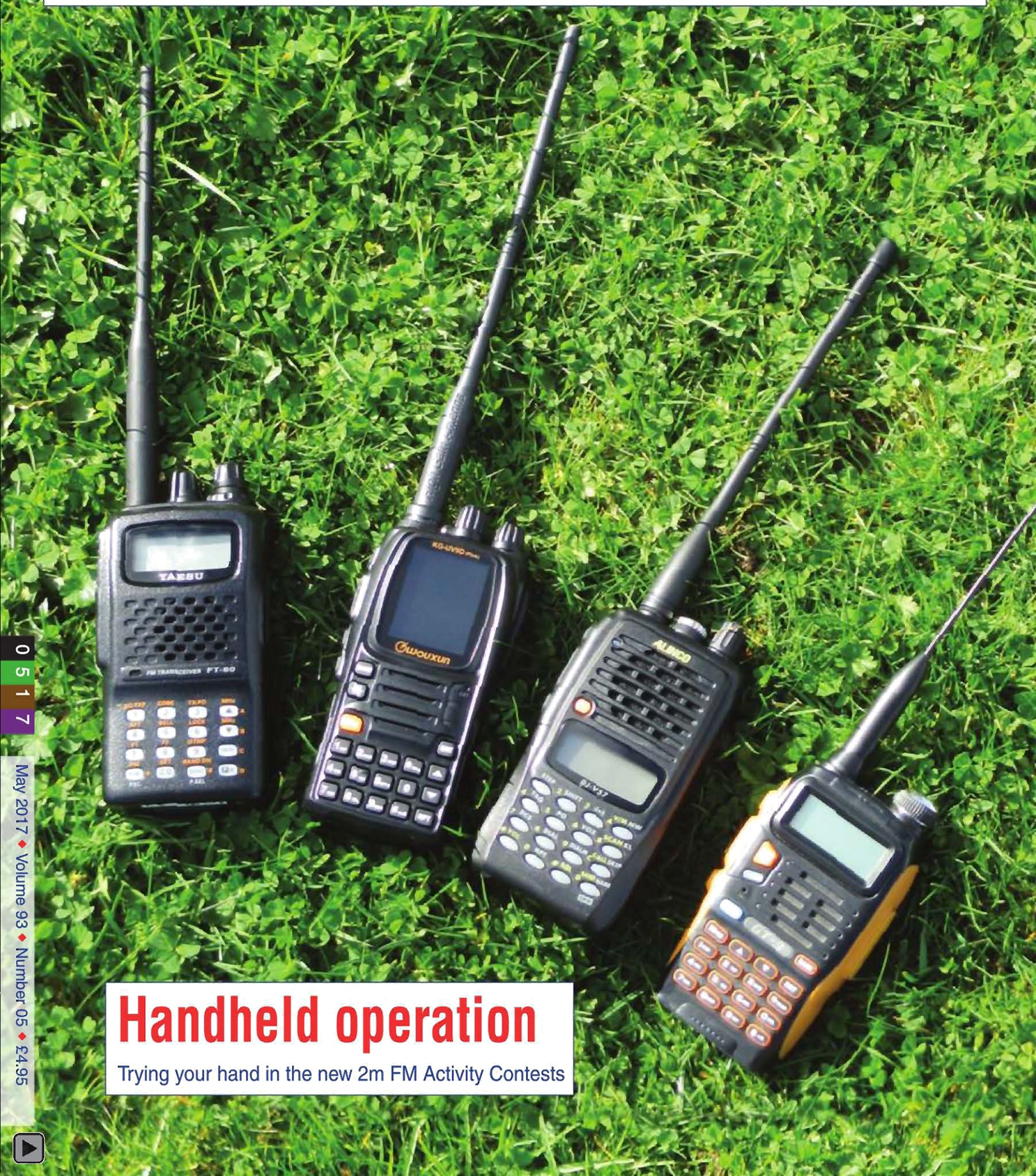
Radio Society of Great Britain
Advancing amateur radio since 1913

RadCom



Handheld operation

Trying your hand in the new 2m FM Activity Contests

0517
May 2017 ◆ Volume 93 ◆ Number 05 ◆ £4.95

Thought I'd start this month by reminding you all that we're open Sunday the 30th of April from 8am until 3pm. That's the same day as Kempton Park Rally & since we are only twenty minutes away from the show, it seemed daft not to open. I've told Richard my Sales Manager & the team to sharpen their pencils even more than usual because I want to see you dragging your new toys out of the store with HUGE grins on your faces. Better still, "admission", parking and cups of TEA & COFFEE are FREE!

ML&S NO.1 FOR SDR RADIO

Two new SDR products from Expert Electronics

NEW SunSDR-QRP — ML&S INTRO OFFER: £799.95

Based on the renowned SunSDR2 Pro transceiver, Expert have now introduced a lower cost QRP version, the SunSDR QRP. *Offering 5W output on all modes from 100KHz to 55MHz (RX) and 160-6m on TX, the QRP version runs all the software of its big brother and can be run locally or via LAN using the Expert Remote System.*

Click! www.HamRadio.co.uk/SUNsdrQRP

NEW ColibriNANO — ML&S: £239.95

A highly advanced 14-bit ADC 122.88Msps Direct Sampling SDR-based receiver packaged in a small dongle type case. *Covering 100KHz-500MHz, this new design leads the way in low cost SDR technology and is compatible with every popular HAM software such as HDSDR, SDRSharp and ExpertSDR2.*

Click! www.HamRadio.co.uk/SUNsdrNANO

FLEX RADIO SYSTEMS

FlexRadio Systems — Software Defined Radios

FACTORY APPOINTED DEALER

Come and see our new display unit for the Flex range of SDR transceivers.

Flex-Maestro Self-contained remote controller for the 6000 series	£1349.95
Flex-6300 1.8-60MHz, 2 Slice RX 100W SDR TCVR	£2249.95
Flex-6500 1.8-60MHz, 4 Slice RX SDR 100W Transceiver	£3899.95
Flex-6700 1.8-60MHz, (+RX 135-165MHz) 8 Slice RX SDR 100W Transceiver	£6899.95
Flex-6700R as above, Receiver only	£6599.95

Click! www.HamRadio.co.uk/flex

FUNcube DONGLE PRO+

The World's Number 1 Dongle for SDR Technology.

150kHz-1.9GHz. (gap between 250MHz to 410MHz).

Designed and Built in Great Britain

ML&S: £149.95

Click! www.HamRadio.co.uk/funcube

EXPERT ELECTRONICS MB-1

100W DDS SDR base station transceiver.

Click! www.HamRadio.co.uk/mb1

WITH AUTO ATU £4799.95

ELAD FDM-DUO — ML&S: £949.95

Click! www.HamRadio.co.uk/fdmduo

Beautifully engineered and crafted in aluminium. 10kHz-54MHz, direct conversion RX operating at 122.88MHz, employing a fast analog-digital-converter sampling received HF directly into digital signals. A downstream DSP module provides for filtering and processing. Another ARM processor handles the signals of the control unit. All Mode, in stock.

Receive only version also available at £699.95.

Click! www.HamRadio.co.uk/fdmduoR

SDRplay — RSP1: £114.95 RSP2: £154.95

Click! www.HamRadio.co.uk/sdrplay

Designed and Built in Great Britain

- 10kHz to 2GHz
- 12-bit ADC silicon technology
- Built-in High Performance front-end filters • Up to 10 MHz bandwidth
- Low noise floor
- Simple USB interface (type B socket)
- Powers over the USB cable
- SDRuno - World class SDR software

RSP2PRO: £189.95

APACHE LABS ANAN-100B HF + 6M 100W ALL MODE SDR

RRP: £1849.95
ML&S PRICE: £1799.95

APACHE LABS ANAN-200D HF + 6M 100W ALL MODE SDR

The ANAN-200D is The most powerful Amateur Radio Transceiver available today, it builds on the very successful OpenHPSDR Hermes and the Apache Labs Angelia designs and offers unprecedented performance/functionality not available in any other HF/6M radio transceiver.

RRP: 3849.95
ML&S PRICE £3099.95

APACHE LABS ANAN-8000DLE HF & 6M 200W SDR

APACHE LABS SOFTWARE DEFINED RADIOS
FACTORY DIRECT DISTRIBUTOR

ML&S PRICE: £3999.95
Click www.HamRadio.co.uk/8000DLE

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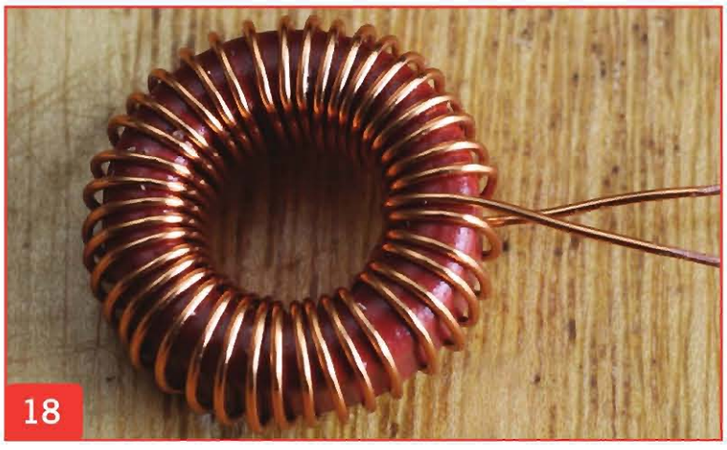

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Technical Features

Features

Cover image: A selection of handhelds to try operating in the 2m UKFM contests. Photo courtesy 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 June edition of *RadCom* is expected to arrive with most Members by 25 May, although this can take up to a week longer in some cases; international deliveries can take longer still.**

The online *RadCom* is at www.rsgb.org/radcom/
Technical supplement *RadCom Plus* is available to RSGB Members online at www.rsgb.org/radcom-plus
RadCom Basics for Members new to the hobby can be found at www.rsgb.org/radcom-basics/

The RSGB is on Twitter @theRSGB

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

Have your say report

The Board recently received a number of reports that postings to the Have Your Say (HYS) web page were not being answered and tasked the Chair with investigating the position. The key findings are set out in a report on the RSGB website: http://rsgb.org/main/blog/news/rsgb-notices/2017/04/04/have-your-say-report/

A technical problem was identified that may mean a number of HYS messages weren't received and, therefore, weren't answered. However, we are only aware of one message specifically that didn't get a response. The technical problem has now been fixed.

It was also noted that HYS does not form part of the formal complaints policy. The Board has agreed to update the complaints policy and to implement some process improvements to ensure that every HYS posting that is received is tracked through to conclusion.

The Board would like to thank those who drew its attention to this issue and trust that the actions taken will show that the Board listens and acts when matters are made known.

Steve Hartley, G0FUW, RSGB Board Chair

Brian Rix, G2DQU Memorial

RSGB President Nick Henwood, G3RWF will represent the RSGB at the memorial service for Brian Rix, G2DQU at The Actor's Church in Covent Garden on Wednesday 3 May at 3pm.

JA youngsters at YOTA 2017

Two young Japanese amateurs will be participating in YOTA 2017 to be held at Gilwell Park in August. Seiya Kato, JE1XUZ (left) and Riku Suda, JR2KHB will be joining the other like-minded young people from IARU Region 1 for the planned mix of amateur radio and intercultural activities.

Earthing and the radio amateur

The Earth Bar article in the last two editions of *RadCom* has caused a significant amount of correspondence on electrical and RF earthing. We are still sorting through replies and presently intend to include a representative sample in a forthcoming Technical Correspondence page.

In the meanwhile, we are still looking for a suitably experienced person who can write an 'accessible' introduction to the issues that surround earthing and the radio amateur. Ideally, we would like an article along the lines of, 'if your electricity meter cupboard looks like this and has this sort of message tag, these are things you *should* do – and these are the things you *shouldn't* do (and why)'. The important thing is to write it from the amateur's point of view. If you think you could tackle this then we would be very pleased to hear from you: email radcom@rsgb.org.uk to open discussions.

We can provide a lot of help with writing, producing diagrams and so on (and also for any other technical articles anyone may think of writing).

YOTA vlog

Our second YOTA 2017 vlog (video blog) features RSGB Youth Committee member Rebecca Hughes, M6BUB. She introduces one of the activities she's looking forward to helping with at the international YOTA 2017 week the RSGB is hosting in August. You can watch this and other vlogs on our dedicated YOTA 2017 web pages www.rsgb.org/yota

RSGBTech Yahoo Group & the RSGB

Brian Reay, G8OSN, the owner of RSGBTech Yahoo Group, and Steve Hartley, G0FUW, the RSGB Chairman, have issued a joint statement to clarify the ownership of the Yahoo Group.

RSGBTech Yahoo Group was established in 2009 by an RSGB Board Member to provide a forum for all radio amateurs to discuss technical matters. It has never been owned by the RSGB and membership has never been limited to RSGB Members. RSGBTech currently has over 1600 subscribers from around the globe.

Since 2009 a very small number of users have been removed from the RSGBTech Yahoo Group for a variety of reasons, including making inappropriate postings and/or abusing moderators. Such behaviour is not tolerated by RSGBTech nor by the RSGB on its own social media channels.

The RSGB has always promoted use of the Group, starting with an announcement in the May 2009 *RadCom*, in its annual *Yearbook* and on its website. The RSGB recognises that the RSGBTech Yahoo Group makes a valuable contribution to technical discussions relating to amateur radio.

Both the RSGB and G8OSN wish to make it very clear that RSGBTech Yahoo Group is entirely independent from the RSGB and that the RSGB does not therefore control membership of the group.

Any questions or complaints about RSGBTech Yahoo Group should therefore be directed to its owner, Brian Reay, G8OSN via email to rsgbtech-owner@yahoogroups.com

YOTA 2017

New supporters

We are pleased to say that many individuals and clubs are showing their support of youth activity in the UK by becoming supporters of YOTA 2017. Support is coming from far and wide and we are pleased so many have joined the RSGB in supporting this worthwhile event.

New Super Supporters

Yasme Foundation: better known for supporting DXpeditions, this charitable group is based in the USA and is keen to help individuals from across the amateur radio world. They have contributed significant funds to YOTA 2017 by meeting the costs for young amateurs from Egypt and Morocco, thus enabling them to attend the event.

SOTA Foundation: SOTA were a proud sponsor of the UK based YOTA activity in 2015 and we are pleased to welcome them as a supporter of YOTA 2017. The delegates to YOTA 2017 will get the opportunity to try for themselves a SOTA activation. We hope that chasers of SOTA activations will take the opportunity to welcome the YOTA participation by contacting them on-air.

More New Supporters

We also have a number of other new supporters to report. We have had very welcome contributions from the Radio Fraternity Lodge No 8040, Radio Amateur Old Timers' Association and Worksop Amateur Radio Society who we welcome to the ranks of our Supporter Plus group. We have now had 15 clubs from across the UK donate to YOTA 2017 and a large number of individual donors. Unfortunately, we can't name them all the clubs and individuals here but we would like to thank them for their support. A full list of our supporters can be found at our website www.rsgb.org/yota

We still need help

Even though the amateur radio community has been very generous in donating to YOTA 2017 we are still in need of your support. If you haven't done so yet, you or your club can help the RSGB in the staging of the event by donating at www.rsgb.org/yotasupporter

YOTA 2017 Award

To encourage engagement with YOTA 2017 we are launching an award for those contacting any of the YOTA 2017 stations that will be operating during August. Certificates for the basic award will be free of charge and issued as an online PDF after a contact is confirmed. For the more serious award chaser we will have an additional award for multiple contacts with the stations on different bands and modes. Full details of the awards and how to claim them will be released closer to the event.

YOTA webpages

We're delighted to announce our newly-extended YOTA 2017 web pages – go to www.rsgb.org/yota to take a look. This dedicated section contains everything you need to know about YOTA 2017:

- Discover more about the history of the event and who will be taking part this year
- Read the latest news and announcements
- Meet the team involved in making YOTA 2017 a reality
- Learn how you could support the event financially

The redesign makes the information easier to find, so take a look around and find out more. Plans for YOTA 2017 are progressing and you can help the RSGB to make YOTA 2017 event a great success by becoming a financial supporter – anyone who donates more than £15 receives a supporters' pin. Find out more from the YOTA 2017 web page, www.rsgb.org/yotasupporter

Radio Fraternity Lodge supports YOTA 2017

The Radio Fraternity Lodge No 8040 was formed in London in 1965 by one-time RSGB General Manager John Clarricoats OBE, G6CL with many other leading radio amateurs of the day who were also Freemasons. The Radio Fraternity Lodge is still a London based Lodge and has always been principally composed of RSGB Members. Since its foundation over fifty years ago, the Lodge has raised many thousands of pounds for charity including the Radio Communications Foundation. The Lodge has this year decided donate some of its funds to become a Supporter Plus of the *Youth on the Air 2017* event at Gilwell Park in August. The Radio Fraternity Lodge sees the importance of supporting amateur radio activity amongst the young and is looking for like-minded people to join them in raising money for such causes. If you are a radio amateur who is already a Freemason or just interested in becoming one, then please email the lodge Secretary via radiofraternitysecretary@gmail.com for more information about Lodge activities.

Get a YOTA 2017 pin by becoming a supporter today Today!

www.rsgb.org/yotasupporter

VHF Contesting scoring

The RSGB VHF Activity Contest B2 scoring method was introduced on a trial basis for use during 2017 in order to try to meet the 2015 Presidential Review aim of reducing geographical and other disadvantage. This is an update.

To ensure there is time for full and comprehensive consultation with all, arrangements are now being made to start to review B2 use, based on scores during the first four months of 2017 (and updated as the year goes by). B2 scoring will, of course, continue to be used throughout 2017.

We are using a process that first gets expert views together in a small invitation workshop session and then consults widely in a timely manner. The workshop session (about 12 people) is being convened on 3 June and will look at factual evidence about the use of B2, the extent to which it meets the aims of VHF contesting and then produce 2018 proposals for full consultation with the contesting community before decisions are taken. The group is deliberately small as it is a working group, not a conference. The data used and its recommendations will be made public.

Those invited reflect a broad spectrum of interests, including, of course, those with differing views on the current B2 scoring system. The workshop will be chaired by the President, working with the VHF Contest Committee. So far, the following members have accepted the President's invitation to attend:

Keith D le Boutillier, GU6EFB; Stewart Bryant, G3YSX; Andy Cook, G4PIQ and 3 VHFCC reps; David Dix, G8LZE; Martin Hall, GM8IEM; Carl Ratcliff, MOICR; Mike Tubby, G8TIC; and Nick Henwood, G3RWF

A review of B2 scoring was promised and that is what is happening. There is no preconceived outcome. The aim is to maximise enjoyment and participation in VHF contesting.

Examination Standards Committee – Chairman

Following the sudden and unexpected sad loss of the recently appointed Chair, Dave Powis, G4HUP, the RSGB Board are again seeking to appoint a suitably qualified replacement. The Examinations Standards Committee (ESC) oversees all aspects of the examinations. The appointment will be for an initial term of three years.

The role is pivotal in steering the Amateur Radio Examinations forward as new technologies and opportunities for change and improvement are developed. The ESC Chair is appointed by, and reports to, the RSGB Board. The ESC Chair is responsible for the appointment of the Examinations Standards Manager (ESM), Examination Quality Assurance Manager (EQAM) and the Chair of the Examination Group (EG). Full details of the role can be found on the RSGB website at http://rsgb.org/main/blog/volunteer-vacancies/2016/08/09/examinations-group/

The ESC develops and publishes all procedures and policies for the administration of examinations. It is also tasked with the development of the syllabus and question banks by the EG, in conjunction with the Training and Education Committee (TEC). The ESC supports the EQAM in deciding and arbitrating in cases of examination irregularity and is required to annually present statistical evidence to Ofcom to support the quality of the examinations system.

The Examination Standards Committee comprises a representative from Ofcom and Chairs from relevant RSGB Committees, in addition to members from academia, industry and learned Societies. It meets formally at least annually with other meetings convened as necessary.

The ESC has recently implemented a number of changes that have been widely welcomed.

Applications, which should include how you believe you could fulfil this role and a brief CV, should be sent to Ian Shepherd, G4EVK c/o RSGB Headquarters or by email to g4evk@rsgb.org.uk by 1 May 2017.

Train the Trainers

The RSGB Train the Trainers event hosted on Saturday 4 March by Cheltenham Amateur Radio Association (CARA) marked the 2nd birthday of the new course. Among the delegates was Tony Barron, G3YYH, Chairman of CARA. Tony was the 200th tutor to attend the new Train the Trainers and Philip Willis, M0PHI, Chair of the RSGB Training and Education Committee presented him with his certificate.

Train the Trainers is still looking for clubs to host courses during 2017. We are especially interested in visiting RSGB regions that have not yet hosted a course. For more information please contact Paul, G4DCV by email to paul@g4dcv.co.uk

New Convention video online

The 2016 RSGB Convention lecture "The rise & rise of 5.7GHz EME" by Peter Blair, G3LTF has been released for Members to view. Just log in and then go to our online video portal, www.rsgb.org/video

Congratulations

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

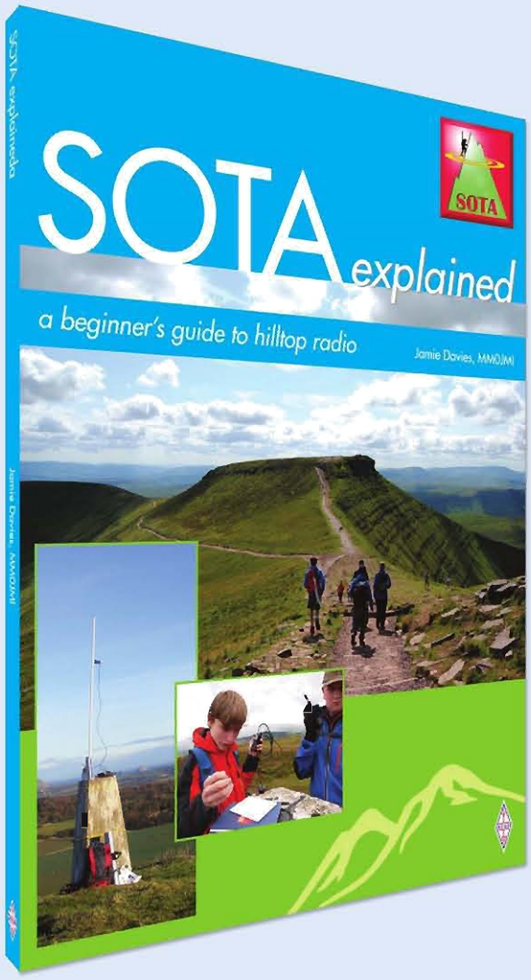
70 years
Mr C B H Bradshaw, G3VHP

60 years
Mr R L Gerrard MBE, G3LAZ
Mr R D Muir, G3LHN
Mr B M Johnson, G3LOX
Mr R J Weaving. G3NBN
Mr D W Thompson, G3OXG
Mr A V Evans, G3ZZX

50 years
Mr M J Darkin, G3KTH
De Montfort University ARS, G3SDC
Mr K M Hampson G3WFW
Mr G Coffin, G3XFN
Mr P Beehlar, G3ZCT
Mr M Broadway, G4GFI
Mr J B King,G5TA
Mr N A Mackenzie, GM3WIJ
Mr K Plumridge, G4BYY

Honour Roll

In the February issue we published the Honour Roll of continuous Membership up to 31 December 2016. Unfortunately there was an error and Mr C J Dodd, VK6DV was missed from the 51 year listing. He has been a Member since 1965: our apologies for this oversight.



NEW TITLE

SOTA Explained

A beginner's guide to hilltop radio

By Jamie Davies, MM0JMI

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

Taking a portable radio station into the hills and operating from a summit is a fascinating and rewarding way to combine the very best aspects of walking and of amateur radio. SOTA activity is also inexpensive providing the opportunity to achieve a great deal in amateur radio. Many appreciate the freedom this sort of operation offers and the benefits of having an elevated radio station far from urban electrical interference. At altitude even modest sets can deliver astonishing performance: communication across the country and across the continent is routinely available and on many days mountain-to-mountain conversations flow across the world.

SOTA Explained provides advice for those who do not venture on to the hills but still want to participate in SOTA. There is a whole chapter dedicated to 'chasers' from the bands to choose, how propagation affects your operation, chasing DX stations and rare SOTA activations. Not only does *SOTA Explained* detail how SOTA works but there is advice on safe hillwalking, setting up simple & cheap SOTA stations and modes of operation. There is technical advice on improving your first station, the antennas to choose and how to run SOTA stations on HF.

The book is not just for those new to SOTA but the more experienced operator will find much of use too. *SOTA Explained* provides the ideal guide to the SOTA scheme and making hilltop operation easy, social, & fun.

Be warned: after reading this book, you will never see a hilltop in the same way again.

Size: 174 x 240mm, 160 pages
ISBN: 9781 4738 8665 0
Non Members' Price: £12.99
RSGB Members' Price: £11.04

Also available on amazonkindle

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

5MHz Update

Amateurs in the UK have been very fortunate in having early access to 5MHz, with five spot frequencies 15 years ago and more than 70kHz of spectrum made available in 2013. This was a result of close cooperation with Ofcom and the MoD (who is Primary User on the band). The UK currently has an arrangement that gives us more spectrum and a higher power allowance (100W) at 5MHz, however it does not cover all of the WRC-15 band (5351.5 - 5366.5kHz).

The Society played a very active role in the WRC-15 process and continues to work with Ofcom to gain access to all 15kHz of the WRC-15 band, however this is not expected to change in the foreseeable future as there are on-going Primary User assignments within the band.

The RSGB will implement the IARU Region 1 band plan for 5MHz within the segments allocated to us. In common with other Region 1 societies with allocations greater than 15kHz, we will recommend that frequencies within the WRC-15 band (that are allowed under the UK Amateur Radio Licence) only be used for international contacts, or for stations with no other option.

Telecommunication regulators in The Netherlands have scaled back considerably the liberal 60m privileges announced for radio amateurs in that country just days after the conclusion of World Radiocommunication Conference 2015 (WRC-15). Since December 2015, amateurs in The Netherlands have had access to a 100kHz wide amateur band at 5MHz, with a maximum power of 100W. The Netherlands *Government Gazette* for 28 March 2017 announced that on 1 April Dutch radio amateurs will have the new 5MHz band agreed at WRC-15 so they've gone from 100kHz at 100W power to 15kHz at 15W EIRP. The Gazette notice also removed the cross-band and duplex restrictions on 50.45-52.0MHz and 70.0-70.5MHz.

QSL Matters

Every day at the bureau we see cards returned to us with messages such as, 'Not a member, Does not collect, or Silent Key'. Last month, amongst the many thousands of cards passing through, we saw a new message begin to appear. It read "No interest read QRZ.com", which is an unfortunate waste of effort and cost, both outgoing and incoming. Clearly the original card had been printed as part of a computer logbook run and sent without any final checking. *Please check before you send.*

This month we have a plea from Scottish, MM and 2M sub manager Steve Gill, MM0SGQ. The numbers of cards for these groups is rising, with almost half of last year's total being received in the first 3 months of this year. Despite Steve's best efforts, collection rates are not keeping pace. He is asking all MM and 2M Members to send him collection envelopes to avoid more cards being recycled (ie destroyed).

Cliff, G4MAR is expanding his role to take on the enlarged G4M-S group. Details are on the RSGB website.

Due to retirements and other commitments we now have a vacancy in the remaining G4T-Z group to handle 10-15,000 cards a year. If you have time, patience, space, some basic spreadsheet skills and a desire to help, please email the bureau via qsl@rsgb.org.uk

Licensing issues

Ofcom Spectrum Licensing is presently experiencing a high volume of calls about licensing issues. Email enquiries can take up to four weeks and telephone answering can also be delayed at peak times. Please use the Ofcom online portal for licence activities and consult the Information for Radio Amateurs and Frequently Asked Questions before calling or emailing. See www.ofcom.org.uk for further information.

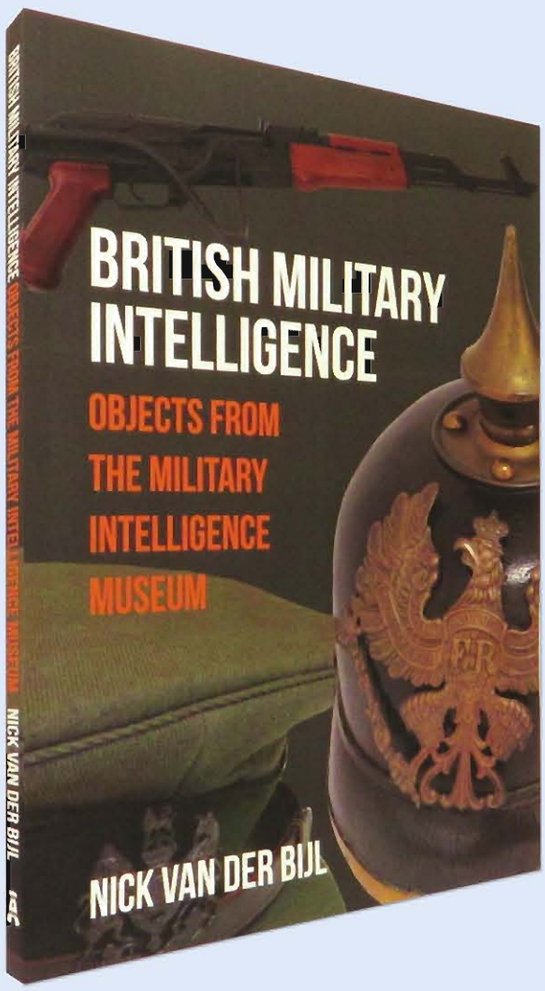
The RSGB would like to welcome to the RSGB family the following new Members who have joined their voice to ours and are helping to keep the RSGB strong.

Mr B Tufnell, 2E0DLC
Mr P Baker, 2E0MVM
Mr M Harrold, 2E0SIP
Mr W Fan, 2E0UUF
Mr K Alabaster, 2E0WEK
Mr P Lewis, 2E1DGL
Mr R Ventura, CR7AOB
Mr W Tappert, DL9WTL
Mr J J OFlynn, EI7HGB
Farnborough CG, GOFRS
Mr G Woods, G0TJI
Mr G Lightfoot, GOWTI
Mr K Pay, G1EGE
DSTL Radio Club, G3BRK
Mr J Robinson, G3CWD
Mr M Dixon, G3LHU
Mr C Elsden, G4CCX
Mr T Walter, G4KWL
Mr D Price, G4MSA
Mr M Rowan, G6SDW
Mr D Crinson, G7DSV
Mr M Else, G7TGL
Mr J Webber, G8DNH
Mr C Keys, G8IML
Mr M Standish, G8WNW
Mr S Penny, G8ZPU
Mr J Bruce, GM4SJB
Mr A Mutch, GM6JYC
Mr C Teague, GW7DUI
Mr W Hulley, K7WXW
Mr R Savage, KE5VDT
Mr W Shipman, KI4OYH
Mr E Danaher, KV4MI
Marine Radio Museum Soc, M0LBL
Dr C Jacobs, M0UOS
Mr W Eustace, M0WJE
Mr C Emmerson, M3HZF
Mr C Ward, M6GVQ
Mr P Bromley, M6HMM
Mrs D Lucock, M6ICX
Mr Y Alghurair, M6IPN
Mr J Blyth, M6IQV
Mr D Parker, M6IQW
Mr D Cassidy, M6IQZ
Mr R Bewick, M6IRB
Mr G MacAndrew, M6IRY
Mr F Rundle, M6ISF
Mr F Fitton, M6KKF
Miss A U Kulatileka, M6KUA
Mr R S Kulatileka, M6KUL
Miss L Jackson, M6LZA
Mr M Cavanagh, M6ODL
Mr B Allen, M6UBJ
Mr D Hudson, M6UDB
Mr B Garrison, M6VOK
Mr K Newby, M6WWX
Mr J Warrior, M6WXF
Mr R Chambers, M6XDV
Mr A Grundy, M6XYT
Mr D Heaton, MD6RHN
Mr C McCartney, MI6LFU
Mr G McCafferty, MI6LLF
Mr A Rackham, MW0HYV
Mr C Jenkins, MW0XFU
Mr A Scott,MW6ADS
Mr K Gilot, NZ1I
Mr J Kotlar, OK1DKJ
Mr G Dewey, RS311782
Mr R Allen, RS311949
Mr A Wake, RS312175
Mr N Simmons, RS312176
Mr P Williams,RS312197
Miss C Bone, RS312203
Mr J D Casey, RS312215
Mr D P Hopwood, RS312256
Mr N Sargent, RS312322
Mr D Swanger, RS312332
Mr M Oxley, RS312333
Mr C Roberts, RS312335
Inverness DARC, RS312336
Mr A Moore, RS312359
P Wood, RS312360
Mr S Hayllar, RS312416
Mr R Bishop, RS312417
Mr J Jackson, RS312419
Mr C Payne, RS312437
Mr M Sroczyk, SQ6JNY
Mr P Signorelli, W0RW
Mr J Eichorn, WD1P
Mr D Horne, ZL1AKW

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

Mr G Stockbridge, 2E0BJJ
Mr A Finn, 2E0GCL
Mr K R Dukes, 2E0KRD
Mr S P Bell, 2E0SBQ
Mr H Yiannakis, 2E0TPZ
Mr R F Jefferies, G0BQG
Mr R Kerby, G0CHK
Mr B P Cooper, G0TUM
Mr M P Lelliott, G4DNK
Mr P R Winchester, G4KHX
Mr C Boulter, G4UXY
Mr M L Mills, G4XRI
Mr LP Brazier, G4ZBC
Mr S Garland, G7HWT
Mr J Farrow, G7SXJ
Mr I Coverdale, G8WVW
Mr T Pillar, GI6FWU
Mr M P Williams-Davies, GW6UWW
Mr G Young, K2AJY
Mr G Cannon, M0IKW
Mr R A Morley, M1BEG
Mr K Mahoney, M1KEV
Mr J A Stanway, M3CGC
Mr J Barnes, M6PGO
Ms L Keogh, MM6KEO
Mr G Thomson, MM6ZGT
Mr SR Hardy, RS199292
Mr A J Read, RS87147
Skovde ARC, SK6EI
Mr R Brown, WN5L

NEW TITLE



British Military Intelligence

Objects from the Military Intelligence Museum

By Nick van der Bijl

One of the little known museums of the UK is the Military Intelligence Museum at Chicksands in Bedfordshire. This museum provides a huge insight into British intelligence activity since Wellington's time and this new book provides a unique look at its fascinating collection.

Through a mix of objects, medals, photographs and documents held in the Military Intelligence Museum, the book tells the story of British military intelligence across the years, moving from its earliest object of the Waterloo medal awarded to the Duke of Wellington's senior intelligence officer to items recovered from operations in Afghanistan. This fascinating collection includes a Boer War photographic stereoscope and uniforms worn by intelligence officers and other ranks during the First World War. Among the Second World War objects are a very rare highest gallantry medal awarded to a British officer by France, items that belonged to a founder of the Long Range Desert Group, an example of a pigeon coop used to deliver pigeons in Occupied Europe, a chess set used by captured Special Operations Executive operatives in Buchenwald concentration camp and copies of forged rations coupons dropped into Germany as part of Psychological Warfare Executive operations. The end of the war saw the Intelligence Corps heavily involved in arresting war criminals in Germany and Japan; among the objects are handcuffs used by a Field Security Section in Occupied Germany to arrest three high-ranking Nazi officials. During the Cold War, the Intelligence Corps role in collecting intelligence from those organisations hostile to British interests and protecting the Army from espionage, sabotage and terrorism is illustrated by several documents.

There are over 180 photographs and illustrations included and the varied nature of these objects illuminates a feature of British military operations that is rarely discussed, despite having been frequently proven to be crucial to their success. *British Military Intelligence* provides a great read and is thoroughly recommended to anyone interested in the UK's clandestine history.

Size: 165 x 234mm, 96 pages
ISBN: 9781 4456 6238 1
Non Members' Price: £14.99
RSGB Members' Price: £11.24

25% OFF

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

Commonwealth Contest from Malta

Peter, G3TJE and Dave, G4CXQ contacted Steve, 9H1SF at Marconi Amateur Radio Circle in Malta to arrange operating in the 80th Commonwealth Contest. On the 9th March, Peter, Dave and David, G3RXP visited the club and met some of the members. They returned on the 10th to set up their station using laptop brought by David, G3RXP and a SB2000 MK2 USB interface that was connected to the Kenwood TS-570D (donated by the Royal Naval Amateur Radio Society) for logging the contacts. The contest began at 1000UTC on the 11th and ran for 24 hours. The Maltese club members looked after the contesters providing lunch, dinner and even a full English breakfast on Sunday morning. Although the weather on the island was windy, the tower was up to its full height. The club members who were present on both days enjoyed watching and learning new things. The club would like to congratulate Pete, G3TJE, Dave, G4CXQ and David, G3RXP for their entry in this contest from the Marconi Amateur Radio Circle Malta, logging 528 contacts. The committee also would like to thank Peter and Dave who presented the club with the club's logo on a stand with light for the shack. David donated the radio interface to the club and he did the set up for this to work. Malcom, G3PDH kindly donated the laptop for the radio. All these gifts were most appreciated. For more information about the club email marc_malta@yahoo.com

Special event stations

GB0GLS will be on the air beween 5 and 11 May with a main day of activation from an original Y station, Gilnahirk Listening Station, Gilnahirk Road, Belfast BT5 7SR on the 6th. This is a joint special event between Antrim District ARS and Mid Ulster ARC to commemorate the Gilnahirk Listening Station. QSL cards will be issued upon request and details about the station are available on QRZ.com George Busby's recent publication *Spies at Gilnahirk* is available from the RSGB online store and a brief history of this fascinating aspect of Northern Ireland radio history can be seen on QRZ.com

Bangor & District ARS will take part in Mills on the Air on 13 May from Ballycopland Windmill, Millisle BT22 2DS. GB2MCW has been used in the past for this event, details from Harry, GI4JTF, by email to gi4jtf@gmail.com

To commemorate the 500th anniversary of the founding of Le Havre, the city's amateur radio club, F6KOH, will be putting TM500LH on the air on 25 to 31 May (also 5-10 July, 30 August to 4 September and 1-8 October). Operation will be using SSB, CW, SSTV and digital modes. A special diploma is available to all stations making 3 contacts. See QRZ.com

The permanent special event station GB2RAF at RAF Neatishead Air Defence Radar Museum in Norfolk is back on air after its winter break. Operation is every 2nd Saturday until 11 November 2017.

GB2SMP is a special event station for Mills On The Air on 13 and 14 May. Operated by Solihull Amateur Radio Society, the station will operate from the site of the Middle Ages Dom Muhle corn mill that later became known as Olton Mill or Olton End Mill.

9-year-old passes Advanced exam

On 14 March, 9-year old George Radulescu, 2E0UKK sat his Advanced exam at the ML&S Ham Radio Training Academy. The result was a pass and congratulations from all at the ML&S Ham Radio Training Academy. George can be seen in the picture along with his father and mentor Remus, M0UKL. George has sat – and passed – all three exams within 1 year and the RSGB exams department would like to add their congratulations for this amazing achievement at such a young age. George, now aged 10, can now be heard on the air with his new callsign M0UKK.

4m beacon update

The North American 4m transatlantic licence for WG2XPN has been renewed for another two years and will thus allow operations to continue until 2019. The trustee of WG2XPN advises that the beacon is still operating 24/7 using its usual operating parameters; 70.005MHz CW, GPS locked, ERP 3kW from a Yagi aimed at 60° true north from grid square FM07fm. The QTH is 1280m ASL. The beacon has been heard via multi-hop E-skip in the UK and other locations in the EU over the past few years. QSL reports are encouraged via the DX cluster or beaconspot.eu.

New venue for Hornsea ARC

Hornsea Amateur Radio Club no longer meets at the Old Bakery on Mereside in Hornsea. They are currently seeking new premises to call home. In the meantime, they have found a meeting place in the Outside Bowling Club on the Atwick Road (B1242) this is just at the 30MPH sign approaching Hornsea. The postcode is HU18 1EL. Club nights are Wednesdays at 7.30 for 8pm and all are welcome. The club will continue to offer a full programme throughout the year and are holding a rally in the Floral Hall on 15 October. Further information can be found at hornseaarc.co.uk

ECCA Collins Commemoration

To commemorate the 30th anniversary of Art Collins' death in 1987, II0CXX (operated by IK0IXI) will be on the air until 31 May. This is the latest in a number of special events arranged by the European Collins Collector Association.

ELAD Visits ML&S

ELAD are manufacturers of high-end SDR products and Franco is showing off the new ELAD FDM-Duo SDR transceiver in red.

The idea to anodise the alloy case in the unusual satin finish colour came from Martin Lynch (seen here shaking Franco's hand in the main showroom), after he suggested that if Ferrari made a transceiver it would be in this colour and look as beautiful as the FDM-Duo! ELAD have many exciting new products scheduled for release during 2017 of which ML&S are their sole UK distributor.

For more information on ELAD products go to www.HamRadio.uk/ELAD

SOTA events

Saturday 11 March saw two intercontinental Summit-to-summit actions by SOTA operators in Europe, North America, Australia, New Zealand and Japan. Despite propagation predictions, the first event at 0700UTC was successful with activators on over 30 summits in Europe, Australia, Japan and New Zealand contacting each other on both SSB and CW. Starting around 1930UTC (very early morning, Sunday in Australia) activators in Australia, Japan and the US were again on the summits. In fact, three Australian activators camped overnight on their summits so that they could take part in both events. Although inter-continental summit to home station contacts were made and several summit to summit contacts within each region, no inter-continental summit-to-summit contacts were achieved due to the propagation conditions. This might sound a little disheartening but in fact it has increased the resolve of those taking part to come back and try again when conditions are somewhat better. Thanks goes to the organisers Mike, 2E0YYY and Andrew, VK1AD.

G0KSC presenting at Dayton

Justin, G0KSC of InnovAntennas and International Ham Stores Group has been asked to speak at the Dayton Hamvention Antenna Forum. He will be speaking about two of his latest developments, *Optimising Stacked Arrays with Free Space Parrasitic Elements* and *Development of the BOLPA Band Optimised Log Periodic Array*. Justin is also a contributor to the *ARRL Antenna Book*, the latest edition of which is available through the RSGB bookshop.

New Fusion/ WIRES-X gateway

The new System Fusion / WiRES-X gateway (31369, MB6IOK-ND) is now live. The gateway is free for all to use and is operating on 431.1625MHz with no CTCSS or digital squelch codes required. The gateway is operating under an NoV assigned to Derek Hughes, G7LFC and is, at present, on an attended basis that means that the gateway will not be switched on 24/7, but should be available most evenings. Further details about the gateway should be online at www.mb6iok.uk (site under construction as we went to press).

Shoreham National Coast Watch event

On 3 and 4 June, GB1SCW will operate from Shoreham NCI Lookout Station near Shoreham Beach car park BN43 5HY from 11am to 4pm. It will be on air in the Lookout compound and visitors will have the opportunity to try their hand at Morse and explore amateur radio. Due to its beach location access for the disabled is restricted. Shoreham Fort will also be open for visitors.

Hot Iron

The latest edition of *Hot Iron* is now available and contains projects such as a simple modular receiver, the next part of the single band superhet and a Construction Club member's favourite circuit. It is a quarterly publication by Tim Walford, G3PCJ of Walford Electronics Ltd distributed free to members of the Construction Club (also free to join). To receive your copy, email electronics@walfords.net

New website

The new Bletchley Park website has officially been launched. You can browse for the latest updates on our news, historical facts and details about all events at www.bletchleypark.org.uk. It has details of the latest podcast (No 56) where you can find out what happened when the war was no longer just in Europe in December 1941, when Japan entered World War Two. This meant intelligence gathering and processing became a far bigger and more complex task, which brought about the need for a significant expansion of the top secret operation at Bletchley Park.

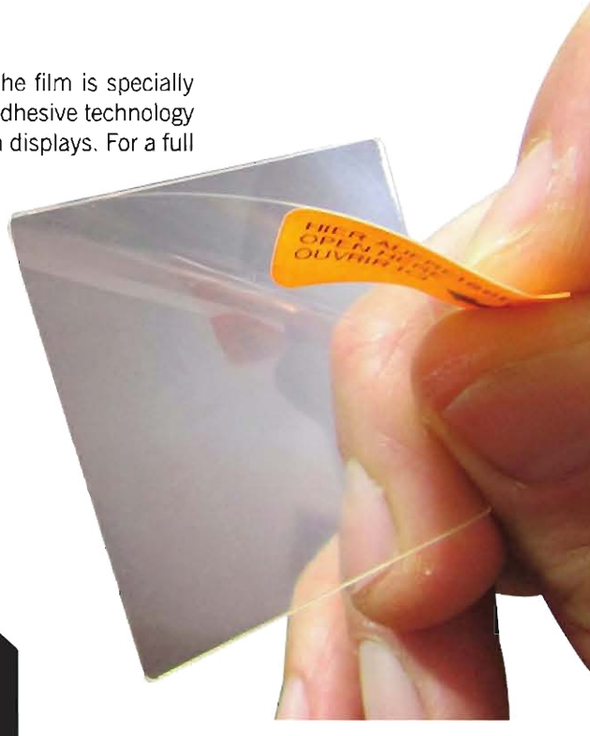
Uruguay gets 60m

General and Superior licensees in Uruguay now have access to 60m from 5351.5 to 5366.5kHz on a Secondary basis. 5351.5 – 5354.0 is for CW and digimodes, 5354.0 – 5366.0 is all modes and 5366.0 – 5366.5 is CW and digimodes. The maximum power for General licensees is 15W EIRP and for Superior licensees it's 25W EIRP. Details at www.iaru-r2.org/new-amateur-radio-regulations-in-uruguay/

New Products

Screen protectors

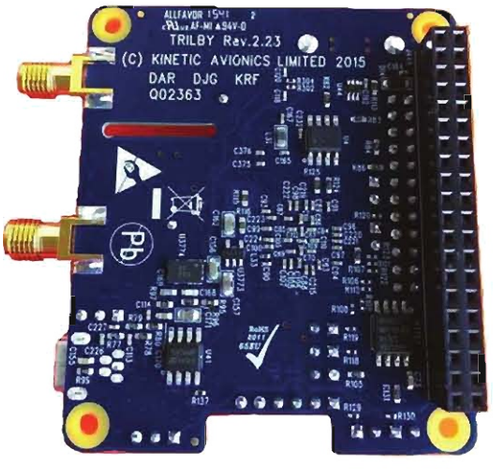
ML&S is now carrying a wide range of screen protectors for most modern transceivers. The film is specially coated to reduce screen glare and improve visibility. It's easy to apply utilising 'no bubble' adhesive technology and, of course, protects your screen from unsightly scratches. It works with all touch-screen displays. For a full list of available Screen Protectors see HamRadio.uk/screen



Acom 600W solid state amplifier

Acom are well known for their valve amplifiers, so the move to solid state is new for them. The Acom 600S covers 1.8 to 54MHz giving 600W RF output for 30W input drive. The amplifier has a 5 inch high resolution colour display, with screen menus that are intuitive and easy to follow. By use of the CAT control the amplifier will automatically track your transceiver bands and switching, but even without this control cable, the amplifier will monitor the frequency of the input signal (just a short burst) and band switch automatically. The RF output stage is fully protected against high SWR, but will still work at reduced output in to a 3:1 SWR. The Acom 600S could be used use at home or on a DXpedition as it weighs just 12kg. The amplifier sells for £2399.95 and is available from Nevada and other members of the International Ham Stores Group. www.nevadaradio.co.uk

The Trilby HAT



The Trilby HAT has been designed from the outset to deliver the opportunity to explore and develop FPGA code as well as Software Defined Radio. It can be used with or without a Raspberry Pi and neatly sits on the HAT expansion connector. Designed to aid in the practical development of FPGA code, the Trilby HAT can be programmed via the Raspberry Pi, a USB cable or with a Lattice Programming Cable for those wishing to perform enhanced debugging. The Trilby Hat features an on-board Real Time Clock, Battery option, programmable LEDs, audio output headers, expansion interface connector as well as a wide ranging radio receiver interface and an up-converter for those wishing to listen to amateur radio. The Trilby HAT is shipped with firmware demonstrating the capabilities of the board as an AM / FM receiver and the website will carry example code as well as programming utilities. For those wishing to start experimenting with FPGA development, a whole new brave world away from software development, Lattice make their Diamond development system available free of charge as a download from their site. Moonraker will be sponsoring regular competitions to find the most innovative developers. The Trilby HAT is in stock now priced £149.95. www.moonraker.eu

Yaesu announces the FT-70DE

During 2017, Yaesu are introducing more C4FM System Fusion transceivers. The FT-70E is a 5W rugged design (meets IP54) handie, covering 108-137MHz airband AM and 2/70 transceive on FM/C4FM Digital. Audio of 700mW ensures good volume with Clear Voice technology. For full specification and to order see the ML&S website www.hamradio.uk/FT70DE

New 1.5kW amplifier from SPE

SPE have announced the release of a new amplifier that's one step up from the current 1.3K-FA. The new model, the 1.5-FA (see right), provides over 1.5kW on all HF bands including 6m. The amplifier uses the same chassis as the 1.3K-FA and weighs in at 10kg, that's 2.5kg more than the original 1.3K-FA. The 1.5K-FA will be available as of the summer 2017. For full details go to www.hamradiostore.co.uk

Clamp meter

An RSGB Member spotted this meter via Amazon Market place from Trustdeal. He says that he had an electrical problem on his Y reg Honda Accord when something was discharging the new battery if the car was stood overnight so it would not turn the starter motor. When the clamp meter arrived he clipped it over the battery earth lead and something was taking 3 amps. He put it over the alternator lead and that was drawing the current so one of its diodes had gone. The meter was also used it to check household equipment standby load. Performance of the instrument using the Clamp is AC/DC full scale ranges of 2A, 20A, 100A sensitivity is 1mA on 2A range 10mA on 20A range and 100mA on 100A range. When on DC if the direction of the current changes a minus sign appears. Normal probe inputs measure AC/DC volts resistance capacitance and frequency. It cost £32.

SunSDR-QRP

Based on the renowned SunSDR2 Pro transceiver, Expert have now introduced a lower cost QRP version, the SunSDR QRP (above). Offering 5W output on all modes from 100kHz to 55MHz (Rx) and 160-6m on Tx, the QRP version runs all the software of its big brother and can be run locally or via LAN using the Expert Remote System. It is available now from Martin Lynch & Sons, priced at an introductory offer of only £799.95. For more info see hamradio.uk/SUNsdrQRP

USB Battery Pack Keep-Alive Load

USB power banks are a convenient way of powering low power USB devices in the field. Unfortunately, as they are designed for charging phones and tablets, many have an internal electronic cut out circuit that switches power off below a certain current draw. The exact current that they switch off at varies from pack to pack. Although there are circuits on the internet that purport to solve this problem by applying a pulsed load, this does not necessarily work with all power banks. As a result SOTAbeams designed a neat variable electronic load to address this problem. Available from SOTAbeams as a kit at £6.95 including VAT, using it is easy; just plug it into your power bank, plug your target device into it and adjust the current draw until the pack remains on. www.sotabeams.co.uk

YOTA 2017 – meet the UK team!

We're delighted that the team of three to represent the RSGB, and the UK, during the week of YOTA 2017 activities at Gilwell Park in August have been chosen. Keep an eye out for their vlogs online in the coming weeks.

UK team leader

Milo Noblet, 2E0ILO
Deputy Chair of the RSGB Youth Committee
Age: 18
Club: Wirral & District ARC

Amateur radio interests: I enjoy a wide range of opportunities within amateur radio. I'm particularly interested seeing how technical theory can be put into practice and how it ties in with my studies (I'm hoping to start an Electronic Engineering degree at Southampton in September.

Leadership experience: I've developed my leadership ability through my time in the Combined Cadet Force, where I now command my unit as a Warrant Officer. I organise the training programme for junior cadets, as well as teaching lessons myself. I have trained young people in signalling (including amateur radio) at the Defence School of Communications & Information Systems, Blandford, as well as at the local level. I've twice led a division of cadets at the Naval Cadet Forces Summer Camp at HMNB Portsmouth, as well as leading a team for the cadet national radio net HF contest Exercise Summer Whine at Nesscliffe Training Area.
I greatly enjoyed assisting with the Youth Committee's Project DX15 expedition to the Brecon Beacons – a fantastic trip with nine youngsters, making 4000 HF contacts with over a hundred different countries – particularly two excursions to local SOTA summits.

UK team member

Peter Barnes, 2E0UAR
Age: 19
Club: Thornbury and South Gloucestershire ARC
Amateur radio interests: I particularly enjoy the construction aspect of amateur radio, and have built devices such as a time difference of arrival direction finding antenna and 3D-printed azimuth rotator. I enjoy experimenting with equipment and methods and using that to develop my knowledge and skills. Amateur radio has allowed me to connect with like minded people who have inspired and helped me to expand my technical abilities. I love to push myself into new areas I have little knowledge about and aspire to learn as much about that area as possible.

Biggest achievement in amateur radio so far: I am most proud of my work on fox hunting antennas. Recently after joining my club and shadowing a couple of fox hunts, I decided that I wanted to develop my own equipment. I searched the internet and became interested in time difference of arrival antennas that use a phase difference between two dipoles to create a null that allows the operator to locate the source of a signal. I built several prototypes and had excellent results, leading to me winning my club's most recent mobile fox hunt! (despite being relatively new to the sport).

UK team member

Jonathan Sawyer, M0JSX
Age: 23
Club: Reading & District ARC

Amateur radio interests: My interest in amateur radio is very broad. I do enjoy experimenting with antennas and trying to find the best possible antenna for my postage-stamp-sized garden. I also enjoy chasing DX from home and attempting to rack up as many countries as possible. Just recently I have been experimenting with WSPR and seeing and learning how propagation changes on different bands during the course of the day with just 200mW. But I am also happy just having a good rag chew on the local repeater.

Biggest achievement in amateur radio so far: My biggest achievement would have to be obtaining my Full licence in December 2015 at the first attempt, after holding the Intermediate for five years. Aside from that I am also proud of the fact I took part in RSGB SSB Field day for the first time in 2016 and that I was a small part of the winning team. This was my first real exposure to contesting and I found it really enjoyable.

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Our team of directors are amongst some of the most respected radio amateurs in the hobby

Justin Johnson G0KSC
I.H.S.G, Operations Director
As owner of InnovAntennas Justin is world famous for his unique antenna designs, used by Force 12, Hy-gain and his own antenna company. Justin is also our SDR specialist and ready to advise on all the latest models.

Mike Devereux G3SED
Managing Director, Nevada
Mike has been a founder member of the 5 Star DX Group who mounted some of the world's largest Dxpeditions, he is also a recipient of the prestigious R.S.G.B. Penault Trophy for outstanding DX achievements.

Peter Waters G3OJV
Director, Waters & Stanton
Licensed for over 56 years, Peter's main interest is in HF operation and has specialist knowledge of Elecraft products and HF antennas. As a musician, he is also happy to discuss audio and microphones.

Jeff Stanton G6XYU
Managing Director, at Waters & Stanton
Licensed more than 25 years Jeff is responsible for staff, administration and importations at Waters & Stanton. Jeff is familiar to visitors at the main radio rallies and exhibitions around the country.

The Group currently consists of: **www.nevadaradio.co.uk** **www.innovantennas.com** **www.hamradiostore.co.uk**

Unit 1 • Fitzherbert Spur • Farlington • Portsmouth • Hampshire • PO6 1TT

Homebrew

Our next project is a single-band SSB/CW transceiver for the 160m amateur band, also known as Top Band.

The design goals for our new transceiver are:

- good RF performance: a 'strong' receiver with good dynamic range
- a clean transmit signal
- simple design, as long as this is consistent with good performance
- avoid using rare and / or exotic components
- easily modified to cover other bands.

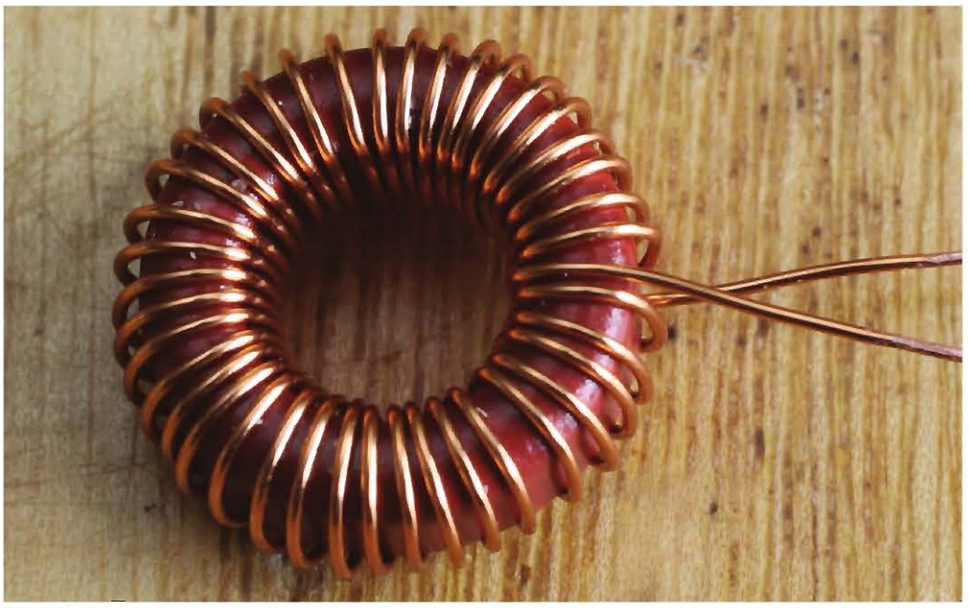

PHOTO 1: A toroidal inductor with its turns carefully evenly spaced.

Where to begin?

We will start with the design of the RF bandpass, lowpass and intermediate frequency (IF) filters.

Figure 1 (top) shows a single, parallel-resonant L/C tuned circuit configured as a band pass filter (BPF). Such a simple circuit is rarely used in any practical application. Input/output is via series coupling capacitors. The centre frequency is determined by the standard formula $1/(2\pi\sqrt{(LC)})$. As an example, for L of 7.85µH and C of 884pF, the resonant frequency (f) is $1\div(2\times\pi\times\sqrt{(7.85\times10^{-6}\times884\times10^{-12})})$ =1.91MHz.

A suitable inductor of 7.85µH is about 40 turns wound on a T50-2 toroid core. This value was chosen simply because it is close to the maximum number of turns that will fit as a single layer when wound with 0.375mm wire.

The simple filter in Figure 1 is useful for measuring the unloaded Q of a resonant circuit. Where the input / output (I/O) coupling capacitors are extremely small relative to C, the filter will have high insertion loss and a very narrow bandwidth that is determined mainly by losses in the main L and C components. Q is simply f/BW where f is the resonant frequency and bandwidth (BW) is the measured -3dB (half power) bandwidth.

A typical inductor wound on a powdered-iron toroid core will have an unloaded Q (Qu) of about 200. Measurements on several home-made resonators using toroid inductors and ceramic disc capacitors have shown resonator Qu in excess of 200 for the better examples and well below 100 where low quality miniature ceramic capacitors were used. Perhaps I shouldn't be surprised that capacitors that cost less than 1p each are not of the highest quality.

The circuit at the bottom of Figure 1 is the classic double-tuned type of BPF. This circuit uses a pair of LC resonant circuits with series capacitive inter-resonator coupling via Ck. This arrangement is sometimes referred to as 'capacitive top-coupling'. Input / output coupling may also use series or parallel (shunt) capacitors. Alternatively, I/O coupling may be inductive, using a separate 'link' winding on the inductors, or simply tapped directly into the main inductor as shown in this example. This type of simple 2nd order (two resonators) filter is widely used in simple receivers. High performance equipment will often require complex filters with more than two resonators. A typical BPF for an amateur band transceiver will have 3-5 resonators.

There are many factors to consider when designing such a filter, which include passband response (shape), insertion loss, stopband attenuation, I/O impedance, component Q and so on. The standard reference for filter design is the *Handbook of Filter Synthesis* by Anatol Zverev. First published fifty years ago, 'Zverev' is still the definitive guide. Anyone with an interest in filter design should also read the many excellent articles on the subject by Wes Hayward, W7ZOI.

For some of our previous projects, I have used 4th order LC filters as the main RF BPF in transmitters and receivers. This subject was covered in depth in Homebrew for February 2011. The design procedure can be found on my website at http://homepage.eircom.net/~ei9gq/bpf.html

Many filter designs are based on series resonant LC resonators instead of the parallel resonant circuits described above. Figure 2 shows how a BPF can be derived from a standard PI type of LPF. Circuit A is a standard LPF, circuit B shows how this is modified to a BPF by placing capacitance (C) in series with each inductor. The capacitance is chosen to resonate at the filter centre frequency. Inter-

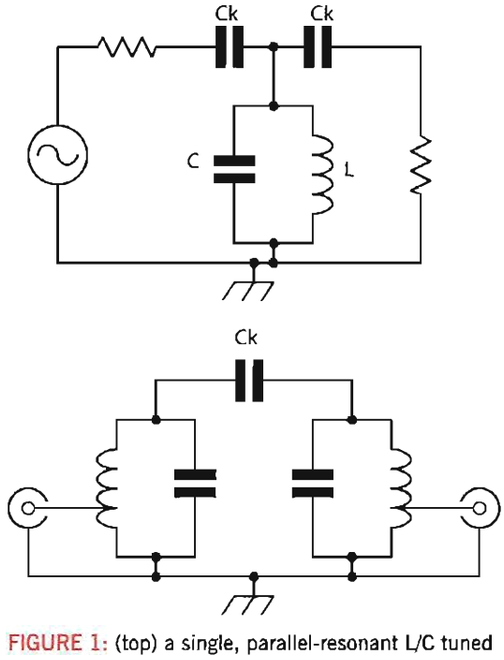

FIGURE 1: (top) a single, parallel-resonant L/C tuned circuit configured as a bandpass filter; (bottom) classic double-tuned bandpass filter using a pair of resonant LC circuits with capacitive coupling.

resonator coupling is via shunt capacitor Ck. Note that this is the standard configuration for a crystal ladder IF filter. Circuit C shows a similar circuit with series capacitance coupling. This will be the basis for the BPF section of the new transceiver.

Components

It is possible to design a filter around any arbitrary value of inductance. In practice, choosing extreme values may result in an unrealisable design. Inductance values with XL of around 50-150Ω are a good starting point. 40T of 0.375mm enamelled wire, evenly spaced on a T50-2 results in an inductance of 7.85μH (XL = 94Ω). This will resonate with 884pF at f=1.91MHz.

The inductors for the BPF are each 40T of 0.375mm enamelled copper (Maplin YN86T or similar) wound on a T50-2 toroid. Try to space the turns evenly around the entire diameter of the toroid, as seen in **Photo 1**. Each coil requires around 80cm of wire. When the coil is wound, scrape the enamel from the end 'tails' and tin them with solder. The T50-2 has an A_L value of 4.9 ±5%. This should result in L = $N^2 \times 4.9$ nH. For 40T: $40^2 \times 4.9$ = 7,840nH or 7.84μH. My coils all measured very close to the expected value, at a consistent 7.85μH.

The 160m BPF schematic is shown in **Figure 3**. The design was tested using the *QUCS* simulator [1] and 'tweaked' for compatibility with standard component values. The filter will be built using only fixed components, so that no adjustment will be required after construction. Filter design calculations are usually based on a -3dB BW. I designed for a relatively wide -3dB bandwidth of around 500kHz so that the design would be less critical and to ensure that the -1dB BW covered the entire 160m band.

The capacitors are standard ceramic disc types. All except the 560pF capacitor are standard E12 values from a Velleman capacitor kit (Maplin N67BT). The 560pF capacitor is also a standard disc ceramic type but I sourced mine from my junk box.

As an alternative to my fixed design, you may prefer to use a trimmer capacitor for each LC resonator. Use a 100pF trimmer in place of each 47pF capacitor and 470 or 510pF in parallel with a 100pF trimmer to replace 560pF for the centre resonator. But you will need to set the filter up carefully for best results.

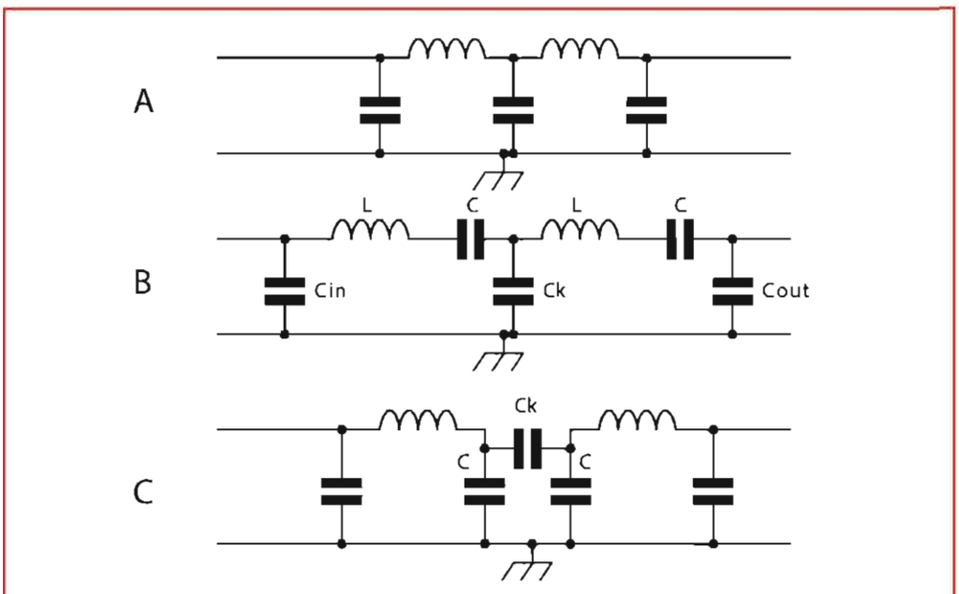

FIGURE 2: How a bandpass filter can be derived from a standard pi-type low pass filter (see text).

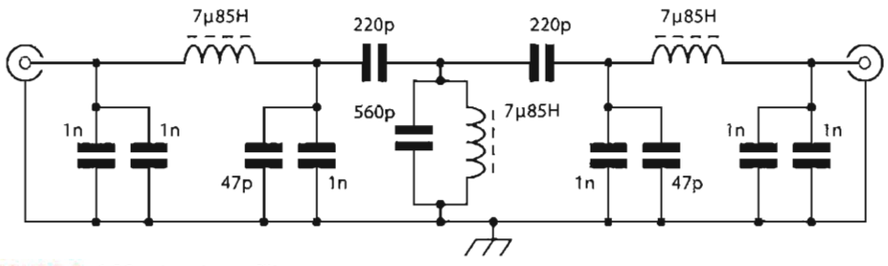

FIGURE 3: 160m bandpass filter.

Testing

The filter prototype was assembled on a strip of PCB laminate (**Photo 2**). I used a signal generator to drive the filter input. The output was terminated by a 50Ω load (a parallel pair of 100Ω resistors). The voltage across the load resistor was monitored using an oscilloscope. The filter response is virtually identical to the *QUCS* plot shown in **Figure 4**. Insertion loss is just over 1dB and the response is flat to within ±0.5dB from 1.8-2.0MHz. This type of filter has an asymmetrical response with greater attenuation at the HF side of the passband. This is ideal for our application because it gives extreme attenuation at the 10MHz (or optionally 10.7MHz) intermediate frequency (IF), IF image and local oscillator (LO) frequencies. Input return loss (RL) of the real world filter is not quite as

PHOTO 2: Completed prototype 160m bandpass filter.

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PHOTO 3: Soldering crystal cans to the PCB makes for a firm mounting.

good as the model but is still very respectable, at better than 20dB RL (SWR=1.2:1) across the 160m band. RL measurements were made using the bridge described last month.

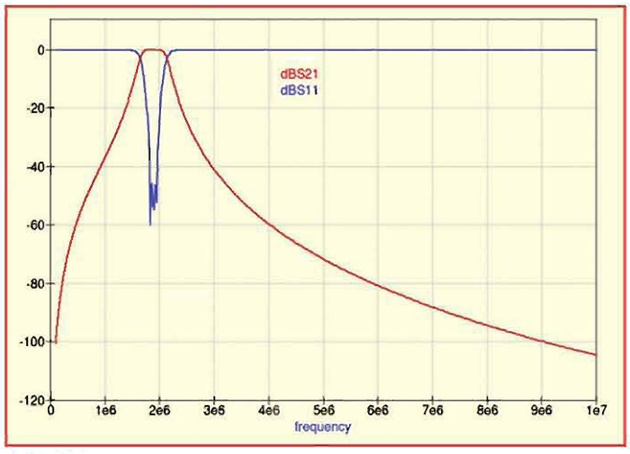

FIGURE 4: *QUCS* plot of the simulated filter bandpass response. My practical filter demonstrated a similar response.

Transmitter low pass filter

The low pass filter (LPF) is a standard pi type 7th order LPF designed for 50Ω. The design was produced using the filter design tool in *QUCS* and adjusted to the nearest standard values. The schematic is shown in **Figure 5**. The inductors are 31T of 0.375mm for L1/L3 and 33T for L2. The capacitors are standard disc ceramic types. As this will be used as the transmit LPF, the capacitors should be able to withstand the voltages arising from several watts into 50Ω. 63V is barely adequate, 100V or more is preferable. The LPF was built on a strip of PCB in exactly the same manner as the BPF.

Testing the LPF

After my immediate success with the more complex and critical BPF, I was quite confident that this simple filter would perform well. However, in testing, the filter didn't work at all. The filter showed huge insertion loss and almost zero output. The problem was traced to an incorrect capacitor, 8.2nF instead of the required 1.5nF. Once the correct value was installed, the filter performed as expected.

As an experienced homebrewer, I am sometime seen as someone who has 'green fingers' so that everything always works first time. In reality, I sometimes get it wrong. The fault is usually something silly like this that is easily rectified.

IF filter

I am planning to use a relatively high intermediate frequency. This option will keep unwanted signals at the IF, image and local oscillator frequencies far away from the RF BPF passband. I plan to use a home-made crystal ladder filter at 10MHz. As an alternative, you may prefer to use a packaged tin-can filter at any of the standard frequencies around 10MHz – 10.7, 10.695, 9.0 and 7.8MHz are popular choices for SSB bandwidth. The schematic of my filter is shown in **Figure 6**. Note that this is a recycled design from Homebrew for March 2013. My stock of 10MHz crystals have values for Lm=14.183fF, Cm=17.872mH, Rm=5.6Ω and Cp=3.7pF. If you use different 10MHz crystals, you will almost certainly have to redesign the filter.

This type of filter is particularly well suited to point-to-point construction methods. If the crystal cans are soldered to the PCB foil, they provide a secure anchor for the shunt and series capacitors (see Photo 3).

Next month we will look at some of the main building blocks for the new transceiver.

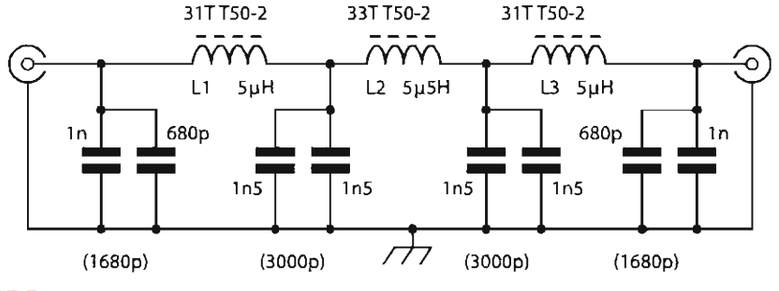

FIGURE 5: Transmitter output low pass filter.

Reference

[1] Quite universal circuit simulator – http://qucs.sourceforge.net/

Recommended reading

Handbook of Filter Synthesis, A Zverev, Wiley 1967, 2005.

EMRFD, Hayward, Campbell, Larkin, ARRL.

Iron Powder Cores for High Q Inductors – Micrometals: www.micrometals.com/appnotes/appnotedownloads/ipc4hqi.pdf

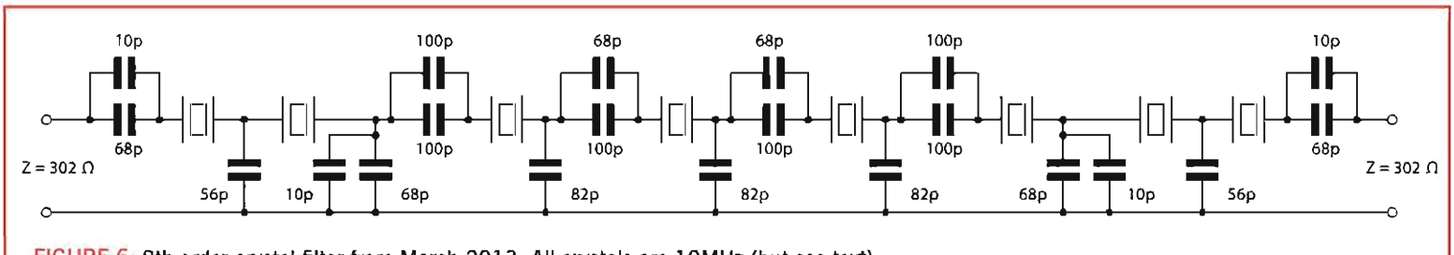

FIGURE 6: 8th order crystal filter from March 2013. All crystals are 10MHz (but see text).

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Trying your hand in the new 2m FM Activity Contests

Left to right – Wouxun KG-UV9D Plus, Yaesu FT-60E, Alinco DJ-V57E and Baofeng GT-3.

As we mentioned last month, there is a new series of contests aimed a newcomers. We are going to take a look at just the 2m contest and see what you can do on a budget of under £150.

Many newcomers start their amateur radio life on the 2m band using FM. It's an easy and inexpensive way to ease into using radio, getting used to communicating over the air with other amateurs and the radios are simple to operate. Many then move on to SSB and using other bands throughout the spectrum available to the amateur.

In recent years, activity on the 2m band hasn't been as intense as many would like and several initiatives have been introduced to encourgae an increase in activity. Last month we looked at these new contests – the UK FM Activity Contests (FM UKAC) – and this month we're looking at what you could do to try out these contests, on a budget, if you are new to the bands (or perhaps even just new to the VHF bands).

UKAC FM

The VHF Contest Committee (VHFCC) has introduced these new short, low power FM contests on 4m, 2m and 70cm. They run in the hour prior to the UKAC events on those bands. These simple events are particularly aimed at newcomers and have power levels aligned with the Foundation and Intermediate licences. They do, of course, welcome all classes of licensee entering. Entry levels have been encouraging so far, but we're not yet seeing as many newcomers as we would like. The committee asks that amateurs spread the word amongst their friends that there is a new way for people only equipped with FM to dip their toes into VHF contesting. As such, the VHFCC has tried to make the rules simple and equipment requirements simple – and these contests are also open to non RSGB Members.

The rules for the 4m, 2m and 70cm FM Activity Contests are available by going to the VHF calendar at www.rsgbcc.org/cgi-bin/readcal.pl then clicking on 144MHz FMAC in the Contest Name column. This takes you to the rules page.

Mentioning a couple of the main points, contest activity should only take place within the band segments 144.5125 to 144.7875MHz and 145.200 to 145.400MHz, which covers parts of both the FM-only and All Mode sections of the bands. There are gaps left specifically to

ensure that space remains on the bands for non-contest participants during these short events. Please take care to avoid interference to other established QSOs / data links etc.

The exchange between contacts is relatively simple – a signal report (RS), a serial number starting at 001 and the 6 character locator from where you are operating. If you are operating from a portable location, you should make sure you know the correct locator before setting out. Scoring is easy too, one point for every kilometre between you and your contacts.

The low power section is most appropriate for Foundation or Intermediate licensees, where the power output must be not more than 10W from the final output stage or external amplifier connection to the antenna. Only one antenna may be used.

The next dates and times for these 2m contests are 2 May, 6 June, 4 July, 1 August, 5 September and 3 October, all 1800 to 1900UTC, with two final 2017 contests on 7 November and 5 December at 1900 to 2000UTC.

Budget radios

We set ourselves a budget of £150 and looked at four currently available, basic handhelds, although we've also included some secondhand suggestions at the end of the article. We've not attempted to do a full technical review, just observations on the operation of the handhelds and their suitability if you want to 'have a go' at these new contests. With handhelds you have a few options: rig up a simple external antenna at home, try it with the supplied antenna out portable or you could try a simple external antenna portable too. Keeping to a simple antenna will help prevent overloading the radio's front end if you're operating from a site subject to particularly high signal strengths (either in or out of band). So, in no particular order, what did we come up with?

Yaesu FT-60E

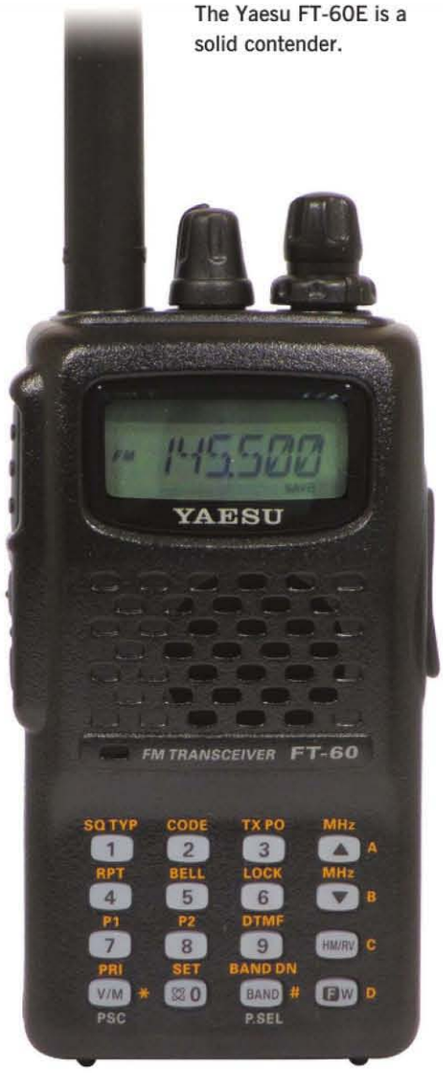
The first radio we looked at is the Yaesu FT-60E, which is actually a dual band handheld, so you could even consider trying your hand in the 70cm FM contests too. We reviewed this in the December 2004 *RadCom*. This radio is tough enough for outdoor operation as well as being quite easy to operate. You can expect an output of 5W on the 2m band, so it's well within the 10W low power section limits. 70cm also musters 5W. The rotary on/off/volume control is on the top, next to concentric Dial and Squelch controls, thus grouping the most common adjustments together. Probably the easiest way to enter your first frequency is to use the keypad on the front. This radio automatically selects simplex if you have chosen a frequency in the non-repeater section of the band (as the frequency limits for this contest are in the rules), which is one less thing for the beginner to take into account. If you want to move around the band, then the larger control on the top will step through the band in whatever steps you have previously chosen.

The receive audio is very good – even outside, although headphones could help in exposed or windy locations. Reports of transmitted audio were of a crisp and clear signal. As far as battery life goes, it seems pretty good: after a couple of hours operating it was still going strong. If you ask around among other users, they all say that you can expect a day of average operating from this radio, though this would probably be less in the higher transmit proportion in contest operating. The battery is a 1400mAh NiMH type and the standard charger plugs into the side of the radio, although a drop-in charger is available.

It's a sturdy radio and there are rubber gaskets around the battery but it's not rated as waterproof or splash resistant – we didn't try a 'drop test' on the borrowed sample but it certainly feels as though it would survive an occasional 'accident'.

The FT-60E also has a host of memories in 10 memory banks and, if you follow the well-written manual, it's easy to program. So, with a bit of time and patience you could set the radio up to cover the most popular frequencies for the FMAC contest before you leave home. The display is easy to read (even without glasses!), which helped make programming relatively simple. Its 15-segment 'starburst' alphanumeric LCD is backlit with a pleasant orange that's bright enough to be noticeable indoors and evenly enough distributed to be very useful in less than optimum lighting conditions. The keypad is also backlit orange, making the numbers printed on the keys easy to see in the dark.

The supplied dual band rubber duck antenna connects to the radio via a standard SMA connector and the whole arrangement looks quite robust.



The Yaesu FT-60E is a solid contender.

Alinco DJ-V57E

The next radio was the Alinco DJ-V57E, which is another dual band handheld, built to IPx7 standards. Alinco says it can survive being submersed in 3 feet (1m) of water for 30 minutes: more than enough to survive a drop into a puddle if operating outside or caught in the rain! This radio also has a high output power of 5W.

The top panel contains the frequency select knob, a speaker/mic socket (with screw-down waterproofing plug) and standard SMA socket for the supplied rubber duck antenna.

The radio was pleasantly easy to use. The keyboard is logically laid out, though with the Function button on the side rather than as part of the keypad (an arrangement used by many radios). The power button is an enticing orangey-red; all other front panel keys are grey. A none-too-bright green backlight illuminates the display and keypad, however the keys have no writing on them so you'll need to know their functions before you can use it in the dark.

Entering frequencies and general programming via the keypad is easy enough and users who have programmed radios before and know what they are doing will probably be able to do so without reading the instructions. The manual is detailed and clear, an accompanied by a circuit diagram. RT software (not supplied as standard) and a

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Alinco's DJ-V57E is rugged enough to survive being dropped into water.

USB interface cable means you can connect the radio to you PC to do the programming. There are 200 memories. One thing I liked with this is the 'oh dear I've made a mess of this' button – otherwise known as factory-presets. It's a simple combination of pressing two buttons at once and you are back to where it all started, so you can try again! The buttons on the radio are mostly a good size so if you happen to have larger fingers, there's less risk of pressing more than one at once. The power button is a bit on the small side but at least that means you won't hit it by accident.

The radio came with a Li-Ion 1100mAh battery that seems to give several of hours of intensive use. It's more than enough to try these contests but might not be sufficient if you are operating all day as part of a Summits on the Air (SOTA) hill walk. It also takes a few hours to charge using the supplied drop-in charger. But you can buy different battery packs and chargers if this is important to you. As with most handhelds, swapping batteries is easy.

Receive audio from the 40mm internal speaker was good and reception reports given were for clean audio. You can also connect an earpiece, which may help with using the radio portable.

Wouxun KG-UV9D Plus

The Wouxun KG-UV9D has a lot going on in one handheld. It's a dual band radio with 5 watts on 2m and 4W on 70cm. It has dual band reception, so you can receive two signals on the same or different bands simultaneously. You can even transmit on one band whilst receiving on another – but's that's all far beyond the simple operation that we're looking at for entering these contests. Interestingly, we noticed it also has an FM broadcast receiver that mutes itself when the communication Rx squelch opens.

The stand-out feature of Wouxun's KG-UV9D Plus is its full colour LCD graphic screen. The display is whiter than it appears in this photo.

Received audio is excellent (actually quite loud, so be warned), so if you have other people around, headphones or the supplied earpiece could be worthwhile. Reports via a local repeater on transmitted audio were very good.

It has a large colour screen display where, if you are operating dual band, both sets of information is displayed. It really is quite impressive, and easy to read. You can adjust the backlight brightness, so you can conserve your battery power if necessary. The backlight stays on very dimly when the radio is idle and the (bright) green status indicator on the top panel blinks. The black keys on the keypad are brightly backlit white, making their legends clearly readable in any conditions.

The Pro Pack we reviewed contained a huge number of accessories including a spare battery, soft case, drop-in charger, car adapter, speaker mix, earpiece, SMA to BNC adapter, two flexible aerials and much more.

The keypad is easy to use and a comprehensive menu system, well described in the manual, allows a lot of personalisation. However, programming was easiest using the supplied USB programming lead and software. It's much faster and more flexible than programming via the keypad, and lets you save and load memories and other configuration information.

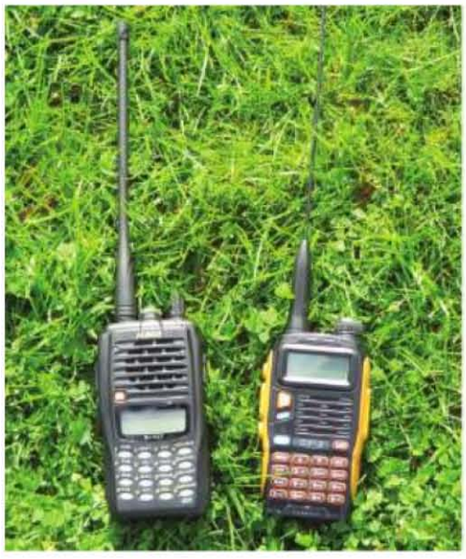
Battery life was good and more than enough for a short contest or even a SOTA activation. Other users are reporting a good 18 hours of use thanks to the long-life 2000mAh Li-ion battery pack.

Baofeng GT-3

Finally, in the selection we chose, the Baofeng GT-3. This is probably the smallest of the handhelds we looked at and is the only one that doesn't come in the standard colour of black – it's orange and black, which means it stands out. It feels quite rugged and I wouldn't be concerned if it was caught in a rain shower as the case has a good feel about it. It's another dual band model, with either 4W or 5W output depending on which section of the manual you read. The 1800mAh Li-ion battery coped adequately during our tests and should be enough for a good SOTA activation or a day of casual use. The drop-in charger is easy to use.

The display is a two-line 5x7 dot matrix with additional annunciators around the outside. It's easy to read in good light and

The striking colour scheme of the Baofeng GT-3 makes it unmistakable.



Although the Wouxun's large screen makes its keypad look slightly smaller than the Yaesu, its keys are actually bigger. Alinco (just) has the largest keypad, whilst the Baofeng won't easily get lost in the grass.

has an automatic backlight that can be set to orange, purple or blue – I found the latter a bit hard to make out, but that may just be down to my eyesight. Whichever colour you choose, the keys are backlit orange and all the legends are visible in darkness.

The manual was a little more basic than the others, with just 14 pages of very small print (plus the same information repeated in similar-size German and French sections). So, to help with the programming, I turned to the internet. I discovered YouTube videos that helped – in fact I found videos on programming all the radios described here and wished I'd looked at them earlier!

The received audio was good and easy to find a suitable and comfortable level. The transmitted audio received good reports too.

The supplied antenna is quite small and slender, and changing to another one in the Baofeng range, such as the one for the UV-B5 that I had at home seemed to make quite a difference to the basic operation. The antenna connection is reverse polarity SMA, something to bear in mind if you plan to connect other antennas.

Conclusions

Each of the radios did exactly what they advertised. They are simple, easy to use, basic handhelds that will get you on the 2m and 70cm bands quickly and cheaply. They are all slightly different sizes and shapes, which means it could just come down to a personal preference and what 'feels' right in the hand. They are available from a number of dealers and we'd like to thank Yaesu UK, Martin Lynch & Sons, Moonraker and Nevada for the loan of these models so we could look at the FM UK Activity Contests.

Of course, a new radio isn't the only option. There are a few second hand models that fit the bill. Using information from RSGB books *The Rig Guide* and *The Vintage Rig Guide* by Steve White, G3ZVW, we came up with the following contenders:

- Alinco DJ-V57E, 2m/70cm, 5W, £100
- Icom IC-T70E, 2m/70cm, 5W, reviewed in *RadCom* November 2010, £110-£120
- Kenwood TH-K20E, rugged (IP54) 2m, 5.5W, £70-80
- Yaesu VX-6R, rugged, submersible 2m/70cm, 5W, £100-120
- If you want more frequency coverage, there's the (now quite old) Icom IC-T81E, 6m/2m/70cm/23cm, 5/5/5/0.5W, reviewed in *RadCom* September 2000, £130-£160
- Alinco DJ-G7E, 2m/70cm/23cm with 5W/5W/1W, reviewed in *RadCom* August 2009, just above the top of our price range at £180-200

The prices shown here are approximate secondhand values. There are also, of course, a slew of new radios below our £150 price point and a lot of secondhand radios with very good features for a fraction of the price. But I recommend you avoid *really* old radios, no matter what the price, because the performance may not be up to modern standards, they're unlikely to have Narrow FM, and replacement batteries may be impossible to obtain.

These FMAC contests are intended to provide a place where stations who have FM equipment can come on and get a feel for contesting, then perhaps move over to the more conventional SSB Activity Contests that follow on straight afterwards. They are a good way to get used to contest operating: contacts are short and follow a prescribed pattern that can build a newcomer's confidence.

Have a go, it's not as daunting as it may first seem.

More useful information

By chance, this month's Book Review looks at *SOTA Explained*, which contains a variety of ideas on how you can use your shiny new 2m/70cm handheld for long-range contacts of hundreds of kilometres (or even thousands of kilometres, if conditions are kind). You'll also find a wealth of ideas on aerials that can extend the reach of your radio, ranging from a very simple dipole arrangement costing pennies through vertical and horizontal variations and even portable Yagis that combine light weight, good performance, easy portability and generally low cost. You'll also find some novel antenna support ideas, which are equally applicable at home or at the crest of some impressive geography. Even if you have no plans to go hilltopping, *SOTA Explained* is full of useful ideas.

Antennas

Several techniques for matching a beam's driven element to a coaxial cable have been described previously in the Antennas column. Another technique that could be used is the gamma match and this is the theme for this month.

Overview of the gamma match

The gamma match provides a method to match an unbalanced coaxial cable to the driven element of a beam antenna. When using this technique, the usual practice is to mechanically and electrically connect the gamma match to the antenna's boom, providing a convenient means to match the feeder to the antenna. Consequently, this technique has become widely used.

A short length of conductor, called the gamma rod, is used to connect the centre of the coaxial cable to the correct impedance point on the driven element, through a series capacitor. This is usually a variable capacitor and is used to tune out any reactance associated with the driven element and gamma rod. The concept of the gamma match is shown in **Figure 1**.

When tuning a gamma match to obtain the lowest SWR, there are many variables that can affect the position of the gamma rod's connection to the driven element. These include the:

- Length of the driven element
- Length and diameter of the gamma match
- Value of the series capacitor
- Spacing between the gamma rod and driven element.

The task of finding the correct combination of settings to give the best match can be time-consuming because several iterations of the variables may be necessary. However, with care it is possible to obtain a SWR of 1:1 using this technique.

Example HF gamma match

The necessary guidance to construct a gamma match can be found in the *Radio Communication Handbook* **[1]**. However, for an HF multi-element array, with a feed point impedance of about 25Ω, a driven element's length shortened by approximately 3% from resonance and the requirement to match the antenna to a 50Ω feeder cable, then the gamma match used should have a:

- Gamma rod of 0.04 to 0.05 wavelengths in length with a diameter of around 1/3 to 1/2 of the driven element's diameter
- centre-to-centre spacing between the gamma rod and the driven element (S in Figure 1) of approximately 0.007 wavelengths
- capacitance value of approximately 7pF/metre of wavelength at the operating frequency.

The dimensions of the gamma match and value for the capacitor will also depend on the driven element's radiation resistance and whether the driven element is resonant.

An example of a gamma match devised by the late Peter Dodd, G3LDO, using the guidance above is shown in **Photo 1**. This arrangement was used to connect a 50Ω coaxial feeder cable to a HF beam antenna **[2]**.

Construction:

The gamma rod was made from hard drawn copper wire with the connection to the antenna element made by using a hose clip. The gamma match used a fixed capacitor whose value was initially determined by experimentation using a variable capacitor.

Adjustment

After installation of the gamma match on the antenna, a short length of feeder cable was used to connect an antenna analyser ready for testing. The setup of the gamma match was found experimentally starting with a trial position for the gamma rod's connection to the driven element. The SWR was measured and the variable capacitor adjusted for minimum SWR. The gamma rod's connection position to the driven element was carefully adjusted to lower the SWR. This process was repeated until an SWR of close to 1:1 was obtained.

When the optimum SWR position was found, the gamma rod was clamped in place using the hose clip. The value of the variable

PHOTO 1: G3LDO's HF gamma match under test.

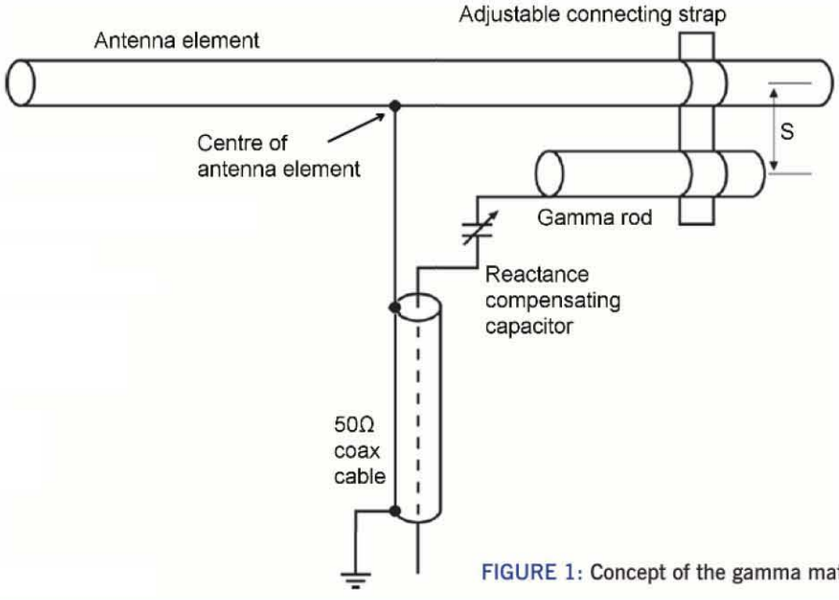


FIGURE 1: Concept of the gamma match.

capacitor was measured and then substituted with a fixed capacitor of the same value (made up from several capacitors in series/parallel). Using capacitors with high voltage ratings enabled this arrangement to be capable of handling RF powers up to 100W without breakdown.

For final testing, the HF antenna was mounted at height and connected to the HF transceiver using several metres of coaxial cable. With a resonant RF signal of several watts supplied from the transmitter to the antenna, the SWR was measured using an SWR meter and found to be low. This test was repeated with the RF power increased to 100W and the SWR measured again to test the antenna under operational conditions. The SWR continued to be low and the antenna was then ready for use.

Weatherproofing

The connection position of the gamma rod to the driven element has the potential to corrode due to the connection of dissimilar metals. When tuning had been completed, the connection of the gamma rod to the driven element was weatherproofed using a layer of grease. The gamma match was protected against the weather by enclosing the capacitor and connections inside a sealed metal box.

Example VHF gamma match

An example of a gamma match made by the author to connect a 50Ω coaxial cable to an eight element 2m Yagi beam is shown in **Photo 2**. Here, the variable capacitor comprises the body of the gamma match and rod, which form a telescopic arrangement (based on the design by James D Guest **[3] [4]**).

Construction

The diameter of the driven element was 12mm and the aluminium tube that formed the gamma match body was 8mm diameter. The length of the gamma rod was 200mm with a diameter of approximately 2mm. It was made of stainless steel. The diameter of one end of the gamma rod was enlarged and insulated by winding PTFE tape around it until it was a snug sliding fit inside the 8mm diameter tube, thus forming the tuning capacitor.

The gamma rod was connected to the driven element using a connection strap. The connection strap was made from two strips of 10mm wide aluminium sheet with a 3mm diameter hole drilled centrally through them. These were clamped together using a M3 bolt, nut and locking washer to form the connection between the gamma rod and the driven element. The assembly was housed in a suitable diecast box. The gamma match body tube was held in place by a round plastic insulation bush. A suitably drilled hole and self-tapping screw secured the connection tab to the end of the gamma match body. A short length of thick copper wire was soldered between the connection-tab and the centre pin of a 50Ω coaxial socket fitted to the die-cast box. When complete, the assembly was sealed to protect it from the effects of the weather.

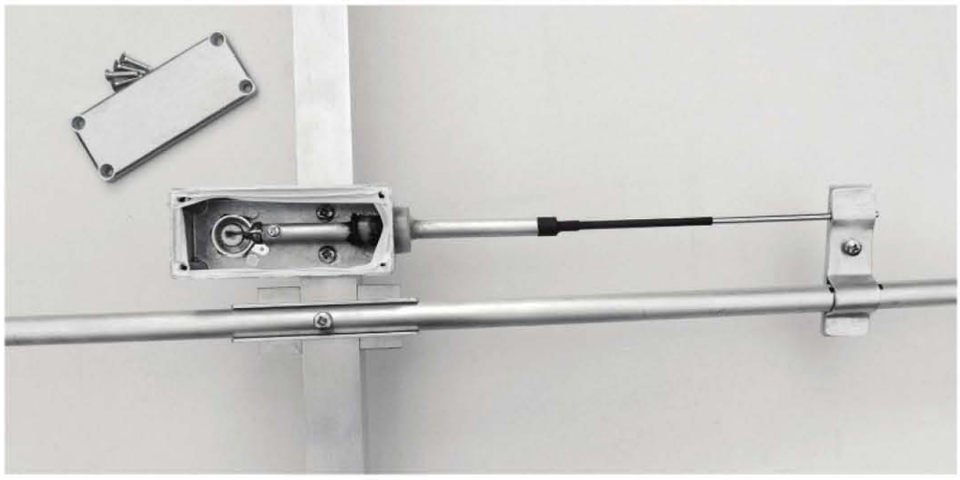


PHOTO 2: G0JMI's gamma match used on a 2m beam.

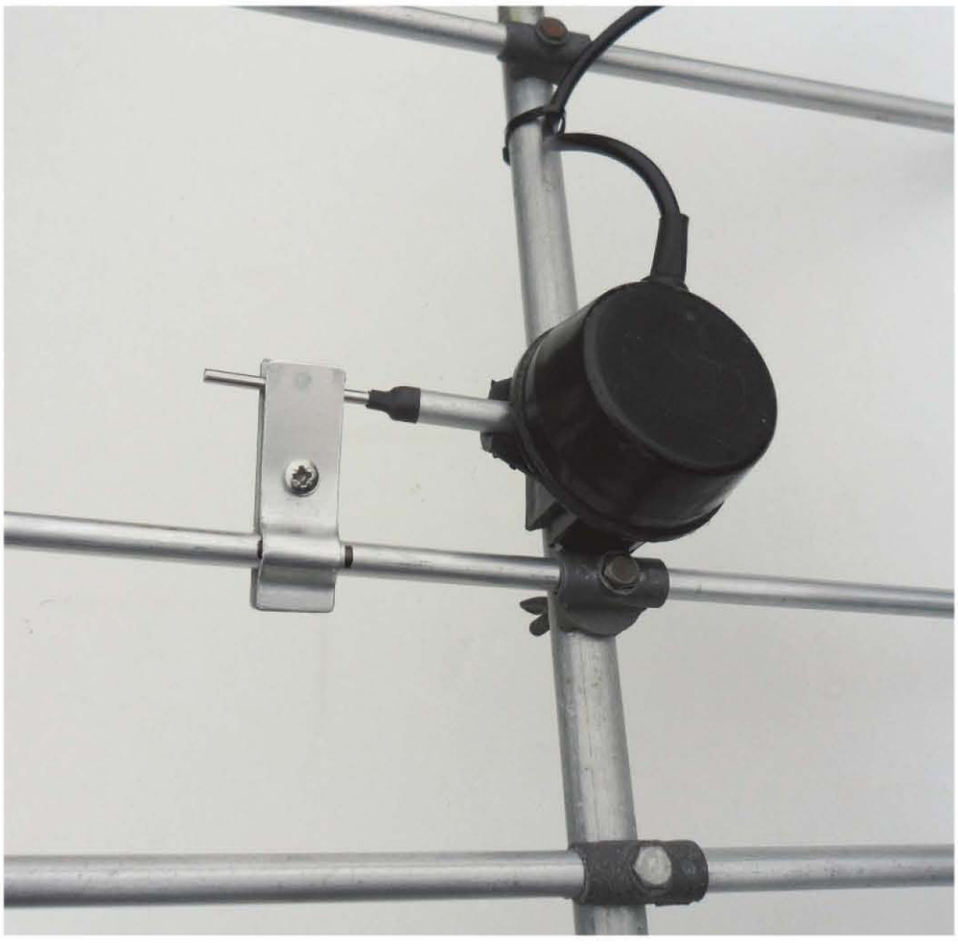


PHOTO 3: G0JMI's gamma match used on a 70cm beam.

Adjustment

With a trial position selected for the connection strap on the driven element, a short length of feeder cable was connected to the gamma match's 50Ω coaxial socket. An SWR meter and 2m transceiver were then connected to

Mike Parkin, G0JMI
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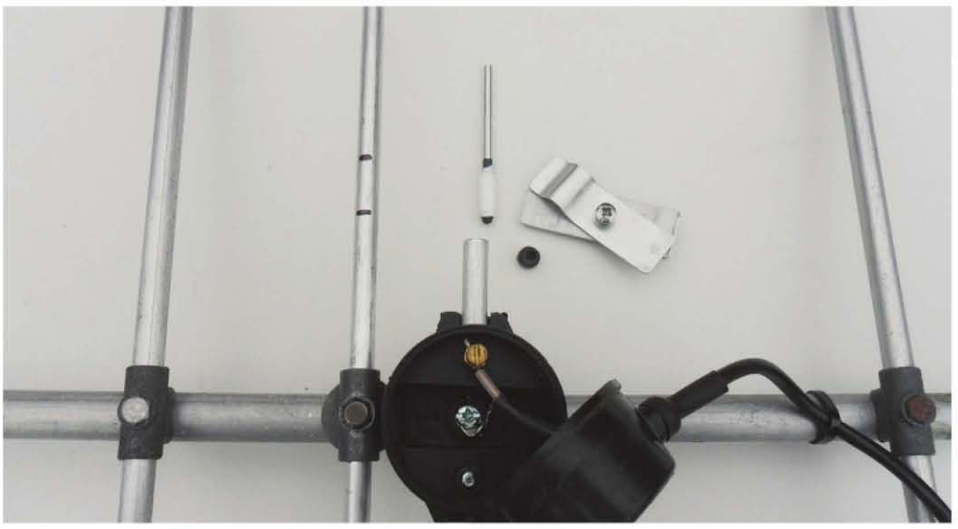

PHOTO 4: Components of the gamma match used on the 70cm beam.

PHOTO 5: The gamma match in use on the 10 element Yagi beam.

the other end of the coaxial cable. Having signed on in CW, the output of the transceiver was set to around 5W of CW on 2m and the SWR was measured. The gamma match was adjusted to obtain the minimum SWR by sliding the gamma rod inside the 8mm diameter tube for various positions of the connection strap. Once the best match was found, a length of heat-shrink sleeving was shrunk over the gamma match body and rod to weatherproof the assembly. Then the connection strap was clamped in place where the best match was found and the system was ready for use. This arrangement is capable of handling RF powers of up to 100W.

Example UHF gamma match

An example of a gamma match made by the author to connect the 50Ω coaxial feeder cable to a ten element 70cm Yagi beam is shown in **Photo 3** and **Photo 4**. This arrangement was very similar to the VHF gamma match, however its construction was based on using a commercially available dipole centre.

Construction

The antenna's driven element diameter was 8mm and the aluminium tube used for the gamma match body was also 8mm diameter, with a length of 65mm. The stainless steel gamma rod had a length of 60mm and a diameter of about 2mm. In a similar way as previously described, the diameter of one end of the gamma rod was enlarged by winding PTFE tape around it to give a snug sliding fit inside the 8mm diameter tube to form the tuning capacitor. Connection of the gamma rod to the driven element used a connection strap made in the same way as that for the VHF gamma match. A hole was drilled in one end of the gamma match body to enable it to be secured to one of the dipole centre's connection-pillars. The other connection pillar was removed and a self-tapping screw used to block the hole that was left. The dipole centre was attached to the boom using a M5 nut and bolt. The inner conductor of the 50Ω coax feeder was terminated on the connection pillar and the braid soldered to a M5 tag secured under the M5 bolt that holds the dipole centre in place. Before terminating the feeder cable, it was passed through a short length of suitable heatshrink and then through the lid of the dipole centre.

Adjustment

The method to adjust the UHF gamma match was very similar to that used for the VHF gamma match. However, when tuning the gamma match the transceiver's output was set to around 5W of CW on 70cm. To weatherproof the coaxial cable's entry-point into the dipole centre, heat-shrink sleeving was shrunk over the cable's entry-point. This arrangement is also capable of handling RF powers of up to 100W. **Photo 5** shows the gamma match in use on the 70cm beam during an activity contest.

Conclusion

The gamma match provides a practical method to match a coaxial cable to an antenna. If you are contemplating building a beam antenna, it may be worth considering the use of a gamma match.

References

[1] RSGB *Radio Communication Handbook*, 13th edition edited by Mike Browne, G3DIH: Section 14, Transmission Lines, Pages 14.16 to 14.17.

[2] Antennas. *RadCom*, March 2005.

[3] US Patent 2976532. Telescoping Gamma Match Antenna Construction, granted 21st March 1960 to James D Guest, Duncan, Okla, USA.

[4] The *ARRL Antenna Handbook for Radio Communications*, 23rd edition edited by H. Ward Silver NOAX: Section 23, Transmission Line System Techniques, Pages 24.30 to 24.31.

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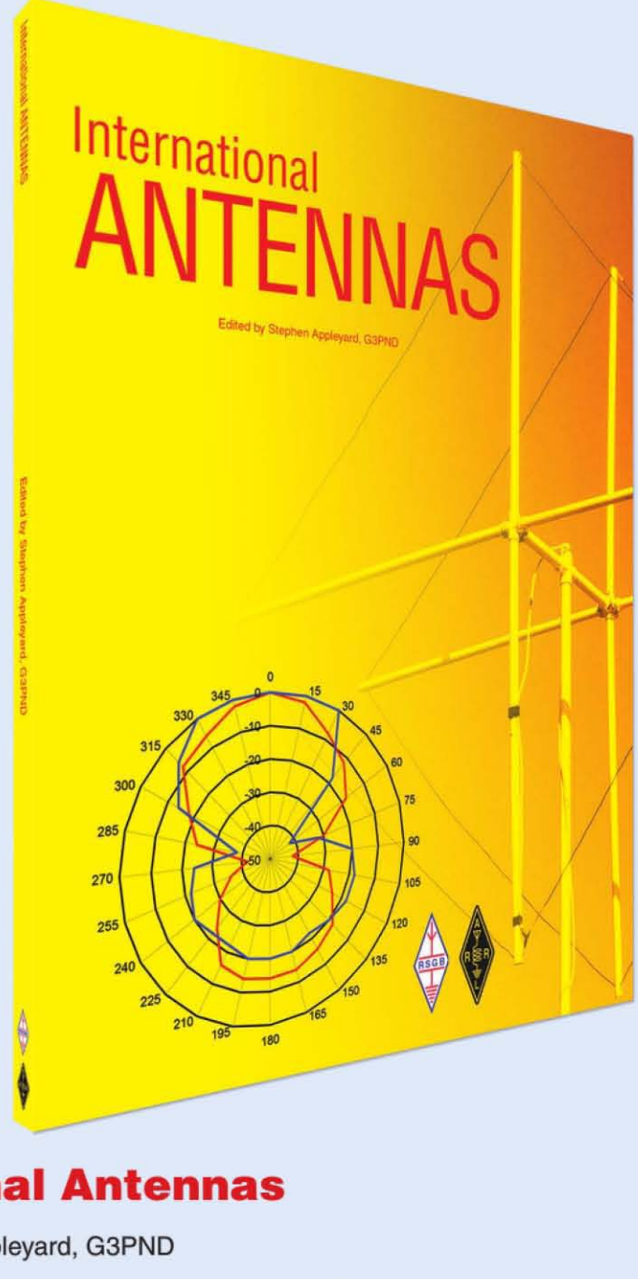

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ATV

MiniTiouner receiver developments

Whilst it is possible to use a cheap 'free to air' satellite receiver to receive digital amateur TV (DATV) transmissions, the most popular way now is to use F6DZP's *MiniTioune* software on a PC with an external tuner module and USB interface (together known as a 'MiniTiouner'"). Previous versions of the software and USB interface have supported traditional satellite TV tuners covering 950–2150MHz, or perhaps 650–2600MHz with some tuners. Recently, 'wideband' tuners have become available that tune 144–2450MHz, covering four amateur bands without the need for any up-converters. Jean-Pierre, F6DZP has now updated his *MiniTioune* software to work with one of these wideband tuners, and the British Amateur Television Club (BATC) shop stocks them along with suitable printed circuit boards and USB adapters to construct the complete MiniTiouner unit. You can download the *MiniTioune* software from the excellent VivaDATV forum **[1]**, and there are lots of construction and usage tips for the MiniTiouner unit on the BATC forum **[2]**.

Another recent enhancement to the *MiniTioune* software is the ability to decode DVB-S2 signals. DVB-S2 is the standard used for transmitting high definition (HD) TV signals from satellite and has two advantages for amateur use: the power required to achieve a locked picture on a marginal path is 2–3dB less than digital video broadcasting – satellite (DVB-S); and where signals are strong enough it can use modes such as 32 amplitude and phase shift keying (APSK) allowing 5 bits of data to be transmitted during each symbol (as opposed to 2 bits for the quadrature phase shift keying (QPSK) used in DVB-S). Tests over the last six months have consistently demonstrated that the 2-3dB margin over DVB-S is achievable. It is only in the first quarter of 2017 that the potential for the use of 32APSK in reduced bandwidth TV (RBTV) – particularly at 146MHz – has been realised.

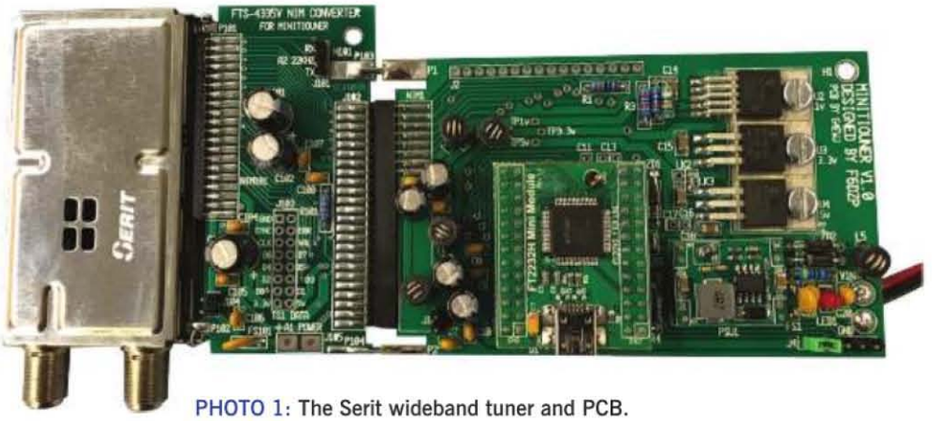

PHOTO 1: The Serit wideband tuner and PCB.

ATV activity weekends

During the BATC March ATV Activity Weekend Arthur, G4CPE received a 32APSK signal from G8GTZ/P 96km away on Walbury Hill. This was a digital bit rate of 1.3Mbits/sec in just 500kHz of the 146MHz allocation. The transmitter was a DATV Express with some very linear power amplifiers producing a transmitted effective radiated power (ERP) of only 25W.

There were over 20 stations active during the March Activity Weekend in locations from the North York Moors down to the South Coast. The most active band was 146MHz, closely followed by 10GHz. There was also activity on 437MHz and 1255MHz, with talkback on 144.750MHz FM.

The next Activity Weekend is on 6/7 May, followed closely by the International Amateur Radio Union (IARU) International ATV Contest on 10/11 June. You can check who is likely to be on the air by looking at the BATC Forum **[3]** and you can also listen out on 144.750MHz for talkback activity.

The Portsdown DATV transmitter

I mentioned the Portsdown home-constructed DATV transmitter (based on the Raspberry Pi) in my last column. The popularity of this project has exceeded the design team's expectations and over 100 constructors are now building the equipment. At least two of the stations active during the March Activity Weekend were using the transmitter on 146MHz and 10GHz. For more details of this project, take a look at the BATC Wiki **[4]**. *[We hope to include a feature on this project soon – Ed]*

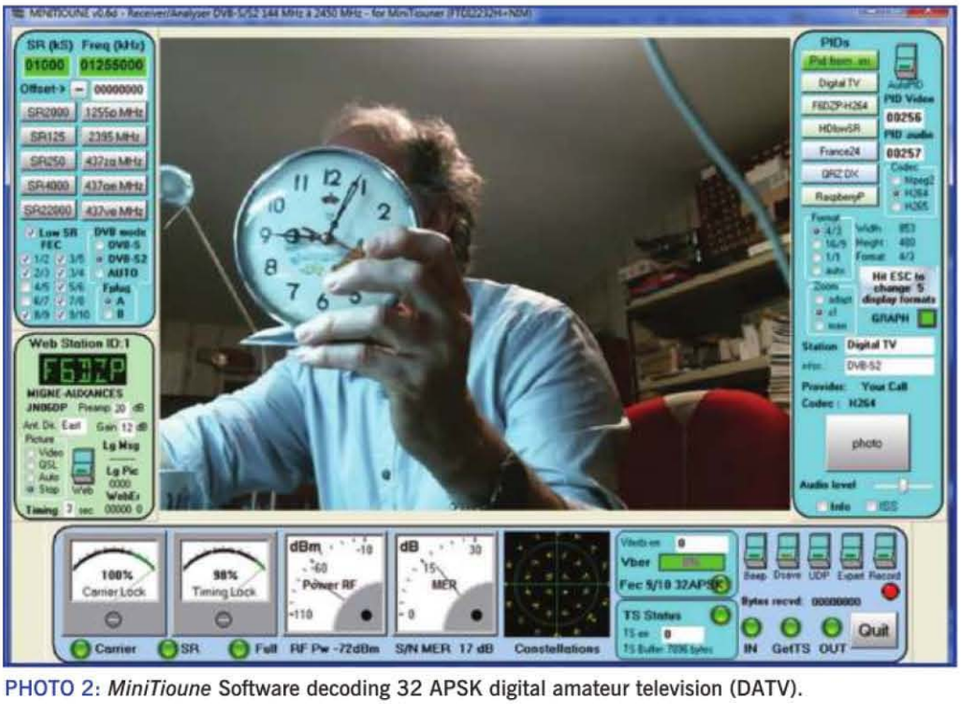

PHOTO 2: *MiniTioune* Software decoding 32 APSK digital amateur television (DATV).

Websearch

[1] www.vivadatv.org/viewforum.php?f=80
[2] http://batc.org.uk/forum/viewforum.php?f=105
[3] http://batc.org.uk/forum/viewforum.php?f=75
[4] https://wiki.batc.tv/BATC_Wiki

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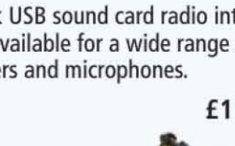

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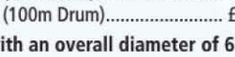
RG-213 

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31m long (102ft) 80m - 10m with 300 Ohm ribbon feeder, super budget HF multi-bander!
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20 Watt Dummy Load (4 seconds 50 Watts) to 800MHz with N-type male.
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HF-UHF Mobile antenna fi tted with PL259 1.9m long rated to 120 Watts.
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No need for dozens of separate cables for all your radios with this one programming cable and interchangeable adapters works with most manufactures.
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Wireless linked Indoor / Outdoor Thermometer, plus alarm clock & rolling date.
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A complete weather forecaster and weather station in one very compact and portable package.
.....£29.95

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This product will power all the sensors connected to it and transmit the data to the main unit.
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Static Discharge connect to ground and install within your coax line for protection SO-239.
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Static Discharge connect ground connector as above with N-type connectors each end.
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Headphone w/PTT and Mic

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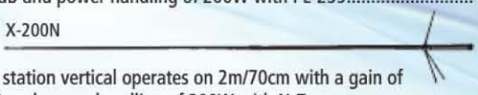
X-200N



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MFJ-991B
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- HF/50MHz 100W SDR Transceiver
- With Dual receivers
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All mode HF - plus 2m SDR transceiver eagerly awaited - new designed and improved specifications!

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Dual Band solid state amplifier
- Covers 50MHz & 70MHz
- Output 1kW for input from 1W to 25W

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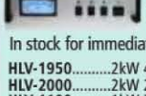

HLV-1000-10

1kW solid state amplifier
144MHz, Input: 10W max

In stock for immediate delivery! **£2495.00**

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- 600W solid state amplifier
- Covers 1.8-54MHz
- Ideal for portable or travel use
- Weighs just 12kg

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A1200S..1.2kW 1.8-54MHz arrives soon.. £2999.95

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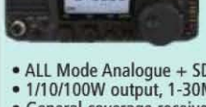
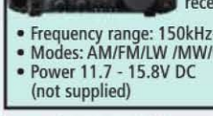


DX-SR9

Hybrid HF Transceiver

- ALL Mode Analogue + SDR capability
- 1/10/100W output, 1-30MHz
- General coverage receiver
- 3 Ceramic Filters

£599.95



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HF communications receiver - top seller!

- Frequency range: 150kHz-34.999MHz
- Modes: AM/FM/LW /MW/CW/LSB/USB
- Power 11.7 - 15.8V DC (not supplied)

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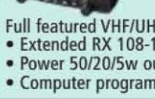

DR-735E

Twin Band Mobile 'Rainbow' display

Full featured VHF/UHF transceiver
- Extended RX 108-174MHz, 400-479MHz
- Power 50/20/5w output
- Computer programmable

£299.95

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High power 5-85W VHF FM transceiver

- 144-146 / 430-440MHz (2m + 70cms)
- 50W on 145MHz / 40W on 433MHz
- EMS-77 multi-function DTMF hand mic included

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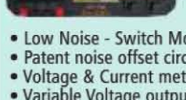

DM-330FXE

Communications grade 30A Power Supply Standard version

- Low Noise - Switch Mode
- Patent noise offset circuit
- Voltage & Current meter
- Variable Voltage output
- Car Cigar socket output
- 2.5kg (with AC lead)

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DM-330MWMkII

Deluxe version Spec as above with extra filtering

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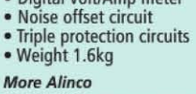
NEW



DM-30E

Lightweight Switch mode power supply

- Output: 9-15 Volts
- Digital Volt/Amp meter
- Noise offset circuit
- Triple protection circuits
- Weight 1.6kg

£89.95

More Alinco
DR-138HE... VHF/FM mob TX 144-148MHz...£169.95
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Full range now available!

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The new version HF+6m transceiver with many improvements

K3S/100-F..... 100W (Assembled).....£2999.95
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160-6m
All modes + DSP

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500W Amplifier

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Call for other Elecraft accessories

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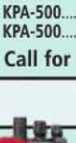

DJ-MD40

Digital/Analogue UHF Handheld

- DMR tier 1 & II
- Power: 5/2.5/1/0.2W
- 1000 memory channels
- Voice recorder • Call logs • Text messages
- Scan facilities • IP54 Commercial Grade
- Free programming for your area...plus lots more!

£179.95

DJ-G7E

Tri-band Radio, die-cast chassis

- 2m/70cms/23cms
- 1000 memory channels
- Full duplex
- 39 CTCSS and 104 DCS encode/decode

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DJ-V57

VHF/UHF Handy

- IPX7 waterproof
- Computer programmable
- Tough case
- Fully featured

£129.95

More Alinco
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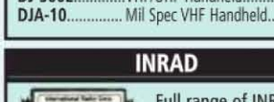
DJ-500E.....VHF/UHF Handheld..... £99.95
DJA-10..... Mil Spec VHF Handheld.... £89.95

INRAD

Full range of INRAD filters for Elecraft and Yaesu - NOW IN STOCK

Morse Keys



Bencher BY-1.....£189.95
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Standard Vibrokeyer.....Black.....£189.95
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100W HF+6m+4m
- RF direct sampling
- Touch screen control
- Great reviews!

GENEROUS Part X CALL NOW!

£1199.95

IC-718.....100W 160-10m base/portable.....£589.95
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IC-7200.....HF+6m rugged style transceiver.....£829.95
IC-7410.....HF+6m 100W DSP Base TX + ATU.£1449.95
IC-7600.....HF+6m twin DSP base transceiver..£2399.00
IC-7851.....HF/6m all mode, output: 5-200W....£9999.95
IC-9100.....HF+VHF+UHF transceiver.....£2699.00
IC-2730E....145/433MHz large screen.....£269.95
ID51EPlus 2.Dual Band Handheld D-Star.....£449.95
ID5100E....Standard version Dual Band D-Star..£574.95
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UT123.....Digital/GPS unit E2820 etc.....£249.95
SM50.....Top of the range desktop microphone..£249.95
SM30.....New compact style microphone.....£119.95
SP23.....Deluxe extension speaker.....£249.00
SP38.....Matching speaker fpr IC7300 .....£149.95
SP34.....Filtered speaker 7800/7700 etc.....£239.95
IC-R6.....1300 ch H/H scanner 1-1300MHz....£179.95
HM151.....Multi-function hand microphone.....£49.95

YAESU

FT-991A + SP10 Speaker
- Coverage: 160-6m, 145/433MHz
- All modes AM/FM/SSB/Data
- 100W HF/6m-50W 145/433MHz
- NEW colour waterfall display

~~£1409~~ AFTER YAESU CASHBACK **£1314.95**

FTDX5000MP..(After Yaesu £170 CASHBACK)..£3229.95
FT991A.....160-6m Transceiver £1299.95
FT857D.....Multiband HF/VHF/UHF mobile.....£699.95
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FT2DE.....C4FM/FM 144/430MHz digital H/H.£399.95
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FTDX3000D..100W HF/6m all mode TX.....£1429.95
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VX6E.....Submersible 145/433MHz handy..£159.95
G2800DXC...Extra heavy duty rotator.....£899.95
G5500.....Azimuth/elevation rotator.....£644.95
G1000DXC...Varispeed heavy duty rotator.....£489.95
G450C.....Rotator + 25m cable kit.....£389.95
STA77.....Stereo headphones.....£79.95

KENWOOD

Kenwood TH-D74E
Dual Band Handheld with APRS and Digital (D-STAR) capability
- Built in GPS
- Wide band receive: HF, VHF, UHF
- IF filtering / DSP

£599

TS-2000X....Allbander classic includes 23cms.. £1469.00
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TS-480HXE..200W DSP mobile/base HF/6m..... £719.95
TS-590SGE..100W DSP HF/6m all mode TX.....£1159.95
TS-2000E....HF 50/144/430MHZ transceiver.... £1279.95
TM-V71E....Twinband 145/433MHz with APRS...£299.95
TM-281E.....High power 2m 145MHz mobile..... £169.95
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Kenwood TS-990S
HF/6m Radio

Generous Part X
2 Year Warranty

£5099.95

ANYTONE

AT-588
70MHz (4m) 50W FM Transceiver
Fully featured classic mobile for 4M
- Covers: 66-88MHz
- Memories: 200
- CTCSS/DCS/DTMF

£159.95

PC-588 Programming software & lead.....£19.95

INRAD RX-7300

New 2nd receiver socket option for the Icom IC-7300

Easy to install plug-in mod. requires no soldering, simple to install and easily reversible. Can be used for the insertion of accessory items into the receiver chain, like receive-only bandpass filters, low noise preamps, etc

Kit only.....£49.95
Fully Fitted by Nevada.....£99.95

PALSTAR

HF-Auto 1.5kW fully auto antenna tuner

Covers 6-160m
Output power: 2-1800W
Display: 4 line large print

£1599.95

AT-2K 2kW manual antenna tuner

Covers 6-160m
Output: 2000W PEP
Metering: Active cross needle

£599.95

AT-500 600W manual antenna tuner

Covers 6-160m
Output: 600W PEP
Built in 4:1 balun

£529.95

AT-5K.....3.5kW manual tuner.....£1249.95
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AT-2KD.....2kW Differential manual tuner..£599.95
DL-1500...1500W high power dummy load..£199.95
BK4C/1:1..4kW 1:1 ratio current balun.....£99.95
BK4C/4:1..4kW 4:1 ratio current balun.....£99.95

LDG

Z11-Pro2
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Taking part in the WAB 1.8MHz contest

Rob, G0PEB (in yellow) and Fred, G1HCM.

Left to right, Ian, G4MBD, Fred, G1HCM and Paul, G0GMY.

Paul, G0GMY, with Dave & Rachel Botha's house in background.

With 2 weeks to go and no site to operate from, Vecta Contest Group, last year's winners of the Worked All Britain 1.8MHz contest, looked like being a non-starter.

In the nick of time, with three days to go, a plea on the Isle of Wight Radio Society's Facebook page yielded an introduction to Dave and Rachel Botha of Butterfly Paragliders, in Chale, a rural spot on the Isle of Wight's southernmost tip.

Setting up the staion

Saturday afternoon saw us in Dave's large garden, putting up our 15 metre mast and full length dipole. The mast is made from six sections of aluminum tube, each section narrower than the section beneath, and prevented from telescoping downwards by Jubilee clips. Such a big mast needs a gin pole and the concentrated attention of six people to get it erected safely, and pegged down, in our case with eight guys. The ends of the dipole were supported by a convenient telegraph pole at one end and an auxiliary mast, (G6DOD's 6m) at the other.

Operation was unexpectedly luxurious. One of Dave's caravans was made available to us, what's more with mains electricity. G0GMY's Yaesu FT-897D was connected up and we were on the air and ready. We made a slow start but eventually the contacts started to build up and the situation looked hopeful. Then came the problems.

Solving problems

The LDG AT-1000 Pro Auto tuner became more and more reluctant to give us a reasonable match. The transmitter was folding back and reducing the power to around 10 watts. Out into the garden with torches – antenna still in the air as far as we could see. Obviously something was horribly wrong, but precisely what was eluding us. We had used a virtually identical setup before without any difficulties.

Feeder? We were using a whole drum of RG58, but because the caravan was almost underneath the mast, most of it was still wound. Although we couldn't see why that would be a problem we nevertheless unwound the whole drum and laid out the cable on the ground, but without effecting a cure.

Suspicion fell on the radio, and there was some evidence that we had a sideband suppression fault, so we replaced the radio with G6DOD's, but no significant improvement. G0PEB had a lightbulb moment and wrapped a few turns of feeder around a big ferrite suppressor (a useful item from GM3SEK) and down came the SWR. Discussions about what exactly had been happening were abandoned by efforts to get back into the contest.

Time to pack up

We made our last contact at 2255, with G3FYQ, signed off and went home.

Returning on Sunday afternoon to take the mast down and clear up gave us time to appreciate what an interesting site Dave has. The scenery is extraordinary, and the take-off to the south is unparalleled: a simple mast and Yagi and VHF/UHF contacts well into France should be easy.

Have a look at www.paraglide.uk.com – Dave and Rachel would be glad to welcome other amateurs, as indeed would Vecta Contest Group and the Isle of Wight Radio Society.

Ian Moth, G4MBD
ian.moth@sky.com

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Committee Reports

Black Sheep Contest Group taking part in VHF NFD.

Rob, M0VFC gets the Camb Hams antennas ready for VHF NFD.

VHFCC Report

2016 saw a major change in the way that the contest committees are structured with the single contest committee being sub-divided down into separate VHF, HF and Support Committees to help provide a clearer focus. This arrangement is working effectively with the people involved working closely to make sure that issues don't fall between the cracks.

The VHF Contest Committee has spent a great deal of time during 2016 looking at how to implement a scoring system for the UK Activity Contests (UKAC) events that meets the outcome of the Presidential Review of Contesting and that provides some compensation for differing activity levels across the whole country. As a clear result of the consultation exercise, a new scoring system has been implemented in the UKACs for 2017 with further study, analysis and refinement planned to help create the rules for the 2018 series.

The UKAC contests continue to be a remarkable success with participation levels up between 7% and 30% on 2015 levels and now with nearly 650 unique entrants to the 2m events across the year. Entry and activity levels in many of the weekend events are also increasing, although this is an area where the committee want to focus hard during 2017. A new Affiliated Society section has been introduced to the VHF Championship for 2017 with the aim of encouraging as many members of Affiliated Societies to come on in the weekend events, even for a short time, and to contribute their points to an overall club score in the same way as they do for the UKAC contests.

We think it is very important that we grow the base of people entering contests. There are many stations who haven't yet experienced the SSB end of the bands – particularly some Foundation and Intermediate licensees. In an attempt to tempt some of these people into contesting, for 2017 we have created new FM Activity Contests that run for an hour on a Tuesday night on 2m, 70cm and 4m FM with simple equipment and operational requirements. We have also introduced awards in all VHF contests for the leading stations aged 18 or under to encourage some of the younger operators to take part.

Andy Cook, G4PIQ

RSGB HF Contest Committee Annual Report 2016

Following the Presidential Review of Contesting that was held by John Gould, G3WKL, in 2015, the HF Contest Committee was formed as one of three RSGB Contest Committees and had its first year of operation in 2016.

The committee has not met in person during 2016 but has conducted its business by email and Skype discussions with sub-groups formed to progress particular areas of work.

Membership: The committee comprises six voting members, four advisors and the Chair who has a casting vote. During the majority of 2016 the voting membership was balanced with three new and three experienced members. The Chairs of the VHFCC and CSC contributed to the work of the committee and HFCC also had the benefit of technical advice from the technical team of the CSC.

Committee Activities During 2016: The committee work was defined by a set of tasks that were outcomes from the Presidential Review. These were progressed during 2016 on a prioritised basis. An initial activity was to produce a set of Adjudication Principles, in conjunction with the CSC, which provide our contesters with a definition of the rules that govern adjudication and give the CSC a specification for the outcomes that HFCC are looking for in the adjudication process. The most significant work of 2016 was the redrafting of the rules for all RSGB HF Contests. This occupied many hours of committee time starting with the rules for a single contest being produced to an agreed specification with a new format that no longer references any General Rules. Once this contest was finalised the committee continued to redraft the remaining contests using the same format. A Glossary of contesting terms was added to the RSGB Contest Committee website.

Particular attention was given to the rules for CW National Field Day (NFD) and SSB Field Days (FD) and here an online survey of contesters was used in May 2016, to determine support for some suggested changes. The survey had 115 responses and these were used to guide committee decision making. Significant majorities wanted the two contests made more similar and also wanted to see them aligned with DARC Region 1 Field Day. Similarly, a more general online survey was run in August 2016 before the remaining contest rules were finalised.

Ongoing work included the analysis of contest participation that was used to inform decision making about future events. Also significant work continued in the analysis of some common contest errors where it is difficult to ascertain whether the sender or the receiver of a contest response is responsible.

The RSGB Contest Club was formed in 2016 providing a means for RSGB Members who are not members of local radio clubs to participate in Affiliated Society based HF contests.

Nick Totterdell, G4FAL

SOS Radio Week

Simon, MW0GSR and Derek, G4LFC operating GB6BLB at Barmouth Lifeboat Station.

Merion Amateur Radio Society and Thurrock Acorns Amateur Radio Club took part in the Royal National Lifeboat Institution (RNLI)'s annual Radio Week at the end of January, raising funds for this lifesaving organisation.

RNLI crews put to sea in all weathers and save many lives.

SOS Radio Week is an opportunity for amateur radio operators and clubs to celebrate the work of the volunteer crews that go out to rescue people at sea, often in the worst of conditions. In 2017 the event took place between 21 and 29 January. Each year an award is available to those who work the many special event stations organised for this event, whether you work one station for the basic award or 15 stations for the Platinum award.

Merion ARS

Planning for this year's event started in October 2016 at a club meeting. As the club has been taking part in SOS Radio Week since 2007, most of the organisation takes care of itself because members tend to do the same task each year. The equipment stays pretty much the same too: an HF station based around a vintage Kenwood TS-430S, an Icom IC-2000 for local 2m operation and a Yaesu FT-897 for digital modes. The only change of radio this year was for the digital modes, where they ran an Icom IC-706.

Antennas for the stations often change between the first and second weekends of the event and the club takes the opportunity to try different options due to the large amount of space the RNLI kindly make available to the club for their operations. There is room to erect a full size 80m dipole if they wanted! In the end the antennas were mainly an 80/40m trap dipole in an inverted V and a 20m dipole for digital modes. They also had an SRC X80 vertical that gave the option of a different takeoff from their coastal location. For the 2m band they used an X200 dual bander.

Ofcom helped when the club needed to change from the previous NoV holder for GB6BLB. Despite being a late change, the club says that Ofcom pulled out all the stops and completed the paperwork in time for the event – for which they say thanks.

For the first weekend, using the club callsign of GC4LZP, tests were conducted to make sure everything was working for the main event the following weekend. Both callsigns were registered for the event so those chasing the SOS Radio Week award could include both. They operated from the crew room of the Barmouth Lifeboat station and the crew were helpful and accommodating, not least by supplying plenty of coffee and biscuits! The crew room is high up on the upper floor of the station and from their operating position operators can see out across the beach towards Cardigan Bay and out to the Irish Sea.

The weather in previous years has been awful but in 2017 both weekends were dry and bright, although a little cold first thing in the morning when erecting the antennas. HF operation was concentrated on 40m SSB but the band was very changeable. One minute a station could be heard at 5/9 but seconds later it was 4/4, making operating challenging. Everyone made the best of it though and GB6BLB achieved 101 QSLs during the second weekend. Contacts were made all

Continued on page 80

Elaine Richards, G4LFM
radcom@rsgb.org.uk

Multimeter breakout box

Fed up of messing with a rats' nest of mixed colour wires, crocodile clips, test probes etc, I designed this simple 'breakout box' to make my life easier.

PHOTO 1: General view of the breakout box with ammeter connected.

It is based on the fact that, in order to measure current, a circuit must be broken and a meter inserted. This is often mechanically awkward to arrange, so this box provides a convenient method of doing so. It also allows the use of unmetered or unprotected power supplies, and making connections with no more preparation than stripping the ends of some wires. The terminals can be to readers' own requirements.

The term 'breakout box' comes from computing and telephony systems, where inspection of a signal or data stream within a cable is needed. This unit enables the voltage and current being drawn from a power supply to be checked as adjustments are made, without disturbing the bench setup. A 50Ω BNC socket is included in order to observe on an oscilloscope factors such as ripple or noise on a DC supply. This impedance connector is used on test equipment, as well as for amateur radio. Please be aware that a mains-powered oscilloscope may well have its ground side (including the barrel of the BNC connector) connected to the mains earth, which may conflict with one or other of the DC supply lines in the test environment, except perhaps in battery-powered equipment that is isolated from other grounding systems.

Figure 1 gives the circuit. It was intended for my 0-30 volt power supply unit, but it is the mechanical design that is of note. It is semi-permanently connected to the output of my power supply (or, sometimes, batteries) and avoids wrong connections, slipping clips, ham-fisted and unreliable temporary solder joints, wires floating about with who-knows-what volts on them, risking damage to innocent semiconductors, shorts, other malfunctions etc. Of course, if you have 'real power' on the test leads, high voltages or current available, it is much better to make sure they are properly connected before you start! It would be advisable to include a fuse immediately after the input connector, and limit the breakout box to setups not exceeding say, 30 volts and a couple of amps.

The fuse should be selected appropriately for the capability of your power supply unit (PSU) or the circuit under test. If you have (say) a 30A PSU but are experimenting with circuits that won't need more than 1A or so, it makes a lot of sense to fit a 1A or 2A fuse. Self-resetting electronic fuses (eg 'Polyfuse') are useful, but make sure the voltage rating is high enough for your requirements. Remember that all the wiring inside your box – and the connectors – should be rated to carry at least as much current as the fuse rating, and preferably two or three times as much.

The unit provides instant, switched, ability to measure current, using the multimeter, whilst a voltmeter is wired in circuit permanently because it is cheap and easy to do. If your voltmeter is appropriate for the intended range, R1 should be replaced by a short circuit, but if the voltmeter range isn't quite right for your intended application (or you're using a microammeter in place of a voltmeter), you will need to calculate a value for R1 and fit it.

A current meter could be added too, but as one of this unit's specific purposes is to allow the insertion or withdrawal of a multimeter, on its current ranges, this is perhaps gilding the lily. A light emitting diode (LED) provides a power status indication. Current limiting resistor R2 should be calculated according to the intended voltage use – for 12V, 2k2 is about right; 4k7 will be fine for anything up to 30V or so, merely causing the LED to be dimmer at lower voltages.

SW1 has to carry the whole output current and must be rated appropriately. Miniature toggle switches of the type I used are readily available with ratings of up to 5A or so, but do check the rating before use because some may only be capable of 100mA or less. When SW1 is on, the external ammeter is bypassed; with the switch off, the ammeter is inserted into the circuit to read the current. Note that the ammeter comes after the voltmeter and LED.

Colour-coded, sprung loudspeaker connectors are used for Power In, Power Out and Test Meter points, with a variety of associated sockets for 2, 3 or 4mm test probes as required, depending on what equipment you have; both my meters use 2mm probes. Where stated by suppliers, the current carrying capacity of the speaker terminals appears to be a universal 3 amps, wherever obtained, and they will accept a meter test probe, or wire up to 2mm diameter (16 SWG). You may of course choose to incorporate other quick-connect terminals or binding posts, for example the type that takes a 4mm plug and screws down to accept a cable of up to 3mm or so. Provision for crocodile clips, scope probes, and sundry attachments, or perhaps spade or Lucar terminals may also be fitted as required. It may be advisable to make a small screen or shroud of insulating material between or around any exposed metal terminals. Plain perforated synthetic resin-bonded paper (SRBP) or Plastikard (a rigid styrene sheet, available from model shops) would be a useful material, fixed with small brackets or superglue. Or, one may leave such terminals off: this unit can be adapted to the reader's personal requirements and nothing should be regarded as a 'must fit' facility.

If you decide to fit a BNC socket to enable power line monitoring (for noise, etc) then you will need to decide whether to make it DC or AC

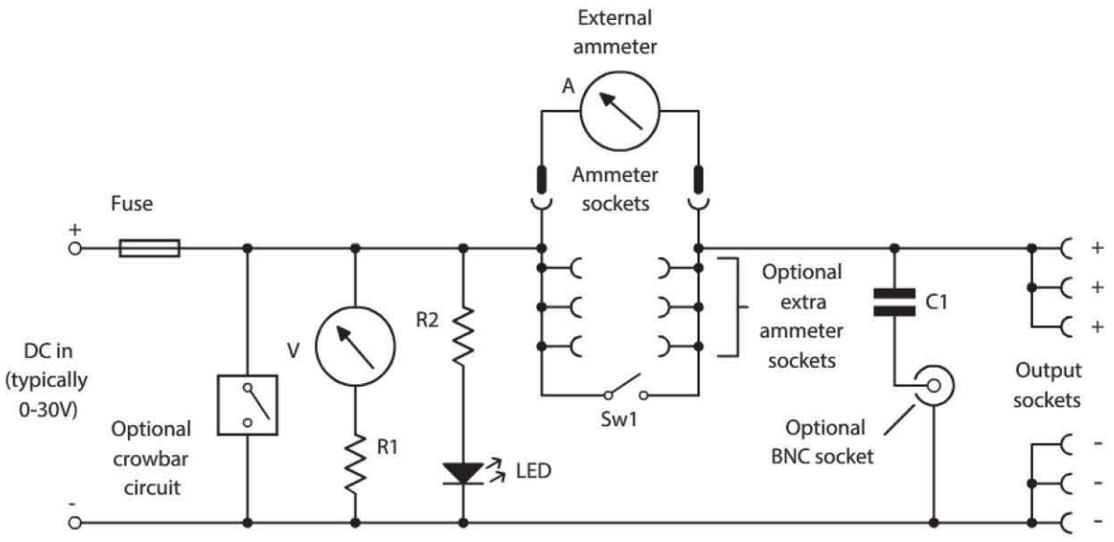

FIGURE 1: Basic circuit of the breakout box. See text for component values and information on optional parts.

coupled. DC coupling runs the risk of excessive current flow into an instrument or cable under fault conditions, so AC coupling is probably best. C1 provides this AC coupling – the value isn't critical, and anything from about 1nF to 1μF would probably be OK. 0.1μF is a good bet, but use whatever you've got in your junk box. Most capacitors have a sufficiently high voltage rating but be aware that some disc ceramics can be rated at 25V or less.

A 'crowbar' circuit is shown on the circuit diagram as an optional extra, discussed later.

PHOTO 2: Close-up of the prototype's connectors.

Constructional details

Construction should be such as to suit readers' personal workshops. The author would be pleased to hear of additional ideas. A transparent polypropylene (Resin Identification Code PP5) 'hobby box' from a hardware shop formed the prototype's case, sprayed black inside with suitable automotive bumper aerosol paint. Unfortunately, my pressure-printed Dymo tape does not stick to this material, hence the lack of labels in the photographs. This plastic tends to crack or snatch on cutting and drilling, so some care is needed in machining this material. Enclosures made from other materials (eg ABS) are generally easier to work. A Forstner woodworking bit or a hole saw is useful when drilling the large hole for the meter.

Brass nuts and bolts were provided on the prototype (not seen in the photos) for the convenient attachment of crocodile clips. The bolt heads should be uppermost, both to give more gripping surface and because, if installed 'thread uppermost', over time the threads may be damaged, leading to difficulties in removal or replacement. They are held in place by nuts inside and out, with a solder tag and shakeproof washers. As noted earlier, it is recommended that if you are going to have exposed terminals you should have some sort of shroud or cover to reduce the possibility of accidental short circuits – this is especially important if your PSU is capable of delivering a significant amount of current.

I haven't included any photos of the inside of my prototype because your build will probably be different from mine. As long as you use suitably rated components and thick enough wire you should be fine. There are no particular layout requirements. The photos show how I laid out the terminals on my prototype: you can, of course, alter this any way you wish to suit your own preferences.

Possible enhancements

In its current state, the breakout box can hardly be called 'electronic', apart from the LED, but there is scope for an 'electronic crowbar' or even a simple Zener diode clamp circuit to protect the circuit under test from overvoltage, as suggested on the circuit diagram. I won't present details here: crowbar circuits are easily found on the internet and usually consist of something like a Zener diode and a thyristor, with a few other simple components thrown in for good measure. Just make sure that the thyristor has a current rating greater than that of the fuse – a safety factor of two or three is useful.

More power conditioning such as a suitably-rated adjustable linear voltage regulator or pulse width modulated motor control circuit etc may also be added, each with its own set of terminals and separately switched, enhancing the usefulness of the box. Such pre-assembled 'building blocks' can often be obtained online at low cost, eg from eBay.

Geoff Theasby, G8BMI
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Design Notes

Novel homebrew CW transceiver

At a recent club meeting Richard Harris, G3OTK gave a presentation on a three band CW (Morse) transceiver he designed and built from scratch. The transceiver has more than a few novel features and Richard put a lot of effort and thought into the design to get something that was easy to use, worked well with strong signals on crowded bands and was optimised for CW working in contests. So it is worth looking at each of his critical design points to see what was done and why. Hopefully the ideas will provide food for thought for others who want to build their own customised radios and other projects.

Transceiver summary

The requirement was for a CW transceiver that covered the 80m, 40m, and 20m bands for CW operation only. For low power portable use 3W output from an efficient PA stage with low power consumption was needed and for ease of operation it had to include an automatic ATU (antenna tuning unit). An electronic keyer was essential and the radio had to be useable with computer control, integrating properly with logging programs like *N1MM+* or *SD*. A block diagram of the transceiver is shown in **Figure 1**.

Frequency control

The radio frequency (RF) source is an AD9850 direct digital synthesiser (DDS); one of the modules popularised through eBay. It is frequency agile, tuning in steps of just over 10Hz. The frequency is changed to act as either a direct RF source on transmit or as the local oscillator (LO) 5MHz away on receive. A 400 steps per revolution optical incremental encoder (obtained from eBay) drives a PICAXE microcontroller to set the DDS registers for the correct frequency output. The frequency controller has a serial computer assisted transceiver (CAT) input port for remote operation that, for ease of integration with logging and transceiver control software, was set to emulate a Kenwood TS-2000.

Another pair of PICAXE controllers drive a 2 line x 16 character organic LED (OLED) display to show frequency and the received signal level via an analogue to digital converter (ADC) from the receiver intermediate frequency (IF).

Receiver

A three pole inductor-capacitor (LC) bandpass filter is used at the antenna input, with one of three units switched in for each band. The Rx is a conventional single conversion superhet with the IF at 5MHz. Two bandpass crystal filters are used with a design bandwidth of 310Hz. A six crystal linear-phase IF filter sits at the input to the IF amplifier. **Figure 2** shows the predicted and achieved filter response. A second, three crystal, linear-phase post-IF filter sits at the output to clean up noise introduced by the amplification and to add extra channel selectivity.

The receiver is only for CW reception so ladder crystal filters were designed and optimised for this mode. With pulsed signal waveforms a sharp edged 'brick wall' filter is a poor choice of frequency response. This is because the time delay though the filter is longer at the edges of the frequency response than it is at the centre. The result is ringing and an unpleasant sound. The linear phase filter response is optimised for pulse waveforms and commonly used. Normalised values for this response are tabulated in sets of filter tables, and linear phase is an option in filter design software such as *AADE* and other packages.

The ladder crystal filters were designed from scratch using principles detailed in *RadCom* and other publications over the years in conjunction with Zverev **[1]**. They were all constructed from a bulk purchase of 100 low cost 5MHz crystals from Farnell, with individual units selected using a crystal measuring test set **[2]** to be as close to each other as possible.

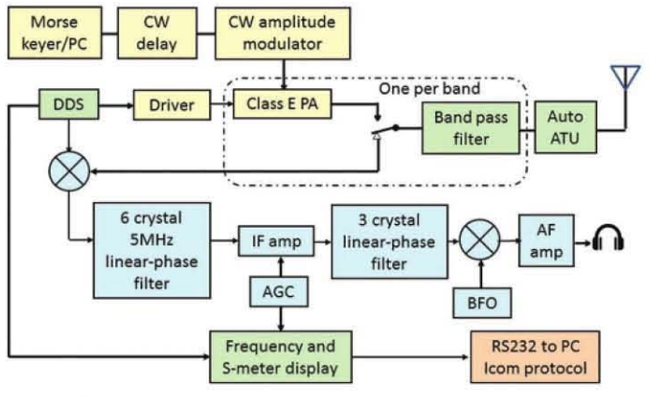

FIGURE 1: Block diagram of the G3OTK CW transceiver.

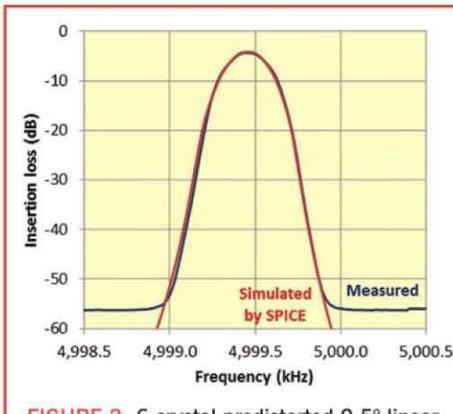

FIGURE 2: 6 crystal predistorted 0.5° linear phase IF filter with Fc = 4,999500Hz and Fbw = 275Hz, as simulated and measured.

Power amplifier

For a long operating life when running from batteries, high efficiency 3 watt Class-E switching power amplifier stages were employed. Class-E operation is a particular type of switch mode circuit configuration where the tank tuning is optimised to ensure the output device switches at the zero current crossing point – thus minimising dissipation during the on-off transitions. Very high efficiency PA stages are possible, approaching 90% if designed and built with care. A couple of Class-E stages for 1.8MHz and 475kHz operation were described in the October 2010 and December 2014 Design Notes respectively. More information on the Class-E amplifiers can be found at **[3]**.

As Class-E amplifiers are inherently narrowband with a medium to high Q tank resonator being essential for their operation, Richard's transceiver used three separate amplifiers, one for each band. **Figure 3** shows the circuit diagram of the 40m one. At just a few pence for the switching MOSFET devices, this proved a cost-effective solution. The output filtering was done by the same filters as used for the receiver input.

CW break-in

Semi-automatic break-in CW operation was considered essential but based on experience some additional thought had to go into the break-in process actually employed on the transceiver. Conventionally, semi break-in, which is similar to voice operated switching (VOX) on SSB, works like this:

- Go to Tx as soon as the Morse key is pressed
- Stay on transmit while keying, with the keying resetting a timer
- 0.4s after the last dot/dash, switch to receive.

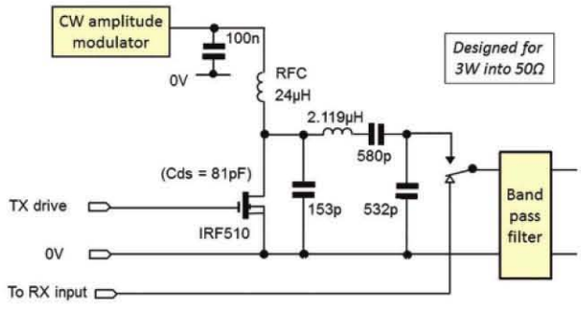

FIGURE 3: Circuit of the 40m Class-E 3W PA stage.

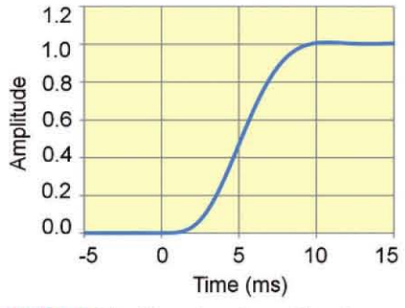

FIGURE 4: The Gaussian shaped leading edge of the keying waveform; the falling edge is the mirror of this. Such pulse shaping leads to a very clean transmitted signal that 'sounds' good, with restricted bandwidth and no keyclicks.

A problem can arise when the other station starts sending before the receiver is active, causing part of the callsign to be missed. Richard states "In the 80m Club Contest I read DQ6Q as IQ6Q, missing the first dash because the transceiver was still on transmit".

The solution is to delay the transmitted CW by 0.4 second and go to receive just after the last dot/dash is sent. The delay is now at the start of sending instead of at the end, so helping other stations using semi-automatic break-in. (The side tone, of course, has to be generated directly from the key without passing though the delay). A PICAXE micro controller is programmed to look after the delay, Tx/Rx changeover and PA driver control. There is also a built-in electronic keyer.

Waveform shaping

To minimise the transmitted bandwidth the output RF waveform rise and fall was shaped. The aim was to produce a transmitted signal whose sidebands (key clicks) were insignificant at a distance of no more than a typical CW filter's width, ie around ±200Hz. The classic RC filter used in simple CW transmitters is just not the right shape for this task as it allows sharp edges to occur on the output envelope. It is these sharp edges that generate key clicks at some distance from the carrier. Instead, the waveform has to be properly shaped, with a curved beginning and end to its amplitude / time response. This cannot be done with a simple filter between PA supply and key input.

The Class-E amplifier, as with any non linear output stage, produces an RF output voltage proportional to the DC voltage supplied to it. So by supplying the power via a DC amplifier stage acting as a high power modulator stage, transmit waveform shaping can be achieved. Low level filtering is applied to the keying input, using a properly designed waveform shaping circuit, the output from this driving the modulator. A Gaussian shape as shown in **Figure 4** (rising edge only) has been shown to offer an optimum tradeoff for bandwidth and readability. A low pass filter based around a pair of opamps was placed between the key and the DC amplifier using a four-pole Gaussian-to-6dB shaped filter with 3dB points at 70Hz. The resulting sidebands are more than 60dB down at 250Hz either side of the carrier.

Auto antenna tuner

The automatic antenna tuning unit was designed specifically for low power operation, covering just the bands in use. It comprises an L match design made up of five relay switched inductors, in roughly binary steps from 220nH to 3.6µH wound on T50-6 iron dust cores in the series arm. Five relay switched capacitors from 20pF to 330pF make up the shunt arm. The capacitors can be switched by another relay between either the input or output sides for antenna impedances whose resistive component falls below or above 50Ω respectively.

A Bruene reflectometer measures forward and reverse voltages and feeds these to a dedicated PICAXE processor that controls the relay switching. The algorithm works as follows: with the capacitors on the input side, select in steps of four values, and for each step, go through the inductors also in steps of four. For each of these 16 steps, measure the forward and reflected voltages and calculate the ratio (the return loss, RL). If any reading is lower than the previous one, save that together with the L and C settings. If the best return loss obtained is worse than 0.2, switch the capacitors to the output side and step though again. When a return loss below 0.2 is indicated, the L and C values are stepped singly in turn until the best match is found.

Wound components

All inductors were wound on the same type and size of toroidal core. The inductance possible from such cores is not continuously adjustable, but changes in steps depending on an integral numbers of turns. Therefore, filters and other tuned circuits were optimised for use with the actual inductance obtained from the nearest number of turns. For example, a filter is first designed from scratch and the number of turns on the selected toroidal core that gives the nearest result for each inductor is first determined. Then the actual value of inductance given by that number of turns is calculated or measured This is fed back into the filter design software where capacitors and filter parameters are then juggled to give the best predicted performance using the actual inductance values obtained. In the finished module, 'odd' capacitor values are made up from several in parallel.

Distributed processing

The transceiver control is performed with seven separate, distributed, microcontrollers. These are:

- DDS controller with tuning knob interface
- OLED
- OLED display decoder (ASCII to graphics characters)
- Electronic keyer
- CW delay, Tx / Rx & PA driver control
- Auto-ATU controller
- CAT interface to a PC running logging and control packages.

The PICAXE microcontroller **[4]** was selected for each of these seven tasks. This is a PIC with an integral 'PICAXE BASIC' interpreter – it is programmed in the BASIC high level language, making it particularly to program. However, such interpreted programs run slower than compiled programs (such as an Arduino) would offer and only 8 and 16 bit integer arithmetic is possible. But the cost of the devices is very low, so the speed issue can be compensated for by using a multiplicity of controllers to look after different tasks. This also eases the software development cycle, especially as programming is so straightforward.

Further information

This project was done purely as a personal project with no intention of making it replicable. More information on individual parts and pictures of the transceiver are available from the Itchen Valley ARC website **[5]**, which is fully open to all.

Websearch

[1] *Handbook of Filter Synthesis,* Anatol I Zverev
[2] An Automated Method for Measuring Quartz Crystals, Richard Harris, G3OTK, *QEX* Nov/Dec 2013, www.arrl.org/files/file/QEX_Next_Issue/Nov-Dec_2013/Harris_QEX_11_13.pdf
[3] Class-E Power Amplifiers, Nathan Sokal, WA1HQC, *QEX* Jan/Feb 2001
[4] PICAXE Microcontroller – the devices are available from several suppliers and typically cost no more than a couple of pounds each; full info at www.picaxe.com
[5] Itchen Valley ARC Documents page, www.ivarc.org.uk/past-presentations-and-articles.html

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GB0WM at Woolsthorpe Manor for British Science Week 2017

To help celebrate British Science Week in March 2017, South Kesteven Amateur Radio Society (SKARS), based in Grantham, Lincolnshire, operated the special event station GB0WM at the birthplace and family home of Sir Isaac Newton.

Stewart, M0DSM and Adam, M6OLT operating with Konrad, M0KVF talking to visitors.

Woolsthorpe Manor in Woolsthorpe-by-Colsterworth near Grantham is owned and managed by the National Trust and is where Newton developed his theories on mathematics, light and optics. It is also the home of the famous apple tree that inspired his laws of gravitation and motion on which all space travel depends. Seeds from the tree were taken by Tim Peake into space on board the International Space Station during the 'Principia' mission and are now back on Earth ready to grown by school children around the country.

Woolsthorpe Manor held activities for visitors during British Science Week celebrating all that is best with British Science today and imagining what Newton might would be doing if he lived there today, culminating in a weekend science festival on the 18th and 19th. As part of this festival SKARS operated the special event station hoping to introduce visitors to the fun and science of amateur radio as well as helping to promote this historic location.

GB0WM

The radio station was setup in the main courtyard at the rear of the main house close to the Visitors Science Centre. The antenna system was mounted on a Land Rover military mast with a dual band VHF/UHF collinear and resonant wire dipole. The main radio was a Yaesu FT-991 operating principally on 40m, with a Yaesu FT-817 and Kenwood TM-G707 for 2m and 70cm.

SKARS were operating at just 100W but there were some problems with the Science Centre's film theatre suffering breakthrough on the sound system when transmitting, but a mains filter and reducing transmission power mitigated the issue. Conversely the numerous visitor audio-visual displays and other equipment generated significant local noise when turned on, which made operating weak stations difficult when combined with the noise and splatter from another weekend contest on the bands.

Saturday started sunny but windy and some heavy prolonged rain showers in the afternoon kept visitors numbers down. Sunday was dry and sunny and proved extremely busy, with several hundred visitors during the day. The wind was a lot stronger so the mast was not as high but on HF a change to an off-centre fed dipole allowed operation on other bands.

As it was still on winter opening hours, the Manor was only open for four hours each day and despite being a challenging environment the operators managed regular contacts into Europe and some UK stations when propagation allowed. Well over 100 contacts were made, mostly on the second day.

Many members of the public came over to visit and enquire about what SKARS were doing and they explained the theory and practical elements of operating radio systems.

Unfortunately, due to the slightly exposed position and the weather, operators were forced to sit with backs to the general public to protect the equipment and the various display boards had to be taken down due to the strong wind. Therefore a less passive role was adopted and members actively went out to engage with the public and the military Land Rover proved a draw to inquisitive visitors. Information leaflets and badges for the children supplied by the RSGB were gratefully received.

A surprising number of lapsed amateurs and ex-military radio operators came along who were seemingly unaware that the hobby was still going and showed great interest in the workings of the special event station and the latest developments in radio and the hobby.

SKARS has run several special event stations in the past but this was probably the most prestigious location for this relatively small club to undertake. Trying to be efficient and engaging while at the same time not affecting the aesthetics of this historic location for visitors was paramount. SKARS is indebted to the staff at Woolsthorpe Manor and the National Trust for allowing us to operate: they are keen to promote science at Woolsthorpe Manor and to shake off the unfair old-fashioned notions of dusty old houses and stately homes. Some could say the same thing about amateur radio today?

South Kesteven ARS would like to say thank you to the National Trust, the visitors who came to meet us and our members that gave up their time to visit and support us. It was a very positive and enjoyable weekend, which we hope it will be a regular event in the future.

Adam Hicks, M6OLT
secretary@skars.co.uk
South Kesteven ARS

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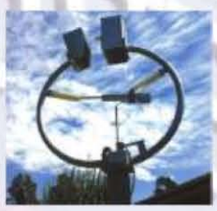

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Autumn dates for your diary

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It's never too soon to book two of the biggest UK amateur radio events in your diary. Autumn 2017 has plenty to keep the radio amateur busy whether you are looking to buy something or hoping to learn something new.

National Hamfest

The National Hamfest will take place on 29 and 30 September at the Newark & Nottingham Showground, Lincoln Rd, Winthorpe, Newark NG24 2NY. The venue enjoys easy connections via road and rail to most parts of the UK. Rail facilities are available from Newark Northgate Station and Newark Castle Station. The Showground is approximately 2 miles from the nearest A1 junction and there is ample free parking on site, with blue badge disabled parking very close to the main entrance.

Most of the leading traders from the UK will be attending, along with specialised dealers from Europe, supported by the major manufacturers, highlighting and demonstrating the very latest equipment available. Whether you are looking for a new rig, antenna or just a couple of connectors, you are sure to find it at the National Hamfest. The RSGB team will also be on site with the usual RSGB book stall together with many of the RSGB committees and groups offering advice and assistance.

Once again there will be an outside flea market trading area for the casual, hobby seller. Details, conditions and costs will be posted on the National Hamfest website (www.nationalhamfest.org.uk) shortly. All trade enquiries should be made in advance with Chris Danby via email to chris@danby-online.co.uk.

Following on from the success of previous years, the Camb Hams and their mobile shack 'Flossie 2' will again be in attendance running the special event station GB17NH. The national winners of the RSGB's Club Of The Year, sponsored by Waters and Stanton, will be presented during the event (the regional winners will be announced at the forthcoming RSGB AGM in Cardiff).

Entrance tickets will be available in advance from early May, priced at £5 per person per day (the same as last year) see website for details.

www.nationalhamfest.org.uk

RSGB Convention

The Convention will again take place at Kent's Hill Park Training and Conference Centre (Swallow House, Timbold Drive, Kents Hill Park, Milton Keynes, Buckinghamshire MK7 6BZ). The dates of the event are 13 to 15 October 2017.

There will be five streams of lectures and forums. We will again feature talks focussed on introducing some of the wide ranging aspects of amateur radio. Whether you are a seasoned amateur looking to try something new or a newcomer looking for help getting started there's sure to be something of interest.

New for this year, as the AMSAT Colloquium will be incorporated into the RSGB Convention, AMSAT-UK will be organising some of the lectures.

We are in the process of confirming this year's talks. Likely talks include the 2016 Chatham Island DXpedition, HF mobile operation and WRTC 2018. Following the great success of Ian White's 2015 talk on 'Cleaning up your Shack', Ian will be back again this year. Streams to look forward to are HF DXing and Contesting, Technical, VHF and Up as well as the Wider World of Amateur Radio.

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

Online bookings will open in early May and there are savings to be made for those who book early. Pre-booked day tickets start at £10, see www.rsgb.org/convention We will be offering free day ticket entrance for under 21s again this year, but please remember to bring some proof of age. Under 16s must be accompanied by someone over 21. Packages start from £139.50 for a two day, one night package for one person. This includes one night bed & breakfast, Saturday and Sunday admission to the event and the Saturday evening Convention Dinner. You can, of course, tailor your package to suit your requirements.

www.rsgb.org/convention

HF

Sunspot numbers were zero for most of last month but thanks to various DXpeditions and contests there was a lot to work. A few new spot groups appeared by the end of March but were accompanied by a coronal hole that sent the K index up to 6.

The EI DX Group 9N7EI team made 30,414 QSOs from Nepal and had some good propagation into Europe. QSO totals with the British Isles were: zero on 10 and 12m, 109 on 15m, 228 on 17m, 100 on 20m, 161 on 30m, 168 on 40m, 15 on 80 and 5 on 160. HF propagation peaked around 8-13z with LF QSOs from dusk until around midnight. EI2CN and G4CCZ topped the British Isles Leaderboard with 13 band slots each.

Down in Ghana the 9G5X crew were also very busy, making 29,372 QSOs during their stay. Totals with the British Isles were: 23 on 10m, 98 on 12m, 400 on 15m, 407 on 17m, 601 on 20m, 86 on 30m, 258 on 40m, 152 on 80m, and 25 on 160m. On the Leaderboard, G4CCZ had 16 band slots and G8DX managed 14.

Not too far away from Ghana, in the Ivory Coast, the French TU7C DXpedition made 52,397 QSOs. Totals with the British Isles were: 13 on 10m, 59 on 12m, 219 on 15m, 276 on 17m, 402 on 20m, 38 on 30m, 81 on 40m, 69 on 80m, and 31 on 160m. The Leaderboard shows MM0SAJ on top with 23 band slots.

The S21ZED/ZEE team made just over 50,000 QSOs from Bangladesh and were worked in the British Isles from 160-15m. 5U5R made over 75,000 QSOs from Niger.

Older DXers may remember the name and callsign of early DXpeditioner Don Miller, W9WNV. He recently met up with Martti Laine and Finnish DXers in Helsinki and the resulting conversations were videoed. Search YouTube for "W9WNV in Helsinki" to find the clips.

The ARRL announced they were deleting Midway and Kure Islands from the DXCC list. See www.arrl.org/news/midway-and-kure-islands-are-now-deleted-dxcc-entities

5B4AGN, G6MC and M0PCB operating 9G5X.

9N7EI Ops - EI5GM and EI2II in foreground EI4GZB and EI5IX behind.

IOTA

The 2017 IOTA Honour Roll and Annual Listing is now on the rsgbiota.org website. The leaders are: 9A2AA, I2YDX and I8ACB with 1118 groups, followed by I1JQJ with 1117, and VE6VK with 1116. G3KMA is the leading UK station with 1115.

The Arctic Legends DXpedition that had planned to activate four rare IOTAs by snowmobile had to cancel the trip on arrival at Dikson Island as the sea ice was just too thin. They say they will reschedule for next year but I suspect that global warming means boats will be more successful in future.

Andy, VK5MAV has announced plans to activate Marion Reef/Diamond Islets (OC-267) in the May-June 2017 period as a single op. The call will be VK9MAV from this rare IOTA – but it will only count as Australia for DXCC. Likely dates are 15-25 May.

Craig, VK5CE announced at the Texas IOTA Bash in February that he is planning to activate Ashmore Reef (OC-216) for 4 days in the period 6-12 November. He also plans a visit to Rowley Shoals (OC-230). See https://ashmorereef.wordpress.com/

Cezar, VE3LYC will be QRV from Pukapuka Atoll (OC-098) in the North Cook Islands as E51LYC from 11-23 May on 40-10 metres SSB and CW. See http://e51lyc.weebly.com for more information.

Hrane, YT1AD has assembled a team for

The 9N7EI QTH and antenna

The 9N7EI Team Photo

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

Call	CW	SSB	Data	All
G4PTJ	172	81	0	217
M0NKR	146	164	23	212
G3TBK	205	109	111	211
G3PXT	67	93	133	168
GI4DOH	144	4	50	146
G4XEX	53	56	90	139
CT7AGZ	137	0	1	137
G4IDL	135	0	0	135
G3HQT	129	0	0	129
G3SVK	88	0	0	88

TABLE 2: Forthcoming DX activity.

Until 20 April	T88 by JAs
Until 22 April	3D2AG/P
Until 23 April	J88PI
25 April – 6 May	A25UK
1-10 May	3W9DQ
11-23 May	E51LYC
15-25 May?	VK9MAV (OC-267)
1-6 June	HB0/GM4UYE
5-14 July	RI0Z (AS-039)
20-24 July	AS-069
28-30 July	VA2NDX/VY0 (NA-173)
End July	RI0LI (AS-022)
End July	RA70AA (AS-070)
1 Aug – 31 Nov	HC8/G8OFQ
12-16 October	VK5CE/8 (OC-198)
6-12 Nov	OC-216 by VK5CE
December	9M0W Spratly

a DXpedition to one of the Malaysian Spratly Islands in December 2017. They expect to use the call 9M0W.

Tony, 3D2AG expected to be QRV as 3D2AG/p from Rotuma (OC-060) until around 22 April. See qrz.com/db/3d2ag for more information.

Brian, GW4DVB will be active again as J88PI from Palm Island (NA-025) until 23 April. He will operate SSB on 40, 20, 17, 15 and 10 metres.

Jim, ND9M, has received his VQ917JC licence and is often QRV between 1200 and 1600z on 30/20/17m.

Other DX

The A25UK team will be active from Botswana at the end of this month but if you miss them you may have another chance with IW5ELA who plans to be QRV as A25AL during September 2017.

DF7DQ will be active from Vietnam as 3W9DQ from 1-10 May.

Dane, S53T is QRV from Djibouti as J28ND, with a 40m vertical that also works on 15m. At the moment he is using a commercial radio pre-programmed with SSB frequencies every 10kHz but will take amateur equipment out after Easter. He has been worked in the UK on 40m.

Laurent, TZ5XR, is active from Mali until 2019 on 40, 20, 17, 12 and 10 – CW only – with 100W to a simple dipole.

Correspondence

Roger, G3LDI concentrated on the 160m element of the CDXC LF Challenge during March and with a few days to go was on a score of 75. Notable DX included S21ZEE and YN7MF.

Ken, CT7AGZ was unsuccessfully chasing the S21 stations for much of the month but found plenty of other DX including: on 10m – PJ2/W6IZT, KP4TF, 6W2SC, PY4TW, 5U5R, TU7C, 9G5X, FY5KE; 12m – CE2AWW, VP2EU, 5U5R, 3B8/G3TXF, 9G5X, CP4BT, TU7C, FY5KE; 15m – 9X2CW, 5U5R, ZS2I, 6W2SC, 9G5X, TU7C, ZF2AG, 4J0SFR, TZ5XR, 9J2BO; 17m – PZ5K, EX8M, HI8Y, 5K0N, 7Z1HL, 3B8/G3TXF, RN5M/6Y5, 9G5X, J5UAP, 5U5R, ZD7BG, TU7C, TZ5XR, CO8LY, PJ2/DL1RNT, 9Q6BB; 20m – TI7/HA5X, E51DWC, 6W2SC, FK8IK, JAs, VE3VSM/HR9, XT2SE, 9G5X, ZD7BG, 5U5R, KL7/VE7ACN, TZ5XR, HH2AA, ZF2AG, EL2DT, TU7C, 5A1AL, J5UAP, UN7TX, VU2PHD; 30m – VP6EU, JA5FBZ, 5V7V, 5Z4/DL2RMC, 6W2SC, PJ2ND, 9G5X, C6APY, CU2DX, T77C, 3B8/G3TXF,

Martin Atherton, G3ZAY
g3zay@btinternet.com

Uwe, DJ9HX, Hans, DL6JGN, Ronald, PA3EWP, Erno, DK2AMM on Pitcairn as VP6EU.

PA3EWP and DK2AMM at VP6EU.

5B4AGN operating as ZC4ZM or ZC4A from the Sovereign Base Area on Cyprus.

EA9/DJ6TF, 5U5R; 40m – OA1F, CO2YT, A61Q, 6Y4K, VP2V/K6TOP, ZB2CN, 5U5R, 3A/PA3FYM, OH0Z, SO1WS.

Peter, G4XEX can only have his hexbeam at a height of 18 inches and has been struggling on QRO CW/RTTY and QRP PSK. He still managed to find: 17m – 9G5X, 3B8/G3TXF, 9Q6BB, J5UAP; 20m CW – 6W2SC, HS3XVP, 5U5U, 9G5X, 3B8/G3TXF, 9N7EI, EL2DT, PJ4/K2NG, OA1F, S21ZEE; 20m SSB – FY5KE, FM5BH, FR5CB, FG4MN, PZ5K, TU7C; 20m data – VK5GR, ZS4GB, JW/SQ8KFH, TU7C, 9M6XRO, YV5AAX, JA7BME, V31RJ, ZF2CJ. His favourite QSO of the month was with the Yukon on 20m (CI1AAA).

Fred, G3SVK does not have any dipoles for 80 or 160m so missed out on some of the LF conditions but found a lot on the higher frequencies though at press time he was still chasing the T2 expedition: 15m – 9G5X; 17m – 6Y1M, 6W2SC, 3B8/G3TXF, 5U5R, 9G5X, 7Z1JA, 3B9FR, S01WS; 20m – CO8LY, JW2US, HS3XVP, ZF2CA, 9G5X, VK6LW, 5U5R, EL2DT, 3B9FR, J5UAP, 9V1YC, S21ZEE, OH0Z, V85TL, VK8AV, SV9/OG55W, TU7C; 30m – A71YY, VK7GK, PJ7/OH2IS, VP6EU, 3B8/G3TXF, 9G5X, 9N7EI, EK/RZ3DJ; 40m – 6Y2T, C6ANM, P4/K1TO, 6Y1M, A61HA, 8P6AL, 6Y4K, 5K0N, C6APY, VK6LW, 9G5X, 3B8/G3TXF, VK6VZ, VK3JA, ZF2CA, 8P9IF, ZL3PAH, VK2GR, VK2BJ, EK/RZ3DJ, ZA1F, 3V8ST, S21ZEE, ZL3XDJ, VK3XU, TZ5XR, TU7C.

Tom, G4IDL, was running some comparisons between a 30m vertical and an inverted V and found the inverted V was superior so is re-engineering his antenna systems. He found: 15m – C6APY, 3B8DB, 5B4AHJ, 9G5X, 9J2BO, 3B8/G3TXF, 9N7EI, ZD8RH, ZD7BG; 17m – CN8KD, PZ5K, ZS2I, 5U5R, TU7C, C9/DL3KWR, S01WS, 9G5X, ZD7BG, YN2WL; 20m – ZB2EO, V31GX, ZF2CA, 5J0NA, 3B8/G3TXF, 9G5X, VU2TMP, 5U5R, KL7/VE7ACN, H40FN, 3B9FR, J5UAP, D4T; 30m – T77C, VK3EGN; 40m – 6Y4K, 8P9IF, HC2AO, OH0Z.

Gordon, G3PXT focussed on the CDXC LF Challenge (more about that next month) using 400W to wire antennas. His 40m haul included: T6MH, LU8HGI, EK/R2DX, VKs, VEs, CO2DC, SU9JG, YS1YS, TR8CA, VU2WEW, YB3VNC, YI1SAL, 6Y4K, JAs, 3B8/G3TXF, ZLs, FR4OO, ZS6BUN, 9V1YC, 4S6NCH, BV2FB, HS0ZIV, 9Y4DG, 3V8CB, S01WS, BH8MBF. Several of the rarer ones were on JT modes.

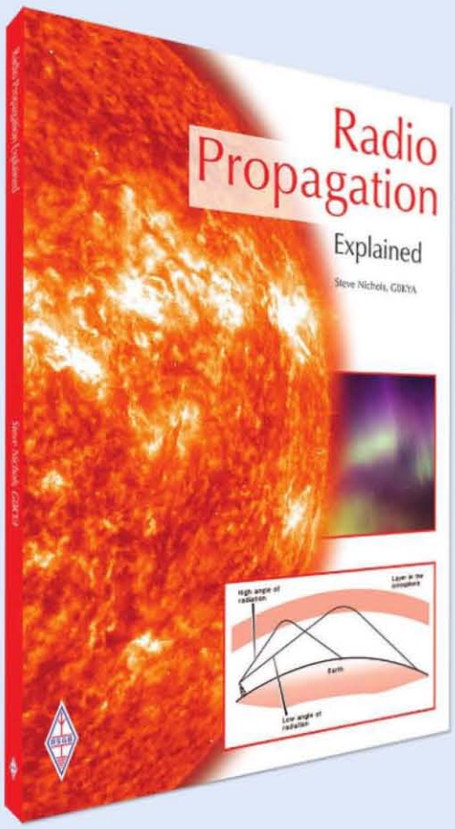
Peter, G3HQT commented that there had been some fine operating from the various DXpeditions last month. Nepal and Bangladesh were ATNOs for him. He found: 17m – ZD7BG, J5UAG; 20m – 3V8ST, 5U5R, 5A1AL, 9G5SX, 3B8/G3TXF, KL7/VE3ACN, TY2AC, TU7C, V85TL; 30m – HI3/N3SY, 9N7EI; 40m – S21ZED, 8P9IF, 9V1YC, PZ5K.

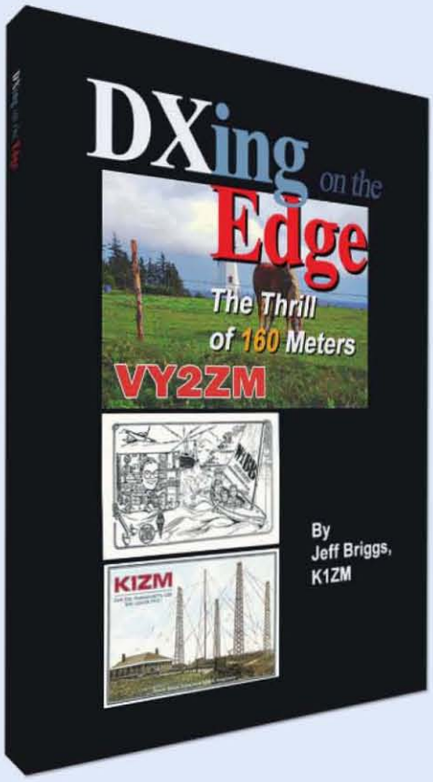
Chris, G8APB says his star QSO was T2QR on 20m during the BARTG RTTY contest. Other DX worked included: 9N7, 5A, S21, 5R, EY7, 5U (on 5 band/mode slots with one on RTTY in the BARTG contest) TU7, EK and 3B8.

Richard, G4CGG wrote in with a 160m report. He was one of the two UK stations to work XX9 on 160 but also over the winter picked up: TZ4AM, 3B9HA, JY9FC, SV9COL, VP6EU, 5V7V, TU7C, 9G5X, EK/RZ3DJ, 5U5R and HH2AA.

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

NEW TITLES





Radio Propagation Explained

Steve Nichols, G0KYA

Understanding radio propagation is essential for anyone with an interest in radio communications who wants to know how signals travel from A to B. Written by acknowledged expert Steve Nichols, G0KYA, *Radio Propagation Explained* provides everything you need to know about this fascinating topic.

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

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

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

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

Also available on amazonkindle

Dxing on the Edge

The Thrill of 160 Meters

Jeff Briggs, K1ZM

For many radio amateurs operating on TopBand or 160m is endlessly challenging, exciting and intriguing. Building on the success of his first edition, author Jeff Briggs, K1ZM, well known as a TopBand expert, has extended a book that will appeal to all who operate TopBand or are just wondering what is possible on this fascinating band.

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

Beware though. TopBand can be addictive and as a true-blue 160m fan you might well find yourself actually enjoying listening to static crashes, waking up just before dawn for three months just trying to make that seemingly impossible TopBand DX QSO. K1ZM has written this book for anyone interested in the history and practice and most of all the enjoyment to be found on 160m.

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

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

VHF/UHF

Generally a poor month for terrestrial propagation but there have been some interesting software developments.

March is generally a poor month in the VHF/UHF propagation timeline. It pretty much delivered in its forecast with conditions being lack lustre apart from some very isolated tropospheric openings and some low latitude aurora during the last week of the month. With low pressure systems generally in charge over the UK and Europe there was little to excite DXers. However, EME (moonbounce) conditions were very good with an excellent perigee during the month.

Looking forward to the spring, Sporadic-E (Es) should be in evidence and, indeed, some very small, low level openings were detected on 50MHz in the last week of the March. These openings should become more regular and intense during April and it has been known for very occasional high maximum useable frequency (MUF) rising up to the 2m band in the period.

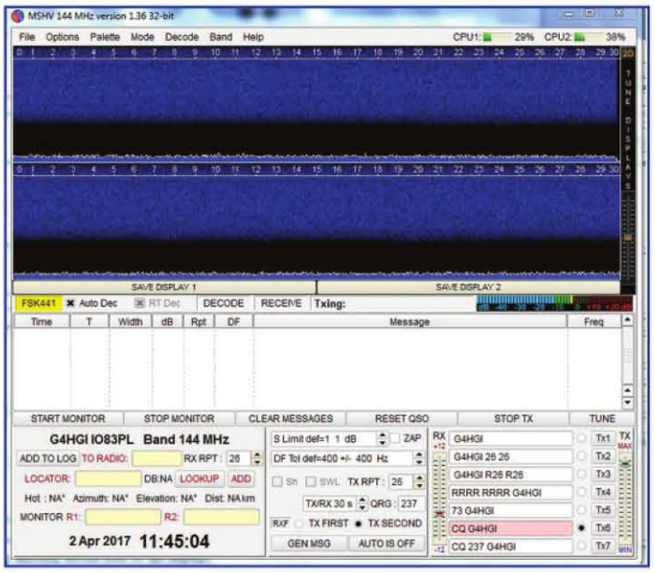
Sporadic-E indicators via the internet are excellent ways of keeping in touch with these openings and, as indicated by the name, in the early days of the season, Es can be very elusive. The excellent website maintained by Andy, G7IZU collates all the information you need to know in one place to monitor conditions **[1]**. There are two key elements to the website. Over many years, Dave, G7RAU has developed the excellent Live MUF V7 Mapping software that shows, at a glance, the corresponding Sporadic-E QSO spots from the DX cluster. As the map populates, it is clear to see where the centre of the reflection is and it's an excellent guide to where a decent path could be from a given location. As propagation / maximum usable frequency builds, coloured lines indicate the-Es propagation per band over a 30 minute period. For example, 28MHz spot lines are blue in colour, 50MHz is in yellow, 70MHz is orange and, when things really get exciting, 144MHz is red. A blank map obviously means no propagation.

A further component is the feed from DX Robot that is a very long serving friend of the VHF radio community run by Allard, PE1NWL **[2]**. From hyperlinks on the G7IZU website it's easy to list recent spots on all VHF bands. Direct connection to the DX Robot website will allow you set up Sporadic-E alerts sent to your email address as well, so it's hard to miss an opening providing you are by your radio that is and not sat on a motorway somewhere! Let's hope for a good Es year on all bands as 2016 certainly wasn't a vintage one by any means.

Meteor scatter

Testing by some meteor scatter (MS) enthusiasts continued even through the periods of rare reflections. The 6 and 4m bands tend to fare reasonably well in these circumstances, however reflections on 2m will still be there but patience is required to make QSOs (contacts) under these poor conditions. Trying to complete QSOs up to 2000km is really a challenge, however some have made it with persistence and excellent operating techniques.

This gives potential for trying out new software. Available as a free download is the new version of MSHV software created by Cristo, LZ2HV **[3]**.



MSHV developed by LZ2HV for meteor scatter EME and tropo.

MSHV / LZ2HV software

Meteor scatter operators have recently had a choice in the software that they able to use, to take advantage of the various meteor showers during the year. Joe, K1JT developed the original WSJT software over 15 years ago – replacing the High Speed CW protocol that had been in existence since the 1970s.

In recent editions of the VHF/UHF column I highlighted some legacy equipment used back in the 70s and 80s that with increasing computer technology became considerably 'old hat', cumbersome and slow.

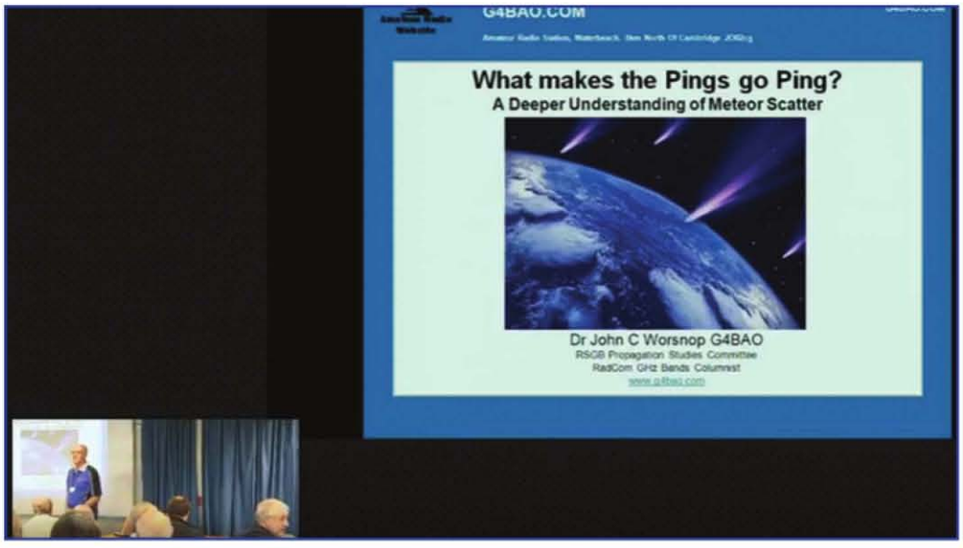
The WSJT software became Open Source a few years ago and developments have been made into parallel software packages. Cristo, LZ2HV developed his MSHV suite initially concentrating on the meteor scatter modes, enabling operators to compare and test against WSJT with modes MSK144, JTMS, FSK441, FSK315, ISCAT and JT6M available in the package.

There are subtle differences, mainly in data speed, that make the versions more efficient on different frequency bands to cope with strong sharp peak reflections as seen on 2m and slower lower signal level reflections say on 6m. MSK144 has a character transmission rate for standard messages as high as 250cps (characters per second). JTMS is 197cps, FSK441 is 147cps and FSK315 is 105cps, all used for mainly, but not exclusively, for 2m meteor scatter operation. ISCAT was originally optimised for 6m operation with a character transmission rate of 32.3cps. This demonstrates the slower, longer, low level bursts associated with the band.

In recent times, operators have found that MSK144 is particularly good on 6m and tests have been made on the band with 15 second periods of transmit and receive instead of the conventional 30 seconds.

The system requirements in terms of computing are quite simple. In fact anyone who is already using other data modes will have some way of interfacing the radio audio to the computer. Basically a stable SSB, frequency accurate transceiver and antenna for one or more VHF/UHF/SHF bands will give the ability to test different reflections rates and work DX on different frequencies.

A superb 'alternative' here is to try 6 and 4m cross band and compare the reflections, which can be remarkably different even with just a 20MHz separation.



John, G4BAO's interesting lecture on meteor scatter is available on YouTube.

Computer requirements

MSHV will run easily on Microsoft Windows XP, Windows 7 32 or 64 Bit and, for Linux enthusiasts, QT4.8.6 and Alsa libraries. The program will also run on modest hardware resources, eg 1GHz or faster CPU, 128MB of available RAM and a monitor resolution minimum of 1024x768 (or 1366x768 for notebooks).

A standard computer to radio audio interface is required of which there are numerous commercial solutions, for example Tigertronics, Rig Blaster etc. A homebrew system can also be very effective as a simple audio in/out from the data jack on your transceiver will be adequate but it is imperative that isolation is provided in both lines with an audio transformer to counteract any possibility of hum and transients in the audio. Using a Yaesu transceiver is easy as there is a digital VOX control that provides the transmit through the data port.

Time accuracy is key to this type of mode – particularly if you are using transmit and receive periods in the order of 15 seconds. Again there are good solutions for this, eg Dimension 4 **[4]** or Meinburg **[5]**.

Significantly, any changes made to the settings of MSHV configure immediately and do not need to be restarted, for example changing the sound settings or radio control, which often required closing WSJT and reloading. The latest version, MSHV 1.36, addresses the JT65 inclusion that is present in the WSJT suite. JT65 protocol has been used over the years for weak tropospheric and EME moonbounce propagation and wasn't included in the initial versions of MSHV, meaning that to run both terrestrial and moonbounce modes two systems would be required. LZ2HV confirms that the JT65A/B/C decoder will only decode real signals as interestingly the 'Deep Search Function' that relies on a callsign database embedded within WSJT is removed from the MSHV software.

Download & setup

When the file is downloaded from LZ2HV's website and unzipped, it is recommended that the software installs in a drive location different from the operating system (on your C drive). By default it looks for D:/MSHV so possibly it might be an idea to create a small partition (easy to do in Win 7) and unzip the file to that location. Once unzipped and extracted, the software will open from a desktop icon. Immediately evident is the compact 'one window' setup, so there's no need to juggle between windows to make any adjustments, which is very handy if you are working only on one monitor. Once you have set the audio settings for the required level then all is really good to go. A critical item though is to make sure that the audio output from the PC into the radio (particularly if feeding into the microphone socket) is well controlled. Having heard some horrendously over driven audio stages, the result is not pleasant for the local VHF community! A recommendation is to adjust the audio output slider and PC audio mixer settings until full output is attained and then just back it off – the old 10% rule as with any similar adjustments is a wise move here.

Next month I hope to have a full operating run with the software and on air experiences to report on 6, 4 and 2 for MS and up to 70cm using the JT65 mode on tropo. Developers of this type of free download spend a great deal of time and effort to produce free downloads that many take for granted. MSHV was developed by Christo, LZ2HV and tested by Jurek, SP9HWY, Dick, G0LFF and Peter, LZ2PG. Ideas about visual format came from Bo, OZ2M and general performance by Harry, LZ1BB. Acknowledgements on developments also to Steven, K9AN, Joe, K1JT and the WSJT Development Group for developing mode MSK144.

RSGB VHF/UHF Convention 2015 Videos

Amongst all the excellent lectures given in the 2015 RSGB Convention, two complete videos have been made available on YouTube. The first was given by John, G4BAO entitled 'What Makes The Pings Go Ping'. This excellent presentation analysed the science behind meteor scatter reflections that we all take for granted in some ways. Secondly, Chris, GW4DGU describes the development and specifications of the Gemini LDMOS VHF/UHF Amplifiers. They are excellent videos and very much worth watching **[6]**.

More unusual antennas

Having featured G3PXT's tree antenna last month, Paul, G3VPT follows on with his version of a tree mounted antenna. The antenna is hidden, located in a sycamore tree this time, which again strangely doesn't suffer too much by being in full leaf. Paul's antenna is a 3/4 wave, end fed, low band base station antenna for 85MHz scaled up and rebuilt for the 4 metre band. At 30ft above the ground it just peeks over the top of the tree. Paul has tested the SWR and there is no noticeable increase as the tree grows to its full glory during the summer months.

Sign off

Looking forward to the spring / summer months and the new DX year, please send in as many reports as possible by the 3rd weekend of the month. Thanks very much and good DXing on VHF/UHF.

Websearch

[1] http://tvcomm.co.uk/g7izu/propagation-maps/map_european_sporadic_e/
[2] http://gooddx.net/
[3] http://lz2hv.org/mshv
[4] www.thinkman.com/dimension4/
[5] www.meinbergglobal.com
[6] www.youtube.com/user/TheRSGB

Richard Staples, G4HGI
g4hgi@live.com

GHz Bands

Reflections on GHz bands DX activity

As an avid DXer, anomalous propagation nut and weak signal activist I have been driven ever higher in frequency due to the noise level at my QTH. The noise level on VHF prompted my first move up to 1.3GHz when it was making it more and more difficult to do any serious weak signal DX. I'm very much a 'shack sloth' in that I like to do my radio from the luxury of a centrally heated room and comfortable chair, so combine this with a flat, low QTH, I have a 'sweet spot' of between 1.3GHz and 10GHz where I can still expect reasonable results from terrestrial propagation. On these bands it's just about all 'been done' from the UK in term of 'firsts and furthest', with a few notable exceptions such as the potential 1.3GHz path from Cornwall down to Cape Verde, so what is there to attract shack-based DXers to the GHz bands? Activity is not high; many of the pioneers of these bands have now given up operation altogether. A few have migrated to doing great things with the bands above 24GHz and there is still plenty to be achieved there, but if your kick comes from DX via anomalous propagation, unless you live on a hilltop these bands have limited attraction for home operation.

Social media, climate change, once a month activity contests, 'been there done that' attitudes have all been blamed for the decline of DX operating on the GHz bands, but there must be people out there like me, who want the challenge of working more squares and countries. It's a fact that if you are only active at the same day and time each month, your chances of working DX are greatly reduced. If you don't react to the propagation conditions and just operate at fixed times around contests, you won't work DX. Unlike HF we don't have the DXpeditions to challenge us when the bands are poor. I highlighted social media as one of the possible reasons why activity is low. Why bother calling CQ for a chat when you can do it on Facebook? On the positive side, a growing number of people are using social media as a way of sharing information about good conditions and making skeds. On the GHz bands, the conditions for DX are still there even without Tropo. On the lower GHz bands, there's aircraft scatter (see the report by G3VPF later) and, higher up, plenty of rain scatter openings go unnoticed just because it doesn't rain during SHF UKAC. I'd like to see a lot more activity on the GHz bands outside of contests and more chasing of the conditions, rather than hoping conditions will come to you on a Tuesday evening. Write to me and tell me your views on activity and how to increase it.

GHz band activity

Ed, G3VPF emailed me to say he's reorganising his home station. Sadly, the 10GHz dish has gone but he's improving his 1.3GHz system to see if he can do better on that band. Ed's QTH is at the bottom of a valley and on the seaward side of the Dorset Ridgeway, so I admire his determination to work at least one GHz band from home. He now has a 14-ele Flexayagi **[1]** at 4.2 metres with an SHF Electronics preamp and a Kuhne G3 giving about 1W output. During the March Low Bands contest Ed was pleased to hear two stations strong enough to be identifiable and two more very weak stations. More of a surprise to him was that the temporary Isle of Wight beacon G8MBU (IO80IR) on 1298.800MHz is audible most of the time on a path over the highest part of the Purbecks. On aircraft scatter, he heard two other beacons, GB3USK (IO81VC) and GB3MHZ (JO02PA). His aim now is to increase power to 30W. I'm sure Ed realises that such a 30W system and JT65c is enough to work the HB9Q superstation on EME at moonrise / set! Ed also has plans for a new portable setup for the band.

Up on the mm bands, G8CUB/P and G0FDZ/P had a 6.1km CW contact on the 122GHz band between Coalhouse Fort, Tilbury, Essex (JO01FL) and Higham (JO01FK) in Kent. Signals suffered from QSB, but were on average 539/579 with several noticeable peaks at times. G8ACE has "downgraded" his 134GHz transverter system to join the activity on 122GHz. He has made tests from a transmitter on his house roof pointing at Shroner Wood, 6.7km away. Signals were not quite as strong as hoped, but using a 30cm dish at the transmitter instead of a horn should add 6dB or so. Tx power was about 100µW. The rigs are all homebrew, using an LMX2541 synth, x5 multiplier to 12GHz then a doubler, amplifier and x5 to 122GHz using an HP beam lead diode. A video can be seen at **[2]**.

PHOTO 1: Prototype 144MHz SDR from DK2FD and DF0MU (thanks to them for the photo).

New SDR transverter driver

DK2FD and DF0MU are engineering a new SDR 144MHz transceiver that is designed as a GHz bands driver. **Photo 1** shows the front and rear panels of the prototype, showing the extensive transverter interconnect. You can watch a video of it in action at **[3]**. As an SDR with DSP and I/Q modulation it's possible to modify the transceiver using software upgrades. The team are currently working on the third generation of the design and are looking for further ideas, so if you want to help, you can email Dirk via DK2FD@t-online.de.

Finally

That's all for this month. Keep 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?

Websearch

[1] FlexaYagi antennas – www.flexayagi.de
[2] G8ACE 122GHz tests – http://microwaves.dsl.pipex.com/indexnew.html
[3] DF202 SDR – http://bit.ly/2IT2P9K

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Count on us!

An update about Islands on the Air

2016 was always going to be a significant milestone in IOTA's history and spring saw the formation of Islands On The Air (IOTA) Ltd, a not-for-profit company, limited by guarantee, with the express purpose to take over all aspects of the programme's management previously carried out by the RSGB's IOTA Committee.

At the CDXC AGM, Roger, G3KMA received his CQ Hall of Fame award. Seen here with Gordon, G3USR, Chris, G3SVL, RSGB President Nick, G3RWF, Tony, G4LDL and Mark, G4AXX.

Rob, M0VFC operating CW as C6APY, in the Bahamas, IOTA NA-054.

Shortly after its formation, IOTA Ltd and the RSGB entered into a partnership arrangement, signing a Memorandum of Understanding that defined the responsibilities that the two parties would observe in their dealings with each other.

The change in governance from a committee of the RSGB to an independent company, bound by UK law, was ground-breaking for those involved. A Board of Directors had to be appointed with a full-on understanding of their personal obligations and commitments. At the same time they needed to understand that with independence comes responsibility, in other words in all matters and particularly financial viability the buck stops with the Board, no one else.

A strong team of helpers had already emerged in late 2015 with a determination to take the steps necessary to raise the profile of IOTA with the world's amateurs and lead to the required step increase in participation. The main element of the strategy was identified as the replacement of the existing programme software with a technologically advanced system that majored on QSO matching with logs on Club Log. This would remove the need for 100 per cent reliance on paper cards to secure credit and follow, although in a different way, the example set by the ARRL's very successful Logbook of the World. Michael Wells generously agreed that Club Log with its huge volume of logs could be the platform for this development. It meant that for matching to take place the island station and his contact would both need to have logs on Club Log.

By the time of the launch of the company, a fully developed project plan had been designed, a team appointed and work was in hand. It was well advertised that this new system would not be released until early summer 2017 when the pressure of the annual Honour Roll exercise had subsided. However, to meet growing expectations (and the impatience of the IOTA Community and those who wanted to join it), an element of QSO matching was launched in July 2016 on the existing system to test its feasibility. Essential to this was the creation of a bank of operations that met IOTA's validation and acceptance requirements. In practical terms, given the short nature of most island operations, this meant an unending list of operations with dates/times of first and last transmissions together with, in each case, a note of the island name. This was and will continue to be a massive ongoing task.

In the early months the Accepted Operations list included a small subset of the island logs on Club Log and yet the results were hugely impressive. Applications/updates rose from 877 in 2015 to 1,045 in 2016 (+19.2%), credits processed from 59,033 to 65,981 (+11.8%) and fees received by 20.9%. It is easy to say

that these increases are modest given the magnitude of the development introduced but that development was a test programme on the existing system where the data files processed for matching were a fraction of the intended ones on the new system. It also reflected just 6 months' benefit since Club Log matching did not start until July 2016.

Analysis of the figures for the months when QSO matching was available shows the proportion of matched QSOs peaking at 42% of total credits given. They include QSOs matched in the IOTA Contest, in volume terms considerably higher proportionally than when this was the only form of QSO matching. Overall, the July to December comparison of the two years shows a 65.6% increase in 2017, while the January comparison a more modest 35.9%.

For a new method of claiming credit this is very respectable. In time, a higher figure than 42% for matched QSOs is likely but one cannot ignore personal choice. In processing the applications it was unquestionably noticeable that many chasers were wedded to a QSL card submission and, despite the availability of going the easier and less expensive route of QSO matches, an apparent acceptance of possible loss of cards in the postal system. One can assume that in some cases they had already entered QSO details from the cards in their online application and did not feel like replacing them with QSO matches. To my mind, the more likely reason was a strong determination to secure the credit the old way and not be seduced into getting it by the easier technological means now available. This was particularly observed with older chasers who seemed to spurn QSO matching unless it was the only means of securing the credit. This led to a preponderance of hybrid applications.

TABLE 1: Analysis of the figures for QSO matching from 2011 to date.

Year	No of Submissions	Cards Submitted	Matched QSOs*	Credits Given
2011	760	49581	2577 (4.9%)	52158
2012	849	51184	3122 (5.7%)	54306
2013	747	46258	3159 (6.4%)	49417
2014	897	57683	2782 (4.6%)	60465
2015	877	56019	3014 (5.1%)	59033
2016	1045	50148	15833 (24.0%)	65981
Jul-Dec 2015	231	21587	1127 (5.0%)	22714
Jul-Dec 2016**	438	22890	14725 (39.1%)	37615
Jan 2016	497	18511	590 (3.1%)	19101
Jan 2017	486	14967	10992 (42.3%)	25959

*Includes IOTA Contest matches in all years, ** QSO matching on Club Log started on 4 July 2016

TABLE 2: The Honour Roll top 20 have registered these scores against the maximum 1123 groups currently possible.

1	9A2AA	1118	4	G3NDC	1108	30	G3XTT	910
1	I2YDX	1118	5	G3ZAY	1091	31	G3LAS	904
1	I8ACB	1118	6	ON4IZ	1091	32	SM6BZV	870
4	I1JQJ	1117	7	GM3ITN	1089	33	OE3EVA	850
5	VE6VK	1116	8	SM3EVR	1089	34	G4DUW	841
6	G3KMA	1115	9	W1JR	1079	35	G4NXG/M	828
6	K9PPY	1115	10	G3OAG	1066	36	G3KHZ	816
8	F2BS	1113	11	AD5A	1064	37	G3SWH	803
9	HB9AFI	1111	12	G0ANH	1064	38	G0RCI	799
9	ON6HE	1111	13	G3OCA	1064	39	5B4AHJ	797
11	I1SNW	1110	14	OH2BLD	1063	40	GM7TUD	760
11	VE3XN	1110	15	OZ4RT	1061	41	MD0CCE	736
11	W9DC	1110	16	G3HTA	1057	42	IZ2AMW	732
14	N8JV	1109	17	G3RUV	1057	43	KD7H	727
15	CT1ZW	1108	18	G0APV	1048	44	G3TXF	722
15	G3NDC	1108	19	GJ3LFJ	1048	45	G4XRX	700
15	I8XTX	1108	20	G0DQS	1045	46	G4IUF	693
15	W5BOS	1108	21	DK6IP	1044	47	G3LUW	681
19	OM3JW	1107	22	G4WFZ	1033	48	G3KYF	626
20	I8KNT	1106	23	G3NUG	1027	49	LA5HE	625
			24	G3SJX	1019	50	SP5APW	625
The following RSGB Members appear in the Honour Roll			25	G4BWP	1002	51	G4VMX	617
			26	G3RTE	959	52	G4KFT	611
1	I1JQJ	1117	27	G3UAS	956	53	G3KWK	610
2	G3KMA	1115	28	OZ1HPS	940	54	F1TXI	567
3	W9DC	1110	29	G0WRE	910			

Personally I opted for QSO matching for the 5 credits in my Honour Roll application and found it so much easier.

Software systems carry a price tag. At the outset the IOTA Board was hugely grateful to the RSGB's Legacy Committee who came up with a £10,000 grant to start the IT Project off. This still left a significant funding gap and there seemed no way of filling this without taking up a sizable loan that was on offer. In any event the Board decided that the problem was one for the IOTA Community, in effect the people who would benefit, and no one else. Any other solution, and this included sponsorship, was not right. A brave move was required – it could work or we could fall flat on our faces. In July 2016 we established Friends of IOTA as a supporters group within the company and launched a funding appeal initially targeted at £25,000 to cover the costs of the IT Project. The response was superb – Thank You. By end February we were within £2,500 of reaching our target and, with an increased operating surplus from the Honour Roll exercise, we were in the satisfactory position of having sufficient funding to cover all liabilities including the IT Project and a significant volume purchase of IOTA Trophies.

We are confident that, once the new software system is launched we will see an even greater step increase in participation. Maybe we will reach 50 or 60% penetration by QSO matching. The income resulting will enable us to introduce new features into the programme including promotional events, further IT developments, a range of IOTA branded goods and, in time, some financial support for IOTA DXpeditions.

Honour Roll and Annual Listing

By the time you read this the 2017 Honour Roll and Annual Listing will have been published on the RSGB IOTA website. It runs to 1533 entries (compared with 1424 last year), an increase of 7.7%.

The IOTA Board of Directors comprises Roger Balister, G3KMA, General Manager and Programme Administrator; Cezar Trifu, VE3LYC, Operations Manager; Stan Lee, G4XXI, Company Secretary and Treasurer and Johan Willemsen, PA3EXX, IT Manager and Coordinator. An Advisers Group supports the Board comprising Michael Wells, G7VJR, Bob Barden, MD0CCE, Don Chamberlain, W9DC, Mauro Pregliasco I1JQJ and Jim Nakajima, JA9IFF. We currently have vacancies both at Board and Advisers Group level.

Roger Balister, G3KMA
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Sport Radio

With no less than sixteen RSGB VHF/UHF contests this month, it's certainly going to be a busy one!

The first of this month's 80m Club Championships is SSB on the 1st, which this year is a Bank Holiday. The datamodes session follows on the 10th and the CW session on the 18th. Don't forget that in the datamodes session there is no longer normalisation of the RTTY and PSK scores.

Moving up in frequency to VHF/UHF, on the 2nd the 2m FMAC is immediately followed by the 2m UKAC. There are three overlapping contests over the weekend of 6-7th, all starting at the same time. The 432MHz-248GHz Trophy is where the most serious microwavers get their kicks. For the first eight hours of this contest the 432MHz Trophy and 10GHz Trophy contests also take place. On the 9th we have the 432MHz FMAC and UKAC contests. Two days later we have the 50MHz UKAC. At this time of year don't be surprised if there is some Sporadic-E (Es) propagation during it. On the 11th the 70MHz CW contest takes to the air. Although it is held at the time of year and time of day when there could be some Es propagation, 2013 was the last year in which any DX of note was worked. It's the first in this year's series of VHF CW Championship series of contests, with 50MHz lined up for June and 144MHz for November. The 1.3GHz UKAC on the 16th is followed by the 70MHz FMAC and UKAC on the 18th. The biggest VHF event of the month is likely to be the May 144MHz Contest that runs for 24 hours over the weekend of 20th-21st. This contest is part of the VHF Championship series. With 6-hour and 24-hour sections for Single-Op Fixed (see **Photo 1**) and Single-op Open stations, plus an Open section for multi-op stations, there are convenient categories for everyone. On the 21st the first of this year's 144MHz Backpacker events runs for four hours, the first three of them overlapping the final three hours of the 24-hour contest. The SHF UKAC is on the 23rd and the third session of this year's 70MHz Cumulative series is on the 28th.

Operating position of the 2016 May 2m Contest 6-hour single-op section winner, Tony, GW8ASD.

Starting on the 6th, the UK Six Metre Group's Marathon is a contest without fixed operating times. The object of the exercise is to work as many Locator squares as possible across three months of the Sporadic-E season. Entrants can upload their logs repeatedly during the Marathon, to update the online League Table. The Italian National Society ARI International DX Contest runs for 24 hours from midday on the 6th. This event has single-op sections for CW, SSB, RTTY and mixed modes. For non-Italians the exchange is a signal report plus serial number, but Italians give a signal report and a 2-letter Province code (there are 110 to collect). There are two very different contests on the 7th; the UK Microwave Group (UKuG) Low Band and the IRTS (Irish) 7MHz Counties. Its 7MHz again on Sunday 14th for the WAB (Worked All Britain) 40m Phone Contest. The biggest event of the month will be the CQWW WPX CW Contest that takes place for the entire 48 hours of the weekend 27-28th. There's another UKuG 5.7-10GHz contest on the 29th.

Steve White, G3ZVW
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RSGB HF Events

Date	Event	Times (UTC)	Mode(s)	Band(s)	Exchange
Mon 1 May	80m Club Championships	1900-2030	SSB	3.5	RS + SN
Wed 10 May	80m Club Championships	1900-2030	Data	3.5	RST + SN
Thu 18 May	80m Club Championships	1900-2030	CW	3.5	RST + SN

RSGB VHF Events

Date	Event	Times (UTC)	Mode(s)	Band(s)	Exchange
Tue 2 May	144MHz FMAC	1800-1900	FM	144	RS(T) + SN + Locator
Tue 2 May	144MHz UKAC	1900-2130	All	144	RS(T) + SN + Locator
Sat-Sun 6-7 May	432MHz-248GHz Trophy	1400-1400	All	432-248	RS(T) + SN + Locator
Sat 6 May	432MHz Trophy +	1400-2200	All	432	RS(T) + SN + Locator
Sat 6 May	10GHz Trophy	1400-2200	All	10G	RS(T) + SN + Locator
Tue 9 May	432MHz FMAC	1800-1900	FM	432	RS(T) + SN + Locator
Tue 9 May	432MHz UKAC	1900-2130	All	432	RS(T) + SN + Locator
Thu 11 May	50MHz UKAC	1900-2130	All	50	RS(T) + SN + Locator
Sun 14 May	70MHz CW Δ	0900-1200	CW	70	RST + SN + Locator + Postcode
Tue 16 May	1.3GHz UKAC	1900-2130	All	1.3	RS(T) + SN + Locator
Thu 18 May	70MHz FMAC	1800-1900	FM	70	RS(T) + SN + Locator
Thu 18 May	70MHz UKAC	1900-2130	All	70	RS(T) + SN + Locator
Sat-Sun 20-21 May	144MHz May Contest +	1400-1400	All	144	RS(T) + SN + Locator + Postcode
Sun 21 May	144MHz Backpackers #1	1100-1500	All	144	RS(T) + SN + Locator
Tue 23 May	SHF UKAC	1900-2230 ~	All	2.3-10G	RS(T) + SN + Locator
Sun 28 May	70MHz Cumulative #3	1400-1600	All	70	RS(T) + SN + Locator

Best of the Rest Events

Date	Event	Times (UTC)	Mode(s)	Band(s)	Exchange (info)
6 May - 6 Aug	UKSMG Summer Marathon	All	All	50	4-character Locator
Sat-Sun 6-7 May	ARI International DX	1200-1200	CW, Phone, RTTY	1.8-28	RS(T) + SN (I's give Province code)
Sun 7 May	UKuG Low Band	0800-1400	All	1.3-3.4G	RS(T) + SN + Locator
Sun 7 May	IRTS 40m Counties	1200-1500	SSB/CW	7	RS(T) + SN (EIs & GIs also send County)
Sun 14 May	WAB 40m Phone	1000-1400	SSB	7	RS + SN + WAB area
Sat-Sun 27-28 May	CQWW WPX CW	0000-2359	CW	1.8-28	RST + SN
Sun 28 May	UKuG	0600-1800	All	5.7-10G	RS(T) + SN + Locator

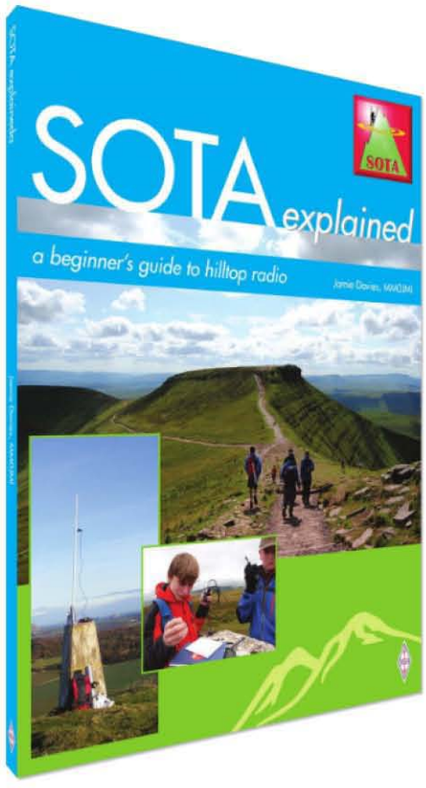
+ VHF Championship event Δ VHF CW Championship event ~ Different bands at different times For all the latest RSGB contest information and results, visit www.rsgbcc.org

Book Review

SOTA Explained

A beginner's guide to hilltop radio

by Jamie Davies, MM0JMI



I have often marvelled at the resilience of Summits on the Air activators, dragging radios, aerials and power supplies up mountains and braving all sorts of weathers and hardships to activate yet another peak. This book communicates the infectious enthusiasm of those who take part and the fascination of working from – or to – the tops of hills. Even if you're not yet on track to be a Mountain Goat or Shack Sloth, the Summits on the Air (SOTA) programme offers the opportunity to make contacts to and from unusual places, often, over remarkable distances.

One of the first things the book makes clear is that there is no need to be a super-fit, skilled mountaineer in order to take part, as it's perfectly possible to enjoy the hobby from home or in a car. But if you *are* planning to carry gear to the top of a high point or mountain then appropriate fitness, clothing and above all precautionary planning are vital to a safe operation – and there is a whole chapter dedicated to explaining the necessary basics. It also, very sensibly, points out that it is a beginners' guide and does not cover "journeys of days or tackling winter weather on mountains". But much attention is given to basics such as stout boots, compass and map reading – instruments on which you never have to worry about a flat battery or lack of signal!

But I digress. Back onto the path of radio, we soon learn how to set up a simple, cheap and effective SOTA starter station operating on 2m FM. To whet your appetite, from a 'minimum SOTA hill' of 150m elevation, a couple of watts from a 2m handheld has a range of about 150km to a similar hill, or 60km to sea level – direct, of course, not via a repeater. No matter where you are, a 150km range is likely to include a significant number of amateurs. I was interested to see several very inexpensive antenna designs that will make these achievements highly feasible. Higher power also has a place, and this is also discussed – as is the all-important propagation. There's also a section on 70cm.

We next move on to the HF bands and how operating on these frequencies can bring world-wide contacts at low power and – because hilltops are generally quite a way from 'civilisation', with far lower noise levels than you're likely to experience at home. Whether you choose voice (SSB), Morse or computer modes, the world is your aardvark. It's rather summed up by the title of the last chapter: "Tuning for maximum fun".

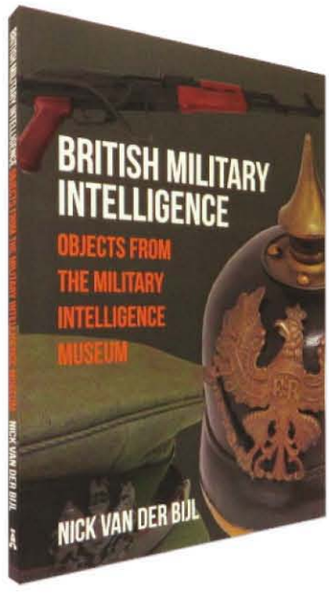
There is a goldmine of practical information – for example improvising a battery carrier from a padded tea-cosy – and a wealth of advice on operating, safety, equipment, aerials and much more. But the thing that comes over very strongly is that, above all, SOTA operating is a fun endeavour and open to all, regardless of licence class, experience or physical fitness. Highly recommended.

Size: 174 x 240mm, 160 pages, ISBN: 9781 4738 8665 0
Non-Members' Price: £12.99, Members' Price: £11.04

British Military Intelligence

Objects from the Military Intelligence Museum

by Nick van der Bijl



When I first picked up this book, I immediately knew it was going to be fascinating. In those few seconds I saw a miniaturised radio set, medals, uniforms and something that looked like a cross between a clothes airer and an accordion. I had to know more!

The introductory pages paint a brief but fascinating picture of British military intelligence from the 1700s to the Falklands War and beyond. One particular passage caught my eye; "About 400 Intelligence Corps men and women were associated with Bletchley Park and its equivalents in Jerusalem and Delhi…" – I think this is the first time I've come across such a reference. As an RSGB Member I was also interested to learn that the Intelligence Corps Colonel-in-Chief is none other than Field Marshal HRH Prince Philip, Duke of Edinburgh, KG, GT, the RSGB's Patron.

This lavishly illustrated full colour book contains a vast number of high quality photographs of artefacts in the Military Intelligence Museum, ranging from equipment to (many) medals, historical images, spy paraphernalia and even a captured tank.

The Military Intelligence Museum, on which this book is based, is just a few miles away from RSGB HQ at Chicksands. I haven't visited yet, but this book has definitely whetted my appetite. If you like the intrigues of intelligence and the artefacts that arise, this book will definitely hit the spot.

Size: 165 x 234mm, 96 pages, ISBN: 9781 4456 6238 1
Non-Members' Price: £14.99, Members' Price: £11.24 (25% OFF)

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Arkwright youngsters get a taste of amateur radio

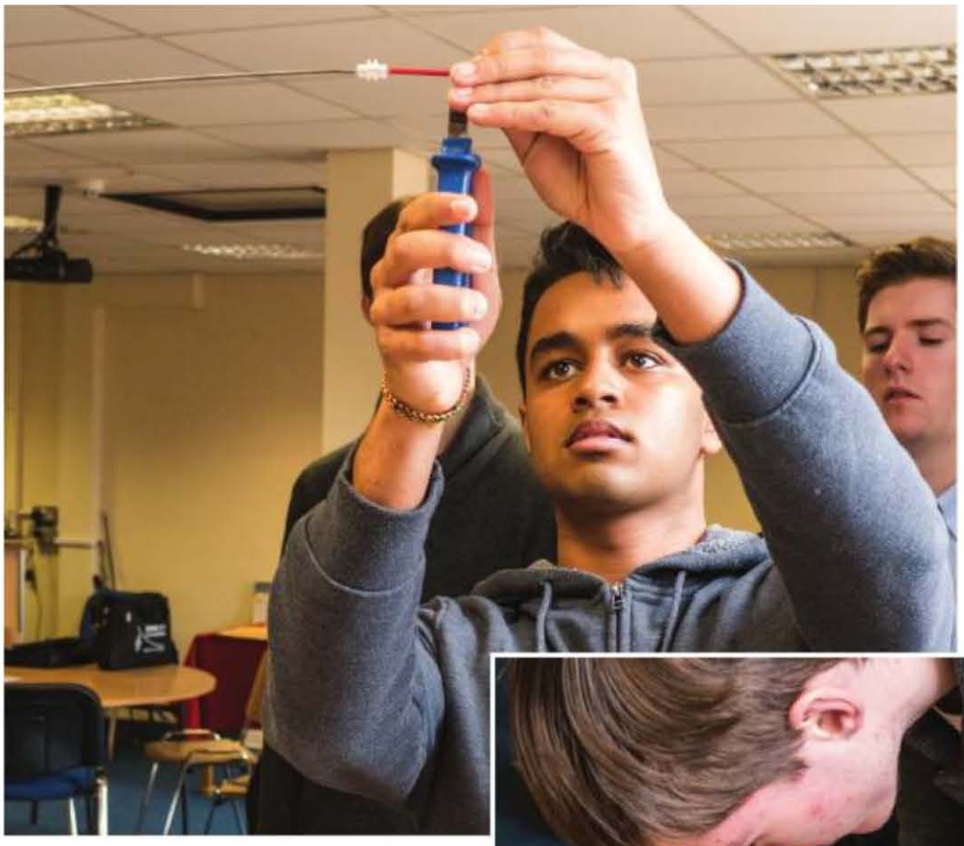
Fifteen students from the Arkwright Scholarship Trust programme spent a day at the National Radio Centre (NRC) completing their Foundation licence practical, finishing with the exam.

The Arkwright Scholarships Trust is a registered charity that administers a scholarship scheme in the UK with over 4,000 Scholarships awarded to date. The aim is to identify, inspire and nurture future leaders in engineering, computing and technical design

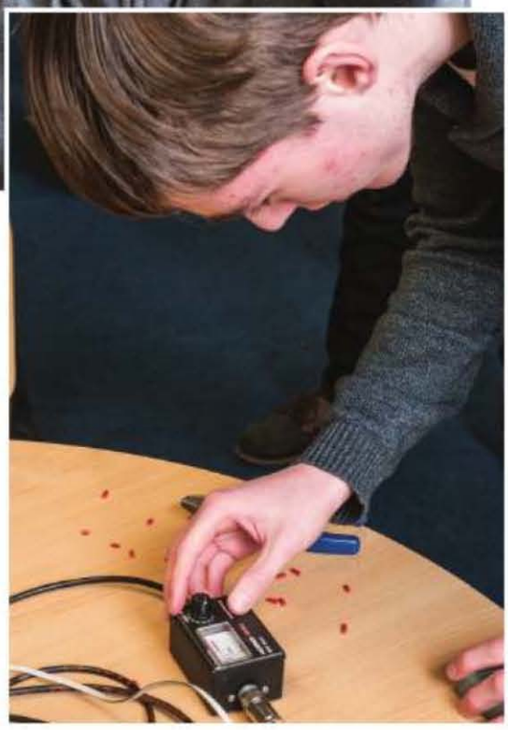
The Scholarships are awarded to high-calibre 16 year old students through a rigorous selection process and support to those students through the two years of their A levels, Scottish Advanced Highers or equivalent qualifications. These Engineering Scholarships encourage students to pursue Engineering or Technical Design at university or through a higher-level apprenticeship and to take up careers in the field.

Every Scholarship is sponsored by a commercial company, trade association, university, professional institution, armed service, government organisation, worshipful company, charitable trust or personal donor. This means that support is offered in various different ways, for example, valuable hands-on work experience, support for the curriculum projects and a personal mentor who can help with aspects of your studies and career planning. The Radio Communications Foundation (RCF) sponsors two scholarships.

In 2016 a number of scholars were offered the opportunity to do the Foundation practical assessments as an activity day and to sit the Foundation examination at the end of it. It was a remarkably successful day, reported in *RadCom* in June 2016. A second event was planned for February 2017 with fifteen students. They arrived at the National Radio Centre, many with their parents who had the opportunity to enjoy a day out at Bletchley Park, bright and early in the morning. Several volunteers were there to supervise each of the elements of the practical part of the Foundation exam. A classroom was set up for the connecting of a station, antenna tuning and Morse appreciation elements of the practical. The NRC was used for the VHF contacts and the main station there, GB3RS, was used for the HF contacts element.



An antenna was tuned by slowly cutting it to size.



Checking the tuning of the antenna.

In the classroom

The students were split into groups of three or four and rotated round the various activities during the day. The classroom was situated in Bletchley Park Block B.

The Morse assessment was carried out by a member of the RSGB Youth Committee, Kieran Clarke, 2E0NCN. It was interesting to see the young students respond to someone much closer to their own age group, especially when being shown Morse, something that's often seen as an outdated method of communication. They picked it up remarkably quickly too – despite this being the first time they had tried to send or receive Morse.

Another member of the Youth Committee, Milo Noblet, 2E0ILO assisted Trevor Gill, G8IBO, describing and demonstrating how to put together the various building blocks of a station. Antenna tuning was done with each student having the opportunity to cut an antenna to length, incrementally, whilst watching the matching on a meter to see the dip in SWR as it was tuned to best efficiency.

Martin, G3ZAY gets the radio ready for the first student contact.


Using a crib sheet each student had the chance to speak to Bob, VP8LP.

In the NRC

A VHF station was set up by Roseanna Devos, M6SHH in the reception area of the National Radio Centre and Graham, G7OSR spent most of his day acting as the contact for each of the students. Each student made a CQ call on the calling frequency and Graham, G7OSR then led them through a simple conversation, including a change of frequency from the calling channel. Whilst each young person had a 'crib sheet' to help with nerves, they were asked different questions so that some 'thinking on their feet' was involved.

A very similar thing took place on the HF bands using the main station, GB3RS. Martin, G3ZAY had arranged that well-known amateur Bob McLeod, VP8LP in the Falklands would be on air to, hopefully, speak to the first batch of students to try their hand at HF operating. After demonstrating the various receiving elements of the practical including tuning in an SSB signal and a data modes signal, the students each tried their hand. Using the station's Yaesu FTDX5000 transceiver and Flex-6500/ Maestro with a rotatable SteppIR, they were able to call CQ and Bob, VP8LP answered. Students were thrilled to talk to someone so far away and Bob had a range of interesting comments and snippets about his day to keep the conversations lively.

Initially it was hoped that Bob would be able to speak to just the first group of students, but in the true amateur spirit he offered to call in again for the next group later in the morning. Having started on 20m, the second conversation had to take place on the 18m band to get the best reception. Bob worked his way through the next group of four students before the lunch break.

It was then that Bob offered to come back into the shack for the third and fourth groups later on in the afternoon! Contacts had to move to the 15m band by this point, but signals were still good and gave each student a very real feel for the amateur bands, although they were told that you didn't just call CQ and necessarily speak to a station as far away as Bob very time! In the afternoon he was joined in the shack by his wife Janet, VP8AIB and a visiting US amateur whose cruise ship had docked for the day in the Falklands.

All those involved in the day, both volunteers and students, would like to thank Bob for his time and effort. It was a real example of the amateur spirit and made that part of the Foundation practical very interesting for each of the students. It also gave Martin, G3ZAY the opportunity to explain and demonstrate the changing propagation as the day went on.

The exam

Each of the students had self-studied for the exam using the *Foundation Licence Now!* book from the RSGB. During the day, several students had questions that the various volunteers helped to answer. Anything from the viability and accuracy of Morse to space communications and regulatory issues on callsign formats to electrical safety came up. The questions were varied and the discussion that ensued, at times, made it difficult to remember that these were just 16 year old students, their level of knowledge was impressive, particularly when you remember they had self-studied.

The classroom was set up for the exam and it's pleasing to note that the majority of students passed with flying colours. One student obtained full marks – 26/26 – and another got 24 out of 26. A couple of them could well take a up the hobby and were asking for details of local radio clubs, but they all enjoyed the day and decided that new knowledge is always useful and there's no knowing when they may come to take up amateur radio later in their life.

Milo and Roseanna are RCF sponsored Arkwright scholars and were excellent role models for the other scholars, who were mostly new to amateur radio. One of the scholars, Murray Whitaker, was so taken with the experience that he went back to his school and did a presentation to his science club. He has already started studying for his Intermediate exam.

Radio Communications Foundation

An ongoing problem is the serious shortage of radio communication engineers, scientists and technicians. This is where the Radio Communications Foundation comes in. An interest aroused in radio by a hands-on demonstration at school or at an exhibition or perhaps by a radio amateur can leave a lasting impression. People who become radio amateurs at an early stage usually retain a lifelong interest in radio and some build on early experiences to go on and take up a career involving radio. The Foundation is a Registered Charity set up by, but independent from, the Radio Society of Great Britain, established specifically to support people and projects where radio communications through the expertise of the radio amateur is the theme.

The strategy of the Foundation is quite simple: To bring the benefits of radio to young people; and to encourage the use of technology. The RCF actively gives financial support to projects that fulfill its strategy. Please help the future of our hobby and consider making a donation no matter how small to this worthwhile cause. You can donate online, or if you prefer you can e-mail secretary@commsfoundation.org for bank details. The website is http://commsfoundation.org/

More information

If you would like more information on the work of the Arkwright Scholarships Trust, see their website at www.arkwright.org.uk

Details of the work of the Radio Communications Foundation can be found at http://commsfoundation.org/

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Rejecting broadcast station interference

Is broadcast interference causing you problems on your software defined receiver (SDR)? Attack it with this simple preselector you can build yourself.

Amateur radio receivers are pretty sensitive these days. Broadcast (BC) signals are often very, very strong and from time to time cause us radio amateurs problems. The trend towards direct conversion, zero IF, software defined radios (SDR) has brought broadcast station interference (BCI) back to our attention. This article describes how you can construct for yourself a simple preselector to eliminate most of the most common forms of BCI. None of the following is new but it is hoped it will give an insight into simple tuned circuit theory and show how a filter you can build yourself can help you attack the problem.

What does BCI sound like? If, when you listen to the amateur bands, you can hear superimposed on the amateur band an amplitude modulated (AM) broadcast signal and this signal does not tune but is present whatever frequency you tune to, then you certainly have BCI. Even some of the most sophisticated modern transceivers and especially those using SDR technology seem to be susceptible to a greater or lesser degree. The interfering AM signal appears when the sheer strength of the broadcast station signal overwhelms the front end filters and the analogue to digital converter or mixer. Some of such interference comes from medium wave AM stations and many receivers include a high pass filter in the front end to attenuate such signals.

In my case, in the evenings, a low level AM signal appeared all over 15m (and at times on 30, 20 and 17m as well). By connecting my antenna to a spectrum analyser I was able to see that very strong AM signals appeared in the 25 and 22m broadcast bands. At times these signals peaked at -12dBm, or about 60dB over S9! Radio China on 13.7MHz seemed to be the main culprit but I also had a case that sounded like some sort of digital signal. Now you may think that the front end filters in the receiver will suppress such a signal but these filters are often rather more broadband than you might hope in order to cater for the general coverage user or because of commercial constraints.

So how might this type of problem be tackled? The first action is to reduce the receiver radio frequency (RF) amplification so that the antenna noise just overrides the receiver noise. Indeed in my case this did reduce the problem somewhat. But amateur radio is about copying weak signals and quite often one needs to use the full amplification available to be able to copy signals easily, especially if band noise is low. What is really needed is better RF selectivity in the receiver front end.

PHOTO 1: **Inside one of the prototype filters. This differs from Figure 4 in that it has a switch to select between two different inductors (one on the white former, the other on a smaller toroid to the left).**

There are two approaches, either to attenuate the offending signal specifically using a bandstop filter tuned to its frequency, or by selecting the wanted amateur band signal with a bandpass filter. As, potentially at least, BCI could arise from signals in any of the 41, 31, 25, 22, 19 or even 16m broadcast bands then the latter approach, bandpass filtering, is likely to be more effective. This is the basis of the so called 'preselector' that, as its name implies, pre-selects a band of frequencies by being placed between the receiver input and the antenna. It only allows a relatively narrow set of frequencies to pass through, ideally rejecting all frequencies higher and lower than the wanted (centre) frequency. The short wave listener (SWL) community often makes use of preselectors to winkle out weaker stations.

A practical preselector will pass frequencies in the selected (eg amateur) band and attenuate other frequencies in any adjacent broadcast bands. Two simple inductor (L)-capacitor (C) circuits do this, the parallel LC and the series LC circuit. Here I am going to analyse the latter but the arguments also apply to the parallel circuit.

Frequency selection is determined by the width of the passband needed to cover an amateur band. For example we would want to pass all of the 450kHz of the 21MHz band

with less than 3dB attenuation. The Q **[1]** of the filter should be approximately 21/0.45 = 47. A simple LC filter with this characteristic would attenuate 13.7MHz by over 20dB.

Now let's take a look at how a typical series circuit connected between antenna and receiver (as shown in **Figure 1**) might perform. I am indebted to VK6APH for his very clear explanation, which you can find at **[2]**. A simple series LC circuit resonating at 21MHz could be an inductance of 1μH in series with a capacitor of 57pF. The Q of this combination on its own might well be close to 200, which would have 3dB bandwidth of 21/200 = 100kHz, apparently easily selective enough for our purpose. But what happens when we insert this filter between the antenna and the receiver, as shown in **Figure 2**? If we actually *measure* the bandwidth, it is more like 16MHz! It seems that the circuit has suddenly become very broad – not quite what we intended! This change arises because we have omitted to include the impedances of the source (the antenna) and the load (the receiver) in the bandwidth calculation. Say, for example, that these are each 50Ω (and the inductor itself has a negligible resistance), as shown in Figure 2. Q is calculated from the frequency (expressed in radians per second, or 2 x π x frequency in cycles per second) times the inductance, divided by the *total* resistance. Using the values shown in Figure 2 and a frequency of 21MHz,

Q = ωL/R
= 2 x π x 21MHz x 0.1μH x / (50Ω + 50Ω)
= 1.32

From this we can calculate the 3dB bandwidth as 21/1.32, about 16MHz. *[More details about the maths employed here can be found at* ***[1]****,* ***[2]*** *and most basic electronics textbooks – Ed].*

So how might we change the circuit to make it more effective? The answer is to reduce the resistive part of the circuit. We can step the input signal down from 50Ω in a broadband transformer to, say, 5Ω, then pass the signal through the LC filter, then step it back up to 50Ω in another broadband transformer, as shown in **Figure 3**. Then the calculation becomes

Q = ωL/R
= 2 x π x 21MHz x 1μH x (5Ω + 5Ω)
= 13.2

and the 3dB bandwidth is 21/15, or a much more satisfactory 1.6MHz.

This forms the basis of a simple, practical circuit to use between the antenna and receiver. To cover several amateur bands the capacitor needs to be variable. The inductance should be capable of being switched to give a number of selectable values if the circuit is intended to cover both LF and HF. For most receiver applications insertion loss is not too important as there is usually plenty of gain available.

On the basis of my calculation a series of prototype filters were constructed. The 3:1 and 1:3 transformers were constructed according to the circuit of **Figure 4** – note that the dots by the transformer indicate the start of each winding: it's important to connect them the right way round. The transformers were 10 trifilar turns on a ferrite toroid of permeability μ = 125. The transformers are connected to give a 3:1 step down/up and thus a 9:1 impedance ratio, 50Ω to 5.5Ω. The variable capacitor was small air spaced variable of about 250pF maximum. A number of inductors, toroidal and air cored, were wound in the ranges 1 to 3μH. Broadly, the trend is that as the L to C ratio increases so the Q and insertion loss increase.

A design with a simple air cored coil (10 turns on 25mm diameter, length 10mm, giving an inductance of about 2.2μH) tuned to 21MHz has an insertion loss of about 1.4dB and a 3dB bandwidth of about 800kHz. 13.7MHz is 28dB down. Inserting this circuit between the antenna and the receiver and peaking it at 21MHz completely removed all traces of BC AM interference. The full range of tuning was from 7 to 24MHz. However, across the range the selectivity does vary, for example at 14MHz the bandwidth is similar but the loss is 0.6dB. Using a smaller coil of about 0.8μH gave an insertion loss of <1dB at 21MHz but still attenuated 13.7MHz by ~20dB. A coil of 15 turns on a T106 yellow toroid (L ~ 2.5μH) gave, at 14MHz, a loss of < 1dB and a bandwidth of 600kHz; it had a similar bandwidth at 21MHz but an increased loss of ~1.7dB. These are given as examples since a degree of experimentation will be needed and the actual values of bandwidth and insertion loss will vary a bit with the components used, aerial / radio impedance and so on.

Photo 1 shows the air cored coil prototype in a screened box. Commercially, preselectors of this type are used in the Hilberling high end transceiver and a rather fine computer-controlled version is available from HEROS Technology **[3]**. For amateur use it is quite satisfactory to tune the capacitor manually to peak the noise on receive. Old timers will recall that it was normal to have a peaking control to tune the receiver front end. Such a filter as described here inserted between the antenna and receiver input and tuned to any of the HF bands completely removed all traces of BC AM interference.

Since I used good-sized components and the insertion loss is pretty low, I can also transmit *low* power through mine. If you use miniature components and / or higher powers than a watt or two then you will need to arrange a relay to bypass the preselector if you want to use it in conjunction with a transmitter.

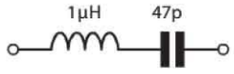

FIGURE 1: Series tuned circuit.

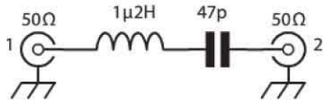

FIGURE 2: Series LC between antenna and receiver.

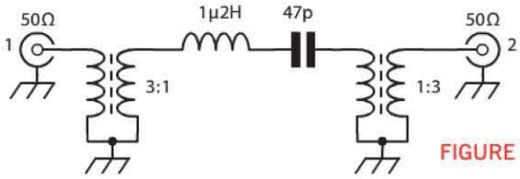

FIGURE 3: Basis of final circuit.

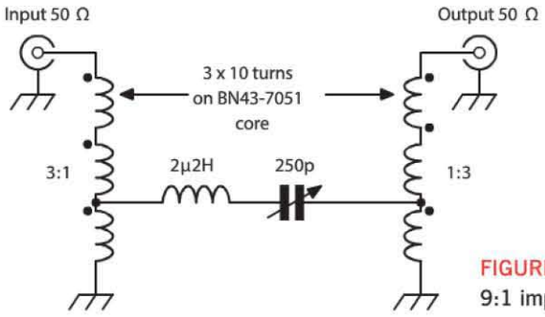

FIGURE 4: Final basic circuit including 9:1 impedance transformers.

Websearch

[1] Q, or 'Q-factor' is a dimensionless parameter that describes how under-damped or lossy a resonating circuit is – a sort of 'goodness factor'. For more info see https://en.wikipedia.org/wiki/Q_factor
[2] http://tinyurl.com/l8s8nup or http://openhpsdr.org/wiki/index.php?title=ANICETUS
[3] http://tinyurl.com/kcy5dry or http://herostechnology.co.uk/pages/tiny_SCR_preselector.html

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Multiband inverted V antennas – the downsides

The G5RV is a very popular multiband antenna that was designed in the 1950s. Its more modern variant, which I developed during the early 1980s, has become known as the ZS6BKW.

The basic principle underpinning them is the same. The part of the antenna that does the radiating is called L1 in **Figure 1**. The function of L2 is to act as an impedance transformer that converts the impedance at the centre of L1, the feed point of the antenna, into a value at the other end of L2 suitable for connection to a low impedance line.

The multiband characteristic of the antenna relies on the fact that the impedance at the feed point of any antenna changes with frequency. When he designed his antenna, Louis Varney, G5RV realised that by making L1 equal to three half wavelengths on 14MHz it would present a lowish impedance at its centre. If L2 is a half wavelength on that frequency then the impedance at its other end would be unchanged because a half wavelength of transmission line acts as a one-to-one impedance transformer. Even so, the SWR on the 72 ohm line Varney recommended as Z4 in Figure 1 would be around 3:1. On 7MHz the antenna exhibits a much higher impedance (typically 400 + j1000 ohms for a 2mm diameter wire 10m above the ground), while L2 is now a quarter wave transformer. A special feature of a quarter wavelength transmission line is its ability to turn high impedances into low values, and vice versa. Thus L2 transforms the high impedance at the antenna into some value more appropriate for connection to the low impedance transmission line Z4. However the match is still far from perfect and this turns out to be true on almost all the amateur bands. The G5RV only produces a good match on part of the 20 metre band and fortuitously, since those were pre-WARC days, on 12 metres too, as it turns out. The best match occurs beyond the limits of all the other bands when connected to 72 ohm line and a good match only occurs on 12 metres alone when L2 is connected to 50 ohm line. Since the transmitters in the 1950s

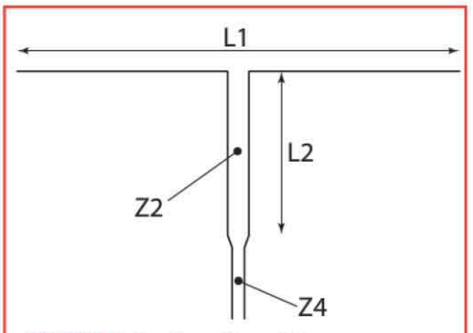

FIGURE 1: Configuration of the G5RV/ZS6BKW antenna.

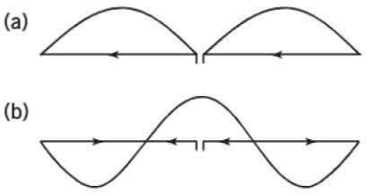

FIGURE 2: Current distribution on two centre-fed 'long wire' antennas with lengths of (a) one-wavelength and (b) three half-wavelengths.

mostly used pi-couplers at their outputs, and were manually adjusted by their operators, this did not present a problem because a suitable match for the valve amplifiers could usually be achieved on all bands. Another factor was that the SWR meter hadn't yet assumed the status it has today so the tune-up procedure was rather different. Despite these shortcomings for modern equipment, which expects to 'see' an SWR of better than 2:1, the general concept behind the G5RV antenna is sound and it was certainly original. Having recognised its potential I was prompted to see if I could improve things.

The challenge I set myself more than thirty years ago was to use the G5RV principle to produce a better than 2:1 SWR on as many bands as possible. Since I started this work before the general availability of any computer-based scheme to analyse antennas, I developed my own optimisation routine with the software all written in BASIC. The process was greatly helped by using the Smith chart to help visualise what was going on. One immediate advantage of doing this was that it revealed the importance of the characteristic impedance of the matching section L2. It is all described in a paper I published in a professional journal **[1]**. In his original article **[2]** Varney merely referred to L2 being an open-wire line, without any mention of its characteristic impedance, though he did say that 300 ohm ribbon feeder could be substituted for that line, thereby implying that 300 ohms was the preferred or, possibly, the most convenient value. My work showed that the optimum value, which I called Z2, actually lies between 350 and 450 ohms.

As one might expect, L1, L2 and Z2 all interact with each other. This allows some flexibility when designing the antenna because there is a range of L1 lengths which will work well with a similar range of L2 values. A very effective combination, as it turned out, is L1 = 28.5m, L2 = 13.4m, and Z2 = 400 ohms. It should be noted that the length of L2 must be reduced by the appropriate velocity factor of the line used. Typically, an open-wire transmission line has a velocity factor in the range of 0.95 to 0.98, whereas for a semi-airspaced line it is usually between 0.8 and 0.95, depending on the size of the air-spaced sections. This is all described in the RSGB *Radio Communication Handbook*. It is most important to note that the ZS6BKW must be fed with 50 ohm coax (preferably via a 1:1 balun) at the lower end of L2.

Horizontal antennas and inverted Vs

The ZS6BKW, just as was the case with the G5RV, was intended to be erected as a horizontal dipole. However, it will still produce a good impedance match on those same five bands when supported at its centre by a just a single pole. This, of course, turns it into the very popular inverted V configuration. The apex angle of the inverted V should not be less than 90 degrees because bringing the two legs of the antenna close together obviously affects both its impedance and, perhaps even more importantly, its radiation characteristics. It's the radiation polar diagram that I propose to concentrate on here.

The multiband characteristic of the G5RV/ZS6BKW comes about because of the changing distribution of current along the two legs of the dipole as the frequency is changed. Both the positions of the current peaks and troughs, and their relative phases, change from one part of the antenna to another. This is illustrated in **Figure 2** showing, as examples, the currents when the antenna has a length of one wavelength and one-and-a half wavelengths.

Based on the principle described earlier, it's as if the antenna automatically adjusts itself from band to band to present the appropriate impedance at the feed point. But this doesn't happen by chance. As we have seen, Varney recognised the advantage of making L1 three-half wavelengths on 20m with L2 equal to a half wavelength. The fact that the amateur bands at that time were all approximately harmonically-related was the key point because it meant that the matching section, L2, would therefore transform the feed point impedances of L1 to appropriate values at its other end. But we should be aware that this changing current distribution along the wire also causes the antenna's radiation patterns to change from band to band, a fact that Varney made clear. Reference to Figure 2 again will confirm that the number of almost sinusoidal current loops along the antenna changes as the antenna length, measured in wavelengths, changes. Then, following on from this, **Figure 3** shows that the more current loops there are along the wire the more lobes there are in the radiation pattern. In addition, the directions in which those lobes point will change with the current distribution and, hence, also with frequency. Though the ZS6BKW (and the G5RV too, if an ATU is used) are both capable of producing an acceptable impedance match (and hence SWR) on a number of amateur bands, the radiation pattern is by no means constant from band to band. In view of the crucial part played by the current magnitude and phase in determining an antenna's characteristics it should therefore come as no surprise that the radiation polar diagrams of the G5RV/ZS6BKW are significantly different, from one band to another, but what may not be so obvious is that when the antenna is erected as an inverted V those patterns differ markedly from when it is horizontal. This aspect of the G5RV's performance has not been given much attention other than in G0KYA's blog of 2009 **[3]**. There he discussed the degraded radiation patterns of the G5RV when it is erected as an inverted V compared with the horizontal antenna.

In what follows, and purely in the interests of conciseness, I shall refer to the antenna as the G5RV but it should be understood that all the effects described apply equally to the ZS6BKW.

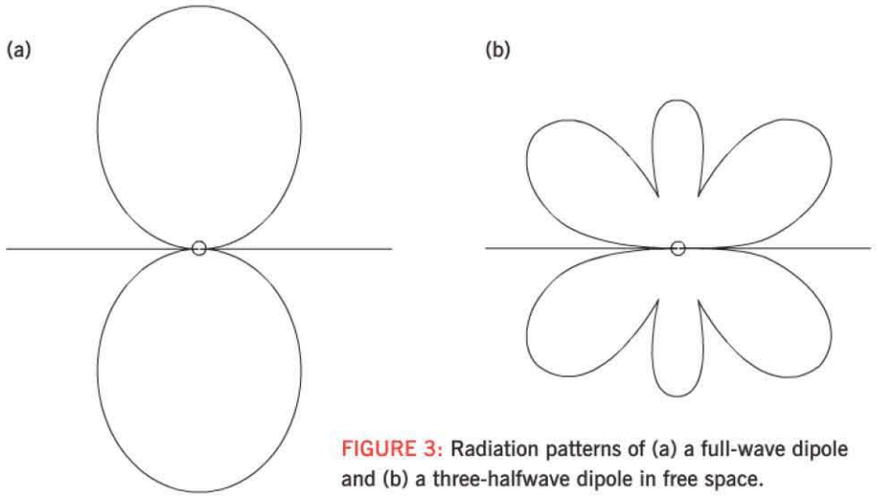

FIGURE 3: Radiation patterns of (a) a full-wave dipole and (b) a three-halfwave dipole in free space.

Antenna currents and radiation patterns

The way any antenna radiates electromagnetic energy is all to do with how the current is distributed within its conductors. For any length of wire the current that flows along an antenna has to satisfy what are known as boundary conditions. First and foremost of these is that no current can exist at the open end of a length of wire – for obvious reasons. But from there back to the feedpoint the current changes, rising and perhaps falling, depending on the length of the conductor and on the frequency. It reaches its first peak exactly one quarter of a wavelength from the end of the wire and then falls (approximately sinusoidally) till it reaches its lowest value at one half wavelength from the wire's end. Depending on the length of the antenna and the frequency at which the transmitter is operating, there could well be a number of current peaks (and also the corresponding troughs where the current falls to its minimum value). This situation is shown clearly in Figure 2. What may not be quite as evident in that diagram is the *phase* of the current. Phase is closely related to time and it therefore indicates when events happen. In this case the phase of the current tells us when, and particularly in

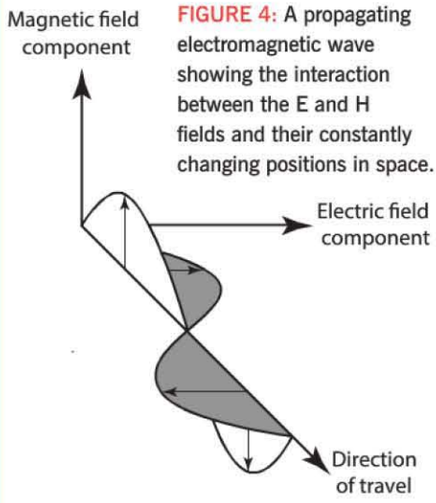

FIGURE 4: A propagating electromagnetic wave showing the interaction between the E and H fields and their constantly changing positions in space.

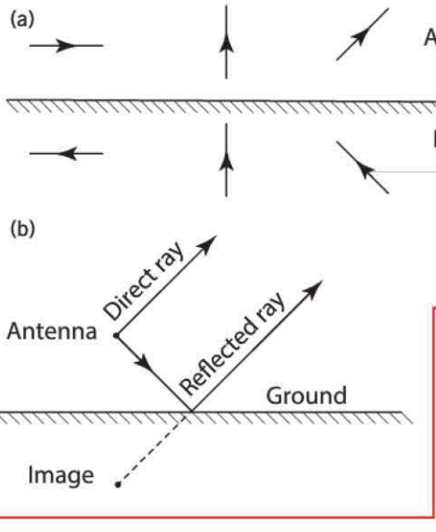

FIGURE 5: Boundary conditions for (a) horizontal, vertical and inclined antennas, and (b) direct and reflected rays showing the effect of the antenna's image.

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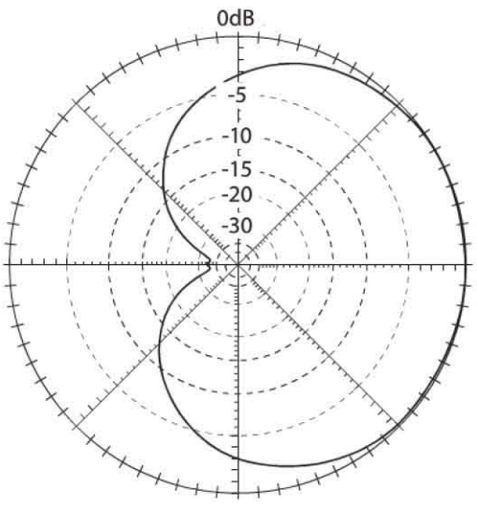

FIGURE 6: Cardioid pattern produced by two radiating antennas spaced λ/4 apart and fed 90 degrees out-of-phase.

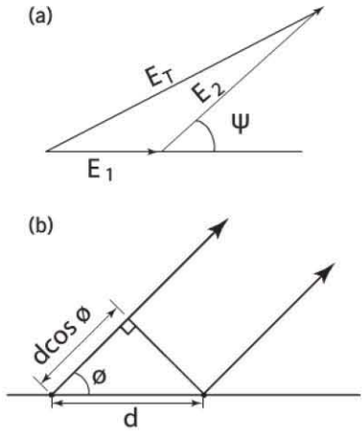

FIGURE 7: (a) The phasor addition of two fields E_1 and E_2 with phase-shift Ψ between them; (b) A two-element array of non-directional radiators showing the phase lag between them as the angle ∅ changes.

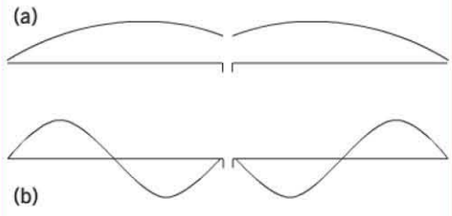

FIGURE 8: Currents on the G5RV at: (a) 7MHz and (b) 21MHz, showing the changes of current distribution between the two frequencies.

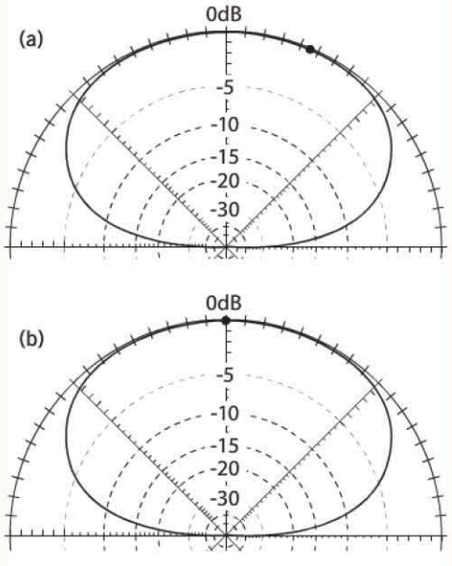

FIGURE 9: Normalised gain in elevation of G5RV 10m above real ground at 7MHz: (a) horizontal and (b) inverted V. The dot indicates the direction of maximum gain.

what position along the antenna, the current goes through its maxima and minima and whether those points are positive or negative relative to each other. Looking at Figure 2b, it's customary to assume that points above the line are positive while those below it are negative but we're not dealing with DC so it's rather more meaningful (and useful) to think in terms of phase measured in degrees, just as in angles. A complete cycle from start to finish implies rotation through 360 degrees. It turns out, in the context of radio waves and the antennas that produce them, that 360 degrees of phase rotation represents one wavelength. Therefore a half wavelength is 180 degrees, a quarter wave 90 degrees, and so on.

Now the fact that the phase of the current along an antenna changes by 180 degrees in every half wavelength means, in reality, that the electric E and magnetic H fields produced by the current must change their phases, or relative positions, by the same amount too. This is shown, in **Figure 4**, as the well-known representation of a propagating electromagnetic wave where the E and H fields are shown to change their relative orientations as the wave moves progressively along its path.

It should now become clear that if the current flowing along an antenna exhibits significant changes in both amplitude and phase along its length then the fields produced respond similarly. In addition, those fields interact with each other as they propagate away from the antenna at the speed of light. In some directions the fields add together, producing a maximum or peak in field strength; in others they might cancel one another out (owing to a phase difference between them of 180 degrees, perhaps). It's this interaction that causes the radiation patterns with lobes (or maxima) in some directions and nulls (or minima) in others. This interaction between the fields is described, formally, as 'interference' and it can be either constructive or destructive. It's the constructive variety that produces the peaks (maxima) in an antenna's radiation pattern while the nulls result from destructive interference between the fields. All wave action in a whole host of physical systems, whether it be the oceans of the planet or the interaction between atomic particles, follows exactly the same set of rules. And because the G5RV has a complicated distribution of current along its length as the frequency changes, so then must its radiation pattern change as we move from band to band.

The ground and images

All antennas are mounted on or above something. Most find themselves above the ground, whether on high towers, on motor vehicles or even on the back of a soldier yomping across some rugged terrain somewhere. Antennas are also to be found – in considerable numbers in some cases – on aircraft, spacecraft and, of course, in this day and age in every handheld device that communicates (rather magically, to some) via the 'airwaves'. In every case the antenna sees an image of itself in whatever constitutes the ground beneath it. Just as with optical images, such as one sees in a mirror, so the image exactly mimics the object while, once again, satisfying some boundary conditions. In the case of an antenna mounted above the surface of the earth the boundary is clearly that between the free space in which the antenna resides and the ground beneath it that, just to complicate matters, may well also absorb some of the energy and convert it into heat. In this case the ground is considered to be lossy. Ideally, we tend to think of the ground plane as a perfect conductor since that simplifies the mathematics considerably. It so happens that typical geological substances, like the ground itself, do behave as fairly good conductors, especially at the lower frequencies. Therefore, in much of what follows, I'll treat the ground as a perfect conductor.

As we see in **Figure 5**, horizontal and vertical antennas have quite different images, not only in their orientation but particularly in terms of the phase or direction of their respective currents. To satisfy the boundary conditions the phases are reversed in the horizontal antenna case whereas, generally speaking, they are the same for the vertical antenna. An inclined or sloping antenna,

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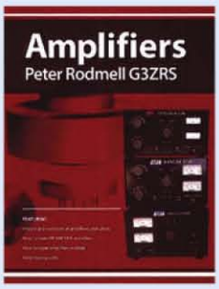

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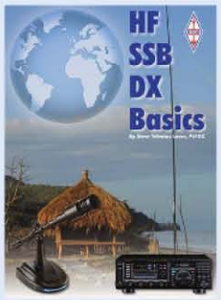

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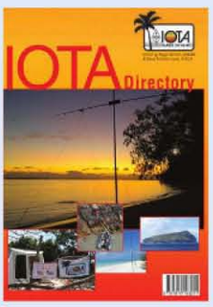

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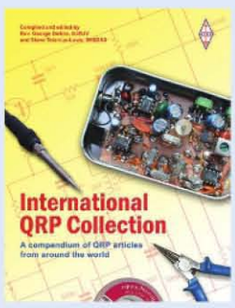

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Compiled and edited by Rev. George Dobbs, G3RJV and Steve Telenius-Lowe, 9M6DXX

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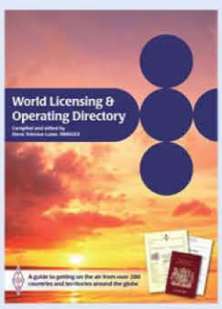

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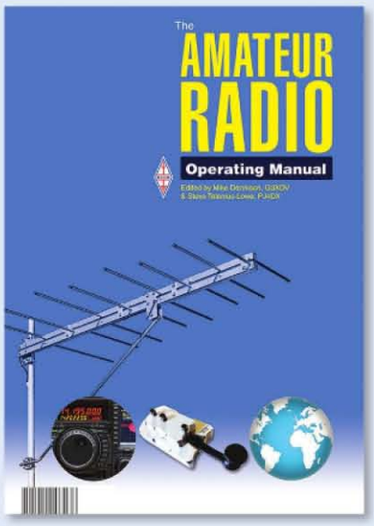

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8th Edition

By Mike Dennison, G3XDV and Steve Telenius-Lowe, PJ4DX

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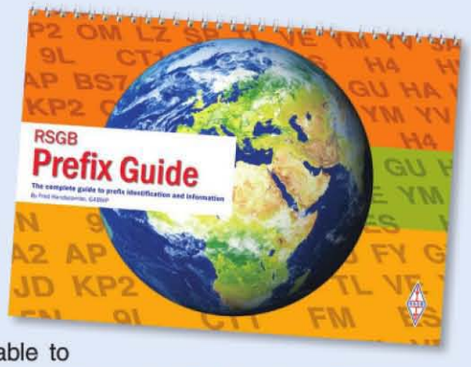
12th Edition



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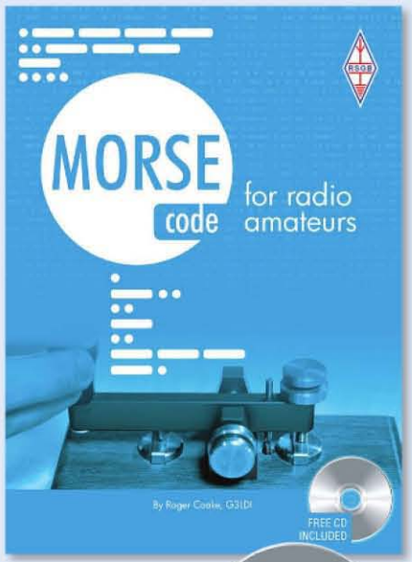

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such as the inverted V, will produce both horizontal and vertical fields but the vertical components, caused by the two halves of the antenna, are out-of-phase and so they tend to cancel, leaving just the in-phase horizontal components to radiate. The phase relationships between the currents within the conductors of an antenna, as well as those between the antenna and its image, have a profound effect on the radiation pattern. The mere existence of the ground beneath an antenna implies that there will be an image of the antenna, at an equal distance below the surface to that of the antenna above it. Therefore, all antennas are actually arrays of two antennas: one element of the array being the antenna, the other being its image.

Antenna arrays

It may come as a surprise to some to discover that their simple half wave dipole, hanging between two trees, is in fact an array – but it certainly is and its performance depends very much on its image as well as on the dipole itself. Figure 5b shows this in a different way. All downward-directed radiation from an antenna will be reflected by the ground as if that reflected component came from the image. The orientation of the antenna, ie horizontal, vertical or somewhere in between, will determine the phase of the reflected signal and this will affect how the direct and reflected waves 'interfere' to produce the final, combined, radiation of the antenna array. The process is no different whether the antenna is as simple as a dipole above the ground or if it consists of many elements, either fed directly as in broadcast transmitting arrays, or coupled together parasitically as in a Yagi. The principle is exactly the same.

Consider a two-element array with the elements parallel to one another and both fed with currents of equal amplitude. Assume they are spaced a distance *d* apart. The total field radiated by the array is $E_T = E_1 + E_2$, where E_1 and E_2 are the fields of the individual elements of the array, or as we've just seen, the fields of an antenna and its image. Since the three field terms in that expression have both magnitude and phase we call them phasors, which are similar to vectors that have amplitude and direction. Hence, when the fields E_1 and E_2 combine they do so 'vectorially' taking account of both their relative magnitudes and phases. It should now be obvious that by controlling either the amplitudes of the fields, or their phases, or both, it should be possible to produce some resulting field that has a particular amplitude and direction in space. This is the basis of all directional antennas. A simple example that will illustrate this consists of two elements carrying currents

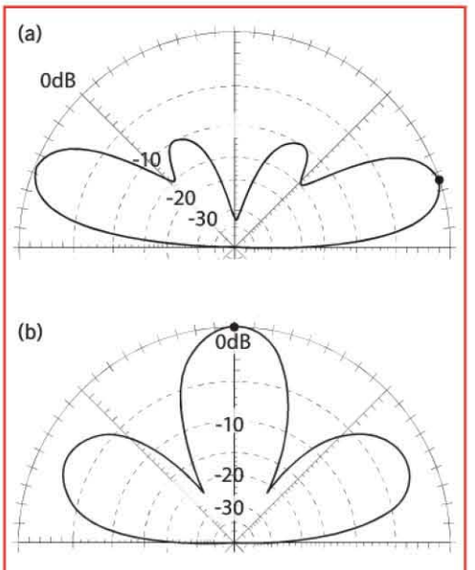

FIGURE 10: **Normalised gain in elevation of the G5RV 10m above real ground at 21MHz: (a) horizontal and (b) inverted V. The dot indicates the direction of maximum gain.**

of equal amplitude but 90 degrees apart in phase. Thus, the current in one element either leads or lags that in the other by 90 degrees. If the distance between the elements is a quarter of a wavelength (or 90 electrical degrees, as we saw earlier) the total phase shift that results when the field from one element interferes with that from the other will be either zero degrees (ie 90° - 90°), after travelling in one direction, or 180 degrees (ie 90° + 90°) after travelling in the opposite direction. Thus the individual fields will combine to produce a maximum in one direction and a null or minimum in the other. The resulting radiation pattern is actually heart-shaped so it's called a cardioid pattern and is shown in **Figure 6**.

Rather than using words and waving one's hands about, it is often far easier to describe what is going on by using mathematical equations.

As above we write: $E_T = E_1 + E_2$ (1)

or $E_T = E_1\left(1 + ke^{j\psi}\right)$ (2)

While this might look formidable it's actually fairly simple to appreciate what it means. k is merely the ratio of the amplitudes of the currents in the two elements and since it's those currents that produce the fields we can relate E_1 to E_2 by that ratio k. Since the currents are equal in this example, k is simply one. The rather strange $e^{j\psi}$ term indicates how E_2 rotates relative to E_1 as the angle ψ changes. This is illustrated in **Figure 7a**. The resultant field E_T is clearly seen to be the phasor sum of E_1 and E_2.

The crucial term is ψ, which is the total phase-shift between E_1 and E_2 caused by any difference in phase between their currents (which we will call α) and by the distance between them d. This total phase-shift is then given by

$$\psi = \frac{2\pi}{\lambda} d\cos\phi + \alpha \quad (3)$$

where $\frac{2\pi}{\lambda}$ is the phase-shift factor and simply indicates that the phase changes by 2π radians (or 360 degrees) for each wavelength λ travelled, as was made clear earlier on. The term $d\cos\phi$ describes the distance, in any direction defined by the angle ϕ measured with respect to the axis of the array that the field radiated by one element has to travel in order to be in phase with that radiated by the other element. This is shown in **Figure 7b**. By substituting (3) into (2) and solving for the magnitude of the ratio of the total field to the field produced by just one element we end with the following expression where the two vertical lines is mathematical shorthand for the magnitude of the quantity involved. Thus, after some mathematical manipulation, we end up with

$$\left|\frac{E_T}{E_1}\right| = \sqrt{2}\left[1+\cos\psi\right]^{1/2} \quad (4)$$

From this equation it is possible to calculate the radiation pattern of the array for any angle ϕ measured relative to the axis of the array.

A numerical example

To show how this works consider the example of the two-element array, discussed earlier, with $d = \frac{\lambda}{4}$ and with the elements fed 90 degrees out of phase. The currents are equal in amplitude therefore $k = 1$. Let's examine the two significant directions (along the axis of the array), ie when ϕ is either zero or 180 degrees. These will give us the fields to the right and left of this two-element array. On substituting $d = \frac{\lambda}{4}$ and $\alpha = +\frac{\pi}{2}$, $\phi = 0$, we obtain (from equation (3))

$\psi = \frac{2\pi}{\lambda}\frac{\lambda}{4} + \frac{\pi}{2} = \pi$. Thus equation (4) gives

$$\left|\frac{E_T}{E_1}\right| = \sqrt{2}\left[1+\cos\pi\right]^{1/2} = 0.$$

In other words there is no radiation in the $\phi = 0$ direction. On the other hand, when

$\varnothing$ = 180 degrees, and after following the same procedure, we find that the total phase-shift ψ is zero and therefore the field strength in that direction is doubled. Clearly, this two element array has a very deep null off one end while the field strength is doubled (increased by 6dB) in the opposite direction. If the phasing of the currents in the two elements were changed to

$\alpha = -\frac{\pi}{2}$, the beam direction swaps around and its maximum and minimum are reversed. Using equation (4) it is possible to calculate and plot the complete cardioid pattern, as was shown in Figure 6.

This is an example of what is called a phased array antenna where the direction of radiation can be controlled simply by changing the phase angle of the currents in the elements.

From these examples it will be obvious that the fields radiated by an antenna are dependent upon a number of separate factors. The first is the current in its elements; second, the spacing or distance between those elements and third, the phase relationship between the currents in the elements. Changing any of them will cause the radiation pattern to change. Therefore simply raising or lowering a dipole will alter its pattern because the distance between the antenna and its image has been changed. It's for this reason that the optimum height of a horizontal dipole intended for near vertical incidence skywave (NVIS) operation is easily shown, by using the equations above, to be no higher than a quarter of a wavelength.

If the antenna is able to operate on more than one frequency, either by virtue of its being a multiband antenna, or because it is used in conjunction with an ATU, then it should now also be clear that its radiating properties might be rather different from one band to the next for the simple reason that any or all of the factors mentioned may well change from band to band. This is most certainly the case with the G5RV and particularly if the G5RV is erected as an inverted V.

Radiation patterns of the G5RV

These days, with the availability of a number of computer programs (almost all are based on NEC, the Numerical Electromagnetics Code developed by the Lawrence Livermore National Laboratories in the USA) for analysing the behaviour of wire and rod-type antennas, it is easy to plot antenna radiation patterns for virtually any antenna configuration. If one does this for the G5RV, both when erected as a horizontal dipole or as an inverted V, it is soon apparent that their radiation patterns are markedly different. And this is especially so when the antenna is close to the ground because of the interaction that takes place between the current-carrying elements within the antenna and those making up its image. The array theory outlined previously can explain all of this but it is by no means straightforward to use when the sources of radiation within the antenna (the current peaks) are displaced both horizontally and vertically from each other, as in the case of the inverted V. The situation is even more complicated when the images are included as well. To illustrate all this I used the EZNEC® program to compute the currents and hence the radiation patterns for the G5RV above real ground.

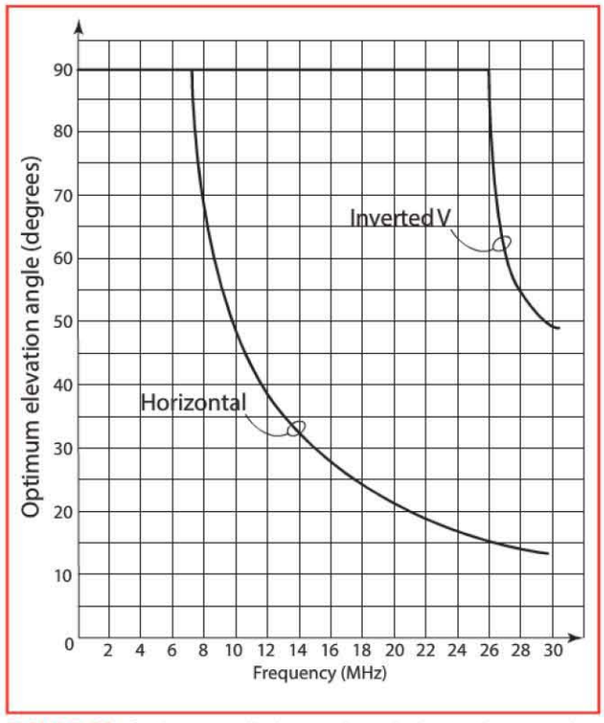

FIGURE 11: **Optimum radiation angles relative to the ground across the HF band of the G5RV/ZS6BKW when erected as an inverted V (upper graph) and as a horizontal antenna (lower graph), at a height of 10m.**

Figure 8 shows the currents for the horizontal G5RV at 7MHz and 21MHz. These two frequencies were chosen because they illustrate most strikingly how both the current amplitude and its phase change with frequency. From the explanation just given we would therefore expect to see the radiation pattern change from one frequency to the other. And this effect is clearly evident at all frequencies across the HF band.

Figure 9 and **Figure 10** show the patterns of the flat top and inverted V forms of the antenna at those two frequencies. In all the cases shown the antenna has its highest point 10m above typical real ground of conductivity 5mS/m and relative permittivity of 13. In the diagrams the antenna is viewed 'end-on' in the direction of the wire. Whereas the patterns are very similar at 7MHz it is clear that at the higher frequency they are markedly different. The gain has been 'normalised' relative to its maximum value in each case so that they can easily be compared.

At 7MHz each leg of the antenna is about a third of a wavelength long, therefore there will be two current maxima a quarter wavelength from each end and the two currents have the same phase. At 21MHz, however, the situation is very different. Now each leg of the antenna is just about a wavelength long, which means there will be two current maxima per side that are 180 degrees out-of-phase with each other. Thus, across the complete antenna there will be four points at which the current reaches its maximum value, two of which are in-phase and two out-of-phase. Naturally, from what we've seen above, we would expect the radiation patterns of the G5RV on 7 and 21MHz will be very different too. And we have also to include the effects of the images as well!

On 7MHz the two in-phase current maxima produce fields that combine, both with each other and with those from their images, to produce the maximum radiated field broadside to the antenna and directed towards the zenith. This is ideal for NVIS operation which seldom occurs at frequencies much above 7MHz. This maximum field strength increases as the antenna is raised from just above perfect ground level up to λ/4. The maximum occurs at a slightly lower height when the antenna is above real ground. The pattern from the horizontal antenna then begins to flatten with maximum gain occurring, a few degrees off the zenith, as is seen in Figure 9a. The inverted V always produces its maximum radiation towards the zenith at that height, as indicated in Figure 9b.

On 21MHz, it is clear from the current distribution along the horizontal antenna that the left-to-right symmetry between the current, in terms of amplitudes and phase, will cause complete cancellation of the field along the bisector of the wire. Therefore, the horizontal antenna has a very deep null at right angles to the wire. This is shown convincingly in Figure 10(a). By contrast, the pattern of the inverted V is very different: as shown in in Figure 10b the major lobe actually points towards the zenith with two minor lobes occurring at a lower angle. Since

21MHz is never used for NVIS, because it lies well above the critical frequency of the ionosphere, the very high-angle lobe simply represents a significant waste of energy as it penetrates the ionosphere and is lost in space.

Comparative performance

Since it is now apparent that the G5RV when erected as an inverted V is far from ideal at 21MHz it's useful to compare the performance of the horizontal and inverted V antenna configurations across the HF spectrum. **Figure 11** shows the results of an EZNEC® simulation of the optimum radiation angle, measured with respect to the ground, for both the horizontal antenna and its inverted V equivalent when the highest points of both is 10m above the ground. The included angle of the inverted V is 120 degrees. The type of ground, whether real or perfect, causes just a slight difference between these results.

It is clear that the inverted V antenna is seriously compromised for DX operation on all bands except, perhaps, on 10 metres. On all frequencies below 28MHz the antenna radiates most of the energy straight upwards. On the 10 metre band the optimum radiation angle is closer to 50 degrees but even that is far too high to be useful for working DX. By contrast, the horizontal antenna will perform well at 7MHz, and below, where NVIS operation predominates, while above that frequency the radiation angle drops smoothly as required for reasonable DX performance. Raising the antenna above 10m would lower the angles somewhat but it would adversely affect its performance as a NVIS radiator on 7MHz, so is probably best avoided.

Some may be tempted to ask about a very common form of inverted V, a resonant halfwave dipole, which is often erected in just this way. It turns out that this monoband antenna exhibits all the right characteristics; individual dipoles, cut to resonate on a particular band, will radiate towards the zenith on 80 and 40m if the feed point of the antenna is not higher than a quarter wavelength above the ground on 7MHz. This makes them ideal for NVIS. Likewise, resonant inverted Vs, cut for the higher frequencies, will produce low-angle radiation once their heights exceed a quarter wavelength, which is fairly easily to achieve at those shorter wavelengths. It's because such monoband inverted V antennas have current of constant phase along their lengths that they do not exhibit the wayward behaviour of the multiband inverted V such as the G5RV and ZS6BKW.

The crucial message contained in all this theory, and the computer simulations that accompanied it, is that the G5RV/ZS6BKW multiband antenna should never be used in an inverted V configuration. This is because of the rather complicated way in which the current in the two legs changes with frequency – both in amplitude and phase – and the resulting interactions of the antenna, now behaving as an array, between one section and another and with their images in the ground. All this leads to a significant waste of radiated energy at high angles of elevation. Multiband antennas, based on the G5RV principle, are therefore best operated as horizontal dipoles rather than as inverted Vs.

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SOS Radio Week continued from page 42

Bob Smith, GW0AYQ watching Louis Martin, 2W0LGG operating GB6BLB.

Stella, G0EKP and Chris, G0EKN working the 2nd HF station on CW at Thurrock Yacht Club.

across Europe and some of the inter-G traffic included pile ups. The club tends to make the weekends a social event as well as a radio one by inviting family members and friends to come along and see what's going on.

The club is already planning next year's participation and would like to thank all those who contacted the station.

John Martin, MW0VTK

Thurrock Acorns ARC

At 8.30am on a Friday morning at the end of January, members of the Thurrock Acorns Amateur Radio Club (TAARC) met at the Thurrock Yacht Club in Grays to set up their stations in the club house to take part in the SOS Radio Week event. The antennas were erected in record time and the stations became operational 9.30am.

This was a joint activity involving TAARC, the yacht club and the Port of Tilbury. The goal was to have fun and at the same time raise some money for the RNLI by speaking to as many of the special event stations as possible as well as other amateurs who may hear the station. The activity is also an opportunity to raise the profile of this worthwhile organisation. The club put three stations on the air – two on HF and one on VHF.

At the end of the day they had spoken to well over 60 different radio stations, some in the UK and some overseas. During the afternoon the group presented £170 to the RNLI local chairman. Sadly, due to the timing of the tides, the lifeboat couldn't visit the Yacht Club so the crew members were unable to see the station in operation.

Members of the radio club are already talking about supporting this worthy cause again next year.

To find out more about Thurrock Acorns Amateur Radio Club, visit their website at www.taarc.co.uk

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HF F-Layer Propagation Predictions for May 2017

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	52.....256	643211123566	455333334565	125544455531	..222222321.	..11111111..	.....	.....
*** Asia								
Yakutsk	.....	21.....112	2211111.1222	...1122.....	.....	.....	.....	.....
Tokyo	.....	.....23..	.....123..	.....11112..	.....	.....	.....	.....
Singapore	.....22.	14431	23311	.....1221..	.....1....	.....	.....	.....
Hyderabad	233	2.....13444	1.....23443	.....1211..	.....1....	.....	.....	.....
Tel Aviv	53.....255	552.....3555	354211234555	.1433334552.	..11111232..	.....1...	.....	.....
*** Oceania								
Wellington	.....	.....	.....	.....	.....	.....	.....	.....
Well (ZL) (LP)	.1.....	242.....232	333.....243	112.....32	.....2.	.....1.	.....	.....
Perth	.....11.	3322	.....122.2	.....	.....	.....	.....	.....
Sydney	.....1..	.....134..	.....2331.	.....1111.	.....	.....	.....	.....
Melbourne (LP)	.....	.13.....	1121.....	..1.....1	.....	.....	.....	.....
Honolulu	.....	.....	..11.....	.....	.....	.....	.....	.....
Honolulu (LP)	.....	.....	.....	.....1...	.....1...	.....1...	.....	.....
W. Samoa	.....	.....	.....	....11.....	.....	.....	.....	.....
*** Africa								
Mauritius	2.....222	2.....3433	13221	.....22...	.....1....	.....	.....	.....
Johanesburg	22.....132	22.....3333	3211	.....12...	.....1....	.....	.....	.....
Ibadan	553.....355	5542....2455	52531.113555	..5421224552	..14111345..	...1...133..	.....1...	.....
Nairobi	33.....233	44.....2444	242.....3444	..311..2444.	....2..132..	.....1...	.....	.....
Canary Isles	664.....256	66531...2466	666532234566	224532335664	..2543555631	..122222562.	...11111221.	.....12..
*** S. America								
Buenos Aires	221.....1	433.....24	223.....133	..1.....232	.....21.	.....1..	.....	.....
Rio de Janeiro	33.....13	443.....355	331.....454	442	.....132.	.....12..	.....1..	.....
Lima	222.....1	333.....24	2121.....33	21	.....	.....	.....	.....
Caracas	332.....3	4432.....24	11321.....34	....1....131	.....2..	.....	.....	.....
*** N. America								
Guatemala	222.....	3331.....3	2121.....13	11	.....	.....	.....	.....
New Orleans	232.....	3331.....1	1.....2	.....1.	.....	.....	.....	.....
Washington	4431.....1	45431.....13	21..21.11123	2111121	.....	.....	.....	.....
Quebec	343.....1	3431.....12	11.....1123	.....1.22.	.....	.....	.....	.....
Anchorage	.....	.....	..1.....	.....	.....	.....	.....	.....
Vancouver	.....	..1.....	.....	.....	.....	.....	.....	.....
San Francisco	.....	122.....	.11.....	.....	.....	.....	.....	.....
San Fran (LP)	.....	.....	.....	.....	.....	.....	.....	.....

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 May, June & July are respectively (SIDC classical method – Waldmeier's standard) 21, 20 & 20 and (combined method) 28, 29 & 30. The provisional mean sunspot number for March was 1707. The daily maximum / minimum numbers were 66 on 31 March and 0 on 4 & 6-20 March.

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 June issue is 27 April and for July it's 25 May. For GB2RS, the deadline is 10am on the Thursday of the week of broadcast.

CLUB EVENTS CALENDAR

INTERNATIONAL

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

International Federation of Railway Radio Amateurs. (FIRAC) www.firac.org.uk
Nets Sunday 14.320MHz at 0830UTC April-September, Wednesday 1430UTC 21.3MHz g4gnq@hotmail.co.uk

NATIONAL

Amateur Radio Caravan and Camping Club membership@arcc.org.uk, www.arcc.org.uk
Caravan Rallies May: Chatsworth House, Brixworth Northants, Rhayader Powys

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

British Railways Amateur Radio Society m0zaa@brars.info, www.brars.info
Net Friday 1600 on 3.685MHz

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

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

REGION 1: SCOTLAND SOUTH & WESTERN ISLES

Regional Manager: Marcus Hazel-Mcgown, MM0ZIF, RM1@rsgb.org.uk

Ayr ARG
Charlie, MM0GNS, 01563 551 704
12 Software around the station, Allan, GM3MWX
26 Pirate radio stations, Bob Donnelly

Cockenzie & Port Seton ARC
Bob, GM4UYZ, 01875 811 723
5 Normal club night
12 First 144MHz DF hunt, Co-Op car park, 6.30pm

Lothians RS
Mike, MM0MLB, secretary@lothiansradiosociety.com
10, 24 Club night/DF hunt, Peter, GM4DTH

Stirling & District ARS
Lyndsay, MM6KEO, 07786 885 566
4, 11, 18, 25 General amateur radio shenanigans

West of Scotland (Glasgow) ARS
wosars@gmail.com
5, 12, 19, 28 Club night, 8pm

Wigtownshire ARC
Lance, 2M0HEO, lancedavisedmonds@gmail.com
4, 11 18, 25 Club night

REGION 2: SCOTLAND NORTH & NORTHERN ISLES

Regional Manager: Denny Morrson, GM1BAN RM2@rsgb.org.uk

Aberdeen ARS
Fred, GM3ALZ, 01975 651 365
4 Junk sale
11 How did I get here? Fred, GM3ALZ
18 Antenna maintenance evening
25 Construction & on the air

Dundee ARC
Martin, 2M0KAU, 0776 370 8933
2, 9, 16, 23 Tuition / club night
30 WAB talk

Moray Firth ARS
Steve, 2M0SKJ, MM6SKJ@yahoo.co.uk
20 Surplus equipment sale, noon

REGION 3: NORTH WEST

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

Bolton Wireless Club
boltonwireless@gmail.com
22 Show and tell evening

Chester & District RS
Bruce, M0CVP, 01244 343 825
2 TX Factor 14
10 (Wednesday) Inter Club Quiz with Wirral & DARC
16, 30 Committee meeting / operating evening
23 Construction competition, judging by M0OBW

Macclesfield & District RS
Greg, M0TXX, Info@gx4mws.com
1, 29 Shack on the air
8, 22 Radio related film/maintenance night
15 How to build a 6m dipole

Mid-Cheshire ARS
Peter, G8HAV, 0791 931 5547
3 Committee meeting
10 SDR systems and demonstration, Colin
17 Glider construction and flying, Martyn
24 Pre-NFD discussion and planning
31 Clear garage roof at club HQ

South Manchester R&CC
Ron, G3SVW, 01619 693 999
4 Model railway control, Alan, M0HYI
11 25 HF operating practice / Morse lessons and practice
18 AGM

Stockport Radio Society
Heather, M6HNS, 0750 690 4422
2 Getting going with microwaves
9 Net, 51.55MHz FM/50.27MHz SSB 7.30pm
11 Club net, 7.30pm, 145.375MHz
16, 23 Radio night / Skills night

Thornton Cleveleys ARS
John, G4FRK, 01253 862 810
1, 29 Closed
8 Natter night / practical / on air
15 HF NFD discussion
22 Digital & video

REGION 4: NORTH EAST

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

Angel of the North ARC
Nancy, G7UUR, 01914 770 036
1, 29 Closed
8 Aerial properties demonstration, G0EVV
15 On the air; Advanced course continues
22 Operating from Cape Wrath, David, G0EVV

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

Colburn & Richmondshire District ARS
Colin, 01748 876 391
11 A cheap receiver: the RTL SDR dongle, G3RLV

Denby Dale RC
Darran, G0BWB, 0797 442 3227
3 Electrostatic, Richard, G4GCX
10 Club net, 8pm, 145.575 FM
14 WAB 7MHz Contest
17, 24 Bring & talk / night on the air
31 Real Ale night at The Star, Lockwood Road

Durham and District ARS
Michael, G7TWX, dadars@dmx.com
3, 10, 17, 24 Club night
4, 11, 18, 25 Club net, 145.425MHz

Hambleton ARS
Tony, G3MAE, 01609 881 530
3 Internet security, Jon, M1CQO
17, 31 Special event program/operating night

Ripon & District ARS
David, G3UNA, 01423 860 778
4, 11, 18, 25 Club night

Sheffield & District Wireless Society
Krystyna, 2E0KSH, 0788 406 5375
3 SETI, Prof S Goodwin
10, 24 Training and social night
17, 31 Awards night / meal out

Sheffield ARC
David, G6DCT, littlewood20@btinternet.com
1, 29 Closed
8, 15, 22 Shack / presentation / club night

Spen Valley ARS
Russell, G0FOI, 01274 875 038
4 Seeing the light, Gordon, G4EWB
18 On the air

REGION 5: WEST MIDLANDS

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

Burton ARC
Mike, 2E0EZG, info@Burton-ARC.co.uk
3, 10, 17, 24, 31 Club night
4, 11, 18, 25 Club net, 8pm, 145.575MHz FM
7, 14, 21, 28 Club net, 10am, 145.575MHz FM

Cheltenham ARA
Derek, G3NKS, 01242 241 099,
2, 9, 16, 23, 30 QRS CW, 3540-3550kHz, 8pm
6-7 Intermediate course, 9am-5pm
7, 14, 21, 28 6m net, 8.30am, 50.220MHz USB

The next Club Calendar deadlines are 27 April and 25 May

16 Lunch, book with G3YJE
18 Auction of Silent Key equipment

Coventry ARS
John, G8SEQ, 0795 877 7363
1, 8, 15, 22, 29 Open net, 8pm, 145.375MHz FM and or 7.16MHz SSB ± QRM
4, 11, 18, 25 Open net, 8pm, 50.175MHz SSB
5 Skittles night, Brandon Social Club
12 Committee forum plus fish & chip supper
19 G4ZMC portable trophy, Sowe common
26 Newcomers' portable challenge

Gloucester AR&ES
Anne, 2E1GKY, 01242 699 595 daytime
1, 29 No meeting, outdoor at Crickley Hill
3, 10, 17, 24, 31 Net, starting on 145.500MHz
4, 11, 18, 25 Club net, 145.550MHz
8 Satellite working, Tim Kirby
15 Construction competition
21 Trip to Bletchley Park
22 Informal evening and general operating

Midland ARS
Norman, G8BHE, 0780 807 8003
3 Review of the London Radio Exhibition
10 Committee meeting; training
17 General meeting, shack on the air, training
24 Discussion on rally visits, social events
31 Open meeting, ragchew and training

Mid-Warwickshire ARS
Don, G4CYG, 01926 424 465
9 Visit to Bletchley Park with M6JIR
23 Video evening with G4CYG and G7RYO

Nuneaton & District ARC
Neil, M0NKE, info@ndarc.co.uk
2, 9, 11 UKAC, 8pm
4, 11, 18, 25 Club net, 145.475MHz, 9.30pm
5 Pint & chat, Harvester, off Hinckley Rd, 7.30pm
19 Digital on the air night, 7.30pm

Rugby ATS
Steve, G8LYB, 01788 578 940
3 Old valve rig day
6 My new antenna'
9, 16, 29 UKAC
20, 23, 30 HF & VHF/digimode on the air
27 GB3ME FM repeater update

Salop ARS
salopamateurradio@gmail.com
2, 9, 16, 23 Club CW net, 4.30pm, 144.07MHz
3, 10, 17, 24 Club net, 8.30pm, GB3LH
4 DF competition: foxhunt #1
11, 19 Natter night / committee meeting
25 Shack night with G3SRT on the air

Solihull ARS
SolihullRadioClub@gmail.com
4, 11, 25 Club net, 145.450MHz, 8pm
13-14 GB2SMP for Mills on the Air
18 Talk on Lowland Rescue

South Birmingham RS
Gemma, M6GKG,
gemmagordon.m6gkg@gmail.com
1, 29 Closed
2, 9, 16, 23, 30 Coffee morning in the shack
4, 11, 18, 25 Training classes with Dave, G8OWL
5, 12 Sorting stock in the shack
15 Arrangements for contests
19, 26 Checking equipment and preparation for contests

Stratford upon Avon & District RS
Clive, G0CHO, 01608 664 488
1, 15, 29 Club net, 145.275MHz FM, 8pm
8 Raspberry Pi / WSPR, Quentin, M0OAE
22 AGM & surplus sale

Sutton Coldfield ARS
Robert Bird, rob2e0zap@gmail.com
1, 15, 29 Open net, 7.30pm, 145.250MHz
7 New Hall Mill event
8, 22 Club meeting
9 Open net, 7.30pm, 70.475MHz FM
23 DMR open net gb7fw slot/local2 from 7.30pm

Tamworth ARS
Richard, 2E0LLE, 0787 521 7124
3, 10, 17, 24, 31 Club net via GB3TA
6, 11, 18 Club night
25 DMR Q&A, Noel, G8NDT of DMRexpert.com

Telford & District ARS
John, M0JZH, 0782 473 7716
3 Committee meeting plus GX3ZME OTA
10 Criggion visit, Rob Pierce
17 One valve super regenerative receivers, G0GTN
24, 31 1st fox hunt / 10 minute topics

Wythall Radio Club
Chris, G0EYO, 0771 041 2819
2, 9, 16, 23, 30 Morse class
2, 16 Club meeting
5, 12, 19, 26 Nibbles night in the shack, 7.30pm
7, 14, 21, 28 Net, 8pm, 145.225MHz or GB3WL
23 Remote operation the cheap way, Lee, G0MTN
29 Curry night
30 A practical loop antenna, Dave, G3YXM

REGION 6: NORTH WALES

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

Dragon ARC
Stewart, GW0ETF, 0783 362 0733
1 10m band & operating, Alun, 2W0CYM
15 Soldering, John, GW3GUX; DF antenna build

North Wales Radio Society
Liz Cabban, GW0ETU, 0776 019 0355
4, 11 General meeting / technical topic
18 Origins & history of NWRS, Tony, GW4PVU
25 Discussion night

Wrexham ARS
Eifion Parry, mw6eyu@gmail.com
2 Numbers talk, Mark, MW0MDH
16 2m SSB, Mike, GW6NLP

REGION 7: SOUTH WALES

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

Aberystwyth & District ARS
Ray, GW7AGG, 01970 611 853
11 Waunfawr Hall fox hunt, Ray, GW7AGG
25 Net on 145.500MHz then 145.550MHz

Barry Amateur Radio Society
Glyn, GW0AWA, glyndxis@talktalk.net
2, 9, 16, 23, 30 Natter and operating night

REGION 8: NORTHERN IRELAND

Regional Manager: Philip Hosey, MI0MSO
RM8@rsgb.org.uk

Mid Ulster ARC
muarc.secretary@yahoo.co.uk
14 SOTA, Victor Mitchell, 3pm, all welcome

REGION 9: LONDON & THAMES VALLEY

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

Bracknell ARC
David, M0XDF, M0XDF@Alphadene.co.uk
3, 17, 24, 31 Open net, 8pm, 145.375MHz
10 Propagation, John Ellerton, G3NCN

Chesham & District ARS
Terry, G0VFW, g0vfw@thirlwell.me.uk
3 Military radios, Don Ross, G4LOO
13-14 Mills on the Air weekend, Brill
17 Datamode demo

Edgware & District RS
Mike, G4RNW, 020 8950 0658
25 Constructors Cup competition

Harwell ARS
John, G6LNU, 01235 223 250
11 Talk by Thames Valley Police Helicopter crewmember

Newbury & District ARS
Rob, G4LMW, 01635 862 737
24 AGM

Reading & District ARC
Laurence, G2DD, 0758 470 6625
11 Emergency communications, Peter Butcher
25 Virtual Radar, Steve Coleman, G4YFB

Shefford & District ARS
John Burnett, john@hobart-europe.co.uk
4 No meeting (hall closed for elections)
18 The magic of 6m, Chris, G4IFX

Southgate ARC
Keith, G8RPA, g8rpa@arrl.net
10 Computer clinic, Keith, G8RPA
13-14 Mills on the Air

Verulam ARC
Greg Beacher, M0PPG, 01582 413 345
11 Social with GB3VH Repeater Group
16 Direction finding

REGION 10: SOUTH & SOUTH EAST

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

Bromley & District ARS
Andy, G4WGZ, 01689 878 089
3, 10, 17, 24, 31 Net, 145.400MHz, 9pm
16 Club meeting
16 Fix-it evening, John, G8MNY

Coulsdon ATS
Andy Briers, G0KZT, secretary@catsradio.org
15 Club night

Crawley ARC
John, G3VLH, 01342 714 402
24 VHF propagation, Mike, G0KAD
4 Basics of contesting, Ed, G3SQX
18 A25UK DXpedition, G0VJG & G4BUO

Crystal Palace R&EC
Bob, G3OOU, 01737 552 170
3, 10, 17, 24, 31 Net, 8pm, 145.525MHz ±

Darenth Valley Radio Society
Mike, G8AXA, 0788 415 7776
10 ROA/natter night
24 Antenna night

Dorking & District RS
David, M6DJB, djb.abraxas@btinternet.com
23 Digimodes demo, 2E0GBK and G3JKV

Dover RC
Aaron, 2E0FQR, 0771 465 4267
4 Planning for club's 50th anniversary

Echelford ARS
John, G4GSC, 01784 451 898
11 Gliwice Tower, Poland, Philip, M1GWZ
25 CW practice, on air, operating and social

Hastings E&RC
Gordon, 01424 431 909
24 View and discuss YouTube AR videos

Horndean & District ARC
Stuart, G0FYX, 02392 472 846
5 Natter night/social evening
19 Shipwrecks of South Coast, Annabel Crawford

Horsham ARC
Alistair G3ZBU, 0785 526 8666
4 Life & amateur radio in France, G8CKT/F8VON
11 Social at The Fountain, Ashurst
18 Fox hunt, Adrian, G4LRP

Mid-Sussex ARS
Dennis, M0YDC, 0747 630 1044
5 Guide Dogs for the Blind
12, 19 Prep for Mills on the Air/On the air
26 How to do NFD logging

Southdown ARS
John, G3DQY, 01424 424 319
3 Hailsham shack, 10.30am; cafe, 12.30pm
8 High voltage engineering, Prof Miller, 8pm
10, 17, 24, 31 Cafe meeting, 12.30pm
20, 21 144MHz contest meeting

Surrey Radio Contact Club
John, G3MCX, 020 8688 3322
4, 11, 18, 25 Net, 70.300MHz, 8pm
5, 12, 19, 26 Net, 145.350MHz 8pm
7, 14, 21, 28 Net, 1905kHz, 9.30am
8 Low cost digital storage 'scopes, G4FDN
22 Chat and fix-it evening, John, G8MNY

Sutton & Cheam RS
John, G0BWV, 0208 644 9945
18 AGM and Constructional Contest

Swindon & District ARC
Jonathan, M0ZGB, m0zgb@sdarc.net
4, 11 Activity night
18 Repeaters, Tony Bettley, G4LDL
25 AGM

West Kent ARS
Keith, G4JED, info@wkars.org.uk
8 Club meeting, all welcome

REGION 11: SOUTH WEST & CHANNEL ISLES

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

Bristol RSGB Group
Shaun, G8VPG, 01225 873 098
22 Practical radio astronomy for amateurs, G4CSD

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

Cornish Radio Amateur Club
Steve, G7VOH, 01209 844 939
3, 4, 18 Committee/ Main meeting/social

Exeter ARS
Nick, M0NRJ, 01363 775 756,
2, 9, 16, 23, 30 Repeater net, 7.45pm, GB3EW
10 Planning for the open evening
24 DMR v D-Star v Fusion discussion

North Bristol ARC
Mat, G7FBD, g7fbd@gb3bs.com
5 Relax and chat evening + operating & training
12, 26 Video / relax and chat / operating
19 Cruising Around part 2, G0XAY

Plymouth Radio Club
David, 2E0DTC, d.beck123@btinternet.com
9 Club night

Saltash & District ARC
Mark, M0WMB, 0781 054 8445
4, 18 Club night, all welcome

South Bristol ARC
Andrew, G7KNA, 0783 869 5471
4 Open source software
11 Mills on the Air briefing
18 DX Challenge
25 Open house and on the air night

Thornbury & South Gloucestershire ARC
Mark, 2E0RKM, 0777 629 2813
3 Club on the air
5, 12, 19, 26 VHF net
10 Vintage technology talk
17, 24, 31 OTA / antenna upgrade / SWL training / M6

Torbay ARS
Dave, G6FSP, g6fsp@tars.org.uk
5, 12, 19 Club night (12th with business meeting)
26 Talk

Weston Super Mare RS
Martin, G7UWI, 01934 613 094
1, 8, 29 Construction, operating & natter night
15 SDR, G1PIB
22 DF hunt

Yeovil ARC
Rodney, M0RGE, 01935 825 791
11 Talk by Rob Mannion, G3XFD
18 Morse practice by G3MYM
25 Station on the air and problem solving

REGION 12: EAST & EAST ANGLIA

Regional Manager: Keith Haynes, G3WRO
RM12@rsgb.org.uk

Braintree & District ARS
Edwin, G0LPO, 01376 324 031
2, 16, 30 Club net, 8pm, 145.375MHz
9 QRP operating / prep for Mills on the Air
23 AGM

Chelmsford ARS
secretary@g0mwt.org.uk
2 Tricks with coax, John Regnault, G4SWX
15 Skills night, Danbury Village Hall

Essex Ham
Pete, M0PSX, news@essexham.co.uk
1, 8, 22, 29 Net GB3DA, 8pm, with chatroom on www.essexham.net
5 Online Foundation course
6 Essex YL net on GB3DA, 8pm

Felixstowe & District ARS
Paul, G4YQC, pjw@btinternet.com
8 Quiz night, G7CIY
14 GB2WTM at Woodbridge Tide Mill
22 Sporadic-E & VHF propagation, Jim, G3YLA

Huntingdonshire ARS
Phil, G7KJW, 01487 832 937
11 Club meeting
13-14 GB2DWM at Duloe Windmill
25 Innards of Enigma and Lorenz

Leiston ARC
John, G4XVE, secretary@larc.org.uk
9 Mini-talks by club members
23 VHF/UHF activity contest

Norfolk ARC
Chris, G0DWV, 01603 898 308,
3 Talk on summer operating, Jim, G3YLA
10 Informal
17 Pictures of the Universe, Paul Money
24 EMC, John, M0JAV, RSGB EMC Chair
31 Informal / Repeater Group AGM / Bright Sparks

Norfolk Coast ARS
Steve, G3PND,
info@norfolkcoastamateurs.co.uk
4 JT65
11 Preparing for Mills on the Air
18 Antenna projects
25 Restoring vintage radios

South Essex ARS
Terry, G1FBW, 0798 607 0040
9 My journey into Amateur Radio, M0PSX

Thames ARG
Patrick, G8JLM, 01621 855 461
5 Ham radio on a shoe string, Tony, G4WIF
6-7, 13-14 Intermediate training
12 Net

REGION 13: EAST MIDLANDS

Regional Manager: Jim Stevenson, G0EJQ
RM13@rsgb.org.uk

Grantham ARC
Kevin, G6SSN, 0779 314 2483
2 Portable operating, David, G6ENN
9, 16, 23, 30 Shack night from 6pm

Hinckley AR&ES
Bob, G8BFF, 0792 876 9767
2 2m UKAC
4 Training and talk

Leicester RS
Sandra, G0MCV, 0793 027 4044
1, 29 Closed
8 Morse class, committee meeting
13 Propagation committee using club rooms
15 Morse class followed by film night
22 WAB squares, Dave, G4IAR

Loughborough & District ARC
Chris, G1ETZ, 01509 504 319
2 Video night, Sony
9 Walking for Health, Lesley
16 Portable 23cm from Markfield
23 Practical evening
30 2m club net

Melton Mowbray ARS
Phil, G4LWB, 01664 567 972
19 Construction contest

RAF Waddington ARC
Bob, G3VCA, 0797 116 6250
1, 8, 15, 22, 29 Club net on 145.325MHz, 8pm
5, 12, 19, 26 Cake night
5 Talk & demo on 3D printing & Arduino, M0ORY
19 Talk by Bob, G3VCA

South Kesteven ARS
Andrew, M0NRD, 0796 906 2859
3, 10, 17, 24, 31 Club net via GB3GR
5 Worked All Britain, Dave, G4IAR
19 Club meeting

Spalding & District ARS
Graham, G8NWC, 0775 461 9701
7 RSGB presentation by Graham, G8NWC
17 Visit to Museum of Technology
19 Members' show and tell, open evening

Welland Valley ARS
Peter, G4XEX, 01858 432 105, g4xex@fsmail.net
1 Club net, 8pm 145.275MHz FM
15 All Star and DMR talk
19 TARGet night

REGION 1: SCOTLAND SOUTH & WESTERN ISLES

West of Scotland Amateur Radio Society (Glasgow) is sad to report the passing of Stan McQueen, GM8MRW. Their thoughts and prayers go out to all of his family. All members will greatly miss him and his weekly quiz.

REGION 3: NORTH WEST

Members of **Furness ARS** had a successful visit to the local commercial airfield on Walney Island, Barrow in Furness. Members had to undergo some prearranged security screening and watch a brief health & safety video before being allowed onto the site. Once on site they were given an explanation of the locator beacons and site layout with a Q&A session. They were then taken into the control tower to watch a plane take off and see the operational procedures and how they use the radio systems; including backup systems and backup of backup systems (handheld transceiver). The main operation is using the standard AM system, but on site security now uses digital (DMR) and a direct radio link to the local fire service. The club thanked the site manager for allowing them to do something not available to the public.

A Thornton Cleveleys ARS project practical evening with soldering irons at the ready with Ted, G3WBB.

REGION 4: NORTH EAST

Angel of the North ARC is now in partnership with **Tyneside ARS**. The club meets every Monday from 7pm (except bank holidays) at Whitehall Road Methodist Church Hall, Bensham, Gateshead NE8 4LH.

Hambleton ARS (Northallerton) would like to congratulate Mac, M0RIE on completing his Foundation, Intermediate and Advanced exams in a 4 month period.

Durham & District ARS have had two students pass their Foundation exam. Adam and Denis, thanks to instructor Tom, M0HYE. This is the first exam held at the new club site of Bowburn Committee Centre.

REGION 6: NORTH WALES

Halkyn Radio Group has a new venue at The Britannia Inn, Pentre Road, Halkyn CH8 8BS. A shack will be active on HF and VHF. The group meets every Wednesday from 8pm with visitors and potential new members very welcome. Contact Bob, GW4KDI on 0784 782 9022 or by email to bobstanton@mail.com

At the recent Wrexham ARS AGM, the following were voted into office: Rob, MW0IAV (Chairman), Mark, MW1MDH (Vice Chairman), Eifion, MW6EYU (Secretary), Vince, GW6ZCS (Treasurer), Mike, GW6NLP (Life President) Malcolm, GW0WZZ (Auditor), Simon, 2W0MLG and Andy, 2W0KMV.

REGION 8: NORTHERN IRELAND

GI4DOH: congratulations to David, MI6IGL and David, 2I0GPQ on their new callsigns.

Bangor & District ARS has a talk on the operation of the club's new transceiver, the Elecraft K3, by Richard (below).

REGION 9: LONDON & THAMES VALLEY

At Verulam ARC's March meeting, the club's new chairman, Alex, M0UKR, said he felt honoured to have been made chairman. In addressing the members he set out his personal objectives of further developing the club's training and educational work, enhancing the facilities of the club's operating cabin and fostering more social activities. This was followed by a screening of the video made by Steve Nichols, G0KYA of the RSGB's Propagation Studies Committee, entitled *Understanding HF Propagation.*

REGION 10: SOUTH & SOUTH EAST

Darenth Valley RS is organising a Foundation licence course for 10 & 17 June, in Sidcup, Kent. The cost of the course including the exam fee is £60. Students wishing to enrol must do so by 28 May. Further details available from www.darenthvalleyrs/training.

The Arthur Redman (G8DUB) Shield is awarded to a Fareham & District ARC member providing outstanding service over the past year. It was presented to Geoff, G4ICD in recognition of his effort in sourcing and distributing the 2016 FDARC Club ATU project and his generous donation of G-Whip antenna prizes for the club raffles. The photo shows G0FOD (right) presenting the Arthur Redman Shield to Geoff, G4ICD.

The Vecta Contest group operated in the 2m/70cm contest from Luccombe Down at 791 feet, the highest point on the Isle of Wight. Weather during the contest meant that caution dictated the use the choice of antennas and masts. This proved wise in the light of squally winds on Sunday that exceeded 60mph. Conditions appeared flat and there seemed to be fewer stations around than last year but all in all an enjoyable contest.

REGION 11: SOUTH WEST & CHANNEL ISLES

Riviera ARC would like to congratulate Roy, M6XDV, Phill, 2E0WZP and Andy, 2E0IVB for passing their Foundation and Intermediate exams respectively.

Torbay ARS will be running a Foundation course over the weekend 12-14 May. Anybody interested in taking part should in the first instance log onto the club website at www.tars.org.uk and have a look at the 'Training Page' for further information. If you are interested, please contact the TARS training team via email at training@tars.org.uk as soon as possible..

Graham G4DPH gave **Thornbury & South Gloucestershire ARC** a really entertaining and technical talk on ARDF. Graham and fellow Weston Club members have invited TSGARC to their next club ARDF event. Thanks to Graham for his time and fascinating array of home made equipment together with numerous stories of eventing.

Weston-super-mare Radio Society members Dave, G4CXQ and Pete, G3TJE were joined by holidaymaker Dave, G3RXP from Grimsby to compete in the Commonwealth Contest. Using the premises of the Marconi Amateur Radio Circle 9H1MRC they managed 528 contacts over the weekend. See page 12 for more of the story.

REGION 12: EAST & EAST ANGLIA

30 years in 30 minutes was the title of this month's presentation at the **Thurrock Acorns ARC**. Nicholas, G4HCK followed the development of the hobby over the years explaining that he had grown up with the hobby as his late father, Edgar, G3NEG, had been an active amateur. Starting with tasks his father had carried out during WWII, the presentation moved on to to explore a 19 radio set. Many of these radios were installed in tanks and the dials glowed in the dark (so they could be seen in the inside of a dark tank). He then looked at other transceivers and explained how they had improved over the years. The presentation then moved into the computer arena and the impact that has had on the hobby. The presentation finished by looking at a RSGB video that encapsulated many of the latest areas that amateurs are getting involved in.

Thames ARG were pleased to welcome Tony, G0JYI (above) who is a tutor and examiner for radio controlled helicopters. He spoke about the legal and technical aspects of the hobby and the presentation was enhanced by a close up look at two machines; one electric and the other with an internal combustion engine.

The focus of activity of **Norfolk Coast ARS** members has been on end fed half wave antennas and the construction of suitable impedance transformers to match on all bands. There was a working lunch following the morning's activity when the performance of the various antennas / un-uns were reviewed by looking at the reports from the Reverse Beacon Network and the data from the antenna analysers.

With three special event stations and a summer camp already scheduled for 2017 Braintree & District ARS set aside an evening to test their equipment (above). With members looking on, Dave, G0DEC checked that the club transceivers were working within specification including power output, waveform of output signal and receiver sensitivity. Thankfully everything was deemed satisfactory and ready for use in the field.

REGION 13: EAST MIDLANDS

Grantham ARC hosted its second rally on 12 March. Again this year was very successful and they would like to thank the traders and customers for their support and hope to see the visitors again next year.

Another successful presentation to the members of **South Kesteven ARS** was given by David, G6ENN. He has held an interest in radio since the mid 1970s and since his first Wainwrights OTA summit during Christmas 2010, David has been performing more portable operations both in the field local to his home base and when following his passion for climbing the Wainwright fells. He has activated 63 WOTA summits thus far. David (right) uses a Yaesu FT-270 (with its superb water protection) and his Yaesu FT-817ND alongside homebrew antennas to operate. Power for the radios is generally supplied by using the internal battery packs of both handheld and the FT-817 but has been supported in non-hill activations by a 10Ah SLAB. SKARS would like to thank David, G6ENN for his presentation and to his wife, Sue, for the excellent WOTA photography.

The next deadlines for Around Your Region are 27 April (June edition) and 25 May (July edition)

Nunsfield House ARG is pleased to announce Harry Hutchinson and David Horner both successfully completed their Foundation exam in March. They are now looking forward to receiving their callsigns and have enrolled themselves onto the Intermediate course. Thanks again to Peter, M0KEF, Ken, G3OCA, Tony, G6MWS and Ken, G0JKC.

Acronyms & abbreviations

Further to comments in The Last Word, this is an early, incomplete draft list of abbreviations and acronyms used in *RadCom*. We plan to expand and migrate it to the RSGB website, where it will be kept up-to-date with new entries as they crop up. Note that not even all abbreviations from this edition are included in this draft. If you would like to contribute to the list, please email radcom@rsgb.org.uk with the subject line Acronyms and format your additions as acronym <tab> expansion, as below.

°C	degree Celsius (degree centigrade)
A	amp (ampere)
AC	alternating current
AF	audio frequency (about 30Hz-20kHz)
AFS	Affiliated Society (contest)
AM	amplitude modulation
AMU	antenna matching unit
APRS	automatic packet reporting system
APSK	amplitude and phase shift keying
ARC	amateur radio club
ARDF	Amateur Radio Direction Finding
ARI	Associazione Radioamatori Italiani
ARRL	American Radio Relay League
ARS	amateur radio society
ATS	amateur transmitting society
ATU	antenna tuning unit
ATV	amateur television
BARTG	British Amateur Radio Teledata Group
BATC	British Amateur Television Club
C	Celsius (centigrade)
CAT	computer-assisted transceiver
cm	centimetre (0.01m)
c/s	cycles per second (Hz)
CQWW	CQ worldwide (contest programme)
CSC	Contest Support Committee
CTCSS	continuous tone coded squelch system
CW	continuous wave (usually Morse code)
DARC	district amateur radio club
DARC	Deutscher Amateur-Radio-Club
DARS	district amateur radio society
DATV	digital amateur television
dB	decibel
DC	direct current
DCC	Data Communications Committee
DCS	digital coded squelch
DDS	direct digital synthesiser
DMR	Digital Mobile Radio
DSP	digital signal processing
D-Star	digital smart technologies for amateur radio
DTMF	dual tone multi frequency (Touch-Tone)
DVB-S	digital video broadcasting – satellite
DVB-S2	digital video broadcasting – satellite, second generation
DX	long distance
DXCC	DX Century Club (award programme)
EF	Réseau des Émetteurs Français
ELF	extremely low frequency (300Hz-3kHz)
EMC	electromagnetic compatibility
EME	earth-moon-earth (Moonbounce)
EQAM	Examination Quality Assurance Manager
ESC	Examination Standards Committee
ESM	Examinations Standards Manager
ETCC	Emerging Technology Co-ordination Committee
EZNEC®	NEC-based antenna modelling software
f	frequency (general)
F	Farad
F	noise factor (note italic F)
FM	frequency modulation
FSTV	fast scan television
ft	foot (about 305mm)
G	giga (multiplier, x 1,000,000,000)
g	gram
GAREC	Global Amateur Radio Emergency Communications Conference
Gb	gigabit
GB	gigabyte
GHz	gigahertz (thousand million cycles/sec)
H	Henry
HF	high frequency (3MHz-30MHz)
HFCC	HF Contest Committee
Hz	hertz (cycles per second)
I	current (A)
I	in-phase part of a complex signal
I/Q	in-phase and quadrature components of a signal
IARU	International Amateur Radio Union
IF	intermediate frequency
in	inch (about 25.4mm)
IOTA	Islands On The Air (awards programme and contest)
ITU	International Telecommunications Union
JARL	Japan Amateur Radio League
K	kelvin (NB: not °K)
k	kilo (multiplier, x 1,000)
kb	kilobit
kB	kilobyte
kc/s	kilocycles per second (kilohertz)
kHz	kilohertz (thousand cycles per second)
LF	low frequency (30kHz to 300kHz)
LO	local oscillator
LSB	least significant bit
LSB	lower sideband
M	mega (multiplier, x 1,000,000)
m	metre
mA	milliamp (0.001A, 1000μA)
Mb	megabit
MB	megabyte
Mc/s	megacycles per second (megahertz)
MF	medium frequency (300kHz to 3MHz)
MHz	megahertz (million cycles per second)
mm	millimetre (0.001m)
MoD	Ministry of Defence
MSB	most significant bit
n	nano (multiplier, x 0.000,000,001)
NEC	Numerical Electromagnetics Code
NF	noise figure
NFD	National Field Day
NRRL	Norsk Radio Relæ Liga
NVIS	near vertical incidence skywave
NZART	New Zealand Association of Radio Transmitters
ODX	longest distance (best DX)
OQRS	online QSL request
OTA	on the air
p	pico (multiplier, x 0.000,000,000,001)
PM	phase modulation
Q	quadrature part of a complex signal
Q	quality factor
QAM	quadrature amplitude modulation
QPSK	quadrature phase shift keying
QRA	callsign
QRM	interference from artificial sources
QRN	interference from natural sources
QRO	high power
QRP	low power (usually ≤5W)
QRPp	extremely low power (usually under 1W)
QRS	slow Morse code
QRSs	extremely slow Morse code
QRT	cease operating
QRV	(ready to) operate
QRX	wait
QRZ	who is calling me?
QSB	fading
QSK	listening or interrupting between transmissions (either overs or dits)
QSL	confirmation of contact
QSO	communication
QSO	contact (conversation) via radio
QST	general call to all stations (also, ARRL monthly magazine)
QSY	change frequency
QTH	position (eg address)
QTHR	'registered' QTH (eg as listed in callbook)
RAC	Radio Amateurs of Canada
RadCom	RSGB monthly magazine for Members
RBN	reverse beacon network
RBTV	reduced bandwidth television
RC	radio club
RCF	Radio Communications Foundation
RF	radio frequency
RSGB	Radio Society of Great Britain
RST	readability, signal, tone
RTTY	radio teletype
Rx	receive (or receiver)
s	second
S	siemens (unit of conductance)
SCART	Syndicat des Constructeurs d'Appareils Radiorécepteurs et Téléviseurs
SCC	special contest callsign
SK	silent key (implying the person is dead)
SNR	signal to noise ratio
SO2R	single operator two radios
SO2V	single operator two VFOs
SOTA	Summits On The Air (awards programme)
SSTV	slow scan television
SWR	standing wave ratio
T	tera (multiplier, x 1,000,000,000,000)
TCXO	temperature controlled crystal oscillator
Tx	transmit (or transmitter)
μ	micro (multiplier, x 0.000,001)
μA	microamp (0.000,001A)
UBA	Royal Union of Belgian Radio Amateurs
UHF	ultra high frequency (300MHz-3GHz)
UKAC	UK Activity Contest
UKuG	United Kingdom Microwave Group
USB	Universal Serial Bus
USB	upper sideband, or
V	volt
VERON	Vereniging voor Experimenteel Radio Onderzoek Nederland
VFO	variable frequency oscillator
VHF	very high frequency (30MHz-300MHz)
VHFCC	VHF Contest Committee
VLF	very low frequency (3kHz-30kHz)
VOX	voice operated switch
W	watt
WAB	Worked All Britain (award programme)
WAC	Worked All Continents (award programme)
WARC	World Administrative Radio Congress
WAZ	Worked All Zones (award programme)
WIA	Wireless Institute of Australia
WRC	World Radiocommunication Conference
WSPR	Weak Signal Propagation Reporter
xcvr	transceiver
XYL	ex YL (wife)
yd	yard (about 0.914m)
YL	young lady

Common symbols and their usual meanings

~	approximately (or almost) equal to
≈	approximately (or almost) equal to
≠	not equal to
≡	identical to (or, in logic expressions, iff)
±	plus or minus
Δ	difference (among other meanings)
≤	less than or equal to
≥	greater than or equal to
°	degree (eg temperature or angle)
μ	micro (multiplier, x 0.000,001)
∞	infinity (or infinite)
λ	wavelength
π	pi (3.14159…)
ω	frequency in radians, equal to 2 x π x (frequency in Hz)
Ω	ohm

Club of the year

1st place small club winners

JOTA involved six Northern Ireland Scout troops for a weekend of radio activity.

The six clubs that won the 1st to 3rd placing in the Large and Small Club categories, presented at last year's National Hamfest, all showed the judges just what it takes to make a club shine. Here's the story of the 1st placed Small Club.

Greenisland Electronics Amateur Radio Society is based in Newtownabbey, Northern Ireland. It was formed in 1995 as Glengormley Electronics & Amateur Radio Society. After moving from the town of Glengormley to Greenisland they changed their name to Greenisland Electronics & Amateur Radio Society – GEARS. There is a great emphasis on sharing information and working as a team to help broaden their knowledge and enthusiasm for radio and electronics.

Exam courses and exams

In 2015 they ran seven exams – three Foundation, three Intermediate and one Advanced and are proud to have a high pass rate for their students. That's thanks mainly to GI4FUM and other members giving up their time to train the students. From the six courses run in 2015, 15 candidates participated in the examination process. The club helped create 14 new licence holders – five Foundation, seven Intermediate and two Advanced.

Projects for the Intermediate exam courses have included 80m RDF kits that the club intend to make use of for a summer evening club fox hunt around the Antrim Coast.

Special events

Many members participated in the special events station GB8SPD for St Patrick's Day. The annual event is run from a site on the East Antrim coast. HF, VHF and 70cm stations were active throughout the weekend. The club mobile mast and new mobile shack (a converted BT OpenReach workshop) was in action, complete with six computer stations and a heating system to keep operators warm.

For Jamboree on the air they joined six Northern Ireland Scout troops for a complete weekend of amateur radio and Scouting. Scouts, club members and their families came together for the event. Around 60 youngsters took part in a variety of radio-related events over the weekend.

National Club Of The Year

Principal Sponsors

WATERS & STANTON

Help for members

A club event was organised to help a member have his beam antenna and mast serviced in one day. Around 12 willing hands cut down overgrown trees, lowered the mast and performed major surgery on the antennas. They then replaced the feeder, erected the antennas and ran tests. Job done. The '60 minute makeover' was complete – well, more like 4 hours. There are plans to help another member get an antenna service in 2016.

Other events

The club also runs an annual barbecue to keep the social side of the club alive and well.

Regional winners of the 2016 Club of the Year competition, kindly sponsored by Waters and Stanton, will be announced at the RSGB AGM in Cardiff on 22 April. The top three National small and large clubs will be announced later in the year. Details of the competition are at www.rsgb.org/coty

Setting up the antennas.

Operating the JOTA station.

Classified Ads

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

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importers of Baofeng & TYT handhelds, Xiegu X108G HF transceivers. Accessories, antennas and more. www.sinotel.co.uk, 01926-460203, sales@sinotel.co.uk

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LINEAR AMP CHALLENGER 1500 WATTS,
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Email alicantebob@hotmail.com

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Website: mirfield-electronics.co.uk
Email: martin.stokes@hotmail.com or
Tel: 07825549430

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Email: martin.stokes@hotmail.com or
Tel: 07825549430

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

Wanted

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national cash settlement for silent key, shack clearouts 07552 678725, vintageradio@btinternet.com

Miscellaneous

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WACRAL welcomes all amateurs & listeners to our Sunday morning 'GOOD NEWS' nets, now at 07300-0830 on 3.747 MHz +/- QRM and, again, at 14.00-15.00 on 7.147 MHz. Our 2m SSB net at 15.00 is held on 144.205 MHz. Or, do join us on Wednesdays 07.30 3.747 MHz +/- QRM, 10.00 on 7.147 MHz (if no contact established after 5 mins QSY to 3.747 MHz and 21.30 on 3.751 MHz, for nationwide Christian fellowship and relaxed chat. All times UTC. See www.wacral.org for more net info and WACRAL details or just call Ian G4OPP on 01622 746650 or g4opp@wacral.org

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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).

FOR SALE

10m/12m 6-ELE OPTIBEAM OB6-2W. 4 active elements on each band. Get ready for the next sunspot cycle! Cost £550 in 2014. Worked 450 slots in 2015. Asking £250. Collect, or can deliver reasonable distance at cost. Dave, G3UEG, 01279 427 788, dave@g3ueg.co.uk (Harlow).

6m EXTENDABLE WALL MOUNTED ALUMINIUM MAST with rotator cage and wall brackets, £350. Ciro Mazzoni Baby magnetic loop, works 6.6 to 28.9MHz, £800. Roger Dunnaker, 2E0LET, 0121 525 7535 (W Midlands).

ACOM 2000A, £2500. 100' trailer tower, £2500. OM2500A, £3500. Elecraft K3, 100W, £1,250. Offers please. Terry, G4MKP, 0784 160 2586, terryburbidge56@gmail.com (Cambridgeshire).

ANALOGUE METERS, over 50 new and used of various models. Email for list. Keith, G3TTC, 01926 490 897, keithorchard1@talktalk.net (Warwick).

CUSHCRAFT R6000 ANTENNA, 20-6m with box. No ground radials. Instant band changing. Hardly used, part of SK sale. £180. Ideally buyer to collect but P&P within UK possible. David, M0EZP, 01484 982 335 (West Yorkshire).

FT-847 WITH 70MHz FROM NEW, £850. Super, Diamond GSV3000 £135, (PSU for FT-847 30A 0-15V) FT-902DM, £425. FT-757, £245. GWMORSE key, £85. Bathtub key, £47. FT-101ZD, FT-101E, FT-77 Will ship. Email for list please. Ron, 2E0ARR, 0748 640 5031, pwa987fa@gmail.com (Notts).

KENWOOD TS-430S s/n J090470 HF TX with CW and SSB filters. Solid, ideal beginner's radio. Nice looking, no serious blemishes, works fine. Mic & power cable included. £250. 10A or 4A 12V PSU available. Prefer collection, could dispatch at cost. Mike, M0VOG, 0208 654 2582, M1CCF@talktalk.net (Croydon, Surrey).

NORMAN WILLIAMS, G7MRL SALE. Due to ill health the shack has to be cleared. All items have been listed at https://goo.gl/rXpc5I or get in contact for more info. Alex Hill, G7KSE, 0797 344 4252 (St Bees, Cumbria).

PAIR OF 4CX250B VALVES. Not matched pair. One is Eimac. Other says made in UK. One EF36 valve. All tested and working. G6UT shack clearout. Open to sensible offers. Postage is £3.95 Royal Mail 2nd class Signed For. Jon Cash, G7AZA, 0750 088 4659, joncash72@hotmail.com (Harlow, Essex).

SDR SWEEP SPECTRUM ANALYSER: AARONIA HF-6065 V4X, 1Hz – 4.5GHz. Perfect but no use to me as an 'H-liner' – discovered ineradicable 1420MHz harmonic! Otherwise, beautiful unit. Cost €1,300 in 2016. Offers? Frank, lukey@willowhouse5.freeserve.co.uk (S Yorks).

HEATHERLITE HUNTER HF LINEAR AMPLIFIER, £395. Yaesu FL-2100 HF linear amplifier, £275. MFJ 989c 1.5kW ATU, £125. All in good working order but due to weight MUST BE COLLECTED. Victor, 2M0JVR, 01343 820 489, jvr911@yahoo.co.uk (Moray, NE Scotland).

RARE KENWOOD TS-2000 BLACK ANNIVERSARY EDITION (number 186 of 210), s/n 80500219. Good condition, little used, with only minor marks. Includes manual and fused lead but no box. Very smart. SK sale. Inspect and collect, OIRO £850. Stephen, 2E0PPF, 0749 592 2238, barleyhillcottage@hotmail.co.uk (Chard, Somerset).

WW2 MILITARY COMMUNICATION RX TYPE DST100. Very rare double superhet 50kc/s to 30Mc/s. Full details available. Collection only from Newquay or possibly Bournemouth. M0BGA, rcry100@yahoo.com (Cornwall).

YAESU FTDX1200, hardly used, silent key sale, £670. Tony, M5AIB, 0788 788 7706, m5aib@yahoo.co.uk (W Yorks).

WANTED

EDDYSTONE 750 COIL BOX or range 3 aerial coil. Also, mic suitable for Kenwood TS-830 such as MC35S or MC50 (50k imp). Robert, G4IHT, 01285 841 203, robert@riddington.me.uk (Tetbury).

EDDYSTONE 880 MK1, Siemens E311, Metrix U61 valve tester, also rectifier valves 5U4G, U52 53KU 52KU CV575 & CV1071. Steve, M6WAA, 0755 267 8725, vintageradio@btinternet.com (Warrington).

I RECENTLY BOUGHT a Yaesu FT-100 and am looking for a YSK-100 Separation Kit. Kelvin, 2E0HJE, 01202 893 574, kelvin348@btinternet.com (Dorset).

MFJ-962C 1.5kW ATU. Jim Shewan, G3UZB, 01642 470 623, Jim.Shewan@ntlworld.com (Redcar).

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**

1 MAY (Bank Holiday Monday)
33rd DARTMOOR RADIO RALLY
Tavistock College, Crowndale Road, Tavistock, Devon PL19 8DD.
Doors open at 10.30am, 10.15am for disabled visitors. Admission is £2, under 14s free when accompanied by an adult. There is ample free car parking on site and catering available too. There will be trade & club stands and the usual Bring & Buy. Details from Viv Watson, G7AWG on 01752 823 427 or by email to vivwatsondrc@aol.com.

6 MAY
SOUTHERN ELECTRONICS & RADIO FAIR
CANCELLED [see www.serf.org.uk]

7 MAY
DAMBUSTERS HAMFEST
Thorpe Camp Visitor Centre, Tattershall, Thorpe, near Coningsby, Lincolnshire LN4 4PL.
This is an outside event with limited room inside. Entry is £3 per person and under 12s, if accompanied, free, and this charge will allow you to enter the museum as well. The venue is all on one level, with access to all buildings for wheelchairs etc. Full catering on site, with hot food van and the NAFFI. There will be an RSGB bookstall. Contact Tony, G3ZPU on 01507 527 835 or email tony.nightingale@yahoo.co.uk.

7 MAY
THE SCOTTISH AMATEUR RADIO AND ELECTRONICS CONVENTION
Braehead Arena, Kings Inch Road, Glasgow G51 4BN. Talk-in will be available on S22. The venue has disabled access and free car parking, including access to the Braehead Shopping Centre. Doors open 10am – 4pm and entry is £4. There will be trade stands, an RSGB bookstall and the GMDX group. There will be talks during the day. Club tables are £10 (prebooked only). For more information contact 0759 344 1518 or email management@scottishhamcon.com [www.scottishhamcon.com].

14 MAY
36th LOUGH ERNE ARC ANNUAL RALLY
Share Centre, Smiths Strand, Lisnaskea, Co Fermanagh BT92 0JZ.
Doors open at 11.30am. There will be trade stands, a Bring & Buy and an RSGB bookstand. Catering is available on site. Mark Mullaney, EI4HDB, ei4hdb@gmail.com.

19-21 MAY
DAYTON HAMVENTION® (new venue)
Greene County Fair & Exposition Center, Xenia, Dayton, Ohio, USA.
Doors open at 8am. There will be trade stands and a huge flea market as well as special interest groups and an RSGB bookstall. A lecture programme will take place each day. There are multiple catering outlets and family attractions on site. US exams are available and there is a raffle. Details by email to international@hamvention.org [www.hamvention.org].

20 MAY
RADARS FLEA MARKET INDOOR SALE
St Vincent de Paul's, Caldershaw Rd, off Edenfield Rd (A680), Norden, Rochdale OL12 7QR. Doors open at 10.30am, with disabled visitors gaining access 15 minutes earlier. Admission is £2.50, with those under 12 years free. There will be a Bring & Buy as well as commercial traders, a junk stall and amateur radio sellers. Traders can set up from 8am. Pitches must be booked at least 2 weeks beforehand, with prices starting at £5. There will be refreshments available including bacon and sausage butties. Dave, G3RIK, rally@radars.me.uk [www.radars.me.uk].

20 MAY
MORAY FIRTH ARS SURPLUS EQUIPMENT SALE
Forces Reserve Centre, Edgar Road, Elgin IV30 6YQ. Doors open 12 noon and entry is £2 for buyers. Tables cost £3 and access is available at 10am for setup. Refreshments are available on site. A raffle will be held. Details from Victor, 2M0JVR on 01343 820 489 or email jvr911@yahoo.co.uk.

21 MAY
34TH DUNSTABLE DOWNS RC ANNUAL NATIONAL AMATEUR RADIO CAR BOOT SALE
Stockwood Park, London Rd, Luton LU1 4LX.
Entry/car park fee is £3. All the usual facilities will be there. [www.ddrcbootsale.org].

28 MAY
DURHAM & DISTRICT ARS RADIO RALLY
Bowburn Community Centre, Co Durham, DH6 5AT. The venture has disabled facilities and car parking on site. Doors open from 10.30am to 2.30pm, with disabled visitors gaining access from 10.15am. Admission is £2. There will be trade stands, Bring & Buy, talk in and catering on site. There will be an RSGB bookstall. More details from Michael, G7TWX on 0782 692 4192 or by email to dadars@gmx.com.

28 MAY
CAUSEWAY COAST GLENS ARC RALLY
Bushmills Community Centre, 14 Dunluce Road, Bushmills, Co Antrim BT57 8QG.
There is car parking and disabled facilities at this venue. Doors open at 11am and entry is £3. There will be trade stands, a Bring & Buy and an RSGB bookstall. There is catering on site. Stevie Morrow, MI0ULK, 07544 923 956 or email stephen769@talktalk.net.

4 JUNE – SPALDING & DARS ANNUAL RALLY

4 JUNE – 21st RED ROSE QRP FESTIVAL

11 JUNE – JUNCTION 28 AMATEUR RADIO RALLY

11 JUNE – EAST SUFFOLK WIRELESS REVIVAL (Ipswich Radio Rally) (new venue)

17 JUNE – SOUTH LANCS ARC SUMMER RALLY

18 JUNE – 30th NEWBURY RADIO RALLY

25 JUNE – WEST OF ENGLAND RADIO RALLY

1 JULY – BANGOR & DARS ANNUAL RALLY

1 JULY – 1st HOUGHTON LE SPRING ARC RALLY

2 JULY – LAMFEST (in aid of Yorks. Air Ambulance)

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 20 March 2017.

Date	Callsign	Phonetics	Location
01/05	GB2EM	Elstead Mill	Elstead, Surrey
	GB0COA	Castles On Air	Portaferry
05/05	GB0TWM	Thaxted Wind Mill	Thaxted
06/05	GB0SRC	Scottish Radio Convention	Renfrew
	GB8ASP	All Saints Paston	Peterborough
10/05	GB2PW	Polegate Windmill	Willingdon
11/05	GB1BWM	Bursledon Wind Mill	Bursledon
	GB2DWM	Golf Bravo Two Duloe Wind Mill	St Neots, Cambridgeshire
12/05	GB1WML	White Mill	Dorset
	GB1WML	White Mill	Fordingbridge
	GB4MW	Mountnessing Windmill	Mountnessing
	GB1SWM	Sacrewell Water Mill	Peterborough
	GB2WBM	Golf Bravo 2 West Blatchington Mill	Hove
	GB8OMB	Old Mill Baginton	Baginton
13/05	GB0LM	Zero Mike Lima	Cwmbran
	GB2BCW	Bally Copeland Windmill	Millisle
	GB2UW	GB2 Upminster Windmill	Upminster
	GB2SMP	Solihull Mill Pool	Solihull
	GB0HSM	High Slavington Mill	Worthing
	GB4WMM	Worsborough Mill Museum	Barnsley
	GB2WMS	Water Mill Shepshed	Shepshed, Leics
	GB0KLM	Kilhope Lead Mine	Co Durham
	GB6MW	Meopham Windmill	Meopham
14/05	GB2RWM	2RomeoWhiskeyMike	Rayleigh, Essex
22/05	GB4MHS	Mike Hotel Sierra	Oxford
26/05	GB0TCS	Thurrock Camp Site	West Tilbury
27/05	GB4YAD	Youth Aviation Day	Lutterworth

SILENT KEYS

We regret to record the passing of the following Members:

Mr D Carpenter, 2W1IHN	28/02/2017	Mr H E White, G4LFB	25/03/2017
Mr B Hartley, G0GGT	03/03/2017	Mr B G C Thompson, G4LKF	05/03/2017
Mr M Constantine, G0MIC	05/03/2017	Mr D Porter, G4NFO	03/2017
Mr G H Speirs, G1DAU	02/2017	Mr J Cook, G4OYC	23/02/2017
Mr C A G Hoy, G1YZN	09/02/2017	Mr J Easey, G4XBE	17/02/2017
Mr L Gibson, G2BUP	21/01/2017	Mr P Rose, G7TDD	09/03/2017
Mr R E Sparry, G3BJC	28/01/2017	Mr D W Dunn, G8KOV	15/02/2017
Mr P J Ingram , G3GYC	07/07/2016	Mr S S McQueen, GM8MRW	16/02/2017
Mr R E Hardman, G3LGV	19/02/2017	Mr R B Palmer, M0ANB	26/02/2017
Dr P G Robson, G3NZK	03/2017	Mr C J Darlington, M0DOL	17/03/2017
Mr K D Brown, G3XQE	29/11/2016	Mr R H Bird, M1CBI	03/2016
Ms L J Scott, G4HUV	03/03/2017	Mr C Edis, M3EDI	11/01/2017

8 JULY – STOCKPORT RADIO SOCIETY RALLY

9 JULY – CORNISH RADIO AMATEUR CLUB RALLY

8/9 JULY – uWAVE ROUND TABLE

14-16 JULY – HAM RADIO, FRIEDRICHSHAFEN

16 JULY – McMICHAEL RALLY

23 JULY – FINNINGLEY ARS RALLY

30 JULY – CHIPPENHAM & DARC RALLY

6 AUG – KING'S LYNN ARC GT EASTERN RALLY

6 AUG – LORN RADIO RALLY

13 AUG – FLIGHT REFUELLING ARS HAMFEST

20 AUG – RUGBY ATS RADIO RALLY

27 AUG – MILTON KEYNES ARS RALLY

2-3 SEP – TELFORD HAMFEST & G-QRP CONVENTION

9 SEP – CAISTER LIFEBOAT RADIO RALLY

9-10 SEP – BATC CONVENTION (CAT 17)

10 SEP – 44th BLACKWOOD ARS RALLY

10 SEP – TORBAY ANNUAL COMMS FAIR

17 SEP – WESTON-SUPER-MARE RALLY

22-24 SEP – WACRAL CONFERENCE WEEKEND

29-30 SEP – NATIONAL HAMFEST, NEWARK

1 OCT – HACK GREEN HANGAR SALE

8 OCT – WELSH AMATEUR RADIO RALLY

13-16 OCT – RSGB CONVENTION

15 OCT – HOLSWORTHY ARC RALLY

15 OCT – HORNSEA AMATEUR RADIO RALLY

22 OCT – GALASHIELS RALLY

5 NOV – W LONDON RADIO & ELECTRONICS SHOW

11 NOV – FOG ON THE TYNE RALLY (new date)

12 NOV – 29th GREAT NORTHERN HAMFEST

18 NOV – RADARS TRADITIONAL RADIO RALLY

19 NOV – PLYMOUTH RC RADIO RALLY

26 NOV – BISHOP AUCKLAND RAC RALLY

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EARTHING AND THE RADIO AMATEUR

Giles Read, G1MFG
***RadCom* Technical Editor**

The Earth Bar article in the last two editions of *RadCom* has caused a significant amount of correspondence on safety, electrical and RF earthing. We are still sorting through replies and intend to include a representative sample in a forthcoming Technical Correspondence page. More information is in the RSGB Matters section of this edition.

ACRONYMS & ABBREVIATIONS

Giles Read, G1MFG
***RadCom* Technical Editor**

We have also received a great deal of correspondence about acronyms and abbreviations this month; a representative sample follows. In this month's *RadCom* we have consciously lowered the threshold for explaining acronyms and abbreviations and welcome feedback on how it 'feels'.

In addition, a list of abbreviations and acronyms is being prepared; a *very early and incomplete* draft appears on page 90 and we plan to migrate it to the RSGB website, where it will be kept up-to-date with new entries as they crop up. (As we went to press there were already some fifty more abbreviations on the draft list than appear on page 90 and there will doubtless be more by the time the list goes online). We will of course signpost the list in each edition of *RadCom*.

Bob Houlston, G4PVB

Bob King, G3ASE's valid acronym point in *RadCom* April 2017 is partially addressed by page 153 in the *RSGB Yearbook 2017* 'abbreviations & codes' and my own website at g4pvb.eu.pn/a.htm

Andy Graves, G1JQJ

I've been a licence holder for quite some time, but find myself becoming lost in the world of acronyms.

As an example in the recent test of the Kenwood TH-D74E it has CTCSS, DCS, DTMF, and then there's D-Star and APRS. There's probably a lot more once it's looked into, although to be fair some of them are disentangled from the acronym at some part of the article.

Perhaps, if you can find a page or two, *RadCom* can produce a glossary of what these are and their function. *[See above - Ed]*

L J Allen, M0TCF

Since I returned to amateur radio in 2011 I have felt that the people who write the articles for *RadCom* (and other similar publications) have been allowed to maintain one of the most annoying traits any writer could develop, as expressed by Bob, G3ASE; that of producing a wonderfully technically correct items, all the while filling them with unknown, unexplained abbreviations, acronyms and other gibberish! … I have long since thought that *RadCom* could and should devote a single page to such abbreviations, acronyms etc in much the same way that one of the most successful and ongoing bi-weekly computer magazines has done so for years. In fact, it was this so called 'jargon buster' that attracted me to buying said magazine in the first place.

Finally, I wish to thank all those who spend time researching, preparing and then writing articles for *RadCom*, I aspire one day to do the same, once I feel able to meet the high standards set by others. I'd like my comments to be viewed as directed towards the editorial team who have final, overall say in what is or isn't published, rather than the article writers themselves.

Andy Graves, G1JQJ

Life is full of surprises. My *RadCom* arrived today and there in 'Last Word' is a letter commenting on the very thing in my letter to you only two days ago. Obviously and perhaps unsurprisingly I'm not alone. The editors' comment to this letter from Bob King, G3ASE did not include an unravelling of APRS or WSPR acronyms used in his reply. There's no need to spell them out all the time but a glossary or jargon buster – as in 'Which' published yearly or half yearly will be useful as a reference.

DEEP POCKETS

Bob Houlston, G4PVB

The 'Deep Pocket' issue in Last Word April *RadCom* could be addressed by SK equipment being donated to local club for distribution to young newly licensed.

DERELICT AERIAL INSTALLATION

John Brady, MM0BIR

I asked for information about an unusual derelict aerial installation (letters page, April 2017 issue). I am pleased to say that, as a result of a reply to my request, the aerial's purpose has been identified. The array consisted of a vertical screen of wires forming one side of a corner reflector, with the sloping terrain of the hillside acting as the other side. The late Dr L M Muggleton, noted for his work in the field of ionospheric physics, used the installation while at Edinburgh University for measurement of ionospheric opacity at 30MHz. Full details have been added at https://boghall-radio-masts.blogspot.co.uk/

LEARNING CW TWICE

Richard Hull, M0AUW

Reference Rich Langford, G4FAD in the April *Radcom* regarding 20 wpm with CW. I was never a 20 wpm man but more a 16/18 speed and was just building up to 20 wpm when I suffered a stroke in March 2015, which robbed me of the prize.

I had locked-in syndrome for a short time and was paralysed for a number of weeks. Thankfully I had no major loss of memory but things were confusing to say the least. Gradually, with physical exercise, I began the long road to recovery. The mental side was a little more difficult and took some time – and one of the many exercises I did was to relearn CW. I was damned if all that hard work learning before was going to go to waste!

I used to sit by to my radio for hours on end listening to the CW operators, trying to pick out the letters. Some were easy and others seemed new to me: I could hear the tones but the brain just wasn't quick enough to translate and when I did the operator had moved on 3 or 4 letters ahead. It was like my brain had been clogged up and was very frustrating, but it was excellent therapy in teaching the brain to rewire itself.

Sending proved just as difficult, as my hands would not stay still. But eventually, after many months of practice, things began to get better and from a basic 5 wpm I gradually began to slowly creep up in speed.

Now recovered, I realise I'm never going to be back to the speed I was. I still can't read in my head, so I have to write some words down, but I'm happy, I can enjoy the code once more. I like to think learning CW a second time round helped me on my road to recovery.

GRATEFUL THANKS

B Jopson, G0UKP

I wish to send this letter in respect to Stuart Priestley, MOSGS who, in the short time I have known him has not only given time and good advice to me but to many others on all the aspects of the hobby. For example, taken time setting up, programming PCs and radios, which is far beyond anyone I have known as long as I have been licensed. In the last year he has been successful setting up and promoting the digital mode Wires-x, which I find far better than DMR and D-Star put together.

'AMATEUR'

J S Linfoot

I really can't agree with MOBGA and G4GHB that it will improve matters if we change the title 'Amateur'. Did the Royal Mail have an upturn in business for the (brief) period that they were called Consignia? Has Windscale benefitted by being called Sellafield? No, the name change simply convinces people that there is something dodgy about them. There is no verbal wand that will magic up support for amateur radio. Nor do I see the point in getting po-faced about Tony Hancock's sketch. If the blood transfusion service can

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take the Hancock treatment in good part, so can we. Instead we should try to find a unique selling point (or two) and plug them.

NO SUNSPOTS – BANDS ALIVE – WHEN?

Sam Turner, G4UQB

Sun with no sunspots; bands dead? Don't you believe it!

CQWW WPX SSB weekend 25/26 March 2017 showed just how dead the bands were – or weren't. During the contest, on 20, 40 and 80 and without madly trying, I worked fifteen countries in just ninety minutes – from east coast USA and Canada all the way to Turkey.

Admitted that there were some big guns out there with their antenna farms, and amplifiers working to the full legal limit, compared to my lowly 100 watts, dipoles and end-feds barely yards off the ground – but dead bands or not, low sunspot cycle or not, I worked them.

This had me thinking why so many amateurs don't bother turning their rigs on during low sunspot cycles? This is certainly as it seemed to me – as when the contest ended the bands were once again completely… dead.

So, on HF, is the hobby turning into a contest-only hobby?

MORSE KEYS

Ray J Howes, G4OWY

First of all, can I offer my profuse apologies to Rich Langford, G4FAD (April 2017) for being so obviously disappointed that my previous letter in the January issue of *RadCom* – regarding computer generated Morse code etc – did not reach the "very high standards" that he has become accustomed to.

However, it appears that another correspondent, Mike, G3TOI was in complete agreement with my comments with the prevalent use of computers to send Morse code – rather than the traditional art of using a paddle or a Morse key.

Having said that, although my original letter on the subject was meant to be slightly tongue-in-cheek, and wasn't meant to be taken quite so literally, perhaps Rich would like to know that I am aware that some people can and do send and receive Morse code at remarkable speeds (a good friend of mine, now a SK, would happily decode Morse at 40wpm whilst talking to me at the same time). Well, these speeds are perceived as 'remarkable' when many operators believe that 25wpm is quick!

Lastly, I totally agree with Rich when he says that "using tones to communicate across the world" is "truly a wonderful part of our hobby". Unfortunately, although for the foreseeable future, there will always be a small band of intrepid operators who choose to use the traditional methods of propelling "tones" from here to there (as I do) as G3TOI rightly intimates, we must be on our guard that the skills of manually sending Morse is not swallowed up and totally lost by the creeping influence of computers on this segment of our hobby.

Some might observe, somewhat provocatively, that digimodes such as PSK31, WSPR etc also *"use tones to communicate across the world" – and at far lower signal-to-noise levels than even the best Morse operator. Of course, they would also have to acknowledge that receiving and decoding such signals requires more equipment than a pair of ears and a Mk 1 human brain.*

Giles Read, G1MFG
RadCom *Technical Editor*

TIME TO GET LICENSED

Brian Davies, G3OYU

I read the letter Time to Get Licensed with great interest as part of Jeremy's story is also my problem. I was deaf from a very early age, how deaf is unknown but successive procedures have done nothing to improve the situation and age has caught up with me over the past several years.

Like Jeremy I too have been unable to use a telephone with any degree of comfort for a long time, many years, and operating has become more and more difficult.

18 months ago the ENT consultant suggested that I might be a good candidate for a very different type of hearing aid. He explained that my problem was due to scarring of the inner and middle ear due to the aforementioned surgeries. This resulted in everything I heard being badly distorted.

I was assessed by a specialist audiologist for what is known as a BAHA, this is a Bone Attached Hearing Aid. This system bypasses the middle and inner ear and uses bone conduction instead.

Eventually I was fitted with this new system and I can truly say I am amazed at the result. I control the aid from my iPhone and can even take calls from the iPhone, as it streams the call direct to the hearing aid via Bluetooth. There are a number of accessories that can be used with the BAHA including the one I'm being issued with early next month. This will take line in from an external audio source and again stream it to the aid. It will also operate via an induction loop, which has a microphone within it. That can be used by, for example, my wife if we are out for a meal and the restaurant is noisy: she will wear the unit on her lapel and hearing her will be easy.

Clearly this also means I will be able to take an audio feed off my various rigs and stream these direct to the aid.

It may be that Jeremy could also benefit from this type of aid. Yes it is expensive, but I'm lucky that the NHS is covering the cost.

Certainly this has opened up a whole new world of sound to me that I have probably never heard before.

MANY ANSWERS

Roger Lavery, MORLX

It is not often that I get three letters on one page to which I would like to respond but the April edition has just this.

Firstly, acronyms. An acronym is defined as a pronounceable word that is formed from the initials or parts of a phrase. So RADAR, SCART, LASER, NATO and BENELUX are all acronyms. RSGB, EMC and all the others in Bob King's letter are just initials – even Wi-Fi, according to the people who coined the term, "Fi" was added just to make it into a catchy expression and has no meaning.

Guy Simmons asks why to buy from an approved importer – the only reason would seem to be if there is a possibility of needing technical support or warranty on the product. If not, go for the best price but then do not expect the UK agent to spend time supporting the product for free.

Amateur. It is regrettable that the word has become used in the sense of amateurish. In many things I am an amateur but my work is professional, however I am not "a" professional in that I do not do the work for payment. If you want to see amateurish work that was done by a professional just look up at many of the TV antennas that are badly installed. I enjoyed the story about the side-to-side Morse key being FM. I went into a DIY store (B&Q) to buy some heavy cable to carry a high DC and was told that mains cable could not be used for DC because AC cable uses skin effect and hence does not work for DC – I did manage to keep a straight face.

[It could have been worse: they might only have had directional *cable in stock – Ed]*

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