apply for licences free of charge and obtain licence documentation immediately – a far cry from the manual application process, where forms must be downloaded, hand written and then submitted electronically or by post.

We still accept applications submitted on paper but licences issued against a paper application incurs a £20 fee chargeable via invoice, which causes a delay in processing the licence until the payment has cleared.

Benefits

What are the benefits of using the Online Licensing Portal?

- 24/7 access
- Licences received instantly
- Licences are issued free of charge
- Personal information can be accessed and updated instantly
- Live 'chat' service during business hours for support
- Validate your licence online

Here are some of the frequent questions that we receive about using the Online Licensing Portal:

I am struggling to register on the Online Portal

Applicants who have never used or registered on the Ofcom portal can register as a new user following the instructions on the Log In page on the Online Licensing Portal.

If you previously registered on the old portal using your email address as the username, please re-register using the same email.

If you can't remember or have changed your email address, please contact the Spectrum Licensing team so we can update your details to allow you to register.

If you previously logged in using an Ofcom generated username, please contact us with the following information:

- Valid email address
- Existing licence number
- Call sign and your postcode

I have passed my exam, but the portal won't allow me to apply for a licence

It can take around 14 days once you have received your certificate from the RSGB for your candidate number to be registered on Ofcom's system. After this time, you will be able to apply via the Portal using the 'Apply for a new licence' option, once you've registered.

How do I validate my licence?

You can validate your licence by following the following simple steps:

- Log onto the Online Licensing Portal and follow the directions to 'Manage Personal Details';
- Once on this page click 'Edit' on the right-hand side of the screen. If any information is incorrect, please make any necessary changes to your contact details. Remember – it is a condition of the licence to keep your details up-to-date;
- When you have finished click the 'Update' button at the bottom of the page. It is important to note that you must click the 'Update' button, even if you haven't changed your details. The system will then return you to the 'My Details' page.

To check the update has been successful, click on the 'Home' icon at the top of the page to return to the Licensing dashboard. Here you will find the last modified date and time, your licence is valid for a further 5 years from this date.

Can I apply for a Notice of Variation (NoV) online?

A Special Event Station NoV can be applied for via the Portal. Once the application is complete it will be listed at the bottom of your existing licence documentation. You can download and print the NoV, to keep it with the main licence document, for the duration of the Special Event Station.

The following NoVs cannot be applied for via the Portal. They need to be applied for in writing but are free of charge. Some are available on application to Ofcom, while others are administered by the RSGB. Further information can be found on our website (www.ofcom.org.uk/manage-your-licence)_and from the RSGB (http://rsgb.org/main/operating/licensing-novs-visitors/online-nov-application).

- Permanent Special Event Station
- Special Special Event Station
- Special Research Permit
- Repeaters and Gateways
- Special Contest Call sign

Can I reinstate my lapsed licence via the portal?

Applications from radio amateurs who require a licence on their return to the hobby after an absence cannot currently be made via the Portal. Ofcom and the RSGB are exploring how to make this facility available in the future. For now, applications must be

Continued on page 61

Fraser Murrey
Spectrum Policy Manager
spectrum.licensing@ofcom.org.

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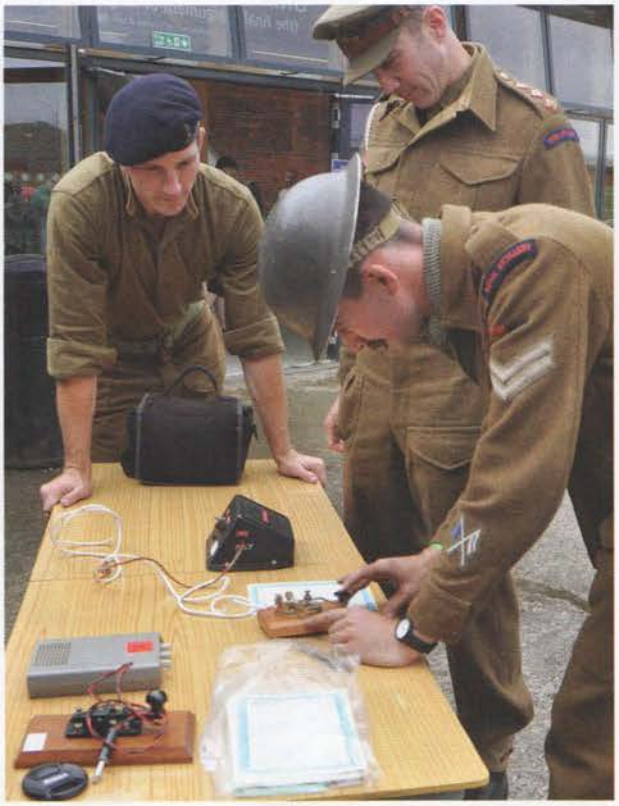
Museums on the Air

Ian G4TAH and Steve, G8JUT operating from Bristol Glenside Hospital museum. Photo courtesy of Dave, M0HDJ.



Royal Artillery sending Morse at GB4FN.

Museums on the Air takes place over two weekends in June. The intention of the event is to set up amateur radio special event stations at as many of the museums as possible. Museums taking part over the years have included ships, castles, air museums, Napoleonic forts, pumping stations, wireless museums, racing museums and many others.

GB0HMG

Harlow and District Amateur Radio Society operated GB0HMG from their QTH for Museums on the Air. The museum is housed in a converted stable block with a walled garden and is a general museum covering items from the stone age to the current day. The club QTH (the barn) is adjacent to the museum and was once part of the same large estate. Operating on 40, 20, 10, 4 and 2m using CW, FM, CW and data and using the club's aerial system, a total of 266 contacts were made. All contacts were been logged on QRZ.com and eQSLs have been sent. Hard QSL cards are sent on return of card received.

GB2FN

Horndean & District ARC operated GB2FN from the Royal Armouries Museum at Fort Nelson, Fareham near Portsmouth. HF conditions were poor all weekend, and the weather was wet and windy – their gazebo just about survived. VHF went quite well, with nice contacts into Guernsey and Jersey. The museum staff were very welcoming and the club plans to attend other events at the Fort (such as the Artillery on Parade weekend in July when the club ran GB4FN). For both events they operated HF and 2m and also had a Morse table where they encouraged visitors to have a go.

North Bristol ARC

North Bristol ARC operated from Bristol Glenside Hospital Museum, Fishponds, Bristol BS16 1DD. The building housing the museum (the old hospital chapel) was the site of the station. It's worth a visit to see how mental health care has developed as well has how the hospital was used during WW I if visiting or living in Bristol. Thanks to Stella and the volunteers at the museum for hosting the club and to Tony, G8CKK, Dave, G3OXB for helping Mat, G7FBD get the project off the ground.

GB2RMM

Huntingdonshire ARS operated GB2RMM from the Ramsey Rural Museum but had to share the location with the Ford Corsair Owners Club AGM and also a Donkey Derby on Sunday This meant relocating to a new operating location within the museum site.

Malcolm, M0OLG offered the use of his caravan and G1KWF, M0OLG, M0VTG, G7DIU and G4KLE erected the two masts. Steve, G1KWF set up the IC-7200 and tested all equipment and the first contact was to Kent on 20m. They contacted Roger TM53IMW who operates a similar rural museum station from Musée de l'Évolution Agricole in France. A number of visitors, operators and helpers visited and a total of 65 contacts SSB and CW on 20m, 40m, and even 15m were made. On Sunday the conditions were not the best but 58 contacts were achieved.

Huntingdonshire ARS operated GB2RMM from the Ramsey Rural Museum.

radcom@rsgb.org.uk

Circuit Competition Result

We had a great response to our competition to work out the function of the spoof circuit from xkcd.com published in the December *RadCom*.

Entries ranged from one-liners to descriptions running to several pages. Most people said they'd had fun putting their imaginations to work and enjoyed the process.

There were *lots* of entries – the printout ran to 16 pages – so our apologies to everyone not mentioned here. We had great fun reading all the suggestions! Here are some that we think were among the best (several have been abbreviated or subtly adapted for comic effect).

- HF Propagation Maker – G4MKP
- World's first paraffin-driven flat-screen TV – M6WXG
- All-band A-D suppressor – G4RNW
- Propagation improver for hard-to-reach DX – M6KIO
- A device to select the cheapest train fare from London to Manchester – M0WBR
- Wonky shopping trolley analyser – M0JFL
- Rare callsign CQ anticipator – M1CYV
- Flux-capacitor controller from the *Back to the Future* DeLorean car – G8GLM
- Specter analyser – G4WQI
- Van Gogh's hearing aid – M0CEO
- Directional propagation indicator – M0EJL
- A Leligometer, to measure the density of snothvariants – G3ZCT
- An interstellar comms unit for the Clangers – G8OKE
- Software defiled radio – G4MWO

Several people made topical references to Brexit and / or President Donald J Trump.

In a long entry describing how the circuit operated as a Time Continuum Transceiver – and the ramifications thereof in relation to a job interview and, possibly, lotteries – G4SHH noted the following points for the would-be experimenter: "(1) Under no circumstances operate the device on three phase power, especially if you are not a wimp. (2) The scarab beetles are happier if they are supplied with rocking horse dung. (3) The signal to noise ratio can be considerably improved if the electric eel is replaced with a tame snark. (4) If you start reducing the 120Ω resistor because you get the taste for it, be warned you will always think you would like it a bit lower and it will end with a bang and a flash. (5) If the 'brown blue orange' resistor needs to be adjusted to provide the correct terminating impedance for the scarab beetles, then some felt tip pens are very useful. (6) The Arduino program should be written in such a way that it recursively updates the code, hence avoiding the possibility of there ever being a bug."

G7AHE identified a number of apparent mistakes in the circuit, including the fact that the solder blob should be across the pins of the Most Expensive Chip, which should also be mounted closer to the Tear Collector.

2E0IQW claims to have actually *built* the circuit, at great effort and expense, then thoroughly analysed it. The answer was, apparently, '42'. (He gets the bonus points donated by Vroomfondel).

And the winner is...

Although the standard of entries was uniformly high, there can only be one winner of the £25 of RSGB Book Vouchers (and the corresponding perpetual fame). In the expert judgement of our conscripted panel, the best answer was

- a **Shack Space Detector**, which identifies gaps where more kit can be accommodated – submitted by Phil, M1CYV

Congratulations Phil: you win the £25 RSGB Book Voucher, which is on its way to you.

Resistance is futile

We had only a few entrants try to evaluate the resistor network. G8GLM claimed it isn't a resistor network at all, but three 1Ω Flux Adjust Restrainer Interfaces. G4GLT estimated 0.732Ω, GW3OQK says he built one and measured the result as 0.745Ω (±1%), whilst GM4HTU used "Kirchoff, Norton, Thevenin and Jim Beam (mostly the latter)" to come up with a value of 0.75Ω. G7BVS also submitted that the network is the same as a 0.75Ω resistor.

According to our best-available reference source, www.explainxkcd.com/wiki/index.php/730:_Circuit_Diagram (which also has some interesting notes on the other circuit elements), the answer is 0.75800964845Ω.

GM4HTU and G7BVS are therefore declared joint honorary winners of this non-prize part of the competition. Well done!

Finally

Our thanks to Randall Munroe and his site www.xkcd.com for the very generous licencing terms that made it possible for us to use their image for our competition. Do have a look at the site, which describes itself as "a webcomic of romance, sarcasm, math, and language". It won't appeal to everyone, but many will find it quite fun.

Last but definitely not least, our very grateful thanks to everyone who took part, including the many whose efforts are not mentioned here for reasons of space. I'll leave the final final word to one entrant who gave no callsign or postcode, and whose entire message was "SWe2hu?r". Go figure.

radcom@rsgb.org.uk

Ofcom continued from page 56

submitted on the paper application form. A paper application licence is subject to a £20 fee, payable against an invoice.

Applications must be accompanied by proof that the applicant has passed the relevant exam, eg a copy of a *Yearbook* entry or an old licence document.

I hold a foreign HAREC. How do I get a UK licence from the portal?

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What is Live Chat and how can it help me?

Live Chat is an instant messaging service accessible from any page of the portal once you have logged in.

If you have a question or query you can get an instant response from one of the team's licensing advisors during business hours. This means you can get ahead of the email and telephone queues. It is worth noting that some queries will require information in writing via email or post to ensure there is a full audit trail of information.

Have your say

We are committed to continuous improvement and would like to hear your views. If you would like to provide feedback about your experience using the portal you can have your say at the following website: www.surveymonkey.co.uk/r/OfcomOnlinePortalSurvey.

Design Notes

The simplest quadrature network – ever!

The SoftRock [1] is one of the simplest software defined radios (SDR), and one that many amateurs cut their teeth on. It consists of a direct downconverter, usually a quadrature sampling detector (QSD), driven by a fixed or tuneable local oscillator delivering baseband (I/Q) outputs to a computer soundcard for further processing and demodulation. Such basic SDRs have now mostly been superseded by direct sampling models like the RTL dongles and other higher end receivers, but there is still be a place for basic front ends like the SoftRock.

One area where a simple narrowband receiver is still useful is for monitoring of beacons or a single frequency, where it can be used with a small computer such as a Raspberry Pi or a surplus laptop without tying up the main shack equipment. Used this way, a quadrature downconverter doesn't need 'proper' SDR software like Rocky or SDR# to derive the recovered audio. All that is needed is to offset the LO from the wanted signal by an amount equal to the frequency of the wanted audio tone output. The LO can be above or below the centre frequency, but we do now need a way to combine the I and Q channels in a way that will cancel the unwanted sideband, which the SDR software would have done before.

We need a network that will sum the I and Q baseband channels while imparting a fixed 90° phase shift between the two. The accuracy of this phase shift, as well as maintaining constant amplitude between them, is what sets the cancellation of the unwanted sideband. Traditionally, all-pass networks have been used; typically several opamps and close tolerance components with a lot of setting up are needed if the full 300–3000Hz voice band is desired. A modern alternative is to do it with DSP; a dsPIC solution appeared in the April 2017 Design Notes. That was for transmitting, but the software is very similar. For a single frequency, or a narrow bandwidth of say no more than a couple of hundred Hz such as would be needed for monitoring a beacon (or the entire 200Hz WSPR band), there is a far simpler solution: nothing more than a CR network.

Refer to **Figure 1**. The low impedance I and Q outputs from the amplifiers following the QSD are combined in a single resistor and capacitor. The values are chosen such that the reactance of the capacitor is equal to the resistance at the centre frequency of interest, ie $F_0=1/(2.\pi.C.R)$ Then, *no matter what terminating load is placed on the summed junction*, a constant phase shift and flat amplitude response is the result. At exactly the centre frequency, the sideband cancellation is theoretically perfect. As the frequency departs from this in either direction cancellation degrades. It is important that the source impedance driving the CR network is low – there must be no significant resistance in series with the capacitor arm. If there is, the optimum phase shift can never be attained and cancellation will suffer. For practical purposes any opamp output impedance will be low enough if used with series arm elements of a few kΩ. Be prepared to swap the polarity of I and Q channels to get the sideband you want – in fact, swap them anyway to check the cancellation.

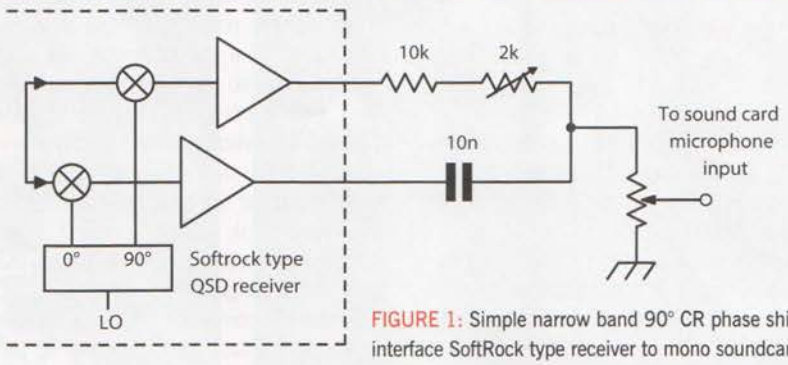

FIGURE 1: Simple narrow band 90° CR phase shifter to interface SoftRock type receiver to mono soundcard input.

I used this technique for monitoring the three beacons in the 5MHz experiment (see *RadCom* October 2017, page 32) over a period of six years of continuous operation. A first generation SoftRock receiver module was driven by an AD9850 DDS as its LO, generating at 21.156MHz. After dividing by four in the QSD this became 5.289MHz, 1kHz below the beacon frequency of 5.29MHz. The 1kHz output from the receiver was combined with a 10nF capacitor and 15.9kΩ resistor made up from a 15kΩ fixed resistor and a 2kΩ trimmer for adjusting optimum cancellation. The summed output was attenuated and fed to the microphone input of an old laptop that ran the beacon monitoring software [2].

Sideband cancellation for the simple CR network can be calculated from a surprisingly simple equation: sideband rejection in $dB=20.\log(ABS(1-F/F_0))$, where ABS means the absolute value (to avoid the inconvenience of taking the log of a negative number).

For the WSPR band centred on $F_0=1500Hz$, choosing values of C=10nF and R=10.6k gives the opposite sideband rejection characteristic shown in **Figure 2** for the full WSPR range of 1.4 to 1.6kHz. Although 'perfect' at the centre of the band, the rejection falls to 23dB at the edges, 100Hz either side. Whilst more than adequate for noise rejection, whether this edge rejection value is adequate really depends on what other strong signals are present 3kHz away from the WSPR frequency, This can only really be determined by a try-it-and-see approach. The WSPR decoding software itself does an excellent job of filtering and rejecting unwanted interference, but really strong signals at the wrong spacing may still cause problems.

Opamp network

Figure 3 shows a more complex phase shift network for wider bandwidth operation made from two opamp all-pass networks. Depending on the settings of the two centre frequencies used for the two arms, opposite sideband attenuation of better than 40dB can be achieved over more than a 10% bandwidth. The response can be tweaked for your own requirements; the Excel spreadsheet at [3] allows you to play around with CR values and examine the resulting sideband rejection versus frequency curve.

Doing it at RF

It is unusual to see CR networks used at tens of MHz but this simple network found a place at HF. I was using an AD8348 quadrature receiver chip to go from V/UHF input down to an IF of 21.4MHz, then via a crystal filter to an AD8310 log power detector chip for a wide dynamic range measurement receiver. As the crystal filter bandwidth was only 10kHz a very simple quadrature combining network would suffice to combine I and Q outputs from the AD8346 at 21.4MHz. The receiver chip has 'low' output impedance so a simple CR network of 1k resistor and 7.4pF capacitor (actually a preset adjusted for best nulling) was used. This gave more than 30dB of rejection and proved quite adequate for the purpose. More details of this measurement receiver were given in the November 2016 *Design Notes*.

Arduino radio project

Antony Watts, M0IFA wrote in about his Arduino-based SDR work. "...This was based on two relatively simple pieces of hardware: an SDR using an Arduino UNO and SDR board from Elektor with a VFO using an Arduino UNO and a custom shield, an AD9851 module and a DS3231 RTC module.

"For the SDR I have written code using an available library to program the Si5351 synthesiser chip and provide reception on 80, 40 & 20m, stepping the frequency each 50kHz. This is used with a 96kHz

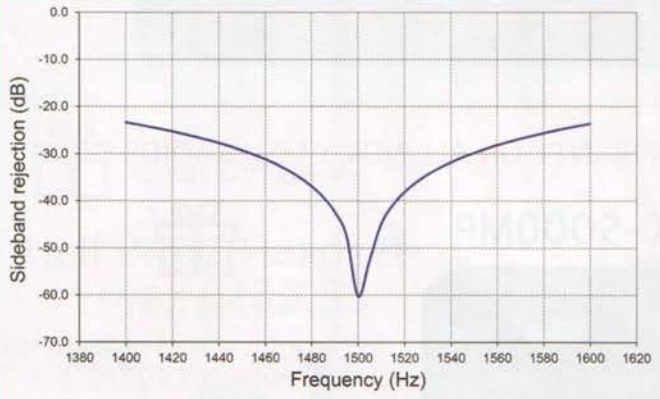

FIGURE 2: Sideband cancellation vs frequency for the circuit of Figure 1.

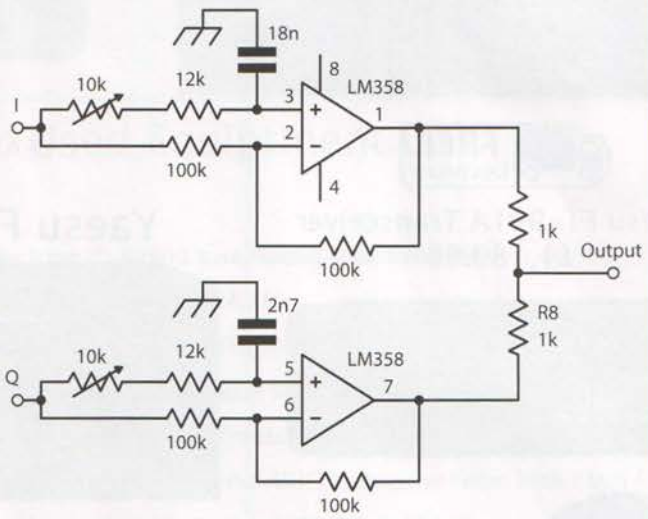

FIGURE 3: Opamp all-pass network offering wider bandwidth quadrature sideband cancellation.

ADC and HDSDR to provide ±48kHz tuning in steps across the bands.

"For the VFO I have number of sketches:

- CW beacon
- PSK31 beacon
- RTTY beacon
- Hellschreiber FELD system, 7 x 14 pixel generator
- Hellschreiber MT system, 5 x 7 pixel generator
- JT65 generator
- QRSS CW generator
- QRSS DFCW generator
- Full range VFO, 1-50MHz, 10Hz-1MHz steps
- WSPR signal generator

"All this is written in C on the Arduino IDE, using available libraries plus a couple of headers/libraries I have written – for standard functions driving an OLED display and for the AD9851 module. These projects have been used for talks at the Banbury Amateur Radio Society (GX0BRA) to stimulate interest in digital modes. As soon as anyone releases a library for the new FT8 mode I will be right on it!"

The software and some descriptions can be downloaded from [4].

Readers' input

Stewart Bryant, G3YSX mentioned an interesting effect he read about on a group posting relating to microphonic effects of high value ceramic capacitors. He quotes from various posts: "One weird characteristic of X5R/X7R MLCC capacitors is how capacitance changes with voltage. When using a modern capacitor that packs the maximum C into the smallest physical size, the capacitance might be half the specified value as the DC voltage approaches the rated maximum. The rated capacitance is only seen near zero volts DC. ... They are piezoelectric and therefore microphonic, and can 'sing' when used in PSU circuits. Be careful using them in low level audio or microphone input circuits as, when mechanically stressed, they can add voltages to your input. Tap on the board, and hear the tapping in your output."

As a user of 4.7μF 1208 and 0805 sized capacitors (the UK Microwave Group chip bank has thousands of these, all going free to good homes) I'm clearly going to have to look out for this effect!

The loop antenna club project described in December's column created a fair bit of interest, with several readers asking if kits were available to non IVARC club members. After a bit of committee discussion, it was decided that there could just feasibly be copyright issues with charging commercially for a product that is based on what is essentially someone else's design, even if taken from an open source publication. Taken together with the considerable effort that always goes into producing kit materials (a fact rarely appreciated amongst kit builders) it was decided that the project would not be offered to non-club members. Furthermore, the PCB order of 20 off is very nearly fully sold out anyway. Our SMT buildathon will be taking place in the New Year.

Software

Peter Rhodes, G3XJP (of PICaSTAR fame) says "I agree about how software writing techniques have moved on over recent years; I'm close enough to the UK teaching profession to know that at long last, they are moving on as well. But in *RadCom*, we are talking about AMATEUR radio, where the primary objective of writing software is completely different from the commercial world. Our only objective – as with any hobby – is to simply enjoy doing it. It only needs to be fun, not efficient or financially profitable. And if we sometimes produce something useful to ourselves and to other amateurs that is a bonus. If that takes a long time and huge number of man-hours that would have reduced our commercial employer to insolvency years ago, then so what?

"By analogy, imagine the pleasures of playing amateur golf where just once in a while, using a set of inexpensive clubs, you hit that perfect tee shot and get a hole in one. It eventually happens to most of those who play regularly (or write software regularly) – and the joy lives on for a very long time. That no professional could have done better is all part of the pleasure.

"However you can't just zip up that magic T-shot and distribute it to others to use, but with magic amateur radio software, you can. That distribution process can and should cost the recipients nothing. Not even the price of a stamp. At the end of the day, it does not matter what infrastructure you write AMATEUR software under – so long as that environment is freely available to us all. Otherwise known as *open source*.

"But there is a big practical catch. Almost all the so-called *free* compilers I have met over decades are so inefficient that the resulting real-time performance is often compromised to the point where you run out of processing time to do something truly useful – or we are all forced to spend more cash on some 'better' hardware to achieve the same end result. Personally, I stick with assemblers. Why? Because I enjoy them more! And finally, the last thing we should ever do is distribute amateur software that requires the recipients to invest in an expensive commercial infrastructure. That is not in the spirit of either amateur radio or open-source."

Websearch

[1] www.softrockradio.org

[2] The 5MHz beacon monitoring software, written by G3PLX, was actually designed to take I/Q inputs in via a stereo soundcard and can do the phase shifting in software. My ancient boot-sale laptop, in common with the majority of laptops and notebooks, did not have such line inputs – just a single microphone port. Hence the need for a separate analogue phase shift network.

[3] Opamp all-pass network design spreadsheet – www.g4jnt.com/DownLoad/OPA90Deg.xls

[4] More descriptions of the Arduino SDR projects by M0IFA can be found at http://ganymedeham.blogspot.co.uk/ and the sketches themselves downloaded from tinyurl.com/RC-1802-DN-1 or https://www.dropbox.com/s/jpa7myezw0ld6dc/M0IFA%20Sketches%20and%20Libraries.zip?dl=0

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LF

A round up of all the latest news from the LF bands.

Following the full allocation of the 136 and 472kHz bands in the USA, there has been a surge in activity. So far, the process of registering with the US Utilities Technology Council hasn't led to anyone being refused permission to use them.

Some new calls spotted over here are: AA1A, W3LPL, WA4SZE, W4BCX, K4SV, W1TAG and N1BUG. Some had been on the air previously with 'Part 5' callsigns but a surprising number are new stations becoming active.

Another new mode

Another LF column, another new mode. This time it's from Con, ZL2AFP and it's an improved version of his earlier WSQ mode. This version is not intended for beaconing but for QSOs and is capable of maintaining readability down to -25dB signal to noise, almost as good as WSPR. It is 50Hz wide and achieves a text throughput equivalent to 5 words per minute. WSQcall is available for free download on ZL1BPU's QSL.net page, just search for 'ZL2AFP WSQcall' and you'll find it.

Within hours of hearing about it, OR7T in Belgium had worked IZ7SLZ and G4GIR had worked LA3EQ all using a 'dial frequency' of 474.00kHz.

VLF news

Stefan, DK7FC doesn't seem to stay on one frequency for long these days. His latest QSY was up to the dizzy heights of 17.47kHz, or as he puts it "close to SAQ". He applied for a special permit and received permission to use 5mW ERP between 17.46 and 17.48kHz until October 2018.

He has wound another enormous coil on a 315mm diameter PVC tube that he reckons is good for a maximum aerial current of 1.5A.

All the usual VLF enthusiasts had to optimise their receivers for this new higher frequency, but the reports soon started coming in. Initially, signals didn't seem much better than previous tests on 8.27kHz but it did yield the first amateur VLF reception of a German station in Spain and also the first VLF reception by IW4DXW.

There was more excitement when the signal was spotted on the Forest Virginia receiver, 6,817km away. This receiver is operated by Mike Smith in Lynchburg, Virginia and is obviously good. He has gone to a lot of trouble to isolate it from local noise sources. It is battery powered and signals are passed to the shack via fibre-optic link, so that there can be no earth-loops.

The SDRs at the island station of Rolf, LA2XPA. The Kiwi-SDR is on the top right.

Stefan then sent a single character EbNaut message that was decoded successfully with an Eb/N0 or +1.5dB. At the time of writing a longer message is being attempted but proving difficult.

One interesting fact that came to my attention because of these tests is that East to West VLF transmission is harder than West to East, by a considerable margin due to the effect of the Earth's magnetic field. It's all the in the Appleton-Hartree equations evidently!

Paul Nicholson worked through the figures and found that the West to East path is better by around 4dB at 17.4kHz and about 13dB at 8.2kHz. This explains why we get good reception on 8.27kHz (well, Paul Nicholson does) of trans-Atlantic signals whilst the American listeners find it hard to receive even Stefan's big signal.

Meanwhile down on 8.27kHz a new signal has been seen around Europe. In addition to the Germans and the two trans-Atlantic participants, VO1NA and W4DEX, we now have Riccardo, IW4DXW active on the band. His LF aerial is a 12m high inverted L with a 3-wire top and his 8kHz loading coil uses bundles of twisted-pair cable with each bundle's two cores connected in series. This must increase the coil's internal capacitance quite markedly, presumably resulting in less turns being needed? He has been received by Paul Nicholson in Todmorden.

136kHz DX

It seems that 2E0ILY has a direct line to N1BUG in Maine these days, with multiple good receptions on many nights. Notably on 2 December when Chris's WSPR2 and JT9 transmissions were successfully decoded 26 times between 0024 and 0524!

Other G stations regularly reaching long distances on 136 are G3XDV and G8HUH.

Also in December, WH2XXP in Arizona has been spotted by KL7L, 4,047km North in Alaska. A similar land-path distance was achieved when R7NT's WSPR15 transmission reached UA0SNV, 4,294km away in Asiatic Russia. Later in the month EB8ARZ on Tenerife copied K3RWR using WSPR, the distance there is 5,609km.

472kHz DX

Looking through the WSPR database I spotted the reception of KL7L (Wassilla, Alaska) by ZL2AFP on 26 November at 11,539km. Laurence, KL7L reports that his 472kHz signals regularly reached half a dozen Japanese stations during December.

From this side of the pond, F4DTL and PA3ABK were both spotted by NO3M in Pennsylvania, DH5RAE reached N1BUG at 5,934km, and best of the UK was G8HUH to WA3TTS at 5,799km.

A first reported opening between KH6 and Europe occurred just after local sunrise on the 16 December when K9FD/KH6 (Hawaii) was picked up by LA2XPA on WSPR. Rolf, LA2XPA has an interesting station on the island of Kalvoya that he controls from his home in Kristiansund. The equipment in use was a Kiwi-SDR and a 315° Beverage aerial. Rolf intends to try transmitting from Kalvoya soon, once he's sorted out the remote control for the transmitter. The TX aerial will be a Titanex V160HD vertical, shortened to 18m and fitted with an umbrella type top-load. He hopes to make trans-Atlantic QSOs on JT9.

To the south, EA8BFK on Fuerteventura in the Canary Islands seems to have a good setup. He often receives WA4SZE from Tennessee over a distance of 6,782km and his best DX recently was K5DNL from Oklahoma 7,645km away. From the UK he has spotted G3KEV, G4FTC and G4JNT. G3KEV in Scarborough is the furthest away at 3,058km.

New on the bands

G0MRF reports working G7JUR for the first time on 472kHz. Phillip uses an IC-7300, which produces around 5W of RF on the band after filtering. The aerial is a G5RV strapped as a Tee. So far his best report is from DH5RAE using WSPR, but he plans to build a PA and extend the range soon.

Dave Pick, G3YXM
daveyxm@gmail.com

HF

There was at least one sunspot in evidence for most of December but even though the sun was spotless at the end of the month there was still DX around.

29 December saw a solar flux index of 72 and sunspot number of zero but there were Australian stations including VI70HI on 21MHz during the morning.

The enthusiasm for trying out the new FT8 data mode continues – even though in very many cases more flexible QSOs would be perfectly possible using traditional modes. Michael, G7VJR announced last month that more FT8 QSOs had been uploaded to Club Log in September than CW and SSB QSOs combined! G3SVK recommends www.g4ifb.com/html/ft8_tips.html as a useful list of tips for FT8 activity and also the website www.ft8dmc.eu

The major 3Y0Z Bouvet DXpedition should be on the air a few days before the end of the month so if you need it you should give it some attention as the massive costs mean that a return trip is unlikely for another 20 years or more. Bouvet is currently #2 on the global most wanted list but should be relatively easy to work from the UK on a path running due south, away from any auroral zone issues.

The Stew Perry (W1BB) 160m winter contest took place at the end of the year and a number of UK stations took part. Looking at reports I see that G3SJJ made over 30 trans-Atlantic QSOs using a dipole at 60ft, G3ZGC managed 15 trans-Atlantics using a long wire in his 55ft garden, and G4IIY managed almost 100 trans-Atlantics and one JA, so conditions seem to have been good.

IOTA

The deadline for submissions for the 2018 IOTA Honour Roll and Annual Listing is 31 January so readers may still have a few days to prepare their online applications and send in any necessary physical QSLs to their checkpoints. During December the IOTA management team announced that IOTA chasers can now get credits through QSO matching for irregular log names in Club Log. To facilitate this, the log names are now listed on the accepted activations tab in the Club Log section on the iota-world website. In order to get a match for AA1AA/P on XX-yyy with the log name AA1AA/P_XX-yyy, the chaser must upload to Club Log a QSO with the callsign AA1AA/P_XX-yyy. Once the match is obtained, the system will automatically use the proper callsign in the subsequent application.

Dane, J28ND, and his 40m vertical antenna.

Craig, VK5CE is planning "a range of rare and semi-rare IOTA operations". He invites island chasers to visit the new VK IOTA website (www.vkiota.wordpress.com) and take the poll to help guide his future IOTA activations.

IK5BCM, IK5CBE and IK5CRH will be active as D68I from the Comoro Islands (AF-007) from 28 January to 10 February. They will operate CW, SSB and digital modes on 80-10m.

Andy, M0HLT will be working on Ascension Island (AF-003) for the next two years. He plans to be active as ZD8AC on 40 to 10 metres SSB.

The special callsign HH70A will be active from 1 January for six months to celebrate the 70th anniversary of the Radio Club d'Haiti (NA-149).

KH0/AA4NC and KH0/AA4VK will be on Saipan from 21-28 February. The operations will commemorate World War 2 and there will be stops on T8, KH2, KH0 and KH6.

AI5P, N0KV, W0ZA and WD0E have rescheduled their planned trip to Pointe Milou, St Barthelemy Island (NA-146) to take place from 18-27 April. They expect to be operating on SSB, CW and RTTY on 3.5 to 28MHz.

Haru, JA1XGI will be active again as P29VXG from New Britain Island (OC-008) on 1-7 February. Main activity will be on 160-20m CW, with a special focus on Europe and North America on 160m. QRS will be on Club Log (search for P29VXG/2018).

ZC4A will be active again from the UK Sovereign Base Areas on Cyprus (AS-004) on 24-31 January, including an entry in the CQ WW 160-Meter CW Contest (26-28 January). Two or three stations will operate CW with some SSB and digital modes on 160-10 metres.

Morten, LA4JSA will be active as JW4JSA from Bear Island (EU-027), Svalbard until 1 June 2018.

N1KDO will be on Providenciales (NA-002) during early February and QRV as VP5/N1KDO. Activity will be on FT8 and some SSB and CW. A KX3 running 4-5 watts will be used along with end-fed vertical wires by the ocean. Listen for him on 40-10m, with a focus on the WARC bands.

N4UM, K4RUM and N4BP will be on Abaco (NA-080) in the Bahamas as C6ARU, C6AUM and C6AKQ from 6-20 February on 160-6m.

Brazilian father and son, PY2NDX, Rafael, and PU2XDX, Joao, are heading to Fernando de Noronha (SA-003). Rafael will use PY0F/PY2NDX, and 11-year-old Joao will be QRV as PU0F/PU2XDX from 27 January to 1 February. Activity will be mostly on 40, 20, 15 and 10m.

Various JA ops will be QRV from Palau (OC-009) around the end of January. Look for T88PB first and then T88XS.

Until 28 February the special callsign VI70HI will be active from mainland Australia (OC-001) to commemorate the first ANARE expedition to Heard Island in December 1947.

Non-IOTA DX

John, N9MDH is working for the US State Department in Togo until the end of May 2018. He has a barefoot IC-7300 and a Gap Titan and will be QRV on the digital modes, especially weak signal modes, as 5V1JE. He can operate on 80-10m, but prefers 30 & 20.

A party of eighteen students and three staff from Sandringham School in St Albans will visit the Senior Secondary High School

New Cocos Keeling licensee Peter, VK9FISH with Keith, GM4YXI.

in Farafenni in The Gambia from 9-16 February. Headteacher Alan, G4DJX, will lead the DXpedition aspect of the trip. He will operate mainly CW, while four licensed students from the school will operate on SSB. Their call will be C5DX (more info on p11).

Willy, 6W/ON4AVT will be on the air from 1-28 February with 100 watts to a Buddipole vertical on 20m PSK and SSB.

Italian ops will use a series of special callsigns throughout 2018 to honour twelve of "the most eminent scientists who have given a fundamental contribution to the theoretical, experimental and technological development of radio communications technology": II4MXW (James Clerk Maxwell) in January, II4HRZ (Heinrich Rudolf Hertz) in February and II4CAO (Temistocle Calzecchi Onesti) in March, see www.arifidenza.it/ for more information and rules of the Science Milestones in the History of Radio Award. Most of the names celebrated are well known but I had to look up Onesti who it turns out invented the coherer that was later used as a radio wave detector by Marconi and others.

Eleven special calls will be on the air for The 11 Cities Marathon in the Netherlands, which spans all of 2018. The city of Leeuwarden is a European Capital of Culture for the year. That city and 10 others in Friesland Province will host the event. The special callsigns all begin with a PF2018 prefix and have a three letter suffix and there will be one per month until December when all 11 will be active. See http://hamecc2018.eu/ for more info.

N4YDU will be QRV as TI7W in the ARRL International DX Contest CW 17/18 February. Before and after the contest he will use the call TI5/N4YDU.

TABLE 1: 2017 worked DXCC entities (ranked by All) showing Top 4 from RSGB or British Isles table in Club Log plus submitted scores or Club Log scores of recent correspondents where available.

Call	CW	SSB	Data	All
M0NKR	215	230	139	271
G4TUK	208	193	198	271
G3TBK	256	176	141	260
M0IKW	161	107	42	258
G4PTJ	215	103	0	257
G3SVD	197	198	86	257
G4IDL	217	0	75	223
G3PXT	125	135	179	216
GI4DOH	205	29	83	207
CT7AGZ	186	-	99	206
G3HQT	199	0	0	199
G4XEX	140	117	120	193
G3SVK	181	0	107	181
G8APB	72	57	64	124

TABLE 2: Forthcoming DX activity.

Until 30 January	C5YK
Until end May	5V1JE
Until June	JW2US JW4JSA
24-31 Jan	ZC4A
27 Jan – 1 Feb	PY0F
End Jan 2018	3Y0Z Bouvet (AN-002)
28 Jan – 10 Feb	D68I
1 – 7 Feb	P29VXG
1-28 Feb	6W/ON4AVT
6-20 Feb	Abaco C6 by US ops
9-16 Feb	C5DX
17-18 Feb	TI7W
21-28 Feb	KH0 by US ops
23 Feb – 16 Mar	3D2/Rotuma
21 Mar – 3 April	7Q7EI
10-20 March	9M0W Spratly (AS-051)
April	St Brandon by F ops

Dane, S53T will be 'sporadically' in Djibouti until the end of the year and operating periodically as J28ND. He has an FT-991A running barefoot into a multi-band dipole and 40m full size vertical. Activity will be on CW, SSB and RTTY on all HF bands.

Correspondence

Peter, G4XEX had his planning appeal turned down and is stuck with his beam only a few feet above the ground. Despite this severe handicap he worked (FT8 in italics): 15m – J5T; 17m – *ZS1TMJ, ZS6C, 9X2AW,* 5A1AL; 20m – *9M2TO, 9M2MRS, CX5RZ, YB3LZ, YV5BM, JH3KCW, JA3ENN, VK6XN, OD5YA, LU2XP, CX1TH*, 6Y0ND, 5X8B, J5T, 5N5N, V47T, 9G5W, 5X1NH, ZF2MJ, FY5FY, PJ4Y, 6Y0D, 5A1AL, PJ4Y, PJ2T, 6W1SU, V5/DK1CE, 6Y0D, 9Q6BB, 9G5W.

Ken, G4RWD/CT7AGZ has ordered a new tower for his Algarve QTH and hopes to have a much better signal in 2018.

Andy, G0SFJ wrote in with a first report on his activity with an OCFD for 40m that is tunable on other bands. He found Russian stations on 17m from 0900 and US/Canadians on 17 and 20m from 1300. Afternoons produced the more distant European countries on 17 and 20m (nearer ones would need a stronger ionosphere or backscatter propagation). He noted that ADSL QRM limits his ability to hear anything on 10MHz and down.

Chris, G8APB reached 124 DXCCs by the end of the year on FT8 including Libya and Gabon.

Gordon, G3PXT clocked up over 12,000 QSOS in 2017 and December additions included: 17m – *9M2TO*, 9Y4DG; 20m – VK, 8P6GU, PJ4DX, *HK3C, 4S6RYD, BV2FB*, 9M2CNC; 40m – HV0A, HF0DGS, *C5YK*, VK. Gordon also qualified for the Platinum YOTA Award.

Peter, G3HQT relied on DXpeditions to build his DXCC score last year but was unable to hear most of the Pacific stations.

Fred, G3SVK found: 15m – V5/DK1CE, CZ2AQ; 17m – 3C1L, 9U4M, J5T, J68GD, 3B9FR, 3XY3D; 20m – TU0PAX, 3B9FR, 3XY3D; 30m – TO2SP, V5/DK1CE; 40m – P40T, 6Y1LZ, HI3Y, KH7XS, 3C1L, VP2MDL, VP9/DK7LX, TO2SP, RI1ANO, TZ4AM, HK1MW, D2EB.

Finally

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

Martin Atherton, G3ZAY
g3zay@btinternet.com

VHF/UHF

The 6m QSL card between GJ4ICD and VK3AKK.

An exciting new MGM VHF contest series is promoted by the RSGB for 2m and 6m.

A departure from the usual format this month with something quite new for experienced and non contesters in the RSGB VHF Contest calendar.

Feedback from various surveys and communications from the VHF community showed that there was the possibility to create a series of contests for usual participants and non contesters, with a simple format that would allow entry from any station whether it be low power and single antenna to the QRO multi antenna big guns.

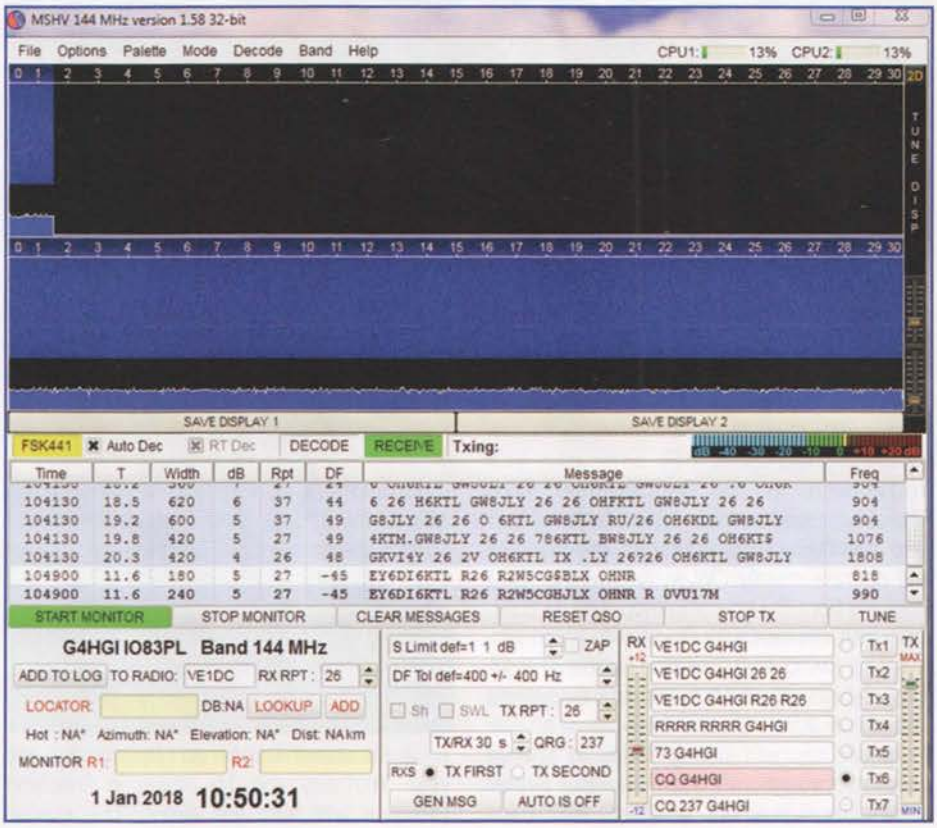
Also this was a chance to allow stations to use cross mode formats to suit the bands and conditions at the time of the contest.

It has to be said that many 'traditional contesters' haven't tried the delights of machine generated mode (MGM) operations and conversely there are many non contester DXers out there who rely on other IARU Region 1 radio societies and groups to provide real DX contacts during contests.

With this in mind the RSGB VHFCC have devised a series of contests that will give all operators the chance to develop skills with other modes of transmission within a dual band (6m and 2m) competitive format.

Next month I will highlight the potential new skills and set up required to enter these contests and the equipment necessary to start using MGM modes.

First, the basic details of the contest.



MSHV desktop screen.

New RSGB VHF MGM Contest Series

In a departure from the usual VHF contest format, requiring full locator square and serial number exchanges, these contests rely on exchanging solely the normal reporting system used for a particular MGM mode and the 4 character Maidenhead locator.

To maintain the points per kilometre theme, the scores for each QSO will be calculated to the centre of the worked locator square.

Just to be clear, this series of contests is quite different from the format used for MGM in the RSGB UK Activity Contests. The UKAC's require the exchange of traditional levels of information ie full Maidenhead Locator and serial number. To achieve this in a cross platform format with all the different modes classed as MGM would be impossible and impractical hence the introduction of a simple but effective scoring system usable by all MGM operators.

The two band format of 6m and 2m also gives flexibly for all users, either equipped for both or just a single band.

What is MGM?

MGM are something many stations are already using anyway on a day to day basis. There are many modes classed as MGM ie FT8, FSK441, ISCAT, JT65, RTTY, PSK etc, with a couple within that list that are currently taking the HF/VHF world by storm. FT8 in particular has seen an incredible rise in interest certainly on 6m whereas ISCAT, FSK441 and JT65 that have been around for some years on VHF still command a good following by DXers.

With so many variables in the type of machine generated mode emission it was difficult to try and establish a scoring system that would be 'inclusive' to as many users as possible. With so many differing reporting formats and QSO structures a simple scoring system was devised by the RSGB CSC/VHFCC that will be different from the traditional contest exchanges and scoring but enable multi modes to be used.

Scoring

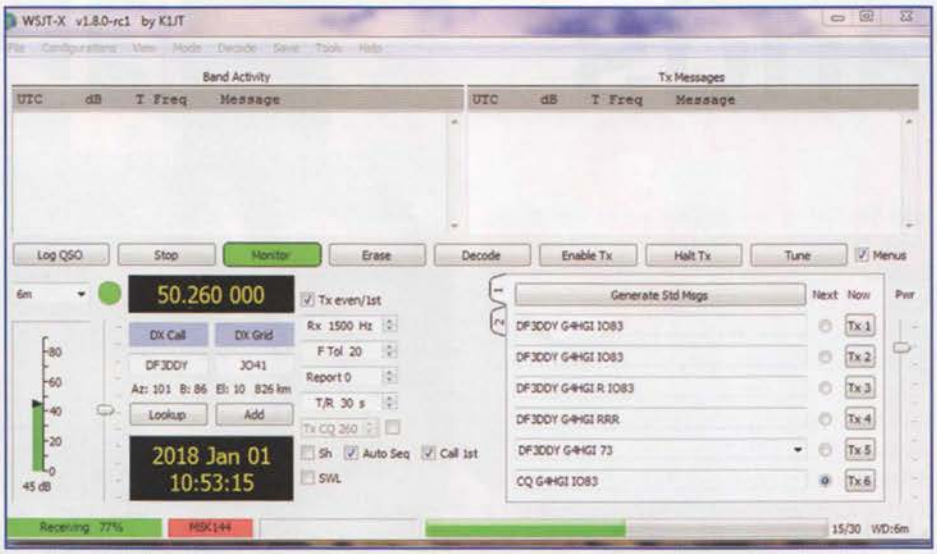
Each contact will be scored to the centre of the locator square worked (for example IO83mm etc) and the points per kilometre score calculated for each contact. Many MGM software structures only support a four character locator system IO82, IO91, JO33 and so on.

There will also be a multiplier for each new locator square worked. So and easy way to score manually or via PC etc – points per km to the square centre multiplied by the number of unique locators worked.

This allows the use of multiple modes within the contest – ie it is conceivable on 6m that FT8, JT6M and MSK144 could be used for meteor scatter, tropo and Sporadic-E contacts all contributing to the overall score.

Only unique stations can be worked on one band regardless of the mode or propagation type.

The MGM series of contacts are not to be confused with the excellent work done by Martin, GM8IEM for the use of MGM in the UK Activity Contests, which is well documented in the guidelines on the RSGB Contest website [1].



WSJT-X desktop screen.

Software

Established software for RTTY/PSK etc and the already well founded QSO structure for these modes can be used as long as a report and the four locator square characters are exchanged. Since the introduction of the WSJT software in the early 2000's each version has developed a full package dedicated to each mode of MGM. There have also been developers who have taken the WSJT base code to different levels and this seems to be continuing apace.

There are three main packages that would satisfy most of the K1JT inspired modes of MGM. The following web locations should satisfy the majority of software requirements for the MGM contest series. WSJT-X [2], WSJT [3] and MSHV [4].

Contest dates

It was important to choose time and date slots during the year for the contest that not only cover a weekend period for maximum activity but also to be close but not necessarily at the peak of potentially good meteor scatter and possible Sporadic-E conditions.

The April 2018 Contest 1 will take place on Saturday 21 April to Sunday 22 April between 1400UTC to 1359UTC.

Contest 2 is currently in the VHFCC calendar [5] on Saturday 20 October to Sunday 21 October however this may be subject to a date change as there is a conflict with another contest – this will be updated as soon as possible – again 1400UTC to 1359UTC.

The bands in use will be 50MHz and 144MHz and the established band plans must be strictly observed for each mode of emission.

Any recognised MGM mode eg FT8, FSK441, ISCAT, JT65, RTTY, PSK etc can be used, however currently CW and EME (moon bounce) contacts are not permitted.

Sections will include **UKL (Low Power),** UK & CD (Crown Dependencies) entrants only. The power 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. Stacked or bayed antennas are not allowed. Backfire or parabolic dish type antennas must not exceed 2 metres in diameter.

UKO (Open) UK & CD (Crown Dependencies) Entrants only. Standard licence conditions and no antenna restrictions

EUL: Non-UK & CD (Crown Dependencies) Entrants only. The power 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. Stacked or bayed antennas are not allowed. Backfire or parabolic dish type antennas must not exceed 2 metres in diameter.

EUO: Non-UK & CD (Crown Dependencies) Entrants only. Standard licence conditions and no antenna restrictions.

The RSGB VHF Contest General Rules apply [6] and also the definition of a completed QSO must be adhered to as detailed in the *VHF Managers Handbook V 8.01* dated November 2017. A full download can be made from [7]. Of particular note is the following extract that includes the use of ON4KST Chat through whatever access portal.

VHF Managers Handbook

Section 4.4.9 Valid contacts

A valid contact is one where both operators have copied both callsigns, the report and an unambiguous confirmation. However no recourse should be made during the contact to obtain the required information, change of frequency, antenna direction, etc via other methods such as the internet, DX Cluster, talk-back on another band, telephone etc. Such secondary methods invalidate the meteor scatter contact.

In essence: if anything concerning the ongoing QSO attempt is agreed through other means than the QSO attempt frequency a new start is required.

Section 4.4.10 Additional information.

Acceptable examples:

- "shall we make a sked on 144.388 starting at 1310z, I will start"
- "I have QRM, let's move 5kHz up and start again"
- "let's continue for another 15 minutes and start again"
- "thank you for a nice QSO" after the QSO has completed on the radio"

Unacceptable Examples:-

- "I only need the final rogers"
- "470/9"
- "I received a burst from you"
- "I received a burst from you but cannot decode it"

Next month there will be an introduction to the hardware needed and operating practices required. This is paramount to get right to avoid confusion and interference to other stations.

Correspondence

It was great to receive a email from Geoff, G(J)4ICD with some real "new old news" as he put it. Email confirmation from Steve Gregory, VK3OT of a record breaking QSO going back to the heady days of superb F2 propagation in 1991 from Jersey right across to Victoria Australia. Also here is the QSL card to confirm it!

Gordon, G3PXT (JO02) continues his operations on 6m in December using his tree mounted, fixed direction 2 element Innov Quad antenna. Prime mover TS-590SG with an Acom Amplifier power unit. With a total of 89 QSOs Gordon has worked 23 DXCC entities in December with 64 Locator squares logged and his best DX at 1732km. OE, EA6, ON, 9A, OK, OZ, G, ES, DL, F, HA, I, 40, PA, GI, SP, ISO, GM, OM, S5, EA, SM and HB. All this activity is ideal for his contribution to the UKSMG Winter Marathon that completes on 31 January at 2359UTC.

Sign off

Slightly different format to the column this month and I hope the details of the new MGM series will increase participation on 6m and 2m.

Websearch

[1] www.rsgbcc.org/vhf/MGMGuidelines.pdf
[2] https://physics.princeton.edu/pulsar/k1jt/
[3] https://physics.princeton.edu/pulsar/k1jt/wsjt.html
[4] http://lz2hv.org/mshv
[5] www.rsgbcc.org/vhf/
[6] www.rsgbcc.org/vhf/rules/18rules/General.shtml
[7] www.iaru-r1.org/index.php/downloads/func-startdown/991/

Richard Staples, G4HGI
g4hgi@live.com

GHz Bands

The GB3CAM 24GHz beacon at Wyton, Cambs.

GHz software radio

You might have noticed recently that I'm getting more interested in the use of software radio and SDRs for the GHz bands (for example see G4JNT's Data column last month). I'm now convinced that this is the future for our bands and I'm not alone in this. Several blogs, notably [1] and [2] have been making noises along these lines for quite a while now. They point out that common RF hardware platforms such as the Pluto [3] and Lime SDR [4] exist, and that to make them work we need to create code (apps) to run on computing platforms for them. If we are to fill our GHz bands and show Ofcom we deserve them, we need to be experimenting with wideband digital modes and data comms based on these ideas. I'm slowly getting my head round this.

So far, I've got my Lime SDR to generate RF and act as a GHz bands receiver. Connecting it to my existing preamp and antenna systems, using just the few code examples supplied, I can look at the 1.3 and 3.4GHz beacons at Martlesham with it. I'm in the process of doing some RF measurements on the Lime, to understand its limitations for amateur radio use and I hope to report on the results in this column in due course. I'm also dipping my toe in the software water, making wireless code for the RTL dongle and my Lime SDR using the GNU Radio companion that is bundled with the 'Pothos' Windows software suite [5]. Pothos describes itself as "a scheduling framework and an API for solving problems with interconnected processing blocks". There you go again with that *language of exclusion*! But it's akin to a visual programming language (VPL) [6] in that it lets users create programs by manipulating program elements graphically rather than by specifying them textually. This is the very dragging, dropping and linking of functional blocks that I mentioned last month in the Data column. For GNU Radio, I'm working from the excellent 4-part GNU Radio Companion primer on the web pages of Prof Sharlene Katz, at the Department of Electrical and Computer Engineering, California State University, Northridge [7]. Too cold to go out portable? Find the Pothosware tutorial [8], download the Pothos suite, and get hacking! What have you got to lose?

Playing in the snow

Back in December we had the first snow of the winter here on the Fen Edge. I saw some nice snow scatter on the GB3CAM beacon 24048.870MHz, GB3MHZ 10368.830MHz and GB3PKT on 10368.943GHz but sadly no activity to go with it. It's always fascinating to turn the dish a few degrees either side of the direct path on rain or snow scatter and hear the Doppler frequency of the scattered signal change from low to high. I tweeted a video of this at [9]. We know that because the individual rain drops are moving at slightly different speeds and directions we get signal spreading, but this effect with beam heading must be caused by different relative velocity of the scatterers as we 'look' at different parts of the rain or snow cell. I consulted meteorologist Jim Bacon, G3YLA and he hasn't a definitive answer for me just yet. Jim and his work colleagues had a long discussion in the office and there is a lot of literature out there, although much of this relates to the larger severe storms in the Midwest of the USA where there is a long history of Doppler radar work. In the USA there is much evidence of slowly rotating supercell storms or mesocyclones where such results could be expected, but there is less on the smaller UK style storms. If you know the cause of this, please email me. I'm sure readers would love to know!

New GHz activity in 2018

G8GKA and G4HSK popped up during the Wednesday night digifest for new stations for me and it's good to see several people building for 1.3GHz and above. Geoff, G0DDX is building a small 1.3GHz EME system that he can wheel in and out of his garage when he needs it. M0CVO's winter project is a 18W PA using a Mitsubishi module, while Simon, G7SOZ, is working towards getting QRV from home on 1.3GHz. He has an SG Lab transverter and a 45W PA for the band. Simon is also experimenting with the Analog Devices Pluto. This interesting looking device is capable of generating or measuring RF signals from 325 to 3800MHz, with a 20MHz bandwidth. It is available from Farnell [10]. In Bedfordshire, Chris, G4SDG is looking for someone close to him to do some tests with his new 2.3GHz system. He can hear the GB3MHZ Martlesham beacon, albeit weakly, but would like to try some QSOs. Email him via g4sdg@cmjdg.com for a sked.

More spectrum challenges

Back in December, Ofcom released a spectrum policy statement [11] following the consultation on the 5.8GHz band, which will increase the available spectrum for broadband data service licensing in the range 5725–5850MHz. The policy will remove a 'notch' in the band that had been earmarked for road tolling systems. Parts of the amateur and amateur satellite 6cm band are already being shared with the broadband data services in this range and this situation will not change. Consultation responses submitted by the RSGB and the UK Microwave Group clearly highlighted the authorised amateur and amateur satellite use of parts of the frequency range, which is not common knowledge amongst the broadband data community.

Finally

Keep band reports and technical snippets coming in to me by email. Why not join the conversation on Twitter @g4bao and @ukghz using the hashtag #GHz_bands? But most importantly, *get on the GHz bands*!

Websearch

[1] https://faradayrf.com/the-future-of-amateur-radio-is-software/
[2] http://bit.ly/2AvwvkS
[3] https://wiki.analog.com/university/tools/pluto
[4] www.limemicro.com/
[5] www.pothosware.com/#overview
[6] https://en.wikipedia.org/wiki/Visual_programming_language
[7] www.csun.edu/~skatz/katzpage/sdr_project/sdrproject.html
[8] https://github.com/pothosware/PothosSDR/wiki/Tutorial
[9] http://bit.ly/2BYPrVa
[10] http://bit.ly/2AtF7Ix
[11] http://bit.ly/2wfNzrt

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Using cheap 5.8GHz drone equipment for ATV on 6cm

The dramatic increase in popularity of cheap drones has led to the ready availability of cheap 5.8GHz video transmitters and receivers that are used to relay 'first person view' (FPV) pictures back to the operator.

These can easily be used as the basis of a simple but very capable 6cm analogue amateur television (ATV) system. **Photo 1** shows a typical 5.8GHz receiver and transmitter set as purchased via the internet.

PHOTO 1: Typical 5.8GHz receiver and transmitter as purchased.

The transmitter modules

The transmitter modules are typically single PCBs about 20x40mm in size, see **Photo 2**. They accept analogue video, audio and 12V inputs via flying leads connected to a plug-socket pair on the board. They are designed to be as light as possible to maximise the flight time of the drone carrying them.

The video input takes 1V peak-to-peak composite video from a camera or other device. There are many options for the amateur to use as a picture source. Most older camcorders have a suitable video output, as do many video players for SD cards; cheap cameras are also available that are specifically designed for use in drones. A Raspberry Pi computer can also generate composite video from the Pi Camera or from the test card application built into the Portsdown software [1].

There are usually two audio inputs, for left and right stereo channels. The audio signals are modulated onto subcarriers at 6.0 and/or 6.5MHz. The inputs need to be driven at line level – about 0.9V peak-to-peak. In amateur use, both inputs are normally driven in parallel.

The DC power input tends to be very tolerant of voltage variations as it is fed straight into a switch-mode power supply. A typical module will operate from 8 to 15V.

The operating frequency is set using DIP switches. Some modules have 16 channels, some 32, others 48; check before purchasing to make sure that your module covers the preferred ATV operating frequency of 5665MHz – many of the 16 channel versions do not. The modulation is wideband FM. The deviation is preset as double that typically used by amateurs in the 23cm band; it is the same as used by first-generation (analogue) satellite TV. The overall transmitted bandwidth is quite wide, at 27MHz, requiring care to stay within the amateur band limits.

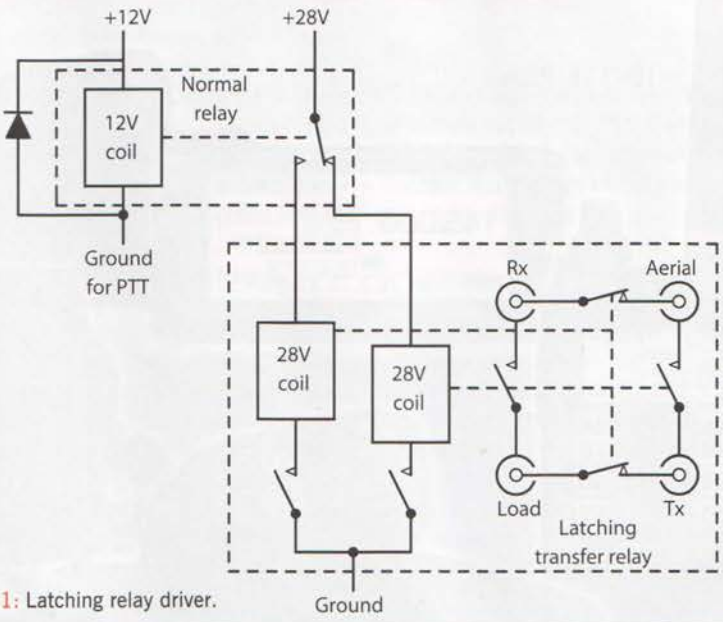

FIGURE 1: Latching relay driver.

The output socket used is normally a reverse-polarity SMA (RP-SMA), of the same type that is normally found on 2.4GHz Wi-Fi equipment. It is not recommended that this socket is changed as the PCBs are delicate and easily damaged. A better solution is one of the cheap RP-SMA to normal SMA adapters, on eBay and elsewhere. Output power is typically up to 600mW, although some recent modules have an output of 2.5W+.

Receiver modules

The receiver modules (**Photo 3**) are generally built to be physically more robust as they do not have to be so light as the transmitters and are subject to more handling during their intended use.

Again, the aerial input is an RP-SMA socket. The receiver sensitivity has been measured as -80dBm (to achieve a picture without 'sparklies' – visible FM noise). This is about as good as could be

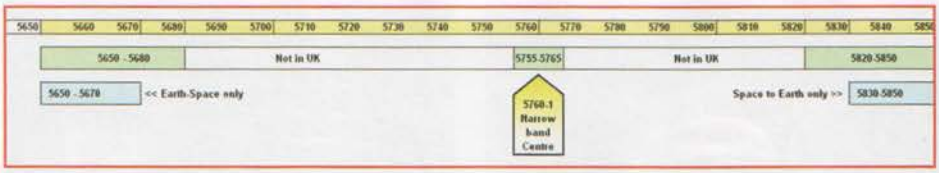

FIGURE 2: The UK 6cm band plan.

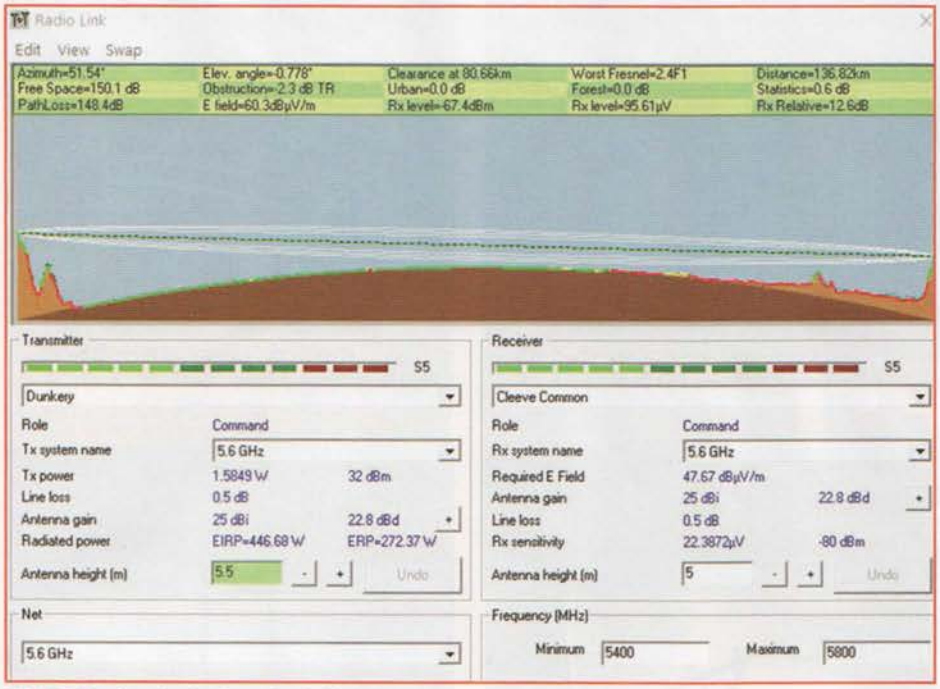

FIGURE 4: A path plot from Radio Mobile.

expected from an integrated receiver. It is certainly sensitive enough that you do not require a preamp before you first get on the air.

Video and audio output connections vary from module to module. A 4-terminal 2.5mm jack is common; the lead supplied for connecting to this should be colour-coded yellow for video, red for right audio and white for left audio. However, some modules seem to be supplied with leads that bring the video out on the red socket and right audio on the yellow socket. The contacts on the 2.5mm jack can be unreliable; the unit in Photo 3 has had the wires soldered to the PCB jack socket terminals and then connected to stripboard and solder pins for reliability.

The video output can be connected directly to a black and white or colour analogue monitor. Old CRT monitors (or TVs with line inputs like SCART or phono) are usually ideal, as they will cope with noisy signals and continue to display a picture. Some more modern CRT TVs go to blue screen, but this can often be disabled via a menu option. Newer LCD monitors display really clear pictures when the signal is good, but tend to only display the blue screen when presented with a noisy picture or no picture at all. This can make

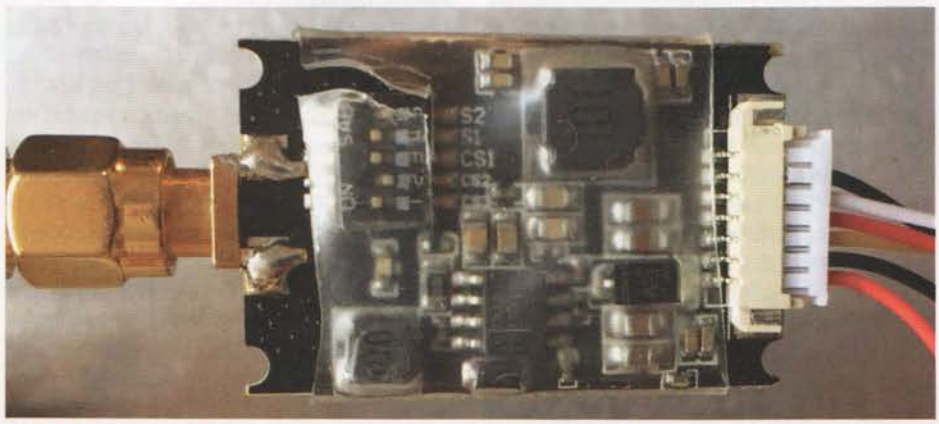

PHOTO 2: Close-up of a typical transmitter module. The DIP switches on the left set the operating channel.

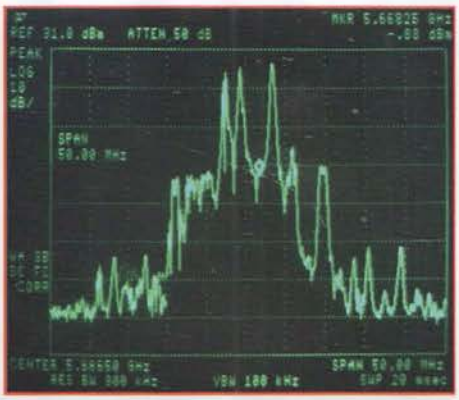

FIGURE 3: The transmitted spectrum is about 27MHz wide.

it difficult to establish initial contact or to receive pictures on marginal paths. The solution to this problem is a device that adds sync signals back to noisy pictures. An example is the Eachine ProDVR Video Audio Recorder device, available for about £20 on eBay, which is ideal; alternatives include the sync processor described in *CQ-TV 129* [2]. The GTH Electronics Advanced Digital Converter and Video Enhancer (ACE) also does a splendid job, but is more expensive.

The receiver audio outputs are at line level, and are best amplified using a set of computer speakers – these provide a volume control and a suitable amount of gain. Successful (noise-free) reception of audio requires a reasonably strong received signal.

Aerials

For initial cross-shack tests, small aerials (eg a quarter-wavelength 15mm wire) are more than adequate. Do not operate the transmitter without an aerial or dummy load, as the manufacturers warn that the power amplifier stage may be damaged by the reflected power.

For general use, panel or dish aerials are suitable. There are many flat-panel aerials produced for the 5GHz Wi-Fi band that are suitable. Examples include the TP Link TL-ANT5823B. There are also dish aerials produced for Wi-Fi links. A recent 136km video contact used the Hyperlink Technologies HG5827G 27dBi grid dishes at each end (see **Photo 4**).

Sky-type satellite dishes can be used with a simple feed placed at the same point as the mouth of the original (but removed) 10-12GHz satellite LNB. The W1GHZ log periodic aerials (available from G4DDK as a 5.7G Dual Patch [3]) are ideal.

You can also use an existing 10GHz dish for 5.6GHz. For my initial tests, I achieved good results (receiving pictures from 80km away!) by simply taping a 5.6GHz dipole (at the end of a

Dave Crump, G8GKQ
dave.g8gkq@gmail.com

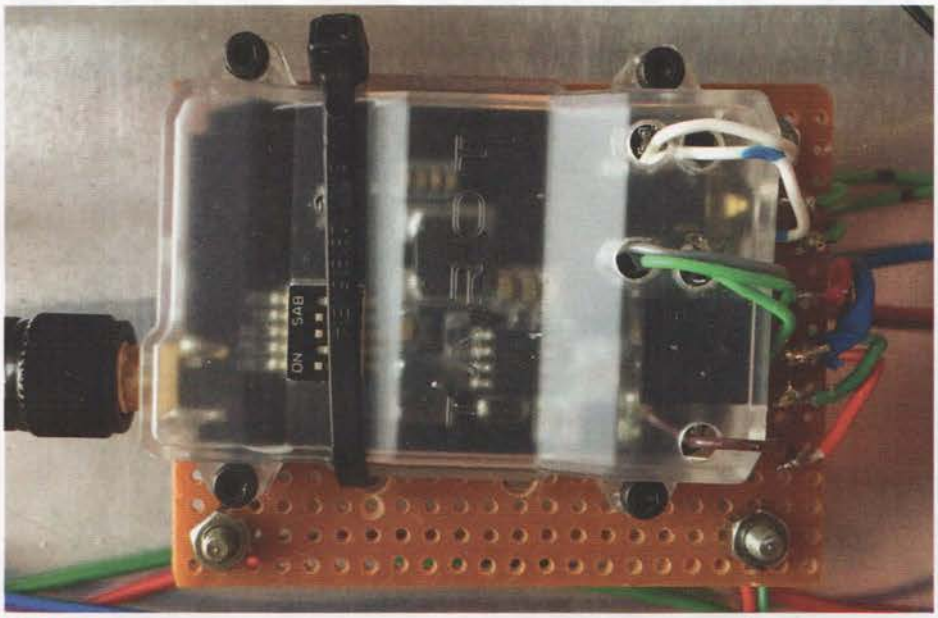

PHOTO 3: Close-up of a typical receiver module. Again, the frequency is set by DIP switches.

PHOTO 4: Hyperlink Technologies HG5 827G 27dBi 5.8GHz grid dish.

PHOTO 5: Sky dish with W1GHz log-periodic feed (the small green triangle).

PHOTO 6: 10GHz dish with 5.6GHz dipole feed.

PHOTO 7: Dual-antenna portable operation by Stewart, GOLGS.

length of semi-rigid coax) in the mouth of the 10GHz horn feed on a 60cm 10GHz dish, as shown in **Photo 6**.

Aerial changeover

You will want to be able to change between transmit and receive without having to disconnect and reconnect SMA or RP-SMA connectors, which are fiddly at the best of times and even the best ones are usually only designed for a lifetime of 500 connections and disconnections. There are two possible solutions to this: you can either use two aerials (one for transmit, one for receive) or a coaxial changeover relay.

Despite the extra expense and weight on the aerial mast, a number of operators using this equipment for wideband voice have found the two-aerial solution best for them. **Photo 7** shows the portable station of Stewart, GOLGS who uses two TP Link TL-ANT5823B panels.

Changeover relays for 5.6GHz need to be high quality specialised relays with SMA (or possibly N) connectors. They are sometimes available at rallies for between £5 and £25 (but often much more) and are generally in high demand. Some suitable examples are shown in **Photo 8**. Note that many of these relays are of the latching variety and the more affordable ones are often designed for 28V operation. The voltage step-up modules sold as 'boost regulators' on eBay are ideal to generate the necessary 28V from a 12V supply. Latching relays can be driven by using a conventional relay, as shown in **Figure 1**. This circuit also comes in handy for any other amateur (usually microwave) operation because latching relays are frequently to be found at rallies etc for much less than their non-latching counterparts.

Choice of frequency

In the UK the 6cm amateur band is split into three segments, as seen in **Figure 2**. The narrow band segment is only 10MHz wide, so totally unsuitable for FM ATV. The two remaining segments are each 30MHz wide, but given that our FM ATV transmission bandwidth is about 27MHz (see **Figure 3**) there are only two possible transmission centre frequencies – one in the centre of each 30MHz band, at 5665MHz and 5835MHz.

None of the commercially available transmit and receive modules seem to be capable of using 5835MHz, but the 32 and 48 channel ones all

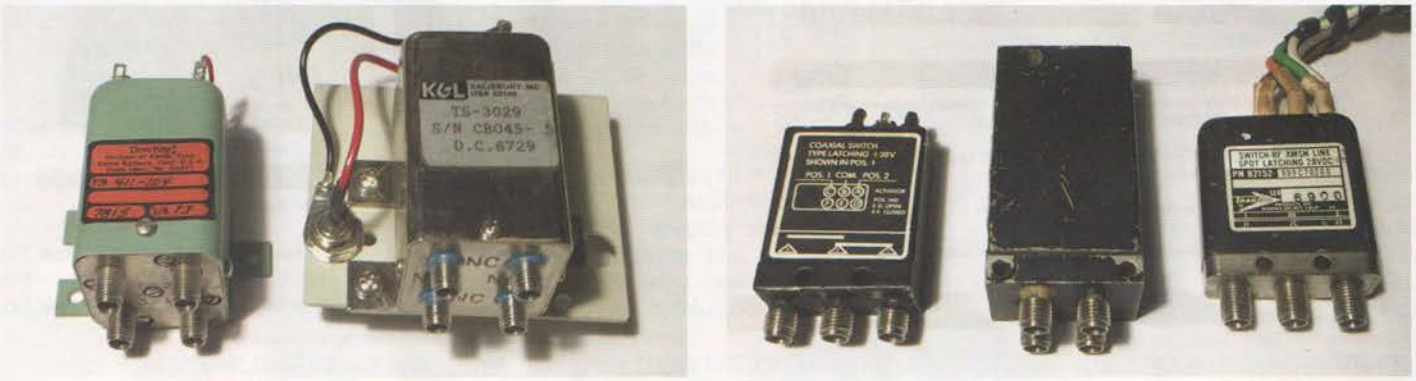

PHOTO 8: Typical suitable changeover relays. Those with four RF connectors are 'transfer' relays, which are also suitable for Tx/Rx changeover use.

PHOTO 9: 2.5W 5.8GHz power amplifier.

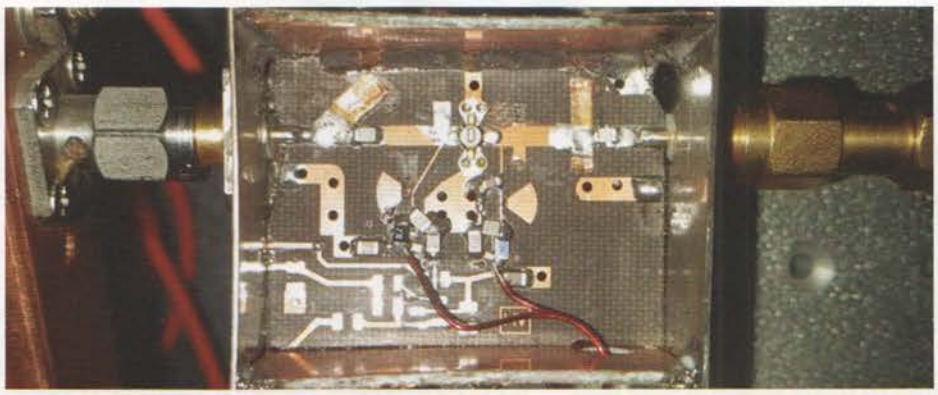

PHOTO 10: Receive preamp for 6cm built by MODTS, based on the 'Franco' surplus board.

seem to cover 5665MHz. This is thus our chosen operating frequency.

5.6GHz portable operation

It is worth testing your portable station with another station at close range before attempting long distances. Little things like power supply voltage drop in cables and intermittent faults are much easier to diagnose 'across the car park' rather than on a hilltop at tens of km from the other station.

Think about what you are going to use for talkback to set up the contact. Whilst mobile phones are quite acceptable, you may feel more 'in the spirit' if you use 144MHz. At the 50 – 100km that might achieve with your 5.6GHz equipment, it is probably worth taking a small Yagi for 144MHz so that talkback is not a struggle. Traditionally, ATV talkback has been on 144.750MHz FM, but some stations use 144.170MHz SSB for longer distance contacts.

You can use a path-plotting program such as *Radio Mobile* [4] to check paths before you travel long distances to try them. **Figure 4** shows a typical plot for a good 5.6GHz path.

Power amplifiers

The output power of many of the commercial modules is only 600mW and there are power amplifiers available on eBay to boost the output to over 2W. These can provide a cheap and effective way of increasing the transmit range of your station. Again, they tend to be provided with RP-SMA connectors and use a switch mode power supply so can be used over a wide supply voltage range. However, they are designed to run right at the limits of their safe operating area and are not tolerant of being used without an aerial, or even with loose RP-SMA connectors. **Photo 9** shows a typical 2.5W "Tx Signal Booster" power amplifier.

Receiver preamplifiers

Whilst the performance of the receivers as supplied seems to be good, the use of a low noise preamp might be advantageous, if only to overcome coax loss and allow the receiver to be located away from the antenna feed point. There are not very many published designs for 5.6GHz preamps, but a number of constructors have reproduced G4DDK's modification of the surplus 'Franco' PCBs as described in in the *RadCom* July 2014 GHz Bands column. MODTS's preamp built from this design is shown in **Photo 10.**

Other TV modes

This article has described a low-cost method to get on to 6cm with FM ATV. Analog Devices have recently released the ADALM Pluto [5], a cheap software defined radio capable of generating 1mW of digital ATV on 5.6GHz. The unit can be driven by the free *DATV Express* software [6] to provide a low-cost entry to digital ATV. It would need to be followed be a linear power amplifier to reach a reasonable power level for transmission. (The cheap 'Tx Signal Booster' amplifiers are rarely very linear, particularly anywhere near their rated power output).

To receive a 5.6GHz digital transmission, a downconverter to a frequency between 144MHz and 2.6GHz would be required. A MiniTiouner [7] and PC would then be capable of demodulating and displaying the received signal.

Support

More information about 5.6GHz operation, and ATV operation in general, can be found on the BATC Wiki [8]. There is also an active community of 5.6GHz constructors discussing the latest developments on the BATC Forum [9]. Newcomers are welcome to post questions there.

Acknowledgements

Thanks to G8GTZ, GOLGS and MODTS for their support to 5.6GHz operation and particularly for their pictures and contributions to this article.

Websearch

[1] https://github.com/BritishAmateurTelevisionClub/rpidatv
[2] http://batc.org.uk/cq-tv/archive/1985.html
[3] www.g4ddk.com/Prices.html
[4] www.ve2dbe.com/english1.html
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[6] https://www.datv-express.com/#Item2
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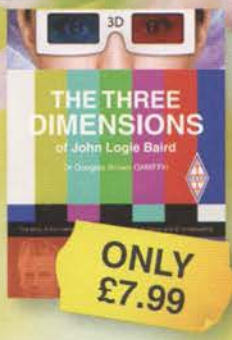

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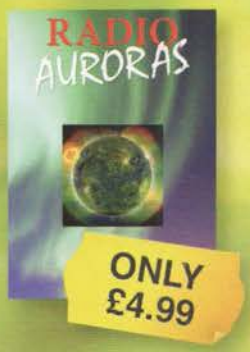

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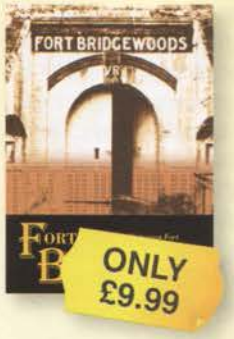

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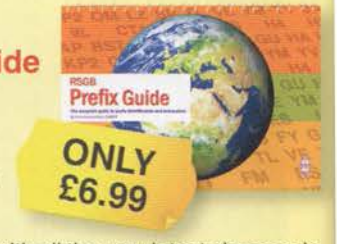

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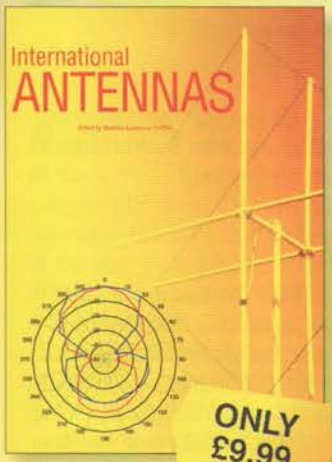

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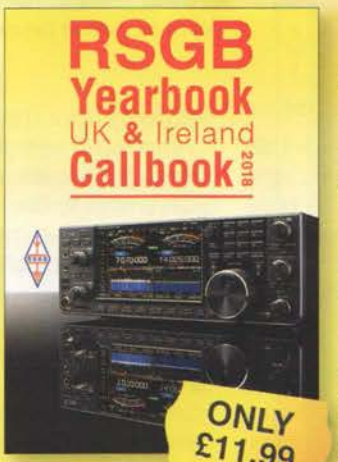

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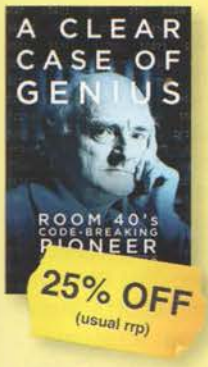

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Data

PHOTO 1: The components of Figure 1 fitted tightly into the barrel of the jack plug. A plastic barrel must be used as the outer shell of the jack is the microphone input, not ground.

External soundcards and USB noise

Many datamode operators use external USB soundcards or audio interfaces to connect rig to PC. In this column we've looked at some of the low cost options, from 99p headphone dongles to raw DIY single chip solutions based around the PCM2900 USB codec. A discussion on the WSJT Yahoo Group recently about the pros and cons and relative merits of various products, particularly related to the noise levels they can generate, prompted Jim, K9YC to post his findings on a number of products. These are his personal views:

"The Signalink design is at least ten years old, not a good design, and it's mono. There are far better and much cheaper USB audio interfaces. While designed for semi-pro audio or computer gaming, the primary differences are quality and where they are advertised. I posted a study [1] about five years ago when searching for an interface for my own station. I updated it a few years ago when older products were replaced by newer ones. The most expensive of my recommendations goes for about $75; all of them blow the Signalink out of the water. The Numark is the best value, the Tascam US100 is my favourite (and still in my station), with the Asus U5 on the shelf for standby use. All perform equally well. The Numark was discontinued for a while but was so popular that it is now back in production. The US100 has been discontinued for quite a while, but can be found on eBay."

Simple solution

But we don't always need an external soundcard – modern notebooks may have enough flexibility on their headset port to allow full duplex operation with a transceiver; or an SDR receiver / dongle having its generated audio fed back to the input of decoding software. My latest PC, a Dell Inspiron laptop, comes with a single 4-way 3.5mm jack for a headset. I already had an older HP notebook with such a jack and its connections for interfacing to a transceiver were described in the June 2014 Design Notes column. But this new notebook goes a stage further. When a jack is inserted into the socket, a window pops up asking what was plugged in. Options are a headset (with mic), headphones, speaker output, line input or microphone input. The headset is the most useful option as it allows simultaneous (duplex) input and output.

Obviously, being a microphone port, you need to attenuate the audio input down to a few millivolts and the subsequent automatic level control gives little choice for controlling drive to data mode decoding software. But these days, critical setting of input level just isn't necessary – WSJT, for example, can cope with a huge range of input level variation. Using the phones output also means you also lose the internal speakers, so if you want to actually *hear* the audio an external speaker has to be used. But it does all work and allows a single lead with a few passive components – mostly resistors – to connect notebook to transceiver.

Interfacing an SDR with no external soundcard is just as straightforward. **Figure 1** shows the circuit diagram of the interface I built up to allow this notebook to function with data mode software (in receive only), while an SDR-IQ was used to get the signals to decode. The entire resistor network is crammed into the barrel of the 3.5mm 4-way jack plug, as shown in **Photo 1**.

Reader input

After reading the last column, Gwyn, G3ZIL wrote in: "Regarding your plea on datamode operating experiences, I've an ongoing collaboration with Mike Gloistein, GM0HCQ who operates /MM and as VP8CMH/MM on the Royal Research Ship *James Clark Ross*. He receives 30m band WSPR spots when he's on board, and I've written up the results from three of his voyages. The most recent, and most interesting, was from Southampton to Svalbard and back this summer."

WSQ updated

From Murray, ZL1BPU: "Three years ago ZL2AFP introduced a weak-signal QSO mode specifically for the LF/MF bands. Now updated and enhanced, it is capable of comfortable QSOs at down to -25dB SNR, almost as sensitive as WSPR. However, the new WSQCall V1.00 is a QSO mode and also has selective calling capability, plus automated responses and the ability to send and receive files. The protocol is the same as for FSQCall, so should be familiar to existing users.

"The WSQCall signal is just 50Hz wide, is easy to tune, and experience has shown that it will fit between carrier QRM lines on 630m. What's more, WSQCall V1.00 also has three notch filters available to knock out carriers. These notches are adjustable in frequency, width and depth. Operating at only 0.5 baud, WSQCall achieves a respectable 5 WPM through the use of a special alphabet and very efficient character coding. This is a true real-time QSO mode with no timing restrictions, not just a beacon. We have been using this new version for reliable 300km 630m contacts *during the day.* The range at night should exceed 1000km. You can now read an introduction and download the software for WSQCall V1.00 from [2]."

And finally

Bob, G4PVB writes: "Whilst receiving PSK31 I was sad to see a message referring to SK [= Silent Key] but later realised it was where I would expect to see VA at the end of a CW message." Clearly someone interpreted the run-together VA used in CW ...-.- as SK."

We are all used to telegraphese creeping into speech; we use QRM, QTH etc routinely and they often appear in text mode operation. But specific Morse symbols like the run together VA do not really belong here in that form. Perhaps typed text modes need some standardised abbreviations.

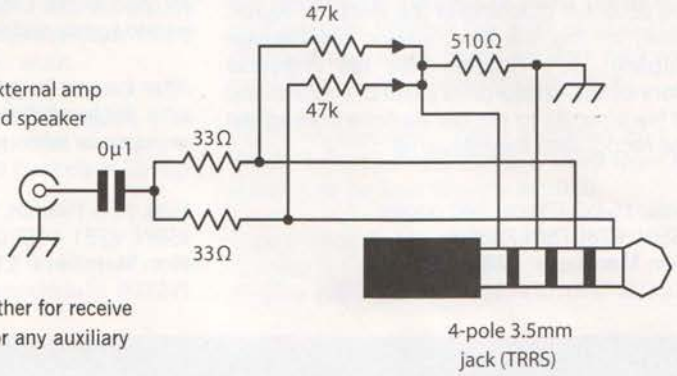


FIGURE 1: Connections to the 4-way headset jack on laptop or notebook PC for full duplex audio wrap-around. This allows an SDR and data mode software to be used together for receive only, without the need for any auxiliary external soundcard.

Websearch

[1] http://k9yc.com/USB_Interfaces.pdf

[2] www.qsl.net/zl1bpu/MFSK/WSQweb.htm

Andy Talbot, G4JNT
andy.g4jnt@gmail.com

Book Review

RadCom 2017 CD and USB stick

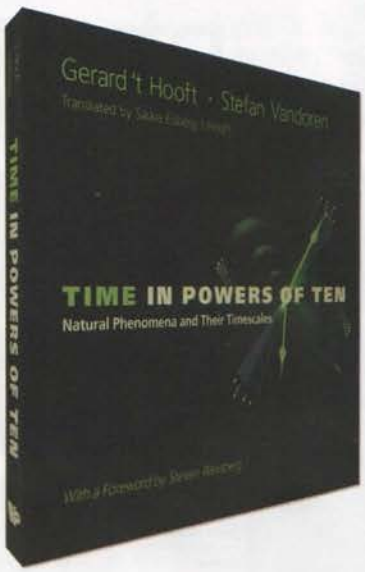
At the end of the year we gather all the master files for the twelve issues of *RadCom* and prepare PDF files of every page we published. These files are available on CD or a handy USB memory stick and can be browsed at your leisure on a computer, tablet or phone. Highlights of the year included YOTA 2017, the US Solar Eclipse, Club of the Year, Contest and Field Day reports, DXpedition stories, over a dozen product reviews, oodles of technical features and a huge amount of club news. The Zoomable PDF pages mean you won't miss the slightest detail.

The entire text of the year's magazines can easily be searched, so you can track down an article even if you only recall the odd word – for example 'aardvark': in 2017 it appeared seven times, beating all records. We're using a different word this year (which appears in this edition).

As well as the 1200+ pages of *RadCom* published in 2017 you'll also find selection of excerpts from several popular RSGB books and other CDs. It's great value, and means you don't have to find an increasing amount of shelf space for your library of printed copies.

ISBN 9781 9101 9350 1 (CD), ISBN 9781 9101 9351 8 (USB Stick)
Non Members' Price £14.99, RSGB Members' Price £12.74

Time in Power of Ten: Natural Phenomena and Their Timescales



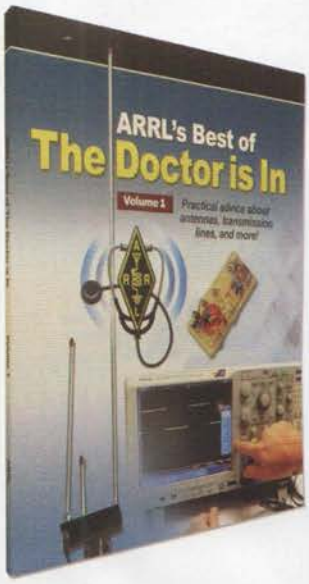
by Gerard 't Hooft and Stefan Vandoren,

This is a quirky coffee-table book that is guaranteed to make you think. It looks at what happens in various increments of time – one second, ten seconds, 100 million years, one picosecond – and how these times interact with the universe. The actual timescales covered range from 10^{-44} seconds (around the Planck unit of time) to 10^{90} seconds – that's 10^{83} years – roughly the amount of time it takes for the atoms in a small drop of water to exhaust all possible positions and start repeating themselves. All of the timescales are related in terms of natural phenomena. For instance, 10 seconds is observed to be about the time it takes a world-class sprinter to run 100m; 10^{9} seconds (31.7 years) is a little over the orbital time of Saturn; 10^{17} seconds (3.17 billion years) is about how long there has been life on Earth. At the other end of the timescale, 10^{-6} seconds (one microsecond) is the time it takes light to travel 300 metres; in 10^{-11} seconds (1 picosecond) it travels just 0.3mm; 10^{-18} seconds is roughly the time period that X-Rays oscillate; we go all the way down to 10^{-44} seconds, the aforementioned Planck Time, 5.39×10^{-44}, which is believed to be the shortest *possible* interval of time.

This is a fascinating, well-illustrated book with copious examples of different things in different timescales. It also really brings home the *power* of powers of 10: from 10^{-44} to 10^{90} seconds, a range of 134 orders of magnitude, we get everything from the quickest possible thing to eternities beyond the life of the universe. It's the sort of book that will arm you with all sorts of fascinating facts and interesting snippets, not to mention giving you a better understanding of the world around us.

ISBN 9789 8144 8981 2, 232 pages, 267 x 254mm
Non Members' Price £20.00, RSGB Members' Price £15.99 (20% off)

ARRL'S Best Of The Doctor Is In, volume 1



Compiled by Joel Halas, W1ZR

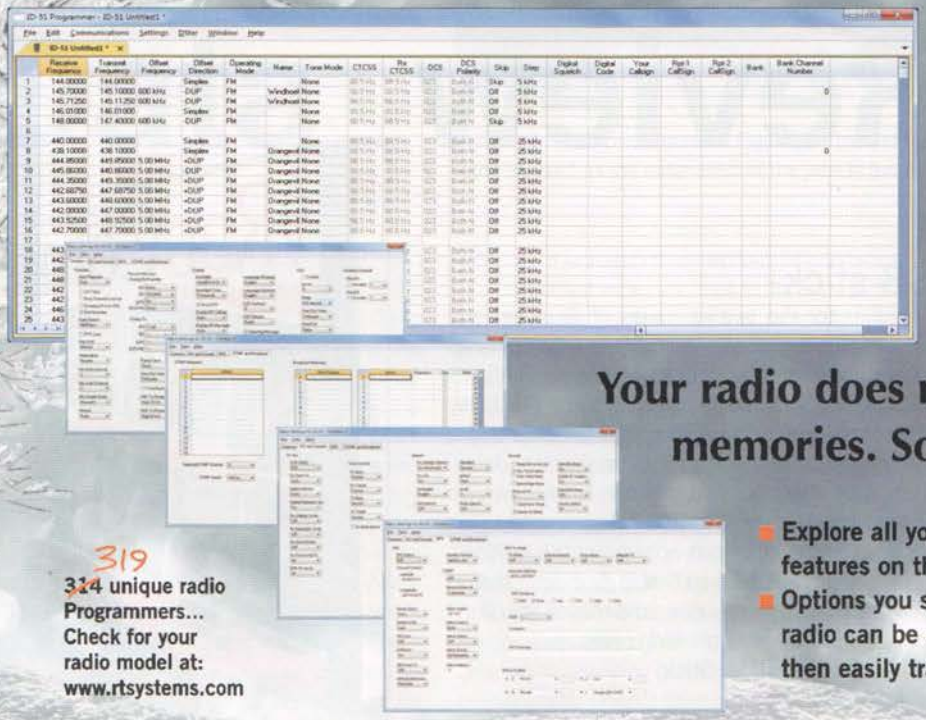
Subtitled 'Practical advice about antennas, transmission lines, and more!', this is one of those books that does exactly what it says on the ~~tin~~ cover. For those who aren't aware of it, The Doctor Is In is a column in ARRL's monthly magazine *QST*, by Joel Halas, W1ZR. In his column Joel looks at various different technical aspects of amateur radio's knotty little problems, usually with a '...and *this* is how you do *that*' kind of presentation. All of a sudden you realise it wasn't a problem after all: you just hadn't come across Joel's magic words on the topic.

This collection, as the subtitle suggests, concentrates mainly on antennas and transmission lines, and is a goldmine of information. Much is based on feedback from real hams writing in to the column; this leads to hundreds of nuggets, all presented with a 'can-do' feeling. A great practical book that covers a multitude of knowledge in an easily-accessible way.

ISBN 9781 6259 5074 1
128 pages, 184 x 229mm
Non Members' Price £22.99
RSGB Members' Price £19.54

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

Take the Mystery out of Radio Programming



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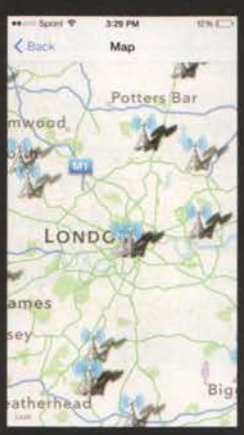
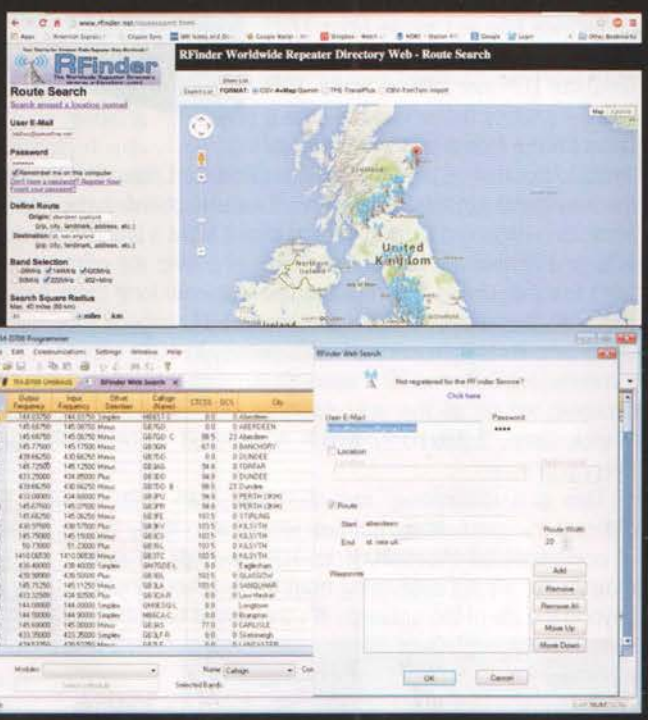
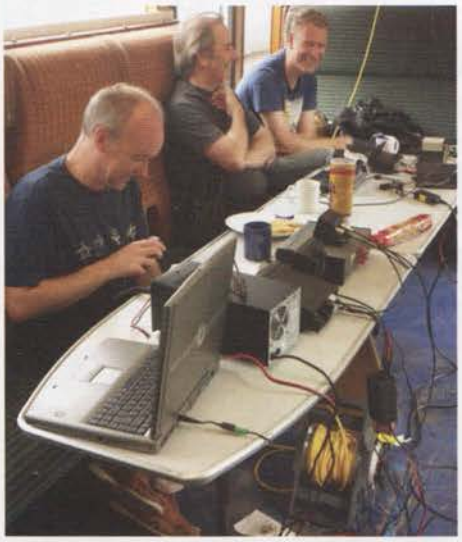
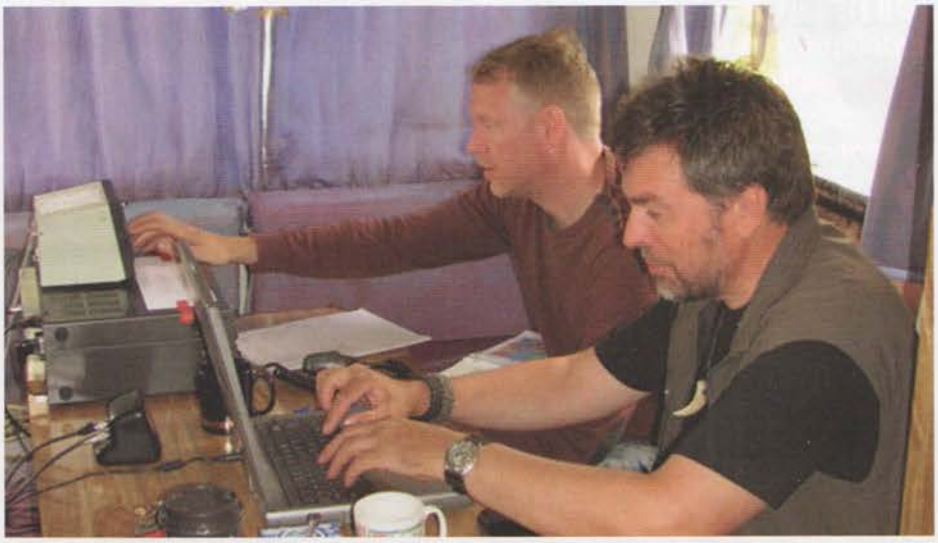




www.rfinder.net - +44 (0) 1234 923 021 - +81 3457 95839 - +1 631 610 5120 - w2cyk@rfinder.net

Club of the Year 2016





South Bristol ARC takes part in regular special event operations at key events throughout the year.

South Bristol Amateur Radio Club won the 3rd place Small Club spot in the RSGB's 2016 National Club of the Year competition, sponsored by Waters and Stanton.

South Bristol ARC prides itself on the training it offers and has four Registered Assessors. During 2016 they completed an Advanced course with a 66% success rate, the students being graduates of their earlier Intermediate and Foundation training. They also started another course for three more graduate students.

The Intermediate course had a 100% success rate, the students being graduates of the Foundation training. They started a second course for 4 students. Foundation training remains important to attract new members to the Club and the hobby. The Foundation course resulting in a 100% pass rate with 75% going on to study further.

Special events

The club has regular special event operations at key events throughout the year. In May, they operated GB0SBM at Saltford Brassmill in Keynsham as part of Mills on the Air. Operating outdoors they mounted a single station operating at various times on 6m, 20m, 40m and 80m SSB making over 100 contacts throughout the weekend. The location brought them into contact not only with people visiting the Brass Mill but also with passers-by as they were located on the roadside adjacent to the Mill.

In June, a small party of club members embarked upon a sea voyage to Lundy Island, taking with them a variety of equipment to establish for a week of HF and digital modes operating as GB2BLE (Bristol Lundy Expedition).

In July, they took part in VHF National Field Day, something they have participated in regular with varying degrees of success. In 2016 they entered the low power 2m section. Most of the operators were newly licensed and not familiar with contest operating. Never the less, they managed 5th place overall in the 2m Low Power class with a confirmed QSO count of 104 on 2m SSB.

In August, they operated GB0CCC from the *John Sebastian* in Bathurst Basin, Bristol as part of International Lighthouses and Lightships on the Air. The *John Sebastian* is home to the Cabot Cruising Club and is a former Trinity House Lightship retaining her original appearance and colour scheme. They made over 100 contacts over the weekend on 20m, 40m and 80m SSB.

In September, GB0SDR was on the air from the Somerset and Dorset Railway Heritage Trust in Midsomer Norton as part of Railways on the Air. This is the flagship special event operation with both digital modes and SSB making over 180 contacts. The heritage railway is open to the public during this operation and they have space to set up and interact with visitors using a mixture of their own and RSGB publicity materials.

The club announces the operations via the club website, through the calendar, on their Facebook page and via their Twitter account. Details of the operations and events are circulated to *RadCom* and published on the website and via their YouTube channel.

Club meetings

During 2016 the club maintained an interesting and healthy calendar of weekly evening meeting events that are publicised widely, circulating event details to the local press, local libraries, local radio as well as *RadCom*. They invited speakers from the Great Western Air Ambulance and the Weston-super-Mare RNLI to give presentations at the Club and took up collections on behalf of these volunteer organisations both within the membership and within the Novers Park Community Centre that houses the club.

Awards

The club operate an annual Awards scheme for members who have gone above and beyond in terms of supporting the Club, made particular contributions or developed projects. The Terry Dunsford Award is awarded annually for the best homebrew construction. The Jean Fletcher Award is presented to the club member (but not Committee member or Officer) who, in the judgement of the committee, has given the most support to the club in the last year. The DX Challenge Certificate is the club's annual award to the winner of The South Bristol Amateur Radio Club DX Challenge.

Please send news reports to radcom@rsgb.org.uk. To get future events listed here and put on GB2RS, email details of your meetings as early as possible to radcom@RSGB.org.uk Include your club name, RSGB Region number, contact name, callsign & phone number, date and details of meeting. Example: Fraser Road Radio Club, Region 9, Steve, M1ACB, 01234 832 700, 29 Oct, On the Air. We normally acknowledge all submissions within 3 working days: if you don't hear from us, please phone. We don't normally include 'closed', 'TBA' or 'every Tuesday'-type entries. **The deadline for the March issue is 24 January and for April it's 21 February.** 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

Cockenzie & Port Seton ARC
Bob, GM4UYZ, 01875 811 723
2 Club night
16 Radio check night, John, MM0JX

Livingston & District ARS
Cathie, 2M0DIB, 01506 433 846
6 Training
13 Talk
17-18 Special Event weekend
20, 27 Operating

Lothians RS
Mike, MM0MLB, secretary@lothiansradiosociety.com
14, 28 Club night

Wigtownshire ARC
Lance, 2M0HEO, lancedavisedmonds@gmail.com
1, 8, 22 Club night
15 Holiday operating with beach-front antennas, Bob, GM4DLG

REGION 2: SCOTLAND NORTH & NORTHERN ISLES

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

Aberdeen ARS
Fred, GM3ALZ, 01975 651 365
1 Junk sale
8 Club night
15 Ten-minute talks by members
22 Construction and on the air evening

Dundee ARC
Martin, 2M0KAU, 0776 370 8933
6 VHF contest
13 Thinking Day OTA prep
17-18 Thinking Day OTA
20 Construction night
27 Talk/club night

Glenrothes & District RC
Dougie, MM6KNR, dougie@digitalmaker.co.uk
7 Club night
14 RSGB film night
21 Codes and cryptography
28 Radio use in motorsport

REGION 3: NORTH WEST

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

Macclesfield & DRS
Greg, M0TXX, info@gx4mws.com
5 Shack on the air
12 Film night
19 Activating data modes /P
26 Club project update

Mid-Cheshire ARS
Peter, G8HAV, 0791 931 5547
7 Committee meeting
14 Final rally preparation
18 Radioactive Rally, Nantwich

South Manchester R&CC
Ron, G3SVW, 01619 693 999
1 Shack night
8 Surplus equipment sale
15 New members in the shack
22 Radio astronomy and our galaxy, G3XGE

Stockport Radio Society
Heather, M6HNS, 0750 690 4422
2, 9, 16, 23 Net, 2pm, 433.525MHz FM
6 Society night
10, 11, 19, 26 Intermediate course
13 Net, 7.30pm, 51.550MHz FM
15, 28 Net, 7.30pm, 145.375MHz FM
20 Radio night
27 Skills night

Thornton Cleveleys ARS
John, G4FRK, 01253 862 810
5 Natter night/club on air
12 Japanese Morse – Norman Kendrick (video)
19 Project planning and suggestions
26 Table top sale (not auction)

REGION 4: NORTH EAST

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

Angel of the North ARC
Nancy, G7UUR, 01914 770 036
5, 18, 26 Come along and take to the air
12 AGM, 7.30pm
17 TDOTA, Trefoil House, South Shields

Hartlepool ARC
Anthony, M0VED, 0792 699 8014
2, 9, 16, 23 Club night
7, 14, 21, 28 Club net, 145.575MHz

Hull & District ARS
Tony, G0WJK, 01430 423 837
1, 15 Club night/on the air
8 AGM
22 Amateur radio trivia

Sheffield & District Wireless Society
Krystyna, 2E0KSH, 0788 406 5375
7 Show and tell evening
14, 28 Technical and training evening

Spen Valley ARS
Russell, G0FOI, 01274 875 038
1 The QCX transceiver project
15 Shack meeting

Tynemouth ARC
www.G0NWM.com
2 Fusion & D-Star digital communications
9, 23 Club night
16 6m and 4m operating

REGION 5: WEST MIDLANDS

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

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

Burton ARC
Mike, M0XMX, 0785 068 5961
1, 4, 8, 11, 15, 18, 22, 25 Net 145.575MHz, 7.30pm
7, 14, 21, 28 Shack night
27 Coffee morning at Dunelms Café

Coventry ARS
John, G8SEQ, 0795 877 7363
1, 8, 15, 22 Open net, 8pm, 50.175MHz SSB
2 Construction competition
5, 12, 19, 26 Open net, 8pm, 145.375MHz FM and or 7.16MHz ± QRM SSB
16 Skittles night

Gloucester AR&ES
Anne, 2E1GKY, 01242 699 595 daytime
1, 8, 15, 22 Net, 145.475MHz, 7.30pm then 80m
2, 9, 16, 23 Net, 7.30pm, 432.220MHz USB
5 Satellites as digital repeaters, Dave, G4BCA
7, 14, 21, 28 Main net, 145.475MHz FM, 7.30pm
12 No meeting (school closed)
19, 26 Informal and operating meeting

Malvern Hills RAC
Dave, G4IDF, 01905 351 568
7, 14, 21, 28 Club net, 145.350MHz FM, 8pm
13 Getting going with microwaves, G8XYJ & G4OYX
27 Informal

Next deadlines are (Mar) 24 January and (Apr) 21 February, (May) 28 March.

Midland ARS
Norman, G8BHE, 0780 807 8003
7 Open meeting, equipment review and training classes
14 Committee meeting & training classes
21 General meeting, shack on the air and training classes
28 Open meeting, ragchew, planning rally visits and training classes

Mid-Warwickshire ARS
Don, G4CYG, 01926 424 465
13 Club net, 28.500MHz
27 Intermediate training, M0OAE

Salop ARS
salopamateurradio@gmail.com
1 Natter night / committee meeting
6, 7, 13, 14, 20, 21, 27, 28 Club net, 8.30pm, GB3LH
8 Video night
15 Demonstration of MINOS Logger
22 Shack night with G3SRT on the air

South Birmingham RS
Gemma, M6GKG,
gemmagordon.m6gkg@gmail.com
1, 8, 15, 22 Training classes with Dave, G8OWL
2, 9 Sorting sock for Wythall Rally
6, 13, 20, 27 Coffee morning in the shack, 11am
12 Checking equipment
19 Review of the year's rally visits
26 Open meeting and ragchew

Stratford upon Avon & District RS
Clive, G0CHO, 01608 664 488
5, 19 Club net, 145.275MHz FM, 8pm
12 Data modes
26 100 years of maritime comms, John, G1AWJ

Sutton Coldfield ARS
Robert Bird, rob2e0zap@gmail.com
5, 19 Open net, ±145.250MHz, 7.30pm
12, 26 Club meeting
13 Open net, 70.475MHz, 7.30pm
27 DMR open net, GB7FW slot/local 2, 7.30pm

Telford & District ARS
John, M0JZH, 0782 473 7716
7 Committee meeting; club call GX3ZME OTA
14 Bowles evening with the LWVH Bowles club
21 Contest and portable planning for 2018 + short talk/video
28 Under a Fiver competition

Wythall Radio Club
Chris, G0EYO, 0771 041 2819
4, 11, 18, 25 Club net, 145.225 or GB3WL, 8pm
6 Morse class and social evening
13 Morse class and committee meeting
20 Morse and club meeting
23 Life on the Other Side, Steve Venner from ML&S
27 Morse class and the 2 – 22 Show

REGION 6: NORTH WALES

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

Dragon ARC
John, MW0JWP, 0751 503 1025
5 Film night
19 Air Ambulance

North Wales Radio Society
Liz, GW0ETU, 0776 019 0355
1 General meeting
8 Technical topic
15 Discussion on summer activities
22 Ynys Enlli (Bardsey Island), GW4PVU, GW0ETU and MW0BXJ

Porthmadog and District ARS
Peter, GW0DFK, 0773 177 1319
15 Construction competition

REGION 7: SOUTH WALES

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

Bangor & District ARS
Harry, GI4JTF, 0289 042 2762
7 Club night

REGION 9: LONDON & THAMES VALLEY

Regional Manager: Tom O'Reilly, G0NSY
RM9@rsgb.org.uk

Aylesbury Vale RS
vic@rakewell.com
14 Discussion evening

Bracknell ARC
David, M0XDF, M0XDF@alphadene.co.uk
7, 21, 28 Open net, 8pm, 145.375MHz
14 Bring and show evening

Burnham Beeches RC
Charles, G0SKA, 01753 647 101
19 Construction contest judging plus show and tell

Newbury & District ARS
Rob, G4LMW, 0797 088 5614
28 Construction contest plus show and tell

Radio Society of Harrow
Linda, G7RJL, lcasey100@outlook.com
2 Club night and talk
5, 12, 19, 26 Net, 145.5/145.35MHz FM, 8.15pm
11, 18, 19, 25 Club net, 1938kHz LSB, 12 noon
16 Black propaganda radio, Michael Kushner

Shefford & District ARS
David, G8UOD, 01234 742 757
1 Your rig: members' discussion
8 Construction winners' talk
15 Natter night with tea and biscuits
22 Computer logging, Gareth, M5KVK

Southgate ARC
Keith, G8RPA, g8rpa@arrl.net
14 Natter night

REGION 10: SOUTH & SOUTH EAST

Regional Manager: Michael Senior, G4EFO
RM10@rsgb.org.uk

Basingstoke ARC
Peter, G0KQA, 01256 414454
19 Club discussion on earthing led by David, 2E0FNY

Bredhurst Receiving & Transmitting Society
Nicky, secretary@brats-qth.org
1 Club night
8 Quiz night
15 Aviation in Medway by James Preston
22 Pre-rally meeting
25 Rainham Radio Rally

Bromley & District ARS
Andy, G4WGZ, 01689 878 089
7, 14, 21, 28 Net, 145.400MHz 9pm
20 Club meeting
21 Talk on SUSY radio, G8MNY
25 Intermediate course

Crawley ARC
Richard, G3ZIY, 01342 843 545
28 History of the magnetron, Mike, G3LHZ

Cray Valley RS
Dave, G8ZZK, 0773 954 9822
1 History of the transistor, Guy, G0UKN
15 Surface mount technology, Ian, G0AFH

Crystal Palace R&EC
Bob, G3OOU, 01737 552 170
2 AGM
7, 14, 21, 28 Net, 8pm, 145.525MHz ± QRM

Darenth Valley Radio Society
Mike, G8AXA, 0788 415 7776
14 Foundation Practical
28 On the air/natter night

Dorking & District RS
David, M6DJB, djb.abraxas@btinternet.com
27 Making antenna traps, Tom Ellinor, G4DFA

Hastings E&RC
Gordon, 01424 431 909
28 AGM then 'bring your mystery thing' session

Hilderstone R&EC
Ian, 2E0DUE, secretary@g0hrs.org
8 Club night
17-18 GB1TBU for Thinking Day on The Air
22 Club night, talk

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

Mid-Sussex ARS
Peter, G4AKG, 01444 239 371
2 Health and Safety, David Davis
9 On air night
16 Natter night
23 Radio night and table top sale

Southdown ARS
John, G3DQY, 01424 424 319
5 Hailsham FM, Neil Povey
7 Hailsham shack meeting, 10.30am
7, 14, 21, 28 FM net, 145.275MHz, 8.30am; cafe meeting, 12.30pm

Surrey Radio Contact Club
John, G3MCX, 020 8688 3322
1, 8, 15, 22 Net, 70.300MHz, 8pm
2, 9, 16, 23 Net, 145.350MHz, 8pm
4, 11, 18, 25 Net, 1905kHz, 9.30am
5, 19 Club night

REGION 11: SOUTH WEST & CHANNEL ISLES

Regional Manager: Pam Helliwell, G7SME
RM11@rsgb.org.uk

Appledore & District ARC
Alan, M6CCH, 01237 422 833
19 The 2018 BITX40, Mike, G4KXQ

Blackmoor Vale ARS
Keith, M0TMO, 01747 851 260
11 Astronomy by Colin
28 HF evening

Callington ARS
John, G4PBN, 01822 835 834
7 Club night

Gordano Amateur Radio Group
Malcolm, G4KPM, mal@g4kpm.co.uk
28 Club night

Mid-Somerset ARC
David, G8BFV, 01749 670085
12 Talk by G3ZXX on the dipole antenna

Newquay & District ARS
Terry, 2E0XTM, 01841 540 142
1 Club night
15 The Icom IC-7300, Richard, G3MRT

Poldhu ARC
Keith, G0WYS, 01326 574 441,
13 Visit by RSGB Region 11 DRM

Saltash & District ARC
Mark, M0WMB, 0781 054 8445
1, 15 Club meeting

Torbay ARS
John, G4VUD@tars.org.uk
2, 16 Club night
9 Club night and business meeting
23 AGM

Weston Super Mare RS
Martin, G7UWI, 01934 613 094
5, 12, 26 Construction, operating & natter night
19 WSPR by G4DPH

Yeovil ARC
Rodney, M0RGE, 01935 825 791
1 The second radio train experiment, G3MYM
2, 16 Construction and on-air at Sparkford
15 Morse practice by G3MYM
22 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
6 PAC / PAT testing
13 TX Factor 17
20 Club net, 8pm, 145.375MHz
27 Data modes demo

Cambridge & District ARC
Richard, G4AWP, 0770 229 5300
9 Marconi, Peter, M0DCV
23 Tx Factor video shown by David, M0ZEB

Essex Ham
Pete, M0PSX, news@essexham.co.uk
3 Essex YL Net on GB3DA, 8pm
4 Online Foundation course
5, 12, 19, 26 Net on GB3DA, 8pm

Felixstowe & District ARS
Paul, G4YQC, pjw@btinternet.com
12 Rig clinic

Harwich Amateur Radio Interest Group
Kevan, 2E0WMG, 0749 352 1049
14 HF propagation video then Skype talk with Steve Nichols, G0KYA

Huntingdonshire ARS
David, M0VTG, secretary@hunts-hams.co.uk
8 Natter night
22 Digital modes, Allan Ralph, G8XLH

Loughton & Epping Forest ARS
Dave, M0MBD, 0798 016 5172
1, 8, 15, 22 Net, 144.725MHz, 8pm

Peterborough & District ARC
Alan Ralph, secretary@padarc.co.uk
5, 12, 19, 26 Net, 1.980MHz, 8pm
6, 20 Net, 145.400MHz, 8pm
14 Operating evening
28 LF talk & demo, Dave, G4ETG

Thames ARG
Patrick, G8JLM, 01621 855 461
2 Emergency First Aid – including using a defibrillator, Fred, 2E0ICH
9, 23 Net, 7.30pm, 144.250MHz CW then 8pm, GB3DA, voice
16 TARGet night, practical radio projects

Next deadlines

March edition: 24 January
April edition: 21 February
May edition: 28 March
June edition: 25 April
See the full list at
tinyurl.com/RC-2018-deadlines

REGION 13: EAST MIDLANDS

Regional Manager: Jim Stevenson, G0EJQ
RM13@rsgb.org.uk

Kettering & District ARS
Ed, M0TZX@yahoo.com
1, 8, 15, 22 Net, 7pm 145.300MHz FM
13, 27 HF operating evening, 7pm

Loughborough & District ARC
Chris, G1ETZ, 01509 504 319
6 Club net
13 Talk by RSGB DRM 131 Mark Burrows, 2E0SBM
20, 27 The beams of WWII (parts 1 & 2) by Brian, G8BUB

Melton Mowbray ARS
Phil, G4LWB, 01664 567 972
16 Talk by RSGB DRM 131 Mark Burrows, 2E0SBM

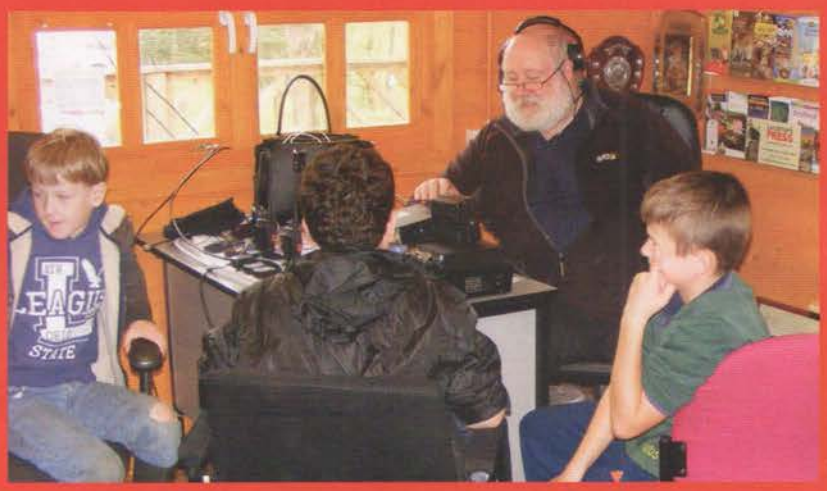
Nunsfield House ARG
Paul Gamble, G1SGZ, pr@nharg.org.uk
1, 8, 15, 22 Club net, 145.325MHz, 8pm
2 AGM, 8pm
5, 12, 19, 26 Shack night
9 Trip to the Derby Radio Museum 7pm
16 TX Factor
23 Club night

Spalding & District ARS
Graham, G8NWC, 0775 461 9701
2, 9 Club night
16 Countdown quiz and social evening
18 Junk sale, 9am, Bromley Hall, Pode Hole PE11 3RU
23 The Royal Observer Corps and its communications, Richard, 2E0TUS

Worksop ARS
info@g3rcw.org.uk or 0789 062 6684
1, 22 Technical night
6 Club night plus 2m UKAC and FMAC
8 Technical night and 6m UKAC
13 Club night plus 70cm UKAC and FMAC
15 Technical night plus 4m UKAC and FMAC
17-18 Thinking Day on the Air
20 Club night and 23cm UKAC
27 Club night

REGION 1: SCOTLAND SOUTH & WESTERN ISLES

Livingston & District ARS recently assisted West Lothian Scouts by supporting Jamboree on The Air, from a dedicated camping site near Torphichen. An advance team set up the antennas and main operating centre in the reception building. On Saturday the operating teams arrived and operated two HF SSB stations using GB2WLS. Conditions were good for a change with 20 and 40m being the favoured bands and were very busy with JOTA stations, both national and international. The slow scan TV operations proved to be of great interest to the Scouts, with contacts to Spain, Russia and Canada to name a few. On Sunday Beavers joined in. However, conditions were not so favourable and contacts were somewhat slower, this was not helped by a contest. Slow Scan TV again proved to be popular. This station then moved to FT8 digital mode and immediately started to make a lot of good contacts including Japan, Australia, central Europe and many more, this again, sparked great interest.



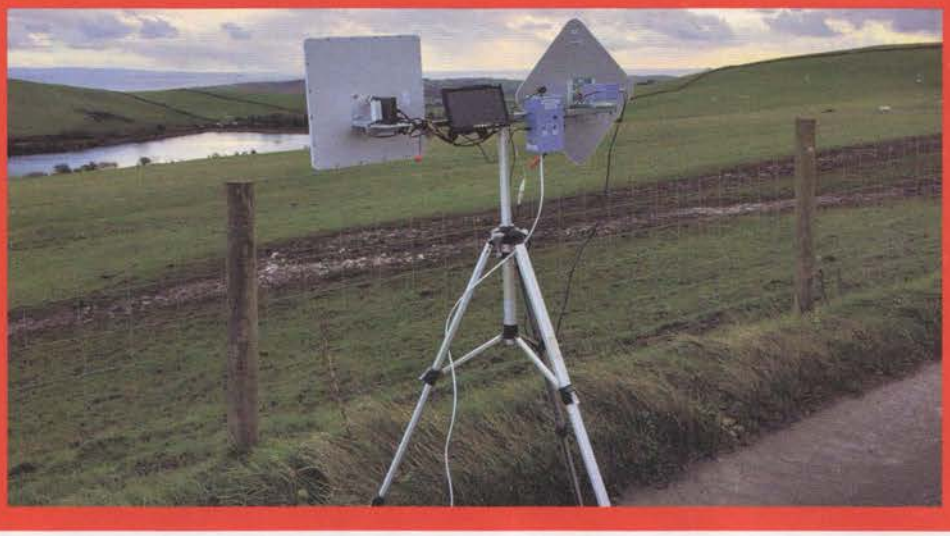
REGION 2: SCOTLAND NORTH & NORTHERN ISLES

Dundee ARC saw two members pass their Intermediate exam. Garry is now 2M0GVB and Iain, MM6YYB is still awaiting his new call. The club also had a Christmas meal in the Ship Inn, Broughty Ferry, where everybody had a good time.

REGION 3: NORTH WEST

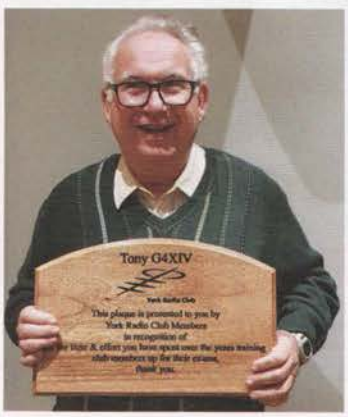
Furness ARS held an end of year surplus kit sale in December. Club members were able to sell, gift or exchange kit with each other. The night was accompanied by mince pies, cheese and biscuits and other festive fare. A lot of the kit was sold on the night in question, but quite a lot of it also went home with whoever it came with!

The club has been busy working on 5.6GHz ATV, with a number of systems being built and tested. Work is on going and tests have been very positive with signals being received over 10 miles away. If any other clubs or individuals are working on 5.6GHz ATV and would like to arrange a sked into the Cumbria hills with club members, please email furnessamateurradio@outlook.com



REGION 4: NORTH EAST

Hartlepool ARS held its first special event station on the JOTA weekend in October, seen above. They ran HF and VHF on SSB and used a 3 element beam for 20-15-10m and a full G5RV for 40-80. The callsign GB60TVS was used for Hartlepool Tees Valley North Scouts. Around 10 members of the club participated and 54 Cubs passed the Communicators badge during the event. In total they made 300 contacts across America, Canada, Europe and Asiatic Russia. Other Region 4 clubs were invited to a Pie and Peas night. It was well attended with over 30 people as well as the RSGB Regional Manager and DRM. Carl, 2E0HPI put on a stand of portable antennas and a talk regarding the great work RAYNET does in the area was given by a **Bishop Auckland Radio Club** member.



The York Radio Club AGM in November was well attended. 2017 was a very successful year that saw the club membership grow and a wide variety of activities completed by members. The highlight of the evening was a presentation of a plaque to Tony, G4XIV (see left) by Kris, M0KOO. Tony has been an active member of the club and committee member for many years. He has tirelessly supported new and existing members of the club by providing them with training and support. This has ranged from Morse tuition to antenna theory. The club would like to express their thanks and gratitude to Tony for his loyal support and time dedicated to the club and its members over the years.

REGION 5: WEST MIDLANDS

Burton ARC joined Mike in celebrating passing his Foundation exam and Neil, M6KQU passing his Intermediate. Both were presented with some bubbles by the club in recognition of their hard work. Mike has been a SWL for many years made it his mission to get his licence and is really looking forward to getting on the air as soon as he gets his callsign. Neil, having only received his Foundation licence two months previously has focused all his spare time on achieving this goal and is so pleased.

Midland ARS member Alan Bailey sat his Intermediate exam and received an indicative pass with a score of 43 from 45. Congratulations.

Congratulations from Wythall Radio Club to eight year old Harry Bacon for passing his Foundation exam (see above). Harry was presented with a 2m/70cm handheld by Sam and Leanne on a visit to RadioWorld's premises in Great Wyrley. His new call is M6NKW and he is the youngest member of the club.

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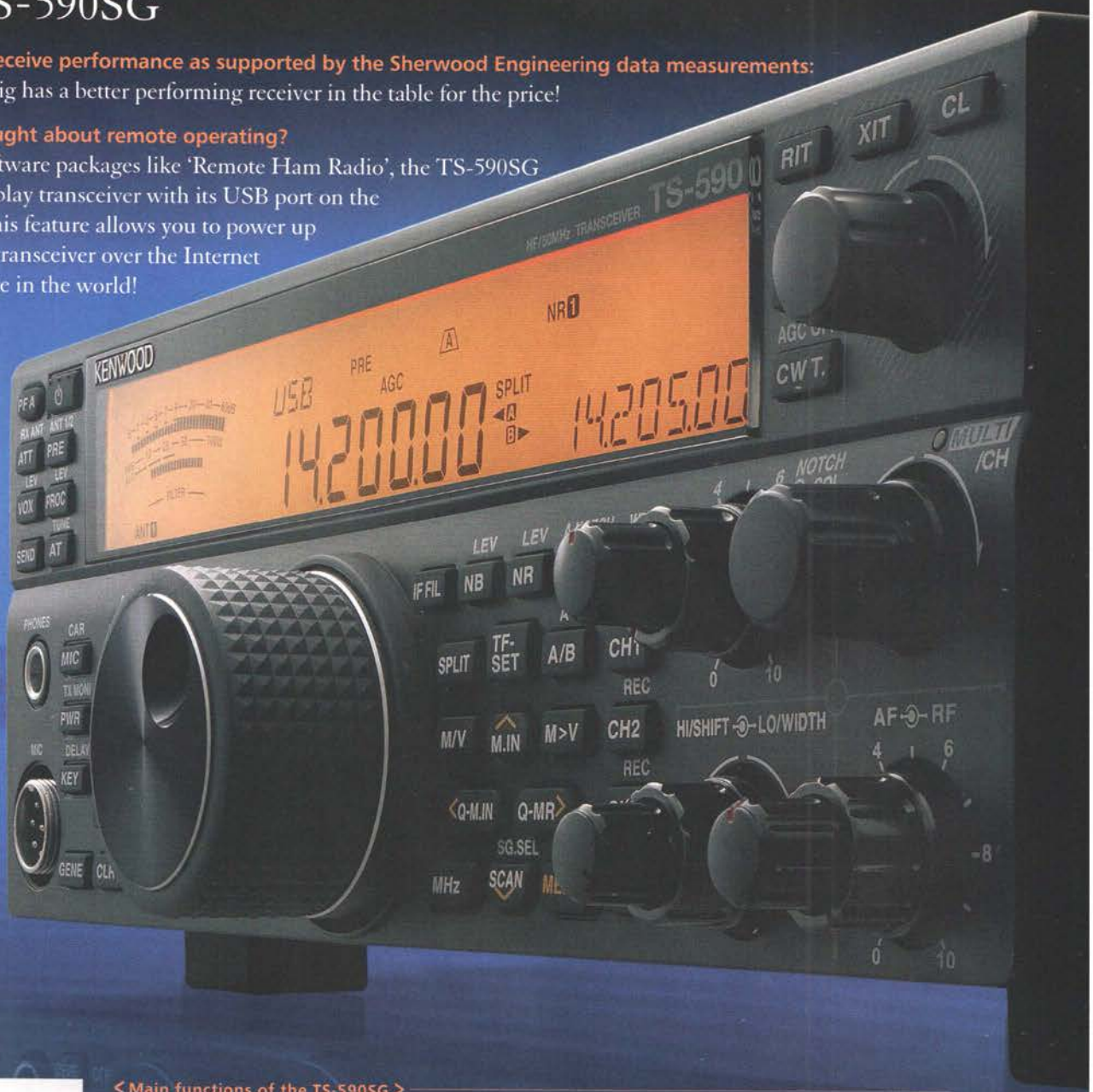

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*Alterations may be made without notice to improve the ratings or the design of the transceiver.
*The photographic and printing processes may cause the coloration of the transceiver to appear different from that of the actual transceiver.

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REGION 7: SOUTH WALES

Western Valleys RAYNET had a successful map reading exercise lead by the Group Controller, Rob, MW0IBF, to the summit of Mynydd Y Gaer. In tow was Deputy Controller Ian, 2W0ITT, Group Secretary Gareth, 2W0GME, Brian, GW6ZYI, Geraint, MW0GWT and new member Mark Stevenson.

REGION 8: NORTHERN IRELAND

Bangor & District ARS held a largely social event with two demonstrations taking place in the background in December. John, GI7UGV provided a demonstration of digital amateur TV BATS Portsdown images with reduced bandwidth transmission over a short transmission range on 70cm to a MiniTiouner Rasberry Pi USB receiver. In addition, Harry, GI4JTF demonstrated the new FT8 data mode.

Next deadlines
March edition: 24 January
April edition: 21 February
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REGION 10: SOUTH & SOUTH EAST

Dorking & District RS held its annual celebration of Christmas. The chairman, John, G3YGG, briefly reported on the year's activities and drew particular attention to the success of seven candidates in the Foundation and Intermediate examinations, maintaining the club's 100% success rate. George aged 11 was the club's youngest candidate and now has the call M6LWK.

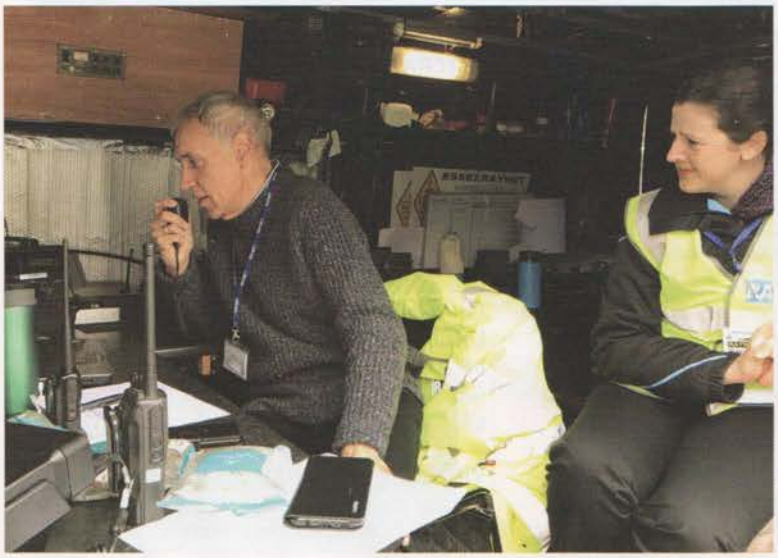
Crystal Palace Radio & Electronics Club website has now moved to http://cprec.btck.co.uk/ There is also a new email address on the Contact Us page of crystalpalaceradio.club@gmail.com

REGION 12: EAST & EAST ANGLIA

Thurrock Acorns ARC met for their Christmas social and were joined by RSGB's Region 12 Manager Keith, G3WRO and South Essex Region 12 DRM Vic, G6BHE.

Nick, MONFE has been quietly 'selling' the hobby to friends and colleagues, and several became interested. He was able to encourage some to take up Foundation training, and they studied using the Essex Hams online course and videos. Three friends attended a one-day session near Southend-on-Sea to complete the practicals and exam, and all three achieved very good indicative passes. Well done to Alkesh, Sarah and Chris for taking up the challenge.

The November meeting of **Peterborough & District ARC** started with a short talk about Worked All Britain by Dave, G4SQA. He explained how it works with members trying to work stations in the 3000+ locator squares covering the United Kingdom. Dave himself has worked over 2000 of them. He said there are also WAB members who collect the WAB book numbers. Dave finished with a lively Q&A session. There was also a silent key auction on behalf of the family of G1NIT. With a varied selection of receivers, transceivers, boxes of components, antennas and sundries for sale, interest from the members was great. Dave, M0VTG acted as auctioneer while Tony, G0IAG did the describing and portering job. Bidding was fast and furious throughout the auction and at the end there was nothing left. The family of G1NIT had expressed a wish that the proceeds of the auction go to Children In Need, a worthy cause. The auction raised £1.073, which was handed over to the family. A very successful evening.



On 3 December, Essex RAYNET supported the Farleigh Hospice 2017 Santa Fun Run (above). 859 Santas ran or walked the 5km route starting at Chelmsford's Central Park. Over a dozen members of Essex RAYNET provided event communications, including a team of three at Control, eight stationed at various points along the walk, and two members acting as sweeps.

In an attempt to get one more field day in before the end of 2017, Essex Ham visited Shoebury Each Beach to support the county-wide Essex 2m Activity Day. Sadly, the weather had other ideas, so the event was run from the back of various cars (above). Running 2m SSTV in a car packed with damp operators led to some rather steamy windows, but some good contacts nonetheless. The Essex 2m Activity Day is an initiative launched by Thurrock Acorns ARC to get more activity on 2m, whether using FM, SSB, CW or data.

Following the previous visit to 1st Woodham Ferrers Hyde Cub pack to help them with their Communicator badge, Chelmsford ARS Chairman Peter, M0PSD and Kristian, M0SSK went along to the Cubs Christmas party to present to them a Morse key trainer (above). The club has also been invited to two further Cub packs to help with their Communicator Badges.

In December, Thames ARG were the hosts for 21 candidates from 7 different clubs for the one-day Train the Trainers course led by three experienced RSGB tutors. A mixture of teaching styles were explained from using a flip chart to a self made internet quiz. It was a full day of learning that promoted reflection on what we do well and what could be done better. The following day TARG held an Advanced exam in the afternoon. With many thanks to Paul Whatton, G4DCV (Training and Education Committee Chair).

REGION 13: EAST MIDLANDS

In September, South Kesteven ARS Chairman Andrew, M0NRD gave a talk to the year 5 pupils at the Barrowby CofE Primary School in Grantham, Lincolnshire as part of their topic 'Earth and Space'. The children were fascinated to learn about high altitude balloons and how they can be sent up into the atmosphere, to the edge of space and then tracked from Earth. They learnt how the images could be transmitted back to Earth and what happened to the balloon once it reached a certain altitude and burst. Additionally, Andrew explained to the children how you could communicate with the International Space Station from Earth and how you could listen in to the Russian Cosmonauts during space walks they enjoyed listening to recordings and watching some videos of this and ARISS school contacts.

Spalding & District ARS recently had a very enjoyable and knowledgeable talk by Richard, 2E0TUS on Lincolnshire's involvement in the Arnhem campaign, followed by a surprise event organised by the ladies, in period dress, a spare room decked out as a 1940s NAAFI for a very nice buffet from the era with a sing along to round off the evening. It was a great social event enjoyed by all members and guests present.

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Advertising. All display and classified advertising enquiries (except Members' Ads, which go to memads@rsgb.org.uk) should be sent to: Chris Danby, G0DWV, Danby Advertising, Fir Trees, Hall Rd, Hainford, Norwich, Norfolk NR10 3LX
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Business Cards

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

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COMPLETE STATION. Wind up tilt over, fully galv mast with Yaesu rotator and Hilomast on top, 18m high, Kenwood TS-200, ICOM IC-7300, ICOM SP-38, plus VHF & HF antennas plus cabling and many extras. £4000 OVNO. A Evans, G6SJD, 0777 832 0390, aevans7033@btinternet.com (Midlands).

DOWNSIZING: vintage test gear, enclosures and components must find new owners or be recycled. Proceeds to charity. Email for details. Ian, G4COL, 0783 706 4698, ianb1955@gmail.com (St Albans, Herts).

ELECRAFT KPA500 linear amplifier. 160-6m. Compact, fully automatic operation with most transceivers. Remote control operation. Noise free T/R transition, easy interfaces to Elecraft gear. Excellent condition. £1600 + postage or collect. Bob, G3PJT. 01223 263 137, bob@g3pjt.com (Cambridge).

ICOM 575D. Microphone included. A few small scratches on the top, otherwise in very good order. £150 plus postage. M Wills, G3OIL, 01722 417 120 (Salisbury).

ICOM IC-7400, £600 plus carriage. Jonathan, M5AEO, 0207 536 0466, jonathan.kempster@gmail.com (East London).

KENWOOD AT-230 manual ATU £200. Kenwood AT-250 auto ATU, £200. Kenwood SP-230 speaker, £100. All in nice used condition, showing signs of age and wear. Yaesu FT-101ZD M3, FM fitted, power lead, mic, manual, £400 ovno. Free UK mainland postage. Joe, M0AJO, 0796 688 5638 after 7pm, axe.man@aol.co.uk (Watford).

TS-590S 100W DSP multimode transceiver HF-50MHz including 5MHz. Internal ATU. First class condition with mic, manual and leads in original box. This transceiver has had very little use since new. Requires 12.8V 20A. Prefer buyer collect. £725. Mike Grierson, G3TSO, 01451 888 239, g3tso@yahoo.co.uk (Stow on the Wold).

KENWOOD TS-950 + 60m, Nevada PSU, MFJ ATU 949e, £700. Stuart Bradshaw, G3WEJ, 0770 784 4031 (Devon).

RII55B RECEIVER, serial number 63317. Excellent example/performer, but due to age strictly sold as seen, £175. Spectrum TRC4 10SL 4m transverter, little use, £75. Both items, cash on collection. Bill Watson, G4EHT, 0783 546 9149, bill.g4eht@yahoo.co.uk (Lichfield, Staffs).

RM BLA 350 LINEAR AMPLIFIER (1.8-30MHz) All mode 300W solid state, £525 ONO. Large heavy item. Buyer collects. Stephen Walters, G7VFY, 0795 654 4202 (Barnet, N London).

SK SALE. Lots of radios, test gear, boxes, components etc. No antennas. E-mail for lists. Tony Bettley, G4LDL, tony.ldl@ntlworld.com (Swindon).

VARIOUS PHILATELY BOOKS. Some containing Commemorative Mint stamps, with details of Issue. All books in VGC. Email for more specific details. P Carey, G3UXH, 0114 245 9081, g3uxh@stanage-edge.com (Sheffield, S Yorkshire).

YAESU FT DX 1200 with FFT1 extra unit added costing £125, transceiver is just over a year old and is in excellent condition. It is complete with operating manual and in the manufacturer's box. £750 OVNO. Purchaser to collect. Mike, M6EJV, 01288 352 656, di.bowman@talktalk.net (Bude, Cornwall).

YAESU FT-101ZD in 'as new' condition. Complete with manual, magazines detailing some possible modifications (not carried out!), mains lead and original Yaesu packing. Unused for five years. Buyer collects to avoid transit damage. £225. Reg Irish, G4LUF, 01668 283 623, regirish@hotmail.co.uk (Wooler, Northumberland).

YAESU STATION comprising FT-902DM, FC-902 ATU, FTV-901R (144MHz only), FT-901, SP-901. Not splitting. Offers around £250. Buyer inspects/collects. Simone, M0BOX, 0797 326 9570 m0box@rsgbcc.org (Cambs).

WANTED

KENWOOD TS-930S wanted for spares. I'm renovating my rig, which has been left to gather dust for many years. In need of various bits. Would prefer complete with ATU. Thomas, GW8WEY, 0747 317 1591, thomas.jones80@ntlworld.com (Cardiff).

STRUMECH HEAVY DUTY TOWER. Any type base. Will dismantle and remove. Robert, GW0WAY, 0747 452 4699 (Aberystwyth).

YAESU FT-767GX. My faithful FT-767GX cannot be repaired so I am looking for another to replace it. If you have one of these in mint or near mint condition that you would like to sell, then please contact me. Ray, G0VSS, 0790 987 8302, r.r.king@btinternet.com (Somerset).

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

10 FEBRUARY
BALLYMENA ARC RALLY
Ahoghill Community Centre, 80 Cullybackey Road, Ahoghill BT42 1LA
Doors open 10.30am. Traders, Bring and Buy, refreshments, raffle and more. Details from Hugh Kernohan, GI0JEV, 028 2587 1481, HKernohan@aol.com.

11 FEBRUARY
HARWELL RADIO AND ELECTRONICS RALLY
Didcot Leisure Centre, Mereland Road, Didcot, Oxon OX11 8AY (3 miles from A34 Milton Interchange)
Doors open 10am, admittance £3 (under 12s free). Free car parking with disabled facilities. There will be traders and special interest groups. Refreshments available all day. Talk-in on 145.550MHz (using callsign G3PIA). Details from Ann, G8NVI, ann.stevens@btinternet.com [www.g3pia.net/radio-electronics-rally].

18 FEBRUARY
RADIOACTIVE RALLY
Nantwich Civic Hall, Cheshire CW5 5DG
Free car parking. Doors open at 10.30am. There will be a Bring & Buy, as well as traders and an RSGB book stall. A single raffle ticket is included with the entrance programme; additional tickets available. Catering is available on site. Contact Stuart Jackson on 07880 732 534.

25 FEBRUARY
BRATS MEDWAY RADIO RALLY
The Victory Academy, Magpie Hall Road, Chatham, Kent ME4 5JB
Doors open 10am (disabled: 9.30am), £2.50. Free parking, talk-in on 145.550MHz (GB4RRR). There will be trade stands and an RSGB bookstall. Catering is available on site. Details from Hugh, G0BRC on 0782 583 8877 or secretary@bratsqth.org.

SPECIAL EVENT STATIONS

These callsigns are valid for use from the date given, but the period of operation may vary from 1-28 days before or after the event date. Details published here were kindly provided by Ofcom on 2 January 2018. *When you apply for a SES NoV please make sure you tick the box on page 2 of the application form or your special event* cannot *be listed here.*

Start	Callsign	Name	Location
01/02	GB1FWW	First World War	Great Bowden
17/02	GB4QBP	Quedgley Brownie Pack	Gloucester
24/02	GB1GC	ASE	Bideford

25 FEBRUARY

PENCOED ARC TABLE TOP SALE

Pencoed Rugby Football Club, The Verlands, Felindre Road, Pencoed CF35 5PB

Doors open at 8am for sellers (tables £10 each, first come firbst served), 10am for buyers, entry £2. Refreshments available on site. To book contact Madeline Roberts on 0773 837 5775.

4 Mar – Grantham ARC Radio & Electronics Rally

4 Mar – Exeter Radio & Electronics Rally

11 Mar – Dover Radio Club Rally

25 Mar – Callington Radio Rally

25 Mar – Wythall Radio Club Hamfest

15 Apr – West London Radio & Electronics Show

21 Apr – International Marconi Day

22 Apr – Cambridge Repeater Group Rally

29 Apr – Northern Amateur Radio Societies Association Exhibition

6 May – Thorpe Camp Hamfest (formerly Dambusters Hamfest)

6 May – Southern Electronics & Radio Fair

7 May (Bank Hol Mon) – Dartmoor Radio Rally

20 May – SARCOM Braehead Radio Electronics Rally

26 May – RADARS Flea Market Indoor Sale

3 Jun – Spalding DARS Annual Rally

10 Jun – East Suffolk Wireless Revival

10 Jun – Junction 28 Rally

17 Jun – new date – West Of England Radio Rally

24 Jun – new date – Newbury Radio Rally

7 Jul – Stockport RS Rally

15 Jul – Cornish Radio Amateur Club Rally

22 Jul – Finningley Amateur Radio Society Rally

29 Jul – Chippenham & DARC Rally, Electronics Fair & Car Boot Sale

10 Aug – 25th Cockenzie & Port Seton Mini Rally

12 Aug – Flight Refuelling ARS Hamfest

26 Aug – Torbay ARS Annual Communications Fair

16 Sep – Weston-Super-Mare Rally

7 Oct – 45th Welsh Radio Rally

14 Oct – Hornsea Amateur Radio Rally

21 Oct – Galashiels Radio Rally

4 Nov – West London Radio & Electronics Show

17 Nov – RADARS Traditional Radio Rally

25 Nov – Bishop Auckland Radio Amateurs Club Rally

SILENT KEYS

We regret to record the passing of the following Members.

Name, callsign	Date
Mr C Fiedler, G0GYP	29/12/2017
Mr S Rudcenko, G0KBL	22/11/2017
Mr A E Monaghan, G0PIX	
Mr D H Davis, G3SVI	12/2017
Mr D M Mallett, G3HUL	12/2017
Mr D J Goacher, G3LLZ	21/11/2017
Mr W Eaton, G3TAO	10/2017
Mr D Kitson, G3TRK	14/12/2017
Mr D N Ansell, G3ZWY	27/11/2017
Mr B D Wignall, G4EAJ	1/12/2017
Mr J Davis, G4HGK	11/2017
Mr R Pellatt, G4LJI	13/11/2017
Mr K Sheldon, G4NIJ	12/12/2017
Mr R G Watts, GM4ZZW	12/2017
Mr B Jayne, G8BFL	23/11/2016
Mr J E Price, G8CNN	5/11/2017
Mr J S Roberts, G8FDJ	9/12/2017
Mr G Evans, G8WXU	22/11/2017
Mr F Mole, M0GHW	26/11/2017
Mr N Tideswell, 2E0BHS	13/12/2017
Mr J Plenderleith, 9M6XRO	12/2017
Mr B Gundry, EI3IK	25/12/2017

Silent Key column entries

To notify the RSGB that a Member has passed away, please email details to sales@rsgb.org.uk or telephone 01234 832 700 then select option 1. This will ensure that their Membership will be ended properly and that they appear in the Silent Keys list (unless you specify otherwise). We need to know their name, callsign and date of death.

Only former RSGB Members appear in this list. *Please note that Ofcom must be informed separately, on 0207 981 3131 – we are not permitted to pass on details on your behalf.*

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 address 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 programme
2 Club night in shack
8, 15 Club net, 145.525MHz, 8pm
22 Talk on meerkats by Bob, G9ABC
28 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 *attach* it to your email as a separate, *high res* 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 three 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

radcom@rsgb.org.uk

RadCom

HF F-Layer Propagation Predictions for February 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	6651...15666	426432246656	1.3544454211	..1555551...	...36552....	...23331....	...1221.....	....111.....
*** Asia								
Yakutsk	21......3443	3311	...22.......	.....	.....	.....	.....	.....
Tokyo	.......2222.	....1123321.	....21121...	....1.......	.....	.....	.....	.....
Singapore	2222	243222	......332...	.....132....	.....11.....	.....	.....	.....
Hyderabad	3.......3333	3......34332	......232...	.....121....	...1112.....	.....	.....	.....
Tel Aviv	552.....3555	5551...25555	1.5322245212	..254444....	...54431....	...2211.....	.....	.....
*** Oceania								
Wellington	.......21...	...133343...	...144432...	....2321....	.....1......	.....	.....	.....
Well (ZL) (LP)	.....	.....	.....	.........1..	.....	.....	.....	.....
Perth	........111.	......13332.	......3421..	.....123....	.....111....	.....	.....	.....
Sydney	.......111..	.....13432..	.....2331...	....1222....	....1.......	.....	.....	.....
Melbourne (LP)	.....	...21.......	...22.......	....2.......	....1.......	.....	.....	.....
Honolulu	...1........	...22111....	.....1......	.....	.....	.....	.....	.....
Honolulu (LP)	.....	.....	.....	........1...	.....	.....	.....	.....
W. Samoa	...1........	...23221....	....233.....	.....22.....	.....	.....	.....	.....
*** Africa								
Mauritius	2........222	3......23333	1......332.1	.......21...	.......1....	.....	.....	.....
Johanesburg	22........33	33......2343	.1......3322	.......221..	...11.121...	....1.11....	.....	.....
Ibadan	5552....1455	55531..13555	522421124533	...5322342..	...543342...	...24444....	....1111....	.....
Nairobi	331.....2333	443.....3444	2.31...14411	...2..132...	...32123....	......1.....	.....	.....
Canary Isles	6665.....566	666631.13666	662643335664	11.6544456 11	...3225552..	...2115531..	...1..332...	......221...
*** S. America								
Buenos Aires	2222.......1	3314......22	11.3......1.	.....	.....	.....	.....	.....
Rio de Janeiro	3323.......3	3324.....133	22.2.....221	....1...11..	....1..11...	.......1....	.....	.....
Lima	2212........	22.3.......1	...1........	.....	.....	.....	.....	.....
Caracas	3333......13	33.42.....23	...23....1..	.....21.1...	.....221....	.....	.....	.....
*** N. America								
Guatemala	2222........	22.32......1	....2.......	.....	......1.....	.....	.....	.....
New Orleans	33331......2	21.32.....11	.....1......	......21....	......2.....	.....	.....	.....
Washington	44442.....24	42.2321.1232	.....22122..	.....3322...	......33....	......21....	.....	.....
Quebec	44431.....24	21..211.1231	.....22222..	......323...	......22....	.....	.....	.....
Anchorage	.231........	.....	.....	.....	.....	.....	.....	.....
Vancouver	2222........	.....	.....	.....	.....	.....	.....	.....
San Francisco	12121.......	1..22.......	.....	.....	.....	.....	.....	.....
San Fran (LP)	.....	.....	.......1....	.......2....	.......1....	.......1....	.....	.....

Key: The figures represent approximate S-meter readings, whilst the colours represent expected circuit reliability. **Black** equals low to very low probability, Blue equals good probability and **Red** equals a strong probability. No signal is expected when a '.' is shown. The RSGB Propagation Studies Committee provides propagation predictions on the internet at www.rsgb.org.uk/propagation/index.php. An input power of 100W and a dipole aerial has been used in the preparation of these predictions; therefore a better equipped station should expect better results. The predicted smoothed sunspot numbers for February, March and April are respectively (SIDC classical method – Waldmeier's standard) 16, 15 & 13 and (combined method) 11, 10 & 9. The provisional mean sunspot number for December 2017 was 8.2. The daily maximum / minimum numbers were 30 on 24 December and 0 on 1-5, 8, 9, 13-18 and 28-30.

CHOKE BALUNS

Trevor Beamond, G3VLF

In the November 2017 *RadCom*, Mike Parkin, G0JMI published an article on a dual band aerial. This included a choke balun to match the aerial to the coax feeder. The feeder is formed into a choke to balance the current in the two wires.

The choke was wound onto aluminium tubing so would have a shorted turn and the inductance would be eliminated. I believe that the balun as fitted would do nothing.

This was sent for publication in The Last Word some time ago and in the interim I have had a long correspondence with G3VLF. Our opinions remain diverged, so it seems sensible to open the subject up as Trevor originally intended. Does anyone have any helpful comments?

Mike Parkin, G0JMI, Antennas columnist

MODERN SOFTWARE

John Worsnop, G4BAO

I'm very pleased with the responses from G1ZYJ and G8GKQ to my contribution to the Data column and other feedback directly to me. It has had exactly the effect I hoped it would have – that of generating discussion on the topic of modern software and getting people to 'take the plunge'. I'm sure Dave understands that it was a bit 'tongue in cheek' and Andy declared such at the start, but it worked.

Since I wrote it I've taken that plunge myself and have started to get my head round GnuRadio and programming SDRs. It took me just one Sunday of Internet searches and trial and error to go from nothing to having a working FM receiver using my PC and an RTL dongle. I've got the bug (no pun intended) and am looking seriously at programming my LimeSDR for GHz bands use. No one should have any fear about having a go at similar things.

COMPULSORY CW

Bernard, G4LGK/VK2IB

There have been some interesting discussions in *RadCom* recently about the one-time compulsory CW requirement for HF operating, with the reason often being given as the need for commercial stations to be able to communicate with the offending amateur if any QRM was being caused.

Many years ago I was a ship's Radio Officer. On one occasion I was working North Foreland Radio/GNF on 1.8MHz SSB setting up a link telephone call when I heard a CW station come up, causing QRM. I asked GNF to stand by while I listened to see who the interfering station was. It turned out to by my friend Roy, G4GPX. So I asked GNF if we could move to a different channel, to which he agreed, and we duly left the frequency so that Roy could continue his QSO uninterrupted. I figured that as Roy was there first, us commercial users moving off the frequency was the decent thing to do!

NEWBIE & CW

Bernie Dowley, 2E0NCI

I have been following the discussion on the question of CW. As a newbie to both amateur radio and CW I am trying to increase my skill and understanding when using my Icom IC-706 Mk2G. One of these attempts is trying to use CW. My problem is that whilst I can send with a reasonable degree of accuracy at about 10-12 WPM, I am having a hard time decoding CW. The speed at which many of the transmissions are sent are way above my ability to decode. With the increasing use of paddle keys and I suspect computer based software, it appears I have little chance of obtaining the reading skill needed. Perhaps you competent and skilled CW users may want to take some time sending a little slower so that I can try and obtain the skill you have.

IT'S TECHNOLOGY'S FAULT

Peter Hutchison, G4URT

Life is getting more complicated and I accuse technology! For example – a 1977 Ford Escort vs a 2017 Ford Focus. I had an old Mk 1 Escort and I serviced / repaired it, a situation I could not envisage with a 2017 Focus with all its electronics. Same with controlling your central heating; no longer (if the adverts make us believe) is a thermostat mounted on the hall wall sufficient – you must control it from the latest mobile phone. I'm not being a grumpy old man here (although those who know me will be the first to disagree) but such advances can be daunting to those not conversant with the rapid pace of technological change.

The same argument can be directed to amateur radio. When I first started to operate, the ultimate communications was packet radio using a BBC computer – oh, the heady days of Cambridge Packet. Since then it seems to me that amateur radio has become more and more complicated along with life in general.

The crux of the matter is that the average age of the 'radio population' worldwide is getting older. And, at the same time, the number of modes available has also greatly increased. No longer is CW the only digital mode – there must be many dozen available at the touch of a computer download. Your local FM repeater has gone really hi-tech.

So, how do we encourage new persons to enter the hobby and keep the older ones when there are so many different modes available? From experience in getting conversant with JT65b for 2m EME I have found other people's experiences invaluable. There is a forum called Moon-Net that, in the early days, I posed questions on and invariably got excellent replies from operators all over the world. However, wouldn't it have been good if I could have contacted someone in the UK directly for advice?

I suggest that the answer could come by the RSGB copying the ARRL 'Elmer' system. This is a system operated by the ARRL that puts people who need advice in contact with the appropriate experts via some sort of database. I'm sure that there are many Members who would be willing to advise those (like me) who struggled in the early days. The list of expertise that is out there is almost endless. From Aurdino programming, digital ATV, antenna designing programs, microwave operating etc I appreciate that there are specialised groups for some areas but a central database for someone who is struggling to view could be of great use. Who knows, there could be an expert in the same town?

For myself, EME JT65b has been the one thing that has kept me in the hobby. Without it I'd have probably sold the mast and kit, quit the RSGB and bought myself a set of golf clubs along with a year's membership of the local club. Basically those un-official Elmers who helped me out did me a great service!'

The RSGB's Training & Education Committee (TEC) are in the process of investigating how a mentoring scheme could work in the UK. Ed.

NO SUNSPOTS AND BANDS ALIVE

Sam Turner, G4UQB

Further to my letter published in December *RadCom* and subsequent responses from G4RJA, GW3TMP and G0SUQ and with apologies with my error of dates as it was indeed 28-29 October 2017, not September.

As Ian, G0SUQ, I am not a contest operator per se but, like him, use the contests to check propagation conditions worldwide and to see just how far I can get out and who can hear me. So it's a tool that I use, simple as that. I could just sit here during sunspot mimimum and 'wonder' if I could get out and to where – but why, when the whole world is calling and 'using' the bands on such occasions? I am not madly for contests or against, but as Ian said, "Contests do breathe some life into 'dead' bands".

A gripe, if we can call it that, is non-contesters bemoaning the 5-9 report for 'every' contest contact. Leave it, as what is important is that every contact is Q5 'every time'. In contests, while S-points in reality count for nothing, readability is everything. Perhaps contesters could just go for Q5 only and leave out S9? So, in contests, being 'heard' is what it is all about and in this

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lowest of sunspot cycles on the weekend in question I was heard by over 25 countries *worldwide*.

Lastly, I have to agree with Ivor, G4RJA – over the years, discounting contests, operating procedures have changed somewhat from when I was first licenced in the 1980s; more specially so with CW. For example, I now hardly ever hear BT, VA or AR, etc.

TRY QRP

Bill Kitchen, G4GHB

In reply to G4ALD regarding CW operators. I don't bother with stations who I hear wanting a quick contact or 5.9.9. signals. They don't bother to work you if you're anything less. Try QRP for interesting contacts. I run QRP 5 watts or less and make QSOs with people who are anything from 5.9.9. to 3.3.9. as I did the other day. I just bought an FT-817ND because of it's small size to take out on my motorbike. It's my first modern bought radio in 40 years or so since an FT-101E long since sold. I have an HF home brew rig made in 1998 of 4 watts and an xtal QRP single valve Tx using a 61BT and had a Pye Bantam on 4 metres and a Pixie on 5.262MHz, 350mW out, made a 180 mile QSO and heard in Holland by a SWL at 220 miles when unfortunately an electrolytic capacitor later went faulty that took out one transistor.

As for learning Morse and speed I wonder if those who worked up speed from 6WPM, as I did, are more able to read slow CW compared to those who did the speed method of learning at the speed they want to operate at? Can they slow down or does it not sound right?

NEW OTA EVENT

Chris Wiseman, G0RDK

As a licensed radio amateur since 1985 I have taken part in my fair share of special event and demonstration stations, including GB100RSGB. The fairly recent wave of 'OTA' events, be it Summits, Museums, Railways, Churches, Mills, JOTA etc, seems to be a good way of spreading the word of amateur radio to the general public, and hopefully increasing our numbers.

With this in mind I propose a new 'OTA', PACOTA or Pubs and Clubs On The Air. The proposed date will be Saturday 12 May 2018. If you or your Radio club or Society is interested in taking part and putting on a station please e-mail pacota@g6tw.org.uk and we'll send you some details, hints & tips.

Don't be under any illusions though, events such as this are hard work and need careful planning and preparation, this is not just an excuse for inebriation in an oast house.

OXFORD UNIVERSITY ARS

Richard, G3XWH (New College 1971)

It is great to see G6UW from Cambridge University taking an active part in amateur radio but what about G3OUR from Oxford? The club appears to have been dormant for many years, perhaps since the late 70s? Within the last year a former member of the society has managed to reclaim the G3OUR callsign and there is a history of the club available here: https://tinyurl.com/ychgn92x

This led me to wondering if there is any interest in re-forming the club within the University via present undergraduates / academics and past members. To this end I have established an e-mail address of mail@g3our.uk as an initial contact point for those interested.

We have also heard details how some of our young Members from the YOTA programme are energising their universities – Swansea and Southampton included. Ed.

INTERNET FRAUD ATTACK FOILED

Brian Summers, G8GQS
BATC Hon Treasurer

The British Amateur Television Club (BATC) received a quite convincing email purporting to be from our Chairman and asking for a payment to be made to a supplier via BACS. As you might expect, the BATC often makes such payments so nothing appeared unusual. Bank account and sort code details were provided and it looked legitimate. Larger transactions are usually discussed beforehand at committee meetings and I (as Treasurer) normally need invoices etc to support payments. As the amount was quite significant and I had no prior knowledge of it, I asked the BATC Chairman to phone me for confirmation. Fortunately, this exposed the attempted fraud and avoided any loss. The important thing to note was that the email was very convincing, normal looking, and contained proper-looking names and correct email addresses etc.

BATC understands that other, comparable organisations have also been targeted, and that at least one lost a substantial amount of money. It seems that this is – or may become – a common form of attack on small societies and clubs. I would recommend that all amateur radio clubs check and double-check *all* payments before they are made in order to avoid potentially catastrophic losses. We must ALL be constantly vigilant.

RSGB is historically very careful about making payments, does not pay anything without proper supporting documentation and sign-off, and takes extra-careful verification steps if, for example, we are informed that a supplier is changing its banking details. We would encourage all organisations to be vigilant and look into ways they can minimise their exposure to fraud. Ed.

SEARCHING FOR OLD ACQUAINTANCES

Derrick S Brown, G4LNM

In 1954-1956, I was in the Royal Signals, doing my 'bit' in National Service. Whilst in Austria (Graz) there were several fellow signalmen who talked about taking the amateur radio exam – City & Guilds. I wonder how many there were and who took, and passed, getting their licences? This was 12 Wireless Squadron, situated in the Thalerhof camp. It would be interesting to hear from them after this very long time.

I located one colleague on the Royal Signals website a few years ago.

If you were amongst Derrick's colleagues, drop a line to radcom@rsgb.org.uk and we'll pass on your email. Ed.

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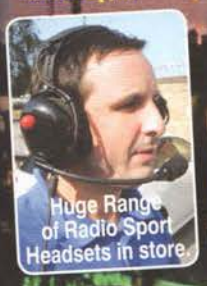

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36 x £24.50p/m

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Our best selling Dual Band Handie with the all-important C4FM Data Mode.
FREE CD-41 Base Charge Cradle.
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The Big Daddy of manual Balanced Output HF Antenna Tuners. Handles 3.5kW continuous tone RF on 160-10m. Peak & Hold metering built-in & 6 position antenna switch. Future proof your high power ATU requirements with this masterpiece "Built-like-a-tank" product from Palstar USA.
Usually £1299.95 but enter AT5Kra at check out and save a massive £150! Web orders only.

Yaesu YA-30

A wire antenna already assembled and ready to go straight out of the box! Total length is just 82ft (25m). Better still, you don't even need an ATU and operates from 160m-10m.
Usually £229.95 but enter YA30ra at check out and save £30! Web orders only.