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0417
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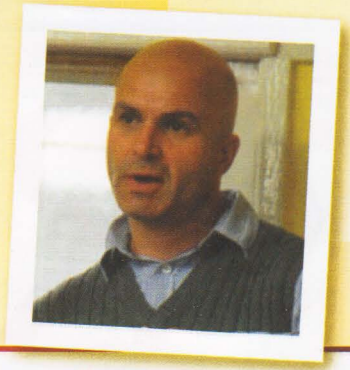

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Contents

April 2017

News and Reports

AGM Calling Notice 6
Around Your Region – Club events calendar 90
Around Your Region – Events roundup 94
Candidates for RSGB Board vacancy 20
Club of the year 2nd place winners 102
New products 14
News 12
RSGB 2016 committee reports 40
RSGB 2017 AGM voting guidance 52
RSGB Matters 6
RSGB Region 10 vacancy 7
RSGB Report & financial statement 60

Regulars

Advertisers index 99
Antennas, Mike Parkin, G0JMI 30
GHz bands, Dr John Worsnop, G4BAO 76
HF, Martin Atherton, G3ZAY 72
LF, Dave Pick, G3YXM 71
Members' ads 100
Propagation, Gwyn Williams, G4KFH 88
Rallies & events 101
Silent Keys 101
Special events 87
Sport radio, Steve White, G3ZVW 89
The last word 104
VHF / UHF, Richard Staples, G4HGI 74

Reviews

Book review, Giles Read, G1MFG 51
SDRplay RSP2, Mike Richards, G4WNC 84

Technical Features

Arduino-based SWR analyser, Michael Booth, G8HKS 16
Cable management system and earth bar part 2, Andrew Churchley, G4EAQ 32
Data, Andy Talbot, G4JNT 59
Design Notes, Andy Talbot, G4JNT 26
EMC, Dr David Lauder, G0SNO 80
Homebrew, Eamon Skelton, EI9GQ 36

Features

Getting started in the FM Activity Contests, Steve White, G3ZVW 70
VK9NZ Norfolk Island 2016 DXpedition, Paul Ormandy, ZL4TT 22

Cover image:
The rotary clothes line and bamboo used to support one of the hex beams for the VK9NZ DXpedition

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

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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/

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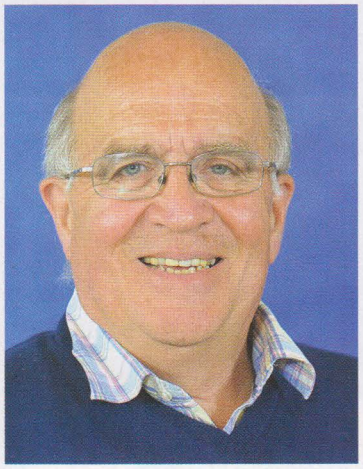
Looking back and looking forward



Following Glasgow last year, it will be great to travel again to hold our Annual General Meeting in Cardiff. It is an opportunity to review the previous year and also look forward as we launch the Society's Strategic Plan for the next five years. That's not as dull as you might think! For amateur radio to thrive, the Society needs to plan ahead to keep pace with change. The Strategic Plan questionnaire showed that many Members think we are heading the right way. That of course is the easy part – the difficult bit is making things happen. For that we are all dependent on and grateful to many volunteers. Contrary to enjoyable myths, RSGB HQ is not some huge London-based full time bureaucracy. There is a very small hard-working staff in Bedford, led by the General Manager and the volunteer Board of Directors, none of whom live in the capital!

The AGM brings us to the end of a busy year. Membership is steady, our finances are in good order and there is lots going on. The National Hamfest and the Convention go from strength to strength and provides that great amateur radio mix of technology, passion, friendship and gossip! The Society is increasingly concerned with fighting for effective access to the radio spectrum – not swamped by rising noise floors. That is tackled from both ends – through national discussion and through support for amateurs in tackling their own particular operating challenges. Dedicated Members continue to teach and test newcomers – not as well appreciated as it should be. This has also been a great year for youth – 'build-a-thons', work with the International Space Station, anticipation of the International camp for Youth on the Air at Gilwell in August. This list goes on.

I would particularly like to thank Steve Hartley, GOFUW who has chaired the Board so well this last year. As I enjoy the mid-point of my Presidency, I sincerely hope that next year there will be a vigorously contested election to replace me – don't hold back – it's fun!

Nick Henwood, G3RWF, RSGB President

Calling Notice for AGM 2017

Notice is hereby given that the 90th Annual General Meeting of the Radio Society of Great Britain will be held on Saturday 22 April 2017 at the Angel Hotel, Castle Street, Cardiff CF10 1SZ commencing at 12 noon for the transaction of the undermentioned business.

Agenda

To receive and, if approved, confirm the Minutes of the 89th Annual General Meeting held on 23 April at Glasgow City Hotel, 36 Cambridge Street, Glasgow G2 3HN and circulated to Members in the April 2017 *RadCom* (see below). [**Resolution 1**]

To receive and consider the accounts for the period 1 January 2016 to 31 December 2016 and the reports of the Board and the Auditor that appear in the April 2017 edition of *RadCom* (see page 60).

To appoint Auditors Sayer Vincent and to authorise the Board to fix their remuneration. [**Resolution 2**]

To elect either David Hutchinson, GI4FUM, Sara McGarvey, 2I0SSW, Mike Tubby, G8TIC or Philip Willis, M0PHI as a Director of the RSGB to serve on the Board. [**Resolution 3**] (Personal statements appear on page 20).

To elect either Keith Bird, G4JED or Michael Senior, G4EFO as Regional Manager for Region 10 (England South & South-East). [**Resolution 4**] (Personal statements appear on page 7).

Formal Minutes of the 89th Annual General Meeting of the Radio Society of Great Britain held on 23 April 2016 at Glasgow City Hotel, Glasgow.

Resolution 1

To receive and, if approved, confirm the Minutes of the 88th Annual General Meeting. Proposed by Philip Hosey, MI0MSO and seconded by Marcus Hazel-McGown, MM0ZIF. Motion carried by a show of hands.

Resolution 2

To appoint Auditors Sayer Vincent and to authorise the Board to fix their remuneration. Proposed by Graham Murchie, G4FSG and seconded by Barrie Spink, GM0KZX. Motion carried by a show of hands.

Resolution 3

That Graham Murchie, G4FSG be confirmed a Director of the RSGB to serve on the Board. Proposed by John Gould, G3WKL and seconded by Martin Hall, GM8IEM. Motion carried by a show of hands.

Resolution 4

That Ian Shepherd, G4EVK be confirmed as a Director of the RSGB to serve on the Board. Proposed by John Gould, G3WKL and seconded by Colin Thomas, G3PSM. Motion carried by a show of hands.

Resolution 5

To elect either Geoff Darby, G7GJU or Ian Douglas, G7MFN as Regional Manager for Region 4 (North East England). After Region 4 votes were cast, Ian Douglas was duly elected as the Regional Manager for Region 4 for a period of 3 years.

By order of the Board.
S Hartley, GOFUW,
Honorary Company Secretary

Region 10 Election

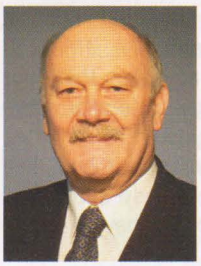
(Please note the details here are as supplied by the candidate and not altered)

Keith Bird, G4JED

Curriculum Vitae: Retired in 2009 after 26 years in communications systems for a global financial corporation. I held many posts over that time, managing regional engineering and operations staff, often attending global strategy and vendor forums in the U.S. Held past committee posts with Crystal Palace REC and Cray Valley RS. Current Vice Chairman of West Kent ARS, having held posts of Chairman and Treasurer. Assist with training at FIA levels with Cray Valley RS and West Kent ARS. I remain an active member of West Kent Raynet-UK having served as Secretary for a number of years. ORM for Kent since 2011

Personal Statement: Having served as DRM for nearly six years, I would, if elected by the members from region 10, bring this experiance into the role of RM. I believe in openness of communications, and endeavour to be straightforward in my dealings with everyone, while respecting confidentiality where required. I believe that members and the wider amateur radio hobby in the UK, have benefited over the years from the volunteers working with the Society, and I would through my role, continue supporting the Society through its plans and activities, and in assisting the members and our affiliated club's through our local DRM's.

Nominee	Known (years)
Gordon Blubb, G7KNS	15+
Darren Parvin, M0PRV	10
Graham Dobson, M0PTD	6+
David Thomson, G3RGS	12
Terry Chipperfield, G3VFC	10
David Green, G4OTV	6
Phil Bourke, M0IMA	4
Richard Perzyna, G8ITB	10+
Chris Whitmarsh, G0FDZ	12
Kevin Jennings, M0KSJ	10



Michael Senior, G4EFO

Curriculum Vitae: I have been a licensed radio amateur since 1970, and hold the current call G4EFO. I am a committee Member of the Horsham Amateur Radio Club. Founder member of The Sussex Repeater Group, constructing GB3's BR, SR, NX, WS, HO and the first UK 23 cms repeater GB3WX. Member of the original Repeater Management Group, for the RSGB. DRM 103 for Sussex 2013, and elected as Regional 10 Manager in 2014. Assisted with three Region 10 schools that were selected to contact the ARISS and Tim Peake on the Space Station. I ran one Foundation course, resulting in three passes.

Personal Statement: Since being elected three years ago I have re-organised Region 10. Surrey, South London and Kent, have become part of Region 10 and Oxfordshire moved to region 9. The regional team needs improving. It is unreasonable to expect a DRM to travel a 100+ mile round trip to visit a club. I therefore propose to form smaller groups of clubs, where they are known to one another, and appoint more deputies to liaise with these groups, thereby giving the membership better representation, and allowing the deputies more time to promote amateur radio to other organisations.

Nominee	Known (years)
Robin Powell, G3OGP	34
Bryn Tinton, G3SWC	39
Keith Evans, G3VKW	19
Alister Watt, G3ZBU	21
Richard Hadfield, G4ANN	16
Adrian Boyd, G4LRP	45
Chris Smith, G4NUX	40
John Pitty, G4PEO	15
Paul Barnett, G4TMC	25
Gavin Jelley, G7DFV	22

Details of how to cast your vote for those Members who reside in Region 10 is on page 52.

QSL Matters

The final figure for cards shipped by the bureau in 2016 was in excess of 1,000,000, a small increase on 2015. The figure includes 12,846 sorted cards (1.275%) that couldn't be onward shipped from the central bureau for a variety of reasons including, wrong call, unreadable, cards with no bureau available, or to known non-Members. If we know that the intended recipient is 'Silent Key', as a courtesy, those cards are returned to the sender.

In the UK, stamp prices for letters increase by 1p soon, so if you have used priced stamps on your envelopes, please re-stock your sub manager without delay.

The consolidation of the G3R and G3S sub groups into the enlarged G3M-S sub group should be complete. Derek, G3RAU and Roger, G3SXW have retired and we thank them both not only for their stewardship as sub managers, but also for their unstinting support and enthusiasm for the bureau service over many years. Thanks also to Keith, G0TSH and Bob, G0VFV as we move to create two new enlarged, sub groups G4M-S and G4T-Z, caused by changing demand. G4M-Z members are advised to keep an eye on the website for updates.

A key target for 2017 is to encourage all Members, particularly clubs, to list/update their contact details plus all their callsigns etc on the RSGB database. Out of date or missing information can slow down the processing of cards. An out of date email means we can't easily make contact regarding cards or envelopes. Not adding new callsigns – or deleting old ones – can slow down sorting, especially as cards take time to work their way from the other side of the world. It also helps if clubs list their affiliation number clearly as it's hard to distinguish between a personal call and an affiliated club if not listed separated.

Dave Powis, G4HUP, SK

Proud Yorkshireman Dave Powis, G4HUP, passed away suddenly on 9 February 2017. In 1965 he joined the GPO as a Youth in Training at Colchester, where he developed an interest in amateur radio and gained his Class B licence, G8BPJ. In 1976 he became a Radio School Instructor and then Lecturer at the GPO Central Training School (later the BT Central Training College), Stone. He taught many GPO students, many of whom remained firm, lifelong friends with him. Dave and colleagues regularly operated GB3CTS (Central Training School, allegedly, the first GB3 call ever issued). It was used to teach Radio Interference Service staff how to set up, monitor and inspect amateur stations. Many students were from overseas administrations on UN-sponsored courses. Dave gained his G4HUP callsign at this time.

Dave moved to BT Research Labs in 1983, where his knowledge of amateur bands surely helped his work on the Kite 49/1.7MHz analogue cordless phone. He was a very active member of several radio clubs, particularly the Martlesham Radio Society, G4MRS, participating in many of their successful contest entries. He mentored many exam candidates and widely promoted amateur radio, including the Morse facilities set up at BBC Local Radio events to remember the contributions of radio and telegraphy in WW1. More recently Dave was a leading member of the team that set up Suffolk RED that aims to foster amateur radio and electronic skills. He also lectured and ran popular hands-on sessions at the RSGB Convention.

He joined the Examinations Standards Committee in 2007. He spent much of 2016 with the Exam Group revising the licence syllabuses. Late in 2016 he became RSGB Exam Standards Committee Chairman and was just beginning to bring his newest ideas to bear.

Dave leaves a wife, four sons and their families. He also leaves a brother and sister.

Tribute led by Sam Jewell, G4DDK, with contributions by others

Latest TX Factor episode

The next episode of the UK's only TV show dedicated to all things radio is released on 17 March at www.txfactor.co.uk TX Factor is proudly sponsored by the RSGB and Martin Lynch & Sons.

In Episode 15 Bob discovers the fun to be had remotely controlling his Icom IC-7300 over the internet using Icom's proprietary software interface and shows you how to set it up. (The IC-7300 was also reviewed in the August 2016 *RadCom*.)

Mike and Bob meet two youngsters who are passionate about amateur radio and find out how they are making more people, both young and old, aware of the delights of our hobby.

This episode also puts you in the picture about the latest advances in amateur TV as the team meets the Bristol members of the British Amateur Television Club (BATC) for an ATV Activity Day.

TX Factor is available to stream to your phone, tablet, computer or smart TV and is produced in HD by a team of broadcast professionals who love amateur radio.

For more information and to view all the previous episodes go to www.txfactor.co.uk

RSGB Convention on YouTube

We're delighted that a number of lectures from the RSGB Convention 2015 are now on the RSGB's YouTube channel by kind permission of the presenters. You can see *Clean up your shack* by Ian White, GM3SEK; *Navassa Island K1N* by Glenn Johnson, W0GJ; *What makes the pings go ping* by John Worsnop, G4BAO; and *Engineering the Gemini range of LDMOS VHF power amplifiers* by Chris Bartram, GW4DGU. Please note that the speakers retain the copyright of their content and their slides. Do join the hundreds of people who have already subscribed to the RSGB channel so you're the first to see videos as they're added: see www.youtube.com/theRSGB

146MHz NoV power increase

Following a Society request, Ofcom have kindly agreed an increased power level of 50 watts ERP for *new* 146-147MHz NoV applications. Should *existing* NoV holders need this change, they should first contact HQ in order to re-apply and obtain an updated NoV. All other NoV terms remain unchanged. The online application system is at www.rsgb.org/nov

Reminder of 70cm power restrictions for all licensees

With the significant increase in numbers of 70cm digital voice repeaters that have inputs at the low end of the band, the ETCC have been reminded to highlight the power restrictions that apply to 430 – 432MHz. The maximum peak envelope power in this part of the band is 40W (16dBW) effective radiated power (ERP) for Full and Intermediate licensees and 10W (10dBW) PEP ERP for Foundation licensees. Given that many modern mobiles can run 50W power output and may be connected to high gain collinears, it is very easy to exceed these levels. Please take care to keep your power to the minimum required and certainly never above the limits mandated in your licence.

Congratulations

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

70 years
Mr D C Hepworth G4LKX

60 years
Mr L J Loveland G3KZX
Newbury & DARS G5XV

50 years
Mr D E Nunn G3JMJ
Mr S G Ridgway G3TZQ
Mr R N Golding G3VZG
Dr C J Doran G3VZH
Mr G D Lean G3WJG
Mr R E Tinson G3XPM
Mr N E Ayres G4ADR
Mr J Phillipson G4BEZ
Mr G Murchie G4FSG
Mr J Ward G8GD
Mr T R Davidson GI8ITD
Mr R G D Stone GW3YDX
Mr J E Brown GW8EHQ
Mr A R Boyce ZL1AFV

YOTA 2017

Clubs help the event

We are pleased to say that clubs are responding to the direct appeal we made to them in February. Recently we have received very generous donations from the First Class CW Operators Club, Chiltern DX Club and UK Microwave Group, to whom we are very grateful.

We have also received donations from British Amateur Radio Teledata Group (BARTG) and GMDX Group. Local clubs have also been donating and we are pleased to thank Echelford ARS, Wearside E&ARS, Weston-super-Mare ARS and Thurrock Acorns ARC for their support.

bhi Noise Cancellation Products are the latest company to become a supporter of YOTA 2017. bhi prides itself on being a forward thinking and innovative company and is pleased to be associated with this youth based amateur radio activity.

We continue to receive generous donations from individuals but unfortunately we can't name them all here but we do thank for their kind support and they are all honoured at our website www.rsgb.org/yota If you haven't done so yet, don't forget you or your club can help the RSGB in the staging of the event by donating at www.rsgb.org/yotasupporter

YOTA 2017 – find out more

We have a dedicated section on the RSGB website that contains everything you need to know about YOTA 2017 – www.rsgb.org/yota

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; and learn how you could become one of our 'Super supporters'.

We are delighted to announce that Youth Committee Deputy Chair, Milo Noblet, 2E0ILO (right) has been appointed as the UK team leader for YOTA 2017. He will lead the UK young amateurs during the IARU Youngsters on the Air (YOTA) 2017 summer camp that the RSGB is hosting at Gilwell Park in August. Congratulations Milo!

Activities during the week will include kit building, a Summits on the Air activity, a visit to London and an ARDF session. Throughout the week a special event station will be in operation by the young people attending the camp.

Youngsters in Austria in 2016 taking their radios out onto the hills.

Help YOTA 2017 and geta free supporters' pin by signing up Today!

www.rsgb.org/yotasupporter

RSGB AGM

The 90th AGM will be held at the Angel Hotel, Castle Street, Cardiff CF10 1SZ on Saturday 22 April 2017 commencing at 12 noon. Following the formal business, trophies for various awards will be presented. Registration is open from 11am. Arrangements have been made for Members who are unable to attend the AGM to cast their votes by proxy – details at www.rsgb.org/AGM2017. Whilst we encourage Members to vote electronically via the ERS website wherever possible (www.ersvotes.com/rsgb17), if you require a postal vote please call HQ on 01234 832 702. Votes must be received by the ERS before 12 noon on Thursday 20 April 2017.

Lunch at 1pm will be provided for Members who notify their attendance in advance. Please register using the form on the website at www.rsgb.org/attendagm

After lunch there will be an informal open session (2pm) in which Members can question the Board and attending officers about any matters relevant to the Society's operations. There will also be two presentations; RSGB President, Nick Henwood, G3RWF, will talk about his progress report on the President's Contest Review, and Steve Hartley, G0FUW will be presenting the feedback on the strategy consultation.

Travel details: By car, from the East, from M4 westbound take junction 29 onto the A48(M). Continue for 7.5 miles, then turn left onto A470 signposted for the city centre. Continue for 1.6 miles, then bear right onto Duke Street, which quickly becomes Castle Street. After a short distance, The Angel Hotel is on the left. From the West, from M4 eastbound take junction 32 onto the A470. Continue for four miles, then bear right onto Duke Street which quickly becomes Castle Street. After a short distance The Angel Hotel is on the left. To programme your sat-nav, please use the postcode CF10 1SZ. There is limited parking at the hotel, priced £7 per day, alternatively parking is available nearby at the Cardiff Arms Park grounds and the NCP car park in Westgate Street, charges apply.

The nearest train station is Cardiff Central at approximately 0.2 miles away. There is a Cardiff Bus Company bus stop within walking distance outside the hotel.

YOTA 2017 Video Blog

The RSGB has just launched its first vlog (video blog) to share what is happening behind the scenes in the preparation for YOTA 2017. It features the Youth Committee Chair, Mike Jones, 2E0MLJ.

Look out for more vlogs in the coming weeks where you will hear from other people involved in making this international event a reality. Go to www.youtube.com/theRSGB for all our videos.

New RSGB videos

Being the DX, QRP by Dominic Baines, M1KTA is the latest RSGB Convention 2016 lecture available for Members to view via the new video portal, www.rsgb.org/video It joins Contesting from VY2ZM on Prince Edward Island by Jeff Briggs, VY2ZM; Developments in IOTA, update on electronic QSLing and the future by Roger Ballister, G3KMA and Advances in amateur television by Noel Matthews, G8GTZ.

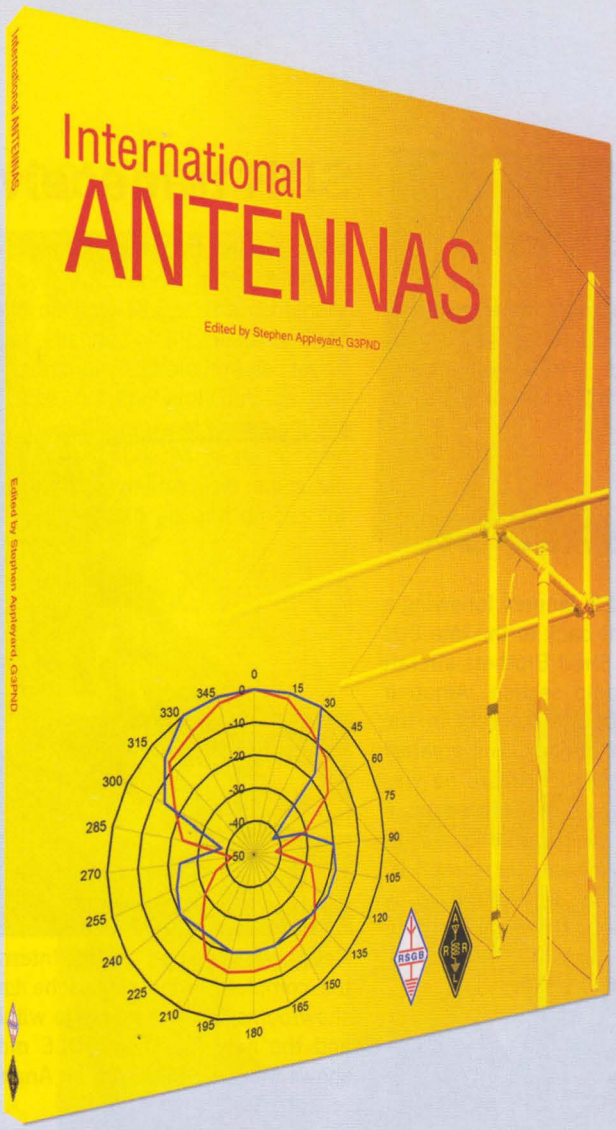
The RSGB would like to welcome to the RSGB family the following new Members who have joined their voice to ours and are helping to keep the RSGB strong.

Mr K Jordan, 2E1CJB
Mr M Martin, 2E0MII
Mr M Rickard, 2E0PNO
Mr W Bradley, 2E0WJB
Mr S Rouse, 2E0XZZ
Mr R Campbell-Black, 2E0YLP
Mr J Stuart, 2M0JST
Mr P Reinhart, AE6QF
Dr W Wilkening, AG6DK
Mr G Martinez, AH6VF
Mr T McGuire, G0AVH
Mr C Shaw, G0KVL
Mr A Penn, G3RLU
Mr S Nimmo, G6OJB
Mr A Brown, G7KMW
Mr M Claxton, G7TYT
Mrs J Beith, G8CON
Mr D Gotch, G8FTX
Mr J Everard, G8OWV
Mr R Meyers, G8ROM
Mr L Breadon, GI7NMK
Mr E Pratt, GM7KBK
Mr F Bonucci, IK0IXI
Mr J Bollettino, K4AMK
Mr J Sokolowski, KB9SXF
Mr D de Ree, KD7QDT
Mr M Walker, M0IAW
Mr D Drizen, M0IFZ
Mr M Napieralski, M0LPK
Mr N Mooney, M0NFI
Mr A Lomas, M1MLM
Mr R Whitehead, M3RNW
Mr S Duncan, M6HRQ
Mr W Kent, M6IIK
Mr P Baillie, M6IIQ
Mr D Wilderspin, M6IJX
Mr J Butler, M6ILG
Mr S Dowling, M6IMN
Mr P Smith, M6INJ
Mr K Hewson, M6KHX
Mr K Greenshields, M6KYB
Mrs J Haigh, M6NFS
Mr W Winn, M6WVW
Mr C Beckitt-Marshall, M6XLN
Mr K Brown, MM6ID
Mr R Kotlarek, MW6PLX
Mr R Olszewski, N3FJ
Mr J Sampson, N5LXI
Mr M Van Gysel, ON4CLG
Mr L Pickering, RS212590
Mr D Wilkins, RS311533
Mr D Saleh, RS311785
Mr R Penn, RS311801
Mr I Hulme, RS311833
Mr R Williams, RS311834
Mr A Waller, RS311850
Mr J Kelly, RS311852
Mr C Buckhurst, RS311860
Mr H Fell, RS311862
Mr D Spencer, RS311863
Mr T Cole, RS311894
Mr G Bryant, RS311899
Mr P Marsh, RS311909
Rev W J L Williams, RS311942
Mr D White, RS311945
Mr S Green, RS311993
Dr A MacGregor, RS312003
Mr J Reynolds, RS312007
Mr A Tomkinson, RS312086
Mr C Waddell, RS312097
Mr G Lewis, W0BTW
Mr J Darden, W6PDD
Mr R Abbinett, WA9AIZ
Mrs K Tache, WE4KAT
Mr T Tache, WE4TOM
Mr G Pierson, WW7Q

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

Mr H J Smith, 2E0HAO
Mr S W Perrin, 2E1HAT
Mr R Todd, 2I0RVT
Mr B E Whittaker, G0MJI
Mr S J Beith, G1ZVC
Mr D Johnson, G4AON
Mr J E Greenhough, G4UIQ
Mr M J Turner, G6DJX
Mr C R Rudge, G6LAW
Mr N A J Hobbs, G7IYG
Mr J Flynn, G7OCD
Mr A Cox, G8TEE
Mr G McKelvie, GM7USC
Mr T L Bosscher, K8TB
Mr D Wharlley, M0GIG
Mr D Philip, M1ALX
Mr G L Jefferies, M1ASR
Mr G S Stephen, M3OBQ
Mr S T Crossley, M5STC
Mr C W Gardner, MI3FBX
Mrs L A Hobbs, RS140229
Mr G T Starkey, RS185231
Mr N J Golds, RS186323
Mr C R Denton, RS188450
Mr E T G D Carre, RS211029
Mr R J Edens, W6RJQ

NEW TITLE



International Antennas

Edited by Stephen Appleyard, G3PND

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

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

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

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

Size: 200 x 279mm, 176 pages
ISBN: 9781 9101 9335 8
Non Members' Price: £14.99
RSGB Members' Price: £12.74

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

Acom amplifiers

The International Ham Stores Group has been awarded a supply and service agency by Acom for their range of HF amplifiers. While awaiting the first batch of stock to be delivered, orders are being taken through all IHSG outlets. www.ihsg.co.uk/

Jim Welsh, GI4JXM, SK

Jim Welsh, GI4JXM passed away on 29 January following a long illness. His interest in radio went back to the late 50s when he began an apprenticeship in Short Brothers aircraft factory in Belfast working in the radio section. Amateur radio was the hobby that brought us into contact in the mid-70s when he and I became firm friends. His greatest interest however was undoubtedly RAYNET where he was my deputy controller for nearly 30 years working across a wide range of charity and sporting events until ill health caused him to stand down. Jim will be greatly missed by his many radio friends both near and far. He is survived by his wife and three daughters to whom the local amateur community extend their deepest sympathy.
Tribute by John McCullagh, GI4BWM

Royal Signals ARS

The Royal Signals Amateur Radio Society (RSARS) was formed 56 years ago. This event has been celebrated every year since by having an activity month. For the whole month of May RSARS members try to find each other and exchange details for points. With members spread around the world, this is an enjoyable challenge and importantly an opportunity to chat, be it SSB, CW or via digital modes. There are specific awards but all members making contacts to a total of 30 points or more may have a rosette. Working an overseas member is worth double points so it is often worthwhile getting upon early. Details at https://rsars.org.uk/

SDR transceivers at Nevada

Nevada Radio, part of the International Ham Stores Group, now stocks the complete range of Apache Labs SDR transceivers at the Portsmouth showrooms. The whole range will be available for demonstration or viewing and the new Anan 8000DLE models will be arriving shortly. The photo shows Mike, G3SED with an Anan 100E. See www.nevadaradio.co.uk

European Collins Collector Association

The European Collins Collector Association (CCAE) has a range of new technical articles from CCAE members on the website here are plenty of ideas for restoring or repairing any Collins equipment. See www.ccae.info.

Isle of Mull activation by Tynemouth ARC

Tynemouth ARC is planning another IOTA trip, this time going to the Isle Of Mull (EU-008) between 21 and 28 April. They will be operating as GS0NWM between 80m-10m on most modes with four HF stations. In addition there will be a VHF/UHF station for the first time. The operators will be Bob, M0KLO, Glen, G0SBN, Tony, G8YFA, Graham, M0GAE and Chris, GM3WOJ. Full details are on QRZ.com

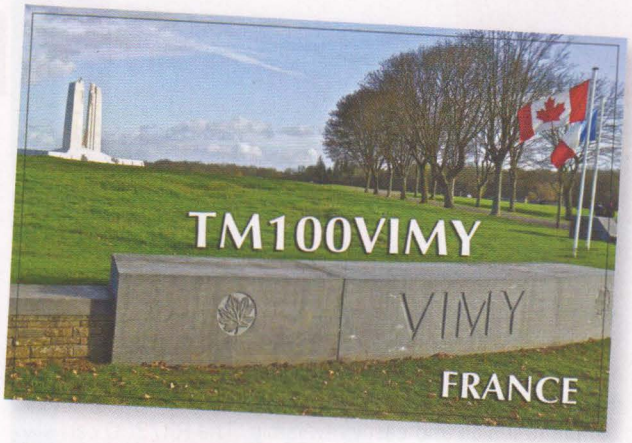
Mid-Ulster ARC to run Marconi Day station

Mid Ulster ARC will take part in International Marconi Day on 22 April. Between 8am and 5pm a station will be on the air from Navan Fort, 81 Kilrea Road, Armagh BT60 4LD. Contact Dave, 2I0SJV by email to muarc.secretary@yahoo.co.uk for more information.

Live bhi DSP demonstrations

Live demonstrations of bhi's DSP noise cancelling products are now available throughout bhi's UK dealer network. bhi has been visiting their UK dealer network setting up dedicated demonstration areas so that customers can hear for themselves the bhi DSP noise cancelling system. Live demos can be found at LAM Communications, Martin Lynch & Sons, Moonraker, Radio World and Waters & Stanton. Check out the bhi website www.bhi-ltd.com for details.

Vimy Ridge – TM100VIMY



A Canadian-led DXpedition-style event will activate the 100 hectare WWI battle site, Vimy Ridge, ceded to Canada by France under a 1922 treaty. It is the centenary of the April 1917 Battle of Vimy Ridge. The centenary observance on 9 April will be a state occasion, attended by the Heads of State of Canada, France and Great Britain. A commemorative amateur radio station will go on the air from the summit of Vimy Ridge on 1 April and continue until dusk on the 9th. Seventeen operators, drawn from the ranks of Canadian and French contesters and DXpedtioners, will run two stations 24 hours per day, using SSB, CW and digital modes on 160 through 10 metres. The radios will be Elecraft K3s and KPA 500s with Spiderbeams, verticals and dipoles for antennas. See www.v100vimy.ca for details.

Visits by HQ staff

Steve Thomas, M1ACB, Mark Allgar, M1MPA and *RadCom* travelled to Portsmouth to find out more about the new International Ham Stores Group, a partnership of InnovAntennas, Nevada and Waters & Stanton.

We heard about their plans for the Portsmouth showroom and warehouse that includes a shack where customers can compare or test radios in peace and quiet – apparently the background RF noise level at their the location is very low, especially on 40m, giving good reception. The warehouse is being redesigned to make space for a small antenna manufacturing facility as well as more storage space for stock. One of the most immediate plans is to get the customer service running quickly and smoothly, whether that's dispatch or queries.

In the future there are plans to open the shop on Saturdays and, whilst on hold for the immediate future, once all the systems are running smoothly, rallies will be back on the agenda. The National Hamfest is on the plan for this year, which will give customers the opportunity to see much of the range that the group now stack.

Left: Dave Hayward at RadioWorld. Top right: Jeff Stanton, G6XYU, Mike Devereux, G3SED and Justin Johnson, G0KSC of IHSG. Lower right: Claire and Lee Marsh, M0LAM of LAM Communications.

Chris Danby, G0DWV and Mark, M1MPA also took the opportunity to visit the new stores of LAM Communications and RadioWorld earlier in the month. They received a warm welcome from both Lee Marsh, M0LAM and Dave Hayward, who showed them around their new premises respectively.

GW3JGA valve collection

The John Lawrence Valve Collection is part of the National Valve Museum and was previously housed at HMS Collingwood. It has now been transferred to the Internal Fire – Museum of Power at Castell Pridd, mid-Wales, SA43 2JS. The collection, made by John Lawrence, GW3JGA over the last 70 years, contains over 200 radio valves from the 1930s, through the WW2 period to the present day.

The photo shows John, GW3JGA alongside part of the valve collection in the radio room of the Internal Fire Museum that also houses the amateur radio station GB2MOP.

Further details of the Internal Fire – Museum of Power are at www.internalfire.com

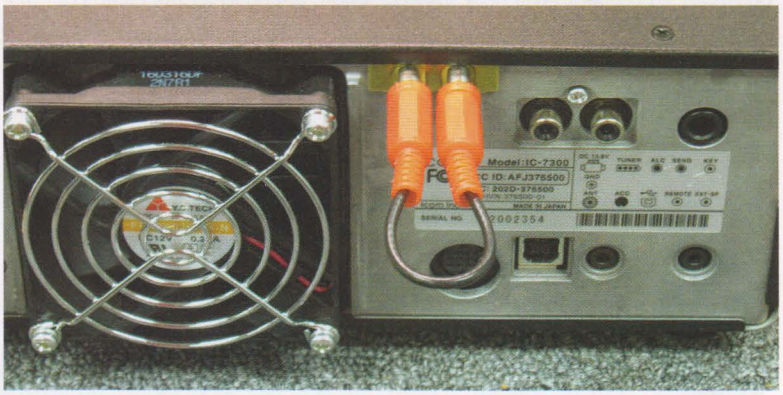
radcom@rsgb.org.uk

New Products

IC-7300 accessory

IHSG and Vibroplex/INRAD has release a new accessory product for the Icom IC-7300 that provides a receive antenna socket on the rear of the radio.

The INRAD model RX7300 allows the user to add a receive-only antenna jack to the Icom IC-7300. This easy to install plug-in modification requires no soldering and is simple to install and easily reversible. The RX7300 can also be used for the insertion of accessory items into the receiver chain on the IC-7300 like receive-only bandpass filters, low noise preamps, etc. When installed, the transceiver will use the SO-239 antenna connector on transmit, and one RCA phono jack on the RX7300 for receive. To use the transceiver in normal operation via the SO239, leave the RG-174 coax loop installed between the two phono sockets.



The RX7300 retails for £49.95 or £99.95 fitted from IHSG affiliated stores. Customers who purchased their IC-7300s via an IHSG store will receive a £5 discount from the supply-only price and £15 discount from the installed price. For more information contact sales@ihsg.co.uk

Portable short wave radio with SSB

The Tecsun S-8800 (GM) is a portable receiver with SSB reception and remote control. The radio covers from long wave through to the VHF FM commercial radio band and uses DSP technology for the best reception.There are various tuning options including, Auto Scan, Manual tuning, fine tuning for SSB, or keypad entry with the remote handheld control unit. The radio is supplied complete with two high power lithium ion batteries capable of running the radio, in normal use, for several weeks. The GM suffix indicates that this version is supplied with gun metal tuning & control knobs. The radio retails for £299.95 and is available from UK importers Nevada, see www.nevadaradio.co.uk

Radio Stations in the UK

The latest edition of the British DX Club's publication *Radio Stations in the United Kingdom* is now out. Published every two years, this booklet follows the successful format of previous editions with its comprehensive frequency-by-frequency guide to domestic medium wave and FM stations in the UK and Ireland. It covers all BBC, RTE, commercial and community radio stations as well as the low power AM and FM stations operating with long-term restricted service licences. Prices start at £4. Full details on this can be found at www.bdxc.org.uk/rsuk.html

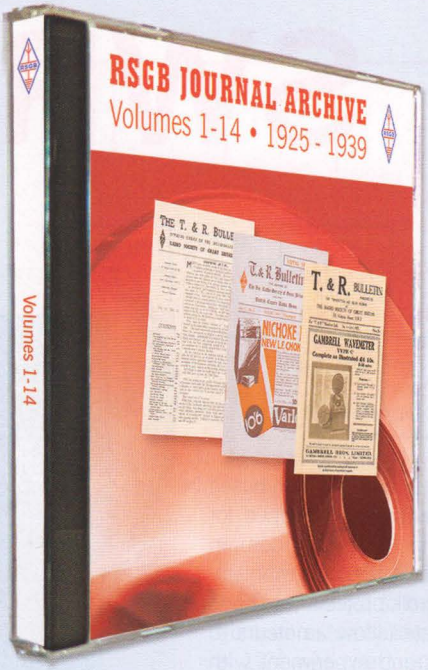
Frequency Counter

The Tytera SF-401 Plus frequency counter reads your RF transmitted frequency from 100 to 3000MHz (27 to 100MHz coverage with reduced specs). Additionally, it can read and display your CTCSS tone and DCS code on the backlit colour LCD screen. It comes complete with BNC antenna, USB charging cable and UK 3 pin USB power supply. Priced at £44.95 inc VAT from ML&S, see www.hamradio.co.uk/tytsf401

Loop Antenna

The Bushcomm Horizon Loop comes in two varieties – 10-20m and 10-40m. These loop antennas have been designed to be used portable or as a small space permanent setup. The antenna is characteristically quiet on receive and highly efficient on transmit. They are rated at 125W PEP power handling. Priced from £299.95 inc VAT, see ML&S at www.hamradio.co.uk/bushcommloop for more details.

NEW TITLES



RSGB Archive 1925-1939

RadCom magazine or its predecessors such as the T&R Bulletin have been published since 1925. This brand new volume of our archive discs covers the years 1925 to 1939. This period covered the huge developments in the science and practice of amateur radio. From the developments of spark transmitters and valves, the change from Metres to Mega Cycles (and later back again), reports of the formation of the IARU and its early work, the use of country prefixes for the first time and so much more is all included here. There is an absolute treasure trove of astounding material, such as a 1925 remote control system for your radio, radio experiments in aircraft & moving trains, to name just a few.

Presented in the easy to use PDF format there are thousands of pages here covering the equipment construction, antennas, operating reports, new techniques and even the social aspects of the 1920s and 30s. Completing the RSGB archive this DVD provides a unique insight into the early days of the RSGB, amateur radio and is absolutely fascinating reading for anyone.

Add this important record of amateur radio over the years to your collection

ISBN: 9781 9101 9334 1
Non Members' Price: £19.99,
RSGB Members' Price: £16.99

RadCom 2016 Archive

RadCom is for many an invaluable archive that is looked back over many times. So why not have all this information in a searchable format by purchasing the *RadCom 2016 Archive*. Every page of the very best amateur radio information that RadCom produced in 2016 is included and that is over 1200 pages. Presented in the easy to use and fully searchable PDF format this is the easy way look back over this mass of information form the twelve *RadCom* editions produced in 2016.

In 2016 *RadCom* published over 80 Construction & Technical Features along with 35 Antenna Articles, 24 Equipment Reviews and over 75 other Feature articles. The equipment reviews covered major equipment releases such as the Icom 7300, Yaesu FT-991, the Flexradio Maestro console, Elecraft K3S and much else besides. You will also find all the host of regular columns that *RadCom* features, from Antennas to VHF/UHF. Simply everything printed in *RadCom* in 2016 is included, even the adverts are provided.

The *RadCom 2016 Archive* also contains a copy of the latest Acrobat Reader DC and additional bonus material including samples from other Archive CDs and even a copy of the RSGB Tim Peake video. If you want to every page from *RadCom* in 2016 and much more besides, the *RadCom 2016 Archive* is great way to store and look back on a bumper year.

CD & USB Options
The *RadCom Archive 2016* is available as either the traditional CD version or in the USB Memory Stick version. Both versions are easy to use and contain the mass of material *RadCom* produced in 2016 along with all the bonus material provided.

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

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

Arduino-based SWR analyser

In this project, a simple hardware SWR bridge is used as a measurement front end for the open-source Arduino development platform.

The user can develop their own solution based on the measurement software developed for the project, which is in the public domain and available on Github. It is not a complete, finished and ready-to-roll project: my hope is that this will stimulate fellow amateurs to build their own boards and experiment with the basic software to enhance the features that the analyser can provide.

In its basic form the analyser gives an accurate measurement of the SWR (in a 50Ω system) and impedance of an aerial at any frequency to >70MHz. Coaxial cable length can be measured and the resonant frequency of an aerial can be tracked. The analyser has the capability to be controlled from a program on a PC to allow data logging and/or graphical analysis of results.

SWR is a measure of the mismatch between the load and the design impedance of the system and gives an indication of the ratio of the impedances. This is a scalar measurement and does not give any information about the capacitive or inductive reactance except for its impedance at the test frequency. Judgement of whether a reactive load is capacitive or inductive requires interpretation of the measurement.

Project history

A desire for an inexpensive SWR analyser and an interest in direct digital synthesis (DDS) modules led to the start of this project. The AD9851 DDS is capable of synthesising a sinewave RF signal up to 50MHz or more with superb accuracy and stability. The cheaper AD9850 is good to 30MHz, but a small software change is needed to accommodate a slight difference in control word for thelatter device. Both are available as assembled modules on eBay for only a few pounds.

The Arduino open-source platform uses a simplified C language environment for program development [1]. The ready availability of low cost digital hardware and a free software development platform to complement it allowed rapid evaluation of a proof-of-concept design.

The Arduino Uno board is based on an ATmega328, which has 20 inputs/outputs. Up to 5 inputs can be configured as analogue, feeding an internal analogue to digital converter (ADC) and two can become external interrupt inputs, which is perfect for this sort of project. The Uno motherboard has socket headers with all the signals brought out to allow a development board to be piggy-backed. This gives a neat solution with plenty of resources to control the DDS, an LCD display and a rotary shaft encoder with push switch to select menu choices.

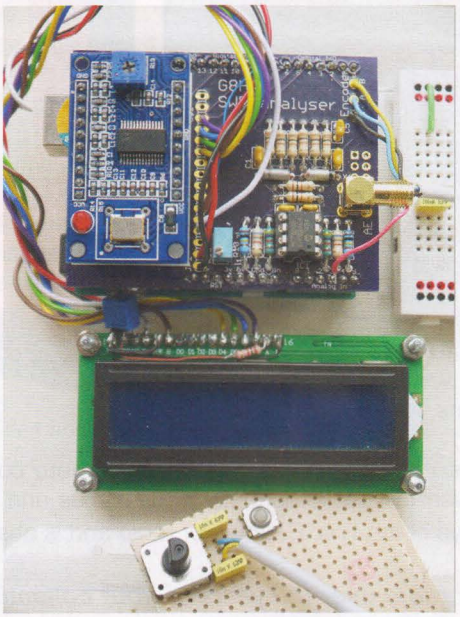


PHOTO 1: The prototype board with piggybacked DDS module (left side of dark blue PCB).

What's needed to make an SWR analyser?

For the majority of day-to-day practical uses, the amateur only needs to measure the SWR of the aerial at the chosen frequency, or to determine the frequency of lowest VSWR when tuning an aerial. In the past, this information was provided by a VFO, bridge, diode detector and moving coil meter: now, for a similar cost we can have a tool that can be programmed accurately to give greater flexibility and functionality (if the user so desires).

In the Wheatstone Bridge (see **Figure 1**), Vr gives an indication of mismatch and would traditionally have driven a moving coil meter. The ready availability of low-cost microcontrollers such as the Arduino allows us to convert Vs and Vr to digital values and process them. Most commercial aerial analysers for the amateur market use some form of the Wheatstone Bridge.

A calculation involving Vs and Vr will reveal the SWR:

VSWR = (|Vs|+|Vr|)/(|Vs|-|Vr|)

where |V| is the absolute value of the voltage, ie the magnitude.

If the bridge is in balance (Z? = 50Ω), Vr = 0 and VSWR = 1

If the load is open circuit, |Vr| = |Vs| and VSWR = (2xVs)/0 = ∞

If the load is short circuit, |Vr| = |Vs| and VSWR = (2xVs)/0 = ∞

A diode RF envelope detector (as shown in Figure 1) allows the magnitude of the RF signal to be measured accurately down to millivolt levels (when lightly loaded, eg buffered by a high impedance amplifier circuit). At low

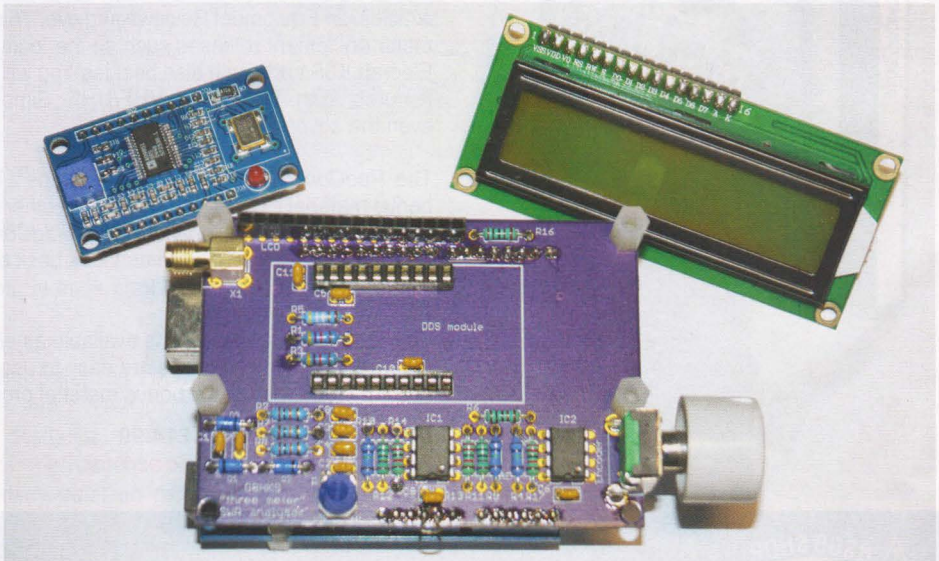


PHOTO 2: Second prototype. Main PCB (centre), DDS (top left) and display.

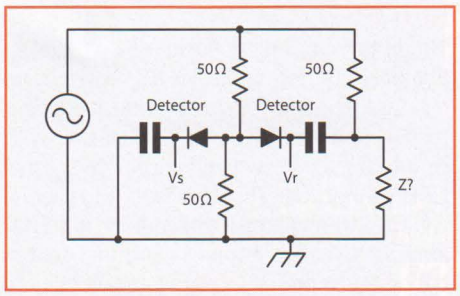


FIGURE 1: RF Wheatstone Bridge.

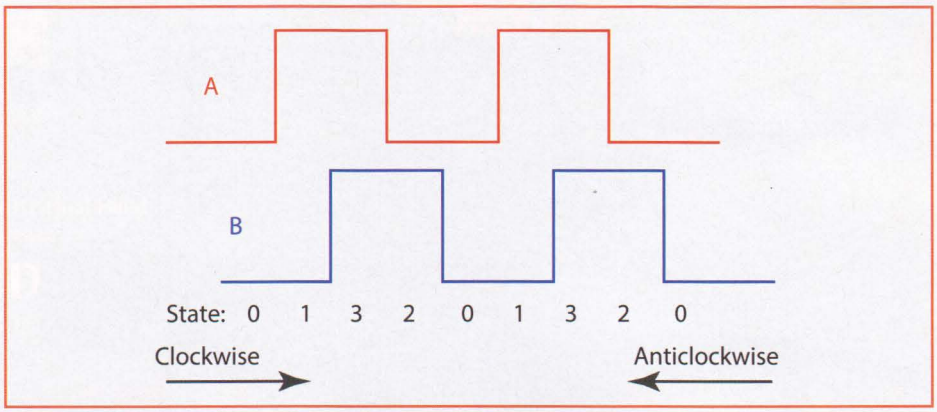


FIGURE 2: Level transitions of quadrature encoder.

signal levels the diode exhibits a logarithmic response, but this can be compensated for in software. A comparative measurement of the I/V curves of 1N914 silicon small signal, 1N34 gold bonded germanium and BAT43 Schottky diodes revealed that the modern Schottky diode performs very well, with a forward voltage drop of only 23mV at $<1\mu A$. And, unlike the older 1N34, BAT43 diodes are readily available!

The detector that measures Vr measures the magnitude of the voltage difference between the two arms of the bridge, and truly floats at AC whilst producing a ground referenced DC signal through the return path consisting of the bridge resistors.

Each low-level detector output is buffered by a high input impedance operational amplifier circuit with sufficient gain (around 20) to give a useful output in the 5V range of the ADC on the AVR processor chip. Following digitisation, the non-linearity of the diode detector is compensated for in the software to improve the accuracy of the results.

The same VSWR will result from both high and low load impedances: SWR 2:1 for both 100Ω and 25Ω, SWR 3:1 for 150Ω and 17Ω, etc. The addition of a third detector to measure the voltage across Z gives us the opportunity to determine whether the load impedance is greater or less than 50Ω. If Vz is low, the impedance must be low; a high Vz is the result of a high impedance.

From breadboard to prototype

Work on a basic two detector bridge design using a breadboard proved that the concept

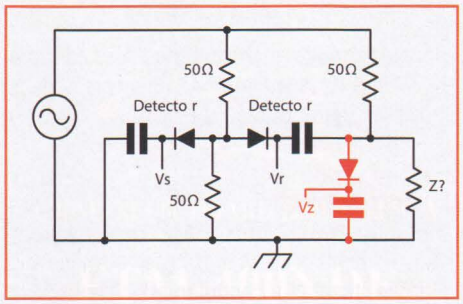


FIGURE 3: Addition of detector for Vz (in red).

was sound and allowed me to write the base software to control the DDS, accept input from the shaft encoder and drive a two line LCD display for menu selection and to display results. I then designed a prototype PCB to allow further development in a more controlled environment.

OSH Park [2] in the USA offer an excellent service for cost-conscious experimenters and provided me with 3 PCBs for $5 per square inch, delivered in roughly 2-3 weeks. The painless process involves submitting the design file from a PCB CAD package to their website and paying by PayPal. The designer is kept fully informed on the progress of the PCB, and following the announcement that it has shipped the excitement grows! *(Other prototype PCB manufacturers offer comparable terms – Ed).*

The board is designed to plug directly into an Arduino Uno. The Arduino requires a stable 5V power supply, which can either come from a PC connected to the Arduino's USB port or from an external low voltage DC supply (eg a 12V wall wart or batteries) through the on-board regulator. The Arduino has a USB serial link to an attached PC that is used for downloading the program to the Arduino as well as being a communications link to allow data logging and debugging when the analyser is in action.

In **Photo 1** the DDS module can be seen piggybacked on the left hand side of the prototype PCB, which itself is plugged into the (hidden) Arduino Uno development board.

The DDS is controlled through a Serial Peripheral Interface (SPI), which uses a clock, data in and data out signals to transfer the control word between the processor and the slave DDS device at very high speed. The control word of the DDS is programmed with a 32 bit number to define the required frequency, which can be set to an accuracy of 0.04Hz(!)

The quadrature shaft encoder uses two signals (A and B) that alternately go high/low/high as the shaft is rotated, but with a lag between them. **Figure 2** shows how this works.

The order in which the A/B quadrature signals are received is interpreted by the processor to give the direction of rotation and keep count of the relative position of the shaft. Using interrupts to detect the level changes allows the processor to continue with foreground tasks whilst the encoder is being rotated: each increment of the encoder creates an interrupt that calls the service subroutine, only taking a few microseconds to update the shaft position. My shaft encoder interrupt service routines were developed from code originally written by Beric Dunn, K6BEZ.

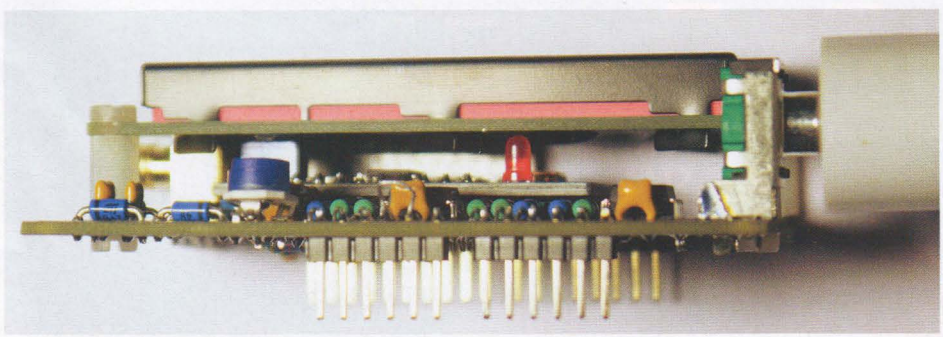


PHOTO 3: The stacked PCB, DDS and display.

Michael Booth, G8HKS
mike.booth@shirenet.co.uk

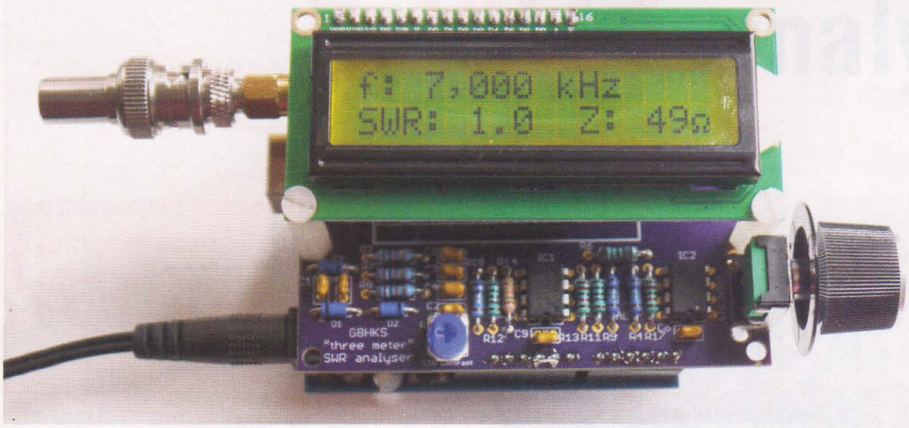


PHOTO 4: Analyser with 50Ω termination.

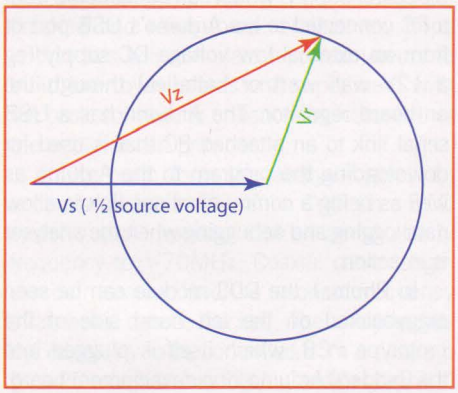


FIGURE 4: Vector triangle for a reactive load.

As the shaft is rotated, the processor counts with the transitions and increments or decrements the position count, which serves to index through menu options or control the DDS frequency. A separate switch contact made by pushing in the shaft of the encoder signals to select the current option. The menu structure is discussed later.

The success of the first board, plus the limitations of having the display and shaft encoder connected by cables, prompted the design of a second PCB (**Photo 2**, **Photo 3** and **Photo 4**). Originally, SMA connectors were chosen because of their small footprint, but were replaced with BNC in the latest revision.

As mentioned earlier, the simple two-detector measurement of SWR has the limitation that it cannot distinguish between a low or high impedance load, both of which exhibit the same mismatch (eg 25Ω and 100Ω both give SWR of 2:1). In order to judge the magnitude of the load impedance, another detector is needed to measure the voltage Vz developed across the load, as seen in **Figure 3**, and this was added on the new board. A low value for Vz implies a low impedance and a high Vz a high impedance.

Note that all the voltage measurements are magnitudes and convey no information about phase shift in a reactive load, but the measurement of Vz gives us a clue to the magnitude of the reactance by solving the triangle of voltage magnitudes formed from Vs, Vr and Vz (see **Figure 4**). The core code is shown in **Figure 5**.

The story so far

The hardware is at a stage now whereby measurements of Vs, Vr and Vz can be made and digitised, there is a control interface consisting of shaft encoder, switch and LCD display and a DDS delivers RF to the bridge at up to about 50MHz or more, with precise control.

The rest of the project is software, which is open-source. At present, the menu system (**Figure 6**) allows the following user control:

- Select any of the HF bands as a base to manually control the frequency of measurement and display VSWR and load impedance
- Measure the length of an open circuit coaxial cable
- Find and track the frequency of best match (useful for tuning an aerial).

```
// VSWR
void VSWR() {
  double Vs=0;
  double Vr=0;
  double Vz=0;
  double VSWR = 0;   // VSWR = (1+Γ)/(1-Γ) = (Vf+Vr)/(Vf-Vr)

  // Read the forward and reverse voltages
  Vr = analogRead(REV_analogue_pin);
  Vs = analogRead (FWD_analogue_pin);
  Vz = analogRead (ZL_analogue_pin);
  if (Vr >= Vs) {
            Vr = Vs - 1;
          }     // To avoid a divide by zero or negative VSWR

   // Calculate VSWR
   SWR = (Vs+Vr)/(Vs-Vr);

   // Linearise VSWR
   SWR = 1+9.55*log10(SWR);

   // Calculate load impedance
 if (Vz <  Vs) {          // ZL is low
      ZL = 50/VSWR;
   }  else  {             // ZL is high
      ZL = 50* VSWR;
   }
}
```

FIGURE 5: Core code.

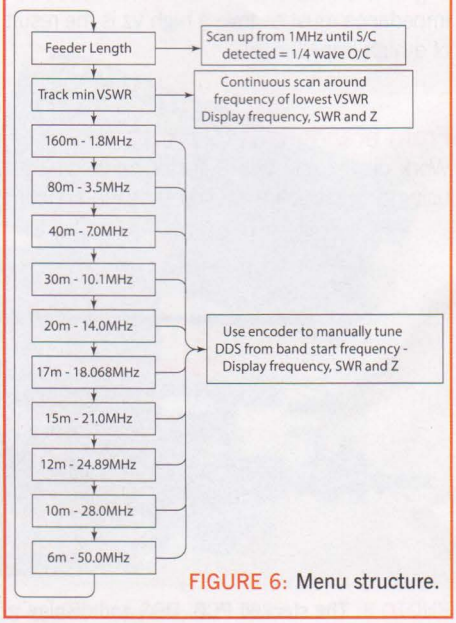


FIGURE 6: Menu structure.

Next steps

There are applications for the PC written in Python script (eg by PA2OHH) that provide a graphical interface to display measurement results from the likes of this board, with control and data being exchanged over a serial USB connection. The next work to be done will involve additional software for the SWR analyser to accept connection to and control by the PC to provide a remote measurement head that can operate via a convenient USB connection.

As mentioned earlier, the impedance of a capacitive load decreases with frequency, so Vz for a capacitive load would also decrease (and the opposite is true for an inductive load). Therefore a trick to determine the sign of the reactive component of the load is to have the software solve the triangle to calculate the magnitude and phase of Z? and then 'jiggle' the measurement frequency and determine the direction of change (and hence sign) of the complex part of Vz.

Including and beyond this, development of the software is open to the user. I will be very interested to hear what you do.

Websearch

[1] www.arduino.cc
[2] www.oshpark.com

Further reading

By conincidence, this month's Homebrew takes a separate look at the RF Wheatstone bridge – see p36
Measuring RF Impedance Using the Three Meter Measuring Bridge, Peter Dodd, G3LDO, *ARRL Antenna Compendium*, 1995
Three Meter Method, Peter Dodd, G3LDO, *RadCom* September 2005
Amateur Measurement of R+jX, Doyle Stradlund, W8CGD, *QST* June 1965

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Candidates for RSGB Board vacancy

Resolution 3

To elect a Director of the RSGB to serve on the Board.
Please note the statements below are as supplied by the candidates.

David Hutchinson, GI4FUM

Curriculum Vitae: I passed the RAE in July 1965. My Amateur Radio Certificate is dated 21 Feb 1977. I joined the RSGB in November 1976. My GI4FUM licence was issued 21st Feb 1977. I joined GI6YM in 1964 and served as a member of its committee. I formed the Antrim and District Amateur Radio Society in 1977 and was its chairman. I am currently treasurer and education officer of GEARS. I am a RSGB registered tutor. I am a member of Bangor and District ARS. I am a GB2RS news reader. I am a corresponding member of the RSGB ARDF committee.

Personal Statement: I have over 30 years experience as a warranted scout leader and have run Jamboree on the Air stations during that time. I was District Commissioner for Antrim and District Scouts from 2000 until 2006. I was a member of the GB100J team at the World Scout Jamboree in Essex in August 2006. I am currently president of the World Association of Christian Radio Amateurs and Listeners. I am a retired NHS GP have been principal managing my practice in Antrim Health Centre for 27 years. I was Grand National Archery Society council member for 20 years and NI Regional Director of GNAS for 6 years. I was GNAS medical officer for 20 years and on the British Olympic Association medical committee for 20 years. I was a member of the International Archery Federation medical committee for 6 years. I helped write the anti doping regulations for archery. I have travelled extensively both in the UK and internationally for the sport of Archery. I help run a DXpedition tour group CQ DX African Safaris and am their QSL Manager. I have operated from South Africa, Namibia, Sweaziland and Mozambique. I am currently setting up a tour company with two friends. I have been teaching local scouts for their foundation license and 7 have recently passed the exam. 2017 is 60th anniversary of Jamboree on the Air. I plan to develop a scout amateur radio club at Crawfordsburn Scout Camp. The GEARS club will continue to teach new hams.

Nominee	Known (years)
Derek C Chivers, G3XNX	20
Don Field, G3XTT	10
Robert Best, GI3VAF	35
Nigel Cole, GW7VJK	20
Frank Heritage, M0AEU	15
Steve Bunting, M0BPQ	11
Paul Lewis, MI1AIB	2
John McCullagh, GI4BWM	40
Allan Wilson, G3WNS	12
Henry Evans, GI0AZB	30

Sara McGarvey, 2I0SSW

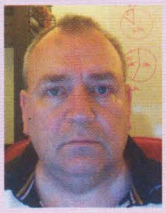
Curriculum Vitae: I have been an amateur since 2012 when I received my foundation licence. Since then I have had the opportunity to become an RSGB DRM in Region 8. I have also had the amazing pleasure of being Team leader for the 2016 YOTA summer camp where I was able to support young people to learn more about amateur radio and develop my own skills and knowledge. I have been the secretary of Carrickfergus ARG and a founding member of Hilltop ARC. Amateur radio has become part of my everyday life and I continue to grow, develop and learn new skills.

Personal Statement: I am a friendly, hardworking and passionate person. As a young professional I spend a lot of time working with and supporting young people. Amateur radio and the RSGB has given me many opportunities over the past few years including the chance to be the Team Leader during YOTA16 and to be part of the project team for YOTA2017. I am passionate about our hobby and I believe that our future is in the hands of the next generation. If elected to the board I would like to work closely with the RSGB Youth Committee, to build upon our current links with other youth groups and schools, to develop new links and to secure our future as a hobby and a society. As a female amateur I also think it is important that we encourage more women to engage in our hobby. Amateur radio has, for too long, been stereotyped as a hobby occupied by older males. I want to dispel this myth and work with the board and our current members to strive for a more diverse and active membership. Whilst I am only 28 I want to make it clear that I am professional, committed to our hobby and have the ability to work as part of the board in order to strengthen and support the growth of the RSGB.

Nominee	Known (years)
Trevor Hawkins, M5AKA	1
Kieran Clarke, 2E0NCN	1
Milo Noblet, 2E0ILO	2
William Campbell, MI0WJC	3
Eddie McCrystal, GI7FHZ	4
Sharon Lewis, 2I0SHZ	2
James Monahan, 2E0JPM	1
Leonard Paget, GM0ONX	5
Mary Paget, MM6PGT	5
Bobby Wadey, MI0RYL	5

Details on how to cast your vote can be found on page 52 of this edition.

Mike Tubby, G8TIC



Curriculum Vitae: I first joined the RSGB at the age of 13 as an SWL before becoming licensed in September 1979 at the age of 15 and have been a member of the RSGB ever since. I have an honours degree in Information Technology and am a member of the Institute of Engineering Technology (MIET). I have a good understanding of electronics, RF, computing and construction of transverters, power amplifiers, antennas and associated systems. I am a founder member of the BlackSheep Contest & DX Group M0BAA/G8T and have served as a committee member of Worcester & District Amateur Radio Society and Worcester Radio Amateurs Association.

Personal Statement: I run a business that specialises in high performance vehicle tracking, job dispatch and resource management systems for the emergency services, public utilities and public transport sectors in the UK, Europe and world-wide. As the managing director of a small business I am familiar with a wide range of issues involved in running SMEs including commercial, legal, technical, compliance and corporate governance. I am a dedicated and hardworking individual with good leadership skills and clear vision along with the ability to motivate staff and tackle difficult problems. I spend a significant amount of my time in the role of 'problem solver' where I able to bring a clear vision and sound judgement to dealing with difficult issues. I have extensive experience in VHF/UHF contesting and have been actively involved continuously from 1981 to the current day. I have also taken part in HF contests with G2W. The RSGB's corporate governance including its Articles of Association and Bylaws need re-working to transform the Society into one which is fit for the 21st Century. I believe that some aspects of the way that RSGB's committees work needs modernising to provide better communications, transparency and engagement with the membership and avoid controversies that have occurred with things such changes to recent HF and VHF contest rules. I want to see a thriving and successful RSGB but it has to be one that listens to its membership and works in their best interests.

Nominee	Known (years)
Dave Edwards, G7RAU	20
Tristan Quiney, M0VXX	10
Pete Badham, G0WXJ	12
David Dix, G8LZE	4
Reg Woolley, G8VHI	20
Carl Ratcliffe, M0ICR	8
Robert Offer, G1ZJP	20
Ian Hope, 2E0IJH	2
Tim Fern, G4LOH	15
R G Titterington, G3ORY	32

Philip Willis, M0PHI

Curriculum Vitae: Member Trowbridge and District ARC, RSGB City of Bristol Group, Wessex Contest Group. 2012: Advanced licence. 2014-now: Training and Education Committee Chair. Reorganised TEC in project teams. Added a Disabilities team and, working alongside Principia Schools, a Schools Link team. Train the Trainers confirms what a team approach can achieve. Work with RSGB Youth Committee, involving them in TEC's two major Principia exhibitions. Provided early input to Advanced Plus and have been involved with Ofcom negotiations. Organised "Try Something New" 2016 Convention talks. Identified the need, and successfully drove the process, to have an RSGB Equalities policy.

Personal Statement: I want people to be enthused by what radio can do, whether as a hobby or in their careers, whether actively involved or as an interested spectator. I wish to ensure amateur radio is available to all, from the very young onwards and regardless of ability. To those ends, we need an RSGB that is flexible, inclusive and supportive, in practice as well as in aspiration; one that continues its excellent support for Members and one that is adaptable to new needs. My role as Training and Education Committee Chair has enhanced my understanding of the breadth of our community. I have met fantastic tutors, schoolchildren bubbling with enthusiasm, teachers fired-up with what radio can do and volunteers keen to help others get as much out of the hobby as they do. I have promoted amateur radio in various ways: by recording pieces for TxFactor and the RSGB promotional videos, by staffing the Hamfest RSGB TEC stand, by working with Youth Committee on public events, by helping with Buildathons for young people and by speaking at the annual conference of the Association of Science Teachers. My background in the university sector has given me management experience, a thorough understanding of teaching and of finding good ways to work with colleagues. I have been lucky to travel abroad from time to time and see how other cultures operate. I would very much like to join the RSGB Board to use my skills to enhance all opportunities to enjoy radio.

Nominee	Known (years)
Stephen Hartley, G0FUW	7
Frank Lake, G4YXS	10
Ian Carter, G0GRI	5
Lewis Thomas, G4YTN	10
Paul Whatton, G4DCV	3
Daphne Neal, G7ENA	1
Alan Messenger, G0TLK	5
Nancy Bone, G7UUR	3
Robin Thompson, G3TKF	8
Philip Hosey, MI0MSO	3

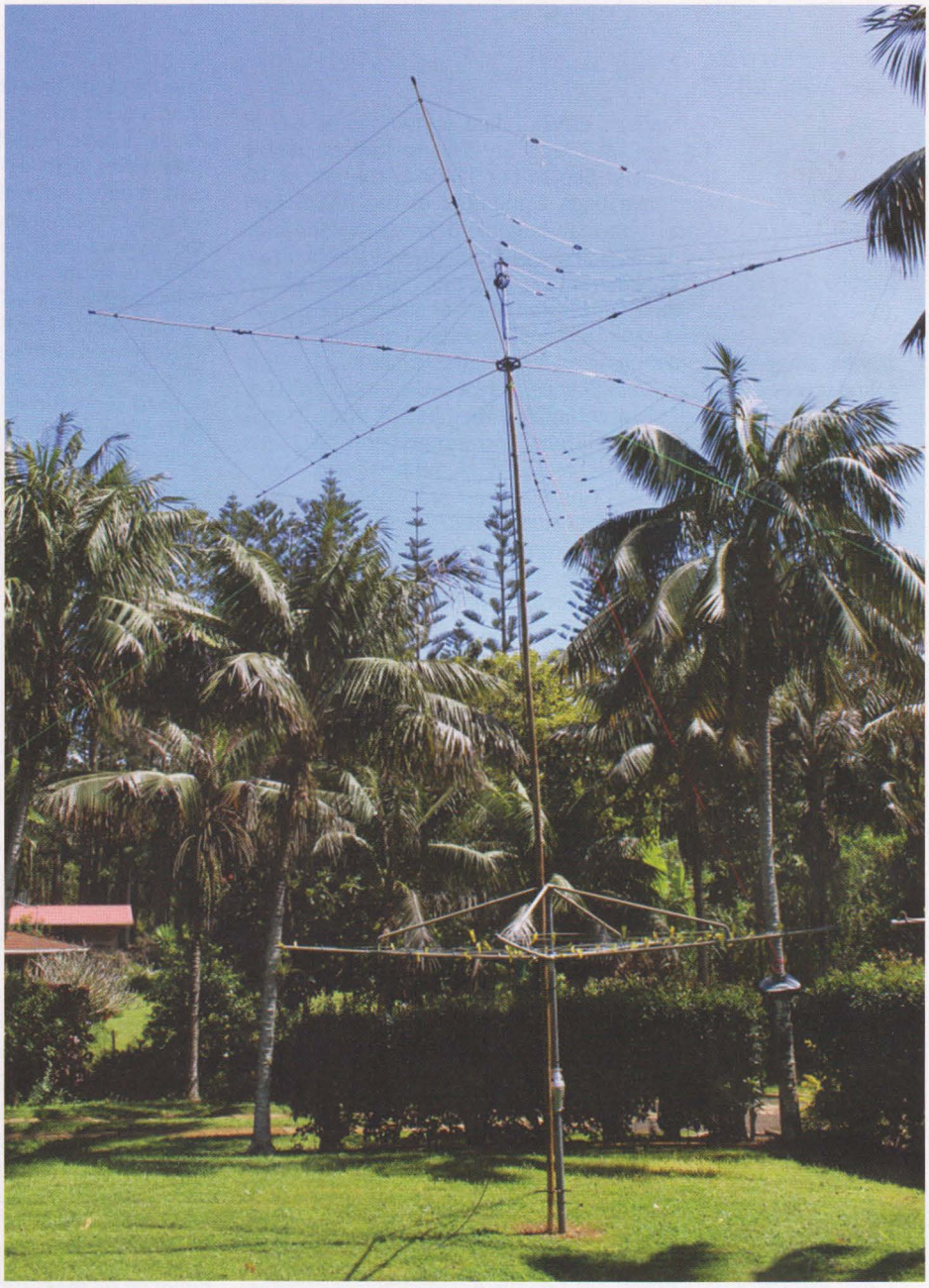
Feature

VK9NZ Norfolk Island 2016 DXpedition

After the successful DXpedition to Vanuatu as YJ0X in 2014 it didn't take long for the Quake Contesters to start talking about where they wanted to go next.

The criteria hadn't changed, ie it had to be reasonably rare, in the Pacific and XYL-friendly. After a long debate, Norfolk Island, being 95 on the Club Log Most Wanted list, was settled on for two weeks from the end of September 2016. The team comprised Vanuatu stalwarts Phil, ZL3PAH, Geoff, ZL3GA, Paul, ZL4TT with Mark, ZL3AB coming for the first week and Don, ZL3DMC for the second, as well as Maggie and Francie, Phil and Geoff's XYLs respectively.

Flights are weekly from Auckland so the focus soon became how much gear we could take while staying within baggage limits. Luckily Francie and Maggie helped with being able to carry extra gear so we ended up taking two Yaesu FT- 450Ds, two Elecraft K3s and three Elecraft KPA 500 amps. We also took four fibreglass poles to use with ground planes, and two hex beams along with the associated coax, wire etc. We soon became experts in how much you can fit into a bag and stay within weight!



The team used a rotary clothes line and bamboo to support one of their hex beams.

Island history

Norfolk Island is approximately 1100km north west of Auckland and 1400km east of Brisbane in the South Pacific Ocean. It has had an interesting and, at times, brutal history.

There is evidence of Polynesian settlement in the fourteenth or fifteenth centuries but the fate of that settlement is a mystery. The first European to discover Norfolk Island was James Cook in 1774 and he named the island after the Duchess of Norfolk, although unbeknownst to him she had died soon after he had left England.

It was settled in 1778 and at one point had 1500 people living there. The lack of a natural port hindered its development and the settlement was eventually abandoned in 1814 as it was considered too expensive to maintain. A second settlement occurred in 1825 for the worst of the worst prisoners from Australia although the scant records that remain suggest many prisoners were in fact first or minor offenders. Life was tough and punishment brutal for anyone who fell foul of the various governors. This settlement was gradually wound down and in 1855 finally abandoned.

When the Pitcairn Islanders faced starvation from overcrowding, Queen Victoria magnanimously offered them Norfolk Island as a replacement. They travelled there in 1856 and despite 17 returning to Pitcairn in 1858 and 27 a further five years later, the rest stayed and the descendants still live on Norfolk today.

An independent territory of Australia, recently Norfolk Islanders have been in the news protesting Australia's move to take back administrative control, which they did in July 2016. There was plenty of evidence of the protests to be seen while we were there.

The DXpedition

We arrived on 25 September 2016 and were met by Wayne, owner of the Anson Bay

Lodge, our home for the next two weeks, with a small pickup truck and our rental car. No sooner had we arrived at the lodge we set about organising the shacks. We had the use of three units so we set up the two K3s and amps in one unit for CW and RTTY and a Yaesu FT-450D and amp in the second unit for SSB with the other Yaesu FT-450D that we used as a 6m beacon. The third unit was used for meals and a break away from the radios.

By the end of the first afternoon we had set up ground planes for 30m, 40m and 17m and one hex beam. The ground planes were basically verticals on fibreglass poles with two raised radials. The hexes were two element folded beams and covered 20-10m.

After an evening meal in the main settlement of Burnt Pine we hit the airwaves in earnest around 0800UTC. Our first QSO was with K6LL on RTTY. The first couple of days were great with good pile ups and plenty of band openings. However geomagnetic disturbances meant the A index had started to rise rapidly and by Wednesday had hit 45. The impact on the bands was noticeable with signals a lot weaker. This slowed our rates down as we struggled to pick calls out of the noise. Signals from some parts of the world, notably Southern Africa, Scandinavia and Western Europe were largely non-existent.

The plan had been to concentrate on using SSB and RTTY and looking for Europe as that was where the demand was. However because of the conditions it soon became apparent that CW was going to be the most effective mode (and which was good as we all love CW). This was illustrated clearly when Mark, ZL3AB called CQ on 20m SSB long path to Europe late one afternoon. Normally that is a very reliable path but after 15 minutes with no takers he switched to CW and generated an instant pile up. By the end of the first week we had 11,500 QSOs in the log, of which around 8000 were CW! The A index remained over 20 for most of the first week and only started to settle down during the last three days of the trip.

Despite the conditions we very quickly settled into a routine of operating and we were constantly checking for band openings to try and maximise QSOs. 10m was a great case in point. In the first week it was quite unpredictable. Some days it hardly opened but on a couple of others we had good openings for several hours. 12m constantly surprised and we had a fairly regular opening to JA and NA during our morning and sometimes past lunchtime.

80m was a war of attrition. Thunderstorms combined with the poor conditions meant 80m suffered from high QRN during the first few days of operating. Even strong signals were hard to pick out in amongst the static crashes. We activated 80m at sunset each day for the first week and stayed on into the evening to pick up the grey line enhancement when the sun rose over North America. Paul ZL4TT would get up and do the (very) early shift through to sunrise. Paul was the team machine. How he managed to operate on the sleep he had was anyone's guess. A CW robot, we must teach him not to yell when doing SSB.

We had many requests for 160m. The plan was to modify the 80m vertical with a top loading wire for 160m and it performed very well. We worked 20 DXCC entities on 160m and 237 QSOs in quite poor conditions. Our best DX was FR4NT on Reunion Island. In comparison 80m provided 59 DXCC entities and around 750 QSOs.

40m and 30m, while open regularly, also suffered with weak signals but often there was a regular pile of callers to keep us busy.

The team put a multi-two entry into the Oceania SSB Contest during the middle weekend. Conditions were frankly awful and we struggled to generate anything like a decent rate. It was so bad Mark, ZL3AB left the country and was replaced by Don, ZL3DMC for the second week.

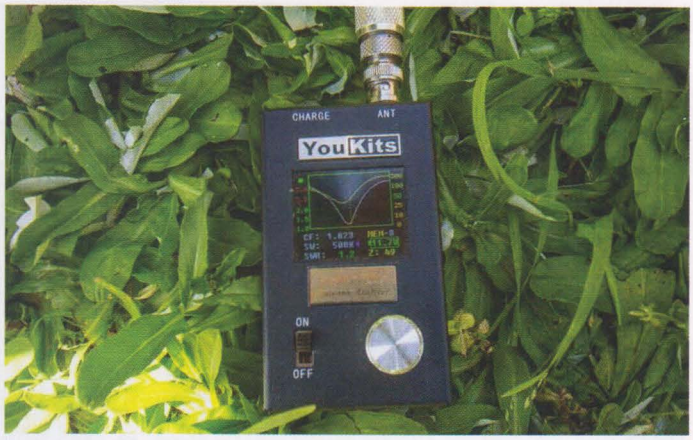
Don was thrown in at the deep end. This was his first DXpedition. 40m SSB in

Mark, ZL3AB, Paul, ZL4TT, Geoff, ZL3GA and Phil, ZL3PAH from the Quake Contesters.

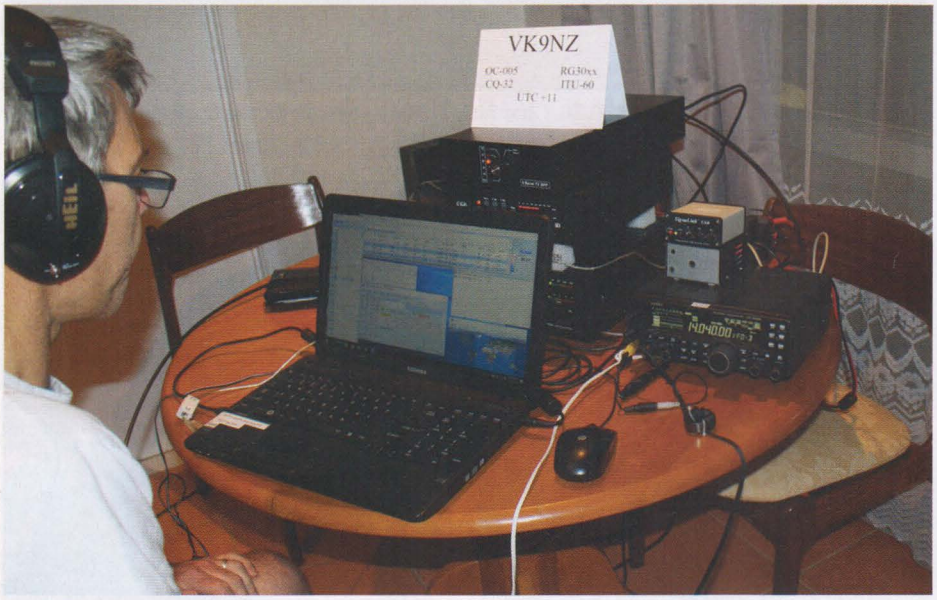
Geoff, ZL3AB, Don, ZL3DMC, Paul, ZL4TT and Phil, ZL3PAH, other members of the Quake Contesters.

Paul Ormandy, ZL4TT
paulzl4tt@gmail.com
The Quake Contesters

Anson Bay Lodge in NW Norfolk Island was the QTH.



The analyser shows the excellent match with the DJ0IP-inspired top loaded 160m inverted L.



Geoff, ZL3GA sat operating the SSB station.

the evenings with huge pile ups from Japan could hurt anyone's ears and so we sent Don off to the SSB shack and pretty much left him to it. He came out with ears ringing but lots of QSOs. We made an earnest effort with SSB particularly during the second week as Norfolk Island was needed by many on SSB and in the end we made over 4,700 SSB QSOs.

We also knew that Norfolk Island was needed by many on RTTY and we made over 4,200 QSOs using this mode. Phil spent much of his time on RTTY – we let him do this as otherwise he gets pretty boring reminiscing about the good old days of Creed 7Bs, the smell of the oil, the noise and the skill in keeping the machines going.

Nowadays it is very different and with the Multi-Rx facility on MMVARI we normally had 16 channels running in the audio passband, which meant we could see a lot of signals at once. It was just like shooting fish in a barrel. Just don't tell him there is no skill involved...

Better conditions

Conditions gradually improved during the second week. It was a pity Mark had already left as we really had a ball. We were amazed by the way 10m and 12m stayed open for extended hours. The difference between our home QTHs in the South Island and being that much farther North and closer to the equator was striking. But the money bands were 40m, 30m and 20m with 89, 84 and 88 DXCCs worked respectively.

No multi-station DXpedition runs well without an IT expert nowadays and Geoff, ZL3GA filled that role for us. We used N1MM+ logger in DXpedition mode with Geoff making sure all the laptops were networked so we could see what everyone was doing and who they were working. It was really fun trying to keep your rate above the other guys. Geoff also set up a link with Club Log to upload our log to their DXpedition page so people could see if they were in the log. Just prior to the trip Phil told Geoff about QSO Director (www.qsodirector.com), which was a real time log website. Geoff set up a link and you could literally work us then then moments later see your QSO appear on the QSO Director website to confirm you were in the log.

In summary

Shutdown was 11am on 8 October 2016 to allow for pack up before flying out the following day. Our last QSO was with JA0DCQ and we finally stopped Paul two minutes after official QRT time. If we hadn't pulled the plug he could well still be there. We had made over 20,000 QSOs that, considering the terrible conditions, we considered acceptable.

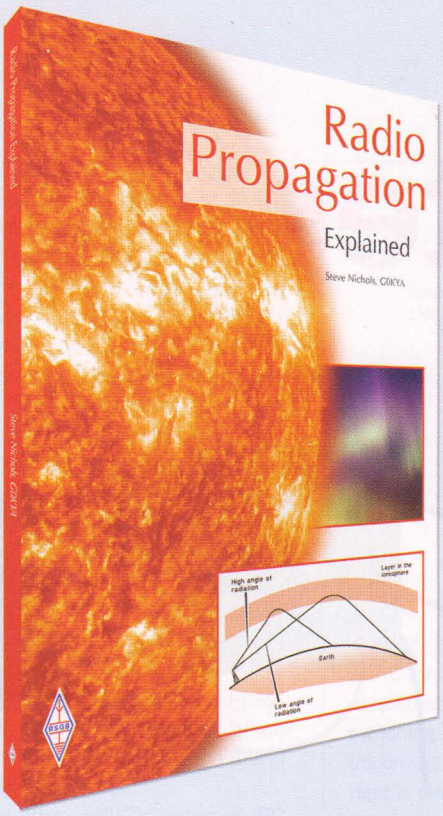
In summary we had a wonderful time and despite the low ranking on the Most Wanted list we had plenty of callers over the whole of the two weeks. We all learnt something during the time we were there and we are sure we all came back better operators. The DXpedition just reinforced for us all how much more fun amateur radio is when you are part of a group.

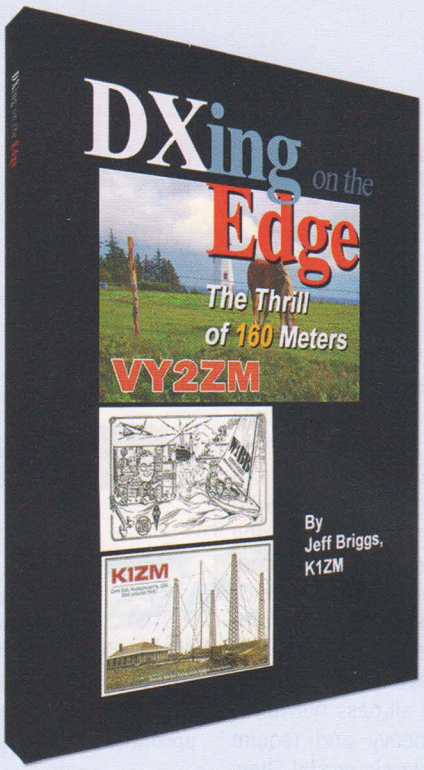
We are most grateful to all our sponsors, Elecraft, Chiltern DX Club, German DX Foundation, GMDX Group, Southern German DX Group, European DX Foundation, the RSGB and the Clipperton DX Club for their support. And to Francie and Maggie for coming and cooking and keeping us company. They still don't know why we do what we do but they are very accepting and we are grateful. And to all those amateurs around the world for providing so much fun with some huge pile-ups, thank you. We hope you all had fun too.

Now we are home. The QSL card is printed and the QSLs requests are flowing in. By the time you read this the cards will have been dispatched. We have already posted the logs to Logbook of the World.

The Quake Contesters will be back with a new destination in a couple of years. We can't wait.

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.

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

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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,
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Design Notes

Weaver (Third Method) in DSP

Generating SSB using image rejection or quadrature mixers has always been a favourite technique for the theorists and experimenters, but its implementation always suffers from practical problems. The main problem with generating an SSB signal by quad-mixing is generating the In-phase and Quadrature audio in the first place. Getting an accurate 0° and 90° phase shift for all frequencies from 300 – 3000Hz has been a problem. Over the years many techniques have been used such as polyphase and opamp all-pass networks, but all are component-heavy and require tricky setting up. Hence classic crystal filters have reigned supreme as SSB sources until digital signal processing took over.

It the June 2014 Design Notes we saw the design by Martin Farrell, G8ASG for a Weaver (Third Method) audio converter using switched capacitor filters. As a quick reminder, the Third Method of SSB generation is a technique that first of all involves 'folding' the audio spectrum back onto itself by quadrature mixing with an audio tone at around 1700Hz at the middle of the audio passband. The resulting baseband (zero to 1600(ish) Hz) I/Q stream then only requires low pass filtering to properly restrict the audio bandwidth and remove mixing artefacts. The two quadrature baseband signals can then be directly upconverted to RF and the full band recovered in a second quad-upconverter.

The advantage of the Weaver method is that the mixer image from the second RF upconversion caused by improper I/Q balance falls on top of the wanted signal, where it can cause far less 'damage' than if it were to fall adjacent, as conventional quadrature upconverters would do. An image rejection of even as low as 20dB would be acceptable on top of an SSB voice signal; for data modes even lower image rejection would suffice. But this level of image rejection at a few hundred to 3kHz away, such as would result from conventional upconverters, is totally unacceptable. A Weaver upconverter specifically for low bandwidth signals at LF/MF can be found at [1].

The 'Holy Grail'

Back in the October 2013 Design Notes I issued a challenge to designers to do an audio phasing or Weaver downconverter in a single chip, such as a dsPIC with its integral A/D and D/A converters. The 'Holy Grail': a design to simplify homebrew SSB transmitters from DC to the Planck Band [2]. It ought to have been possible; I had no programming experience with dsPICs so threw down the gauntlet to others. After repeating this challenge on a recent RSGBTech posting, Martin responded:

"I did a Weaver Tx last year as a project to learn dsPIC coding and DSP. It certainly is a steep learning curve. No attempt was made to optimise microprocessor time; as I had the processor cycles available, I used them. I enclose my assembler program for a Weaver/phasing TX in one IC, the dsPIC33FJ64GP802. Whether there's any point in it I can't say. I came to the conclusion that if I was going to use SMD construction, I might as well use a proper 16 bit codec and have a free choice of processor type. Audio DACs are only available in a few devices and those only have 12 bit ADCs. To demonstrate its sound, there's an MP3 file on 7.5MHz fed with audio from a PC with an HC4053, HC74 and 30MHz canned oscillator. I think it sounds pretty good. Certainly better than those B&Q phasing modules of our youth. If you want a programmed DIP (sorry, it's got legs) to try, just let me know."

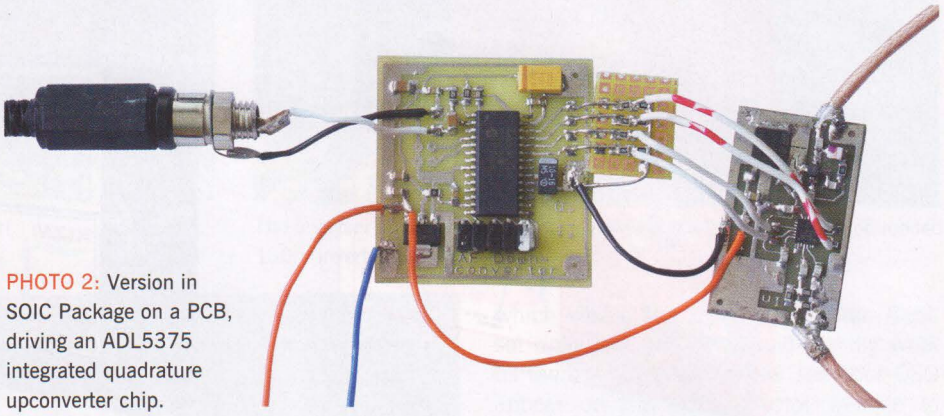

PHOTO 2: Version in SOIC Package on a PCB, driving an ADL5375 integrated quadrature upconverter chip.

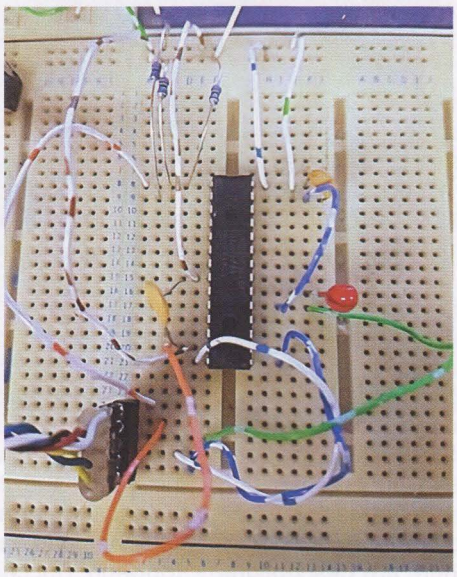

PHOTO 1: G8ASG's test breadboard of the dsPIC Weaver / quadrature audio converter.

Practical hardware

Figure 1 shows just how simple the circuit diagram is. I didn't take up Martin's offer of a programmed dsPIC33FJ64GP device – that would have been a cop-out and as readers know, 'JNT doesn't 'do' DIL packages! **Photo 1** shows G8ASG's breadboard of the design. Instead I decided to make sure I could program the supplied hex code into blank devices, so purchased two of the specified dsPIC chips in SOIC package (they cost less than £5 each from Farnell) and mounted them on a small PCB, as can be seen on the left of **Photo 2**. My Pickit 2 programmer with the latest, albeit outdated, support software had this dsPIC in its library so all looked OK. Martin's .HEX code appeared to successfully load into the chip, but the final result didn't work. After a couple of email exchanges Martin realised what was wrong, and supplied me with a full, larger complete 'image' .HEX file. That worked perfectly. He then 'persuaded' me that downloading the MPlab programming environment might be a good idea – more about that later.

Andy Talbot, G4JNT
andy.g4jnt@gmail.com

dsPIC audio converter

The design, as it stands, samples an incoming audio waveform at a sampling rate of 27.2kHz and passes it though a 300Hz to 3.2kHz bandpass filter. The filtered samples are then mixed with a quadrature sine wave at exactly 1/16 of the sample frequency (1.7kHz) to give the two baseband channels, which are lowpass filtered to 1.5kHz. They are then sent to the two-channel D/A converter and output as I/Q differential analogue outputs.

As an alternative, by pulling a pin on the chip low, the 1.7kHz mixing is missed out and the device functions just as a 0°/90° phase shifter. The output then consists of bandpass filtered 0 and 90° versions of the input. Using DSP to generate this 0/90° split over the complete audio voice band is far more accurate than any polyphase or all-pass solution Another pin on the device, when pulled low, swaps the polarity of the sideband conversion: USB/LSB control.

For simplicity, the dsPIC's internal RC clock oscillator is used to generate the 27.2kHz sampling and hence the 1700Hz 'centre' frequency. This RC oscillator is only guaranteed to within around 2% frequency accuracy so this 1700Hz centre could be off by up to around 34Hz. For voice this doesn't matter as it would just be taken out in the overall tuning, but for critical LF narrowband data applications it could be significant, especially if the frequency drifts with temperature. The solution is either to use conventional phasing upconversion – where the unstable sampling cancels out and does not influence the output frequency, but the image response of the RF upconverter can be a snag – or to modify the dsPIC firmware to run from a crystal or external high stability clock input.

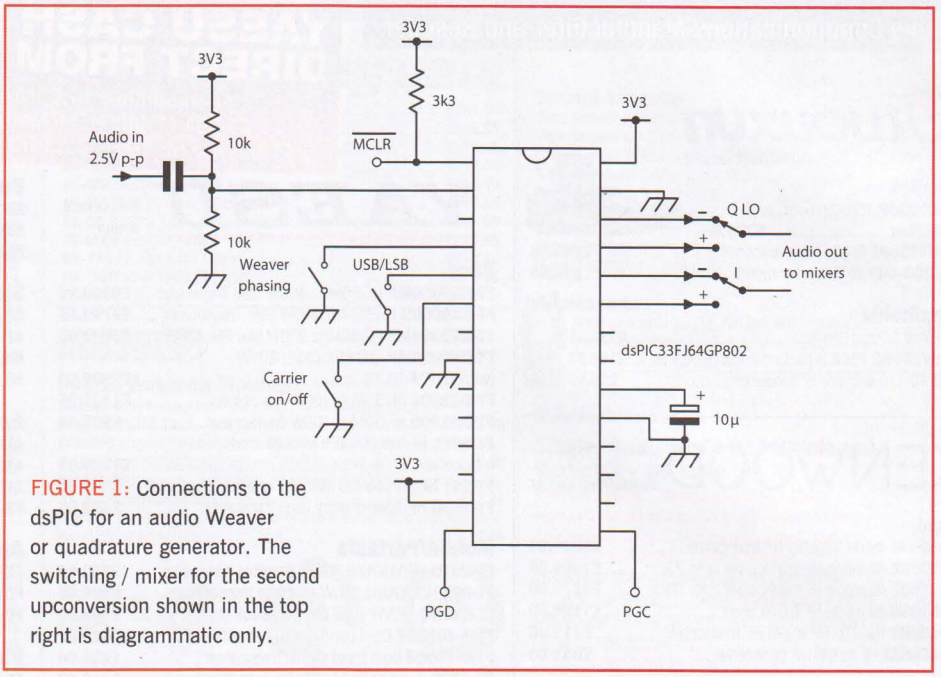

FIGURE 1: Connections to the dsPIC for an audio Weaver or quadrature generator. The switching / mixer for the second upconversion shown in the top right is diagrammatic only.

Using and programming dsPICs

As I proved, a simple (obsolete) PIC programmer with its support software was all that was needed to blow pre-compiled .HEX code into the chip – so long as it is the complete .HEX image (not a shortened version MPLAB can work with). No knowledge of dsPIC programming is needed, just a suitable programmer and driver software – but that wasn't enough for 'JNT! Martin supplied the source code as well as the .HEX file so of course I studied that (the .S file or source code) and was delighted to see it was written in pure assembler language – not C. While this comment may sound odd, or even weird, to a majority of readers, I just do not like C. I just cannot get on with it, whereas I am very familiar with basic PIC-family assembler. I also used to play with the Motorola DSP56002 in assembly code some 20 years ago so DSP assembly language isn't a complete mystery. Looking through the dsPIC programming reference manual it all came flooding back and in spite of a completely different architecture and command set, nearly all was familiar. This was in spite of the chip and command set having moved on after nearly 20 years of progress. But I still had no programming tools, specifically an assembler, for the dsPIC family.

Martin suggested I download the MPLAB programming environment from the MicroChip website – not the latest MPLAB-X suite that they are trying to push, which is more geared towards programming in C, but the older MPLAB V8.92, which can be found as a full installation package in the Archives page. After a short learning cycle involving 'projects' and 'includes' I soon had Martin's source code compiled and running. I added minor changes related to gain and DC offset settings, and a carrier injection option. There's going to be a lot more learning to do before I make any *major* changes to the code though!

G8ASG has agreed to make his original code available, both source and compiled, so

Continued on page 38

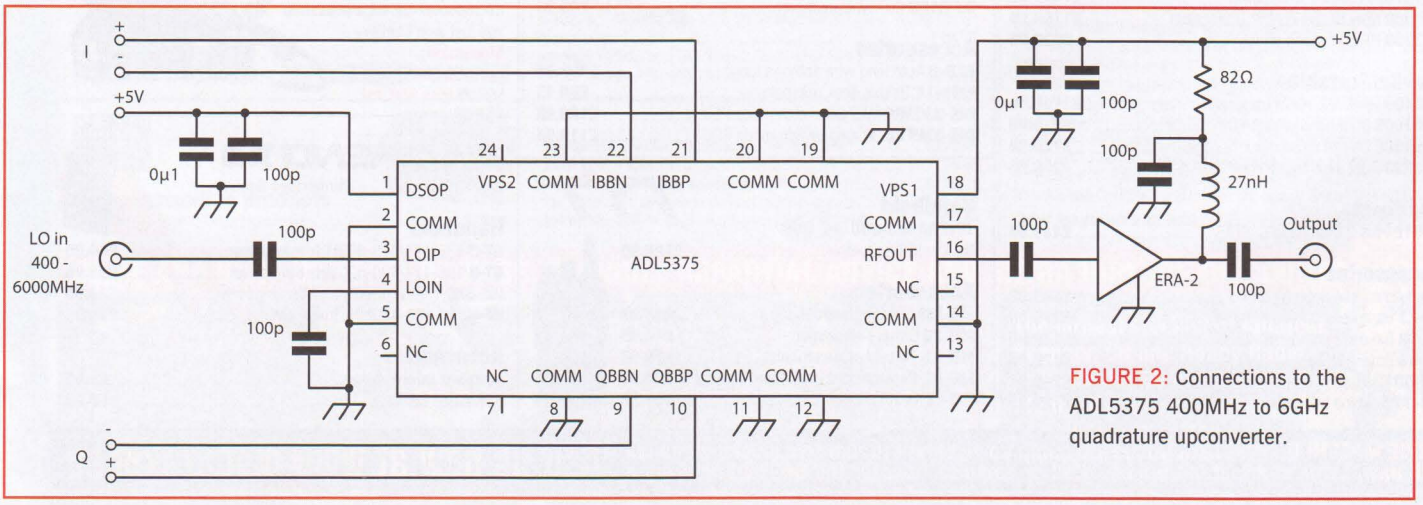

FIGURE 2: Connections to the ADL5375 400MHz to 6GHz quadrature upconverter.

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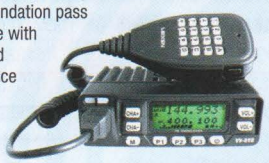

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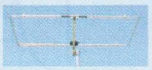

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Antennas

The length of an HF helical vertical antenna can be made physically short, making it a good possibility where the space available to install an antenna is limited. This month's column examines a compact vertical antenna design using two examples built for the 20m and 40m bands.

The helical vertical antenna

A compact vertical antenna can be constructed by helically winding an electrical half wavelength (λ/2) of insulated copper wire onto a suitable length of plastic pipe of at least 20mm in diameter. A short length of metal tube is connected to the wire end at the top of the antenna to act as a capacitive load. The lower end of the wire forms the antenna's feed point and the antenna is worked against ground as effectively a quarter wavelength aerial system. An advantage of this vertical antenna system is that it does not require the use of radial wires, however the feeder cable should be run over the ground to the shack to maximise the antenna's performance. The antenna's voltage and current distribution is more linear than when lumped-inductance is used and is a possible reason why this technique tends to result in an effective antenna. This vertical antenna design was described in the 1976 *ARRL Handbook*, where a variable inductive tuning arrangement was used to match the antenna to the feeder cable [1].

This antenna is particularly useful for limited-space applications for the lower HF bands (eg 1.8–14MHz). The antenna can be used for the higher HF bands, although its use tends to be desirable only when an antenna of shorter than a natural quarter wavelength is required. The concept of this antenna is shown in **Figure 1**, where a 1:4 unun (unbalanced-to-unbalanced) auto-transformer was used to match the antenna to the coaxial feeder cable (based on the VK6YSK unun design described in the January 2017 *Antennas* [2]).

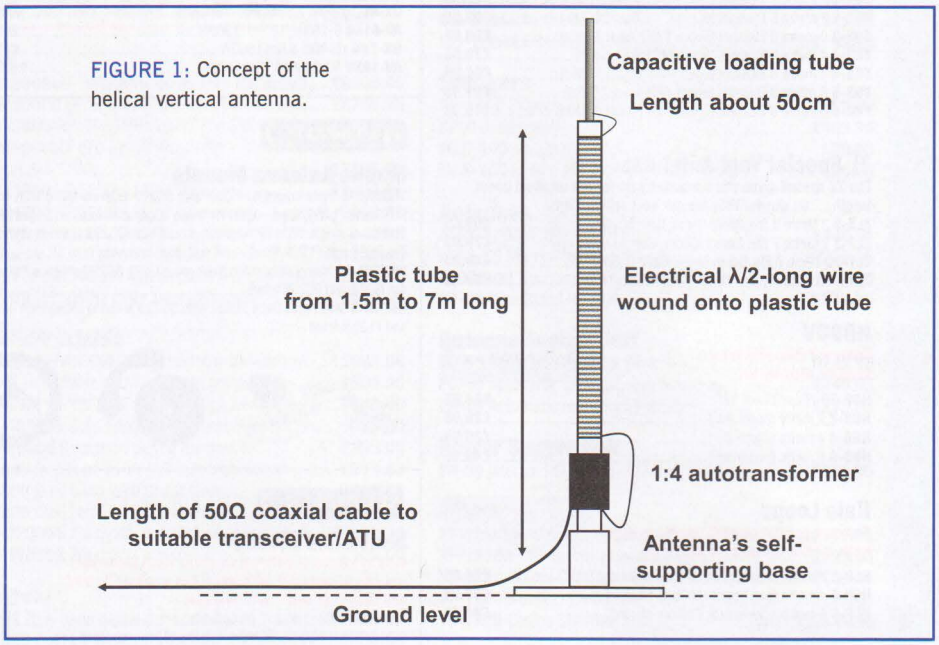

FIGURE 1: Concept of the helical vertical antenna.

A 20m helical vertical antenna

A version of the helical vertical antenna for the 20m band was made using a 2m length of 20mm diameter plastic electrical conduit as the antenna's former. This type of electrical conduit is available from many electricians' suppliers and DIY outlets, however a robust variety of conduit should be chosen that does not bend easily. Onto this plastic conduit was wound 8m of insulated single core wire of 1.5mm diameter (giving an electrical λ/4 in this particular case). The winding started about 40cm along the electrical conduit with approximately 100 helically wound turns extending out over the remaining 1.6m length to form the antenna's inductive section. Five equally spaced cable ties were used to hold the inductor's windings in place onto the conduit. A length of aluminium tube of 12mm diameter was secured to the top of the conduit to form the capacitive load. About 50mm of the aluminium tube was slid inside plastic conduit and fixed in place using two self-tapping screws passed through the conduit, with 520mm of tube left protruding above the top of the conduit. The inductor's upper end was connected to this tube just above where it emerged out of the conduit. This connection was made by first drilling a small hole into the tube and using a self-tapping screw to hold a ring-tab in place. The wire was soldered to the tab and a smear of grease used to weatherproof the joint. The final length of the assembled antenna was 2.52m.

A 1:4 unun auto-transformer was used to match the antenna to the 50Ω coaxial feeder. The unun comprised 9 bifilar wound 2-wire turns on a T130-2 toroid core. The circuit of the unun auto-transformer used here was shown as Figure 5 in the January *Antennas* column and this should be referred to if you're unsure what to do. The unun was housed in a small ABS box and two 20mm saddle-camps were fixed to the back of the box to allow it to be secured to the lower end of the conduit. The coaxial cable feeder and antenna wire were passed through holes in the ABS box and soldered to the unun. The ABS box and the cable access holes were sealed with external grade sealant to weatherproof the assembly. **Photo 1** shows the 1:4 unun housing arrangements used for the 20m helical vertical.

PHOTO 1: The 1:4 unun auto transformer using a T130-2 toroidal core used to match to the helical vertical 20m and 40m antennas.

A plywood base was made to support the antenna when in use. This base comprised a 300mm length of 25mm diameter electrical conduit that was held vertically in position on the plywood board using three angle-braces and Jubilee clips. Four 350mm long horizontal

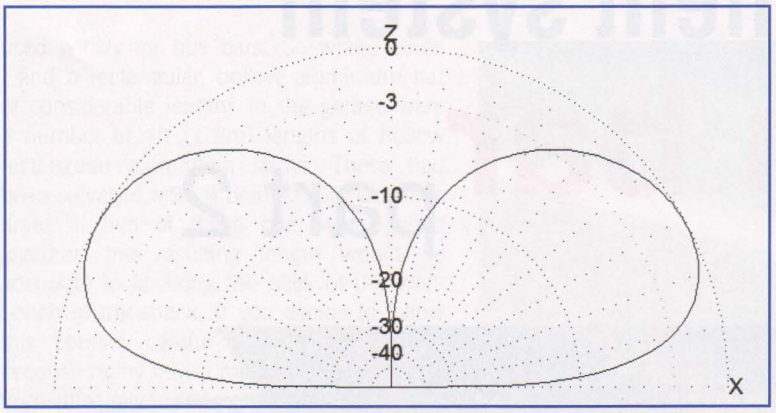

FIGURE 2: MMANA-GAL predicted vertical polar radiation pattern for the 20m antenna. A very similar pattern was predicted for the 40m version.

PHOTO 2: The base design used to support both antennas.

supports, made from 25mm oval conduit, were screwed to the bottom of the base at right angles to enable it to stand upright on the ground when the antenna was slotted into the 25mm conduit. **Photo 2** shows the base that was constructed for the antenna.

To tune the antenna to 14.15MHz, 10m of coaxial cable was connected to the antenna's unun auto-transformer and the antenna was set up on the ground clear of local objects. For testing, an antenna analyser was connected to the end of the coaxial cable to monitor the SWR. Initially, the antenna's inductive section was formed by helically winding 10m of wire on to the 20mm conduit. The inductance was reduced by trimming the wire and the SWR monitored until a good match was obtained. The gaps between the helical winding were also altered as part of the tuning process. The antenna was resonated at 14.15MHz, where it gave an SWR of 1.3:1. The antenna's inductance was measured using the MFJ antenna analyser and found to be 2.7μH. This correlated closely with the calculated inductance of 2.5μH using the equations published in the *Radio Communication Handbook* [3].

Using this information, a MMANA-GAL model was made of the antenna to examine its performance. The model predicted a low angle radiation pattern of about 25° to the horizontal and a gain of about -0.35dBi with the antenna at ground level. **Figure 2** illustrates the predicted radiation pattern for the 20m helical vertical antenna.

Although the antenna was resonated at 14.15MHz, it gave an SWR of 1.3:1 across the band from 14.0 to 14.3MHz. Under a load of 100W CW the antenna maintained an SWR of 1.3:1, however for operational use an ATU was used. A comparison of the 20m helical vertical antenna was made with a G5RV and 20m long end-fed wire. Generally, the signals received using the 20m helical vertical were about 1 S-point lower compared to the other antennas. However, surprisingly, some signals were received at an equal level when compared to the other antennas.

The 20m helical vertical antenna has been used by Roy Emery, G3FYX. It was set up at ground level at his QTH. This antenna has enabled many contacts to be made throughout Europe and across the Atlantic using 100W SSB/CW on the 20m band. **Photo 3** shows the antenna set up in G3FYX's garden, next to his summer house.

A 40m helical vertical antenna

A 40m version of this antenna design has been constructed using a similar technique to that used for the 20m helical vertical antenna. The 40m version used 19m of insulated single core copper wire to form the inductor, needing approximately 260 helically wound turns. An aluminium tube of the same length and diameter as described earlier was connected to the top of the inductor to form the capacitive load. The antenna was tuned on 7.1MHz using the same technique as before.

The 40m antenna's inductance was measured as 16.5μH and this tied up closely with the calculated inductance of 16.8μH. The matching arrangement was the same as that used for the 20m version, using a 1:4 unun auto-transformer.

A MMANA-GAL model was also made of the 40m vertical helical antenna to examine its performance when operated at ground level. This predicted a radiation pattern for 40m that hardly differed from the 20m version's pattern shown in Figure 2, although the model predicted a slight improvement in the gain to -0.2dBi.

Many stations have been worked all over the UK and Europe using 70W SSB/CW on 40m band using this antenna with an ATU. Received signals were about 1 to 2 S-points lower compared to the G5RV and λ/2 end-fed wire antennas. However, this was to be expected for a very short antenna on 40m.

Other bands

This antenna design has been used on the 60m and 80m bands using a 75mm diameter tube and caused quite an amount of interest when the antennas' details were given as part of each QSO. Similarly, these antennas were also about 2.5m long and operated at ground level. My aim is to describe these antennas in a future *Antennas* column.

PHOTO 3: The 20m helical vertical antenna in use.

Conclusion

This antenna design is useful when there is only limited physical space available and particularly benefits from not requiring an elaborate ground system.

Websearch

[1] 1976 ARRL Handbook, 53rd edition, Chapter 21, HF Antennas, p606-607

[2] VK6YSF Projects, Peter Miles – http://vk6ysf.com/unun_9-1.htm

[3] *Radio Communication Handbook,* 13th edition, edited by Mike Browne, G3DIH, Appendix A, General Data, Coil Winding, pA.3

Mike Parkin, G0JMI
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Cable management system and earth bar part 2

After last month's description of the cable management system we conclude with a look at a low impedance earth bar for shack radio equipment.

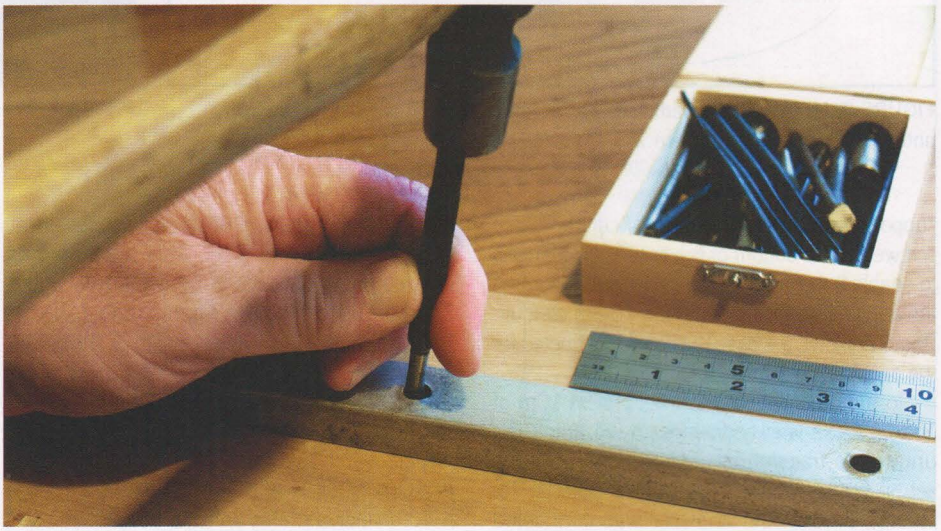

PHOTO 4: Removing indentations from opposite side of earth bar.

Development of the earth bar

My first thought in searching for material to make an earth bar was to find some new or second hand copper bus bar or lightning conductor. When I recovered from the shock of how much this would cost, I set to thinking in greater depth about the conditions to be satisfied by an earth bar. It must be highly conductive to HF currents but, due to the skin effect, this is necessary *only* at and near the surface. The skin depth in aluminium at a frequency of 1MHz is only 82 microns, less than one tenth of a millimetre, and gets shallower as frequencies increase. So even very thin grades of aluminium would suffice. You can find a very useful skin depth calculator for various substances and frequencies at [5].

Whilst the bar should have a large external surface area, the core is not needed at all. Although copper is ideal, aluminium is more readily obtainable and has been

Punching holes in sheet aluminium to receive self-tapping screws

Here is an extremely quick and simple method of making excellent mechanical and electrical connections to aluminium sheet at any point. First imagine that a hole is drilled through thin sheet aluminium to receive a self-tapping screw. The result will be weak, as shown on the left of Figure 5. This is because only one or two of the screw threads can cut into the metal. It is very easy to strip a thread formed in this way.

A far better method is to punch a hole for the screw thread to cut into. I use a sharp, hardened steel spike and an 8 ounce hammer, seen in Photo 6. No drilling is necessary and little force is required. Punching forms an 'inverted volcano' profile in the metal. The tapering opening allows screw threads to bite into the sheet aluminium over several times its own thickness, as shown in the middle of Figure 5. It is much more difficult to strip the threads so formed.

PHOTO 6: Tools used to punch holes.

In practice it is easy to control the size of the punched hole. The general rule is to punch too small and enlarge only if necessary. Usually the screw will do the job of enlarging and sizing the hole perfectly, whilst cutting threads at the same time. It need hardly be added that the screw, having produced the threads, will be in very intimate contact with the metal, which is ideal for mechanical strength and electrical continuity. The screws shown in Photo 6 are known as self-tapping or 'binder' screws. Many other types of self-tapping screw are suitable. The length of screw is not critical. If it is too long, then additional grip will result as it bites into the wooden core of the earth bar, as shown to the right of Figure 5. I prefer to use only screws of the same length and diameter. However, if larger diameter screws must be added for any reason, then it is a simple matter to punch a little deeper to increase the diameter of the hole.

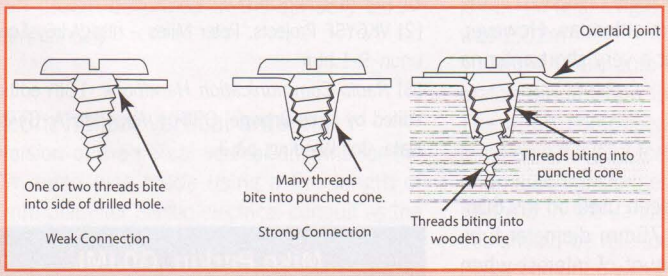

FIGURE 5: Drilled and punched connections in earth bar.

used widely for bus bars. So where could I find a rectangular, hollow aluminium bar of considerable length? In the garage were a number of 4ft (1.2m) lengths of hollow rectangular aluminium struts. These had been salvaged from a defunct rotary clothes dryer. If two of these bars were joined together, the resulting length would be adequate to fit along the back of the work bench in my shack. If you decide to follow this course, careful selection is needed because many newer rotary dryers are made from thin galvanised or even painted steel. Inferior results are to be expected from these.

I wanted to make a strong connection between two of the hollow bars, avoiding mechanical weakness and poor conductivity at the join. First, all plastic ferrules or grommets used to support the cords of the rotary dryer were removed. Then I used a hammer and punch to flatten their indented holes. To do this, I worked around the hole from the opposite side of the indent, tapping against a flat wooden block. **Photo 4** shows how this was done. Over the number of holes involved this is a little tedious, but is essential to allow easy insertion of a closely-fitting hard wooden core for reinforcement.

The core is preferably made from a single strip of the toughest wood available. Its length should exceed the total length of the hollow bars to be joined. Thin it down as necessary to slide into the rectangular tubing, using for example, a circular saw or hand plane. The objective is little or no gap between the wood and aluminium. Do not insert it yet.

Slit the corners at the end of one tube. This is best done by placing a hacksaw blade inside the tube and cutting outwardly at the corners. The blade should be inserted almost parallel to the length of the tube, to avoid snagging. The blade can be held by wrapping a thick rag around the outer end to form a handle. After sawing the slits, the corners are rounded off using tin snips and a file. Bending the ends out a little will ease this task. This process forms four connection tabs.

The two rectangular tubes are then slid onto the wooden reinforcement. To assist smooth insertion, rubbing the wood with a candle will lubricate it. Where the tabs on one tube meet the plain end of the other tube, they are raised and the tubes are forced together. The raised tabs are then flattened back against the sides of the plain tube. Holes are drilled through the larger tabs and wooden core, to take a pair of machine screws with nuts and anti-shake washers. The smaller tabs are drilled for self-tapping screws, offsetting them to avoid clashing with the machine screws. The plain end of the bar underneath the smaller tabs is punched to receive self-tapping screws (see sidebar for details). The finished arrangement, which provides a good physical and electrical connection, is illustrated in **Photo 5**. Any wood left projecting at the outer ends of the earth bar is trimmed off. Before making equipment connections to the earth bar, it is combined with the cable management system and mounted on the working surface.

PHOTO 5: Joint between lengths of rectangular tubing.

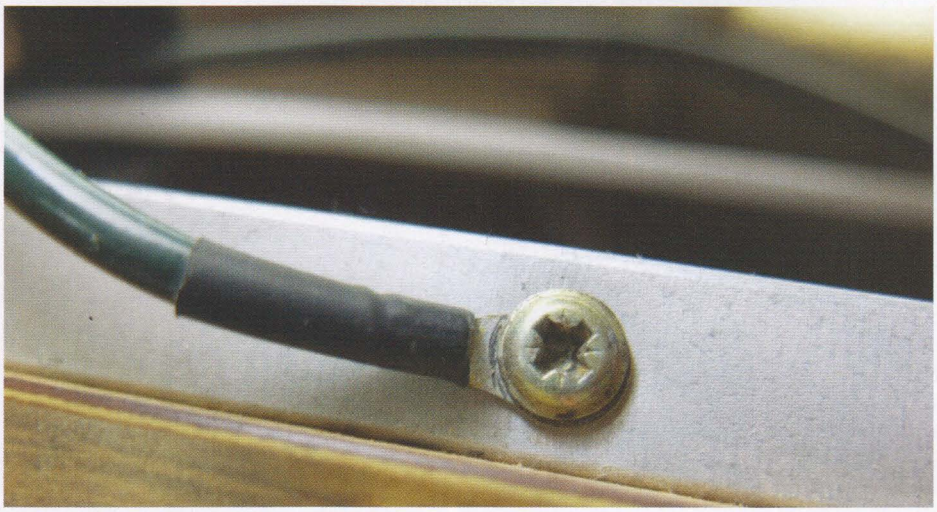

PHOTO 7: Connection made to earth bar.

IMPORTANT: as mentioned last month, all references to and descriptions of safety electrical earthing in this article are for general guidance only; for specific advice the RSGB strongly advises you seek the guidance of a suitably qualified person. Readers outside the UK should also note that their local electrical arrangements may differ from those described here – Ed.

Combining the earth bar and cable management system

Photo 3 (last month) showed one of the screws holding both the earth bar and a J-clip against the rear edge of the bench.

My shack bench is a kitchen worktop about 25mm thick, made of particle board with a hard surface. The rectangular aluminium tubes, formerly used as an outdoor clothes drier, conveniently already have holes that were formerly used for the drying line. These have about 5 inch (130mm) spacing. A hand drill is used to penetrate the wooden core of the earth bar at each of these locations, leaving a close clearance hole for the fastening screws. I recommend stainless steel screws. You can find bargains on the internet; buy in quantity and get rid of all those rusting screws in the garage! The first cost is greater but stainless screws don't corrode or rust solidly into their holes. I have been using and re-using them out in the garden for decades. 2-3 inch No 6 screws (50-75mm x 3.5mm) will be fine for this job. Pass each screw through the hole in the J-clip and then through the hole in the earth bar and on into the rear of the bench, as

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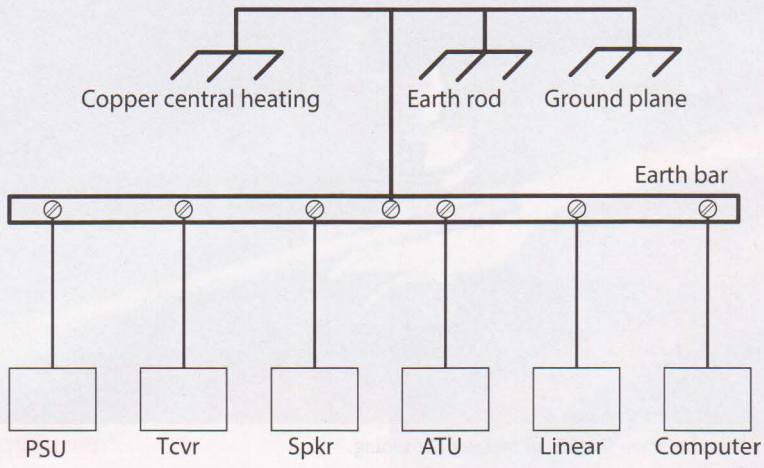

FIGURE 6: Plan schematic view of station earthing arrangement.

shown in last month's Photo 3. It may seem excessive to use screws at 5 inch spacing, but apart from the convenience of using the already-present cord holes, excellent rigidity and support is achieved for punching each hole required to make an earth connection at any location.

Making connections between equipment and earth bar

I like to solder ring terminals onto both ends of each earth cable. One end is connected to the equipment and the other is screwed to the earth bar as shown in **Photo 7**. The earth cables are kept as short as practicable, but a little slack is left to accommodate any movement of the equipment.

Each earth connection hole is punched into the upper surface of the earth bar. Happily, this surface is easily seen and reached from the front of the workbench. It is obvious that this system allows a connection to be made quickly at almost any point along the earth bar. If at any future time a connection is removed, its screw can remain, tightened down, so that the screw hole is covered neatly. I have found this handy when later changes necessitated re-connection to earth at the same point.

Adding and removing cables

There is a simple, but perhaps not entirely obvious secret to laying cables so that they can never tangle. Those who have been struggling for years with cables will benefit greatly! It consists merely of connecting both ends of each cable, before laying it in the J-clips. It does not matter whether each cable runs from box to box, or from a box to a wall socket. Connecting both ends prevents the cables from snaking about and tangling with each other. The method is topologically sound. The cables will lie parallel to each other in the J-clips and can be removed freely at any time, with or without disconnection.

Earth source

The question is often asked, "What makes the best RF earth?" The answers range widely from purpose-designed counterpoises to extensive earth mats. Deep vertical copper spikes and buried drums of sal-ammoniac surrounded by coke are less in favour these days, because the frequencies we use are higher and HF currents tend to flow near the Earth's surface (remember the earth mirror cited earlier). My method is to hedge my bets, particularly because I want an earth to work at all HF frequencies.

I use all three of the following: insulated copper wire radials in the surface of the lawn, a connection to the copper central heating pipework and a three foot (1m) earth spike. These three are joined to a short lead connected to the centre of the earth bar, my shack being conveniently on the ground floor. The short earth lead from the earth bar should be highly conductive; car battery earth braid would be suitable. Note that more recently-installed plastic pipework will be useless as an earth. It is increasingly likely, as time goes on, that our homes will be connected to plastic underground water mains by plastic incomer pipes. It is also likely that plumbers making cheap repairs will replace sections of copper pipe by plastic, so an eye must be kept on this situation.

Even with well earthed copper pipework it is worth knowing that some newer copper push-fit connectors will not guarantee earthing continuity.

Special note on electrolytic corrosion

In constructing the earth bar, and in making connections to it, practical considerations dictate that dissimilar metals are joined together. Such metals occupy different locations in the galvanic series **[6]**. At the central mechanical connection, for example, stainless steel screws are in intimate contact with aluminium; the smaller self-tapping screws are made of galvanised steel. The ring terminals are silver-plated copper. Placing dissimilar metals into contact where moisture vapour and oxygen can penetrate invites the risk of electrolytic corrosion. In a well-maintained dry shack, the risk of poor connections should be small, but it could be a very different matter in, for example, a garden shed. In the latter case it may be prudent to coat all connections with a sealant such as clear silicone. I have found this very effective, on outdoor SHF connectors, over decades.

Concluding remarks

The final arrangement has been operating very satisfactorily in the shack for five years or more. It is shown in a simplified, schematic plan view **Figure 6**. It may seem a lot of trouble to go to, but will be saving time and avoiding 'cable frustration' for many years into the future.

During the time that this article was being processed for publication, the Station Manager decided that my radio shack was due for complete re-decoration. All the equipment had to be disconnected and removed. The cables remained, held in the J-clips. The entire 'wiring harness' was lifted out intact, together with the working surface (bench). After decoration, it was child's play to re-make all of the numerous connections since all the wires, plugs and earthing leads were in exactly the right locations. This added up to a considerable and unexpected saving of time and effort.

If, as in my case, you used the XYL's rotary dryer to make the earth bars for this project, buy her a brand new, condensing electric dryer. If my experience is anything to go by she will love you for it and be delighted never to hang out the washing again!

Websearch

[5] http://chemandy.com/calculators/skin-effect-calculator.htm
[6] https://en.wikipedia.org/wiki/Galvanic_series

ICOM

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Contesters and DXers are always looking for that competitive edge to magically pull out the weak signal that is either a rare country or multiplier they need to climb up the list.

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The IC-7851 shown with SP-34 External Loudspeaker and SM-50 Desktop Microphone accessories (not included).

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Count on us!

Homebrew

Following last month's look at RF power meters and directional measurements, our attention now turns to measuring SWR and return loss at low power levels.

The circuit shown in **Figure 1** is the standard type of resistive bridge. The circuit is named after Charles Wheatstone, although he never claimed to have invented it. The bridge is formed by four resistances: the three fixed resistors shown in the schematic, and the resistance of the circuit connected to the 'X' or unknown port. When the external circuit connected to port X is a pure resistance, with a value exactly equal to the three other resistors in the bridge, the bridge is 'nulled' and zero volts appear across the detector. If the external circuit has a resistance other than R (which in RF applications is usually 50Ω), or if the circuit presents a reactance (capacitive or inductive), the bridge will be unbalanced and the detector will produce a voltage. The detector output is proportional to the degree of mismatch, so a small output from the detector indicates a value close to R (50Ω) and a large output indicates a greater mismatch.

A simple QRP SWR bridge

Our first project is a very simple SWR bridge. The resistors in the bridge must be capable of dissipating most of the transmitter output power while the bridge is in circuit. This is easily achieved at power levels in the 1-5W range, making this type of instrument very popular with QRP operators. The circuit is very reliable and particularly easy to build. The schematic is shown in **Figure 2**. If you look closely you can see that it is a practical implementation of the Wheatstone bridge.

This is not a directional watt meter of the type that can be used for continuous real-time measurement of forward and reflected power because of the amount of power it soaks up. The bridge is switched in line for SWR checking or adjustment. The transmitter power is shared equally between the four resistances while the bridge is in line. When the bridge is balanced (SWR = 1:1), only one quarter of the transmitter power will be delivered to the output load. This may seem like a disadvantage, but it does mean that your transmitter will always see an SWR of 2:1 or better while tuning, even in the worst case where there is an open or short circuit at the output. The 10log(4) = 6dB power reduction while the bridge is in line will also tend to reduce interference to other band users while you are tuning. Once a good match is achieved, the whole circuit is usually bypassed using a DPDT switch (SW1 A and B in Figure 2).

The bridge is inherently broad-banded. A typical build using standard metal film resistors will provide accurate measurements from LF to VHF. Coverage can be extended well into the GHz range by using SMD components and good UHF construction techniques.

PHOTO 1: Balun made for the return loss bridge, plus two hand-picked 100Ω resistors paralleled to give as close to 50Ω as possible.

Construction

Construction is not particularly critical for an HF version. I built the prototype on PCB laminate and used SO239 coaxial sockets for input/output. The bypass switch is a 5A DC (2A 240VAC) DPDT. The resistors must be low inductance types. Metal film or carbon film are ideal for HF/VHF. I used parallel pairs of 0.6W 100Ω 1% tolerance (Maplin M100R or similar) for the 50Ω resistors. In the best case (SWR=1:1), this allows measurements at power levels up to 4.8W, or just 1.2W in the worst case scenario where the output sees a short circuit. For higher power levels, you can use 100Ω 2W metal film resistors, which means maximum continuous power rises to 4-16W.

I used a 1N4148 switching diode as the detector, which works well in the prototype. A Schottky or germanium point-contact type would offer slightly better sensitivity at low power levels. Take care not to exceed the maximum peak inverse voltage rating for the diode if you choose this option (see last month). Capacitors are standard ceramic disc types. For VHF/UHF operation, there may be a case for using surface mount ceramic chip capacitors instead. At GHz frequencies, surface mount construction would be mandatory throughout.

Detector output is indicated on a 200µA meter using the SWR scale described last month. With the indicated component values, you can use a 100 or 200µA meter. If a 50µA meter is used, you may need to substitute a 470k pot or add a fixed resistor in series with the 220k pot.

The potentiometer is adjusted for full-scale (calibrate) indication at your normal operating power level. Once the aerial or a 50Ω load is connected, the SWR readings will be accurate for all future transmissions at the same power level. Even at other power levels, where the meter is used uncalibrated, it still provides a useful indication. A zero indication shows the bridge is balanced and SWR=1:1. This is usually what we are trying to achieve when adjusting an ATU or trimming an aerial.

It would be a simple matter to substitute an LCD digital voltmeter as used in our other recent projects. It wouldn't read SWR directly, of course, but as with the analogue meter, the smaller the reading the better the match.

A simple return loss bridge

The return loss bridge (RLB) is very similar to the bridges just described. The RLB is a very useful and versatile tool. It allows measurement of return loss (and SWR) even at extremely low power levels in active

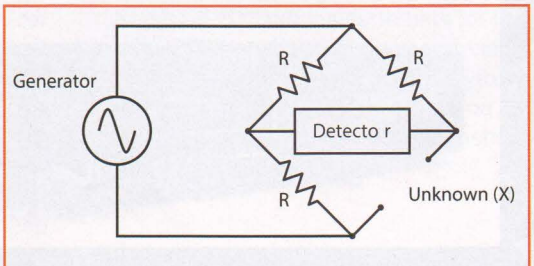

FIGURE 1: Standard type of resistive bridge, known as the Wheatstone bridge. It works from DC upwards.

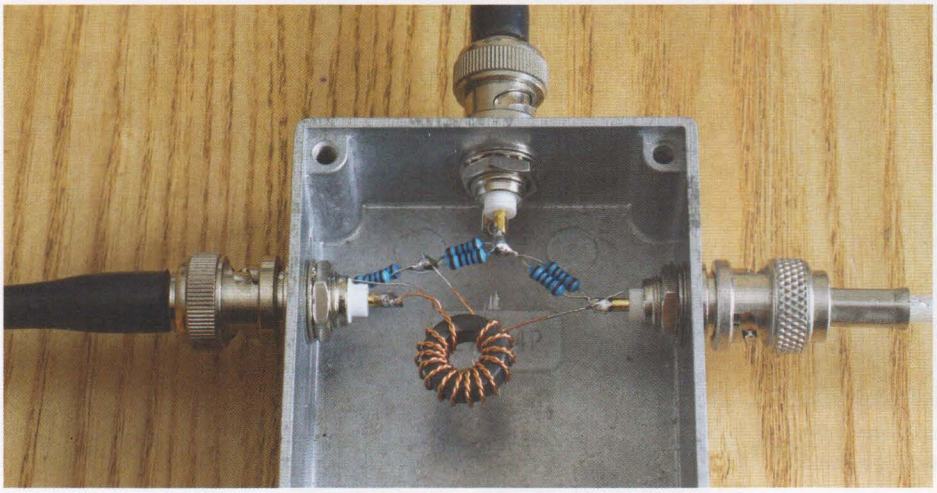

PHOTO 2: The completed return loss bridge. Note the three sets of paralleled resistors.

circuits. The RLB can also be used as a power splitter/combiner. When used for this purpose, it is often referred to as a -6dB hybrid combiner. When used for combining the outputs from two signal generators, the -6dB hybrid gives excellent isolation between the two signal sources. This is particularly useful for two-tone IMD tests on amplifiers or receivers, where IMD generated within the test equipment could lead to false results.

A typical configuration is shown in **Figure 3**. The Generator and X ports remain unchanged, but the detector has been configured as a 50Ω RF port. A 1:1 balun handles the balanced to unbalanced transition at the detector port.

RLB construction

The RLB circuit was built into an Eddystone cast aluminium box. I used a Maplin N89BQ, although it is a bit larger than necessary. Input/output for the three ports is via BNC sockets. I used single-hole mounting types because they were readily available. I have tightened them as much as I dare without stripping the threads and they have been reliable so far. I prefer 2 or 4 hole bolt mount type BNCs, because they are not so prone to loosening during use.

The 50Ω resistors are made from parallel pairs of 100Ω, 1% metal-film types. As this bridge will be used for precise measurements, I have taken great care to use carefully matched resistances. Values are hand-picked to match within 0.2%, ie they are 49.9 – 50.1Ω.

The detector port transformer is a simple 1:1 current balun. The balun consists of a length of transmission line (TL) wound on a ferrite toroid. As always, there are a number of compromises involved. It is common practice to use a few turns of miniature coax as the TL. This approach guarantees that the line impedance will be 50Ω from input to output. A transformer using coax will have a limited number of turns and it will also tend to be larger than the same device based on a twisted-pair line. I found that I could get the best compromise between LF and VHF performance by using a line made from a twisted pair of copper wires.

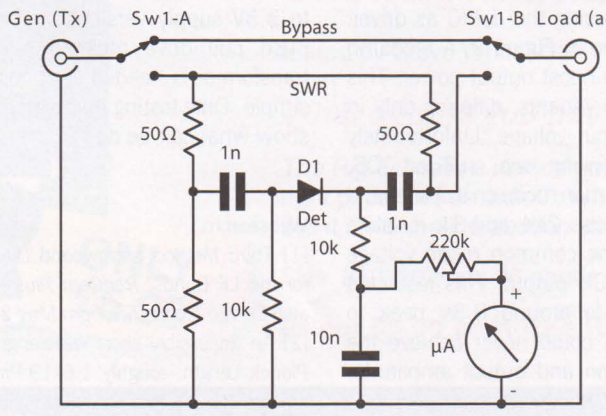

FIGURE 2: Practical implementation of a Wheatstone bridge for QRP power levels.

I twisted two lengths of 0.375mm enamelled copper wire together. To achieve Zo close to 50Ω, it was necessary to wind a fairly tight 3 turns/cm. A 76cm length of this line was measured using my L/C meter, open circuit for capacitance and short circuit for inductance. Measured values were 132.8pF and 0.34µH.

$Zo = \sqrt{(L \div C)}$

$= \sqrt{((0.34 \times 10^{-6}) \div (132.8 \times 10^{-12}))}$

$= 50.6\Omega$.

15 turns of this line were wound on an FT50-43 ferrite toroid, as seen in **Photo 1**. Once the 8mm holes were drilled for the BNC sockets, it was a simple job to assemble the RLB. Only two soldered ground connections are required; these are soldered to the tab on the back of the detector port socket. The assembled unit is shown in **Photo 2**.

Testing

No adjustments are required. Performance is determined by the accuracy and low inductance of the resistors. Bandwidth is limited mainly by the behaviour of the balun transformer. Directivity of the prototype was better than 30dB from 1.6-200MHz and an excellent 40dB or more from 3.5MHz-100MHz. This covers my required frequency range from 160m to 2m.

In use

To use the bridge, set your signal generator to the required level, generally in the milliwatt range (0-10dBm), or even lower for working on active low power circuits. Connect a sensitive power meter to the detector port. A homebrew meter based on a logarithmic amplifier is ideal (eg last month's Figure 2). You can also use an oscilloscope with a 50Ω resistance at the input. **See Figure 4**. Scope bandwidth is not too critical here, because RL calculation is based on relative measurements. It doesn't matter if you are near the upper limits of your scope bandwidth. My 60MHz digital scope is useful to 70MHz and my analogue 40MHz scope is OK for relative measurements to about 50MHz. The ideal generator/power-meter combination is a spectrum analyser with a tracking signal generator. **Photo 3** shows the RLB used to measure the input of a VHF matching network using a spectrum analyser plus tracking generator. This shows RL approaching 40dB (SWR=1.02:1) across the 2m band. A real-time indication like this is of great benefit when adjusting filters and matching networks.

Eamon Skelton, EI9GQ
hbradio@eircom.net

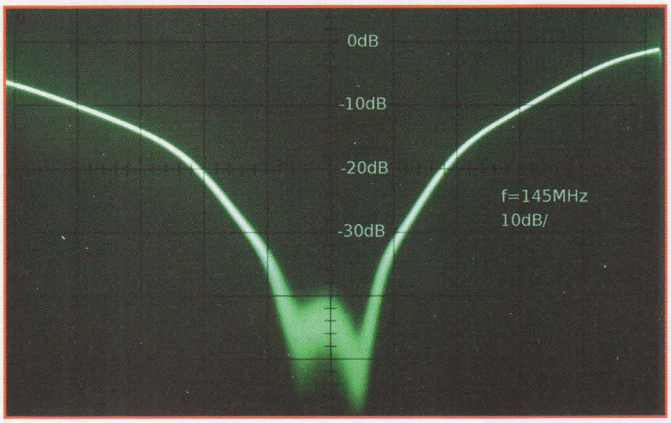

PHOTO 3: Result of using the RLB with a spectrum analyser and tracking generator to show the response of a VHF matching network.

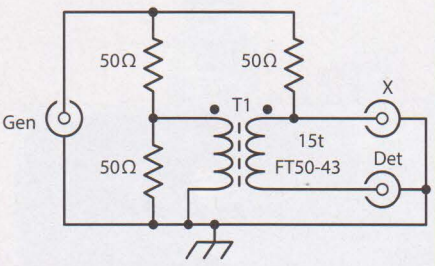

FIGURE 3: The return loss bridge.

TABLE 1: Relationship between SWR and return loss.

SWR	RL (dB)
1.1:1	26
1.2:1	21
1.3:1	18
1.4:1	16
1.5:1	14
2:1	10
3:1	6

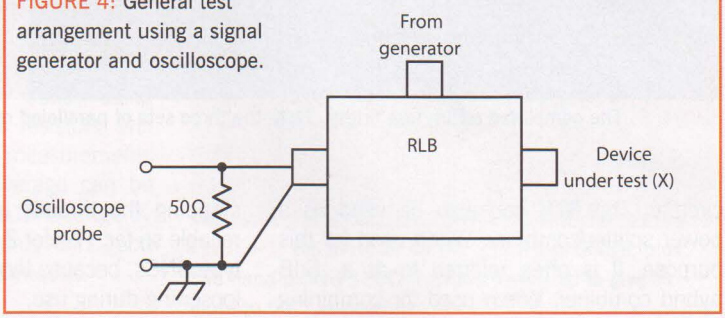

FIGURE 4: General test arrangement using a signal generator and oscilloscope.

Output at the detector port is checked with port X open or short circuit. This is the zero RL or infinite SWR reference point. Any better match will show some loss at the detector port. Some approximate values are shown in **Table 1**. A more precise and detailed table is available in the Mini-Circuits RL-VSWR table **[1]**. When measuring detector port voltage with a scope or peak-reading meter, RL (dB) = 20LOG(Vcal/Vtest), where Vcal is the voltage with X open circuit, and Vtest is the voltage measured when a circuit is under test. The circuit connected to port X is often referred to as the device under test or DUT.

Another very easy way to measure RL is to place a precision step attenuator between the DET port and your power or voltage measuring instrument. Calibrate the bridge with an open circuit, connect the DUT and then adjust the attenuator to restore the previous calibration level. The RL is the attenuation in dB.

[By coincidence, the Wheatstone RF bridge features in another article this month, the Arduino-based SWR analyser on p16 – Ed].

Websearch

[1] https://www.minicircuits.com/app/DG03-111.pdf

Recommended reading

Experimental Methods in RF Design, Hayward, Campbell, Larkin, ARRL, Chapter 7, Measuring equipment

Design Notes continued from page 27

anyone with a suitable PIC programmer can use it to 'blow' a blank device. He states, "As far as publishing the assembly file / firmware is concerned I'm happy for you to put it on your website. I had thought it could benefit from a method of setting/storing DC offsets but maybe simplicity is a better option. Anyway I'd be happy to answer questions on modifications if anyone were interested – email me via g8asg@yahoo.co.uk."

All can be found at **[3]**. The download also includes a mirrored 1:1.PDF of my PCB, suitable for home PCB construction using Press-N-Peel or UV transparency.

RF upconverters

The February 2012 Design Notes looked in detail at several RF quad-upconverter chips, the AD8345 covering 140 – 100MHz, the AD8346 for 800 to 2400MHz and U2793 for 30 to 300MHz. I still had a few of the original Analog Devices test modules available to try with the new drive. All require differential drive to the chip – exactly what the dsPIC delivers – but unfortunately a direct connection isn't possible. The D/A outputs rest at about 1.76V and the output signal delivered is up to 1.5V peak-to-peak differential between to two outputs. Unfortunately, all the upconverter chips are limited to a common mode voltage in the region 0.5 to 1V, so each of the four D/A outputs needs a resistor divider, which also reduces the peak to peak amplitude. More complication: not ideal, but only resistors! That is the purpose of the small bit of patch board between the two PCBs of **Photo 2**.

A newer upconverter chip, the ADL5375 covering the wider 400MHz to 6GHz range had been recently acquired so was put through its paces using the dsPIC as driver. The connections are in **Figure 2**. A modamp has been added to boost output power. This chip comes in two variants, differing only in common mode input voltage. Unfortunately I purchased the wrong one, suffixed -05, requiring 0.5V common mode on its baseband inputs, so had to use 2k4 and 1k resistors on each to drop the common mode voltage to match the dsPIC's output. This restricted the drive voltage to around 0.3V peak to peak and meant I could never achieve the best carrier rejection and output amplitude. The -15 variant needs 1.5V common mode and the permitted tolerance means a direct connection to the dsPIC would be possible. I'll know next time! Both require the same 1V pk-pk differential signal drive. There is no space here for detailed test results, but even with the reduced signal drive level, an opposite sideband rejection of better than 40dB was seen at 432MHz, falling to 20dB at 5.76GHz. More results are available at **[4]**.

Another upconverter option is to do what Martin tried: use the dsPIC outputs directly into a switching mixer – one based on bus switches like the FST3xxx family. The 1.76V common mode voltage is optimally suited to 3.3V supply versions of these; the direct push pull drive means no centre tapped transformer is needed so it could all be very simple. Only testing and experimentation will show what can be done.

Websearch

[1] Third Method narrowband Direct Upconverter for the LF Bands, *RadCom Plus* July 2016. See also Design Notes, *RadCom* May 2016.
[2] An impossibly short wavelength based on the Planck Length, roughly $1.6x19^{-35}$m. Gamma rays are about $1x10^{-12}$m and visible light about $5x10^{-7}$m.
[3] www.g4jnt.com/DsPIC_Weaver_DUC.zip
[4] www.g4jnt.com/ADL5375_Tests.pdf

NEW TITLE

The RSGB Vintage Rig Guide

Edited by Steve White, G3ZVW

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

Covering the mid-1960s to 1990s, the *RSGB Vintage Rig Guide* covers the equipment from manufacturers that were never in the standard *RSGB Rig Guide,* along with the items that have been discontinued from the listings in early editions of that publication. Therefore manufacturers such as Drake, Heathkit and KW are now included for the first time. There are brief synopses of all the manufacturers and a useful guide on what to smell, feel and look for when buying vintage radio equipment. Details of over 300 receivers, transmitters, transceivers and linear amplifiers are included as are likely trade-in and second-hand prices from dealers.

If you are interested in vintage amateur radio equipment because you have some, are interested in restoring something or you want to know its likely market price, this book provides a valuable insight. Recommend reading for anyone interested in old equipment.

Size: 210x297mm, 80pages, ISBN: 9781 9101 9330 3

Price: £5.99 post free (UK only)

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RSGB 2016 Committee Reports

ARDF Committee

The Amateur Radio Direction Finding (ARDF) Committee is a group of committed volunteers who have been driving forward the development of this aspect of 'Sport Radio' in the UK.

On the International scene, the 18th World Championships were held in Bulgaria in September. The highlight of our success was the gold medal won by David, M3WDD in the M50 category (men aged 50-59) of the Sprint competition. This was only the second time an RSGB Member has won gold at a World Championships.

A total of twelve events were staged during the year including three competitions at the British ARDF Championships that were held in the West Midlands in May. Competitions have embraced not only the 'Classic' format of five transmitters in a five minute cycle, but also the FoxOring and Sprint formats. Some organisers used other variants, often using 7 transmitters in a five minute cycle.

The RSGB equipment has been loaned to a number of affiliated societies and Scout groups during the year. This is now configured to provide 5 transmitters in a five minute cycle accompanied by ten receivers. A map of the area is not essential and it gives a realistic feel for the 'classic' ARDF format.

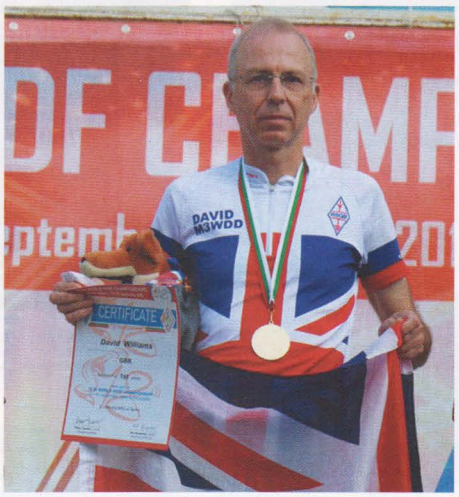
During the year a generous donation from John, M1SHE has provided some loan equipment for the 144MHz band to complement the existing kit that uses 3.5MHz. The 144MHz equipment includes a set of five transmitters and antennas but there are no receivers included. This is in contrast to the 3.5MHz provision which, as mentioned above, includes 10 receivers as well as 5 transmitters and aerials.

The 21st IARU Region 1 ARDF Championships will be held in Lithuania in September 2017 and the hope is that the RSGB will again send a strong team.

Also looking ahead to 2017, the Committee wishes to do more to promote participation. Our stand at the National Hamfest and at the RSGB Convention has become a familiar feature. We hope that by working with some of the Regional Managers to stage local introductory competitions, more RSGB Members will be tempted to try this exciting activity that has implications for good health as well.

There are Regions in which there is no local ARDF activity outside of club based events and the committee is always eager to hear from Members interested in 'kick starting' activity in these areas.

Finally, I wish to acknowledge the enthusiasm and contributions of the committee members in running events and promoting the sport. In addition those who ran events without being committee members are also thanked.



Congratulations to David, M3WDD on his gold ARDF medal.

These were Stuart, G1ZAR, Michael, M6MDD, Robin, RS213497 and David, G6HGE.

The committee is also grateful for the unfailing support it has received from the RSGB Board member responsible for Sport Radio, Stewart Bryant, G3YSX and from *RadCom*.

R G Titterington, G3ORY

AROS

Vince Shirley, G0ORC was appointed to the role of Deputy Amateur Radio Observation Service (AROS) Co-ordinator following a recruitment campaign at the end of 2015, however, Vince has now stood down from this role and Mark Jones, G0MGX, is currently solely responsible for coordinating the monitoring activities of the AROS Observers across the country and managing the interface with Ofcom for which a formal process has been defined and agreed between all parties.

AROS and Intruder Watch (IW) was combined earlier in 2016 so we are now covering both roles jointly and receiving reports from the RSGB IW internet pages. A meeting between AROS/IW and Ofcom took place earlier in 2016 at the Baldock Monitoring station, which has resulted in a formal process between IW and Ofcom for reporting.

AROS is an advisory and reporting service of the RSGB that is intended to assist radio amateurs and others who may be affected by problems that occur within the amateur bands or that develop on other frequencies as a result of amateur transmissions. The service investigates reports of licence infringements, or instances of poor operating practice that might bring the amateur service into disrepute. Reports, complaints and associated supplementary information are accepted from any source and the contents of each communication are regarded as confidential material.

The RSGB Monitoring System, more popularly known as the Intruder Watch, forms part of the IARU Monitoring System and as such it submits reports of non-amateur transmissions heard on the exclusive HF amateur bands to both the Ofcom Monitoring Station at Baldock and IARU Region 1.

Observers: The number of observers registered with AROS continues to increase through *RadCom* advertising and the RSGB website. Following the presence of the AROS Co-ordinator at the 2016 National Hamfest, the number now stands at 120. Although the observers are spread across the country there is still a need for more observers to effectively cover the UK, particularly the south east of England.

Cases: Since the beginning of this year there have been 58 unique recorded complaints. In some cases there have been many complaints about the same event.

A few of these were resurrected cases from previously reported incidents that had not been resolved or their history was known to AROS. So far this year, 3 of the 58 cases have resulted in letters being sent by AROS to suspected culprits advising them that their behaviour is subject of complaint. They are advised that AROS has reasonable cause to believe that their callsign/identity is associated with the bad behaviour and has been recorded by observers. Generally the letters appear to have been received in a positive way in that the behaviour appears to have been modified and the complaints have ceased. One of the letters was acknowledged and an apology received.

There are a number of on-going and persistent cases of repeater abuse that AROS is involved with. One case has been used as a test case and significant work has been undertaken to provide Ofcom with detailed reports and supporting information. This has resulted in Ofcom visiting the prime suspect but no formal action; the abuse continues unabated.

Reported cases have included:

- Misuse of the 5MHz band with Tx outside allocated frequencies (especially JT65).
- Sending offensive SSTV images.
- Abuse of repeaters.
- Three cases relating to repeater abuse referred to Ofcom.

AROS has published a number of information articles in *RadCom* throughout 2016 including advice relating to out of band transmissions of JT65 and JT9 on the 5MHz allocation.

A further article for *RadCom* is currently under review on the topic of repeater abuse and more specifically highlighting the importance of not responding in any way to on-air abusers.

Repeaters: The vast majority of the reported nuisance activity is taking place on the repeater network and appears to be involving the same abusers on a regular basis. The reported

KENWOOD

Unique concept, brilliant execution. Kenwood's compact TS-480HX/480SAT is tailor-made for DX'ing. But its smartly designed standalone LCD control panel — featuring backlit keys to enhance operating ease — is equally at home on your desk, with the main unit up to 4 metres away. And wherever it is, this HF transceiver delivers an astonishing punch: 200W. Performance is equally impressive. For example, a quad-mixer provides RX dynamic range in the TS-950 class, while AF DSP processing offers many powerful features, including noise reduction, a speech processor, and AF filters. And of course you can enjoy all of the convenience of PC-based control. The TS-480HX/480SAT lets you enjoy the best of both worlds.

● Built-in automatic antenna tuner (100W model) ● Terminals for external antenna tuner, linear amp, PC ● Electronic memory keyer ● AF DSP features: ● AF DSP filters ● Beat-cancel, noise reduction ● TX/RX equalizer ● CW auto-tune ● Speech processor ● Optional 500Hz/270Hz band CW narrow IF filters, 1.8kHz band SSB narrow IF filter ● PSK31 compatible ● 5W minimum RF output, QRP compatible ● Electronic keyer ● Plug-in voice recording/synthesis unit available ● Packet cluster tune with TM-D710E & TM-D700E ● Supplied with mobile panel bracket, tabletop panel bracket and carrying brackets

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*Alterations may be made without notice to improve the ratings or the design of the transceiver.
*The photographic and printing processes may cause the coloration of the transceiver to appear different from that of the actual transceiver.

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behaviours include apparent drunkenness and foul language; abuse aimed at fellow amateurs; silent keying and jamming frequencies with music or verbal ranting.

Some repeater keepers have turned off the repeaters for a period of time in an attempt to discourage their abuse. Some repeater keepers appear unable to monitor their own repeaters and investigations are being conducted into the requirements of the NoV over this aspect of repeater keeping so that accurate advice may be issued under these circumstances.

Ofcom policy dictates that enforcement within hobby radio is of lower priority than issues affecting protected, emergency services or safety of life issues. This can lead to situations where AROS has full knowledge of the source of a specific problem, but no formal enforcement activities are being undertaken.

Mark Jones, G0MGX

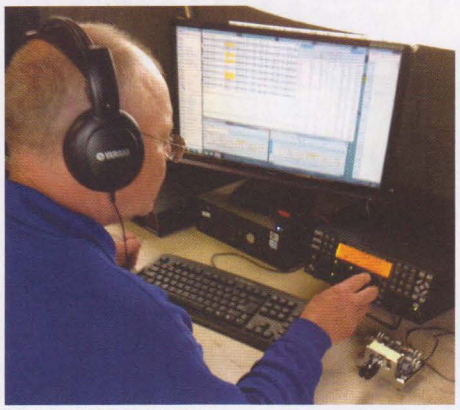
Awards

The Awards Manager is responsible for promoting the RSGB Awards scheme in addition to answering and resolving enquiries and processing claims to the satisfaction of the applicant. Details of the schemes covering HF and VHF spectrums are published in the *RSGB Yearbook* and on the Society's website. They need to reviewed on a regular basis to ensure they are up to date and relevant.

Achievement awards have been a popular aspect of amateur radio for many years, and assist in promoting education, band usage and innovation. I am particularly proud to follow in the footsteps of John Dunnington, G3LZQ (SK) and before him Fred Handscombe, G4BWP.

Credit must be given to HQ staff for initiating an online system for the issue of certificates after verification by the Awards Manager. I have taken the opportunity to revise the HF Programme in a number of ways, making it easier to understand and use, achievable in a shorter time whilst still being challenging. The traditional method of collecting QSL cards will be retained for those interested in that aspect; in addition more reliance will be placed on self-certification and the use of Logbook of The World and Club Log for confirmation. This, in turn, will introduce a retrospective element with the ability to claim for an Award based on contacts already made in the log.

The Programme will be progressive in terms of complexity and challenge. I have re-designed the Foundation and Intermediate Awards with more emphasis on HF band operation and with particular appeal to younger amateurs. I am proposing to undertake a publicity campaign partially based on the back of the 'Tim Peake' impact. The IARU Region 1 Award is achievable with relatively modest equipment and antennas, whilst the Commonwealth Century requires a more in-depth knowledge of propagation and a level of interest in DXpeditions.



A station taking part in the RSGB's HF NFD.

Whilst initially the IARU Worked All Continents Award might look easily achievable in modern times, there is a potential to use it for specific applications such as 160m. Indeed one of my first tasks on taking office was to process an outstanding claim working for the continents on 2m moon bounce! I had taken this out of the Programme but now feel it is worth re-instating.

It is worth noting that whilst Award applications are popular from many areas of the world, interest in the schemes appears to be lower in the UK. Thought needs to be given to greater publicity and targeted marketing, possibly through DX Clubs.

The VHF Awards need to be re-considered and I will undertake this over the next year in conjunction with the VHF Manager.

Chris Burbanks, G3SJJ

Contest Support Committee

The Contest Support Committee is one of the three Contesting Committees that came into existence on 1 January 2016. The other two committees are the HF Contest Committee (HFCC) and the VHF contesting Committee (VHFCC).

The Contest Support Committee (CSC) is responsible for administration and adjudication of all RSGB contests, trophy/award administration and, at the end of 2016, had thirteen full members and three corresponding members. This team of experienced and dedicated volunteers administer over 140 contests each year. The CSC also provides support and advice to the HFCC and the VHFCC.

A comprehensive in-house developed website is run by the Contest Support Committee with links to all RSGB contest rules, results (past and present) and to the log submission robot. The adjudication software used by the Contest Support Committee has been upgraded several times in 2016 to increase the automatic checking facilities available to adjudicators. All RSGB contests (except the IOTA contest that uses dedicated adjudication software) are adjudicated using this software.

The Contest Support Committee also assists Ofcom in processing all Special Contest Call (1+1 callsigns, eg G0A, M9Z etc) applications and, from the 29 February 2016, by issuing all SCC Notice of Variations on behalf of Ofcom.

The free Contesting Committees Newsletter has continued to be published during 2016. All of the newsletters published during 2016 were produced to convey important news to the readership. The newsletter continues to be popular, with a circulation of over 750. To subscribe to this newsletter, please visit www.rsgbcc.org/cgi-bin/subscribe.pl?subtype=news.

The short duration weekday contests continue to very popular with Members. During 2016, 83 clubs/groups and over 500 stations participated in the 80m Club Championship.

The all band HF SSB/CW IOTA Contest (July) attracted 2233 valid entries and 236 check logs. HF National Field Day (all band portable HF CW only contest) attracted entries from 42 clubs/groups and SSB Field Day (80m to 10m, portable SSB only contest) attracted 32 entries.

Turning to VHF, the UK Activity Contests (UKAC) attracted entries from 120 clubs/groups and 739 stations.

VHF National Field Day (NFD) attracted entries from 60 groups and these groups assembled 184 stations to compete in this multi-band contest. The Sweeper section (fixed station section) attracted entries from 140 stations, which is a massive increase over the 43 entries received in 2015.

Ian Pawson, G0FCT

ECC

During 2016 the Emergency Communications Committee (ECC) were working on the following tasks:

- Co-ordination and checking the group membership information held at RSGB HQ primarily to ensure that the members are correctly insured when taking part in RAYNET activities. By the end of the year there were 34 groups.
- Checking and updating the Emergency Communications pages of the website.
- Answering the occasional query about RAYNET matters.
- Unification of RAYNET. This project has progressed to the stage of forming the new RAYNET-UK organisation to be the re-unified RAYNET.
- The Memorandum of Agreement between RSGB and RAYNET-UK has been approved by both the RSGB Board and the Network CoM (for RAYNET-UK). This document has now been signed by both parties.
- Contacting RSGB RAYNET Groups to check that they are aware of what is required to become members of RAYNET-UK and to offer assistance if needed. Groups are also encouraged to remain affiliated to the RSGB as a 'Club'.

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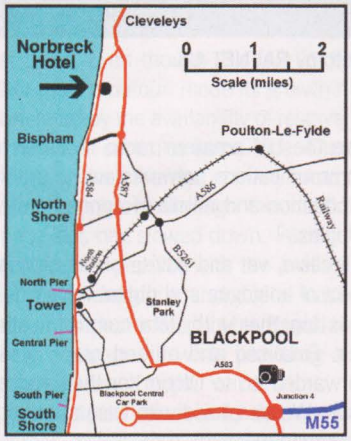

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- RSGB book stand – several local and national officers usually attend the rally
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- Hot and cold food and drink available in the hotel at reasonable prices
- Morse Tests – more info on the Region 3 Website – www.rsgb-region-3.org.uk
- For the latest information on the rally visit the NARSA website – www.narsa.org.uk

Admission £5 (under 14's free). Exhibition Manager: Dave Wilson, M0OBW, 01270 761608, 07720 656542

Our work for 2017 will include:

- Continuing with the first three items above.
- Contacting RSGB Groups as they approach their affiliation renewal date to check that they are aware of what is required to become members of RAYNET-UK and to offer assistance if needed. Groups will also be encouraged to remain affiliated to the RSGB as a 'Club'.
- Two members of the ECC will be co-opted onto the RAYNET-UK management committee to represent the interests of the RSGB Groups who have joined RAYNET-UK until they have had an opportunity to vote in the management committee elections.
- The present independent groups will also be approached and encouraged to join RAYNET-UK.
- There is likely to also be a need for some liaison with users of the service to ensure that they are aware of who to contact, and Group / National capabilities. This function will be closely co-ordinated between the ECC and the RAYNET-UK management.

Once the unification is complete and any wrinkles have been ironed out, the ECC's work will be complete. Day to day RAYNET matters will be dealt with by RAYNET-UK. RAYNET-UK will have close liaison with the RSGB via a nominated Board member and representation on appropriate committees/forums.

It is expected that in early 2018 the ECC will be disbanded – job done!

Peter R Thomson, GM1XEA

In the future, the day to day RAYNET matters will be dealt with by RAYNET-UK.

EMC

The aims of the EMC Committee are to provide advice and support to Members who suffer from EMC problems and to protect the spectrum from Radio Frequency Interference (RFI).

Advice is provided through the EMC Help Desk (100 cases per annum) to identify what the interference is, when it is active and to locate where it comes from. The EMC Matters forum (over 100,000 views per annum) allows Members to share problems and help each other by suggesting solutions. Updated information is provided through web pages, *RadCom* articles (25 pages in the last year) and society handbooks. An update on recording and reporting RFI was presented at the RSGB Convention.

To protect the spectrum, we investigate emerging sources of RFI pollution; we work on standards committees to specify acceptable RFI levels; we lobby regulators, suppliers and service providers to reduce RFI emissions.

During 2016 investigations group submitted their xDSL broadband report to BT and Ofcom highlighting the Harmful Interference (HI) it can cause and recommending steps to be taken to reduce its impact. Other areas investigated included LED floodlights, emergency lighting, digital inverter kitchen devices and air source heat pumps. These are regularly reported in the EMC matters articles in *RadCom*.

Standards work has suffered from staff changes but successful recruitment has strengthened the team to six volunteers, this will allow more progress in 2017. Contacts have been made with a view to joint IARU/RSGB participation in the 2018 CISPR International Congress in Manchester.

We presented three papers at IARU Region 1 conference. We have continued to lobby Ofcom pointing out how they could improve the new Section 54 regulations for in service equipment and requesting them to pursue harmful interference cases. We have recently had some success with them acting against noisy switched mode power supplies but have not persuaded them to pursue the three biggest problem areas of VDSL2, solar PV and wind turbines.

Publications were updated but a major revamp of the EMC pages on the website is planned for 2017. We are preparing diagnostic tools and guidance on how to identify the new causes of interference not covered by our current advice. These will form the basis of updated self-help pages.

To improve our service we need to focus our investigative efforts into a few critical areas next year while providing a continuously improving EMC Help Desk / Forum service. Our objectives for next year include building a database of EMC signatures to help Members self-diagnose their problems and preparing a lobbying strategy including a public campaign to reduce electronic pollution. We see this pollution having as serious an impact on the spectrum now as fog/smog did at the time of the industrial revolution.

The workload in this area is increasing rapidly as more and more RSGB Members seek help with interference. If you can help us in any way to fight this pollution, please contact emc.chairman@rsgb.org.uk

Dr John AV Rogers, MOJAV

ETCC

The Emerging Technology Coordination Committee (ETCC) functions to develop and enhance the UK amateur radio repeater and data communications networks and to promote the introduction and rollout of appropriate new technologies.

We receive, vet and advise on all proposals in respect of analogue and digital voice and TV repeaters together with data communications systems. Finalised and agreed proposals are then forwarded on to Ofcom for their approval and issue. We also liaise with Ofcom and other bodies as required.

Current Issues: Repeater abuse continues to be an unfortunate fact of life in the repeater scene. The ETCC works closely with AROS who are the official point of contact with Ofcom to ensure that relevant advice is given to keepers with reports passed to Ofcom for investigation. It is unfortunate that as amateur radio is not a 'Safety of Life' service it seems to be very low down on the priorities for enforcement action. Even though we often provide full information on the problems being encountered, Ofcom must evidence the interference for themselves and if it is not apparent when they monitor a particular complaint then it tends to get written off because of the costs being incurred.

Primary Users: Unfortunately progress with frequency clearances by the Primary Users of our bands remains as a continuing problem. We have continuing difficulties in 23cm where it can take years to achieve approval. ATV probably suffers more than most even though repeater keepers and groups have tried to be very accommodating and flexible in reducing bandwidth. 70cm clearances times are variable but in general acceptable although some areas present special difficulties. As noted last year it has become impossible to achieve 4m frequency clearances anywhere in the UK. These issues continue to be addressed via Ofcom and are agenda items at our regular Ofcom – RSGB Forum meetings.

Data Communications: This area of our work that encompasses Packet Radio, APRS and Internet Gateways of all kinds remains extremely busy. Because of some anomalies in the current NoV documents we have suggested some rewording to Ofcom but approval has not yet been forthcoming.

Over the past year we have noted very significant growth in the use of personal digital voice 'hotspots'. We would remind anyone using these units to ensure that they are using frequencies that comply with the 70cm band plan for digital voice and not to use the default channels many are supplied on. Remember that hotspots are for personal use only: for 3rd party use you require a Notice of Variation.

Emerging Technology: Although D-Star continues to develop there are other new kids on the block. The emergence of DMR has been a continuing feature of our work over the past year or so. Even though this is a 'professional' rather than 'amateur' mode its growth has been accelerated by the availability of relatively cheap but well-built portables from China. There is now quite extensive coverage in many areas and this continues to grow although the initial surge in applications has slowed down. Fusion has also become quite popular with the availability of a dual mode analogue and digital base station that some repeater keepers have used to replace ageing analogue kit while providing a path to another flavour of digital voice.

It has been notable to see considerable progress in amateur digital technology. The development of a new open source multi-mode modem by G4KLX has resulted in a significant number of 'homebrew' repeaters coming on the scene providing access for users with D-Star, DMR and Fusion equipment.

Licensing: In recent months we have been permitted by Ofcom to issue renewal Notice of Variation (NoV) documents directly to keepers for installations that have previously been authorised by them. They have also agreed to a rolling programme of renewals to avoid the inevitable backlog that could occur as all repeater and beacon NoVs will be expiring in March/April 2017.

We are currently inviting keepers to renew their documentation early while confirming that the information on closedown operators is fully up to date.

If you are a keeper and receive one of these invitations, it would help us greatly if you renew early and avoid the queues.

John McCullagh, GI4BWM

ESC

The Examination Standards Committee (ESC) was set up under the Schedule of Terms agreed between Ofcom and the RSGB in September 2015. We are responsible for oversight of the management structure and policy for the amateur radio examinations. The Examination Group (EG) reports to the ESC and is responsible for managing examination performance standards, the examination question banks and examination specifications. The Examination Standards Manager (ESM) and the Examination Quality Assurance Manager (EQAM) also report to the ESC. The ESM is responsible for documenting and maintaining our internal and external procedures, and the EQAM is responsible for auditing the processes of the UK amateur radio examinations, for coordinating examination inspections and for investigating reports of non-compliance with the defined procedures. The Air Cadet Organisation (ACO) is also represented on the ESC. With the agreement of the RSGB and Ofcom, candidates achieving a pass in the ACO Foundation Equivalent Examination may apply to the RSGB for a candidate number, enabling them to apply to Ofcom for a Foundation licence. The ESC is responsible for monitoring the performance of the ACO examinations to provide assurance that they continue to meet the requirements set down by Ofcom.

During this last year, in response to user requests, we have introduced Advanced examinations on demand, which greatly increases the flexibility of arrangements for this examination that is taken by 400 to 500 candidates each year. We have also improved our procedures for Access Arrangements and Special Consideration for all examinations. In line with our management of the procedures associated with examinations, we published a new version of the Examination Handbook EX500 and new procedures for the handling of examination irregularities and appeals. In 2015, the last year for which statistics are currently available, there were 1475 passes at Foundation, 632 passes at Intermediate and 300 passes at Advanced level. Further details of the work of the ESC and examination statistics for 2015 can be found in our first annual report, published in April 2016 and available in the Committees section of the RSGB website.

Current work of the ESC includes a major review of the examination syllabuses being undertaken by the EG, with input from the Training and Education Committee. Our aim is to better align the Advanced level with HAREC (T/R 61-02), to introduce more recent technologies and operating practices and to improve the transition between the examination levels, Foundation, through Intermediate to Advanced. We are also continuing to investigate suitably secure methods for providing online examinations that, if successful, will constitute a major change in the management of examinations in the future. Other tasks include the need to grow the examination question bank and the development of examination software, including the statistical analysis of results. We are also seeking to recruit a new ESM and a new chairman and additional members for the EG. These are very important roles that support the ability of the ESC to manage a successful examination process.

I retired as chairman of the ESC at the end of 2016, having taken on this role when it started within the Radio Communications Foundation in 2006, and Dave Powis, G4HUP was appointed my successor (sadly now SK, see page 8). I would like to thank all the present and past members of the ESC and EG for their considerable hard work, commitment and support to me over this time.

Simon Watts, G3XXH

HF Manager

The main activities during the previous 12 months has been work following the WRC-15 award of the secondary allocation to the amateur service at 5MHz and the preparation and acceptance of a number of papers at the 2016 Region 1 Interim Meeting in Vienna. Current tasks for the following year will cover CEPT and preparation for the 2017 IARU Region 1 General Conference in Germany.

5MHz: The RSGB proposed a band plan for the 5MHz WRC-15 allocation that was accepted by Region 1 at the Interim Meeting and has now also been implemented by Region 2 at their General Conference. We will continue to work towards the goal of achieving a harmonised band plan at 5MHz across all regions.

A number of countries have already implemented the new 5MHz band and the number of countries with article 4.4 permissions continues to grow. The potential for confusion exists as there are many different allocations, but for the most part operation is orderly. The main problems continue to be out-of-band operation by some operators. The RSGB has published guidelines and recommended operating frequencies on its website to help ensure compliance.

Discussions continue with Ofcom and the MoD to try to secure access to the new band in 2017 whilst retaining access to the existing 5MHz frequencies in the current licence schedule.

C4 Matters, IARU Region 1 Interim Meeting, Vienna: The RSGB input paper on a 5MHz band plan was accepted and will be added to the IARU Region 1 band plan, assuming it is ratified at the next General Conference.

A number of proposals from the RSGB and DARC were discussed on resolving the issue of conflicting band plans between regions on 30m and 80m were discussed. It was agreed to align both band plans with Region 2 around the CW and data mode segments. All HF band plans are largely aligned now across regions where practical, considering different allocations in certain countries.

IARU Region 1 General Conference, Landshut 2017: Inputs are now being solicited for papers for the Region 1 general conference next Autumn. Inputs for papers should be sent to G4FSU and/or discussed on the RSGB consultation forums.

Other Issues: Harmonisation of 1.8MHz still remains a possible agenda item, not only to increase the allocation in some countries to the full 1810 – 2000MHz band, but also to resolve the power limitation above 1850kHz. Although this did not make the WRC-19 agenda,

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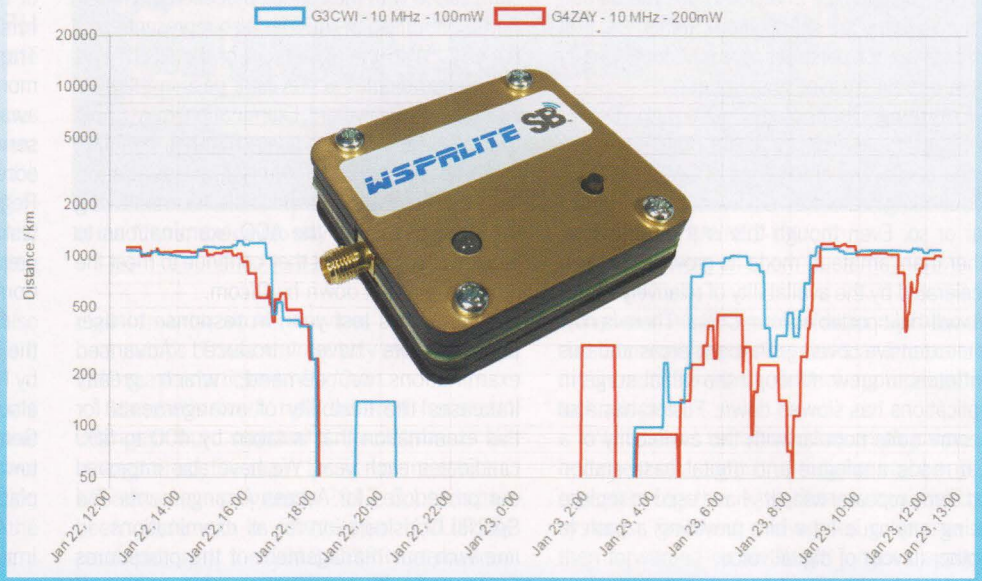

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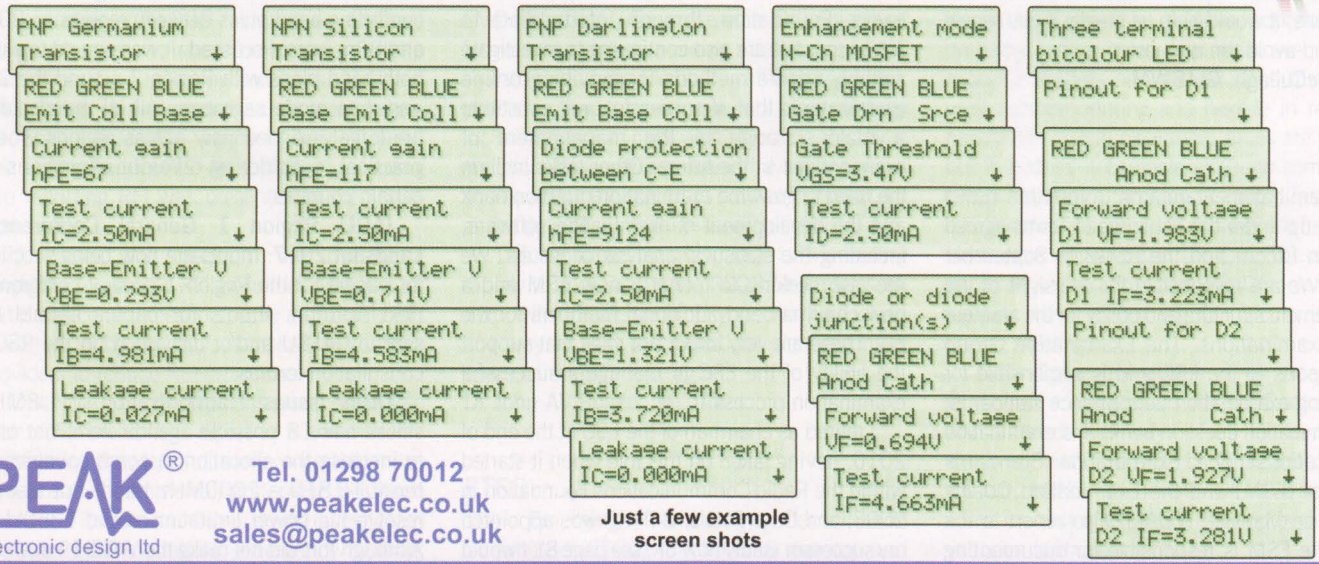

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it remains a desirable objective. It seems likely that no further requests for increased access to HF frequencies at the ITU will be considered for the next few WRC cycles.

The noise floor continues to rise at HF. The threat of PLT for the last 10 years has largely been superseded by noisy electronics; in particular switch mode power supplies in lighting and solar PV arrays, and broadband internet delivery systems such as VDSL2. A further potential threat from wireless power transfer systems (WPT) is being closely monitored at the ITU.

Common questions and emails received by the HF Manager tend to revolve around complaints over band plan adherence and questionably legal operation of remote stations.

DXpedition funding: The HF Manager is a *de-facto* trustee of the RSGB DXpedition Fund. This fund raises money for DXpeditions through sales of raffle tickets at the RSGB Convention and individual donations. A number of DXpeditions received donations last year; full details are reported by the DXpedition fund.

Awards: The two main awards for HF are presented at the RSGB Convention. The nomination process and committees are managed by the HF Manager. This year the following awards were made:

ROTAB Trophy: Paul Dane, G4PWA

G5RP Trophy: Dan McGraw, M0WUT

Ian Greenshields, G4FSU

IOTA Committee

As envisaged in last year's report, IOTA ceased to be an RSGB committee in Spring 2016 when Islands On The Air (IOTA) Ltd, a new not-for-profit company, limited by guarantee, was formed to take over all aspects of the programme's management. In a partnership arrangement, IOTA and the RSGB signed a Memorandum of Understanding in October defining certain responsibilities that the two parties would observe in their dealings with each other.

A brief report on the company's first year will appear in the May *RadCom*. It will show how successful the move has been for IOTA. A strong team of helpers had already emerged in late 2015 with a determination to set in place a programme structure that would enthuse the world's amateurs to a step increase in participation. The main element of this would be the replacement of the existing software with a technologically advanced system that majored on QSO matching with logs on Club Log, removing the need for 100 per cent reliance on paper cards. Although this new system will not be released until early Summer 2017, an element of QSO matching was launched in July 2016 on the existing system to test its feasibility. The results were quite startling, reflected in huge increases in take-up by the IOTA Community.

Roger Balister, G3KMA

Microwave Manager

The Microwave Manager is responsible for all bands above 1GHz. These are home to a wide variety of activity, innovation and modes – including narrowband, beacons, ATV and EME. Active groups in the UK include data and repeater users, the UK Microwave Group (UKuG), BATC and AMSAT-UK.

During the past year the threats to a number of amateur microwave bands have continued both from international activity associated with the preparations for WRC-19 as well as national UK initiatives associated with the 2.3 and 5.7GHz bands. Internationally, the 47 and 5.7GHz bands are the subjects of specific WRC-19 agenda items and the 24GHz band has the potential to be affected as a band adjacent to future mobile broadband operations.

The Society and the Spectrum Forum has robustly responded to these threats by directly contributing to and participating in the international committees dealing with these topics and by collaborating with the IARU especially where the amateur service is a primary user (eg the 47GHz band and parts of the 24GHz band). Work in these areas will continue throughout the next year.

Consumer demand for spectrum for Wi-Fi has put pressure on the 5.7GHz band with Ofcom publishing a consultation proposing to increase the extent of the band available for Wi-Fi. Again the Society and the Spectrum Forum responded robustly with a detailed consultation response. This and other related documents can be found on the RSGB website.

But it's not all about threats with opportunities secured in 2016 by the RSGB and the Spectrum Forum for Full licence holders to explore new territory with access under NoV to the Tera-Hz bands above 275GHz. This part of the spectrum remains unallocated to radio communication services with only certain frequency ranges identified for scientific monitoring and astronomy services. This is a great opportunity for experimentation and with microwave enthusiasts already successfully experimenting in the existing frequency bands up to 241GHz, this new development is a key opportunity for experimenters to push back the frontiers into these sub 1mm wavelength bands.

The UK Activity Contest programme for the 1.3 to 10GHz bands has again encouraged increased activity with individual station entry numbers for the 2016 SHF series almost double those of three years ago. Innovation and experimentation is in evidence here too with club activities promoting successful activity with relatively simple modified equipment operating in simple modes.

Finally being new to the post of Microwave Manager I'd like to thank the RSGB management and the Spectrum Forum members for their warm reception and guidance throughout the year as I've tried to establish myself in this role.

Barry Lewis, G4SJH

PAC

The Planning Advisory Committee (PAC) consists of 4 panel members all of whom have detailed knowledge of the workings of the planning system in the England, Wales, Scotland and Northern Ireland and the way in which the planning system works differs slightly between each of the four countries of the United Kingdom. Committee members provide initial advice to amateurs who are applying to their local council for planning permission, usually for support masts and antenna systems. We also provide guidance on submitting appeals against refusals of permission.

I took over the Chairmanship in June from Stephen Purser. I am a Chartered Town Planner. One of the first things I did was to take over responsibility from the RSGB General Manager for writing letters of support for Members. I amend the standard letter to reflect the circumstances of each case and sign it in my name giving my professional qualifications. That appears to have achieved a modicum of success with the number of approvals increasing.

Since June there has been a consistent stream of enquiries by Members, averaging about one a week. The main difficulty remains that of neighbours objecting to amateur radio installations, sometimes putting forward somewhat far-fetched objections. I see it as our job to 'educate' planning officers as to what the hobby is all about. Just because the neighbour doesn't like to look at the mast and antennas is not a good enough reason for refusal. Unfortunately, there is no longer any reference to amateur radio is the National Planning Policy Framework for England and only a very brief passing reference in Wales. There never has been any central guidance in Scotland and Northern Ireland. The result is a considerable amount of inconsistency between different local authority planning departments. All too often, the local planning authority looks to apply policies designed for commercial (cellular system) installations with no understanding as to why larger antenna systems have to be used for the proper enjoyment of the hobby and that it has to be in a residential area.

Committee members staffed a stall at the National Hamfest, dealing with a wide range of enquiries from some 20 Members. I also took the opportunity to arrange a face-to-face meeting of the committee, not least so that we could all put names to faces and learn about one another's backgrounds and experience. It has been agreed that our top priority is to revise the RSGB Member's advice booklet on the planning system. I also intend to write an article for *RadCom* on the use of planning conditions. An approach to the Local Government Associations to provide information on the nature of the hobby would also be worthwhile. The committee continues to monitor planning decisions for amateur radio installations. I believe there is much more the RSGB could do, for example making an input

into local development plans, but with only four volunteer members that is beyond the resources we have available at present.

John Mattocks

Propagation Studies Committee

The purpose of the Propagation Studies Committee (PSC) is to promote interest in radio propagation amongst amateurs and short wave listeners, to enable them to make better use of the amateur bands and encourage research into the subject.

Any committee is only as good as its members and PSC is blessed with some excellent people, involved in lots of different areas.

2016 saw the success of our first HF video presentation for clubs. This has now been shown by more than 80 with many opting for a Skype-based question and answer (Q&A) session with Steve, G0KYA. The feedback has been wholly positive and a VHF version was released in late 2016 on the back of its success. More than 30 clubs have used it so fair and they too have the option of a Skype Q&A, delivered by John, G4BAO, Jim, G3YLA or Chris, G4IFX. Feedback has also been excellent.

The weekly propagation report for GB2RS continues to be produced, covering both HF and VHF propagation. Despite the vagaries of the troposphere and ionosphere, it is about as good as it can be given it has to be produced up to more than a week ahead of the forecast period.

Martin, G3USF maintained the comprehensive HF and 50MHz beacon list, while John, G4BAO continued to write the *RadCom* GHz column with a number of beginner-related features.

Gwyn, G4FKH continued to produce the monthly predictions for *RadCom* and the RSGB website and also launched a new online HF prediction tool at www.predtest.uk This uses the ITURHFPROP engine to produce area and point-to-point charts and is thought to be more accurate than the older VOACAP-derived predictions. In December 2016 the website received 1,918 hits, but in early January 2017, with the point-to-point predictions enabled, there had already been 4,786 hits that month. It is proving to be a very useful tool for UK amateurs.

PSC is involved in the propagation of electromagnetic waves of all frequencies. To prove this Barry, G8AGN conducted a series of tests comparing transmission of signals at red light (623nm) and infrared (IR) (850nm) over path lengths up to 102km. The IR signals were surprisingly strong (up to +50dB S/N) for IR output powers (from an LED) of maybe 100-200mW.

Moving down the spectrum Marcus, G0IJZ had an article published in the December 2016 issue of the IEEE *Antennas and Propagation* magazine. Entitled 'High-Frequency Near Vertical Incidence Skywave Propagation: Findings associated with the 5MHz Experiment'. It was also the subject of a talk at the RSGB Convention.

Train the Trainers continues to inspire Trainers around the country. This session was held in Norwich.

Speaking of talks, PSC members actually delivered a whole host of talks at the Convention and to clubs around the UK. Jim, G3YLA and Steve, G0KYA also presented two sessions on propagation for the TX Factor video programme. The HF segment with Steve should have been released by the time you read this.

Graham, G3TCT focused on getting the GB3USK beacon on 1296.87MHz up and running. The beacon used to be located near Bristol, but had to be closed down in June 2013 due to the withdrawal of site permission. It is now sited at the GB3JB 2m repeater site near Mere in Wiltshire and the beacon, which is purely solar and wind-powered, started operation on 26 July 2016. Reception has been reported from IO93 (305km north), JO33 (652km NE), and JN03 (903km south).

Chris, G4IFX has been heavily involved in 50MHz polarisation experiments. These have proved to be very interesting and were the subject of another talk at the RSGB Convention in Milton Keynes.

Ron, G3SVW says he conducts a regular informal 'Aerials and Propagation Clinic' at the South Manchester club and has started a propagation section on the club's website.

This year we were very pleased to welcome Professor Cathryn Mitchell, M0IBG of Bath University and Tim Fern, G4LOH as PSC members. We have also had support from our overseas members, notably Tomas, NW7US and Carl, K9LA.

Finally, the RSGB released Steve G0KYA's new book entitled *Radio Propagation Explained* in late 2016. This is based on Ian Poole's excellent book *Radio Propagation – Principles and Practice*, but updated and expanded.

PSC entered 2017 with a full complement of members and a strong portfolio of ongoing research work.

Steve Nichols, G0KYA

Spectrum Forum

The Forum brings together the RSGB Spectrum Managers, specialists, and chairs of RSGB committees that have an interest in spectrum management, and representatives from special interest groups within the UK amateur community. This broad membership brings with it a wide array of experience to the array of matters it comes across. The year has seen a number of membership changes with Barry Lewis, G4SJH assuming the post as RSGB Microwave Manager and Phil Lawson, G4FCL joining as a consultant, whilst we wished farewell to Bob Whelan, G3PJT.

One of the Forum's roles is to assist in preparations for the IARU Region 1 events. The beginning of the year saw the submission of several papers to the 2016 Region 1 Interim Meeting in Vienna. This had the novel aspect that in addition to HF (C4) and VHF/Microwave (C5) papers – it was the first meeting of the newly formed 'C7' EMC committee as well. In all 70 papers were reviewed prior to the meeting in April. The Vienna meeting itself proved to be well attended and quite intense. One of its earlier outcomes was a synchronised band plan update across Region 1 on 1 June for changes to 80 and 30m. Also notable was the successful adoption of an RSGB proposal as the provisional 5MHz band plan by Regions 1 and 2, for which HF Manger Ian Greenshields, G4FSU deserves a major credit. In parallel to all this was the fact that some forum members were also heavily involved in Tim Peake's mission and school contacts, adding to a very busy and successful start to the year.

The Forum conducts most of its work via email and meets annually. This year the annual meeting was slightly earlier and the 21 papers from the annual meeting on 29 October 2016 are available on the Society's website. In addition to annual reports, the initial progress on WRC-19 topics was highlighted at the meeting, including Agenda Item 1.1 on a potential ITU 50-54MHz allocation in Region 1 and Agenda Item 9.1.6 on the impact of Wireless Power Transfer (WPT) for charging electric vehicles. RSGB volunteers are already deeply involved in WRC-19 preparations. A special focus section for WRC-19 has been

added to the RSGB website and more will appear in *RadCom* in due course.

The Forum also has an interest in licensing and matters. General Manager Steve Thomas, M1ACB benefitted from this pool of expertise when Ofcom's new IT system and personnel changes significantly added to the workload during the middle of the year. A further IT phase is about to rollout and we expect to continue close engagement in 2017. Spectrally, the year saw further progress with the renewal of the 146-147MHz band and a new NoV for pioneering work above 275GHz, whilst a robust consultation response to defend amateur 5GHz users was submitted to Ofcom.

Other topics handled by the Forum during the past year included a consultation on the UK 5MHz beacons, interference on 472kHz, Ofcom's licensing guidance, activity on 47GHz (a WRC-19 candidate band for 5G), licence statistics/demographics, increases in the VHF noise floor and the new EMC directive. The latter topics are a good example of the close ties between the Spectrum Managers and the EMC Committee.

Looking ahead, 2017 has a full schedule of CEPT preparation for WRC-19, as well as ongoing preparations for the 2017 IARU Region 1 Conference, so a busy year is also in prospect. So this is an opportune point to thank the pool of volunteers and expertise on hand to assist with this.

Murray Niman, G6JYB

TEC

The Training & Education Committee (TEC) covers a wide range of activities, ranging from working with Ofcom to ensure our exams meet the licencing needs, to support for tutors, to the encouragement of activities and mentoring beyond the licences. Membership isn't fixed and varies from time to time. The Committee currently consists of around 20 individuals who individually and collectively commit a lot of their volunteer time to Training and Education matters. I am grateful for the way they do this with good humour and to the benefit of amateur radio as a whole. The reporting Board Member for TEC is Alan Messenger, G0TLK.

TEC has two strands of activity, one through its project teams as listed on the RSGB website and one through one-off contributions, often of a more strategic nature. For a strategic example, this year we drafted the RSGB's Equalities document, which the Board has accepted and has rolled-out. Some of our larger or longer-term projects are described here.

Syllabus Review: The Examinations Group and the Syllabus Review Working Group are currently engaged in updating and reviewing the syllabus for the three levels of the Radio Communications Examinations. Work has been on-going since 2014. The two main objectives are to better align the Advanced Level with HAREC (T/R 61-02) and to smooth out the steps more evenly between Foundation to Intermediate and Intermediate to Advanced. In addition, the syllabus will be refreshed to include more recent technologies and practices currently in use in amateur radio. Consultation with the training community took place at the 2016 Convention and will continue as further progress is made. In due course, we will be working on new books, alongside the Examinations Group who will be revising the exam questions. TEC retains its role for delivery of examinations and this is carefully fire-walled from the EG's role in creating of exam questions and handling appeals. The Examination Standards Committee reports to a different Board member to TEC, to ensure probity at all levels. This is reinforced up by the Examinations Audit Committee, ensuring robust oversight is fully available.

The Convention and Training & Education Open Forum: Philip Willis, M0PHI, the TEC Chair, curated one of the streams of Convention speakers, in topics to encourage people to try something new. During the weekend David Stansfield, G0EVV, Andrew Hebden, G8BYB and Mark Jones, G0MBX invigilated the Foundation and Advanced exams. There was no demand for Intermediate this year. The TEC Open Forum included an update and discussion on the syllabus review and exams (Alan Messenger, G0TLK and Alan Betts, G0HIQ), a Train the Trainers update (Paul Whatton, G4DCV and Derek Hughes, G7KFC) and a reminder of Youth Committee's work from James Thornhill, 2E0JTH. David Stansfield reported an interesting experiment with Skype Tutorials. I am very grateful to all who helped us make the Convention a success.

Train the Trainers: This established and popular programme continues to inspire Trainers around the country. Led by Paul Whatton, G4DCV and ably supported by Derek Hughes, G7KFC, David Evans, G0EVA and Alison Hughes, M6COV, visits were made to Staines on Thames, Newton Abbott, Antrim, Stockton on Tees and Leicester.

Schools Link project: This important activity is to support STEM teachers in the classroom. In 2016 it gained a lot of momentum with Principia schools and other interested bodies under the leadership of Ian Stevenson, G3YNU. Ian has now stepped down and we are extending the team for 2017. Current members Daphne Neal, G7ENA and Peter Butterworth, G0GPH attended the Principia event in York for TEC and Philip Willis, M0PHI provided similar cover at the Portsmouth event.

Disabilities project: This new project started early in 2016 with an RAIBC Liaison officer Graham Smith, G4NMD. It has now expanded into a full team with a wider brief, under the guidance of Steve Hambleton, G0EAK and is formulating its policy for the coming year.

Philip Willis, M0PHI

Technical

The Technical Forum (TF) is responsible for the technical side of RSGB's activities and is a Reflector and email based group allowing rapid response and discussion with all the forum's members having access, and being able to contribute immediately. To date we have avoided holding meetings, being able to conduct business purely online. We did, however, hold one this year in November at Eastleigh, Hampshire. It was decided that in future we will probably hold one at around the same time each year.

Technical review of articles for *RadCom* forms the bulk of the activity taken on by the Forum. Any technical article being considered for publication is sent by the Technical Editor to the Forum for review. We look at its suitability, technical merit and for any safety implications. Articles are taken by individuals on a first-come-first-served basis. With the advent of *RadCom Plus* in 2015, a few more articles are now being considered. Absolute technical correctness in certain areas is not always necessarily challenged for *RadCom Plus*; especially where it is realised that experts and beginners will approach some areas in a different light. Certain articles have been 'allowed though' in spite of a few concerns and in such cases it is left to readers and the correspondence columns to discuss them.

The members of the Forum have a breadth of specialist knowledge to cover most of the areas needed for detailed review, but we are currently lacking an antenna expert and will looking to recruit a member to cover this area in the coming year. Another member, or perhaps two, would also be useful to allow a wider overview of modern digital communications and the new data modes and 21st century techniques moving into the hobby. At the moment, the bulk of any such reviews fall on just one member.

Another task we perform is the selection of award winners for the five RSGB technical awards. The winners are selected through a straightforward voting system by forum members, after a list of all suitable publications and candidates is first drawn up and circulated; they are then sent to the Board for approval.

The independently-run RSGBTech Yahoo Group (http://groups.yahoo.com/group/rsgbtech/) is an Yahoo group and continues to gain in popularity, with the current membership now standing at 1644. The breadth of subjects have covered too huge a range to even begin to list here, going from basic construction right through to advanced and specialist techniques being discussed. Antennas, EMC matters and licensing issues appear, as always, to be the most popular subjects. As is often the case, some seemingly quite trivial subjects often generate a huge discussion thread. With the wide range of expertise and experience amongst the subscribers, most questions soon get answered to the satisfaction of their originator. A big thank you should go to the moderators of RSGBTech.

It is difficult to know where the Technical Forum could go on developing technical expertise amongst the society's Members. Technical expertise is not something that is really open to guiding – individuals make their own progress. However, the TF may be able to make some contributions in this area via *RadCom Plus*. If you have any ideas on areas you would like the Society's publications to cover, or any direction you think we should take, please let us know.

Finally, I would like to thank all the members of the Technical Forum for their time and the support provided.

Andy Talbot, G4JNT

One of the activities at YOTA 2016 held in Austria.

VHF Manager

The VHF Manager is responsible for RSGB spectrum matters for the VHF and UHF amateur bands 50 to 432MHz. A key part of the VHF Manager's role is to liaise with Ofcom concerning the amateur VHF/UHF bands and IARU Region 1 dealing with band plans.

In 2016 much of the work was focused on the temporary amateur experimental allocations from 70.5 – 71.5MHz and 146 – 147MHz. Permission for amateurs to use this temporary spectrum has been renewed for a further year. The support received from the amateur TV community, including presentations on the technical success of R-B DATV (Reduced-Bandwidth Digital Amateur Television) played a significant role in securing their renewal. The perceived value from such amateur experimental work should not be underestimated, as it demonstrates significant technical innovation in the efficient usage of VHF spectrum.

In 2016 Ofcom changed the noise floor criteria used to calculate coverage areas for Band One and Low Band 'Technically Assigned' Business Radio users. This change from the previous figure of -114dBm, which was based upon old CCIR figures, to -92dBm recognises the increase in man-made noise in this part of the spectrum. The change resulted after surveys and pressure from business users of this part of the spectrum. This should not surprise those who operate on 6m and 4m who have long recognised that their noise floor mainly comes from man-made sources. Unfortunately, this degradation of the RF spectrum is unlikely to feed through into EMC standards that are sadly very poor above 30MHz.

This higher noise floor and the physical size of 70MHz antennas has made R-B DATV experimentation at 70.5-71.5MHz particularly challenging. After a number of discussions Ofcom have agreed, in principle, to permit greater ERP for wide bandwidth modes in the 70.5-71.5MHz temporary allocation, making long range RB-DATV on this band a more realistic proposition.

IARU Region 1 is engaged in preparatory work for a harmonised allocation for the amateur service at 50MHz that will be considered under Agenda Item 1.1 at WRC19. Currently, 47 – 68MHz spectrum remains allocated to broadcasting at ITU Region 1 level, whereas Region 2 and Region 3 do have formal ITU amateur primary allocations. The proposal is to make 50 – 54MHz an amateur allocation in Region 1 – and the case for 52 – 54MHz is based on the development of new amateur digital services. The RSGB has already spent a lot of effort assisting, both preparing the case for IARU Region 1, and participating in two CEPT-PTD meetings so far, as part of the UK-Ofcom delegation.

The RSGB is running a consultation exercise on the IARU-forums section of the RSGB website for potential issues for submission to the IARU Region 1 Conference in September 2017. Some of topics which are likely to be included in RSGB proposals include; further simplification of the VHF/UHF band plans, greater flexibility to address the requirements for emerging digital modes and a possible re-alignment of MGM narrowband modes within the 144MHz and 432MHz band plans.

The general level of 432MHz activity continues to cause concern with many repeaters remaining unused for long periods every day. Similarly, apart from a small handful of stalwarts, CW operation in the CW-exclusive part of the 432MHz band plan is almost non-existent. When CW operation takes place, it is mostly higher in the band intermixed with SSB operation. This raises the question of whether CW exclusive sub-bands are still required in the band plans above 432MHz.

John Regnault, G4SWX

Youth

The Youth Committee (YC) has several roles within the Society. Primarily our role is to represent the views of young Members (defined as anyone under the age of 26) to the RSGB Board and act as a forum in which young Members can share their opinions and comments with the committee. The committee liaises with the Board through the Committee Chairman to the Board Liaison. The YC advises the board and wider Membership on many matters including, but not limited to communication, marketing, recruitment & STEM (Science, Technology, Engineering & Maths). The YC has representation on the International Amateur Radio Union through the Chair, who is designated Youth Coordinator for the UK & NI. The YC is also tasked with running and arranging events for young Members. The YC write articles in *RadCom* and represents the Society at youth related events throughout the UK. The YC is also tasked with attracting more young Members to the hobby and society.

In December 2016, the UK took part in YOTA (Youngsters on the Air) Month again, a great success with G16YOTA and its regional variants being used throughout the country throughout the majority of December making thousands of contacts in the world. News appeared in the February 2017 RSGB Matters.

As part of the YOTA Programme, the Society selected four young people and a team leader to attend the International Youngsters on the Air that was held in July 2016 in Austria. This is the third time we have made a delegation to the IARU YOTA programme. More about the YOTA programme can be found on www.hamyota.com

This year the committee were represented at Gilwell 24, various JOTA events, EMF Festival and among clubs. The Youth Committee were also represented at *every* Tim Peake ISS contact, with members of the committee doing presentations at the majority of the stations. The launch event was also attended in Cardiff.

A meeting was also held in Blandford Camp with Major Joe Summers of the Army Cadets about forging closer relationships with the military aspect of amateur radio and the cadets.

The Youth Committee are committed to improving the hobby to cater for young people's needs and interests and aim to attend key events such as Maker Faires, British Science Week, STEM events, Scouting events like Gilwell 24. The committee will be attending local clubs of committee members' local areas and is committed to build relationships with Members of the society, in particularly youth Members and their respective regional teams.

The RSGB is hosting the YOTA 2017 event in Gilwell Park and it is a collaborative effort between HQ, the Youth Committee and other bodies.

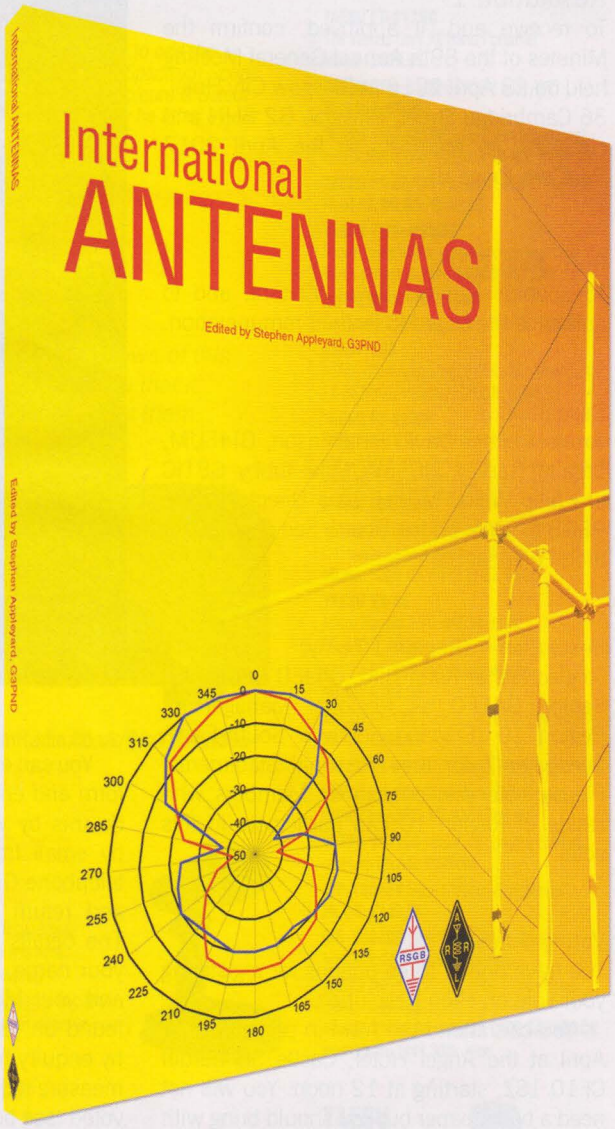
Mike Jones, 2E0MLJ

Book Review

Antennas from around the globe

International Antennas

Edited by Steve Appleyard CEng, MIET, G3PND



Antennas are one of the most popular subjects for amateur radio magazine articles and books. There is an almost infinite variety of permutations; everyone has their favourites and yet there is always a feeling in the back of your mind that a change of some sort – minor or radical – might just make the difference.

This is an unusual book in many regards, not least in that it is a joint UK-US publication by RSGB and ARRL. It draws on the libraries of the ARRL, Wireless Institute of Australia and the RSGB, and also includes previously unpublished material. The result is a well-rounded book that covers antennas from a wide range of perspectives, not to mention almost all international bands from 137kHz to 70cm.

One of the things I found interesting was the opening chapter, which describes how to use the Reverse Beacon Network as a tool to check the relative performance of aerials – handy if you're experimenting and want an objective measure of which works best, without relying on, say, an automatic "5/9" from everyone you talk to.

There are some 50 antenna designs in the book, ranging from compact to enormous. Naturally enough the VHF and UHF antennas tend to be amongst the smallest, although there are also some remarkably compact designs for HF, such as loaded verticals. At the other end of the scale you'll find monsters like the Vee Beam – as the title suggests it's a V shape; the sides are over 90m long and the opening at the top of the V is greater than 50m. This is suitable for 20-10m (at <2:1 SWR); I presume that its frequency range could be extended downwards if you had more space, though this isn't explored in the text.

Portable and mobile operators are well catered for, with several designs that are straightforward to construct and very easy to set up and remove when operating 'in the wild'.

One of my favourite antennas has to be the tape measure vertical, which basically combines the branch of a tree, a piece of string and an ordinary steel tape measure to form a variable length vertical antenna that can easily be tuned to precise resonance. Whilst it does require a good ground plane to operate efficiently, it sparked my imagination as something that could be set up quickly and cheaply in almost any circumstances, whether that be portable or a semi-permanent home installation.

Steve Appleyard has combed through hundreds of articles and made his selection of the best from a large international pool. Wherever you hail from you're pretty much guaranteed to find a lot of new material in this book, which will certainly broaden your radio horizons. Definitely one for the bookshelf.

ISBN 9781 9101 9335 8
176 pages, 200 x 279mm
Non-Members' Price £14.99
Members' Price £12.74

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

RSGB 2017 AGM

Notice is hereby given that the 90th Annual General Meeting of the Radio Society of Great Britain will be held on Saturday 22 April 2017 at the Angel Hotel, Castle St, Cardiff CF10 1SZ commencing at 12 noon for the transaction of the undermentioned business.

Resolution 1

To receive and, if approved, confirm the Minutes of the 89th Annual General Meeting held on 23 April 2016 at Glasgow City Hotel, 36 Cambridge Street, Glasgow G2 3HN and circulated to Members in the April 2017 *RadCom* (page **6**).

Resolution 2

To appoint Auditors Sayer Vincent, and to authorise the Board to fix their remuneration.

Resolution 3

To elect either David Hutchinson, GI4FUM, Sara McGarvey, 2IOSSW, Mike Tubby, G8TIC or Philip Willis, MOPHI as a Director of the RSGB to serve on the Board. See page **20** for their Personal Statements.

Resolution 4 (Region 10 only)

To elect either Keith Bird, G4JED or Michael Senior, G4EFO as Regional Manager for Region 10 (England South & South-East). See page **7** for their Personal Statements. Please note that only those Members who reside in Region 10 can participate in this vote.

Voting Guidance

You have one of three options for registering your vote on each Resolution.

You can attend the AGM in person on 22 April at the Angel Hotel, Castle St, Cardiff CF10 1SZ, starting at 12 noon. You will not need a ballot paper but you should bring with you copies of the Resolutions and the CVs of the prospective Director or Regional Manager as appropriate.

You can vote by the internet; the voting is being conducted by the Electoral Reform Society (ERS) on behalf of the Society. To vote, go to www.ersvotes.com/rsgb17. You will be asked for your Membership number without the leading zeros as part 1 of your security code and the first four digits of your callsign as part 2 of your security code (eg GM1MFG enters GM1M or G4FSG enters G4FS). ERS internet services are available 24 hours a day commencing 13 March 2017. The internet voting service will close at 12 noon on 20 April 2017.

A busy 2016 AGM held in Glasgow.

You can enter by post by requesting a ballot form and envelope from RSGB HQ. You can do this by writing to the General Manager, by email from gm.dept@rsgb.org.uk or by telephone 01234 832 702. The proxy form and return envelope will be sent to you. The details required on the proxy form are your name, address, callsign or RS number and your Membership number. This can be found on your *RadCom* mailing wrapper or by enquiry from RSGB HQ. This is a security measure required by the ERS. Once you have voted (see below), place the completed ballot paper in the pre-paid envelope and post it to the ERS to arrive on or before 12 noon on Thursday 20 April 2017.

Postal voting is expensive so please use the internet option if possible.

How To Cast Your Vote

If you do not enter the name of the proxy holder, your vote will be cast by the Chairman of the meeting in accordance with your wishes indicated on the voting form (whether electronic or paper). Alternatively, you can assign your vote as a proxy to another nominated individual. If you take up this alternative, you will need to indicate your choice of proxy holder – it has to be someone at the AGM.

Some of the trophies presented at the AGM.

On the voting screen/proxy form you will find three boxes alongside each Resolution. Against each Resolution you should mark an X indicating your choice.

If you leave the instruction on how to vote blank, your choice of proxy holder may vote as he/she wishes. Although provision for a withheld vote (Abstain) does not appear in the Society's Articles, it is now common. So if you are assigning your proxy and do not vote "for" or "against", you can elect to abstain, which is also binding on your proxy holder.

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see www. HamRadio.co.uk/ swc-100

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Microset CF-300
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Microset SR-200 is a 144MHz 200W Linear Amplifier. 8-50W input will give you 200W out. Pre-amp Gain 18dB. SO239 sockets. **£389.95**

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The UK's favourite rig-mounted antenna system!

New! WonderLoop 4010. 40m -10m

If you are an avid FT-817 or KX-3 operator and enjoy nothing more than heading for the hills on a weekend to active those rare WAB squares. Take a look at the all new WonderWand WonderLoop Antenna. Incorporating their easy to use tuning circuit, which offers frequency coverage from 40m-10m and handling 10W of RF power, you can be on the air in seconds. The tuning unit is enclosed within a lightweight ABS case, no larger than a pack of cards. This means you will no longer need to carry around all those additional extras needed to string up a wire in the field. There is also no need to worry about running a counterpoise with this efficient loop design. So how does it perform? As we had sunshine this afternoon, we popped out into the car park here at ML&S and attached the loop to our demo FT-817. Within minutes we had tuned to the 20m band worked into EA, I and 9A. Not bad for 5W and the 'shack' in our hand.

ML&S PRICE ONLY £99.95
For full info & video see: www.HamRadio.co.uk/wonderloop

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2m Coil for MP1 series SuperSlider Antennas. Adds 2m 144MHz ham band. For use with current generation MP1 series vertical antennas. **£89.95**

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X-300N	2/70, 6.5/9dB, 3.1m Long
VX-1000	6/2/70 2.15/6.2/8.4DB 1.42M Long
X-510N	2/70 Fibre glass 8.3/11.7dB gain. 5.2m long "N"
V-2000	6/2/70, 2.15/6.2/8.4dB, 2.5m Long
X-7000	144/430/1200MHz (2m/70cm/23cm) 8.3dBi (144MHz), 11.7dBi (430MHz), 13.7dBi (1200MHz) 5M Long

Mobile Antennas

NR-770RSP	100W, 2/70, 3/5.5dB, .98m Long, spring loaded
NR-7900	2/70, 3.2/6.4dB, 1.46m Long
AZ-504FXH	Extremely compact dual band antenna for 144 & 430MHz. 15.5" long
MR-77	Magnet mount/antenna combination. Includes 13' RG58 coaxial cable with BNC or SMA connector
SG-7500	2m/70cm, GAIN 3.5/6.0, 41" long
SG-7700	1/2wave C-Load radialless(144MHz), 2x5/8wave radialless(430MHz), 3.5dB(144MHz),6.0dB(430MHz). 1.06m long
SG-7900	

See Web for prices

Duplexers/Triplexers

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MX-62M	1.6-56/140-470MHz Duplexer
MX-610	HF/6+2+70 (for FT-8900)
MX-2000	6/2/70 Triplexer
MX-3000N	2/70/23 Triplexer

See Web for prices

Switches

CX-210A	2-way, SO-239 Die Cast
CX-210N	2-way, N-Type, Die Cast
CX-310A	3-way, SO-239, Die Cast
CX-310N	3-way, N-Type, Die Cast

See Web for prices

Hustler Antennas

HUSTLER

Hustler are one of America's oldest manufacturers of Ham Radio antennas. The famous "White Whips" have been seen on many cars operating HF mobile. Their HF base range of 4, 5 or 6-BTV antennas are probably the easiest to assemble and get going and of course are ground mounted, operating with just an earth spike mounted close to the base.

See web for full listing!

Base Station Range
Free standing, max 7.3m tall, 1kW

4-BTV	40/20/15/10m	£189.95
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Full range of Messi & Paoloni Low Loss Professional Coaxial Cable in stock now!

NEW PRODUCT!
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Further information see:
www.hamradio.co.uk/ultraflex13

M&P ULTRAFLEX 7
7.3 LowLoss cable, 50 Ohm, double shielded.

M&P ULTRAFLEX 10
10.3mm LowLoss cable, 50 Ohm, "alternative for RG-213"

M&P BroadPro50 double jacket
12.4mm LowLoss cable, 50 Ohm, double jacket.

Further prices and full details see web:
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Any of our cables can be ordered in any multiple of 10m length. There is a 10% discount for 100m+.

mRS MiniVNA Antenna Analysers

Perfect for checking antennas and RF circuits for hams and commercial users.

MiniVNA Pro with Bluetooth	100kHz-200MHz	£329.95
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The SARK-110 Antenna Analyser is a pocket size instrument providing fast and accurate measurement of the vector impedance, VSWR, vector reflection coefficient, return loss, and R-L-C (as series or parallel equivalent circuits). Typical applications include checking and tuning antennas, impedance matching, component test, cable fault location, measuring coaxial cable losses, and cutting coaxial cables to precise electrical lengths. The SARK-110 has full vector measurement capability and accurately resolves the resistive, capacitive and inductive components of a load. The measurement reference plane is automatic adjusted via the Open/Short/Load calibration standard to enable the accurate impedance measurements at the end of an intermediate coaxial cable. **ONLY £329.95**

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MFJ

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MFJ-949E	Manual ATU metered, Dummy Load, 1.8-30MHz, 300W	
MFJ-901B	Manual Mini ATU 1.8-30MHz, 200W	
MFJ-971	Manual ATU metered, 1.8-30MHz, 200W	
MFJ-904H	Manual ATU, metered, inc balanced, 1.8-30MHz 150W	
MFJ-969	Manual Roller ATU Metered 1.8-54MHz, 300W	
MFJ-993B	Auto ATU Metered 1.8-30MHz, 300W	
MFJ-1786X	Magnetic Loop 10-30MHz, 150W re-built & re-aligned by ML&S	
MFJ-1788X	Magnetic Loop 7-22MHz, 150W re-built & re-aligned by ML&S	
MFJ-259C	Antenna Analyser 530kHz-230MHz	
MFJ-266	V/U Portable Antenna Analyser 1.5-185MHz + 300-490MHz	
MFJ-269C	530KHz-230MHz, 415-470MHz Analyser	
MFJ-260C	Dummy Load 300W SO-239	

See Web for prices

DX Accessories are available at ML&S

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Lab & Field Grade Impedance Analyser.

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Flex-6700R as above, Receiver only	£6599.95
Flex 1500 SDR Low cost SDR Transceiver, connect via USB & you have 5W 160-6m	£749.95

There is so much to detail so check out our web page **HamRadio.co.uk/maestro** for more information.

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MULTI-USE 5W SDR TRANSCEIVER

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Up until now the RF enthusiast have had to limit themselves to cheap "RF Power Detector/ Frequency counter" devices. But these are limited to display data for a single point of maximum power, and traditionally power metrics are too unreliable, in the order of 20dB or even 30dB inaccuracy. In contrast, a spectrum analyser like RF Explorer will display full frequency spectrum in the band, including carrier and modulated shape, it will display Spread Spectrum activity, if that exists, and will show bandwidth to monitor collisions, frequency deviation from expected tone, etc.

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"For a New Direction in Ham Radio"

This 100W DDS SDR base station transceiver is powered by an internal core i5 3GHz processor running W10. It has so many advanced and leading edge features its technical specification sheet would fill 3 pages of this magazine.

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Tigertronics Grants Pass, Oregon

ONLY £131.95
WITH FREE LEAD

ALL sound card Digital and voice modes are supported by the SignaLinkTM USB. This includes traditional modes such as RTTY, SSTV and CW (to name a few), as well as today's hottest new modes like PSK31, MT-63 and EchoLink.

Cable included - see web.

ELAD FDM-DUO"R"

Receive only version of the popular FDM-Duo 5W SDR Transceiver. Coverage is 9KHz-54MHz, direct sampling. Identical to the TX variant but introduced because of many requests from SWL's and users who wanted RX only.

ML&S PRICE: £699.95

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See web for full range and specifications

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Kent Hand Key	£99.95
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SDRplay

- Robust and strong plastic case
- Continuous coverage from 10kHz to 2GHz
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- Built-in High-Performance front-end filters • Up to 10 MHz bandwidth
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- SMA antenna socket
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For more info see HamRadio.co.uk/SDRPLAY

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MYDEL CO-201N	2-WAY COAX SWITCH. N-TYPE SOCKETS. 500W MAX	SPECIAL OFFER £21.95
MYDEL CO-201AM	2-WAY DELUXE HEAVY DUTY COAX SWITCH SO-239 1KW	SPECIAL OFFER £32.95
MYDEL CO-201AN	2-WAY DELUXE HEAVY DUTY COAX SWITCH N-TYPE 1KW	SPECIAL OFFER £33.95
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FUNCUBE DONGLE PRO+ £149.99

- Coverage is from 150kHz (yes, that's kHz) to 1.9GHz.There is a gap between about 250MHz to 410MHz. There isn't a gap anywhere else.
- Eleven discrete front end filters, including some really, really serious SAW filters for 2m and 70cm
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- Much improved phase noise
- Better Dynamic Range by up to 7dB
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- All this plus more and still no drivers required!

bhi Hear those weak signals with a bhi DSP noise cancelling product!

NES10-2 MK3
Amplified DSP Noise Cancelling Speaker

Please see web for price.

- 5W input & 2.7W audio
- Headphone socket
- 8 filter levels
- Rotary filter select knob

DSPKR - 10W DSP Speaker
Easy to use - Sleep mode

Please see web for price.

- Filter level select & store
- Separate volume control
- Input overload LED
- Headphone socket
- Supplied with manual and fused DC power lead

NEIM1031 MKII
Fully featured Amplified Noise Eliminating In-Line module

- 2.8 W audio - Audio & line level inputs/outputs
- 50Hz to 4.5KHz bandwidth
- 12 to 24V DC, 500mA
- Headphone socket
- Separate input level & volme controls
- 8 filter levels 9 to 35 dB

Please see web for price.

Dual In-Line
Dual Channel DSP noise eliminating module

Please see web for price.

- Suitable for all radios, receivers and SDR
- Mono or stereo input & output options
- 7 watt mono audio output, line out and headphone out
- Ideal for DXing, special event stations and field day events
- New improved noise cancelling!

DESKTOP
Amplified DSP base station speaker - 10 Watts audio

- Separate volume and filter level controls - 8 DSP filter levels
- Speaker level and line level input - Sleep mode
- Easy to use
- Size 200(h)x150(d)x 160(w)mm
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New Compact In-Line

- Compact DSP noise cancelling module with new improved DSP algorithm giving even better noise elimination
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- Use mobile or in the shack
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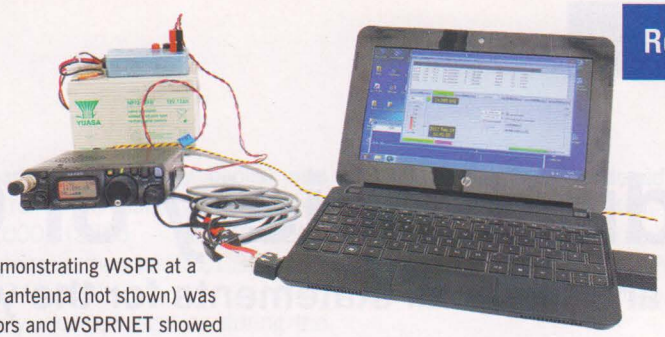
- Size: 121x70x33mm

Please see web for price.

Data



Portable setup used for demonstrating WSPR at a club talk. A magnetic loop antenna (not shown) was used for transmitting indoors and WSPRNET showed the station being decoded around Europe.

Data modes come and go

Over the years various amateur data modes have evolved from basic RTTY, which started when surplus teleprinters appeared after WW2. AMTOR, adding a layer of error detection and repeat-requests, was developed by G3PLX round about 1979 using the early home computers that were beginning to become popular amongst amateurs then. Packet radio followed a few years later. But it wasn't until sound cards appeared that datamodes moved forward to any degree.

A number of weak signal modes for HF were developed (eg Olivia, Throb and many more), mostly being designed to overcome the HF propagation path. The aim was for keyboard to keyboard 'chat', but with their heavy error correction and interleaving, the long delays in decoding soon lead to dissatisfaction. OK for experimenters, but not really very user-friendly.

G3PLX developed PSK31 as a replacement for RTTY, giving several dB of extra sensitivity – a boon for QRP operators. Its narrow bandwidth allowed many users into a small bit of spectrum with an easy to use soundcard interface and it remains very popular today. Take a look at a waterfall display of any HF band for its characteristic two-tone idle and 'string-of-beads' appearance. But soon there was a new game!

Very weak signals

The WSJT weak signal modes, such as JT65 and JT4 with their strict short formatted messages and precise timing requirements were originally designed for EME (moonbounce) operations where very rigid protocols for timing and message format had been adopted for CW and SSB. Not something you'd normally expect casual HF operators (contesters excepted) to take on board? Think again!

The narrowband, highly error corrected nature of JT65A meant that *really* weak signals – even inaudible ones – could be copied perfectly. Along with low power operation this opened up vistas that many ops could exploit, especially those with small or no gardens for decent antennas. The rigid protocols were quickly accepted, and even modified slightly for HF. JT65A on HF really took off.

The WSJT software, previously mostly the EME-focussed brainchild of Joe Taylor, K1JT, was expanded into WSJT-X by a team of software experts in various fields. Apart from improving decoders and adding new modes, simultaneous decoding of multiple signals in the passband for JT65 was perfected – specifically for HF use. Rig control via CAT was first introduced mainly for automatic Doppler correction tuning for EME. But it allows auto band setting and complete control just from the PC screen. Preferred frequencies for each mode are stored and the rig automatically set as mode or band is changed. JT65A at HF is now so popular that on some weekends, dozens of QSOs and CQ calls can be seen on the bands during the day, with some really exotic DX looking callsigns being worked.

JT9 was added, a new mode that is both narrower and a dB or so more sensitive than JT65. Its use is just beginning to increase. Its sensitivity is comparable with WSPR. The latest WSJT-X suite allows simultaneous JT65A and JT9A operation – but it helps to have a wide SSB filter for this dual mode operation so DSP based transceivers with settable SSB filter widths win here.

An excellent paper describing in some detail each of the weak signal WSJT modes can be found at [1]. This covers each topic clearly, concisely and accurately, and shows how anyone with some curiosity about how the JT modes work can explore and test their sensitivities using tools provided with the open-source WSJT-X.

The latest modes

MSK144 was discussed last time, and QRA64 mode was described briefly back in October's *Data* column, just after it was announced. The latter has been considerably worked on now and has been accepted into the mainstream. QRA64 appears to show a dB or two extra sensitivity over JT65. But without a noticeable sync tone showing on a waterfall, users have to 'know' where it is in frequency more than with JT65 with its ease of point-and-click tuning. QRA is just beginning to make an appearance on HF, but is not yet properly coordinated and not advised except for purely experimental use.

The DLOSHF EME beacon

A couple of years ago Per Dudek, DK7LJ installed his high power 10GHz Moon tracking EME beacon for small-dish operators to listen for. Originally it sent a JT4G message as well as CW and a period of carrier. However, for reasons to do with tuning accuracy and the relatively small spread of EME reflections, the narrower JT4F was adopted for 10GHz EME and the beacon was changed to this sub-mode. Later, a spare new driver was developed and QRA-64D mode was added as a switch selectable option, along with JT4F. Experiments are still ongoing, but the QRA64 transmissions have been copied by several microwave EME operators with small backyard dishes. More details of the DLOSHF drivers can be found at [2].

The best description of error correction – ever!

This description in non-mathematical terms of how Forward Error Correction works [3] is a real eye-opener. In the words of its author, Paul Nicholson:

"I wrote a non-mathematical introductory article about how forward error correction works. There's a lot of material on the web about FEC but most of it is very technical and tends to concentrate on one or another particular coding scheme. I couldn't find anything that demonstrates and really explains in simple terms the essential principle of it. So I thought I'd try to write something, perhaps to see if I can understand it myself. The article should appeal to anyone who's wondered how 'coding' a message, which increases its bandwidth and reduces its S/N, can actually lead to greatly improved communications. Whether I've succeeded or not, the reader will have to judge."

Successful club WSPR demo

I recently gave a live demonstration of the WSPR beacon mode to my local club (Itchen Valley). It involved an FT-817 transceiver running 5W on 7MHz to a homebrew magnetic loop that another club member had brought. A small HP notebook computer completed the station. Noise levels were far too high inside the village hall to hear anything at all, but our transmissions being decoded by other stations around Europe could be seen popping up in real time on the WSPRNET database. A few days later several club members' callsigns suddenly started appearing on WSPRNET, so the demo was clearly a success and had spurred their interest!

Websearch

[1] http://destevez.net/2016/10/simulating-jt-modes-how-low-can-they-get/
[2] www.g4jnt.com/EME_Beacon_OpenPub_.pdf
[3] http://abelian.org/fec/pn161218/

Andy Talbot, G4JNT
andy.g4jnt@gmail.com

Radio Society of Great Britain

Report and financial statements for the year ended 31st December 2016

Legal and administrative details for the year ended 31 December 2016

Status	The organisation is a company limited by guarantee, incorporated on 21 July 1926 in England and Wales.
Company number	00216431
Registered office and operational address	3 Abbey Court, Fraser Road, Priory Business Park, Bedford MK44 3WH
Country of registration	England & Wales
President	Nick Henwood, G3RWF
Chairman	Steve Hartley, G0FUW
Treasurer	Richard Horton FCA, G4AOJ
Company Secretary	Steve Hartley, G0FUW
Audit Committee	Stewart Bryant. G3YSX, Stan Lee, G4XXI, Richard Horton FCA, G4AOJ
Bankers	NatWest Plc, 181 Darkes Lane, Potters Bar, Hertfordshire EN6 1XT
Solicitors	Hatchers Solicitors LLP, Welsh Bridge, 1 Frankwell, Shrewsbury SY3 8LG
Auditor	Sayer Vincent LLP, Chartered Accountants and Statutory Auditors, Invicta House, 108-114 Golden Lane, London EC1Y 0TL

Introduction and overview

This report provides an overview of the finance and governance of the Society during 2016.

2016 was a busy year as the RSGB continued to improve its services to ensure Members enjoy their interest in radio communications to the full. The Board pays tribute to the volunteers and staff who continue to work tirelessly to ensure that services are supported and improved.

A Survey of Amateur Radio in the UK, last undertaken in 2010 ahead of a Strategic Review, was completed in the last quarter of 2015. The outcome was analysed during the first quarter of 2016 and the findings were presented at the AGM in April and the Convention in October and were summarised in *RadCom*.

There were several changes in personnel with a new General Manager, a new President, a new Director and a new Board Chairman all taking up office in April.

There was significant work on the Society's quinquennial Strategic Review with the involvement of external professional assistance freely given by Chris Deacon, G4IFX. Meetings and workshops sought views from the Board, the Regional Council, the Leadership Team and RSGB HQ staff. Consultation with the Society as a whole will take place through February 2017 and the launch of the new strategy is planned for the 2017 AGM.

The interests of the UK amateur radio community were represented by the RSGB at numerous meetings with Ofcom, at the IARU Region 1 interim meeting in Vienna and at the CEPT meeting in Rome as part of the preparation for the World Radio Conference in 2019. RSGB volunteers were present at over 50 amateur radio rallies in the UK and the international gatherings at Friedrichshafen and Dayton.

There was a huge amount of work in support of the ARISS contacts with Tim Peake, the UK astronaut on the International Space Station. Ten schools made contacts with Tim Peake who was using the callsign GB1SS. Media interest was high and a number of school radio clubs were established following the ISS contacts.

Two significant agreements were signed during the year, the first handing over the management of the Islands On The Air award scheme to IOTA Ltd and the other re-unifying RSGB RAYNET and the RAEN.

Statement of the Directors' responsibilities

The directors are responsible for preparing the Directors' Report and the financial statements in accordance with applicable law and regulations.

Company law requires the directors to prepare financial statements for each financial year. Under that law the directors have elected to prepare the financial statements in accordance with United Kingdom Generally Accepted Accounting Practice (United Kingdom Accounting Standards and applicable law). Under company law the directors must not approve the financial statements unless they are satisfied that they give a true and fair view of the state of affairs of the company and the profit or loss of the company for that period.

In preparing these financial statements, the directors are required to:

- Select suitable accounting policies and then apply them consistently
- Make judgements and accounting estimates that are reasonable and prudent
- State whether applicable UK Accounting Standards have been followed, subject to any material departures disclosed and explained in the financial statements
- Prepare the financial statements on the going concern basis unless it is inappropriate to assume that the company will continue in operation.

The directors are responsible for keeping adequate accounting records that are sufficient to show and explain the company's transactions and disclose with reasonable accuracy at any time the financial position of the company and enable them to ensure that the financial statements comply with the Companies Act 2006. They are also responsible for safeguarding the assets of the company and hence for taking reasonable steps for the prevention and detection of fraud and other irregularities.

The directors are responsible for the maintenance and integrity of the corporate and financial information included on the

company's website. Legislation in the United Kingdom governing the preparation and dissemination of the financial statements may differ from legislation in other jurisdictions.

Each of the directors confirms that to the best of his/her knowledge there is no information relevant to the audit of which the auditors are unaware. Each of the directors also confirms that he/she has taken all necessary steps to ensure that he/she is aware of all relevant audit information and that this information has been communicated to the auditors.

The Directors who served on the Board during the year and up to the date of this Report were as follows:

John Gould, G3WKL,
President (elected), until 23/04/2016
Stan Lee, G4XXI, Nominated Director, until 23/04/2016
Barry Palin, G4AHK,
Co-opted Director, until 23/04/2016
Len Paget, GM0ONX, Elected Director
Steve Hartley, G0FUW, Elected Director
Alan Messenger, G0TLK, Elected Director
Stewart Bryant, G3YSX,
Nominated Director, until 23/04/2016
Elected Director, from 23/04/2016
Graham Murchie, G4FSG,
Elected Director, until 23/04/2016
Nominated Director, from 23/04/2016
Ian Shepherd, G4EVK,
Nominated Director, from 23/04/2016
Nick Henwood, G3RWF,
President (elected), from 23/04/2016

Governance

The Board met 12 times in 2016; an additional meeting was convened to focus on the Strategic Review. Proceedings of those meetings have been published on the RSGB website.

The Leadership Team, comprising members of the Board, Committee Chairs, Honorary Officers, Regional Managers and senior members of staff met twice during the year.

The Board reviewed and updated its risk register, looking at current and potential risks to the operation of the Society. Mitigating action was taken where possible. Next full review is planned for March 2017.

The first audit of the examination system since its management was transferred from the RCF to the RSGB was completed. The audit identified a small number of issues but concluded the system was fit for purpose.

Financial results

The Society reported an operating surplus of £32,000 (2015 – £34,000), and a surplus on ordinary activities before taxation of £37,000 (2015 – £51,000). These results are in line with the objective of achieving a roughly breakeven result each year.

Turnover, which comprises Membership subscriptions and commercial income from merchandising (primarily books) and advertising remained largely unchanged at £1,482,000 (2015 – £1,476,000). Operating expenses amounted to £1,351,000 (2015 – £1,344,000).

The Society received legacies during the year of £21,000 (2015 – £17,000). There was £1,000 of expenditure attributable to legacies during the year (2015 – £21,000). The Society's Legacy Committee continues to explore ways in which these funds can be deployed for the benefit of amateur radio. Undisbursed Legacy Funds amounted to £195,000 at 31 December 2016 (2015 – £175,000).

The Society's net assets at 31 December 2016 amounted to £1,278,000 (2015 – £1,221,000).

During the year, the Board decided, after careful consideration based on professional advice, to invest £250,000 of the Society's funds in a balanced portfolio of funds. The objective is to obtain a return in excess of the current unattractive yield on cash deposits. This investment was made just prior to the year end. The Board will review performance, in conjunction with its professional advisers, on a regular basis. The returns will be used to further the Society's strategy and objectives.

With a general upward trend in Membership over the last few years, and good financial management, the Board has been able to keep Membership subscriptions at the same level for the 6th year in a row; the last increase was on 1 January 2011. However, we cannot rule out a change in 2018 – the economic outlook is far from certain.

Membership recruitment and retention

At the end of the year there were 20,981 Members of the Society, an increase of 65 on 2015 year end. When set against the number of Members becoming 'silent keys' this is seen to be a very positive result.

Increasing the Membership of the Society and retaining Members remain our top priorities and to do this means we must ensure the quality of our services to existing Members as well as recruiting anew. Our Members are our best recruiters and we thank everyone for their support.

Volunteers

We would like to record our thanks for all of the volunteer support we received, and continue to receive. The time and effort given up so freely allows us to deliver an impressive range of services that are valued by our Members. A volunteering video was published in 2016 and now forms part of a revamped vacancies webpage.

If any Member is interested in volunteering, then we would be delighted to hear from you – the personal satisfaction of volunteering one's time and skills can be a two-way process of giving and receiving; a true partnership.

The Society was saddened by the death of Rupert Thorogood, G3KKT, who had been the Company Secretary for ten years. Rupert's funeral was attended by the President, three past Presidents and the Board Chairman.

Affiliated Clubs

Traditionally, clubs were seen as the social life blood of amateur radio but increasingly there are questions over whether this holds true in the 21st century. There is no doubt that many clubs still provide an excellent service, including licence training and examinations but we are sensing a move to less formal groupings and virtual clubs.

We ran the Club of the Year competition and plan to do so again in 2017 with continued sponsorship from Waters & Stanton.

A review of good practice in clubs and similar groups has been planned for 2017 with the aim of sharing what has been seen to be successful.

HQ management

The Headquarters staff continues to provide a first class service with every department securing a high score in the results of the 2015 Survey of Amateur Radio in the UK. Steve Thomas, M1ACB who took over as General Manager in April 2016, has settled in well and now leads the HQ team and supports the Board in its work.

The new General Manager reviewed the IT system and has commenced work on a suite of improvements that should allow new and improved services to be provided within existing budgets.

The Board would like to record its thanks to all of our small dedicated team at Abbey Court in Bedford.

Communications

In 2016 we continued to work on our communications. We had very positive feedback about our social media presence and the new videos on our YouTube channel have proved to be popular across the amateur radio world. As a result of feedback from users we introduced a new menu system for our website and further updates are planned for 2017.

We have discussed Committee communications with our Leadership Team and monthly e-newsletters are sent to every affiliated club. Whilst there is more work to be done, with the professional advice of the RSGB's Communications Manager, communication across the Society continues to improve.

Publications

RadCom continues to be seen as one of the best amateur radio publications in the world and received much positive feedback on the improved format for 2016. *RadCom Plus*, which is targeted at those who aspire to a more in depth technical treatment of amateur

radio, was published twice during 2016 and has continued to attract a significant readership. *RadCom Basics* has continued to provide a consistent family of publications with something for all levels of knowledge and understanding.

The RSGB published 13 new book titles in 2016. Sales of the regular titles were generally on a par with previous years. The lack of new writers and titles does though continue to constrain overall sales. Three of the new titles were also published in Kindle format and sales for all these equates to about 10% of the sales of paper copies, which is roughly what had been expected. E-publishing has yet to become a significant income for the Society.

The *RSGB Yearbook* had to be re-published due to errors in the data provided by Ofcom. The costs involved in republication and replacement of original copies were covered by Ofcom.

License examinations

Demand for exams continues to hold level. Congratulations to all those involved at all levels; students, trainers, assessors and examination teams. Advanced examinations moved to being available 'on demand' rather than on fixed dates in 2016. This has allowed some exam centres to host exams when they were previously unable to do so on the fixed dates and has seen the HQ work load even out over longer periods.

Work has been carried out to meet the long held aim of being able to provide the option of online examinations. Plans are in place to start offering Advanced exams using a secure online system during 2017. The other examinations will follow in due course. Paper-based exams will continue to be available for those who require them.

National Radio Centre (NRC)

The NRC continues to showcase radio communication at Bletchley Park and visitor numbers have continued to increase. We arranged for a building condition survey during the year and will have short and long term maintenance plans in place during 2017.

The NRC shack was enhanced through a generous donation of a modern Software Defined Radio from FlexRadio Systems. Work is in hand to refresh some of the displays, in particular the Future Zone and we are working with Bedford University who continued to support the Centre in 2016.

Annual convention

The RSGB Convention continues to grow in attendance and its diversity of offerings and we are grateful for the continued sponsorship from Martin Lynch & Sons. Attendance was up by some 10% in 2016. The publication of some presentations as Member-only videos attracted large numbers of views. We plan to make some of the 2016 videos accessible to all via our YouTube channel during 2017. The Society has agreed to co-locate the annual AMSAT-UK Colloquium at the 2017 RSGB Convention.

Auditor

Sayer Vincent LLP were re-appointed as the company's auditors during the year and have expressed their willingness to continue in that capacity.

The directors' annual report has been prepared in accordance with the special provisions applicable to companies subject to the small companies' regime.

Approved by the directors on 18 February 2017 and signed on their behalf by

S Hartley, GOFUW
Board Chairman & Company Secretary

Independent Auditors Report

To the Members of the Radio Society of Great Britain.

Opinion

We have audited the financial statements of Radio Society of Great Britain (the 'company') for the year ended 31 December 2016, which comprise the profit and loss account, balance sheet and the notes to the financial statements, including a summary of significant accounting policies. The financial reporting framework that has been applied in their preparation is applicable law and United Kingdom Accounting Standards, including Financial Reporting Standard 102 The Financial Reporting Standard applicable in the UK and Republic of Ireland (United Kingdom Generally Accepted Accounting Practice).

In our opinion, the financial statements:

- give a true and fair view of the state of the company's affairs as at 31 December 2016 and of its result for the year then ended;
- have been properly prepared in accordance with United Kingdom Generally Accepted Accounting Practice;
- have been prepared in accordance with the requirements of the Companies Act 2006.

Basis for opinion

We conducted our audit in accordance with International Standards on Auditing (UK) (ISAs (UK)) and applicable law. Our responsibilities under those standards are further described in the Auditor's responsibilities for the audit of the financial statements section of our report. We are independent of the company in accordance with the ethical requirements that are relevant to our audit of the financial statements in the UK, including the FRC's Ethical Standard, and we have fulfilled our other ethical responsibilities in accordance with these requirements. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

Conclusions relating to going concern

We have nothing to report in respect of the following matters in relation to which the ISAs (UK) require us to report to you where:

- the directors' use of the going concern basis of accounting in the preparation of the financial statements is not appropriate; or
- the directors have not disclosed in the financial statements any identified material uncertainties that may cast significant doubt about the company's ability to continue to adopt the going concern basis of accounting for a period of at least twelve months from the date when the financial statements are authorised for issue.

Other information

The other information comprises the information included in the annual report, other than the financial statements and our auditor's report thereon. The directors are responsible for the other information. Our opinion on the financial statements does not cover the other information and, except to the extent otherwise explicitly stated in our report, we do not express any form of assurance conclusion thereon. In connection with our audit of the financial statements, our responsibility is to read the other information and, in doing so, consider whether the other information is materially inconsistent with the financial statements or our knowledge obtained in the audit or otherwise appears to be materially misstated. If we identify such material inconsistencies or apparent material misstatements, we are required to determine whether there is a material misstatement in the financial statements or a material misstatement of the other information. If, based on the work we have performed, we conclude that there is a material misstatement of this other information, we are required to report that fact.

We have nothing to report in this regard.

Opinions on other matters prescribed by the Companies Act 2006

In our opinion, based on the work undertaken in the course of the audit:

- the information given in the directors' report for the financial year for which the financial statements are prepared is consistent with the financial statements; and
- the directors' report has been prepared in accordance with applicable legal requirements.

Matters on which we are required to report by exception

In the light of the knowledge and understanding of the company and its environment obtained in the course of the audit, we have not identified material misstatements in the directors' report.

We have nothing to report in respect of the following matters in relation to which the Companies Act 2006 requires us to report to you if, in our opinion:

- adequate accounting records have not been kept, or returns adequate for our audit have not been received from branches not visited by us; or
- the financial statements are not in agreement with the accounting records and returns; or
- certain disclosures of directors' remuneration specified by law are not made; or
- we have not received all the information and explanations we require for our audit; or
- the directors were not entitled to prepare the financial statements in accordance with the small companies regime and take advantage of the small companies' exemptions in preparing the directors' report and from the requirement to prepare a strategic report.

Responsibilities of directors

As explained more fully in the directors' responsibilities statement, set out in the directors' annual report, the directors are responsible for the preparation of the financial statements and for being satisfied that they give a true and fair view, and for such internal control as the directors determine is necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error.

In preparing the financial statements, the directors are responsible for assessing the company's ability to continue as a going concern, disclosing, as applicable, matters related to going concern and using the going concern basis of accounting unless the directors either intend to liquidate the company or to cease operations, or have no realistic alternative but to do so.

Auditor's responsibilities for the audit of the financial statements

This report is made solely to the company's Members as a body, in accordance with Chapter 3 of Part 16 of the Companies Act 2006. Our audit work has been undertaken so that we might state to the company's Members those matters we are required to state to them in an auditors' report and for no other purpose. To the fullest extent permitted by law, we do not accept or assume responsibility to anyone other than the company and the company's Members as a body, for our audit work, for this report, or for the opinions we have formed.

Our objectives are to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with ISAs (UK) will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these financial statements.

A further description of our responsibilities for the audit of the financial statements is located on the Financial Reporting Council's website at: www.frc.org.uk/auditorsresponsibilities.aspx This description forms part of our auditor's report.

We communicate with those charged with governance regarding, among other matters, the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that we identify during our audit.

Jonathan Orchard (Senior statutory auditor)
Date 24 February 2017 for and on behalf of Sayer Vincent LLP, Statutory Auditor, Invicta House, 108-114 Golden Lane, London EC1Y OTL

Statement of comprehensive income for the year ended 31 December 2016

	Note	Operations £'000	Legacy Funds £'000	2016 Total £'000	Operations £'000	Legacy Funds £'000	2015 Total £'000
Turnover	2	1,482	21	1,503	1,476	17	1,493
Cost of sales		(99)	–	(99)	(98)	–	(98)
Gross surplus		1,383	21	1,404	1,378	17	1,395
Sales and distribution expenses		(155)	–	(155)	(155)	–	(155)
Other operating expenses		(1,196)	(1)	(1,197)	(1,189)	(21)	(1,210)
Operating surplus		32	20	52	34	(4)	30
Profit on disposal of fixed assets		–	–	–	12	–	12
Interest receivable		5	–	5	5	–	5
Surplus on ordinary activities before taxation	4	37	20	57	51	(4)	47
Taxation	6	–	–	–	–	–	–
Retained surplus for the financial year		37	20	57	51	(4)	47
Other comprehensive income							
Currency translation differences		–	–	–	–	–	–
Total comprehensive income		37	20	57	51	(4)	47
Accumulated surplus at the start of the year		1,037	184	1,221	986	188	1,174
Accumulated surplus at the end of the year		1,074	204	1,278	1,037	184	1,221

All of the above results are derived from continuing activities. The movement in the income and expenditure account is shown in note 13.
All movements in funds are included within the statement above.
*Operations includes Membership and related commercial activities

Statement of financial position as at 31 December 2016

	Note	£'000	2016 £'000	2015 £'000
Tangible fixed assets:				
Property, plant and equipment	7		412	459
Investments	8		250	–
			662	459
Current assets				
Inventories	9	64		67
Debtors	10	102		61
Cash at bank and in hand		977		1,175
		1,143		1,303
Creditors: amounts due within one year	11	527		541
Net current assets			616	762
Net assets			1,278	1,221
Capital and reserves				
Income and expenditure account			1,074	1,037
Combined Legacy reserves	16		195	175
Spectrum Defence Fund reserve	16		9	9
Total funds	13		1,278	1,221

These accounts have been prepared in accordance with the special provisions applicable to small companies subject to the small companies' regime.
Approved by the directors on 18 February 2017 and signed on their behalf by

Steve Hartley, G0FUW
Chairman

Nick Henwood, G3RWF
President

Notes to the financial statements for the year ended 31 December 2016

1. Accounting policies

a) Statutory information
Radio Society of Great Britain is a company limited by guarantee and is incorporated in the United Kingdom. The registered office address is 3 Abbey Court, Fraser Road, Priory Business Park, Bedford, MK44 3WH.

b) Basis of preparation
These financial statements have been prepared in accordance with applicable United Kingdom accounting standards, including Financial Reporting Standard 102 Section 1A – 'The Financial Reporting Standard applicable in the United Kingdom and Republic of Ireland' ('FRS 102'), and with the Companies Act 2006. The financial statements have been prepared on the historical cost basis.

c) Going concern
The directors consider that there are no material uncertainties about the company's ability to continue as a going concern.

d) Income
Turnover represents the invoiced amounts of goods sold and services provided, net of Value Added Tax and trade discounts. Turnover comprises subscription income, book income, advertising income and exam income. Subscriptions income is recognised on a monthly basis over the duration of the subscription; book income is recognised on despatch of books; advertising income is recognised on publication date; and exam income is recognised on the date of the exam. Legacies, donations and voluntary income are recognised when received or receivable – whichever is earlier. All income arises in the UK.

e) Tangible fixed assets
Depreciation is provided on all tangible assets at rates calculated to write each asset down to its estimated residual value evenly over its expected useful life (except freehold land which is not depreciated), as follows:

Leasehold buildings	2%
Bletchley Park Building	4%
Bletchley Park Fixtures & Fittings	20%
Computer equipment	33%
Fixtures and fittings	10%
Furniture and equipment	20%
Motor Vehicles (not leased)	33%
Leased assets (motor vehicles)	over the period of the lease

Assets are reviewed for impairment if circumstances indicate their carrying value may exceed their net realisable value or value in use.

Assets are capitalised where the purchase price exceeds £1,000.

f) Interest receivable
Interest on funds held on deposit is included when receivable and the amount can be measured reliably by the company; this is normally upon notification of the interest paid or payable by the bank.

g) Inventories
Inventories are stated at the lower of cost and net realisable value. In general, cost is determined on a first in first out basis and includes transport and handling costs. Net realisable value is the price at which stocks can be sold in the normal course of business after allowing for the costs of realisation. Provision is made where necessary for obsolete, slow moving and defective stocks.

h) Deferred tax
Any charge for taxation is based on the surplus for the year and takes into account taxation deferred because of timing differences between the treatment of certain items for taxation and accounting purposes. When this arises it appears in the income and expenditure account. Provision is made on the liability method for all taxation deferred in respect of timing differences to the extent that, in the opinion of the directors, a liability is likely to crystallise in the foreseeable future.

i) Investments
Investments are a form of basic financial instrument and are initially recognised at their transaction value and subsequently measured at their fair value as at the balance sheet date using the closing quoted market price. Any change in fair value will be recognised in the statement of comprehensive income and any excess of fair value over the historic cost of the investments will be shown as a fair value reserve in the balance sheet. Investment gains and losses, whether realised or unrealised, are combined and shown in the heading "Net gains/(losses) on investments" in the statement of comprehensive income.

j) Pension
The Society contributes to group personal pension policies to provide benefits for employees on a defined contribution basis. The assets of the policies are held separately from those of the Society in independently administered funds. The amount charged to the income and expenditure account represents the contributions payable to the policies in respect of the accounting period.

k) Foreign exchange
Monetary assets and liabilities in foreign currencies are translated into sterling at the rates of exchange ruling at the balance sheet date. Transactions in foreign currencies are translated into sterling at rates of exchange ruling at the transaction date. Exchange differences are taken into account in arriving at the net incoming resources for the year.

l) Debtors
Trade and other debtors are recognised at the settlement amount due after any trade discount offered. Prepayments are valued at the amount prepaid net of any trade discounts due.

m) Creditors
Short term trade creditors are measured at the transaction price. Other financial liabilities, including bank loans, are measured initially at fair value, net of transaction costs, and are measured subsequently at amortised cost using the effective interest method.

2. Turnover

	2016 £'000	2015 £'000
Subscription income	883	858
RadCom advertising income	182	185
Book sales	277	267
Other income (note 3)	140	166
	1,482	1,476

3. Other income

	2016 £'000	2015 £'000
Foundation licence exams	50	50
Intermediate licence exams	23	23
Full licence exams	17	17
3rd Party Book Production	2	1
Commercial Sponsorship	8	13
Sundry income	4	25
Rallies and exhibition fees	36	37
	140	166

4. Surplus on ordinary activities before taxation

This note lists significant items in the income and expenditure account.
The surplus is stated after charging / (crediting):

	2016 £'000	2015 £'000
Depreciation on owned assets	68	62
Depreciation on leased assets	–	3
Interest receivable	(5)	(5)
Profit on disposal of other fixed assets	–	(12)
Directors' remuneration	–	–
Board reimbursed expenses	17	15
Regional & Committee reimbursed expenses	23	27
Auditors' remuneration:		
▪ Audit	12	11
▪ Non-audit services	1	3
Legal expenses	7	3

Expenses totalling £17,000 (2015: £15,000) were reimbursed to 7 Board members (2015: 8) for directly incurred travel and subsistence costs of attending meetings, and other sundry costs. Board members serve in a voluntary capacity and are not remunerated for their services.

5. Staff costs and numbers

	2016 £'000	2015 £'000
Salaries and wages	439	429
Social security costs	41	41
Pension contributions	17	11
	497	481

The average weekly number of employees during the year was as follows:

	2016 No.	2015 No.
Headquarters staff	15	15

6. Taxation

	2016 £	2015 £
UK corporation tax	–	–

RSGB has an agreement with HMRC over the calculation of trading profits for corporation tax purposes. In recent years this has generated a loss, contributing to a deferred tax asset (see note 12). RSGB has generated a tax loss in the year, and consequently no corporation tax liability has arisen in the year.

7. Property, plant and equipment

	Leasehold land and buildings £'000	Computer equipment £'000	Fixtures and fittings £'000	Furniture and equipment £'000	Motor vehicles £'000	Bletchley Park £'000	Bletchley Park F&F £'000	Totals £'000
Cost								
At the start of the year	339	107	5	45	38	209	140	883
Additions in year	–	13	–	8	–	–	–	21
Disposals in the year	–	–	–	–	–	–	–	–
At the end of the year	339	120	5	53	38	209	140	904
Depreciation								
At the start of the year	53	73	4	34	9	126	125	424
Charge for the year	7	26	–	4	13	4	14	68
Disposals in year	–	–	–	–	–	–	–	–
At the end of the year	60	99	4	38	22	130	139	492
Net book value								
At the end of the year	279	21	1	15	16	79	1	412
At the start of the year	286	34	1	11	29	83	15	459

The Society purchased 3 Abbey Court, Fraser Road, Priory Business Park, Bedford MK44 3WH on 17 March 2008 for £339,000. The building has been acquired on a leasehold of 125 years. The land is on a peppercorn lease from Bedford Council for 125 years, and is not depreciated.

The National Amateur Radio Centre at Bletchley Park was opened in July 2012. The land is on a peppercorn lease from the Bletchley Park Trust for 25 years and is not depreciated.

8. Investments

On 20 December 2016, the Society invested £250,000 in funds held by Funds Network. These are shown at fair value at year end.

9. Stock

	2016 £'000	2015 £'000
Consumable stock	2	1
Goods held for resale	62	66
	64	67

Inventories recognised in cost of sales during the year as an expense was £99,160 (2015: £98,747).

10. Debtors

	2016 £'000	2015 £'000
Trade debtors	26	26
Prepayments and accrued income	82	41
Other debtors	–	–
Provision for doubtful debts	(6)	(6)
	102	61

11. Creditors : amounts due within one year

	2016 £'000	2015 £'000
Trade creditors	61	51
Taxation and social security	13	14
Other creditors	20	15
Subscriptions in advance	320	328
Grants payable	–	10
Accruals	113	123
	527	541

12. Unprovided deferred tax asset

	2016 £'000	2015 £'000
Difference between accumulated depreciation and capital allowances	(4)	26
Tax losses	(2,519)	(2,513)
Undiscounted, unprovided deferred tax asset	(2,523)	(2,487)

Deferred tax asset is not recognised because of the unlikelihood of utilising trading losses brought forward in the light of current trading conditions.

13. Reconciliation of movements in Members' funds

	2016 £'000	2015 £'000
Members' funds at the start of the year	1,221	1,174
Surplus/(Deficit) for the period on income and expenditure fund	37	51
Movement on Combined Legacy reserves	20	(4)
Members' funds at the end of the year	1,278	1,221

14. Pension scheme

The company operates a defined contribution pension scheme. The pension cost charged for the period represents contributions payable by the company to the scheme and amounted to £16,951 (2015: £10,963). Outstanding contributions at the year end amounted to £1,723 (2015: £1,176). These are included in other creditors at the year end.

15. Related party disclosure

Steve Hartley is a director of the Society. He received £593 during 2016, (2015: £507), as payment for book royalties from the sales of two books published by the Society.

The Radio Communications Foundation is a registered charity, number 1100694. Steve Hartley, a Director of the Society and Marilyn Slade, an officer of the Society, are trustees of the charity.

During the year two donations totalling £2,500 (2015: £1,723) were received by the Society from the Radio Communications Foundation. £2,000 was for the Tim Peake School Contacts project and £500 for the Arkwright Trust Day held at the National Radio Centre.

Since its inception, the Society has provided the Foundation with management services at no cost.

16. Designated funds

Current year:	At 31 December 2015 £'000	Incoming resources £'000	Outgoing resources £'000	At 31 December 2016 £'000
Legacy Funds	175	20	–	195
Spectrum Defence Fund	9	–	–	9
	184	20	–	204

Prior year:	At 31 December 2014 £'000	Incoming resources £'000	Outgoing resources £'000	At 31 December 2015 £'000
Legacy Funds	179	17	(21)	175
Spectrum Defence Fund	9	–	–	9
	188	17	(21)	184

The Spectrum Defence Fund was established in December 2009 to contribute towards legal costs that would be incurred in the defence of the amateur radio spectrum. In the first instance it was agreed that the money raised would be used to meet the costs of the legal challenge of Ofcom in relation to the Power Line Adaptor issues. The Board decided in February 2010 not to proceed with any further legal challenge. It is committed to a policy of protecting radio amateurs privileges and the amateur radio spectrum and these funds will be used for this purpose.

17. Funds held on behalf of trusts

RSGB acts as custodian for the funds below and holds the amounts below within bank accounts for each fund. These funds are repayable to the individual trusts upon demand and, as such, are not recognised as assets held by the RSGB. The movements on these funds are shown below.

Current year:	At 31 December 2015 £	Incoming resources £	Outgoing resources £	At 31 December 2016 £
The J Fraser Shepherd Prize Fund	1,693	3	–	1,696
DXpedition Fund	10,423	2,462	(2,550)	10,335
The Pilot Officer Norman Keith Adams Prize Fund	2,153	4	–	2,157
Dewit L Jones W4BAA IOTA Legacy Fund	2,653	8	(2,661)	–
Total trust funds	16,922	2,477	(5,211)	14,188

These amounts are not included in the balance sheet of RSGB at the year end.

The Dewitt L Jones W4BAA IOTA Legacy Fund was closed on 2 September 2016 at the request of the trustees and the amount of £2,661.43 held there was transferred to Islands on the Air (IOTA) Ltd for the benefit of its supporters' section, Friends of IOTA.

Prior year:	At 31 December 2014 £	Incoming resources £	Outgoing resources £	At 31 December 2015 £
The J Fraser Shepherd Prize Fund	1,177	516	–	1,693
DXpedition Fund	9,333	2,836	(1,746)	10,423
The Pilot Officer Norman Keith Adams Prize Fund	1,400	753	–	2,153
Dewit L Jones W4BAA IOTA Legacy Fund	2,651	7	(5)	2,653
Total trust funds	14,561	4,112	(1,751)	16,922

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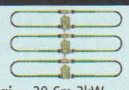

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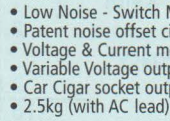

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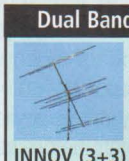

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Getting started in the FM Activity Contests

What you need to know to take part in the new series of contests.

At the start of 2017 the night on which some of the UK Activity Contests (UKACs) take place was changed from Tuesday to Thursday. This was done to make some sessions coincide with activity nights on the Continent. As a result the 4m UKACs, which were limited to three or four Tuesday sessions per year, now have eleven and take place on Thursdays. The 6m UKACs, now also take place on Thursdays.

Brand new for 2017 is a series of contests aimed at stations taking their first steps into contesting and encouraging the development a station's performance on three easily accessible VHF/UHF bands. Each of the sessions run for one hour and take place immediately before the UKAC that takes place on the same band, so some people operate in both. You can find the schedule and rules on the Contest Committee website, www.rsgbcc.org

Power

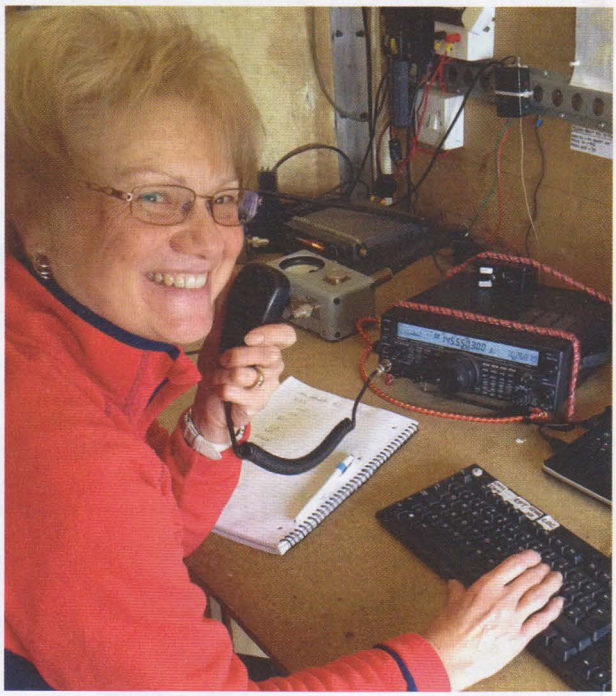
The power levels of the FMACs – 10 watts and 50 watts – were chosen very much with Foundation and Intermediate licensees in mind. For Foundation licensees there is no disadvantage of competing against higher power stations. The same is true for Intermediate licensees, who are not put at the disadvantage they might suffer it they were competing against Advanced licensees running high power.

Equipment

First, the obvious, you need an FM transceiver and an antenna. A common outdoor antenna for FM might be a dual-band ground plane. This should get you some contacts, but maybe not many. Don't expect much at all from a rubber duck antenna on a handheld transceiver.

Most people use vertical polarisation for FM operation, but many of the UKAC regulars who have also started taking part in the FMACs use horizontal polarisation. Horizontal polarisation is the de facto standard for SSB and CW operation and it leads to a problem when stations try to communicate 'cross polarised'. On VHF and UHF there can be a big signal loss between the two. Ideally you should have a vertical antenna and a horizontal antenna, but the rules state "only one antenna". At least one person has overcome the problem by making a mechanism to turn a beam between polarisations.

Whilst you can use a handheld microphone, a lot of contest operators choose to use a headset-mic. There are numerous models on the market, from cheapies intended primarily for Skype to models costing hundreds of pounds.



Pauline, G8HQW operating on 2m FM. The logging software is Minos. Photo: Chris, G4FZN.

Location

If your home is well sited you should be able to work some people from it on all three of the FMAC bands. If, like G8HQW (see photo), your home is in a valley, a sparsely populated area and/or you're using a non-directional vertical antenna it might not be many, so try driving to higher land and operate mobile from there. If you're new to VHF/UHF operating you may be surprised how much difference this can make. The next thing is to increase the height of your antenna above ground. This too can make a big difference to your QSO potential. The next step would be to use a beam. Even a small one can make a big difference.

Activity

In January the logs received for the 4m, 2m and 70cm FMACs were 21, 60 and 36 respectively. Some have said that the level of activity in the FMACs is low, but I would like to point out that when the 2m UK Activity Contests began in 2001 the level of support was very low. Only 36 stations entered – during the whole year! These days a few people make over 200 QSOs per session in the 2m UKACs.

Anything else?

Yes, to take part fully you need to log the contacts you make as they take place. You can keep a handwritten log, but these days most of us have a PC and there are a variety of software packages that will make logging easy. Using a headset will reduce noise that might prevent you from hearing a weak station properly and also leave your hands free to enter the information you receive into the log.

After each contest you will need to upload your log to the VHF Contest Committee website. Your entry is not confirmed until you receive a confirmation. Some errors may be flagged up and if necessary you have seven days to fix it and re-submit your log. If you logged contacts with pen and paper there is the facility on the website to key them in online. Take care to fill in all the details correctly. In particular make sure you don't transpose sent and received signal reports and serial numbers.

The FMACs are intended to give those with limited or no experience of contesting a taste of what awaits them when they equip themselves for more ambitious operation. Radio club members who may not have had the chance to operate in contests before can also join in the fun as this series contests is open to everybody.

Steve White, G3ZVW
steve.g3zvw@gmail.com

LF

After their problems in the autumn the alternator transmitter (SAQ) at Grimeton in Sweden returned to the air on Christmas Eve with one of their most successful events. Over 400 reports were received on the 17.2kHz CW transmission including quite a few trans-Atlantic ones. Among the LF regulars reporting were Joe, VO1NA, who had excellent reception on the East coast of Newfoundland, and Laurence, KL7L who gave a 449 from Alaska. SAQ normally transmits twice a year, once at Christmas and once on 'Alexanderson Day' in late June or early July so you have plenty of time to get ready for the next transmission.

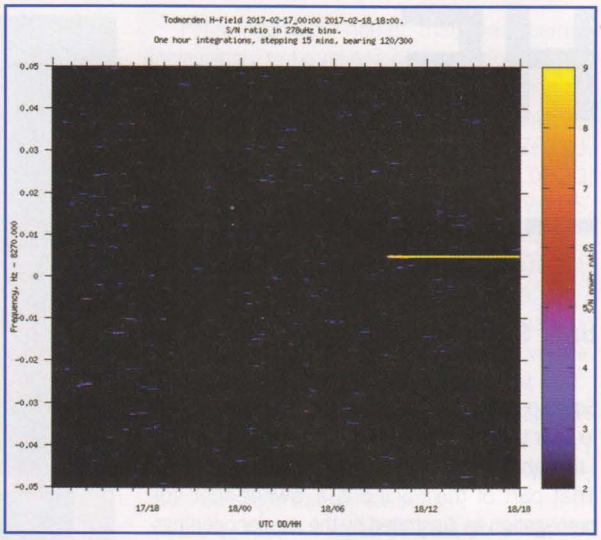
More VLF success

Stefan, DK7FC seems to be on a downward spiral these days, his VLF tests have been popping up on various frequencies over the last few months. He started off the New Year with an EbNaut test on 5.17kHz – a wavelength of 58km. This was decoded by Paul Nicholson in Todmorden, both from his own recording and from one made via the IK1QLF VLF monitoring station in Cumiana, NW Italy. The transmissions were made from Stefan's usual LF/VLF aerial; a large vertical suspended from a tower block, into which he was feeding about 230mA of RF (AF?) current.

Next he tried 970Hz, which he managed to detect on his tree-mounted remote receiver 3.5km away. This test prompted an interesting analysis from Jim, AA5BW who reckons that, if the ERP at 970Hz could be raised to about 0.3μW it should give a similar signal to noise ratio to the 6.47kHz transmissions that Stefan made earlier at 1μW ERP. It would also propagate under water and quite deep underground. He brought up the subject of a propagation null in the 3kHz region that could scupper the chances of Stefan's 2.97kHz tests reaching any greater distance. Despite that Stefan's signal reached the Cumiana receiver whilst running 170mA of aerial current. This is about five wavelengths on the 101km band.

Later in January, Stefan was back on 8.27kHz and received a report from RN3AUS at a distance of 1993km. This is approaching the record set by OE5ODL and 4X1RF in 2011. He also made a weekend transmission with the aerial current above 600mA that was picked up by RN3AUS, IK0VVE, Paul Nicholson and by G3ZJO. This time Alex and Eddie both managed to decode the EbNaut message from the transmission: that is definitely a first! The Eb/N0 ratio with Alex in Moscow was 6.5dB, which is a big signal by these standards, so there's no doubt that the transmission could go a lot further. Paul Nicholson reported that the signal was the strongest he'd received since Stefan's kite experiments.

This is all very interesting research work and the ability of amateurs to probe the limits of what is possible using a combination of old-fashioned VLF RF technology and highly efficient signalling techniques surely gives us reason to be proud.



Big signal received in Todmorden from DK7FC.

Another LW station gone

Well, almost. On 31 December the high power 162kHz transmitter at Allouis in central France fell silent. This station was set up in 1939, destroyed in 1944 and rebuilt in 1952 to broadcast to the whole of the country. In latter years the power was increased to 2MW but now that long wave broadcasting is in decline the cost of running and maintaining these high power stations is thought to be unsustainable. Someone must be continuing to pay the upkeep however, as the carrier is still silently broadcasting low bit-rate data for utilities and acting as a frequency standard for French users.

137kHz DX reports

Alex, R7NT keeps an eye on the best distances achieved in various modes. His own 137kHz *Opera* transmission was received by JA5FP in January, which at 7,918km is pretty impressive. As for UK stations, he reports that RX3DHR received G3XDV (2,584km) using *Opera* and that G8HUH reached SV8RV (2,395km) and EW6BN (2,137km) both using WSPR-15.

In the month of January, G3XDV had reports for his *Opera* 32 transmissions from 31 stations in 13 countries with a best DX of 2,857km to RA3TGZ. He reckons that the total number of stations active was 38, in 14 countries. Who says there's nobody on 136kHz? Mike even had a CW contact with G4GIR!

N1BUG in Maine received DC0DX's WSPR-2 transmission several times at a distance of 5,399km. He also received G8HUH on a couple of occasions and 2E0ILY. WSPR-2 is supposed to be the quick mode for 'local' contacts!

Chris, 2E0ILY has been having trouble with his 137kHz Tx recently. He had rebuilt it in order to make FET replacement easier, which was just as well as the dead FET tally has been mounting up. Once this problem was sorted out Chris was delighted to receive his report from N1BUG in Maine in addition to the usual good reports around Europe and into Greece.

472kHz DX news

In mid-January G3KEV received a couple of WSPR spots from FR5ZX on Reunion Island in the Indian Ocean, a distance of 9,923km with much of it over land. 31 January seemed to be another good night for low-frequency propagation. EA5DOM was received by KU4XR (7,170km) in *Opera* 8 mode and by WI2XRM (7,345km) and WH2XZO (7,060km) in WSPR-2.

The good conditions continued into February and several European stations heard VO1NA's 12wpm CW calls at readability 5.

In WSPR, WD2XSH/17 was received very well over here by many G stations including G3WCB, G3XKR, G0LUT and also in France, Sweden, Germany and the Netherlands. Also active in WSPR and spotted on this side of the pond were WG2XXM, WG2XIQ and WG2XKA.

In the reverse direction G8HUH and EA5DOM were received by N1BUG and WD2XSH/17.

The Pacific ocean was crossed many times on the night of 20 February with the most impressive spots being of VK4YB by VE6JY at 12,682km, WH2XXP by VK2XGJ at 12,535km and some nice reports in the USA for ZF1EJ in the Cayman Islands.

The sincerest form of flattery?

CQ magazine has announced that it will soon have an LF column in anticipation of the 2200m and 630m bands being open to all US amateurs when FCC approval is finally granted. The column will be in the safe hands of John Langridge, KB5NJD, who is active on LF as WG2XIQ.

Dave Pick, G3YXM
daveyxm@gmail.com

HF

There were several DXpeditions active at the end of February and propagation wasn't too bad. Solar flux was in the low 80s.

Some people, particularly in the north, struggled to hear the VP6EU DXpedition on Pitcairn Island; I thought their signals were generally quite good. That part of the Pacific is a 'sweet spot' for propagation as illustrated by the regular openings on 15m despite a lack of sunspots. With a few days operating to go, Club Log was showing 64 British Isles QSOs on 15m (peaking around 1700), over 100 on 17m (14-1800), 40 on 20m (08-1100), 98 on 30m (07-1100), 45 on 40m (07-0800), 66 on 80m (peaking around 0700), and 15 on 160m (06-0700). This expedition was a recipient of a grant from the RSGB HF Expeditions Fund.

TX5T in the Austral Islands (French Polynesia) was not quite in the geographical sweet spot but was worked on 15-40m from the British Isles. The team was not there as long however and total QSO numbers were down on VP6.

Over in Macao, the XX9D team made around 45,000 QSOs. This is not a particularly easy path from the UK but easier than the one to Japan that takes a more northerly route. The main problem faced by DXpeditions in recent years has been finding a suitable operating location with good takeoff to Europe and North America. XX9D solved this by getting permission to mount their antennas in the roof garden of one of the major hotels. They had an excellent signal when the bands were open. Referring to Club Log the following QSO totals were made with the British Isles: 12m – 2 QSOs (around 0700), 15m – 27 QSOs (around 08-0900), 17m – 67 QSOs (10-1100), 20m – 36 QSOs (09-1300), 30m – 56 QSOs (15-2000), 40m – 102 QSOs (15-2300), 80m – 21 QSOs (peaking 22-2300), 160m – 2 QSOs (21-2200).

An unusual opening was reported by Owen, G0PHY and Larry, N7DD in Arizona when they made a QSO on 14MHz at 1254 over the North Pole. Signals were very strong and Larry noted it was 90 minutes before sunrise, when the band is normally dead during February. He called it the most amazing opening he had ever seen on 20m and he went on to work stations in Russia and Scandinavia.

The XX9D team in Macao made around 45,000 QSOs.

DXpeditions

An experienced team of 10 UK based operators will be QRV from Botswana for a second time as A25UK with up to 5 QRO stations. Dates will be 25 April to 6 May on 160-6m, SSB, CW, JT65 and RTTY. They plan to give extra attention to the low bands. See A25UK.com for info.

A large team will be active as S21GM and S21KW from Bangladesh on 15-27 March. They will operate CW, SSB and RTTY on 160-10m with four stations. S21GM will be used during the first half of the DXpedition and S21KW during the second half. See www.lral.lv/s21gm/

Maurizio, IK2GZU will be QRV as 5H3MB from Tanzania until 12 April, while doing volunteer work.

Bob, K7YB is moving to Belize and expects to be QRV as V31YB. He may construct a second home on his property for renting to visiting ops. It will probably mean bringing your own rig but having access to the permanent antennas.

Members of Stirling & District ARS (GM6NX) and the GMDX group will be active from Liechtenstein as HB0/GM4UYE from 1-6 June on 80-6m CW, SSB and data. Any money raised will be donated to the Yorkhill Children's Charity or Glasgow Children's Hospital Charity.

IOTA

Plans are afoot for the first valid activation of the new IOTA counter of Viktoriya Island (EU-190) in the Russian Arctic. The callsign will be RI1F and more details will be available after the February-March Arctic Legends DXpedition. See www.qrz.com/db/ri1f

Thanks to members of the Western Washington DX Club, E51PT, Pia Taraeka (Papa Pia) is back on the air from the North Cook Islands after being QRT for more than 30 years. Papa Pia was a commercial CW radio operator in the 1960s relaying messages between the Cook Islands and other parts of the Pacific. Listen for his signals from Manihiki (OC-014) on CW and SSB.

A JA group will be QRV from Koror Island (OC-009) in April. Look for T88IH, T88FT and T88TA. They will be QRV from about 2100 on April 13 to around 1500 on April 20. Activity will be on 1.8-50MHz on CW, SSB, JT65 and JT9.

Rod, YJ8RN may be QRV from Gaua Island (OC-104), formerly Santa Maria, in the next few months while he installs some HF radios for the Red Cross.

Francois, F4HLT is now active as FT3YL from the Dumont d'Urville Station on Petrel Island (AN-017) in Antarctica. At the moment he operates only JT65 on 20, 15 and 10 metres but expects to work PSK31 and SSB later. His licence is valid until 1 February 2018. He is mainly QRV from 09-1100.

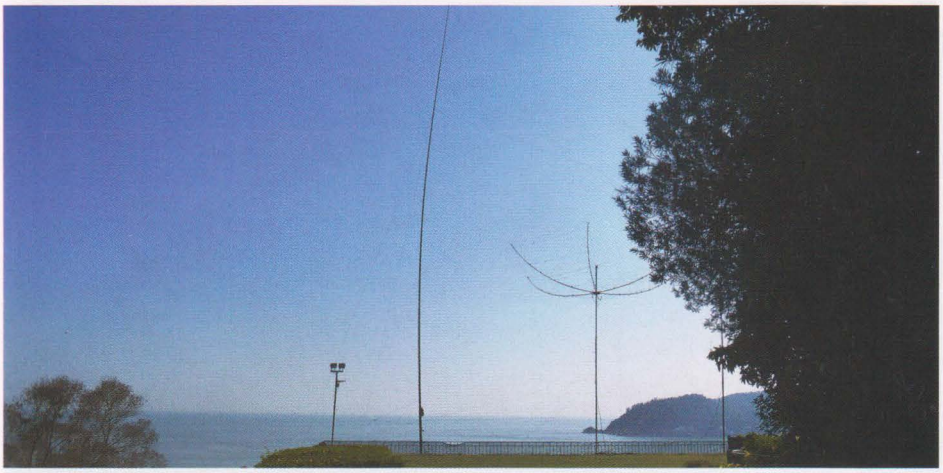
Alex, UA1OJL will be active as RI1ANO from Bellinghausen station on King George Island, South Shetlands (AN-010) from April 2017 to March 2018.

Masa, JA0RQV, expects to be active as A35JP/P from Niuafo'ou Island (OC-123) between 22 and 28 March. On his way back he might be active from Niuatoputapu (OC-191).

Haru, JA1XGI will be QRV as P29VXG from New Britain Island (OC-008) on 6-12 April.

Correspondence

Ken, CT7AGZ, managed to find a lot of DX around: 10m – 3XY3D, TL8TT; 12m - 3XY3D, PJ2/W9VA, CX2AQ, 9X2AW, CE2AWW; 15m – CE2MVF, 3XY3D, 7P8EUDXF, PJ4D, C6AKQ, PJ2/NF9V, 9Q6BB; 17m – CE2AWW, PY0F/PP1CZ, UP28USB, EK7D, A93JA, C6AUM, 8P9NX, PJ2/KB7Q, PJ2ND, JY9FC, UK9AA, TL8TT, 3XY3D, 7Z1JA, FM/UT5UGR, 3B9FR, V4/K4ZGB, 4JT6RO, 7X3FG, WP3C, VP5/AC0W, 6W2AC, 9X2CW, ZA1E, 5A1AL, 9Q6BB, 4S7VG, PJ7/OH2IS, 7P8EUDXF, RI1ANR, FS/F8AAN,



The antennas in use by the XX9D team in Macao.

5Z4/DL2RMC; 20m – PY0F/PP1CZ, CO8LY, ZC4A, TL8TT, C6AKQ, XE1XR, T77C , 3B8CF, PJ2/K2PLF, VP5/AC0W, 3XY3D, FS/F8AAN, P4/NE9U, PJ7/OH2IS, TR8CA, 9K2MU, VP9BO, PJ4D, 8P9AL; 30m – ZC4A, E51DWC, TZ4AM, OF0RJ, ZA1E, V31JZ/P, 5A1AL, TR8CA, OY1CT, TI7/HA5X, JY9FC, OX3XR, TX5T; 40m – 7X4AN, E51DWC, ZL4YL, C31US, PY0F/PP1CZ, YV5LAY, P4/NE9U, TX5T, TI7/HA5X, FK8CE, 7X3WPL; 80m – A45XR, NP2N, V43Z, ZF2LC, VP6EU, 7X4AN; 160m – S01WS.

Peter, G4XEX is struggling with his antenna mounted only 18 inches above the ground but he is still working DX – though his plan to work data stations on 160m has resulted in zero QSOs so far! On the other bands he worked: 15m – V53DX, 3XY3D, YC1BJV, TL8TT; 17m – KG4AW, HI8CSS, C5YK, 3B9FR, 3XY3D, 5A1AL; 20m – FY5KE, YI3WHR, EP2LSH, 3B9FR, 3XY3D, C6AUM, HS3XVP, ZS4GB, VK5GR, ZP6ARO, XT2SE, TR8CA, YE1K, PZ5RA, J62DX, P49X, YC1BJV, YV5AAX, TL8TT.

Andy, M0NKR reports: 12m – TL8TT, TU5MH; 15m – 3XY3D, A5A, VP6EU, TL8TT; 17m – SU1SK, FM5WD, HR5/F2JD, CE0Y/DF8AN, 9X2CW, 9Q6BB, XX9D, VP6EU; 20m – TG9ANF, PY0F/PP1CZ, CP5HK, 5J0NA, VP5/AC0W, V31AA, VP2MVV, FY/F6CKD, XT2SE, FP5BZ, VP6EU; 30m – ZC4A, PY0F/PP1CZ, 5Z4/DL2RMC, VP6EU; 40m – TU5MH, ZC4ZM, KP2M, TZ4AM, KG4AW, N0J, VP6EU; 80m – TL8TT, ZC4A, HI3T, VP6EU.

Pete, MM0TWX managed to work VP6EU on 30m for 'wire only' ATNO #281 when their signals came out of the noise but missed TX5T and S21SM.

Tom, G4IDL found VP6EU on 17m for an ATNO. His other DX included: 15m – TL8TT, PJ2/N1ZZ, 7P8EUDXF, 9X2AW, HS0ZLM, A93JA, P29LL, PY0/PY2QI, 3XY3D, 9K2NO, CO8PY, 6W2SC; 17m – TL8TT, ZF2BJ, C6AUM, JY9FC, ZB2FK, 4S7VG, VU2PAI, CE2AWW, 3B8CF, RI1ANR, 9Q6BB, 3B9FR, 3XY3D, XX9D, 5A1AL, V4/K4ZGB, 7X3FG, CW1C, HR5/F2JD, PJ7/OH2IS, VP6EU, PJ2/NF9V, V31JZ/P, VP2MVV, VP5/K0PC, KG4ZK; 20m – 3XY3D, V85TL, TR8CA, 3B9FR, PY0/PY2QI, 9M2MCB; 30m – ZC4A; 40m – ZA1E, ZL2AP, VK3IM, CX5FK, PJ7/OH2IS.

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

Call	CW	SSB	Data	All
G4PTJ	154	71	0	197
G3TBK	187	31	102	192
M0IKW	119	47	33	191
M0NKR	99	132	8	185
G3PXT	47	83	123	154
GI4DOH	121	4	48	124
G4IDL	113	0	0	113
G4XEX	32	40	77	111
CT7AGZ	106	0	0	106
G3HQT	96	0	0	96
G3SVK	51	0	0	51

Table 2: Forthcoming DX activity.

Feb – late March	Arctic Legends IOTA trip
Until 19 March	E51KTA
Until 19 March	TU by F group
Until 20 March	9N7EI
Until 21 March	9G5X
Until 21 March	5U5R
Until 27 March	S21GM & S21KW
Until 29 March	5J0NA
Until 12 April	5H3MB
20-27 March	YE0S (OC-177)
22-28 March	A35JP/P
6-12 April	P29VXG
13-20 April	T88 by JAs
25 April – 6 May	A25UK
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

Peter, G3HQT noted that he seemed increasingly to be relying on expeditions for DX QSOs and wondered if there was a decline in the number of resident amateurs in rare spots. He found: 15m – CE2AWW, K5KG/KP2, ZF2MJ, P29LL, 9X2CW; 17m – TL8TT, TR8CA, 3XY3D, PJ2/K2PLF, 6W2SC, KG9N; 20m – JW2US, YB3MM/7, EP2C, 5R8SV, 7P8EUDXF; 30m – FK8DD, PY0/PP1CZ, VP6EU; 40m – 3B8CF, JT1CO, RI1ANR, VU2TMP, KH6/VE7AHA.

Ian, G3ROO is building a 40m 4-square on his workshop roof but with just a single vertical he is hearing ZL3AL on 40m every day at 559.

Chris, G8APB assisted by G0BSU, made 1463 QSOs on RTTY in the CQ contest – only slightly down on last year when they won the multi-op single transmitter section.

Fred, G3SVK bagged VP6EU on 30m. His other DX included: 17m – PY0F/PP1CZ, 4S7VG, 3XY3D, 4JT6RO, 6W2SC; 20m – V85TL, JW2US, TL8TT, 3XY3D, C6AUM, CT9/DL7AXX, PJ2/K2PLF, CO8LY, JW2US, PJ7/OH2IS; 30m – ZC4A, A71YY, VP6EU, VK7GK, JW7US; 40m – 9V1YC, TU5MH, XE1RK, PV8ADI, HI1UD, 5R8UI, PY0F/PP1CZ, A45XR, PJ2/NF9V, 3XY3D, VP5M, VP5K, 6Y1M, Ws (ARRL Contest), K5KG/KP2, C6ANM, 6Y2T, P4/K1TO, C31US.

Gordon, G3PXT worked stations including: 15m – 5R8AL, 9X2AW, A61QQ, A71FJ, K5KG/KP2, LU2ICA, V31AT, V5/DJ9KM, ZD7FT, ZS6ZA; 17m – 3B9FR, 3W3B, 3XY3D, BD0AAI, C6AKQ, CE2AWW, CO2YQ, DP1POL, FR4OM, JAs, JW2US, JY9FC, LUs, PYs, TL8TT, VKs, VO2NS, VR2s, XE2YWB, XT2SE, ZSs; 20m – 3DA0TM, 9M2TO, A5A, BDs, EY7AD, Caribbean, JAs, TI2CC, TR8CA, VU2WJ, YB7ERV, YI1SAL, ZL4IA, 5Z4/DL2RMC.

Top Band specialist John, G3PQA wrote in with some comments on that band. ZL3IX has been QRV around ZL sunset on 1826.5 and has worked a number of UK stations. He nearly worked G3YC (VK6GX on holiday in the Isle of Wight) who was running 80W to an inverted L with a 20ft vertical section and a few short radials – but slightly miscopied the call. The LF path to ZL favours the equinoxes and signals are usually heard between UK sunrise and ZL sunset. G3PQA also heard several Japanese and Thai stations in early February.

Still on 160m, G4EIM and G4ERZ have been experimenting with verticals about 60ft high. Both of them managed QSOs with KH6AT in late February around 0600z. G4ERZ worked ZL3IX at 0731z. G4EIM worked HL5IVL at 1950z and TY2AC at 2048. So lots of DX on Top Band still.

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

Martin Atherton, G3ZAY
g3zay@btinternet.com

VHF/UHF

Late January saw excellent tropospheric conditions to Scandinavia with stations in Norway (LA) and Sweden (SM) being worked with very strong signals throughout the UK.

As the last of the winter months, February doesn't bring too many surprises in DX terms and, like previous years, storms caused many stations to lower their antenna systems – storms Doris and Ewan proved very intense, with potential for antenna breakage. Meteor scatter conditions also are low at this time of year with just a few random meteor reflections. It is April before recognised meteor showers make their entrance with the April Lyrids that peak between 21/22 April.

Correspondence

Lyn, GW8JLY (IO81), wrote, "On 26 January I was very surprised to work LA2IMA in JO59FE. QSOs to LA via tropo are very, very rare here as my takeoff in that direction is very poor indeed. The distance (QRB) was a very decent at 1229km and Bjorn peaked to a 59 signal at my QTH.

"I also heard LA4YGA in JO48 but could not complete a QSO due to deep and persistent QSB. Those who have good QTHs were copying LA2IMA at enormous signal strengths. For example, G4RRA in IO80BS copied Bjorn at 59 plus 20dB. Paul, G4RRA made a video of LA2IMA and that video can be seen on YouTube **[1]**. Also, on 2m, random meteors are rare at the moment as we pass through the meteor doldrums period. This meteor quiet time lasts from late January to early April but MS QSOs can still be made every day.

"I try to complete at least one MS QSO each day (if I am in the shack, of course) and usually achieve between 2 to 4 MS QSO on a daily basis. On 27 January, I completed a MS QSO with Hannu, SM5KWU in JO89IP at 1538km. This was very surprising as Hannu's PA was broken and he could only use 20W maximum. This shows that even when meteors are few and far between, high power is not always necessary to complete a meteor scatter QSO."

The past 6 months have seen some excellent reports coming in from Gordon, G3PXT (JO01) who has worked numerous DXCCs with quite an unusual antenna. I have been surprised at the reports, given that the 2 element InnovAntenna quad is actually mounted in a willow tree in Gordon's garden. Whilst most of us have constant issues with the sight line created by our antenna systems Gordon's solution could be termed 'spot the antenna'! With spring coming it will be interesting to see how the development of 'leafage' will affect antenna performance. From reports last year there didn't seem to be too much of a problem. Looking forward to further reports.

John, G4SWX (JO02) continues his Moonbounce activities. "The first couple of months of 2017 has, as usual, been brief periods of activity mixed with periods when the antennas have been down.

"However I have worked 90 squares in 34 DXCC countries on 144MHz in the first 8 weeks of the year. Highlights of the period were 10 February GI6ATZ on EME – Gordon was a great signal off the moon. The first time I have ever worked GI on EME!

"On 8 February was CR3EME worked on EME for DXCC 132. Kari, OH2BC was a great signal from Madeira. On 10/11 February VK5APN was worked again on EME while portable in PF84 and PF85. On 25 January on MS, despite mediocre MS conditions, LZ2PG (KN23) was worked at 2073km. Peter was running relatively low power and a small antenna. What made the difference is that his antenna was about 25m above ground on an apartment block. This resulted in excellent low angle radiation that gave such a good result at >2000km on a pretty average day."

Many amateurs seem to forget that meteor scatter is an ionospheric mode where your take-off angle, a function of antenna pattern and height above ground, will often dictate your maximum range.

Gordon, G3PXT conceals his antenna in a willow tree.

QRM / electro smog

John, G4SWX has also been investigating solutions on how to counter act the ever growing noise/birdie problem affecting our bands. Since becoming active again on 4 and 6m, the noise floor at my QTH in IO83 has certainly risen during the two years on inactivity.

John says, "Birdies produced by Ethernet systems are a real pain to most VHF amateurs and particularly with 50/144MHz EME. I run a remote station where almost every system is connected to an Ethernet backbone so I have had to learn what works well and what does not. My first move was to replace *all* Ethernet patch cables with CAT6E FTP ones – foil-screened, twisted pairs with

The VK5APN portable EME antenna has worked many stations throughout the world.

screened connectors. These are often twice the price of cheaper CAT5 UTP ones but are still relatively cheap. This change, in my experience reduces most 'birdies' by around 15dB. Unfortunately there is no standard for egress from Ethernet cables and notionally similar CAT6E ones do differ. Some domestic routers do not have a ground connection at the RJ45 socket that can make VHF radiation far worse. In my remote station, where I have 30+ Ethernet connected devices, I use metal cased Netgear switches and a metal cased Cisco router. These are grounded to the local RF earths in each building. Even so I had to add a ferrite choke on the Netgear switch PSU leads to stop egress of noise from the internal switching regulator! Where I have used webcams for monitoring I have put them in metal boxes with an additional screened and grounded CAT6 RJ45s on the box.

"Adding a clip-on ferrite to Ethernet cables can be problematical. After all you are effectively inserting a RF resistance into the ground/shield connection. With poorer quality CAT5 UTP cables this does improve matters at 144MHz but not with good quality CAT6E patch leads. With the best screened cables it makes matters worse! I use a FT-817 portable transceiver with a short helical antenna as test of the effectiveness of various cables and ferrites. For infrastructure cable the best that I have found in CAT7 S/FTP where each pair is foil screened with a braid screen over all of the pairs.

"On my station I have an 18m run of Ethernet cable, which also carries POE, running vertically up a tower some 80m from the EME array. In a set of tests beaming at the cable I observed the following: CAT5 UTP – not tested, CAT5 FTP – birdies 20-25dB over noise, CAT6 FTP – birdies 10-20dB over noise – two different manufacturers of cable one always 6-8dB better than the other! CAT7 S/FTP – all birdies <6dB over noise.

"Adding good quality VHF, clip-on ferrites at the top end by the RJ45 connector *increased* the birdie amplitude by several dB on the CAT6 FTP cables. As this system is to the north of my EME tower I now do not see many birdies from my own equipment. However, I can see some coming from a house nearly 1km away!

"As RSGB VHF Manager I often get requests to move various frequencies in the amateur band plans as people have difficulties with Ethernet-generated 'birdies'. The problem is that because the 'birdies' are from harmonics of the Ethernet carriers that are not crystal controlled, almost any frequency in the 144MHz band will suffer given the wide range of different manufacturers of Ethernet transceivers. If you are suffering from 'birdies' on a frequency used by a DXpedition you might try heating up the offending equipment to temporarily give you a clear frequency!"

VK5APN portable moonbounce

Wayne, VK5APN has been travelling to all points of the Australian continent activating rare and very rare locator squares. His two Yagi portable antenna system has worked many stations around the world with UK stations G4DML, G4CDN and G4SWX all from JO02. Wayne makes regular updates on his website of his expeditions. See **[2]** & **[3]**.

UK SMG Winter Marathon

The 6m Winter Marathon organised by the UK Six Meter Group ended on 31 January at 2359 and, once again, Tom, EI4DQ (IO51) ended top of the listing with 100 squares worked during the two month period from December 2016 to January 2017. The best distance worked was 2349km, which is a considerable achievement during Winter months where good propagation is at a premium. UK stations showing in the result table includes 4th place G0LFF (IO90) 74 Grids 1528km, 5th G0GGG (IO81) 72 Grids 1631km, 6th GW4MBN (IO71) 58 Grids 1637km, 8th G3PXT (JO02) 52 grids 1589km and in 11th place G8HGN JO01with 22 squares worked and a best DX of 1484km. From May to August the UKSMG has the Summer Marathon with a similar format but thankfully with better propagation chances. Check out the UKSMG website **[4]** for more information. For those who haven't operated on 6m before check out the 'New To Six' page that gives valuable information. Thanks also to Chris, G4IFX with a date for UKSMG's 2017 AGM, which will be held at the G3WOS 50MHz BBQ on Saturday 5 August. They are looking forward to meeting, as many members as possible from all over the world.

Dave, G4HUP, SK

Very sad news received from Sam, G4DDK and John, G4SWX regarding the sudden passing of Dave, G4HUP. Dave was a great friend of the VHF/UHF community and will be sadly missed by many. It was only at the latter half of 2016 that I chatted with Dave whilst he was on a mini expedition 'up north' and was QRV from Winter Hill (IO83RO). He described how he straightened his rather bent 2m 4 element Tonna antenna and had it mounted on the rear of his car. Sincere condolences to Dave's family and close friends from all column readers. *Vale* Dave. *[See also page 8 – Ed].*

Sign Off

Thanks once again to all contributors and let's hope for better weather and radio conditions in the warmer months to come.

Websearch

[1] www.youtube.com/watch?v=Y29lb11Wwlg
[2] http://members.iinet.net.au/~pearsons@aapt.net.au/PF84.html
[3] http://members.iinet.net.au/~pearsons@aapt.net.au/PF85.html
[4] www.uksmg.org/landing.php

Richard Staples, G4HGI
g4hgi@live.com

GHz Bands

Some interesting activity this month and a new receiver but sad news of a sudden and unexpected SK.

GHz band activity

Some welcome tropo DX on 1.3GHz was seen on 25 and 26 January with Tony, G4NBS (JO02af) reporting QSOs with OK0EL (JO60lj) at 918km and OZ9PZ (JO46lp) at 721km. Conditions seemed better further East with a stand-out 1241km 1.3GHz QSO on the 27th between HA5OKE (JN97mn) and F4GYG (JO10gj). In January, I had CW aircraft scatter QSOs with G3YPQ (IO70ss) and G4ALY (IO70vl), both over 350km, moving up to complete a 3.4GHz QSO with G4ALY. G3YPQ has been testing aircraft scatter with Neil, G4DBN (IO93nr). Using the mutually agreed 'digital calling frequency' of 1296.165MHz they have been experimenting with ISCAT-A. To allow for Doppler they used the maximum 1kHz frequency tolerance and 15 second transmit cycles. Neil reports that the best reflection lasted almost two full periods. They later switched to SSB and had a QSO over three reflections. Neil runs a water cooled 250W DF9IC PA to a 44-ele Yagi. He will shortly be putting dishes up for 13, 9 and 3cm. Another UK 1.3GHz terrestrial station has discovered that he can make digital EME QSOs with big stations at moonrise and moonset. Jason, G4KVT (IO81rk) worked HB9Q and UA3PTW, describing the contacts as "easy, mainly due to the fantastic stations that Dan and Dmitry have constructed". Jason was running a Kuhne transverter [1] with 100W from a Gemini 23 PA [2] to a single 25-ele loop Yagi from Directive Systems [3]. On receive he used an SHF Electronik MVV1296VOX masthead preamplifier [4] with a noise figure of 1dB.

I'd encourage anyone to give it go with Dan, Dmitrij and other big dish stations.

SDRPlay RSP2 on the GHz bands

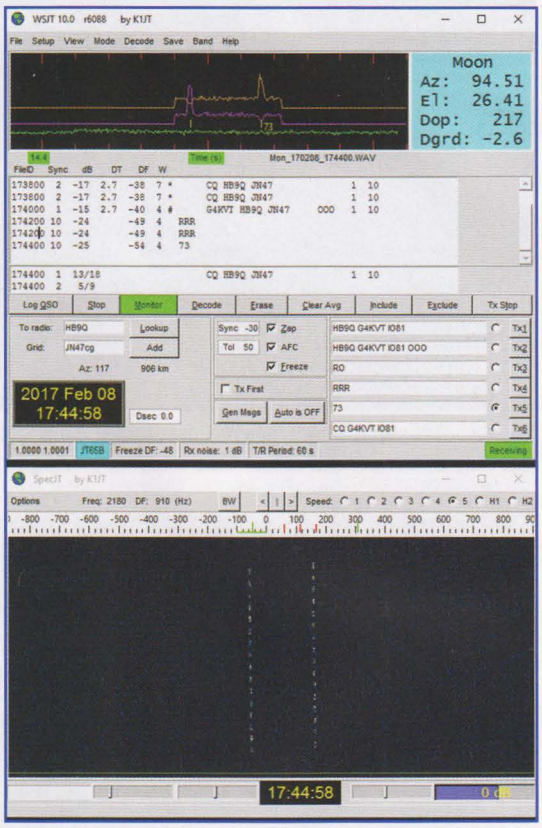
I was very kindly loaned an SDRPlay RSP2 [5]. I wrote a review for the February Scatterpoint [6] (there is also a detailed review of the RSP2 by G4WNC on page 84 of this *RadCom* – Ed). I focussed on what it offers to those of us whose main interests lie above 1GHz. It provides three software selectable antenna inputs, good stability and the ability to lock it to a reference. It has continuous coverage from 1kHz to 2GHz with up to 10MHz display bandwidth. The wide frequency coverage allows you to use it directly on the RX IF of a transverter at 144 or 432MHz, giving you a view of a large slice of a microwave band. The RSP2's coverage extends up to 2GHz, so it covers the 1.3GHz band directly. It can be locked to a 24MHz reference but its own 0.5ppm reference is adequate and can be trimmed in software. While the quoted 3.5dB noise figure at 1.3GHz is far from state of the art, it is certainly as good as many older 1.3GHz transverters or general coverage receivers that still are in use today. I tried the RSP2 as a receiver both on EME and terrestrial via a very high gain G4DDK VLNA23 preamp [7]. I don't have a strong local TV or cellular station that gives me problems on the band but with or without my bandpass filter in front of the RSP2 I saw the same 1dB increase in noise when I point to my local TV station that I see with my usual 1296 transverter. In terms of raw sensitivity, testing with beacons showed that because the preamp dominated performance, I could see no difference between the RSP2 and my transverter. The frequency accuracy, without adjustment, was sufficient for me to find the ON0EME Moon beacon (quite weak with my small system) just using the readout and calculated Doppler.

The RSP2 can be used with programs such as WSJT for digimodes operation via virtual audio cable software. MAP25 does not support the RSP2 yet, but with its open API it's likely to be supported in due course.

Finally, Es'hailSat2 [8] will have a transponder downlink on 10.489-10.499GHz, so a satellite LNB with an LO of 9750MHz would convert this down to 739-749MHz and enable an RSP2 to act as an IF.

G4HUP SK

I was particularly upset to hear of the sudden death in February of my good friend Dave Powis, G4HUP. Dave was an educator, electronic homebrewer and a fine mechanical engineer. Over the years, he operated all the bands up to 10GHz on EME and terrestrial. Dave 'retired' last year and had just got his new venture, hupRF off the ground. He'll be greatly missed. *[See also page 8 – Ed].*



HB9Q via EME at G4KVT on a single 25 element loop Yagi. Image courtesy of G4KVT.

Finally

Please keep reports and technical snippets coming in to me by email. Join the conversation on Twitter @g4bao and @ukghz using the hashtag #GHz_bands.

Websearch

[1] http://bit.ly/2kevQfp
[2] www.linamp.co.uk/gemini_23.htm
[3] http://bit.ly/2kE1zFt
[4] www.shf-elektronik.de/
[5] www.sdrplay.com/
[6] www.microwavers.org/scatterpoint.htm
[7] www.g4ddk.com/VLNASept13.pdf
[8] https://amsat-uk.org/satellites/geosynchronous/eshail-2/

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* Kenwood TS-870SAT HF Transceiver £799.00
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* Kenwood TS-870SAT DSP HF Transceiver £799.00
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* Kenwood TS-590 HF Transceiver with Automatic ATU £799.00
* Yaesu FT-950 HF Transceiver £799.00
* Kenwood TS-870SAT HF DSP Transceiver £799.00
* Yaesu FT-950 HF Multi Mode Transceiver £779.00
* Icom IC-7000 Multi Band Multimode Transceiver £769.00
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* Yaesu FT-847 Multi-Band Transceiver £699.00
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* TenTec Jupiter 538 Built In ATU With Blue Screen £699.00
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EMC

Quiet LED floodlights

The August 2016 EMC column showed some test results for an exceptionally noisy outdoor LED floodlight that appears to have little or no RF interference suppression. Since then several Members have enquired about where they can buy outdoor LED floodlights that emit low levels of RFI.

A Member who is professional involved in EMC has given us a favourable report about a 50W LED floodlight, Ansell Lighting part number ACALED50/WW. The WW suffix indicates warm white (a 'daylight' version is also available). The price in October 2016 was £47.40 inc VAT.

Most outdoor floodlights need to be earthed so they need a three-wire RFI filter. This Ansell Lighting model is double insulated with a plastic (polycarbonate) enclosure and a 2-wire mains cable, which makes the design of the RFI filter slightly easier. On the basis of some laboratory measurements, this unit is reported to be well under the EN55015 limits.

Another Member had some trade contacts and was able to borrow samples of three different types of LED floodlights for evaluation. This was based on interference received in HF bands rather than laboratory testing but two were reported to be very noisy over a large part of the HF radio spectrum while a third seemed particularly good. The latter was the 10W PowerLED Flex-10 LED floodlight. It cost around £30. It is worth noting that the PowerLED UK website not only has data sheets available for download but also the EC-Conformity Declaration that list the various standards including EMC standard EN55015.

A tale of two floodlights

Another outdoor floodlight is the Osram LEDvance range. Tests by the author (**Photo 1**) show that these also have low RFI. The sample tested was a 20W model and the results are shown by the blue line in **Figure 1**. These show conducted emissions of RF interference into the mains up to 30MHz. This test was done using pre-compliance test equipment so the results have significantly higher measurement uncertainty than an EMC test lab would achieve. Nevertheless, it appears that the LEDvance is well within the EN55015 limit from 150kHz – 30MHz. Although there is a fairly narrow peak at 11.25MHz, this still appears to be well within the EN55015 limit.

The red curve in Figure 1 shows the conducted emissions from the exceptionally noisy 50W outdoor LED floodlight that was tested in August 2016 EMC column. It can be seen that it is around 50dB higher than the LEDvance over most of the range 0.15 – 30MHz. However, a small amount of this difference may be due to the difference in power. If the LEDvance was 50W instead of 20W and if it had the same RFI filter then we would expect the emissions to be about 4dB higher. That still leaves a difference of around 46dB over much of the range, or to put it another way, one creates 40,000 times more interference power than the other!

It can be seen from **Photo 3** that LEDvance is a German company and the label includes the TÜV Süd logo. The noisy floodlight that was tested in August 2016 EMC Column was made in China and appears to have been CE marked in the UK. The label has the postcode of a UK company with ISO9001 quality assurance. Readers are invited to draw their own conclusions.

LED light reliability

LED lights typically claim 30,000 hours life, which sounds impressive as it would be 3.4 years at 24 hours a day or 10.2 years at 8 hours a day. The claimed life is for the LEDs themselves but mains LED lights require an LED driver – and not all drivers last 30,000 hours. One Member reported a case where six LED floodlights were installed high up inside a church. All failed within a few months and, as replacing them requires a two people with a 'cherry picker', the (re)installation cost far exceeded the cost of the lights or the energy saved.

It is not known why some LED lights fail prematurely but one possible reason is an EMC immunity problem: insufficient immunity to high voltage transients on the mains from inductive load switching. These can be up to 2kV and might cause the LED driver to fail. If non-compliant LED lights don't have any RF interference filtering to stop RF interference getting out then they are likely to be less immune to fast transients from the mains getting in.

Driverless LED lights

Some manufacturers are offering driverless LED lights that are claimed to have improved reliability by not having an LED driver. Instead they use high voltage LEDs with many more LEDs connected in series. There must be some sort of current limit so these may use a capacitor as a reactive dropper. Driverless LED lights shouldn't produce any RFI.

Air source heat pumps

An important EMC consideration with air source heat pumps and air conditioning units is how the cables are installed. We have received useful information from three Members about their air source heat pumps.

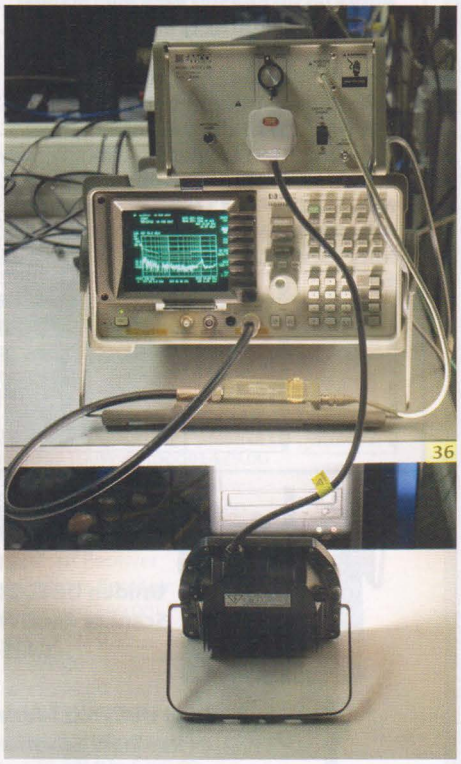

PHOTO 1: Osram LEDVANCE 20W outdoor floodlight under test.

Further to the item in December 2016 EMC Column, Alan, G3MGU reports that his air source heat pump installation did not perform as wished, so he had an engineer visit several times. At the last visit, Alan mentioned radio interference and the lack of screening of the cable from the control panel to the heat pump. The engineer made a connection to the screening and earthed it. It has reduced the interference by a noticeable amount.

Martin reports that his property already had an LG 'Therma V' air source heat pump installed when he moved in. This consists of an external condenser/heat exchanger unit (see **Photo 4**) and an internal wall mounted heat exchanger (which also has a heating element for when the outside temperature is too cold) that feeds the heating system.

Martin reports that the system as originally installed was relatively quiet at RF, apart from when the external heat exchanger is running, in which case broadband noise could be heard at a relatively low level over a frequency range of about 1 – 10MHz. Like all air source heat pump units, this unit would be designed to meet applicable EMC standards when correctly installed but Martin looked at how the levels of RF interference are affected by installation and whether further reductions are possible to improve reception of weak amateur radio signals.

The mains supply goes directly to the external unit by means of a screened twin and earth cable. From there, the power and control signals are fed to the internal heat exchanger by means of a three core and earth screened cable. The two units are also linked by copper flow and return

PHOTO 2: General view of Osram LEDVANCE 20W floodlight.

PHOTO 3: Data label of the Osram LEDVANCE 20W floodlight.

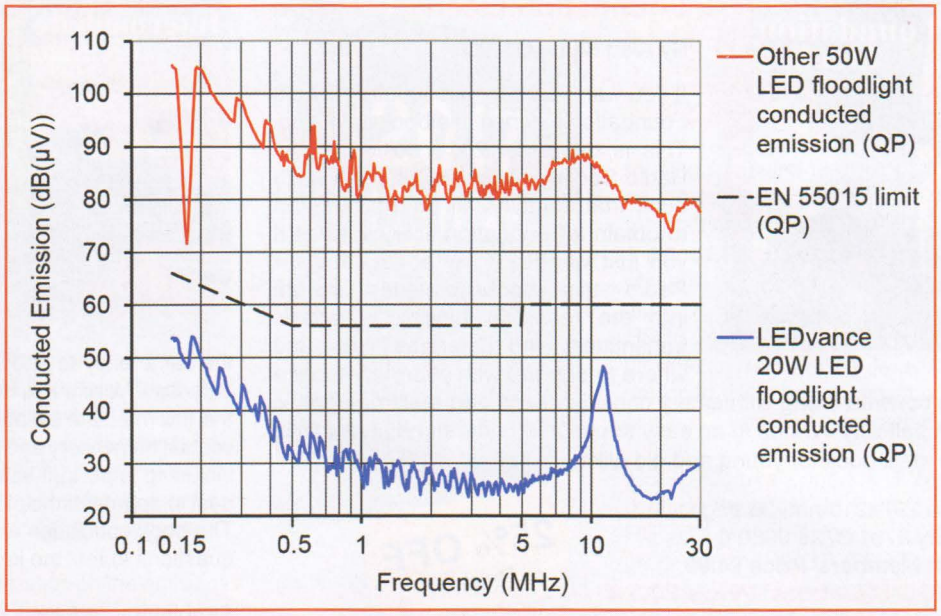

FIGURE 1: RF interference conducted into mains from Osram LEDvance 20W (blue curve) and another 50W LED floodlight (red curve).

pipes. These multiple earth paths form loops at RF where RF currents can circulate and radiate interference. Martin identified three possible areas for improvement in EMC performance, in order of priority.

First, interconnecting power cables and grounding arrangements. The mains cables are screened but screens were not connected at either end. The green and yellow earth wire inside the screened cable was connected to the chassis of the units via RF chokes, approximately 10 turns on a type 2 iron powder ring core. **Photo 5** shows the RF suppression cores inside the external unit. The black clip-on cores on the thick blue and brown supply cable have been added and were not fitted to the original installation.

Secondly, RF grounding outer panels on the external heat exchanger to reduce signals radiated directly by the unit. Bonding removable metal parts for electrical safety may not provide good grounding at radio frequencies, due to the length of the bonding wire. In this case, the panels are held together by bent metal hinges that are painted. The heads of the panel fixing screws are fitted with plastic washers to avoid scratching the paint.

Thirdly the variable speed fans in the external heat exchanger have large grilles but the guards are plastic so there are two large holes in the RF shielding.

Martin reports that the safety earths and cable screens now connect directly to the chassis earth bonding points and he estimates that this and other modifications have reduced the noise radiated by the cabling by about 12dB. It must be emphasised that any removal of covers for inspection or changes to the cabling of such a system must only be done by a suitably qualified person.

Stephan, DL9HAL reports that he had an old air source heat pump running for nearly 30 years with old fashioned multi-core cables and heavy power cables. His amateur radio antennas are six to eight metres away and the old system produced no RFI. The old system needed to be replaced and the new system is a split system that is half the size and has one single wire for all data, so Stefan was concerned about possible RFI problems.

When the new split system was being installed, it could be seen that it had many RF filtering capacitors, inductors and ferrite cores. A long discussion on the phone with the German headquarters of the manufacturer (Panasonic) and the supplier in Hamburg ended with the promise that if there was any RF interference, they would help to solve the problem. After installation in October 21016, he checked the system with different air source heat pump modes on HF, VHF and UHF amateur bands. No RFI was detectable in this case and there was no noise with additional water pumps so he was completely satisfied and there was no need to get help from the company. Stefan hopes that all buyers of such a system will have the same experience.

This report shows that the combination of a well designed product and good installation can produce very low levels of RF interference in amateur bands. We are currently investigating whether there is any difference in installation practices between UK and Germany and in particular whether German installers ground the screens of the screened cables.

PHOTO 4: External condenser/heat exchanger unit for an air source heat pump.

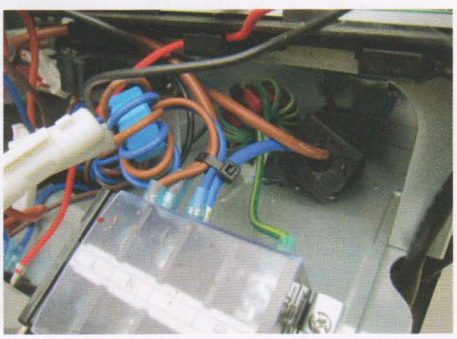

PHOTO 5: RF interference suppression cores in an air source heat pump

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Beginners, Trai

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By Alan Betts, G0HIQ

If you want to obtain an Amateur Radio Foundation Licence this book is for you. This is the latest 2013 edition of the Radio Society of Great Britain (RSGB) book that contains all that is required to obtain a Foundation licence. Even if you just want to know about Amateur Radio this book provides insight into the technical basics, receivers, transmitters and antennas. How and where to operate with your new licence are covered along with safety considerations and electromagnetic compatibility. Written in an easy to use and understand style this is the ideal book for young and old alike.

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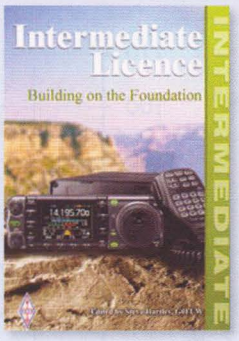

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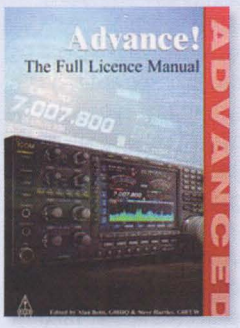

Advance

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By Alan Betts, G0HIQ &
Steve Hartley, G0FUW

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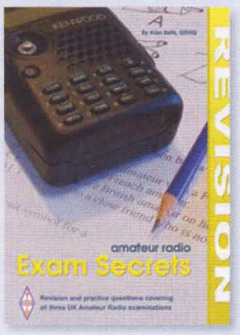

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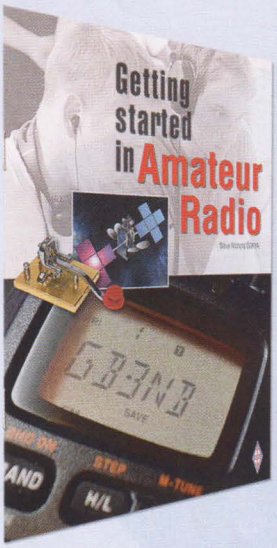

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By Steve Nichols, G0KYA

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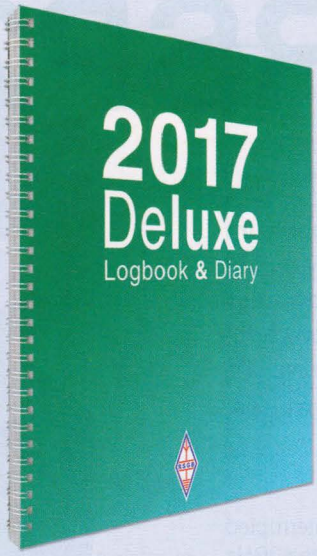

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SDRplay RSP2

The new RSP-2 Radio Spectrum Processor from SDRplay builds on the features of the popular RSP-1 to deliver an even more powerful low-cost SDR receive system. We take a close look at the new features.

PHOTO 1: SDRplay RSP-2 general view. The two SMA sockets are the main antenna connections and the green block is a detachable high impedance (1000Ω) input.

Overview

The new RSP-2 provides uninterrupted frequency coverage from 1kHz to 2GHz and now includes three software selectable antenna inputs along with additional preselection filters and a bias tee power feed. A software adjustable low noise preamplifier has also been added, along with a switchable notch filter for the medium wave and VHF FM bands. The reference clock oscillator has been upgraded to a 0.5ppm TCXO device and this can be further trimmed to 0.01ppm. Those with access to an external reference clock will be able to lock the RSP-2 to a local 24MHz source by using its external clock input. The provision of a clock output also enables several RSP-2s to be daisy-chained so they can all be locked to the same reference source. Software support for the RSP-2 is also looking good and it's currently supported by SDRplay's own SDRuno plus SDR-Console V3 and HDSDR plus any other software that supports operation via the standard ExtIO interface.

Antenna connections

Multiple antenna inputs are essential for a receiver with such a wide frequency range and the RSP-2 now has three separate antenna inputs, each with a different role. The two 50Ω SMA connectors are labelled A and B and follow similar RF paths into the tuner, as seen in the simplified block diagram of **Figure 1**, but input B has a 4.7V bias tee facility included. This can be used to power a masthead preamp or active antenna, providing they are compatible with a 4.7V supply. The bias tee power is also software controlled, which is helpful. The provision of the third, high impedance (Hi-Z) port is very welcome and makes an ideal connection point for the random wire antennas that are so often used for general listening on the lower frequency bands. This port is suitable for use from 1kHz through to 30MHz and has a nominal input impedance of 1000Ω. If you want to use this port with a 50Ω coax fed antenna, SDRPlay suggest using a reverse 9:1 balun to handle the connection. As you can see from **Photo 1**, the Hi-Z input is fitted with a three-terminal block for connecting the wire antenna. In most configurations, the antenna is connected directly to the P terminal with the N and GND terminals looped together and connected to the station ground. When using antennas with a ribbon feeder, the ribbon is connected directly to the P and N terminals. The Hi-Z terminal block can also be unplugged from the main board and a custom plug can be used to make a more permanent connection.

Reference clock

The reference clock in SDR hardware provides the heartbeat that controls the overall frequency accuracy of the receiver. Because of this, it has become standard practice to use good quality, temperature controlled crystal oscillators (TCXO). For the new RSP-2, the previous 10ppm (parts per million) crystal oscillator has been replaced with a new and much more accurate 0.5ppm TCXO. For many, this will provide sufficient accuracy, especially as most of the SDR software packages include calibration utilities that allow a clock correction factor to be applied. In addition to providing better absolute accuracy, the new, tighter controlled, TCXO has lower drift than its predecessor.

An important enhancement for the RSP-2 is the addition of a pair of MCX miniature coax

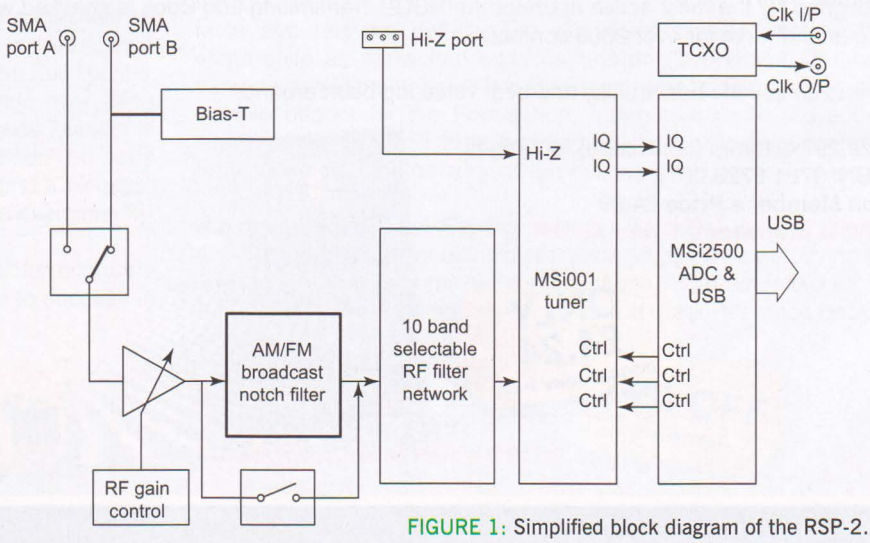


FIGURE 1: Simplified block diagram of the RSP-2.

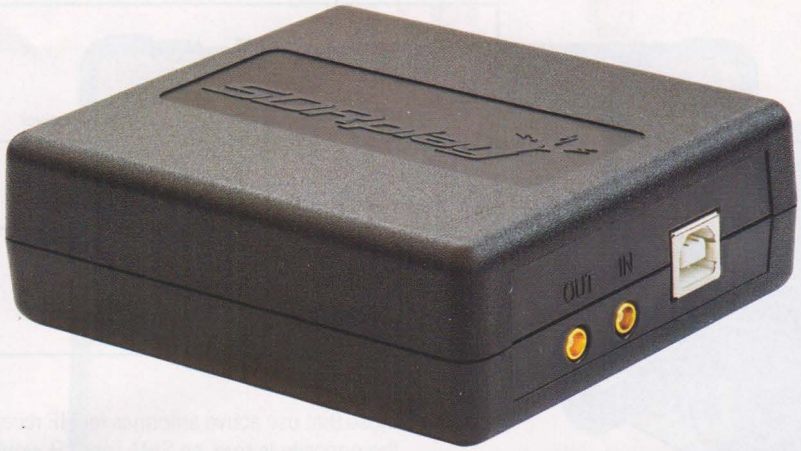


PHOTO 2: Side view of the RSP-2 showing USB connector and MCX coax clock in and clock out ports.

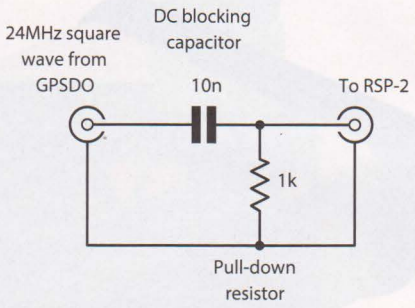


FIGURE 2: Minimum circuit for using the GPS-DO with the RSP-2.

connectors (**Photo 2**) that provide a clock-in and clock-out facility. For those using multiple RSP-2s, the clock-in/out enables receivers to be daisy-chained in a master/slave configuration so that they can all be synchronised to a single clock source. That source can be the internal reference clock of the first receiver in the chain or an external 24MHz sine wave reference oscillator with a signal level of 1 to 2V p-p. To use the RSP-2 with an external clock or the clock from another RSP-2 you must power up the RSP-2 with the reference clock already connected. This is because the external clock input is scanned for a valid signal during start-up and cannot be activated later. In addition to being available during power-up, the external source must provide a DC path to ground (1kΩ is ideal) to enable the switch-over from the internal reference. For the review, I used the excellent GPS-DO (GPS Disciplined Oscillator) from SDR-kits, **Photo 3**. This compact, dual output, reference clock can be set to deliver a wide range of clock frequencies. Its only limitation is that the range of frequencies available from the second output are mathematically linked to the frequency supplied by output 1. Fortunately, with output 1 set for 10MHz (as used by other kit in my shack), the second output could be configured to provide the required 24MHz. To use the GPS-DO with the RSP-2, a small interface is required. The minimum is a 1k resistor to ground and a 10nF capacitor to provide a DC block, shown in **Figure 2**. Don't be tempted to connect the square-wave output of the GPS-DO directly to the RSP-2, as it doesn't work properly! The specification suggests a 1 to 2V p-p sine wave is the ideal clock source. I built a simple in-line low pass filter to tidy up the GPS-DO output, shown in **Figure 3**.

RF filtering

With all wideband receivers, good filtering is essential to help prevent strong out-of-band signals from overloading the tuner front end and the analogue to digital converter (ADC). Like the RSP-1, the RSP-2 uses software switched RF preselection filters ahead of the tuner, but this has been enhanced from 8 to 10 bands in the new model, as shown in Figure 1. In addition, switchable RF notch filters have been added to attenuate the MW and VHF/FM broadcast bands. When activated, MW signals are attenuated by around 40dB and the VHF/FM band by approximately 60dB. This will be a big help for those who suffer overload from very strong broadcast signals. One important point to note here is that the new broadcast notch filters and the 10-band RF preselection filters are only available when using the SMA antenna ports A and B. When using the Hi-Z port, the signal is applied directly to the LF port of the Mirics MSi001 tuner with minimal filtering.

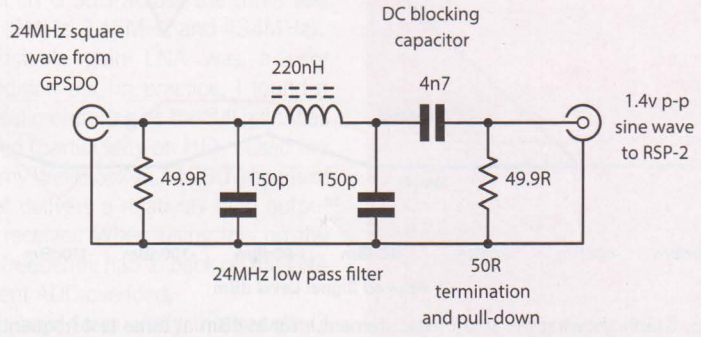


FIGURE 3: Suggested low-pass filter for use with square-wave external clocks.

Calibrated signal level

This is a particularly useful enhancement that brings the RSP one step closer to being a measuring receiver. The calibrated receive level allows the RSP-2 to indicate true signal input levels in dBm. This may sound simple but it's not really. In a modern SDR, the signal level measurement occurs at the ADC. In this stage, the incoming analogue signal voltage is measured at high speed, typically, a rate that's twice the highest IQ bandwidth. So, a receiver that's displaying a 10MHz bandwidth will be taking ADC measurements at a rate of at least 20 million samples per second (MSPS). The accuracy of each measurement is defined largely by the accuracy of the ADC's reference voltage. Thanks to developments in technology these reference voltages are extremely good. As a result, we can have confidence in the accuracy of the signal measurement at the ADC. However, looking at the block diagram, Figure 1, you can see that there are a number of analogue stages before the signal reaches the ADC and some of these have gain control settings that can either be changed manually or by the automatic gain control (AGC). To produce an accurate signal level representation in the spectrum display, the ADC measurement needs to be corrected for the current gain settings. The SDRplay team have tackled this problem by using a complex set of data tables that show the gain effect of all the analogue stages over a wide range of settings and frequencies. As a result, the displayed signal level will remain largely static when you alter the gain controlled stages. I'll show you how

Mike Richards, G4WNC
mike@photobyte.org

PHOTO 3: Leo Bodenar GPS-DO reference clock used during the review.

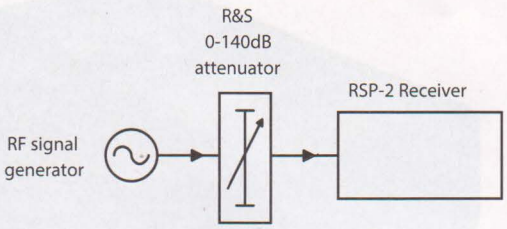


FIGURE 4: Test setup for checking the signal level tracking.

well it does later. This is a new feature and the SDRPlay team are continuing to gather data and refine the data set with each software release.

RF low noise amplifier

Also new to the RSP-2 is an adjustable RF low noise amplifier (LNA). The main benefit here will be seen with higher frequency signals. The amplifier gain is adjustable in 8 steps and uses the same principle as the other gain controls in the RSP series. Both RSPs provide all their gain adjustment stages as gain reduction, ie the starting point is to assume full gain and performance is tailored by reducing the gain to optimise performance for the current receiving conditions. This might seem a bit odd at first but it's easy to master.

Standard vs Pro option

The new RSP-2 is available in two options, standard and Pro. In both instances the electronics are identical but the changes are in the enclosure. The standard version uses a new ABS enclosure that has conductive plating on the inside to provide some additional screening to help keep stray RF out, as seen in **Photo 4**, whilst the Pro version uses an all-metal enclosure. In addition to providing improved screening, the Pro version is more robust.

One the air

The general performance of the RSP-2 is very similar to the popular RSP-1, as most of the electronics at the core of the receiver remain the same. Here I'll look at the improvements that come with the new features.

The software switchable antennas are a big step forward as few people will attempt to cover 1kHz to 2GHz with a single antenna! With 3 antenna inputs, many of the common antenna installations can be covered. I found that the best way to apportion the inputs was to use the Hi-Z for long and medium wave listening but then switch over to SMA input A for the HF bands. This is because the Hi-Z input connects to the LF input of the Mirics tuner and this is optimised for LF/MF performance. The new RF pre-selection and notch filters are only available to SMA inputs A and B so, by using Input A for HF we get the dual benefit of improved pre-selection filtering and the MW/VHF FM notch filters. A few measurements of the notch filter shows attenuation of just over 40dB at 1MHz and 60dB at 98MHz. In most installations, Input B is best kept for VHF/UHF operation as it has the benefit of the additional filtering and includes a bias tee power feed that could be used to power a masthead preamplifier. For those that use active antennas for HF reception the opposite is true, so SMA input B would be used for HF and SMA input A for VHF/UHF.

As mentioned earlier, I used the Leo Bodenar GPS Disciplined Oscillator to provide the 24MHz frequency reference for the RSP-2. This provides an extremely accurate reference that allows the RSP-2 to be used for very precise frequency measurement. When connected to a good external GPS antenna, the GPSDO can approach an accuracy of 1 part per billion (ie within 1Hz at 1GHz), which is very impressive.

The calibrated signal level was a very welcome addition and I did a number of tests to check the accuracy of the reported levels. The test setup comprised an RF signal source connected to the RSP-2 (SMA A) input via a Rohde & Schwarz variable attenuator, shown in **Figure 4**. I adjusted the input level to read -50dBm on the RSP-2 and then used the attenuator to adjust the level over the range -50dBm to -120dBm in 10dB steps. This is roughly equivalent to an S-meter range of S1 to S9+20dB, so represents the main working range of the receiver. To simulate normal use

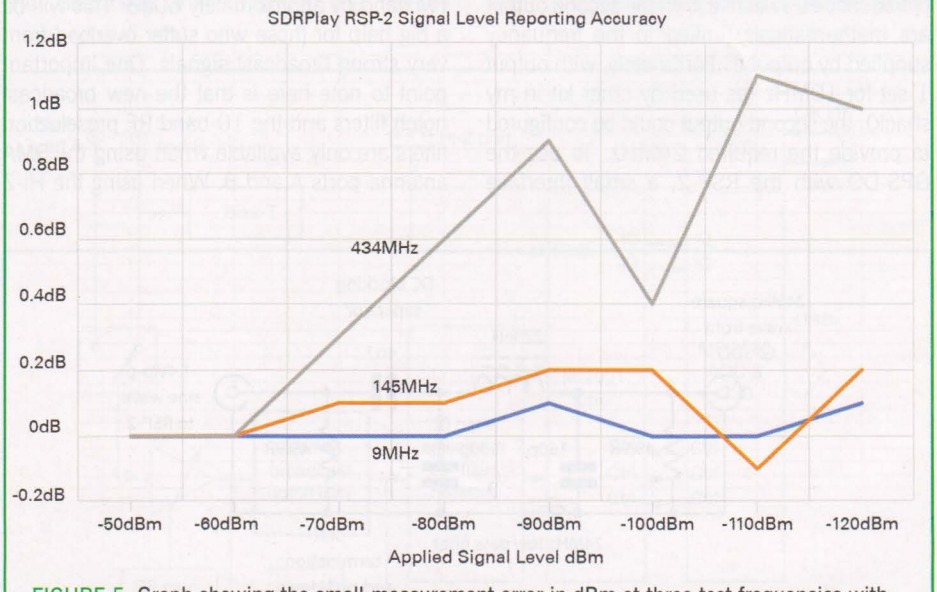


FIGURE 5: Graph showing the small measurement error in dBm at three test frequencies with the signal level varied between -50dBm and -120dBm.

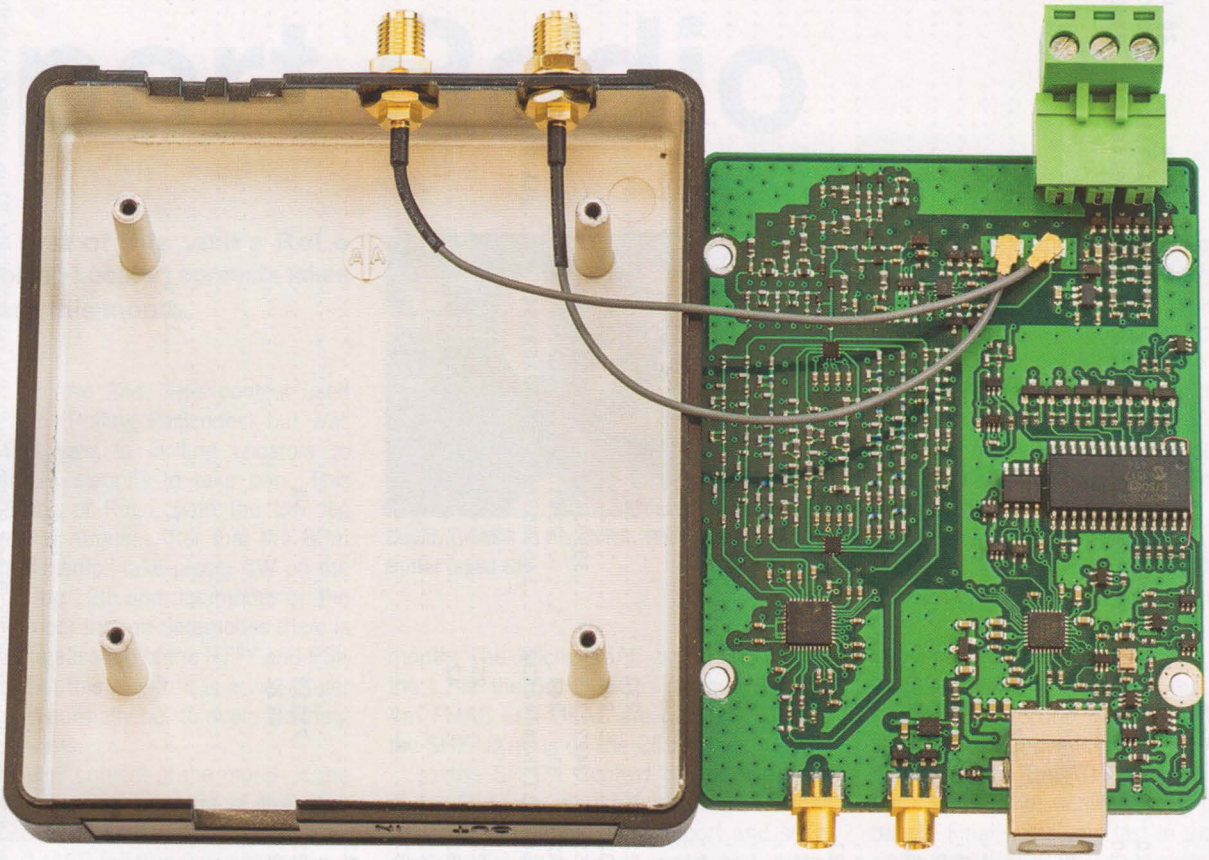


PHOTO 4: Inside the RSP-2, showing the conductive plating inside the ABS case. The filter banks on the left of the main PCB are quite distinctive.

of the receiver, I had the AGC switched on and the RF LNA at gain reduction 3. To check the RSP-2's level tracking, I noted the RSP-2 signal level whilst increasing the attenuation in 10dB steps. The results are shown in **Figure 5**. Whilst the absolute signal accuracy is currently only good to within 1-2dB, the tracking accuracy over the 50dB level range was excellent. The 9MHz and 145MHz tests remained within 0.2dB but, as you might expect, the 434MHz result was not quite so good although it remained within 1.1dB of the true value. The increased error at higher frequencies is due to the difficulty predicting the precise gain of the system at these frequencies. However, the accuracy will improve as the SDRPlay team refine their dataset. One final test was to check the gain reporting whilst adjusting the RF gain setting. This showed excellent tracking that was within 0.5dB across the three test frequencies (9MHz, 145MHz and 434MHz).

The adjustable gain LNA was a very welcome addition but, in practice, I found it needed careful monitoring as the full gain was rarely required (particularly on HF). I used the RSP-2 with my Wellbrook ALA1530 Imperium Pro loop that delivers a relatively high output level to the receiver. When using this on the HF bands, I frequently had to back off the LNA gain to prevent ADC overload.

I found it hard to quantify the benefit of the improved RF preselection filters but they will no doubt help in receive locations that are plagued by strong out-of-band signals. The combined MW and VHF/FM notch filter was easier to quantify and provided useful attenuation of the broadcast signals.

Summary

The SDRPlay team have clearly listened to their customers and enhanced the RSP-2 with a host of well-chosen improvements. Like all wide band SDRs, care is needed when strong signals are around as it's easy to overload the ADC, especially if you don't keep control of the new RF gain adjustment. The addition of the calibrated signal level reporting and the new TCXO plus the external reference option makes the RSP-2 a very useful measuring instrument to have around the shack.

Not only are the RSP-2 hardware improvements very welcome but their development team are very active and their in-house SDRuno software and the driver APIs are under constant revision, so we can expect more improvements will be seen over time. The RSP-2 is £164.40 inc VAT and tracked courier delivery in the UK and can be purchased direct from the SDRplay website (www.sdrplay.com/purchase/) or, alternatively, ML&S are a direct distributor. My thanks to SDRPlay for the loan of the review model.

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. The details published here were kindly provided by Ofcom on 20 February 2017.

Date	Callsign	Event Phonetics	Location
01/04	GB2M	Marconi	Isle of South Uist, Outer Hebrides
	GB0MPA	MPA	Sully
07/04	GB0LAF	Lissett Air Field	Driffield
13/04	GB0RM	GB0RM	Dudley
21/04	GB4GM	Marconi Day	Caernarfon
22/04	GB0AA	Caister Marconi Station	Caister
	GB1STG	Saint George	Chelmsford
	GB5LT	Luttrell's Tower	Southampton
	GB0IMD	International Marconi Day	North Somerset
	GB0CMS	Caister Marconi Station	Caister
	GB4MDI	Marconi	Sully
23/04	GB4TDY	Tour de Yorkshire	Lancaster

RadCom

HF F-Layer Propagation Predictions for April 2017

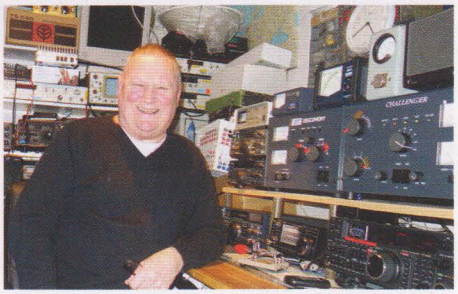
Compiled by Gwyn Williams, G4FKH

	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	641.....1566	654211124666	135333345532	.135445553..	..12222221..	...111111...	.....	.....
*** Asia								
Yakutsk	11	221..1..1222	..1112.....	....12.....	.....	.....	.....	.....
Tokyo	.....12..	.....134..	.....1223..	.....11..1..	.....	.....	.....	.....
Singapore	.....122.	24431	.....13431.	.....1231..	.....11...	.....	.....	.....
Hyderabad	1333	2.....23443	.....2342.	.....12....	.....	.....	.....	.....
Tel Aviv	53.....455	553.....3555	244211135552	..53333452..	..1122222...	.....	.....	.....
*** Oceania								
Wellington	.....	.....1...	....11212...	....111.1...	.....	.....	.....	.....
Well (ZL) (LP)	..1.....	134.....31.	224.....321	..2.....22.	.....	.....	.....	.....
Perth	.....111.	23331	.....2321.	.....	.....	.....	.....	.....
Sydney	.....11..	.....244..	.....1333..	.....1221..	.....	.....	.....	.....
Melbourne (LP)	.....	..22.....	..23.....	...2.....	.....	.....	.....	.....
Honolulu	.....	..2.....	...11.....	.....	.....	.....	.....	.....
Honolulu (LP)	.....	.....	.....	.....2...	.....2...	.....2...	.....1...	.....
W. Samoa	.....	..1.....	...111.....	....111.....	.....	.....	.....	.....
*** Africa								
Mauritius	2.....322	3.....4543	24422	.....232..	.....12...	.....1...	.....	.....
Johanesburg	22.....133	33.....3444	.1.....4432	.....242..	.....123...	.....112...	.....	.....
Ibadan	554.....455	5552....2555	52531..13555	..342222451.	...3333343..	...1111241..	.....1...	.....
Nairobi	33.....333	441.....2444	122.....3442	..31...244..	.....2341..	.....1...	.....	.....
Canary Isles	6641.....356	66541...2566	646432234666	113534444632	..145555561.	...2223354..	...1112232..	....111121..
*** S. America								
Buenos Aires	222.....1	334.....23	112.....122	.....21.	.....2..	.....1..	.....	.....
Rio de Janeiro	333.....13	434.....344	223.....432	.....42.	.....13..	.....12..	.....	.....
Lima	222.....1	2231.....23	..12.....21	.....	.....	.....	.....	.....
Caracas	3331.....3	3333.....24	...31.....31	....2....1..	.....	.....	.....	.....
*** N. America								
Guatemala	222.....	2232.....2	...2.....11	.....	.....	.....	.....	.....
New Orleans	3331.....	3132.....2	.....	.....	.....	.....	.....	.....
Washington	4442.....2	44432.....13	21111121	.....21112..	.....1..	.....	.....	.....
Quebec	3442.....2	3222.....13	....1...112.	.....1122..	.....	.....	.....	.....
Anchorage	.....	.....	.....	.....	.....	.....	.....	.....
Vancouver	..2.....	..21.....	.....	.....	.....	.....	.....	.....
San Francisco	.22.....	1121.....	.....	.....	.....	.....	.....	.....
San Fran (LP)	.....	.....	.....	.....	.....1....	.....11...	.....	.....

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 April, May & June are respectively (SIDC classical method – Waldmeier's standard) 24, 24 & 23 and (combined method) 32, 32 & 31. The provisional mean sunspot number for February was 26.1. The daily maximum / minimum numbers were 59 on 28 February and 11 on 8 February.

Sport Radio

The first of this year's RoLo (Rolling Locator) contests takes place this month.



David, G4ASR in his shack. Photo credit: Isla Butler (aged 6).

RoLo 1 is on the 2nd. This contest used to be RoPoCo (Rolling Postcodes) but was changed last year to Rolling Locators to enable non-UK stations to take part. This is the SSB leg of RoLo, with the CW leg taking place in August. After that the 80m Club Championships take place; CW on the 3rd, SSB on the 12th and datamodes on the 27th. Remember that on datamodes there is no longer normalisation of the RTTY and PSK scores and that this month it is a week later than it would normally be, to avoid clashing with 4m contests.

The first VHF contest of the month is the First 70MHz, on the morning of the 2nd. There are no multipliers in this contest. Last year David, G4ASR (pictured) was the winner of the Single-op Fixed section. He has topped the Table for the last four years. After the 2m FMAC and UKAC on the 4th we move on to the First 50MHz Contest on the 9th. The rules for this one are different to those for the First 70MHz. After that we return to the FMACs and UKACs for the remainder of the month. The 70cm FMAC and UKAC are on the 11th, the 6m UKAC is on the 13th, the 4m FMAC and UKAC are on the 20th and the SHF UKAC is on the 25th.

In the SP DX Contest on the weekend of 1st-2nd you should work Polish stations only, giving them a signal report and serial number. Expect a signal report and one of sixteen single-letter Province codes in return. There are lots of categories, with certificates on offer for the category winners in each DXCC entity. This is the CW/SSB leg of the contest, with RTTY later in the month. The UKEICC 80m SSB contest runs for one hour on the evening of the 5th. With activity on RTTY and PSK, the WAB data contest is on the 16th. In the Calendar below I included only one entry, but in reality there are four two-hour contests that follow on from one another. On Easter Monday, the 17th, the IRTS (Irish) 70cm Counties and 2m Counties contests run, the second starting as the first ends. For multipliers, EI and GI stations also send their county abbreviation. There are 32 in all to try to collect. The RTTY leg of the SP DX Contest is on 22nd-23rd. Coinciding exactly with it is the UKEICC DX CW Contest. Exchange a serial number and 2-letter District Code. There are 155 to collect. To qualify for an award you will need to upload your log within two hours of the end of the contest. The second in this year's series of UKuG Low Band microwave contests is on the 23rd. The BARTG Sprint 75 is also on the 23rd, with all activity taking place at 75 bauds. Finally, the very last in the 2016-17 series of UKEICC 80m contests is on the 26th.

Steve White, G3ZVW
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RSGB HF Events

Date	Event	Times (UTC)	Mode(s)	Band(s)	Exchange
Sun 2 Apr	RoLo 1 *	1900-2030	SSB	3.5	RS + Locator received
Mon 3 Apr	80m Club Championships	1900-2030	CW	3.5	RST + SN
Wed 12 Apr	80m Club Championships	1900-2030	SSB	3.5	RS + SN
Thu 27 Apr	80m Club Championships	1900-2030	RTTY, PSK	3.5	RST + SN

RSGB VHF Events

Date	Event	Times (UTC)	Mode(s)	Band(s)	Exchange
Sun 2 Apr	First 70MHz	0900-1200	All	70	RS(T) + SN + Locator
Tue 4 Apr	144MHz FMAC	1800-1900	FM	144	RS(T) + SN + Locator
Tue 4 Apr	144MHz UKAC	1900-2130	All	144	RS(T) + SN + Locator
Sun 9 Apr	First 50MHz	0900-1200	All	50	RS(T) + SN + Locator + Postcode
Tue 11 Apr	432MHz FMAC	1800-1900	FM	432	RS(T) + SN + Locator
Tue 11 Apr	432MHz UKAC	1900-2130	All	432	RS(T) + SN + Locator
Thu 13 Apr	50MHz UKAC	1900-2130	All	50	RS(T) + SN + Locator
Tue 18 Apr	1.3GHz UKAC	1900-2130	All	1.3	RS(T) + SN + Locator
Thu 20 Apr	70MHz FMAC	1800-1900	FM	70	RS(T) + SN + Locator
Thu 20 Apr	70MHz UKAC	1900-2130	All	70	RS(T) + SN + Locator
Tue 25 Apr	SHF UKAC ~	1900-2130	All	2.3 & up	RS(T) + SN + Locator

Best of the Rest Events

Date	Event	Times (UTC)	Mode(s)	Band(s)	Exchange (info)
Sat-Sun 1-2 Apr	SP DX	1500-1500	CW, SSB	1.8-28	RS(T) + SN (SPs send Province code)
Wed 5 Apr	UKEICC 80m	2000-2100	SSB	3.5	4-character Locator
Sun 16 Apr	WAB Data	1200-2200	RTTY, PSK	3.5-14	RST + SN + WAB (four contests)
Mon 17 Apr	IRTS 70cm Counties	1200-1300	FM, SSB	432	RS + SN (EIs & GIs also give county)
Mon 17 Apr	IRTS 2m Counties	1300-1500	FM, SSB	144	RS + SN (EIs & GIs also give county)
Sat-Sun 22-23 Apr	SP DX RTTY	1200-1200	RTTY	3.5-28	RST + SN (SPs send Province code)
Sat-Sun 22-23 Apr	UKEICC DX	1200-1200	CW	3.5-28	SN + District code
Sun 23 Apr	UKuG Low Band #2	1000-1600	All	1.3-3.4G	RS(T) + SN + Locator
Sun 23 Apr	BARTG Sprint 75	1700-2100	RTTY	3.5-28	SN
Wed 26 Apr	UKEICC 80m	2000-2100	CW	3.5	4-character Locator

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

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 May issue is 23 March and for June it's 27 April. 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 Easter: Stafford; May Day: Chatsworth House

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
14 Closed
28 Radio lock picking, John, 2M0JCG

Cockenzie & Port Seton ARC
Bob, GM4UYZ, 01875 811 723
7 Normal club night
21 Visit to Highland Colour Coaters

Livingston & District ARS
Cathie, 2M0DIB, 01506 433 846
4, 25 Training
11 Talk
18 Training and operating

Lothians RS
Mike, MM0MLB, secretary@lothiansradiosociety.com
5 Spring surplus equipment sale, St Fillan's Church
26 The unsung heroes of Enigma, Peter, GM4BYF

West of Scotland (Glasgow) ARS
wosars@gmail.com
7, 14, 21, 28 Club night, 8pm

REGION 2: SCOTLAND NORTH & NORTHERN ISLES

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

Aberdeen ARS
Fred, GM3ALZ, 01975 651 365
6 Junk sale
13 Multimeter utilisation
20 Micro programmes and PICs, John, MM0JOM
27 Construction and on the air

Glenrothes & District RC
Tam, MM0TGB, 0775 3526 498
5 Talk on PSK
12 Talk on Raspberry Pi, Leven
19 MOTA/LOTA planning
26 Coastguard

REGION 3: NORTH WEST

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

Chester & District RS
Bruce, M0CVP, 01244 343 825
4 AGM
11 Committee meeting
18 Grand surplus sale
25 GB7WX and Wires-X, Graham, G7NEH

Isle of Man ARS
iomars@manx.net
11 Satellite operation, Matty, MD0MAN

Macclesfield & District RS
Greg, M0TXX, Info@gx4mws.com
3 On the air
10 Film night
17 World Wide Flora Fauna Day, M0PAI
24 Worldwide Flora Fauna club activation

South Manchester R&CC
Ron, G3SVW, 01619 693 999
6 Operating practice
13 Getting started on microwaves, Dave, G4MVU
20 Communicating through multiverse portals, Gary Chlio
27 Samuel Morse's 226th birthday party

Stockport Radio Society
Heather, M6HNS, 0750 690 4422
4 VHF propagation
9 Blackpool rally
11 Club net, 51.550MHz FM, 7.30pm then QSY 50.270MHz SSB at 8.15pm
13 Club net, 7.30pm, 145.375MHz
18 Radio night
25 Skills night
27 Advanced course primer

Thornton Cleveleys ARS
John, G4FRK, 01253 862 810
3 Final prep for NARSA rally
10 Auction
17 Closed
24 Fox hunt

The next Club Calendar deadlines are 23 March and 27 April

REGION 4: NORTH EAST

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

Angel of the North ARC
Nancy, G7UUR, 01914 770 036
3, 10 Aerials, David, G0EVV; Advanced course continues
9 NARSA rally
17 Closed
24 On the air; Advanced course continues

Blyth Radio Club
John, 2E0DCV 0191 237 1729
5, 12 Club night
19, 26 Foundation training

Colburn & Richmondshire District ARS
Colin, 01748 876 391
13 Raspberry Pi demo, 2E0RYE
27 General club meeting

Denby Dale RC
Darran, G0BWB, 0797 442 3227
5 Surplus sale
12, 26 Club net, 145.575MHz, 8pm
16 WAB DATA contest, Brian, G0BFJ
19 My life at the BBC, David, G4CLI

Hartlepool ARC
Anthony, M0VED, 0792 699 8014
1 Natter night
8, 22, 29 Club on air
15 Talk

Sheffield & District Wireless Society
Krystyna, 2E0KSH, 0788 406 5375
5 In Cook's footsteps, David, M0GDX
12, 26 Training and social night
19 CERN, R French

Sheffield ARC
David, G6DCT, littlewood20@btinternet.com
3 Shack night
10 Club night
17 Closed
24 Space exploration, Ian Hole, G0OUG

Spen Valley ARS
Russell, G0FOI, 01274 875 038
6 Bring a Morse key evening

REGION 5: WEST MIDLANDS

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

Burton ARC
Mike, 2E0EZG, info@Burton-ARC.co.uk
2, 9, 16, 23, 30 Club net, 145.575MHz, 10am
5, 12, 19, 26 Club night
6, 13, 20, 27 Club net, 145.575MHz, 8pm

Coventry ARS
John, G8SEQ, 07958 777 363
3, 10, 17, 24 Open net, 8pm, 145.375MHz FM and or 7.16MHz ± QRM SSB
6, 13, 20, 27 Open net 8pm, 50.175MHz SSB
7 Backyard EME in the USA, David, G4FRE
14 Hoc tempus vigilate
21 G2FDC 2m DF trophy round 2
28 Radio workshop

Gloucester AR&ES
Anne, 2E1GKY, 01242 699 595 daytime
3, 24 Informal evening and general operating
5, 12, 19, 26 Club net, starting on 145.500MHz
10 Club net in lieu of meeting, 7.30pm, 145.550MHz
17 Operating at Crickley Hill plus club net in lieu of meeting, 7.30pm, 145.550MHz

Hereford ARS
Rod, M0JLA, 01432 356 079
7 Curry night

Midland ARS
Norman, G8BHE, 0780 807 8003
5 Open meeting and ragchew with training classes
11 Committee meeting and training classes
19 Discussion on social events and rally visits
26 General meeting with shack on the air and training classes
30 West London Radio and Electronics Show

Mid-Warwickshire ARS
Don, G4CYG, 01926 424 465
11 Club net, 145.275MHz
25 Technical topics/homebrew

Nuneaton & District ARC
Neil, M0NKE, info@ndarc.co.uk
4 2m UKAC
6, 13, 20, 27 Club net, 9.30pm, 145.475MHz
7 Social pint and chat, 7.30pm, The Harvester, Nuneaton
11 70cm UKAC
13 6m UKAC
21 Bring & Buy, 7.30pm

Rugby ATS
Steve, G8LYB, 01788 578 940
1 Club antenna plans & measurements
4, 11, 18 UKAC
8 Soldering methods and tools
15 Committee meeting, HF & VHF shack on the air
22 AGM
25 VHF shack on air
29 HF & VHF shack on the air and project activities

Salop ARS
salopamateurradio@gmail.com
4, 11, 18, 25 Club CW net, 4.30pm, 144.070MHz
5, 12, 19, 26 Club net, 8.30pm, GB3LH
6 Natter night / committee meeting
13 Contesting outwith NFD, Ken, G8DIR
20 Natter night
27 Lightbeam radio, Dave, G8VZT

South Birmingham RS
Gemma, M6GKG,
gemmagordon.m6gkg@gmail.com
3, 10 Work in the shack
4, 11, 18, 25 Coffee morning in the shack, 11am to 1pm, visitors welcome
6 Training classes with Dave, G8OWL
7, 14 Sorting rally stock
17 Discussion on Field Days
24 Ragchew in the shack
28 Checking aerials and rigs for Field Day in May

Stratford upon Avon & District RS
Clive, G0CHO, 01608 664 488,
cousbey@theiet.org
3, 17 Club net, 145.275MHz FM, 8pm
24 ATUs, Peter Chadwick, G3RZP

Sutton Coldfield ARS
Robert Bird, rob2e0zap@gmail.com
3, 17 Open net, 7.30pm, 145.250MHz
10, 24 Club meeting
11 Open net, 7.30pm, 70.475MHz FM
25 DMR open net, 7.30pm, GB7FW slot/local2

Tamworth ARS
Richard, 2E0LLE, 0787 521 7124
5, 12, 19, 26 Club net via GB3TA
6, 13, 20, 27 Club night

Telford & District ARS
John, M0JZH, 0782 473 7716
5 Committee meeting, GX3ZME OTA
12 Webinar: PCB's using Eagle, Shabaz Usaf
19 Memoirs of a cellular field engineer, John, G8JJF
21-23 Marconi weekend
26 Coaxial cable and connectors

Wythall Radio Club
Chris, G0EYO, 0771 041 2819
2, 9, 16, 23, 30 Club net, 8pm, 145.225MHz or GB3WL
4, 11, 18, 25 Morse class
4 Prep for Easter Contest
7, 14, 21, 28 Nibbles night in the shack, 7.30pm
11 Committee meeting
18 Free and easy
25 Curry night

REGION 6: NORTH WALES

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

Dragon ARC
Stewart, GW0ETF, 07833 620 733
3 Marconi Day planning & ten minute topics
17 Surplus / pre-loved equipment sale
22 International Marconi Day at Old Marconi Station, Waunfawr

North Wales Radio Society
Liz, GW0ETU, 0776 019 0355
6 General meeting
13 Technical topic
20 V2 rocket & its guidance systems, Les, MW0SEC
27 Discussion on dates for outside activities

Porthmadog & District ARS
Peter, GW0DFK, 0773 177 1319
20 Talk by RSGB area rep

REGION 7: SOUTH WALES

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

Aberystwyth & District ARS
Ray, GW7AGG, 01970 611 853
13 North Dyfed RAYNET AGM
27 Net on 145.500MHz then 145.550MHz

Barry ARS
Glyn, GW0AWA, glyndxis@talktalk.net
4, 18 Natter and operating night
11 *Titanic / Carpathia* special event GB0MPA
22 Marconi Day special event GB4MDI
25 Aerials for small gardens, Gwyn, GW0ANA

Chepstow & District ARS
Ollie, 2W0ZXX, 0748 182 1973
4 Linear amplifiers, Dan, GW0EGH
18 Club call on the air

Cleddau ARS
Heinz, MW0ECY, 0774 804 7008
18-22 Operating from Patrick Hill
27 Barbecue

REGION 8: NORTHERN IRELAND

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

Bangor & District ARS
Norman, GI3YMY, norman.newell@yahoo.com
6 Constructors' contest

Mid Ulster ARC
muarc.secretary@yahoo.co.uk
11 Contact the shack night

REGION 9: LONDON & THAMES VALLEY

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

Bracknell ARC
David, M0XDF, M0XDF@Alphadene.co.uk
5, 19, 26 Open net, 8pm, 145.375MHz
12 WSJT/WSPR, Mike, G4DDL

Burnham Beeches RC
Charles, G0SKA, 01753 647 101
3 Logbook of the World and ON4KST, Trevor, M0TDZ
17 Radio quiz with Steve Venner of ML&S

Edgware & District RS
Mike, G4RNW, 020 8950 0658
13 Carry on up the Amazon, Mike, G4RNW
27 Round table discussion on first jobs

Harwell ARS
John, G6LNU, 01235 223 250
13 Show & tell + natter evening

Newbury & District ARS
Rob, G4LMW, 01635 862 737
26 How many radios does it take to run an airshow?

Radio Society of Harrow
Linda, G7RJL, lcasey@imperial.ac.uk
2, 9, 16, 23, 30 Club net, 1938kHz LSB, 12 noon
3, 10, 17, 24 Club net, 8.15pm, 145.500MHz then 145.350MHz FM
7 M0UJC Memorial Lecture: Designing antennas by computer, Brian, G3YKB
21 Equipment sale + members' bring & buy
30 Outdoor event, 2-5pm, Old Redding car park

Reading & District ARC
Laurence, G2DD, 0758 470 6625
13 Discover digital radio
27 Mag loops, Prof Mike Underhill, G3LHZ

Shefford & District ARS
John Burnett, john@hobart-europe.co.uk
6 Special Forces communication equipment 1970s and1980s, Mervyn Foster
20 Steve Ashley: Bedford-Milton Keynes Waterway Park
23 Club lunch
27 Secret life of the transverter, Sam, G4DDK

Southgate ARC
Keith, G8RPA, g8rpa@arrl.net
12 More about the Raspberry Pi, Graeme, G8DVJ

Verulam ARC
Greg, M0PPG, 01582 413 345
13 Social with GB3VH Repeater Group
18 One ham's journey to the moon and back via EME

The next deadlines are
23 March, 27 April and 25 May.
Send your details to radcom@rsgb.org.uk

REGION 10: SOUTH & SOUTH EAST

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

Bromley & District ARS
Andy, G4WGZ, 01689 878 089
2 Intermediate course
5, 12, 29, 26 Net, 145.400MHz, 9pm
18 Frequency counter construction, Damien, 2E0EUI

Coulsdon ATS
Mike, M1CCF, 020 8654 2582
2, 9, 16, 23, 30 Nets: 11am, 145.4MHz ± QRM, 5pm, 3.7MHz ± QRM
5, 12, 19, 26 Net, 9pm, 70.425MHz

Crawley ARC
John, G3VLH, 01342 714 402
26 3D printing for amateur radio, Stewart, G3YSX

Cray Valley RS
Richard, G7GLW, 0783 171 5797
6 Top Band to 198kHz, G4AEH
20 AGM

Crystal Palace R&EC
Bob, G3OOU, 01737 552 170
5, 12, 19, 26 Club net, 8pm, 145.525MHz ± QRM
7 Frequency counter design considerations and the use of KiCad, Alan, G8NKM

Darenth Valley RS
Mike, G8AXA, 0788 415 7776
12 Video night
26 AGM

Dover RC
Aaron, 2E0FQR, 0771 465 4267
13 Open forum hosted by Ian, G3ROO
27 Special event planning for 2017

Echelford ARS
John, G4GSC, 01784 451 898
13 CW practice/on air operating and social
27 AGM

Hastings E&RC
Gordon, 01424 431 909
26 DVD show

Horndean & District ARC
Stuart, G0FYX, 02392 472 846
7 Natter night/social evening
21 Small antennas, Rob, M0RZF

Mid-Sussex ARS
Sue, G6YPY, 01273 845 103
7 Surplus equipment sale
14 Closed
21 Radio night and table top sale
28 Quiz and cakes night

Southdown ARS
John G3DQY, 01424 424 319
1, 15, 22, 29 Saturday meeting
3 Monthly meeting
5, 12, 19, 26 Café meeting
5 Club net, 8.30am, 145.275MHz FM; Hailsham Shack meeting, 10.30am
9 50MHz contest meeting

Surrey Radio Contact Club
John, G3MCX, 020 8688 3322
2, 9, 16, 23, 30 Net, 1905kHz, 9.30am
3 AGM
6, 13, 20, 27 Net, 70.300MHz, 8pm
7, 14, 21, 28 Net, 145.350MHz, 8pm
24 Chat and fix-it, John, G8MNY

Sutton & Cheam RS
John, G0BWV, 0208 644 9945
20 Home construction and finishing, Bob, G3OOU

Swindon & District ARC
Jonathan, M0ZGB, m0zgb@sdarc.net
6, 20 Activity night
13 Closed
27 Equipment sale

REGION 11: SOUTH WEST & CHANNEL ISLES

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

Bristol RSGB Group
Shaun, G8VPG, 01225 873 098
24 Weston Clevedon & Portishead Light Railway, Paul Gregory

Callington ARS
John, G4PBN, 01822 835 834
5 AGM and natter night

Cornish Radio Amateur Club
Steve, G7VOH, 01209 844 939
5 Committee meeting
6 AGM
20 Social evening
21-23 International Marconi Day setup, activity and dismantling

Exeter ARS
Nick, M0NRJ, 01363 775 756
4 Net, 7.45pm, GB3EX
11, 18, 25 Net, 7.45pm, GB3EW
12 Aerials for satellite tracking
26 How to build a repeater

Mid-Somerset ARC
David, G8BFV, 01749 670 085
11 Slide and video presentation on VHF propagation

North Bristol ARC
Mat, G7FBD, g7fbd@gb3bs.com
2, 9, 16, 23, 30 Club net, 7pm, GB3BS
7 Relax and chat evening + operating
14 Bring and Buy
21 Relax and chat evening + operating & training
28 Codes, cyphers and radio, G0ECM

Saltash & District ARC
Mark, M0WMB, 0781 054 8445
6, 20 Club night, visitors welcome

South Bristol ARC
Andrew, G7KNA, 0783 869 5471
6 Committee meeting
13 Practical evening – baluns
20 Open source software
27 Open house and on the air night

Torbay ARS
Dave, G6FSP, g6fsp@tars.org.uk
7 Club night
14 Closed
21 Club night and business meeting
28 90/10 auction

Weston Super Mare RS
Martin, G7UWI, 01934 613 094
3, 10, 24 Construction, operating & natter night
17 Surplus equipment sale

Yeovil ARC
Rodney, M0RGE, 01935 825 791
6 AGM
13 Workshop practice, Bob, G7LNJ
20 Briefing for QRP Convention
23 33rd QRP Convention
27 On the air and committee meeting

REGION 12: EAST & EAST ANGLIA

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

Braintree & District ARS
Edwin, G0LPO, 01376 324 031
4 Club Net 8pm 145.375
11 Talk / Presentation from RNLI
18 Club Net 8pm 145.375
25 Sausage and mash/ Mills on the air planning

Cambridge & District ARC
Peter, M0DVC, 0744 304 6040
2, 9, 16, 23, 30 Club nets, 8.30am, 144.180MHz USB, 10.30am, 7.0875MHz LSB or 3.620MHz LSB, 11.30am, 145.550MHz FM
5, 12, 19, 26 Club net, 8pm, 145.550MHz FM
14 Closed
28 Piracy on the high seas, Chris Hindley (British Antarctic Survey)

Chelmsford ARS
secretary@g0mwt.org.uk
4 Talk by RSGB President Nick Henwood, G3RWF
17 Skills Night at Danbury Village Hall
22-23 International Marconi Day at Sandford Mill

Essex Ham
Pete, M0PSX, news@essexham.co.uk
1 Essex YL net, GB3DA, 8pm
2 Online Foundation course
3, 10, 24 Net on GB3DA, 8pm, with chatroom and audio feed at www.essexham.net
17 Getting Started table at Essex Skills Night

Felixstowe & Dstrict ARS
Paul, G4YQC, pjw@btinternet.com
1-2 Intermediate course weekend
3 AGM
10 Kent Britain entertains, Kent, WA5VJB
15 Intermediate exam
24 RSGB Presentation: HF propagation

Norfolk ARC
Chris, G0DWV, 01603 898 308
5 AGM
12 Informal
19 Microwaves, Simon, G7SOZ
26 Informal – Bright Sparks

Norfolk Coast ARS
Steve, G3PND,
info@norfolkcoastamateurs.co.uk
6 More on EME
13 Pedestrian mobile
20 The end-fed long wire
27 Contesting

South Essex ARS
Terry, G1FBW, 0798 607 0040
11 Using the Raspberry Pi in amateur radio, Peter, G0DZB

Thames ARG
Patrick, G8JLM, 01621 855 461
7 Developing the club, new events, quiz
14, 28 Net
21 TARGet night

Continued on p94

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Thurrock Acorns ARC
Gordon, 2E0ELI, acorns@taarc.co.uk
4 2m SSTV open net, 7.30pm
6, 13, 20, 27 2m FM open net, 7.30pm
18 Lightning protection, Steve, G4HXY
22 Purfleet Heritage Centre event station 9am-5pm

REGION 13: EAST MIDLANDS

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

Hinckley AR&ES
Bob, G8BFF, 0792 876 9767
4, 11, 18 UKAC
6 Intermediate training and talk
13 Intermediate training and 6m UKAC
20 Training and 4m contest
27 Training and workshop

Leicester RS
Sandra, G0MCV, 0793 027 4044
3 Maritime mobile on VHF, G8VHI
10 Morse class, night on the air, committee meeting / open meeting
17 Closed
24 Technical / project night with Duncan
27 Cuppa and chat, noon-5pm

Lincoln Short-Wave Club
Pam, G4STO, 01427 788 356
1, 8, 22 Workshop & mentoring, G5FZ on the air
5 Club night, G5FZ/G6COL on the air
6 Club net, GB3LM, 8pm
12 Talk on fox hunting, Ian, G4XFC
13 Club net, 145.375MHz, 8pm
15 3-ele portable steel tape Yagi workshop
19 Formal meeting
20, 27 WAB, Dave Brooks, G4IAR
26 Surplus equipment sale at Aisthorpe Village Hall
29 Club trip to Duxford War Museum

Loughborough & District ARC
Chris, G1ETZ, 01509 504 319
4 2m club net
11 Video night
18 Early TV, Chris Lewis
25 Practical evening

Melton Mowbray ARS
Phil, G4LWB, 01664 567 972
21 Basic radars and microwaves, Howard, G6KQP

South Kesteven ARS
Andrew, M0NRD, 0796 906 2859
5, 12, 19, 26 Club net via GB3GR
7 History of radar, Arthur, M0GUU
21 Club meeting

South Normanton Alfreton & District ARC
A Lawrence, 2E0BQS, 0115 930 7322
3 AGM
10, 24 Natter night
17 Bank holiday

Welland Valley ARS
Peter, G4XEX, 01858 432 105
3 Club net, 7.135MHz LSB
17 Re-install VHF/UHF collinear & test
30 Cambridge Radio Rally

The next Club Calendar deadlines are 23 March and 27 April

EVENTS ROUNDUP

REGION 1: SCOTLAND SOUTH & WESTERN ISLES

The **Scottish Borders Repeater Group** is holding its AGM on 30 April at 2pm in the Focus Centre, Galashiels.

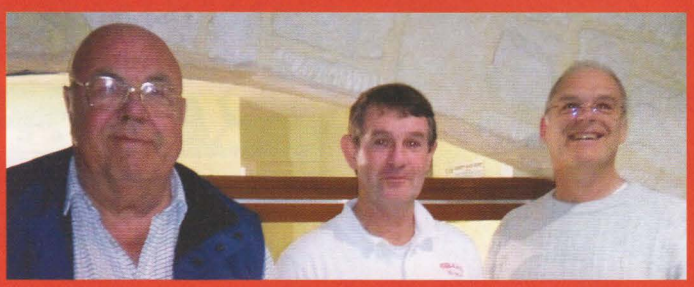
REGION 3: NORTH WEST

Furness ARS has upgraded its club rig. The opportunity arose to buy an Icom IC-7300, which was less than 12 months old and in 'as new' condition. A thorough test was done and the decision was taken to buy. A number of club members own IC-7300s, so it is well know to be an excellent rig, with touch screen functions and a fantastic spectrum scope. The new rig also opens some bands that weren't possible with the club's existing rig, including 6m and 4m. The club has used a faithful TS-570DG for many years, and it was deemed a suitable time to buy a new rig. There are no plans to dispose of the Kenwood; it's hoped it will serve as a backup for many years to come.

Stockport Radio Society has a quarterly newsletter that is printed in full colour. They would like to thank their new sponsor, Olympic Press of Manchester, for sponsoring the printing of the newsletter. At the AGM in December three members resigned from their positions. The club would like to thank Steve, G8YPT, Tom, M0DCG and Nigel, G0RXA for their invaluable help and assistance to the club over the years. Welcome to Phillip, M0XYA as Station Manager and John Marsh as Course and Examination Secretary. The club wishes them all the best in their new roles.

INTERNATIONAL

Pafos Radio Club in Cyprus extends a welcome to all visiting radio amateurs. The AGM was held in February and the Committee was re elected for a further year. Pictured here are the President, Norman, 5B4AIE (centre), Treasurer, Mike, 5B4AIK (left) and Secretary, Richard, 5B4AJG.



Bob, G3VVT was presented with a piece of etched glassware by Mike, G0CHV, Chairman of Morecambe Bay ARS, commemorating Bob's 50 years continuous Membership of the RSGB (photo right). Bob was also elected as President of MBARS at the recent AGM.

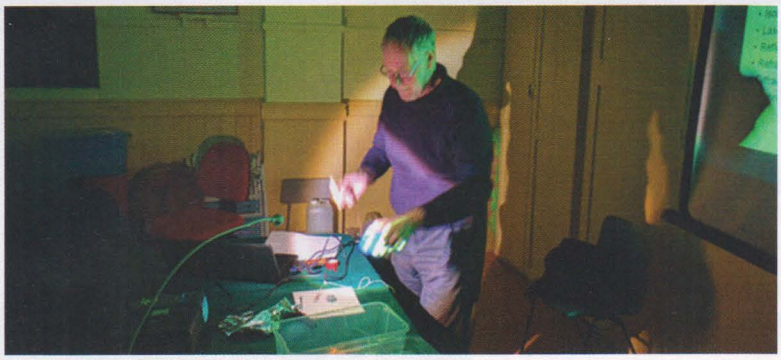
REGION 4: NORTH EAST

Bishop Auckland RAC meets every Thursday night at the Stanley Crook Village Hall. Everyone is welcome. The club repeater, GB3CD, is a Yaesu DR-1 C4FM/FM Digital Repeater running full fusion: RV55 Output 145.6875 Input 145.0875 CTCSS J/118.8Hz. This repeater is connected to the Echolink internet linking system (node number 412936), and Wires X is also available on the repeater now in digital mode. Thanks go to Brian, G7OCK for supporting this facility. More details are at http://barac.org.uk

Hartlepool Radio Club is a new club started in January 2017 and already has around 30 members. By now they will have conducted their first Foundation exam. All are welcome and a comprehensive list of events are being planned and special event stations will be run, including JOTA.

REGION 4: NORTH EAST

Denby Dale ARS entered the WAB 160m contest on 21 January. This was operated from the club shack at Farnley Tyas using a full size dipole. The team managed to work 54 stations and 44 squares and 9DXCC, giving a total claimed score of 13770. They are hoping that this will be enough to place them high in the results table.



David, G0EVV delivered two presentations to about 25 members of Angel of the North ARC explaining how radio propagation functions on both the VHF and HF bands (photo left). The VHF propagation presentation covered free space loss, what enhances propagation and what degrades it. It also looked at what we can do to improve our chance of making the best of the propagation and how to set about achieving the ultimate DX, Earth-Moon-Earth communication. The HF presentation examined the properties of the ionosphere that make HF radio contacts possible, a section about how solar physics affects radio propagation and the battle between the solar flux and mass ejections.

REGION 6: NORTH WALES

Halkyn RC has moved to The Britannia Inn, Pentre Road, Halkyn CH8 8BS where they will have a shack set up. They meet every Wednesday from 8pm with visitors and new members made very welcome. Details from Bob, GW4KDI on 0787 482 9022.

REGION 8: NORTHERN ISLAND

Bangor & District ARS had a talk on interconnecting amateur transceivers and computers. Most modern transceivers have facilities to make the connection. Harry, GI4JGB (see photo above) demonstrated this facility for contesting and logging. The club website is www.bdars.com

REGION 9: LONDON & THAMES VALLEY

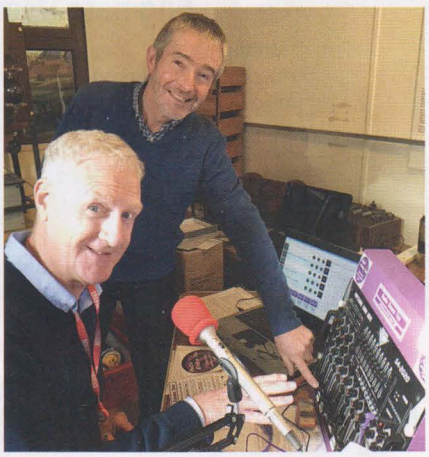
Chertsey RC is looking for a social media secretary, someone who would like to update Twitter, Facebook and send regular updates on our club activities to the RSGB and GB2RS news. The club is now able to offer and sign off practical tests for the Foundation and Intermediate licence levels and can also offer all 3 USA ham radio exams if required.

At Verulam ARC's AGM in February it was all change for the club's leadership. After three years of sterling service, David, G4HHJ handed over the Chairmanship to Alex, M0UKR and Greg, M0PPG took over the post of Secretary from Peter, G4HSO. Both David and Peter will remain as members of the committee. As his last act, David, presented the Chairman's Award for outstanding service, to Greg (left). This was in recognition for all of Greg's efforts that included help train pupils at Sandringham School to pass their Foundation licence in time for the schools historic contact with Tim Peake aboard the International Space Station.

REGION 10: SOUTH & SOUTH EAST

Brede Steam ARS held another successful training and exam weekend in February. Congratulations to Harry Hatchard, Dan Brennan and Jason Keel on soon to be gaining their M6 callsigns. Two other students Dan and Gavin did their training and will take their exam on 4 March. The students who passed their exam have expressed a wish to take their Intermediate exam. The club wish to thank the First Brede Scout Group for allowing the use of their facilities for the weekend.

REGION 12: EAST & EAST ANGLIA

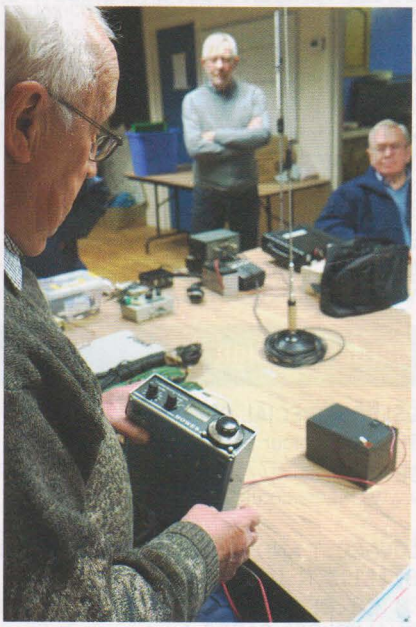


Essex Ham has had another busy month. The group supported Radio Emma Toc, an online radio station run by Jim, 2E0RMI, which was celebrating the launch of 2MT in February 1922. As well as being interviewed on Radio Emma Toc and providing a live video stream of the event, Essex Ham members Pete, Jim and Kathryn were interviewed on the local BBC station to promote the hobby. The group was also at the Essex Skills Night, this time demonstrating some broadcast radio equipment as well as a demo on PSK31 and JT65 modes. Over 50 attendees took part in a mass link-up with Essex Ham's Monday Night Net live from the Skills Night venue in Danbury.

Norfolk Coast ARS has continued their experimentation with EME by constructing a 12-element 2m Yagi – on an 8m boom. Here it is shown on the simple manual pan/tilt arrangement that is located on a shed on an allotment adjoining the club's facility. The location gives a clear view of the horizon from due south to west – and now it is just a case of waiting for a Thursday when the moon is in the right position during the club's meeting.

Great feedback was received from traders and the many local hams who attended the 32nd Canvey Rally in February. Over 400 people came through the doors. South Essex ARS donated £100 to the Essex CW Club, which was presented to the rally organiser, Vic, G6BHE. The rally was visited by Steve Thomas, M1ACB, RSGB General Manager.

Thames ARG had a talk on amateur radio in medicine by club member and hospital doctor, Bejoy, 2E0KFB. The presentation started with a 1956 Pathé News clip of a GP using a Ford Prefect 107E, fitted with a Pye Cambridge transceiver, to receive details of patients needing urgent attention. Then they were shown various networks from around the world that use radio to ensure prompt medical attention and to supply medicine. Bejoy went on to explain how amateur radio could best serve medical teams today. He highlighted that radio equipment may be locked in a cupboard for security reasons and therefore not accessible. The session concluded with Questions and Answers from the audience.



In anticipation of a future QRP field event, members of Braintree & District ARS presented to a meeting their impressive selection of QRP radios and /P antennas. Sets included a Yaesu FT-817 and an FT-290R, an Icom 2m multimode, two versions of the MKARS80 kit transceiver, a vintage Codar receiver, an Elad FDM-DUO an Elecraft KX3 and finally a Howes multiband kit receiver. Several permutations of the SuperAntenna were on display as well as magmounts, one with a g-whip, and the other with a quadband vertical. Neville, G8CDG was on hand with his highly portable SARK110 analyser to check antennas. Reports were given on recent QRP (including DX) contacts, and plans were made for the future event. The shared experiences were beneficial to all members present.

REGION 13: EAST MIDLANDS

Nunsfield House ARG is pleased to announce Lyndsay Latimer and Terry Baker both successfully completed the Foundation exam in February. Lyndsay is the first lady in a while to sit the exam at NHARG and they look forward to many more joining the hobby. Both are now looking forward to obtaining their callsigns. Special thanks to Peter, M0KEF, Ken, G3OCA, Tony, G6MWS and Ken, G0JKC.

South Kesteven ARS enjoyed a presentation by Mark, M0OBL and Stewart, M0SDM demonstrating the type of test equipment used within the amateur radio environment. Equipment used was a mixture of oscilloscopes, signal generators and Frequency counters with details given on how the equipment is used within the hobby. Demonstrations showed RF interactivity between hand held transceivers and frequency counters, Lissajous patterns on oscilloscopes and the use of various types of signal generator. See the club website at www.skars.co.uk

Classified Ads

For Sale

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

SINOTEL UK - AUTHORISED UK
importers of Baofeng & TYT handhelds, Xiegu X108G HF transceivers. Accessories, antennas and more. www.sinotel.co.uk, 01926-460203, sales@sinotel.co.uk

CTCSS ENCODER AND DECODER KITS,
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LATEST VERSION 3 SUPER STABLE RTL-SDR USB STICK
with 1ppm TCXO. Now with HF mode, software activated bias tee, longer SMA, clock and GPIO pads. Also Thumbnet N3, pigtails, connectors, adapters and many more useful items. Buy direct from our web shop at technofix.uk

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Computer Software

SD CONTEST LOGGER, €20 - EI5DI.COM
Supports RSGB 2017 rules. SDX - free Special-Event logger.

Aerials

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

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

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

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

TYT MD380/NEW MD380 + GPS
MD380 £109.95, MD380G includes GPS facility £129.95, MD380 Li battery £14.95, speaker/mic £14.95, ear/mic £12.95, All inc post next day delivery. Website:mirfield-electronics.co.uk.
Email: martin.stokes@hotmail.com or
Tel: 07825549430

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

Wanted

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

Miscellaneous

ALL UK STATIONS – CALL IN ON OUR 'M1CRA' CHRISTIAN NETS!
WACRAL welcomes all amateurs & listeners to our Sunday morning 'GOOD NEWS' nets, now at 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

VINTAGE FIREWORK COLLECTOR
will pay cash and collect from anywhere call Tony - 07956 506300 Licensed explosive storage

Equipment

REPAIRS TO RECEIVERS, TRANSMITTERS
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RADIO REPAIRS BY M0NKL
Icom, Yaesu, Kenwood etc, plus linear amplifiers, please contact Nick on 07770 397668 or email np262@yahoo.com

Classified advertisements 58p per word (VAT inc.) with a minimum of 14 words £8.12. All classified advertisements must be prepaid. Please write clearly. No responsibility accepted for errors. Latest date for acceptance is 1st of the month prior to publication
Payment to: RSGB, 3 Abbey Court, Priory Business Park, Bedford, MK44 3WH

Advertising. All display and classified advertising enquiries (except Members' Ads, which go to memads@rsgb.org.uk) should be sent to: Chris Danby, G0DWV, Danby Advertising, Fir Trees, Hall Rd, Hainford, Norwich, Norfolk NR10 3LX
Tel/Fax 01603 898 678
e-mail adsales@rsgb.org.uk

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Advertisers Index

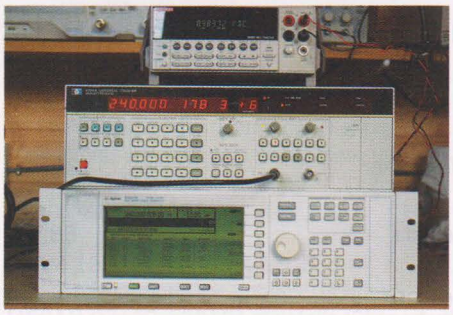
bhi	103
Goodwinch Ltd	103
Hammond Enclosures	43
ICOM UK Ltd	35
JVC Kenwood	41
Kuhne Electronics	103
LAM Communications	93
Martin Lynch & Sons	53, 54, 55, 56, 57, 58 , 95, 98, 108
Moonraker	28, 29
Nevada	68, 69
NORBRECK	43
Peak Electronics	46
Radioworld	77, 78, 79
RF Parts Company	95
RT Systems Inc	95
RSGB	11, 15, 25, 39, 82, 83
SDRplay	43
SOTAbeams	46
Upshot UK Ltd	95
Waters & Stanton	2, 3, 4, 106, 107
Yaesu UK Ltd	19

FREE MEMBERS' ADS OF UP TO 40 WORDS

Email your Members' Ad to memads@rsgb.org.uk. You must include your name, callsign, phone number, email address and location (not counted in the 40 word limit). Optionally, attach your own photo of the item (min res 800 x 600, must be in focus and well lit). Max 1 ad per Member per month; other terms & conditions also apply (see tinyurl.com/MemAdsInfo).

FOR SALE

20m AND 40m Arno Electronica vertical antennas, EH Cobra20 and EH Cobra40. Boxed / new with instructions. Antennas are pre-tuned at factory, ready to install, complete with fixing clips. External fine-tuning sleeve. SO239 connector. £150 each or £250 for pair. Martin Brown, M0BJR, 0778 606 0100, mbb1976@btinternet.com (Saxmundham, Suffolk).



AGILENT 4421B 250kHz-3GHz generator, £550. HP5335A 200MHz universal counter, £150. Keithley 2000 6½ digit bench meter, new display Feb 2017, £350. All GWO. Collection and demonstration welcome else carriage TBA. Rob Macfie, G4FAX, 0771 308 4244, rob.macfie@gmail.com (Luton, Beds).

ALPHASPID RAS AZ/EL ROTATOR and controller £500. 6m InnovAntennas 6LFA, £150. 4m homebrew 6LFA, £100. 70cm homebrew 18LFA, £75. All good condition including balun. R&S 1kW freestanding dummy load (heavy, very conservative), Dezifix connectors. Scruffy but functional, £50. All collect. Brian, G4AEZ 0754 033 1624 brian@oughton.me.uk (Basildon, Essex).

COLLINS 30L-1 linear amplifier 1000W. Round emblem model. Good condition. SO-239 output jack. Working when stored in 2011. Not turned on recently. Set of four new, boxed Svetlana 811A valves included. £550. Dick, G3VKT, dick.smith@combpyne.com (West London).

COLLINS KWS-1 transmitter, fully restored with spare KWS-1 RF deck and 1kW Johnson Matchbox ATU, £1500. 75A-4 receiver, fully restored, mint, £750. Harris RF601A/C 1kW autotuner, perfect, £675. Recent illness forces reluctant sale. Buyer to collect. Pat McAlister, G3YFK, 01743 884 858, Pat1McA@aol.com (Shrewsbury).

ELECRAFT KPA500 500W linear amplifier in excellent condition, covering 160m – 6m, being sold on behalf of G3IUW. £1850 ONO. This product will be for the buyer to collect from Fleet, Hants, where pre-purchase demonstrations will be available. Bob, G3MSL, 01252 687 810, robert.ives@ntlworld.com.

HEATHKIT HW-101 transceiver with PSU, LS & mic, £120. 1.4MHz tested crystal filters for AM, USB, LSB & CW, £15 each. Pye 455kHz filter, £3. *ARRL Handbook* 2009, good condx, £10. All excl P&P. Bob, G3OOU, 01737 552 170, g3oou@aol.com (Coulsdon).

HUSTLER 6 BT V trap vertical multi band HF aerial. Tri band 2/6/70. 23cm beam plus mobile and mag mounts and cables. £90 ono. John, G4JRC, 0794 003 9168, john_lander10@hotmail.com (Cambridgeshire).

ICOM IC-7600, boxed, in mint condition, £1,500. Begali Sculpture Iambic stainless steel key, £280. Bencher Hex Key, £240. Non smoker. Colyn Baillie-Searle, GD4EIP, 0762 441 3036, gd4eip@wimanx.net (Isle of Man).

ICOM IC-910H with 2m, 70cm & 23cm module. £950 inc UK mainland carriage. This TX is in excellent condition, recently checked by Icom UK, engineer's report is included. Dave, G1LNA, 01209 717 261 (Cornwall).

ICOM IC-E208 VHF/UHF FM transceiver, 55/50W. Brand new, immaculate, never opened or used, £185. Trio/Kenwood R600 Rx, VGC £170. KW Vespa transceiver, £100. I will ship. Ron, 2E0ARR, 0748 640 5031, pwa987fa@gmail.com (Notts).

JRC NRD-345 HF RECEIVER. 100 – 30,000kHz. Immaculate. Manual, original box and packing. 12V PSU. £300 ONO plus delivery. Bernard, G8KVM, 0771 679 4431, bernard_rhead@hotmail.com (Staffs).

K2 100W transceiver, £550. KAT100 ATU, £150. Codar CR45 TRF receiver in excellent condition, all coils, £100. HW7, as original, £60. FT-101 Mk 2 with WARC, £70. FC-102 ATU, £50. KW107 ATU, £70. Buyer collects from North Kent or Wiltshire. Colin, G3VTT, g3vtt@aol.com.

LINEAR AMP CHALLENGER 1500 watts, little used, with new tube, as new, £1500. Tennadyne T8 LP beam, fantastic spec, little use, aircraft quality ali, £500, all ono. Items are in Spain, will ship on sale. Bob Limehouse, G3WTN, 00 34 689 291 753, alicantebob@hotmail.com (Alicante).

RACAL VHF/UHF SURVEILLANCE RX RA2091. Two RF heads, 20MHz to 400MHz. AM/FM/CW/pulse, in cabinet with manual. £275 plus post/packing. DST 100 HF vintage military RX, £140. Collect Cornwall or Bournemouth. M0BGA, rccry100@ yahoo.com.

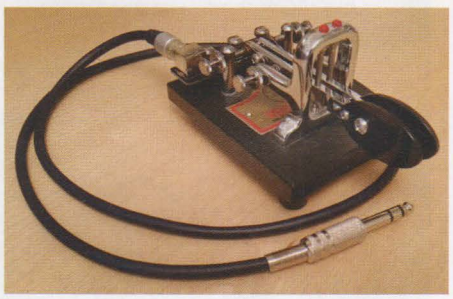
RELAX IN G3PAI'S COTTAGE in rural Burgundy. No charge – just donate what you feel able to Combat Stress (www.combatstress.org.uk). Space for antennas. See www.charity-cottage.org.uk for details. John, G3PAI / F5VLF, +33 386 20 25 50, rosemary.border@gmail.com (58800 Cervon).

SILENT KEY SALE. Kenwood World Clock and ACOS 36 crystal mic. Offers. Numerous valves also offered (due to exceptional circumstances, a copy of the list has been posted on the RSGB website at http://rsgb.org/main/files/2017/03/Valves.jpg). Pam Haynes, 01604 621 262 (Northampton).

SK EQUIPMENT SALE by family – includes Yaesu FTDX5000MP/SM5000, Yaesu Quadra linear amplifier, a number of other HF transceivers of assorted vintage, Tokyo High Power 2m linear, assorted power supplies – including one suitable for aforementioned 2m amp, many other station accessories. Most items have original packaging. Online list viewable at https://goo.gl/4wKUIM and equipment is located in North East Cheshire. Contact juliet.brough@googlemail.com.

SONY ICF SW55 receiver with case & power supply, £100. Sony ICF SW100E receiver, £35. Sony AN102 antenna, £20. Kantronics KAM XL modem, £50. All boxed little and used. B2 transmitter, single coil, offers. Tony, G4KHT, 0748 065 1045, tonylord75@outlook.com (Cottingham).

TENNADYN 6-ele log Yagi, 10/20m, £200 ono. GW3NAS, 01545 581 108 (Wales).



VIBROPLEX 'STANDARD' iambic paddle, in black, fitted with the G3LIV dedicated cable set. Unused gift, mint and boxed. Current RRP for the pair is £190. £95 plus carriage. David, G5HY, 0791 261 9001, david@g5hy.com (nr Ringwood, Hampshire).

WESTERN HF 10. Ideal small garden wire dipole only 67ft long. 160 – 6m. Coax fed. Extremely well made. See ad in classified ads in *RadCom*. Bought but never erected. Cost £75. Sell £38 plus £4 p&p. John, G3EGC, 01204 301 502, jvhoban@gmail.com (Bolton).

YAESU FT-1000 transceiver in excellent condition. It is fitted with optional 2kHz SSB filter. Complete with mic and instruction manual in original packaging. Prefer collection from near Dorking, Surrey or carriage by arrangement. £699 or near offer. George, G4CMU, 01306 631 115 (Newdigate).

YAESU VX-6E 144/430 handie with original packaging and handbook. As new condition. Comes complete with unused Yaesu accessories: in-car charger, leather case, external DC cable, speaker-mic. Diamond MR77s mag mount and dual band whip included. £110 plus delivery. John, G6BJQ, 01458 445 909, hantek53@hotmail.co.uk (Walton, Somerset).

WANTED

8 PIN DIN PLUG to fit Trio TS830 transverter input socket. Can anyone help? Mike Ayres, 01249 443 037, g4oqg@hotmail.co.uk (Wiltshire).

ACOUSTIC COUPLER MODEM. The type that has two cups to accept telephone handpiece and a serial (usually RS-232) interface. Working or not. Godfrey, G4GLM, 020 8958 5113, cgmm2@btinternet.com (Edgware).

HANDS ELECTRONICS RMX10A build instructions needed to finish a project. NOT the RMX10, I need the 'A' version. If you have any unused component packs or related kits, please get in touch. Simon, 0786 089 2222, simon@m5poo.co.uk (Corbridge).

ICOM A25 & A35 PREAMP. Comet CF-BPF2 2m bandpass filter. Icom UT-50 tone encoder. Julian, M0IPU, 0207 112 5119, iulianp@msn.com (NE London).

ICOM AH703 ANTENNA Peter, G7AGB, 01202 695 350, rothwellp@yahoo.co.uk (Wimborne).

ICOM IC R7000 receiver in good working order. Brian, GW0GHF, 02920 703 429 (Cardiff).

MANUAL & SOFTWARE FOR REVOX H210 TERMINAL, a 2 way IR link. Also, has anybody got a switch tuned crystal controlled FM Band 2 receiver they are willing to sell, Such as *Wireless World* July 1964 or September 1965 or even a Jason kit? Peter Dorey, 01202 578 814, peter.dor3ey@yahoo.co.uk (Bournemouth).

MARCONI MARINE (MIMCO) LIFEGUARD N AUTOALARM and/or Marconi Marine AKD N Auto Keying Device. Must be in reasonably good cosmetic condition. Jonathan, M0ZGB, 0789 409 0423, m0zgb@btinternet.com (Swindon).

QSL STAMPS ON QSL CARDS. Before about 1990 some QSL bureaux issued stick-on QSL stamps for verifying payment of QSL fees. Stamps are usually on the back of cards. Bob Vernall, ZL2CA, vernall@xtra.co.nz (New Zealand)

SPECTRUM ANALYSER ANRISTU MS610 B. Dead one wanted for spares to get one working. Mike, G3TOI, mikenicholas888@btinternet.com (Bournemouth).

TGM MQ-34SR ANTENNA. Roger Dunnaker, 2E0SIP, 0121 525 7535, rdunnaker@gmail.com (West Bromwich).

UP FOR GRABS

FREE – ALPHA 91β LINEAR AMPLIFIER. HV transformer fault, has been used for 10 years on an outboard transformer (included). Control circuit fault. Two good valves 4CX800A/GU74b. Beautiful quality high power components. Must be collected, weight 30kg. Manual and circuits. John, G3HTA, 01392 773 333, art@hta.eclipse.co.uk (Crediton, Devon)

FREE TO GOOD HOME, service manuals for Trio TS 520SE SSB TX-RX and Trio DG 5 digital display. John Saunders, EA5ARC / G3OLU, 0034 966 87 84 86, johntsaunders@hotmail.com (Benidorm).

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

2 APRIL

HACK GREEN HANGAR SALE

Hack Green Secret Nuclear Bunker, French Lane, Nantwich, Cheshire CW5 8AL

Doors open 10am. Sale of amateur gear, electronic equipment, comps, military radio sets and vehicle spares. Refreshments are available on site. More details from Lucy Siebert on 01270 623 353 or by email to lucy@hackgreen.co.uk.

9 APRIL

NARSA EXHIBITION (Blackpool Rally)

Norbreck Castle Exhibition Centre, Blackpool FY2 9AA

There is car parking at the venue and a talk in station. There will be trade stands, a Bring & Buy, special interest groups and an RSGB bookstall. Doors open 10.30, or 10.15 for disabled visitors. Dave, M0OBW, 01270 761 608, dwilson@btinternet.com [www.narsa.org.uk].

23 APRIL

33rd YEOVIL QRP CONVENTION

Digby Hall, Hound Street, Sherborne, Dorset DT9 3AA

There are disabled facilities. Doors open from 9.30am to 3pm. There will be trade stands, a Bring & Buy, RSGB bookstall and stands for RSARS and RAFARS. A programme of talks will take place on the day. Refreshments are available on site. Details from Bob Harris by email to wjh069@gmail.com [http://yeovil-arc.com/qrpconvention].

30 APRIL

CAMBRIDGE REPEATER GROUP RALLY

Foxton Village Hall, Hardman Road, Foxton, Cambridge, Cambs CB22 6RN

Doors open at 9.30am and entry is £2. There will be a talk in station and car parking is free on site. There will be trade stands, a Bring & Buy, car boot area and RSGB bookstall. The usual burger van will be in attendance. Contact Lawrence, M0LCM on 0794 197 2724, email rally@cambridgerepeaters.net [www.cambridgerepeaters.net].

30 APRIL

WEST LONDON RADIO & ELECTRONICS SHOW (Kempton Rally)

Kempton Park Racecourse, Staines Road East, Sunbury on Thames TW16 5AQ

There will be a talk in station and free on site car parking. Doors open at 10am, or 9.50am for disabled visitors. There will be trade stands, a Bring & Buy, special interest groups, lectures, a raffle and on site catering. Contact Paul, M0CJX on 0845 165 0351, info@radiofairs.co.uk [www.radiofairs.co.uk].

SPECIAL EVENT STATIONS

The list of Special Event Stations for April appears on page 87.

SILENT KEYS

We regret to record the passing of the following Members.

This list includes Silent Keys we were unable to record in March. We apologise unreservedly for any distress this delay may have caused.

Name, callsign	Date
Mr J J Seymour, G0CWK	24/01/2017
Mr G P McConnell, GW0DIB	7/11/2016
Mr C D Shearing, G0KVX	19/02/2017
Mr J G W Wintle, G0UJW	30/12/2016
Mr K Wilkinson, G0VKW	28/12/2016
Mr J Dale, G2DSY	30/2/2016
Mr J G Holland, G3GHS	7/10/2016
Mr T C Bryant, GW3SB	30/12/2016
Mr G S Garrett, G3IJW	28/11/2016
Mr H E Smith, G3IVF	30/11/2016
Mr A E Trigell, G3JAF	12/12/2016
Mr A Wilson, G3JHS	01/2017
Mr M Sparrow, G3JKN	13/01/2017
Mr J A K Pitcher, G3JNI	02/2017
Mr D G Radford, G3KMY	26/12/2016
Mr P N Ackley, G3LRP	22/12/2016
Mr D L Jones, GW3LYF	04/02/2017
Mr J H Moxey, G3MOE	21/01/2017
Mr J H W Bolter, G3NNY	19/02/2017
Mr J D Peters, G3VMJ	31/12/2016
Mr P B Jackson, G3WQ	07/01/2017
Mr J R Jardine, G3XJY	
Mr R F Allenet, GJ3XZE	17/01/2017
Mr S H Bassford, G3YZB	12/2016
Mr P R Hawes, G4CKW	21/12/2016
Mr H H Exley, G4FOT	07/02/2017
Mr D S Powis, G4HUP	09/02/2017
Mr J A Welsh, GI4JXM	29/01/2017
Mr C A Gove, GM4LCJ	02/02/2017
Dr P J Walker, G4PLW	07/11/2016
Mr H A Kemp, G4TMO	03/12/2016
Mr W Thompson, GI4UUC	03/12/2016
Mr B J Cowley, G4WDH	05/11/2016
Mr D J Palmer, GW4XMV	24/02/2017
Mrs M A Newnham, G6NZ	22/12/2016
Mr T Parsons, GW6XPO	18/01/2017
Mr D Hulin, GM6HGF	01/2017
Mr L J Gooch, G6PTI	30/11/2016
Mr A Phoenix, G7CBR	01/02/2017
Mr B R Wallace, G7MVN	04/02/2017
Mr P C Dunstan, GW7UHM	27/07/2016
Mr A Fraser, G8PWX	19/01/2017
Mr G R Powell, M0AKA	01/2017
Mr J C Symons, M0GUN	03/12/2016
Mr A Stromstedt, M0GZX	27/01/2017
Mr G R West, M1AUY	16/02/2017
Mr D Atkinson, M6NTZ	23/12/2016
Mr W Eden, M6WME	01/01/2017
Mr D McCarthy, 2E0DYK	19/02/2017
Mr J C H Hammond, 2E0HMD	01/01/2017
Mr S J Harrison, 2E0NKF	31/12/2016
Mr J H Lindeboom, PA0HLT	
Mr M J Miller, RS301784	03/02/2017
Mr R E Haighton, VE3FRH	02/12/2016
Mr R A Swain, ZL1RA	04/10/2016

Club of the year

2nd place winners

2nd place small club

Leiston Amateur Radio Club is based in Region 12 and is known locally as an open and friendly club, with a very diverse range of interests amongst the members. A 'buddy' scheme exists so that the newly licensed (and others) can seek assistance at a level that suits their needs.

They ran a successful Intermediate course and used the Bath Distance Learning scheme to teach the Advanced candidates along with face to face tutorials and a local exam. In addition they also work with the local ATC Squadron (432) in Woodbridge, training some of their cadets for their Foundation licence.

Both special events in 2015 were community outreach events – the Brundish Village Green fete and the 'Final Fling' steam day put on at Longshop Museum. At the end of the year the club supported the first Suffolk RED (Radio and Electronics Development) evening. This is aimed at the wider technical interest community, although rooted in amateur radio.

For the last two years LARC has been running a VHF activity contest locally on 2m FM. This has run for nine sessions each year, one per month, on the 4th Tuesday. It was started as a local fun and operator skills development event, but has attracted interest across East Anglia. They have been working with other clubs locally to widen the sphere of operation. In 2016 it will become the Leiston Co-ordinated Club Contest, with participation at club level from Felixstowe (FDARS), Colcester (CRA) and Medway (MARTS) clubs and the rules have been modified to make it a dual band (2m and 70cm simplex) event.

2nd placed large club

Hilderstone Radio and Electronics Club runs a regular programme of training at all levels with six members achieving their Foundation licence in 2015. The club supports them following their exam success and ensure that they make full use of their callsign by getting on the air. Some have progressed to the Intermediate level and a buildathon making the RSGB PSK 31 receiver enabled them to complete their Intermediate practical project. The students at the University of Kent at Canterbury continue to incorporate amateur radio in their Tinker Society. They have called on the club for occasional advice.

Special event stations aim to educate the public in radio communications as well as involving members in a team effort and some have become annual features. During SOS Radio Week at Margate Lifeboat station, GB1MLS raised £252 for the RNLI. The Margate Sea Cadets had fun operating as well. Thinking Day on the Air with the local Brownies saw them talking on the air using GB2TBU, having fun looking for the hidden fox transmitter and trying their hand at sending and receiving Morse. GB2WM from The White Mill saw many visitors watching amateur radio in action generating much interest with the public. Museums on the Air takes place at the Spitfire Memorial Museum where GB2MSM saw visitors sending a greetings message.

The club joined Bredhurst Receiving and Transmitting Society operating GB75MQ on the Medway Queen Little Ship to mark the 75th anniversary of the Dunkirk evacuation, Operation Dynamo. In August International Lighthouses and Lightships weekend was another successful special event at the North Foreland Lighthouse GB0NFL.

A new event was International Air Ambulance Week with GB1KSS for the first time at Manston Spitfire Museum. They helped a local astronomy group celebrate World Space Week with GB2WSW at the Thanet Observatory, Monkton Nature Reserve. Finally, in December, GB15YOTA operated for one day at Wellesley House school in Broadstairs. In addition, they also had various radio communication activities such as fox hunting, Morse code, PSK31 and using PMR radios. The pupils had a great time learning about radio and, in the evening, a Brownie group visited because they enjoyed Thinking Day so much earlier in the year.

Hilderstone R&EC has worked with local school children including an ISS contact.

National Club Of The Year

Principal Sponsors

WATERS & STANTON

Leiston ARC is known as an open and friendly club.

The highlight of the year has been the cooperation with Wellesley House school in Broadstairs, leading to their shortlisting as one of the ten schools chosen to have a chance to speak to Tim Peake on the International Space Station. The club assisted them with the application and is now helping them to prepare for the possible amateur radio contact. Some members are running a Space Explorers club where the pupils learn about Space and amateur radio. Three pupils were being prepared for the Foundation Licence examination. The radio contact has generated a lot of interest in Thanet and the school featured on local television BBC South East and ITV Meridian on the day of Tim Peake's launch.

The club sebds regular reports with photos to the two local newspapers, which has resulted in several members returning to the hobby after reading the interesting reports. Some members manned a stall advertising amateur radio at a Thanet Community Silver Sunday event where local groups showed what activities are available for retired people. RSGB leaflets and club information were handed out to many interested visitors.

radcom@rsgb.org.uk

NATURE'S WONDERS

Glyn Jones, GW0ANA

Here's one of 'Natures Wonders'! My end fed turned into a cobweb antenna. I covered the balun with a plastic bag temporarily.

TIME TO GET LICENSED

Jeremy Harmer, M6IGP

Ever since I joined the RSGB in 1975 I have been planning to take the exam and get on the air but life kept getting in the way. Now the kids are at university and my career is nearly over I have time, but, sadly, not as much health. I now have a severe hearing problem leaving me with sometimes S9+ tinnitus both sides and what can best be described as multiple notches in my hearing spectrum that can make conversation very hard. Anyway, I've been into data modes forever so I thought how hard could it be as I do not need training, just the practicals and the Foundation exam?

And there is where the problems began. I try not to use the phone because it is very hard work for me. I tend to use email so I was rather glad to find that the nearest club had a website and published email addresses. But there was never a reply. OK, the *next* nearest club. Also no replies. Checking the numerous websites, I found they are mostly out of date, some by years. I looked further and further, taking into account the distance and ease of travel, still with no replies, and eventually gave up.

But my failure to find anyone to talk to was bugging me. It was an email to the RSGB that turned the situation around. From there, the exams people kindly put me in touch, by email, with a club actually just outside my original search area. After clocking up 150 miles in three trips I passed the Foundation exam and got my callsign just before Christmas.

This experience makes me wonder how many other potential new licensees simply give up after failing to communicate with their local clubs using methods other than the phone. Many club websites are woefully out of date. This is your shop window, and while I realise everyone is a volunteer I have seen websites still advertising 'future' events dated 2013. I must add that some club websites are right up to date and clearly engaging with their audience.

My thanks to Martin and all the great guys at Halifax & District ARS, and to the RSGB's exams department for finally getting me on the air.

CATCHING UP

Terry Blackmore, G1XXV

At the beginning of 2016 I restarted amateur radio after over a 20 year layoff. During this time there have been massive changes to the hobby. I read all the articles in *RadCom*, even if I have no intention of doing that part of the hobby.

One thing I often find, not having taken part in the article being described, that there is always one part of the article to which it's practically nigh on impossible to follow without 'hands on' experience. It's OK if you're well versed in the subject. I've always looked at manuals and instructions as being written by an expert for another expert. At 72 years of age it's a long hard slow slog catching up on those missed 20 years.

MORSE KEYS

Mike Nicholas, G3TOI

Well said Ray, G4OWY (January Last Word, page 94). Sums up amateur radio today very well. The skill of CW is lost, as are so many other skills with the use of computers.

On the subject of computers, data transmissions and 'RTTY', how many amateur operators today know how a teleprinter works, or indeed what one is? Good to hear there are some out there who are keeping true amateur spirit alive.

Rich Langford, G4FAD

I always look forward to reading letters from Ray Howes, G4OWY as usually they are of a very high standard but I am afraid to say his letter in the January *RadCom* was not in his usual class. Ray seems to make a basic mistake about the Morse code, alleging that it is only read above 20 wpm by some sort of computer. This is far from the truth.

There are many operators who regularly have contacts above 20/30 indeed 40 wpm on the bands and find this quite enjoyable to do, not because they wish to show off but because they enjoy their hobby and enjoy learning the skill to be able to do it just for its own sake.

When you are first learning how to send and receive Morse code, of course it is hard work but once you get to read over 20 wpm or so you learn how to read in your head and this means that you are not constantly writing or using the key and just sitting back and enjoying the conversation and making odd notes of names, QTH etc.

Come on in Ray and join us, you will have a lot of fun and meet a lot of good people who will be only too pleased to help you just for the sheer fun of it all. It has never been more easy to get the Morse reading speed up than now with free downloads on the internet that can be put onto an MP3 player and carried around at all times. I find waiting rooms or walking the dog great for practice.

Just take a listen on the bands to the joyous QSOs going on and the skill and dedication of the operators and wonder at the ingenuity of man using tones to communicate across the world – truly a wonderful part of our hobby.

INFORMATION PLEASE

John Brady, MM0BIR

I am trying to find more details on an unusual derelict aerial that appears originally to have been installed in the 60s by the Post Office (now BT). A description and photographs can be found at https://boghall-radio-masts.blogspot.co.uk/

Any comment or suggestion that might further help in revealing the purpose and history of this installation would be welcome.

BUYING OVERSEAS

Robin Ayres, GU4ASO

Reference the letter 'Buying Overseas' in the January *RadCom* by Mike Yorke, G6WBX.

This is ever so easy now by using 'Transferwise'. I use this for personal and business transactions for buying in foreign currencies and accepting sterling payments from overseas customers. Simple, quick and low cost. Saves a fortune on regular bank charges! More information is at https://transferwise.com/

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ACRONYMS

Bob King, G3ASE

Scanning through March 2017 *RadCom* I was struck once more by the liberal use of, and often unexplained, acronyms. The cover obliging states the meaning of RSGB, but inside we are not so fortunate. Yes, the contents are intended for semi professional radio 'amateurs'. But we have seen mention of the intention to attract a wider, and younger, readership.

With the plethora of acronyms, I wonder if I am alone in sometimes wondering what is going on or is it just my age? On page 14 is a review with 6% acronyms (none explained). The interesting account of caving communication does explain WSPR part way through the article. Not so the review of the Kenwood TH-D74E where APRS could stand for almost anything due to the lack of other information. Of course, if you don't know the meaning of this 20 year old acronym, and a few others, reading the review is rather pointless. I wonder if every licensed amateur could say what EMC stands for straight off. If every article had a box interpreting the acronyms it would make reading cumbersome especially where the box proved larger than the article.

If I may tread on toes.

Throughout most issues are pictures of men (and rarely women) and sometimes a few youngsters, sitting in front of several thousand pounds worth of equipment with a caption implying 'radio amateurs'. They may well be but this is not what the photograph indicates, rather it is illustrating the wealth of the 'amateur', or in the case of the youngsters, the affluence of the parent.

The qualifications for getting on the 'air' appear to be a deep pocket and an acquaintance with operating procedure and licensing conditions (soon forgotten) plus a knowledge of AC theory that can be very demanding according to level. However the chaps in the Far East have taken care of the equipment design so it might be more instructive to examine the students' knowledge of acronyms. Unless, of course, they find the technical side fascinating and study it for their own satisfaction.

We usually explain acronyms as we go along, particularly in technical articles, but we do assume a certain base level of knowledge – as G3ASE points out, APRS is a 20 year old acronym; WSPR has been very widely reported on (and used!) for nearly ten years. The New Product announcements (page 14) are not *"reviews" and are sourced from manufacturer/ retailer press releases – again, we reasonably expect that people will understand common acronyms like "SWR", "MHz", "Wi-Fi", "GB" and so on, in context. But we are always open to suggestions: if enough people want every single abbreviation spelled out in full everywhere we can do so, although I suspect many might consider this a waste of valuable space. What do other readers think?*

Deep pockets are not always needed to get on the air: in January 2016 I reviewed a transceiver kit that cost under £3 including delivery. Yes, £3.
Giles Read, G1MFG,
RadCom *Technical Editor*

CONFUSED!

Guy Simmons, G4DWV/4X1LT

In these days of many amateur radio outlets with the exactly the same prices on many products, one does have to wonder if there is a really free competitive market. But that is not the main reason for my letter. In light of there being price parity, one has to look for other reasons to choose a retailer. In my case, the one that offers a discount always gets my money. That is the retailer that always gets my first call.

Anyway, enough waffle. The reason for writing is I would like for somebody to explain what 'advantage', if any, does buying from an 'approved importer' confer?

THE TERM 'AMATEUR'

Bill Kitchen, G4GHB

I must agree with Richard, MOBGA (March) when he says about using the word 'amateur' to describe our hobby. Whilst a lot of people are amateurs in the hobby rather than having a professional connection work-wise, I think to many other people it does conjure up an image of amateurishness. Even worse is 'ham', as in ham-fisted. Perhaps we should come up with a new name for it.

I enjoyed Tony Hancock's *Radio Ham* on TV but how many people thought that's how we are?

It's unfortunate that it was called amateur radio from the beginning, but it does let me tell two stories about it.

Back in the 80s when CB was in full swing I was in a pub and mentioned amateur radio when someone said, "You're only a radio amateur but he's a CBer", pointing to someone else. Oh dear, never mind!

Last year, I was talking about Morse keys and said a modern key goes sideways. When my companion's girlfriend walked up and said, "That's FM" I said it isn't but she insisted it was. I said I could do the same thing with two bits of wire and it can't produce FM. She looked at me as though I was daft and said she was an electronics technician and again insisted it was FM, then walked away shaking her head.

Electronics technician maybe but clearly she doesn't know about radio. Why didn't she ask me what on earth I was talking about when I said it can't be FM and bits of wire? Half a conversation overheard and assuming sideways must be FM.

Interestingly, the Irish regulator ComReg specifically says in its Amateur Station Licence Guidelines *that "The term "Amateur" as it is used in this regard does not necessarily reflect the skills of the participants, which are often quite advanced, but rather it denotes that communications under an Amateur Station Licence are not permitted for commercial purposes or monetary gain." The term [licensed] "radio experimenter" has also been used in various places, however the Radio Regulations and international treaties specifically identify our hobby as the "Amateur Service" (and "Amateur Satellite Service").*

IN TRAINING

Terry Roeves, G3RKF

Daphne is our Hearing Dog puppy in training. (The charity is Hearing Dogs for Deaf People www.hearingdogs.org.uk). Here she is helping me celebrate working VP6EU. She may look laid back, but she takes her listening very seriously. Her favourite mode is SSB, CW still being quite difficult. We will keep persevering! Her contribution to my entry for Tall Trees Contest Group in the 80m CC is questionable. My scores have dipped. So if my audio sounds odd at times, it's probably Daphne QRM.

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