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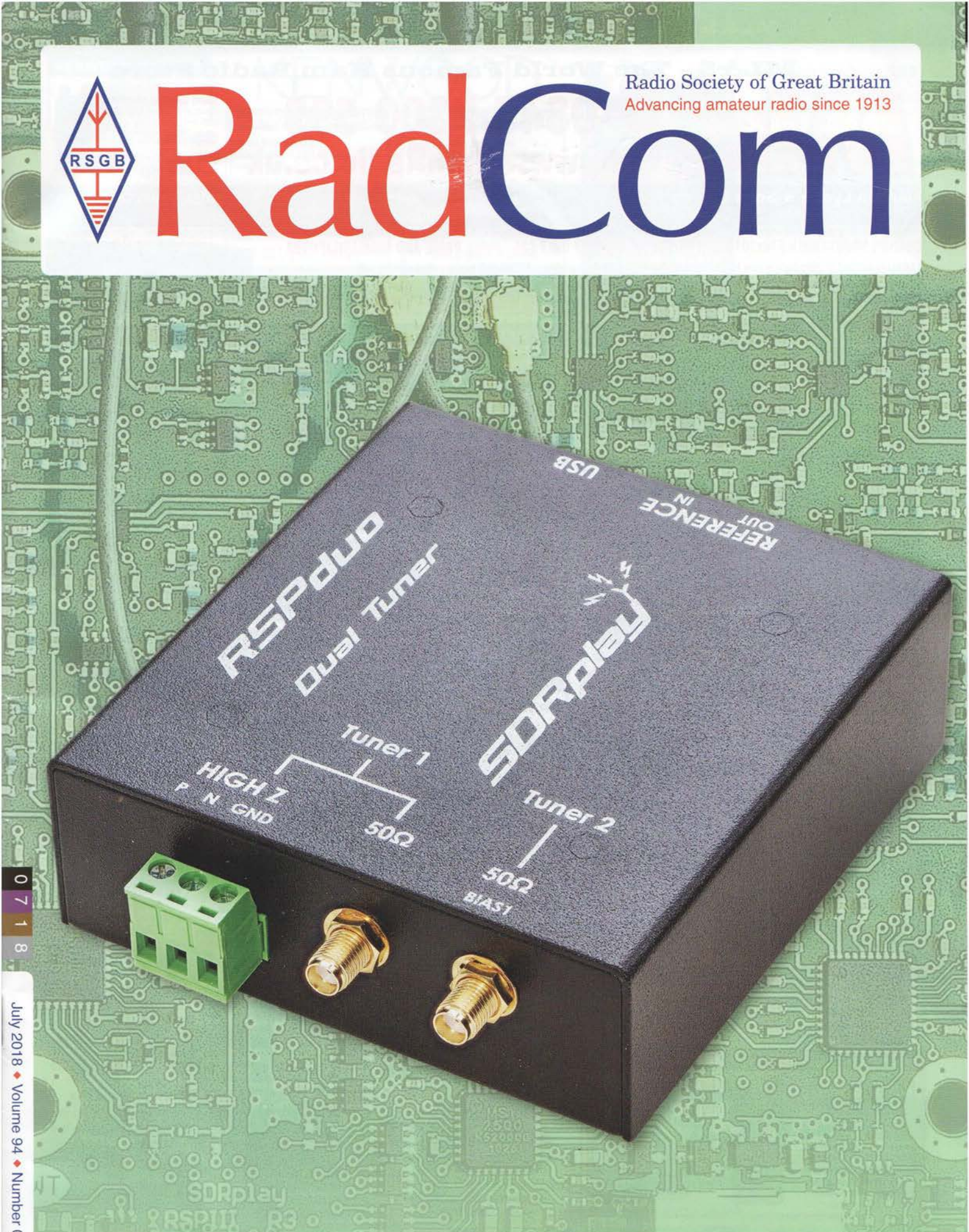

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KENWOOD

KENWOOD TS-590SG

160-6m Base with ATU. Upgraded version HF & 6M FULL DSP Base Transceiver

CALL FOR PRICE

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200W HF/50MHz Base Station Transceiver with Dual TFT Display and Dual Receiver.

CALL FOR PRICE

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NEW ICOM IC-R8600

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NEW

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HF/50MHz Base Station Transceiver IN STOCK NOW

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ICOM IC-2730

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FREE MBF-4

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ICOM IC-7100

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ML&S: £999.95

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ICOM ID-5100

ML&S: £574.95

Latest 2/70 D-Star Touch Screen Transceiver from Icom. Bluetooth connectivity and second station control through an Android device.

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HF through to 23cms Base Transceiver.

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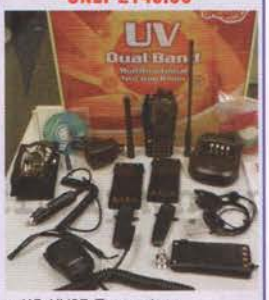

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- Battery eliminator
- Manual
- Wrist strap
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WOUXUN KG-UV950PL

NOW WITH 4M!

ONLY £289.95

Includes FREE programming cable and software for only £289.95.

Up to a full 50W output on 4m, this unique QuadBand mobile/base from Wouxun exclusive to ML&S. Bands covered are 4m / 6m / 2m / 70cm.

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VHF/UHF DMR Handheld

FREE PROGRAMMING CABLE AS STANDARD

The AnyTone D868UV radio is a VHF and UHF radio with both Digital DMR (Tier I and II) and Analog capabilities. It offers a total of 4,000 channels (Analog and Digital), 10,000 Digital Talk Groups, and up to 150,000 contacts, as well as multiple DMR ID numbers (Radio ID's) for a single radio.

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5W Dual Band DMR Handheld.

£159.95 including free shipping.

TYT MD-9600

New improved model now in stock.

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NEW

Twin Band 2/70, 30W 250mems, full feature.

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Dual-Tuner wideband full feature 14-bit SDR, 1kHz to 2GHz, 10MHz of spectrum visibility. Simultaneously monitor 2 separate 2MHz bands of spectrum between 1kHz and 2GHz. 3 software selectable antenna inputs, & clocking features ideally suited to industrial, scientific, Ham & educational applications. Windows 10.
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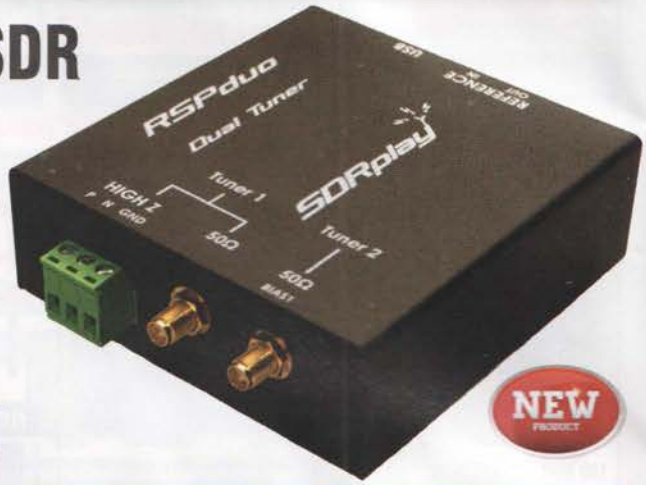

NEW ANAN-8000DLE

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HF & 6M 200W SDR
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ADD PiHPSDR CONTROLLER TO ANAN-7000 AS A PACKAGE & SAVE £100!! £3399.95

Click! www.HamRadio.co.uk/7000DLE

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NEW SDRplay RSP-1a

NEW RSP1 REPLACEMENT

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SDRplay

Click! www.HamRadio.co.uk/sdrplay

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- Up to 10MHz bandwidth
- Low noise floor
- Simple USB interface (type B socket)
- Powers over the USB cable
- SDRuno - World class SDR software

RSP2: £154.95 RSP2PRO: £189.95

SunSDR-QRP

Click! www.HamRadio.co.uk/SUNsdrQRP

Designed and built in Great Britain

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

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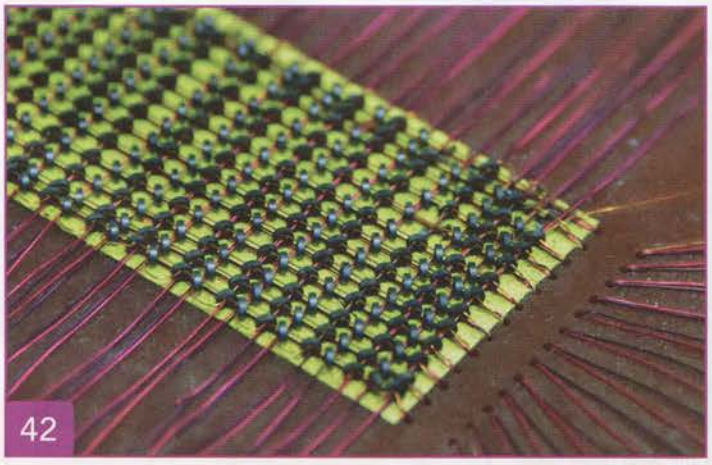

Technical Features

Features

Cover image: The RSPduo twin-tuner software defined radio from SDRplay. Photo by Mike Richards, G4WNC, design by Kevin Williams, M6CYB.

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

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The RSGB Board – stronger strategy links and responsibilities

The RSGB's Strategy 2022 has been in place for a year now and is already affecting various aspects of what we do. With major changes to the Board we now have three new Directors, including a new Chair, and we also have a new President. There has also been a major rethinking of the Volunteer Leadership Team. Taken together it seemed a good opportunity for the Board to reflect on how its own organisation could be improved to deliver the Society's strategic priorities. These priorities are:

- **Growth** – grow and develop amateur radio
- **Participation** – support and encourage active participation in amateur radio
- **Research** – promote active involvement in research and technical development
- **Diversity** – encourage and respect the full range of amateur radio activities, in all its diversity
- **Membership** – increase the proportion of radio amateurs who are members of the RSGB
- **Recognition** – support, encourage and recognise our volunteers and staff
- **Organisation** – ensure that the RSGB is an effective, efficient and flexible organisation that works with and listens to our members, clubs and special interest groups to meet the changing needs of the amateur radio community.

This is an ambitious list but you might notice that these priorities depend on one another. For example, **Growth**, **Participation** and **Diversity** overlap in various ways. Membership depends at least in part on having people who **Participate** in amateur radio; it benefits from **Recognition** and also requires the RSGB to be well-organised at all levels.

The Board believes that the best way to ensure progress in all the priorities is to have one Board member take the lead for each priority. This ensures that decisions taken by the Board will have been reviewed for their full strategic potential. The aim is to encourage thinking that goes beyond our continuing roles as Board Liaison Members for Committees. It will allow us to create initiatives which target certain priorities in a more imaginative way. For example, the Training and Education Committee and the Youth Committee recently cooperated to have a presence at the UK Maker Faire 2018. This directly addresses **Participation** and **Diversity** but also feeds in to **Growth**. In future, each Board member will be able to look at any initiative to see what we can improve to get the most benefit for their Strategy priority.

Board Directors and the strategic priorities they lead:

- Ian Shepherd, G4EVK: Recognition
- Len Paget, GM0ONX: Diversity
- Simone Wilson, M0BOX: Membership
- Mark Jones, G0MGX: Growth
- Philip Willis, M0PHI: Organisation
- Stewart Bryant, G3YSX: Research
- Keith Haynes, G3WRO: Participation

The Society already carries out and supports a wide range of activities that fit within its Strategic priorities. However, the Board will now have a better overview of all of these and, together, will be able to offer a more joined-up approach to achieving the Society's goals. If the Board decided to launch a new project to boost the growth and development of amateur radio, it could approach this in a different way, precisely because there is an established amateur radio community. For example, the RSGB Convention includes lots of talks covering aspects of amateur radio that you may not yet have tried. As a result, many attendees will be inspired to try something new. This is **Diversity** in action but, with additional support, it could also allow the new experience of those delegates to feed into the clubs. This would address **Participation** and, by encouraging more people to train and join, also addresses **Growth**.

"ensures that decisions taken by the Board will have been reviewed for their full strategic potential"

If we foster initiatives which bring together the expertise of a mix of our Committees, our Honorary Officers and our Regional Teams, while ensuring that what we do specifically addresses some of our Strategic Priorities, then the very substantial effort of all of our volunteers will be amplified for the future benefit of amateur radio as a whole.

Philip Willis, M0PHI, RSGB Board Director

RSGB Amateur Radio Observation Service

Recently the RSGBs Amateur Radio Observation Service (AROS) has received reports of people using 2m FM to exchange work-related messages. Typically these are people who drive some sort of a vehicle contacting their offices. These all appear to be in the south of England. In some cases they are straightforward intruders, but in others what appear to be legitimate amateur callsigns have been heard. Clause 1 of the Amateur Licence specifically prohibits usage for "commercial purposes of any kind". in this respect our licence is much more restrictive than, for example, CB, PMR446, or any form of commercial PMR.

Another common theme in reports received by AROS is stations failing to identify clearly with their callsigns. The onus is on the licensee to ensure that their station can be identified quickly if, for example, a technical fault is resulting in interference to an important service. So the full callsign should be given, not just the suffix, clearly and distinctly, preferably using phonetics on voice modes. The recommended phonetic alphabet is given in note (b) of the licence.

Separately, we have received a letter from John, G0KRR, who believes his callsign has been pirated "for some considerable time". He asks us to spread the word that although he is still interested in our hobby he has not transmitted for at least fifteen years.

Four new Regional Managers

We're delighted to welcome

John Pritchard, MW0JWP
(previously DRM 112) **as RM6;**
Keith Bird, G4JED
(previously DRM106) **as RM10;**
Martin Sables, G7NTY
(previously DRM112) **as RM11,** and
Peter Onion, G0DZB
(previously DRM123) **as RM 12.**

Our thanks go to Ceri Jones, 2W0LJC, Mick Senior, G4EFO, Pam Helliwell, G6FSP and Keith Haynes, G3WRO who supported radio amateurs in these regions for many years.

Legacy funds in action

RSGB General Manager Steve Thomas, M1ACB dropped into the ASRA Radio Rally in Glasgow on his way back from the Camb-Hams G3PYE/P DXpedition to Islay. At the rally he met David Searle from CQ Scotland, who was running a Buildathon with Mid Lanarkshire ARS. The RSGB Legacy Fund has supported CQ Scotland's innovative construction-led initiatives to draw young people to technology and amateur radio and it was great to see this in action at the Rally. The Buildathon also used soldering equipment funded by the RSGB Legacy Fund. The Legacy Committee is always looking for interesting projects which develop amateur radio and make it more accessible. There are guidelines and an application form online at www.rsgb.org/legacy-committee

RSGB Board roles

Each RSGB Board Director provides a liaison function between the Board and the various aspects of the Society's work. From this year, each Board Director will also take the lead for one of the Society's Strategic priorities: Growth, Participation, Research, Diversity, Membership, Recognition and Organisation. This ensures that decisions taken by the Board will have been reviewed for their full strategic potential. The areas have now been confirmed for the new Board – you can see the list on our website at **www.rsgb.org/board**

Board Director Philip Willis, MOPHI explains more about the Board Directors' strategic roles in this month's Strategy Editorial on P6.

NRC welcomes club visits

The RSGB's National Radio Centre Coordinator Martyn Baker, G0GMB gave an introductory talk about the NRC to the Milton Keynes Amateur Radio Club, MKARC. This was followed by an 'open door' session where the club members went to look at the facilities and operate the NRC station, GB3RS. The evening was enjoyed by all and, surprisingly, despite the close proximity, many of MKARC's members hadn't previously been to the NRC. Martyn hopes that this will be the first of a series of 'club visits' to the NRC. If your club is interested in arranging a visit, please email Martyn via martyn.baker@rsgb.org.uk

Photo courtesy of Andy Roberts, M0GYK.

Latest RSGB 2017 Convention presentation released

Software Defined Radio is not new but improvements in design and cost reductions mean that it is rapidly becoming mainstream technology for discerning radio amateurs. SDR is as much a disruptive technology as were the advent of semiconductors or synthesisers. It is said that in five years it will no longer be possible to buy a new radio that is not SDR. In his presentation "SDR – the station of the future", John Linford, G3WGV looks at what SDR offers us as radio amateurs and what our stations might look like in a few years' time. The presentation is available in our online video portal at www.rsgb.org/video

RSGB Privacy Policy

We have updated our Privacy Policy in line with the new General Data Protection Regulations (GDPR) that came into force on Friday, 25 May. You can find it on our website at www.rsgb.org/privacy-policy

Calcutta Key presented at Dayton

RSGB Board member Stewart Bryant, G3YSX is seen here awarding a glass trophy representing the RSGB Calcutta Key to Ron Cramer, KD8ENJ, who was representing the Dayton Amateur Radio Association. The presentation was in recognition of DARA's efforts in running Hamvention for so many years and making it the premier amateur radio event in the world. Stewart said: "The Calcutta Key is one of the top RSGB awards and is presented each year to a person or organisation in recognition of outstanding work associated with international friendship through amateur radio. This year it is awarded to the Dayton Amateur Radio Association, who, every year since 1952 have sponsored and organised the Dayton Hamvention. As you all know, this event brings in amateurs from across the world and welcomes participants in every aspect of amateur radio."

RSGB at Friedrichshafen

RSGB General Manager Steve Thomas, M1ACB said, "It was a busy Ham Radio 2018 event in Friedrichshafen and we welcomed members, visitors and other National Societies from around the world to the RSGB stand. RSGB representatives attended IARU briefings and ICQ Podcast interviewed Board Chair, Ian Shepherd, G4EVK and Youth Committee Chair, Mike Jones, 2E0MLJ."

Following the very successful Youngsters on the Air (YOTA) 2017 held in the UK that brought together 80 young people from 26 countries, IARU Region 1 YOTA 2018 will be held in South Africa. The YOTA flag was handed over from the UK to South Africa at Ham Radio 2018 in Friedrichshafen and, in doing so, marked the official opening of YOTA 2018. This year's YOTA will see participants taking place in a train-the-trainer event designed to show them how to create events for young radio amateurs in their own country.

QSL Matters

When did you last check your information at QRZ.com? Is your callsign accessible and the contact information correct? It would be a great help to our volunteer team if all QSLing Members would re-visit their web presence, ensure that their contact information and email address are current and their QSL preferences made clear. It only takes a moment to check. While you're at it, why not check some of the other online callbooks at the same time? None of these are run by the RSGB so we're unable to influence them in any way.

The Brazilian QSL Bureau has a new address for all cards in the ranges PP-PY and ZV-ZZ. It is now Liga de Amadores Brasileiros de Radio Emissão – LABRE SP, PO Box 79.473, CEP: 03089-970 São Paulo – SP, BRAZIL.

There are often changes to international QSL bureau information so it's a good idea to download a complete list of available bureaux at least once a year, as not all locations are covered worldwide. You'll find the list at www.iaru.org/qsl-bureaus.html

Congratulations

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

70 Years
Stoke-on-Trent ARS, G3GBU
Mr L Miller, G3YEQ
Mr D Smith, G4DAX
Mr MN Fagg, G4DDY
Mr W J Brooks, G4DTT

60 Years
Mr J R Shewan, G3UZB
Mr R Waterman, G4KRW
Mr G Peck, G4OIG
Mr DR Tanswell, G6LAU

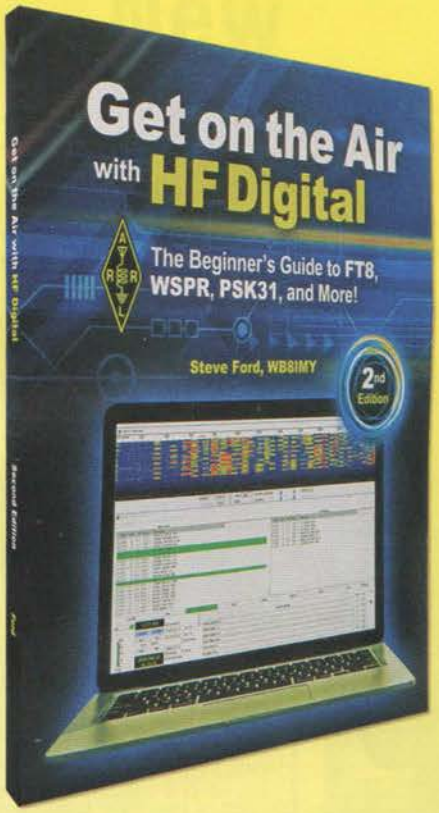
50 Years
Mr J Tournier, G3INZ
Mr H V Ashford, G3WGY
Mr A S Flather, G3XMK
J A Shepherd, G8BQA
Mr D F Gray, GJ3XOJ
Mr D J Long, RS30485
Mr W Grant, RS30501

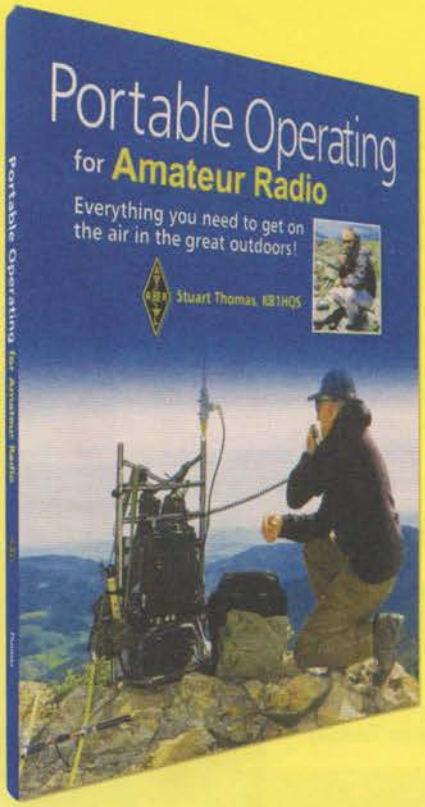
The RSGB welcomes to the RSGB family the following new Members who have joined their voice to ours, helping to keep the RSGB strong.

Mr P Krysiak, 2E0IWO
Mr B Fitchett, 2E0WEI
Mr R Scott, 2E1AQT
Mr P OHara, 2M0IPO
Mr O Bostrom, AB1TT
Mr A L Yessel, AB3CE
Mr M Crownover, AB5EB
Mr J Wilson, AC8NT
Mr B Slovick, AD0HI
Ms L MacLennon, AF1R
Mr R Gulley, AK3Q
Mr P Robinson, G0SDM
Mr P Devlin, G1SMP
Mr K Dearing, G3XVX
Mr D Madden, G4ZPI
Mr A Godbold, G6GIR
Mr G Cooke, G6LFT
Mr D Hall, G8CLT
Mr G Newstead, G8EKG
Mr D McKinney, GI4MXW
Mr H Mattinson, GM1CUC
Mr S Gruber, HB9FXL
Mr B Borsert, HB9QO
Mr R Meneghimi, IK3TCH
Mr R Blocksome, K0DAS
Mr D Buhrman, K0DSP
Mr P Stephenson, K0PWS
Mr J Lenahan, K0RW
Mr P Marinaccio, K1PJR
Ms A Slack, K2EZ
Mr R Schwartz, K8HEF
Mr S Lubbers, K8LX
Mr W Mathews, K8NQ
Mr E Abel, K8RCT
Mr M Kosta, K8VCP
Mr R Terrell, K9BCT
Mr D Gahimer, K9ZCE
Mr J Bowers, KA0SER
Ms A Rothcock, KB1PYV
Mr J Hein, KB36MD
Mr M Durket, KB6VN
Mr K Stanelle, KB9SNE
Mr D Robbins, KC2MB
Mr J Shannon, KC4WZB
Mr D Tracy, KC9RH
Mr J Wright, KC9WOM
Ms S Sims, KD0ODN
Mr M Ladd, KD2KOG
Mr R Anderson, KD87YO
Mr D Casler, KE0OG
Mr M Newhall, KE8CEI
Mr W Hill, KE8GGH
Mr R Ohrenberg, KE8GWX
Mr D Calloway, KE8IZY
Mr J Pandzik, KE9PK
Mr D Wilson, KF7Z
Mr J W Nollenberger, KG0AJ
Mr A Wicks, KG4ZSM
Mr M L Love, KG5MDL
Mr M Ostrowski, KI8IK
Mr J Novak, KK4QYM
Mr M Gunderson, KK6BXQ
Mr G Davis, KK6YO
Mr B Spangler, KN4ETD
Ms D Gordon, KN7NUR
Mr H Saethre, LA9LT
Mr T Witherspoon, M0CYI
Mr A Mills, M0IKU
Mr L Dettman, M0INM
Dr K J Singh, M0IOV
Mr P Johnson, M1BCV
Mr C Wilkinson, M6KZB
Mr A Bent, M6KZD
Mr S Kembrey, M6LPX
Mr R Phillips, M6NJJ
Mr P Austin, M6NLT
Mr P McGee, M6NXL
Mrs J Raynerd, M6OEY
Mr H Peare, M6OFK
Mr I Holden, M6OHD
Mr J Holley, M6OHT
Mr Z Mansell, M6OJV
Mr G Grace, M6RYT
Mr S Peare, M6UGF
Mr E Burford, M6XEB
Mr J Walker, M6XLE
Mr N Irving, M6XNI
Ms S Rogers, M6ZRJ
Mr A Cowan, MM6VPM
Mr J Toole, N1RU
Mr R Weidman, N3OAW
Mr K Nason, N4XL
Mr S Rainey, N6MVX
Mr M Schlesinger, N6NNI
Mr B Fitchew, N6VOH
Mr R Shaddick, N7BU
Mr M Lunati, N7OEI
Mr N Young, N8IJN
Mr P Andrews, N8NYI
Mr W Hannon, N8PW
Mr M Blake, N9KLM
Mr T Gahimer, N9WQO
Mr W Whitfield, RS317091
Mr R Young, RS317192
Mr D Munster, RS317215
Mr A Brown, RS317227
Mr R Wilson, RS317262
Mr L Rowe, RS317263
Mr A Lucas,RS317305
Mr D Marshall, RS317318
Mr M Groetz ,RS317372
Ms J Greer, RS317630
Mr G Broadhead, RS317791
Mr B Taylor, RS317806
Mr G Meadows, RS317808
Mr A Tyrrell, RS317810
Mr M Burden, RS317874
Mr C McConnochie, RS317926
Mr L Black, RS317931
Mr L Jones, RS317938
Mr D Franchino, RS317959
Mr P Dopson, VE3H2Q
Mr T Mauroids, VE3ODH
Mr K Clarke, VE7BC
Mr J Orleff, W0FAA
Mr S Goldsmith, W1HS
Mr P Erickson, W1PJE
Mr S Seidel, W2FCC
Mr W Gromen, W3WEG
Mr D Lynch, W4DBL
Mr J Perkins, W4SWV
Mr H Patterson, W5VY
Mr D Seckel, W8GWI
Mr D Suffel, W8HFJ
Mr R St John, W8RSJ
Mr T Ryan, W8SAI
Mr A Conn, W8XY
Mr M Lea, W9MRL
Dr L Plumb, WA2TZY
Mr M Mackey, WA3MMM
Mr V Klein, WA4THR
Mr R Phillips, WA9MTH
Mr C Agosti, WD8AXA
Mr R Landers, WI0T
Mr R Metcalf, WR9V
Mr T Graf, WV8TG
Mr J M Vazquez, XE1EFQ

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

Mr K A Jones, 2E0AWO
Mr J Cahill, EI6BT
Mr S Jeffery, G0LAP
Mr K Pay, G1EGE
Mr P Bruce,G1FJH
Mr D A Keable, G1ICA
Mr C Jeffery, G3JLK
Mr M Grindrod, G4EDY
Mr C Moulding, G4HYG
Mr I K Weston, G4UAQ
Mr J T Allsopp, G4YDM
Mr C Shroff,G6FZR
Mr N H Deacon, G7KMK
Mr J Batten, G8BIJ
Dr D R Kirkby, G8WRB
Mr E Smith, GW4VTG
Mr B Blain, K1BG
Mr J D Murray, K1NSS
Mr J Huggins, K8HUG
Mr B Knapp, K9MHZ
Mr W J Deegan, K9XT
Mr. K Seibert, KS8J
Mr D Gibbs, KT3E
Mr P Hayes, M0PIT
Mr M Lewis, M0XMX
Mr C O'Broin, M0ZCO
Mr D Willson, M3ITK
Mr J Mckie, M6MKM
Mr M Edwards, MI0GJN
Mr S Harvey, MM0HUF
Mr T Thomas, MW3VJN
Mr B Steffey, NY9H
Mr O Frederiksen, OY1OF
Mr J Checketts, RS195522
Mr R Kreuter, WA3ENK





NEW TITLES

Get on the Air with HF Digital

By Steve Ford, WB8IMY

Now including popular modes FT8 and WSPR!

The popularity of HF digital communications among Amateur Radio operators continues to grow rapidly. A few watts of RF power are all it takes to work the world – digitally! Written in an easy to understand style, this book will show you how to set up and operate your own HF digital station.

Fully updated, the second edition of *Get on the Air with HF Digital* is a step-by-step guide that'll get you started in the fascinating world of HF digital technology. Starting with the basics of build your own an HF digital station there is advice on the essentials: the radio, the computer and the device that ties them together. The book then moves on to discuss PSK31 for worldwide working with low power and minimal antennas and RTTY which for many is still the champ when it comes to contesting and DX hunting. The "WSJT Modes:" are explored in particular the newer and increasingly popular FT8 and JT65. MFSK and Olivia modes are not forgotten as these will still have you chatting when all others have given up. PACTOR and WSPR are also discussed in detail. *Get on the Air with HF Digital* provides instructions for configuring all these modes and how to get the best out of them.

Get on the Air with HF Digital provides readers with a practical advice on this fun and easy way to get on the air. If you want to start operating HF digital modes this is a great place to start.

2nd Edition, Size: 184x227mm, 144 pages
ISBN 9781 6259 5083 3
Non Members' Price: £22.99
RSGB Members' Price: £19.54

ARRL Portable Operating for Amateur Radio

By Stuart Thomas, KB1HQS

For many amateur radio stations are traditionally home based and associated with a table full of gear. However in recent years many have taken on the challenge of operating portable, away from home. A new generation of compact, full-featured, portable radios combines with modern battery technology to make it easier than ever to set up your station and enjoy amateur radio in the great outdoors. This book sets out to show what is possible and the fun to be had when operating portable.

With the increase in organised outdoor operating activities by clubs and award programmes such as SOTA, it's no wonder that more radio amateurs have been inspired to venture into portable operations. Anyone can give portable operating a try and this book shows that portable operators use HF and VHF bands, as well as SSB, FM, CW, and digital modes. There are chapters dedicated to organising your equipment, radios you can use, power sources, portable antennas, the on air activities and even a handy online resource listing.

This book provides something for everyone, if you want to activate from a picnic table at a nearby park, or a remote summit, *Portable Operating for Amateur Radio* offers a wealth of practical information to help make your portable amateur radio operations successful.

Size 208x265mm, 176 pages
ISBN: 9781 6259 5080 2
Non Members' Price: £22.99
RSGB Members' Price: £19.54

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

1000th Altberg SOTA activation

The 631m ASL summit of Altberg, in Switzerland, Summits on the Air (SOTA) reference HB/ZH-015, was activated for the 1000th time on 22 March 2018 by Juerg Allemann, HB9BAB. Over 960 of the thousand activations were by Juerg himself!

The only other SOTA summit in the world to be into four figures is The Cloud, G/SP-015, in North West England on the Cheshire/Staffordshire border. This has been activated for SOTA over 1450 times, with Tom Read, M1EYP responsible for over 1000 of those.

See www.sota.org.uk for further information about the SOTA amateur radio awards programme.

RSGB at the Palace

RSGB General Manager Steve Thomas, M1ACB, HQ PA Joy Burrells, M6LRM, RSGB former Chairman Graham Murchie, G4FSG and his wife Jenny (not pictured) were invited to a Garden Party at Buckingham Palace on Tuesday the 5th of June.

Blessed by good weather, they mingled with other guests and saw their hosts, His Royal Highness Prince Charles, Prince of Wales KG, Her Royal Highness Camilla, Duchess of Cornwall, GCVO and Her Royal Highness Anne, Princess Royal, KG.

NARSA Rally at Blackpool

The weather was kind to those travelling from far and wide to the Northern Amateur Radio Societies Association (NARSA) rally back in April. The myriad traders and private stalls, club stands and other points of interest were all in the main hall this year. One club exhibitor was the Vintage and Military Amateur Radio Society, VMARS, staffed by club volunteers. They displayed many items including an AN-GRC-9 with LV-80 linear amplifier, a WS19HP, WS18 and WS88 plus an early American tube tester. The highlight was a homebrewed QRO VFO-controlled AM transmitter by Bronek, MODAF, who went on to win the Constructors' Contest. *[There are more reports on the rally in Around Your Region – Ed].*

Members of VMARS and visitors gather at their NARSA rally stand.

News in Brief

SOTA-LINK is an experimental 'back-channel' to support SOTA activations. Devised and developed by Richard, G3HGI, it uses WIRES-X room 44050, which is connected to the Macclesfield System Fusion gateway MB6SO (144.8375MHz) and linked to the Brandmeister DMR server TG973, thus allowing access via DMR. Other modes may be added in the future. SOTA-LINK contacts are not valid for SOTA awards, but they can help set up contacts and aid safety.

Graham, G8NWC (RSGB DRM135 for Lincolnshire) and Andrew, G8BYB, Lead Trainer for Spalding DARS gave a presentation on amateur radio to the U3A. An audience of 150 was taken through the various aspects of the hobby including how to listen, how to get a licence, and the various bands and modes. Most were surprised at our hobby's diversity and the ISS provided a big focal point.

Nick Peckett, G4KUX was interviewed by his local paper about his amateur radio activities. The article shows our hobby in a very good light and can be seen on his Facebook page or tinyurl.com/G4KUX-paper

The FT8 Digital Mode Club (FT8DMC) was founded last July by Jo, OE4VIE and Hannes, OE1SGU/OE3SGU. It has grown to almost 5300 club members and there are over 7000 people on the Facebook group. The club runs an extensive programme of over 30 awards and so far over 28,000 have been given. All the awards are sent as PDF/JPG and are available free via UltimateAAC (see www.epc-mc.eu) using electronic log uploads (eg in ADIF format). Only contacts made in FT8 count for these awards. More information is at www.ft8dmc.eu

This edition of *RadCom* is more feature- and picture-led than usual because a key member of the editing staff is seriously ill. This has also had an impact on GB2RS and amateur radio technical support from HQ. We wish them a speedy and complete recovery. In addition to getting invaluable help from a number of other RSGB staff (and even former *RadCom* Editors) we have now recruited a part-time temporary assistant who should help us provide a nearer-to-normal service whilst our colleague is poorly.

Special Event news

GB5RC will be run by the Martello Tower group from the Radio Caroline ship MV Ross Revenge from 3 to 5 August. More details, including how to visit, are on page 91.

The Norwegian Radio Relay Liga has been issued special call **LM90NRRL** for its 90th anniversary, valid for the whole of 2018. This call is available for one week at a time to local radio clubs or individuals representing their club.

Durham and District Amateur Radio Society is participating from Durham as a bonus station, **GB13COL**, for the 13 Colonies special event. Activity will be continuous (24h) from1300UTC on Sunday July 1 to 0400UTC on Sunday the 8th, primarily on HF SSB, CW and digital, plus local activity on VHF/UHF.

New Products

SP-41 speaker matches IC-7610

The new SP-41 is a matching external speaker for the IC-7610 SDR transceiver. Icom says the SP-41 will allow received calls to your station to be clearly heard, giving extra comfort for prolonged distant communications. If you are a lucky owner of this new radio and want to complete your station, this would be a fine addition.

The SP-41 is now available from all authorised Icom amateur radio dealers with a suggested retail price of £192 including VAT. sales@icomuk.co.uk

SDRplay announces RSPduo twin-tuner SDR

Launched at Dayton and reviewed in this edition of RadCom, the RSPduo is a new twin-tuner software defined radio receiver that covers 1kHz to 2GHz without gaps. It can receive on two totally independent 2MHz spectrum windows anywhere between 1kHz and 2GHz. The high performance front end filters and 14-bit analogue to digital converters provide excellent dynamic range for challenging reception conditions. More advanced users will appreciate the phase and time coherent demodulation of the two receivers. An external 24MHz reference can be used for the highest precision applications, and daisy-chained to other receivers. All you need to get going is a computer and an aerial; SDRuno Windows SDR software is provided free of charge and the receiver is compatible with other platforms and popular SDR software.

Ideal for use as a high performance standalone general coverage receiver or as a high resolution panadapter, the British-designed and manufactured RSPduo connects via a standard USB 2.0 connection and costs £239.94 including VAT, plus shipping. www.sdrplay.com/rspduo/

New 1kW HF-6m amplifier

The DX Shop Limited has released its all-new Linear Amp UK Gemini HF-1K solid state amplifier. Covering all amateur bands from 472KHz to 50MHz, the amplifier is designed from the ground up to be plug and play, quiet and be user friendly in operation.

There is automatic band selection, requiring no CAT interconnect. It supports multiple antennas, selectable by band. Diode switching gives full QSK operation to 50wpm and there is a touch screen colour display.

The HF-1K has full remote capability via its network port using software provided.

Priced at £2500 including VAT, the Gemini HF-1K will be available through The DX Shop Limited from July/August onwards. See www.thedxshop.com

ZD7BR mini-DXpedition by air to St Helena

Bill Rothwell, G0VDE describes taking his radio gear on the very first scheduled commercial flight to St Helena, previously a hard to access DX location.

I have been a keen DXer for many years, and have been fortunate in the past to live in rural Suffolk and own an 80ft Versatower with around 330 DXCC entities confirmed. When I moved to Cambridge around five years ago I had significant restrictions on my antennas, so for a change I decided to see what *being* the DX was like.

Looking at the 'most-wanted' lists, the island of St Helena stood out as a good candidate for a novice DXpeditioner like me. It was in reasonably high demand (but not in the P5 league), had good radio conditions, a temperate climate, only 1-2 hours time difference from the UK, no language problems and is keen to host tourists. An additional attraction was the planned opening of a brand new international airport. The only previous way of getting there was on the Royal Mail ship *RMS St Helena* [1], a five- or six-day journey from Cape Town.

Getting there

St Helena is located approximately 1200 miles west of Namibia and 2500 miles east of Brazil. It's one of the most isolated inhabited islands in the world. The first recorded mention of an airport was in 1943 but serious discussions about construction only began in the early 2000s. In October 2008 an Italian firm was selected but the world financial crisis intervened and the project was put on hold. After further delays, Basil Read of South Africa was chosen and construction began in 2012.

The airport [2] was the biggest construction project in the island's history, complicated by the near-complete lack of flat land and the difficulty of access for materials, construction equipment and people. Around 8,000,000m^3 of material had to be moved to level the proposed runway. Construction was finally completed in mid-2015 [3]. **Photo 1** shows the hazardous location of the runway. The first aircraft to land was a Beechcraft King Air 200 'calibration flight' to test airport infrastructure, arriving on 15 September 2015.

PHOTO 2: Prince's Lodge – the 'Studio Flat' is the ground floor door at the left-hand end of the building.

PHOTO 1: St Helena Airport – 1000ft cliffs at either end of the runway! (Photo courtesy of St Helena Airport via www.airportspotting.com).

Flights to St Helena were originally planned to be operated by Comair. A trial flight of the 737-800 aircraft planned to operate the route took place in April 2016, but was not without problems! An initial fly-past of the runway was followed by an unsuccessful landing attempt, with touch-down on the third pass. On my trip to St Helena I sat next to one of the Basil Read contractors who had been on that Comair flight. He told me the fly-past and attempted landing were extremely hair-raising!

In the days after the Comair test flight it emerged that the go-around had been caused by severe wind shear (probably due to the location of the runway on a thousand-foot-high plateau and the presence of large rocky outcrops close to the northern approach). The airport opening was postponed 'indefinitely', thus cancelling the flight I had been booked on (a charter from the UK to St Helena with a refuelling stop in The Gambia).

A number of small business jet aircraft had successfully landed because they were able to avoid the wind shear zone at the start of the northern approach. So in the coming months, efforts focused on finding the largest 'small aircraft' that would be able to land using only a portion of the runway (which was already relatively short at 1950m). Eventually an Embraer E190 aircraft was selected. SA Airlink were chosen in July 2017 to operate weekly flights from both Cape Town and Johannesburg, with an essential refuelling stop in Windhoek, Namibia. The first scheduled commercial flight was finally planned for October 2017 so I contacted SA Airlink [4] to confirm my ticket.

The hotels in the 'capital' are not suitable for amateur operations: Jamestown is in a very deep valley and useless for radio. I decided self-catering was the most appropriate, settling on 'Prince's Lodge' studio flat (**Photo 2**).

The advance formalities were relatively simple. No visa is needed for UK passport holders. Licensing was arranged by email and the document had been collected by my on-island contact Derek, ZD7CTO, so that I could start transmitting the moment I arrived.

UK to Johannesburg was easy to arrange, with plenty of overnight flights to choose from. However, as operations on St Helena are only permitted in daylight hours, the aircraft departed at around 0900 meaning an overnight stay in Johannesburg was necessary. I arrived in South Africa on 13 October and caught the first scheduled SA Airlink flight to St Helena on the 14th.

Various operating restrictions mean the Embraer E190 is restricted to 76 passengers among the 96 seats, but even on the first flight there were only 68 on board. Most were journalists: I was briefly interviewed by 'the man from ITV', the Reuters reporter asked me who was I with, and the BBC chap sat in the seat behind me. The flight itself was quite uneventful. We landed at Windhoek to refuel, then flew for a further three hours before sighting St Helena through the clouds and rain. Despite the pilot announcing "please don't worry if there is some turbulence and we have to go around; that is normal", we had a smooth approach and uneventful landing and were finally on St Helena.

Bill Rothwell, G0VDE/ZD7BR
bill@frambb.com

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Specified performance: Amateur bands only

A Superb All-around Transceiver with a built-in real-time spectrum scope and superior basic operation

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- Built in Real-Time Spectrum Scope with Multi-Color Waterfall Display
- 100 Watts (2 Meter & 70 Centimeter: 50 Watts) of Solid Performance
- IF DSP for Superb Interference Rejection
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The Ultimate Backpack Multi-Mode Portable Transceiver

HF/50/144/430MHz 6W All Mode Transceiver

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Operating Modes: CW/SSB/AM/FM * C4FM digital mode is not supported

- Incredibly Small Size (W135 x H38 x D165mm) and Light Weight
- High Frequency Stability (±0.5ppm) TCXO Included
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Specifications subject to change without notice. Some accessories and/or options may only be standard in some areas. Check with your local Yaesu Dealer for specific details.

PHOTO 3: Disembarking amidst flag-waving and the press.

PHOTO 4: FT8 activity – many stations calling me.

PHOTO 5: Ready to leave – the ski-bag that had contained my antennas is now nearly empty.

Coming down the steps, we passed under South African and St Helena flags held by the pilots (**Photo 3**) and were greeted by the Govenor! We walked to the small terminal whilst being filmed by the BBC and ITV. After receiving a passport stamp of the native 'wirebird' (the St Helena plover, only found on the island) we were free to go. My ski-bag of antennas and large suitcase survived the journey unscathed.

Operational at last

I had arranged for Derek, ZD7CTO to meet me, and after being briefly interviewed for the local web radio station *Saint-FM* we set off towards my ground floor flat at Prince's Lodge, arriving around 3pm. It's about three miles outside Jamestown; the roads leaving the capital tend steeply uphill and the lodge is at around 1500ft ASL. I set up my radio in the small front room, then unpacked and tuned my 4BTV multiband vertical just outside the front door. As I hoped, connecting the antenna barely raised the background noise level and I spent an initial hour or so on SSB. Derek had invited me to a fresh local tuna supper at his home a quarter-mile down the road, where I also met a couple of other resident hams.

The next seven days were a mixture of radio and tourism. I usually operated from around 7 until 10.30am local time, when the bands closed. In the middle of the day I did antenna work or indulged in sightseeing. On several days Derek drove me around, visiting places such as Sandy Bay, Longwood (Napoleon's house), Farm Lodge Hotel (the best-located hotel for amateurs), High Knoll Fort and a short but unsuccessful wirebird hunt. I then re-started radio operations when the bands opened after 1600, closing down around 2300 when the radio fell silent.

My CW is not good enough to be a DX station so initial contacts were SSB, but I'd always planned to do something different from the locals so I started using more RTTY and FT8. I spent most of Thursday and Friday on the air, RTTY in the mornings and evenings, changing to FT8 over lunch.

FT8 was a bit of a learning exercise for me. After some hours of practice, I found that I could usually complete a contact in a minute and was also able to operate in a semi-duplex fashion. As can be seen in **Photo 4**, there were usually many stations calling me, so the next contact could be selected before the current one completed. To maximise throughput I tended to reply to the station with the strongest reported signal. FT8 was very useful when the bands otherwise seemed closed, even though it has rather a slow QSO rate for a DXpedition.

On Monday I moved the aerial to the large lawn in front of the lodge (see QSL card), using all 40m of Aircell cable I had. I also used a 40ft Spiderpole for a 60m band vertical, but found the band to be rather noisy and didn't actually transmit. I think the optimum time for 60m would have been after midnight.

My location was excellent, with no neighbours and I was able to use 400W from my linear continuously – the only issue was its fan noise, mitigated by wearing headphones. Prince's Lodge has a clear take-off to the East, North and West (EU, UK and the Americas). The sea is clearly visible about two miles away and 1500ft down. Hills in the centre of the island block the site to the South (JA, VK) but even so I made a number of JA contacts long-path and even one VK QSO on FT8.

Going home

As I had agreed to leave my 4BTV vertical antenna behind for Derek and thus didn't need to dismantle it, I was able to continue operating until about 0915 on the day I left. Another of the local amateurs had acquired the Spiderpole, so I returned home with about 15kg less luggage (**Photo 5**). Driving to the airport we saw mist and cloud down on the runway but the plane eventually arrived and I was on my way home.

I was very pleased with my trip: the travel had gone extremely well; all my radio gear travelled intact; I made over 2100 contacts split fairly evenly between SSB, RTTY and FT8; and I was able to meet the local hams and see a good number of the sights. St Helena is a fantastic place for a fairly informal DXpedition; access is now reasonably easy and I have already been contacted by a Scottish amateur wanting to visit in the near future.

I would like to thank Jim Kellaway, G3RTE for useful discussions and ideas, Phil Whitchurch, G3SWH for being my QSL manager and my wife Kate for letting me go on this trip!

Websearch

[1] http://rms-st-helena.com/
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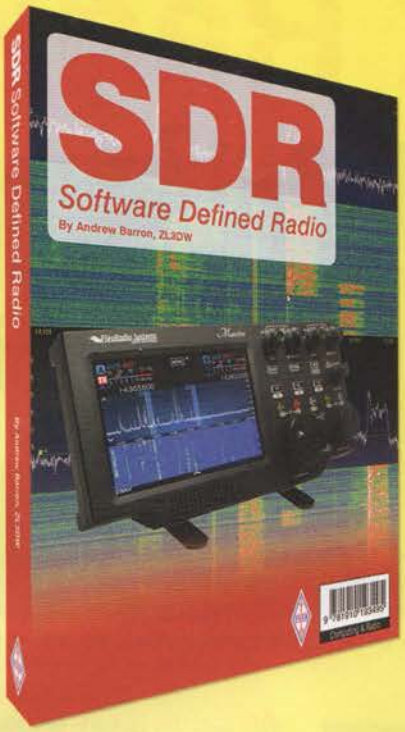

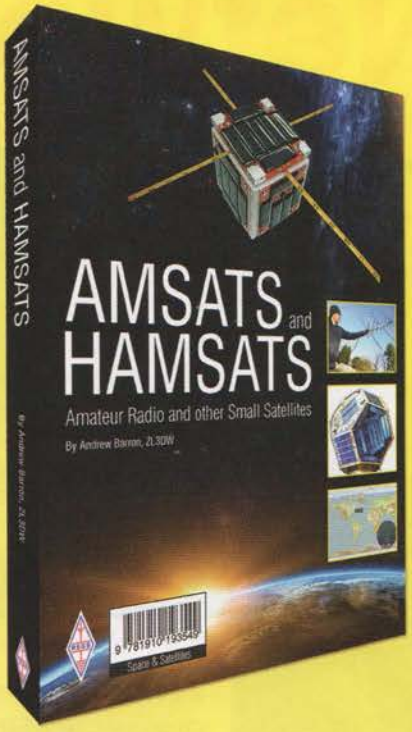

NEW TITLES

Software Defined Radio

Bestseller! - have you got your copy yet?

By Andrew Barron, ZL3DW

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

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

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

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

Amsats and Hamsats

Amateur Radio and Other Small Satellites

By Andrew Barron, ZL3DW

Simply the most comprehensive guide available on how you communicate through amateur radio satellites and how to receive signals from other small satellites. Written by best-selling amateur radio author Andrew Barron, ZL3DW this is the answer to everything you wanted to know about the world of satellites.

Amsats and Hamsats begins by answering questions like, 'how do satellites stay in orbit' and 'why are they so expensive to launch?' before moving onto sections about the history of amateur radio satellites, the mathematics governing orbits, different types of satellite and their orbits. It covers the equipment you need, to track and use the amateur satellites and some of the satellite tracking software that is available. There are detailed sections covering feeders, masthead preamplifiers, antenna systems and automated rotator control. There are the details of FUN cube Satellites, Weather Satellites and even the International Space Station. If you want to know the art of the possible and what satellites are available, where they are, new ones that are planned and even the bands you can operate, *Amsats and Hamsats* has the answer. There is much more included and this book provides the ultimate guide to operating satellites.

Amsats and Hamsats, provides a great value guide to this stimulating and challenging area of amateur radio activity. If you want to get started or are already an experienced operator you will find something of value in these pages.

Size 174x240mm, 368 pages
ISBN: 9781 9101 9354 9
Non Members' Price: £14.99
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Network Radio – what's it all about?

PHOTO 1: A typical handheld Network Radio.

Innovation

Radio amateurs have a long and laudable history of innovation. Whether it be experimenting with the first transatlantic signals or exploring the latest digimodes such as FT8, amateurs have often been at the forefront of taking on board and using new technologies. However, it would also be fair to say that not everyone has welcomed every innovation with open arms.

Many years ago, when transistors were new technology, solid state circuitry took some time to be fully accepted in the hobby. Yet before long, such innovation became commonplace in electronic design, transforming, if nothing else, the physical size of our radios.

Those darned computers!

Among such examples, arguably a larger amount of suspicion followed the advent of computer technology into amateur radio. The amount of local noise that older computers in particular scattered around the RF spectrum didn't endear them to all of us.

However, computers are so much a part of our everyday lives now that it was inevitable they would find their way into our shacks.

21st Century magic

Computers, whether you love or hate them, are indeed 'magical' devices – for DXing they can log on to the DX Cluster and, with a mouse click, tune our transceiver to the far station's frequency, ready to pounce. We use them in other ways too – sending email to set up a sked; eQSLing for verification purposes; we also use them to connect to services like Echolink. And a small USB dongle accessory gives us access to digital modes like D-STAR without buying an expensive transceiver.

A computer in your pocket?

The technology involved in computing has shrunk dramatically over the years. Android and iOS devices have made the computer truly pocketable and, although we might still refer to such devices as "phones", this is a travesty of the term. Telephony is arguably one of their lowest technological uses.

These small powerhouses are equivalent to desktops of just a few years ago; moreover, they will continue to develop further. Many enterprising amateurs have already written some truly amazing software for them. So perhaps it was no surprise that someone would write software to make such a versatile, internet-connected device suitable to use as a form of two-way radio.

Business beginnings

In today's global economy, a business might have operatives in several countries who all need to communicate seamlessly. Your local but privatised bin lorry could perhaps be managed from Spain, or maybe an international trucking company wants to be able to talk to its drivers all over Europe without incurring massive call charges. Most versions of private mobile radio (PMR) and its variants are only effective over shorter distances [1], so it would be useless trying to connect a disparate group of employees in that way. However, so-called push-to-talk (PTT) over cellular (PoC) interests the business community because it works via public cellular networks and/or Wi-Fi.

A business user doesn't really care about the underlying infrastructure provided the equipment is easy to use and the costs are reasonable. People are familiar with the form-factor of hand-portable and mobile radios. Some PoC radios – which are, essentially, smartphones in a different shape box – mimic radios (**Photo 1**), so that the changeover is easy for businesses to implement.

Amateurs get involved...

Any kind of new technology alerts radio amateurs! Before long, some started playing with PoC to see what might be possible. Having a computer in one's pocket is quite an astonishing concept and the possibilities are only constrained by the apps available. If we choose to adapt these devices further, we just need to write software for them.

Enter Network Radio

The name Network Radio was adopted, because the devices require a network of some kind to operate. Based mostly on the Android operating system, they are disparagingly dismissed as "mobile phones with a PTT button", but they are somewhat more than that description might imply.

Most can operate on a variety of cellular frequencies, typically from 800-2100MHz, but many are also capable of working via Wi-Fi at 2.4 and 5GHz. One can immediately see why some amateurs are suspicious! Here we have a 'radio' that doesn't transmit on amateur frequencies, so what on earth are amateurs actually doing with them?

It's quite simple. Having a fully featured computer in a PTT form-factor, amateurs can now use what *looks* and *feels* like a radio *to access many of our own services.*

Echolink

Traditionally, Echolink has used a desktop PC for access. Now, an Android app is available so, used with a mobile phone or Network Radio, one can access myriad repeaters and nodes worldwide. Network Radios have a radio form-factor and, importantly, a PTT button. It feels more 'accessible' as a result.

PTT Network Radio is totally different from using a phone. While you can download Echolink and use it on your everyday mobile, it doesn't 'feel' quite like radio, whereas on a Network Radio, it does!

PHOTO 2: Cricket in 'natural' conditions – it's great in sunny weather. Image by Acabashi via Wikimedia Commons, CC BY-SA 4.0.

PHOTO 3: 'Man-made' conditions for cricket, ideal for inclement weather. Image by Ben Sutherland via Wikimedia Commons, CC BY 2.0.

You can access the system via your own Wi-Fi or while out and about using cellular coverage, no longer tied to the shack PC.

International Radio Network

The brainchild of paramedic and computer-hobbyist Gareth Jackson, M6IGJ, the International Radio Network (IRN) was devised as a 'meeting-point' for all kinds of amateur streaming audio, but with an additional option to transmit back into the system. Using a very resilient piece of VoIP software called Teamspeak, IRN has already outgrown its origins and is now part of the 'Worldwide Amateur Radio Guild'.

It is rapidly becoming a valuable resource worldwide wherever amateurs wish to share audio. It also supports multiple stations talking at the same time – not that that is either recommended or encouraged!

Callsigns at the ready!

For Echolink and IRN an amateur callsign is mandatory. A user may *enter* the system via a network, but could very well *exit* it on amateur-band RF anywhere in the world! There are safeguards to ensure compliance.

IRN allows for non-RF based contacts too and you can find unlicensed people in some groups there with "IRN callsigns" getting to grips with the system, but who are not allowed anywhere near an RF link.

Can anyone else see any implications for amateur radio training here?

Remote operation

Dave Pick, G3YXM, has set up his handheld Network Radio to act as a remote controller for his two HF stations. Recently, whilst on holiday in Italy, Dave was able to use the Remote Hams 'RCForb' app to operate both his Scottish and Birmingham stations from his handheld's touch screen. By mapping its hardware PTT to the PTT switching at the remote station, it enabled him to keep in touch with his friends on Top Band. All that was required was a network connection.

Receiving stations

Since a Network Radio is a computer, it is possible to use its browser to access the many online webSDRs, such as Hack Green [2]. You can listen to pretty much anything, eg watch for those sudden 6m openings.

Even APRS...

The APRSDroid app turns your Network Radio into an APRS Beacon. Since Network Radios (and smartphones) normally have GPS built in, highly accurate and regular beaconing can take place.

Broadcasts

Access to a Broadcast Radio app means you can tune into pretty much any streaming radio station in the world, something that might be good when our bands are quiet.

One particular nicety is the loudspeaker volume on these devices – loud even in the outdoors. This is another way they differentiate themselves from phones.

Controversial

There is however a side to Network Radios that some find controversial – "Radio over Internet Protocol" (RoIP). Network Radios can communicate directly to each other, which has led some to declare that using them in this way is not "real amateur radio".

What is "real" amateur radio anyway?

The problem is that no-one *quite* knows what "real amateur radio" *is* any more. It depends on who you ask that question and what they consider to be amateur radio. If you ask a QRPer or an ATV enthusiast, a PSK user or a contester, or even a CW enthusiast or a microwaver, you are sure to get different and conflicting answers. This is no bad thing – it is only because our hobby is so wide in its appeal that this happens. Not many hobbies are so diverse!

The nub of the problem is the internet. Like it or not, it has changed the rules. It can be argued that it fulfils the criterion of actually being a *form* of propagation in itself. But what do I actually *mean* by that?

Natural propagation

Google's definition of "propagation" includes the "transmission of motion, light, sound, etc in a particular direction or through a medium." All our amateur signals, from Top Band to microwaves, are intrinsically line-of-sight [3]. We rely on *external* influences to "propagate" signals over greater distances.

Amateur Service signals traditionally rely on *naturally-occurring* phenomena to travel further than they otherwise would. This is why we need international regulation and are granted special privileges.

Depending on the frequency, the means of propagation changes. Below 30MHz we rely generally on ionospheric reflection; as we move towards VHF, the troposphere and E layer play a more important role and meteor scatter is practical; at microwave frequencies, rain-scatter becomes a valid mode of propagation.

But is aircraft scatter propagation 'natural'?

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Internet propagation

I argue that the internet is *also* a form of propagation. It takes low power signals from devices and enables them to propagate further than would normally be feasible.

The significant difference is that the internet is *man-made*, an *artificial* form of propagation. Furthermore it is 'open' 365 days a year, 24/7, with S9+ signals and no atmospheric noise. Viewed in this way, it might become a little easier to understand why so many under the age of 40 (or even 50!) scratch their collective heads when we extol the virtues of amateur radio to them.

Internet propagation is open to *everyone*, and requires no exam or licence to utilise it.

An example from another hobby...

Let me try to explain this another way. **Photo 2** shows cricket played in its 'natural habitat' using 'natural phenomena', rather like we would consider natural propagation. But **Photo 3** *also* shows cricket – using a man-made indoor cricket centre.

Do the players in Photo 2 think only *they* are playing 'real' cricket and those in Photo 3 are not playing the game 'correctly'? Are the cricketers in Photo 3 more miserable because they are playing on a man-made surface and indoors? Do you think the advent of indoor cricket centres has helped or hindered enthusiasm for the sport?

The same arguments can apply to 'artificial propagation'.

Threats and opportunities

You could view this Network Radio 'wave' as a threat to our hobby's existence, or alternatively as an opportunity to be explored and exploited. The two forms of propagation do not *have* to be mutually exclusive – in fact, if we react to internet propagation in too negative a way, we may well completely turn off potential newcomers to our hobby.

Times have changed

A BBC station took an FM portable radio onto the streets and asked young people what it was and what it did. Few knew – fewer still could actually operate it! Yet this age-group is busy video-chatting to people around the world while Grandad is in the garden shed muttering about how poor the bands are!

This is part of the problem. Most under-40s think of radio as either a push-button or streaming device. They have not experienced a moment of 'magic' on shortwave, listening to far-off signals, as many amateurs have.

Perhaps if we embrace this new phenomenon as an opportunity, Network Radios and internet propagation could help us *attract* people into the hobby

Zello

The most popular app for RoIP use is Zello. Part PTT app, part social media platform, it works as a kind of 'parallel PTT universe'.

Zello came to prominence during the Florida Hurricanes of 2017. Only around 3% of phone towers went off air in the hurricanes and Zello proved to be one of the most resilient forms of emergency communication for the rescue teams. The number of downloads went through the roof.

Zello can work as a private one-to-one PTT system, but the more exciting part of it for amateurs is that you can create your own 'channels'. These can also be moderated, locked down (or not) to varying degrees and have all the advantages of a digital system – eg all stations visible with descriptions, short messaging and photographic add-ons.

'Network Radios' is a UK-based Zello channel. Inaugurated by Karl Hobson, G1YPQ, it has seen phenomenal growth in a short space of time. There are already two overflow channels and others are in the wings. No-one can speak on the channel unless approved by moderators, who lightly interview potential members – but at the first sign of misbehaviour you are summarily kicked off. If only repeater operators could do that!

As a result, operating practices are exemplary and remind many of bygone days.

Alongside the channels there is a Network Radios Facebook group **[4]** where members communicate via 'normal' social media. It is not uncommon for people to be using both simultaneously. This link across social media channels is familiar to many and very much a 21st century form of 'community building'.

Hobbyists too...

Unlicensed stations are also to be found here. They are not just 'allowed', but positively *encouraged* to join the group if they have *any* kind of interest in radio.

Some are already studying for their licences, others are PTT-experienced operators who want to interact with us – let me repeat that – they actually *want* to interact with *us*! Furthermore they come from all over the world to join the group. At any time you could hear pretty much any nationality.

Is it *radio* though?

So is it 'real amateur radio' if amateurs are using Zello channels? If you Google the definition of 'Amateur', you get "a person who engages in a pursuit, especially a sport, on an unpaid basis." 'Amateur' comes from the Latin *amare* meaning 'to love' – in other words, we are people who *love* radio and engage in it as a pastime. Do we only love certain exclusive bands and modes, though? Or do we love radio in all its forms?

Enjoyment is one key factor

Listening to the Network Radio channels, you find people thoroughly *enjoying* radio as communication. There is a vibrancy that, maybe, yes, comes from its 'newness'. However, "I haven't used a radio for 10 years but I've been here every day for two weeks now" is a not untypical comment.

Technology creates problems!

Just as people consume broadcast radio today without knowing what frequency they are listening on, we are now using two-way radio in the same way. We should not be surprised at this – it's just a leap forward in technology. This is not to say that 'traditional' amateur radio is sidelined. The two distinct forms of propagation each require different hardware. Perhaps a manufacturer will combine a Network Radio with an HF SDR, making a hybrid? That would be exciting!

Does any of this matter?

No-one suggests that Network Radios will supplant 'traditional' amateur radio. They are simply different devices for different purposes but with a common theme. Network Radios are great if you cannot erect an antenna, have strong local noise, or maybe live in a retirement flat. But Network Radio is pretty useless at contesting or doing any kind of experimental work on natural propagation.

But I would argue that they *do* have a place in the hobby. Perhaps one day we will look back on the advent of Network Radios and realise it was just another branch of the hobby coming into existence, but one that brought it into the 21st Century in a way we were simply not expecting.

Finally...

This article is not intended to stir up arguments but to ask you to think creatively about how technology is forcing us to re-think what radio actually *is* in the 21st Century. There are more developments coming and they will continue to challenge our thinking.

I suspect that we will have to either adapt and adopt, or alternatively ignore them – though we run the risk of possible future irrelevance. Surely none of us wants that.

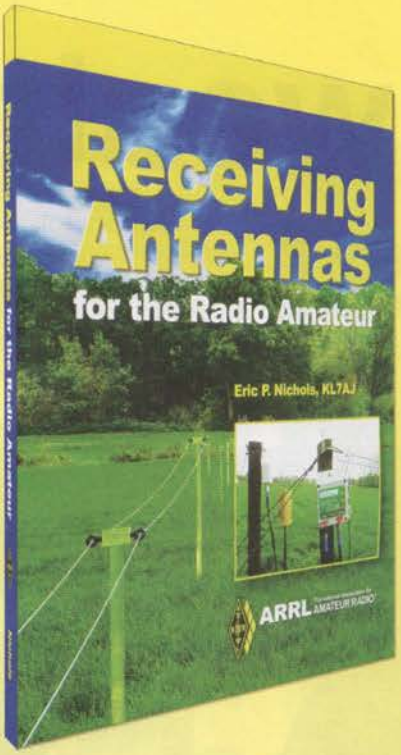
References

[1] Wide-area PMR-like solutions exist, generally with proprietary infrastructure and site links

[2] http://hackgreensdr.org:8901/ – free, multi-band SDR that supports multiple simultaneous browser-based users on most platforms

[3] In free space, unaffected by any atmospheric or other effects

[4] https://www.facebook.com/groups/747365082123751/



NEW TITLES

Receiving Antennas

for the Radio Amateur

By Eric P. Nichols, KL7AJ

Although the fundamental characteristics of antennas apply to both transmission and reception, the requirements and priorities of receiving antennas can be vastly different from those of transmitting antennas. *Receiving Antennas for the Radio Amateur* focuses entirely on active and passive receiving antennas and their associated circuits. There are relatively few cases where a radio amateur cannot benefit from a separate, well-designed receiving antenna or antenna system. On the low bands, including our new allocations at 630 and 2,200 meters, heavy emphasis on the receiving end of these radio paths is essential for success.

The active antenna holds a prominent position in *Receiving Antennas for the Radio Amateur*, as it offers good receiving performance while taking up minimal space. Recent developments in radio frequency (RF) semiconductors, especially low-noise RF operational amplifiers, have made a number of previously difficult-to-implement active antenna designs a very simple task. *Receiving Antennas for the Radio Amateur* is a wide ranging book readers will find chapters covering Preamplifiers, Power Gain, Small loops and a wide array of other antennas. There are chapters on LF, NVIS, Propagation and of course Antenna Projects, Construction Techniques and a lot more.

If you are looking to maximise your receive capabilities, this book provides the ideal guide to this topic and is a must for every radio amateur's bookshelf.

Size 208x265mm, 256 pages
ISBN: 9781 6259 5078 9
Non Members' Price: £27.99
RSGB Members' Price: £23.79

60 Antennas

you will want to build!

Edited by Giles Read, G1MFG

Whatever the type of antenna, there is always a genuine sense of achievement when you build one yourself and it provides great results. This book sets out to provide a huge array of designs that the home constructor can attempt and more importantly will want to build.

Unlike many other antenna books this book starts with the premise that it will provide all the information needed to construct the antenna so it is at your fingertips when you start. Broken into sections *60 Antennas* provides designs from the simple to the complex but still achievable for the home constructor. *60 Antennas* starts with a section on Vertical Antennas which includes antennas from 2-160m and even 630m. Readers will find here mobile 'screwdriver' and Slim Jim antennas and compact verticals for a wide range of situations. The book moves onto Horizontal Antennas that also cover the amateur radio spectrum with dipoles, multi-bands and more. Directional antennas are covered with a variety of beams and quads. The section on Loop Antennas includes an indoor variant and details of how to make these as efficient as possible. For those with restrictions of what antennas they can use Stealthy Antennas provides a variety of invisible or nearly invisible options amongst the designs included. VHF and up isn't forgotten with a selection of antennas for microwaves, 2m, 70cm that includes horn, beams and log periodic varieties.

There is not enough space here to list all the antennas or their variations are included in *60 Antennas*. Selected from around the amateur radio World and from some of the great names of antenna design there is much here that will inspire 'You to want build!' your next antenna.

Size: 174x240mm, 288 pages
ISBN: 9781 9101 9355 6
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81st Commonwealth Contest

PHOTO 1: Dave Goodwin, VE9CB winner of the Senior Rose Bowl.

PHOTO 2: Nick, G4FAL winner of the Col Thomas Rose Bowl.

With long stretches of spotless sun, the tail of Solar Cycle 24 is casting a shadow over most DX operating and this year's Commonwealth Contest was no exception.

Apart from a few local contacts there were no DX contacts at all on 10m. 15m was a story of short openings, easily missed if you were not keeping your eyes on band conditions. This reduced the contest to three bands, 80, 40 and 20m, for many entrants. In such conditions entrants with good low-band setups were at an advantage. Looking at the results it seems that conditions in the southern hemisphere were marginally better than in the northern, as evidenced by the strong showing of VK stations in the Unassisted Open section.

Conditions are also likely to be one reason for a reduced entry after a number of years of increasing participation. The presence of the special UK HQ stations therefore made things more interesting for all entrants.

The reduced entry comprised 62 Open Assisted, 67 Open Unassisted, 28 Restricted Assisted, 50 Restricted Unassisted, 13 5W / QRP and 4 Multi-op. The percentage of entrants using Cluster and other assistance showed an increase this year as the use of spotting systems becomes more widespread. Spotting is especially significant when DX openings are so fleeting and often helps less well-equipped stations have an interesting contest.

Notwithstanding conditions, there was plenty of Commonwealth DX around, it's just a pity propagation didn't make the openings last longer. It's worth noting, though, that GB5CC (GM3WOJ) made contacts with VO1, VO2, VP8, VU, VY2, ZB2, ZF2, ZL1, 2, 3, 4, 6, ZS1, 3B8, 5B, 9H, 9J, 9M6, 9V1, C6, V3, V5, VE1, 2, 3, 4, 5, 7, 9, VK2, 3, 4, 5, 6 and 7!

Apart from the call areas entering the contest, the following were also active: 3D2, 4S7, 5H, 6Y, 8P, 9M0, 9Y, P2, V8, VK1, 5, 8, VP8 and ZS1, 4, 5 and 6. Not all of these were worked from the UK but a good number were.

Open Unassisted section

First place in the Open Unassisted section and winner of the Senior Rose Bowl is Dave Goodwin, VE9CB (**Photo 1**). This was Dave's first win after many years as an entrant and it is very fitting that he takes the Senior Rose Bowl. Dave comments, "The contest started very well, with good propagation to ZL and VK on 40 and 80 metres. I was able to work several UK stations on all-daylight paths on 40m. Absorption was very low, but so was F-layer ionisation. As the contest wore on, conditions declined. I watched the solar flux stay still at 68, and the A and K indices slowly rose. The last hours are always long, but these were especially so. At least there was no disturbance." Dave's antenna system was severely damaged a few days later (**Photo 3**).

VE9CB was closely followed by Ron, XL3A. In third place was Colin, ZF2CA (G4CWH), who nearly made it to second place. Looking at how these leaders made their scores shows the importance of QSOs on the 'edge' bands of 80 and 15 / 10m, with the former favouring the VEs and the latter favouring ZF2CA.

Conditions seem to have been relatively better in the southern hemisphere, with six VK stations in the top ten. Leading the VK group was Kevin, VK6LW, followed by Barry, VK2BJ. In seventh place was VK6VZ, followed by VK2GR (**Photo 4**), VK7BO, and VK4SN in 10th place.

The highest-placed UK station, in sixth position, was Nick Totterdell, G4FAL (**Photo 2**), and he wins the Col Thomas Rosebowl for the first time. "A five-band contest, when two of the bands are virtually unusable, should be disappointing. However, I quite enjoyed BERU this year – especially as I had three QSOs in the last hour, whereas last year I had none. 40m was in good shape and worked well with my 4-square. 20m was quite good but lacking in the Far East and Far West directions. 80m was good but the opening to ZL at 0630 on Sunday was a little disappointing. I enjoyed the added interest from the eight UK&CD HQ stations, working three of them on five bands and all of them on 80m and 40m. My setup had SO2R which meant I could run on one band whilst searching on another – which is effective in a contest that is all about finding QSOs at every possible opportunity. I was pleased to work many VKs and ZLs – something I always dreamed of doing when I was first licensed as a teenager."

In 10th place was Andy Cook, G4PIQ, with a 12-hour entry, and he is the winner of the Ross Carey Rose Bowl.

Restricted Unassisted section

The leader of the Restricted Unassisted section and winner of the Junior Rose Bowl for the second year running was Peter Hobbs, G3LET, this year operating as 9H3ET from the QTH of 9H4CT. Apart from some CAT logging problems, Peter commented, "I was very pleased with the performance of my multi-band vertical, inspired by G7FEK, which weighed in at a total of 1.6kg. I shall certainly use it again. After setting it up at home beforehand, little more tweaking was needed on site to achieve better than 2:1 on all bands. I had suspended additional 16.5ft and 25ft vertical elements between the catenary and the feed point to allow operation on 20 and 10m (¾ wave), together with appropriate tuned counterpoises."

ZL3AL was in second place, followed by Brian, VK3MI, in third.

The leading UK&CD Restricted Unassisted entry in fourth place, and winner of the John Dunnington Trophy, was John Cockrill, G4CZB.

QRP

First place in the 5W section was Dom, M1KTA, operating as C6AKT, who is awarded the Lilliput Trophy. Dom's setup was completely home brew, down even to the PSU. Roger, G3SXW, was second.

Open Assisted section

First place in the single operator Open Assisted section was John Sluymer, VE3EJ, who wins the Rosebery Shield. As usual, John's unparalleled skill in finding bonuses more than made up for his smaller number of QSOs. The systematic searching out and QSYing of bonus stations is a must if you wish to score well in this contest. VE3JM was in second place and in third place Nigel, 3B8XF (G3TXF), just ahead of VK4CT.

The leading G station, in sixth position, was Bob, G3PJT, closely followed by Dave, G3TBK, in seventh.

Restricted Assisted section

In the Restricted Single Operator Assisted section there is no change in first and second places from 2017, with certificates going to Iain Haywood, V31GX (G4SGX) and to G3RLE in second place.

Multi-operator section

In the Multi-operator section 9H6A (operated by 9H1GP and 9H1XT) was first, followed by 9H1MRL (9H1TX, 9H1PI and 9H1GW), a superb effort from all the operators on Malta. G5XV, operated by G0ORH, G8HKS and M0OJO, was third and G4WSM (G4CXQ and G3TJE) was fourth.

PHOTO 3: **'Well, we had another storm last night. My antennas have been modified.' VE9CB!**

Travellers' tales

Overseas travellers visited 3B8, 9H, 9M6, C6, V3, and ZF. A 'Traveller's Award' for 2018 goes to Iain, V31GX, for his trips to Belize.

Mike, G3VYI, in 9M6, said he "...struggled with local rain static noise at times but enjoyed all the VK and ZLs, very different here! Worked as many Gs as I could, no Caribbean and just a few VEs, as expected, but after bands closed overnight at 3.00am here it was very slow to open again, like my brain! Nothing on 40m in the morning here."

There are plenty more travellers' tales on the Commonwealth Contest website [1]. The RSGB HF Contests website is at [2], from which there is a link to the Commonwealth Contest rules.

Commonwealth Medal

The Commonwealth Contest Medal is awarded to Peter, G3LET. Peter has been entering 'BERU' since the late 1950s, but perhaps he is best known for his operation from Signy Island as VP8GQ from 1960–1964 (**Photo 5**). Exciting enough, but on arriving on Signy Peter had first to build his transmitter! In 1963 Peter won the High Power section and the Senior Rose Bowl. Since then he has been active most years, most recently from 9H, VO1 and VY2. He has managed the team competition and for the 80th contest, last year, he donated miniatures to be retained by future Open Unassisted section winners.

Team competition

In the team competition, the top three places are the same as in 2017, with Team Australia 1 in first place, Team Canada Eh? in second and Team Australia 2 in third. However, the winners this time achieved a commanding lead over their northern hemisphere rivals and Team Australia 2 were not far behind the Canadian team. Team Quake Contesters were in fourth place. The top UK Team, in ninth position, was the Essex CW Club (G3PJT, G3XLG, G3PVM, M5D, G0IBN).

HQ stations

After the success last year of the UK&CD HQ stations with calls in the Gx6XX series, this year all seven UK&CD areas were represented, as well as GB5CC (GM3WOJ). Graham, G4FNL, operating G6XX, was the leading station with over 500 QSOs and 124 BCAs, with GD6XX not far behind in second place. Dave, G3NKC, and Martin, G4XUM, were the operators at GD6XX, travelling specially to the Isle of Man for the event.

Australia fielded one HQ station at VK5WIA operated by Grant, VK5GR, and Theo, VK5MTM. New Zealand was represented by ZL6HQ (Frank, ZL2BR). Canada had six HQ stations on the air and VA3RAC achieved fourth place overall, operated by Les, VE3NNT.

Many thanks to all the HQ stations. They all made significant contributions in QSOs and bonuses and kept up the general level of interest and activity under challenging conditions.

Soapbox

VE7RAC: "The worst condx in 40 years of BERU'ing. My QTH has fallen into a black hole from which RF energy can neither enter nor leave..."

VE3RAC: "I woke up for the European opening at their sunrise Saturday night only to find out that the sun didn't rise after all."

G3SJJ: "S&Ping paid off with 5HOJK and 4S7AB."

G4DBW: "Thank you to all the HQ stations who supported BERU 2018. The additional HQ stations in GU, GJ, GM, and GW added interest for me."

G3PHO: "Nothing was heard from West Africa. 7MHz came alive on Sunday morning with excellent VK / ZL signals."

G4KNO: "Disappointed that for another year I couldn't work Nigel on 80m – because I couldn't hear him. This is an on-going problem for me to do with the noise level here on 80 / 40m."

G3XLG: "Overall a very enjoyable experience and an interesting contest."

VE3BR: "Full daylight on Saturday morning had me with no ZLs or VKs in the log. Much worse than that: I had heard none."

VA7ST: "Yikes. At the very bottom of the solar cycle, BERU is a tough slog."

VE3RUA: "High points were working 3D2EU and a large number of HQ stations. I was also thrilled by having VY1KX come back to me."

VE7CC: "Nice to meet many old friends. A few good openings on 40 and 80 to Pacific but generally conditions were horrible. Weak or non-existent signals and lots of static crashes."

Bob Whelan, G3PJT
bob@g3pjt.com

PHOTO 4: Antennas at VK2GR.

VK4CT: "The best surprise was when 40m opened for a nice run between 0650 and 0800UTC."
VK2BJ: "Conditions were pretty awful on all HF bands."
VK2PN: "Well chaps... it was fun after all. Mix of frustration and delight."
VK6VZ: "Wind gusts hitting 100km/hour made the first 12 hours of BERU a scary experience!"
ZL3AB: "Made my first mistake in not getting up for the sunrise greyline shift."
ZF2CA: "So I am back home now after 10 flight legs and eight security searches during which the process slowly got a bit slicker and excitement kept to a reasonable minimum."

Silent keys

Two stations who have operated for many years in BERU became silent keys this year, namely John, ZL1AH, and Joe, 7Q7BP. John Wightman, ZL1AH, was a very long time member of the RSGB, over 80 years. He was aged 97. Joe Poole, G3MRC, as 7Q7BP, could be relied upon for at least one or two bonuses from Malawi.

Adjudication

by John Cockrill, G4CZB

Only one late entry was received this year after adjudication had started, and had to be reclassified as a checklog. A few uploaded logs had minor problems. Please always take note and check on any warnings issued by the entry robot and also check the returned log file to confirm that it has uploaded correctly.

PHOTO 5: Shack at VP8GQ (G3LET) in 1963 with transmitter actually built on Signy Island.

Most logging errors were callsign or received serial number, but points and bonuses were also lost by not recording the 'HQ' suffix sent by HQ stations. And it wasn't ZB0A, it was Z60A!

There was a significant number of non-entrants from both the UK and the Commonwealth that made 20+ QSOs and some would have been well-placed in the final tables if they had entered a log. Please send in an entry next year.

Next year

Solar conditions in 2019 are expected to be similar to this year. So what steps might you take to be as prepared as possible? Whilst the general level of solar flux is expected to be in the 60s, there is a reduced likelihood of geomagnetic disturbances as Cycle 24 recedes. Low levels of absorption will favour 80m, so expect that some DX contacts will be possible even before sunset on Saturday and after sunrise on Sunday.

As far as 40m is concerned there could be DX around for the whole 24 hours, so spend some time this summer making sure that your 40m setup is in good shape and be prepared to keep checking for long path and other short openings. 20m will mostly be a daytime band so don't get caught out with an early closing of the North Atlantic path on Saturday. 15m will be a daytime band with short openings so will require lots of checking. Only local contacts are expected on 10m.

The 9th and 10th of March 2019 are the dates for the diary. Please follow the web and blog pages as that's the way we publicise all the news. An email to Bob, G3PJT, will get you on the circulation list.

Commonwealth Century Award

And finally, contacts made in the Commonwealth Contest can qualify for the Commonwealth DX Award. This RSGB award is administered by Chris, G3SJJ, who is the RSGB Certificate and Awards Manager.

Websearch

[1] Commonwealth Contest: https://berucontest.wordpress.com/about/
[2] RSGB HF Contests: https://www.rsgbcc.org/hf/

Sport Radio

This month everyone can help support the RSGB HQ team, by working GR2HQ.

July is the final month of this year's series of 80m Club Championship contests and we start with the CW session on Monday 2nd. The SSB session follows, on Wednesday 11th. The Low Power Contest on Sunday 15th has four categories, a trophy being awarded to the winner of each. Until a couple of years ago this was an 80/40m contest, but these days 20m is included as well. We then return to the 80m Club Championships for the very last session in the current series, datamodes on Thursday 26th. The biggest HF contest of the month is undoubtedly Islands on the Air (IOTA), which takes place for 24 hours on CW and SSB over the weekend of 28-29th. Invariably there are contesting DXpeditions to rare islands and DXCC entities for this event, so it should be good for picking up some new countries on HF even if you don't take part competitively.

The first VHF events of the month are the 144MHz FMAC and 144MHz UKAC on Tuesday 3rd. VHF NFD follows. It runs for 24 hours, starting at 1400Z on Saturday the 7th. Last year Trowbridge and District ARC (**Photo 1**) were winners of the Mix & Match section, but there are several sections, including two Sweeper sections for fixed stations. On Sunday 8th the third in this year's series of 2m Backpacker contests overlaps VHF NFD by three hours, then continues on its own for a fourth hour. After that it's back to the Activity Contests, with the 432MHz FMAC and UKAC on Tuesday 10th, the 50MHz FMAC and UKAC on Thursday 12th, the 1.3GHz UKAC on Tuesday 17th, and the 70MHz FMAC and UKAC on Thursday 19th. The 70MHz Trophy contest runs for six hours on Sunday 22nd. Last year activity on the band was pretty high and entrants to this contest were treated to enhanced propagation – not just Sporadic-E, but Auroral. The SHF UKAC is on Tuesday the 24th.

PHOTO 1: Trowbridge and District ARC won last year's VHF NFD Mix & Match section.

The UK Six Metre Group (UKSMG) Summer Marathon continues all month. Work as many locator squares as you can, whenever you can, on 6m. The IARU HF Championship runs for 24 hours on the 14-15th. As well as being a contest for individuals around the world there is a team element, with teams representing national societies. For the past few years the callsign used by the RSGB HQ team has been GR2HQ and it will be on the air again this year. GR2HQ stations will be spread across the country, at some of the best equipped contesters' locations – and those people open up their shacks to other top contesters, each forming a sub team. Each GR2HQ station concentrates on one band/mode, for example 20m SSB, but some of the bigger stations will be active on more than one band/mode. They are all linked live via the internet, so if you want to know what frequency any of them is on you can ask any of the others. Finally, the UK Microwave Group has a High Band (5.7/10GHz) contest on Sunday 29th.

Steve White, G3ZVW
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RSGB HF Events

Date	Event	Times (UTC)	Mode(s)	Band(s)	Exchange
Mon 2 Jul	80m Club Championships	1900-2030	CW	3.5	RST + SN
Wed 11 Jul	80m Club Championships	1900-2030	SSB	3.5	RS + SN
Sun 22 Jul	Low Power Contest *	0900-1600	CW	3.5-14	RST + SN + power
Thu 26 Jul	80m Club Championships	1900-2030	Data	3.5	RST + SN
Sat-Sun 28-29 Jul	IOTA	1200-1200	CW/SSB	3.5-28	RS(T) + SN + IOTA ref

RSGB VHF Events

Date	Event	Times (UTC)	Mode(s)	Band(s)	Exchange
Tue 3 Jul	144MHz FMAC	1800-1900	FM	144	RS + SN + Locator
Tue 3 Jul	144MHz UKAC	1900-2130	All	144	RS(T) + SN + Locator
Sat-Sun 7-8 Jul	VHF NFD	1400-1400	All	50-1.3G	RS(T) + SN + Locator
Sun 8 Jul	3rd 2m Backpackers	1100-1500	All	144	RS(T) + SN + Locator
Tue 10 Jul	432MHz FMAC	1800-1900	FM	432	RS + SN + Locator
Tue 10 Jul	432MHz UKAC	1900-2130	All	432	RS(T) + SN + Locator
Thu 12 Jul	50MHz FMAC	1800-1900	All	50	RS + SN + Locator
Thu 12 Jul	50MHz UKAC	1900-2130	All	50	RS(T) + SN + Locator
Tue 17 Jul	1.3GHz UKAC	1900-2130	All	1.3G	RS(T) + SN + Locator
Thu 19 Jul	70MHz FMAC	1800-1900	FM	70	RS + SN + Locator
Thu 19 Jul	70MHz UKAC	1900-2130	All	70	RS(T) + SN + Locator
Sun 22 Jul	70MHz Trophy +	1000-1600	All	70	RS(T) + SN + Locator + Postcode
Tue 24 Jul	SHF UKAC	1830-2230 ~	All	2.3G & up	RS(T) + SN + Locator

Best of the Rest Events

Date	Event	Times (UTC)	Mode(s)	Band(s)	Exchange (info)
5 May - 5 Aug	UKSMG Summer Marathon	All	All	50	4-character Locator
Sat-Sun 14-15 Jul	IARU HF Championship	1200-1200	CW, SSB	1.8-28	RS(T) + ITU zone (UK=27)
Sun 29 Jul	UKuG High Band	0600-1800	All	5.7, 10G	RS(T) + SN + Locator

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

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This radio is cellular so works like a walkie talkie but uses the cellular network as a repeater! This means hand held to hand held or handheld to mobile comms around the world. Companies like ID offer a suitable sim with EU roaming from £3.99 a month or if you are in the UK Freedompop is available otherwise you can use it on Wifi! Using Apps like Zello & Teamspeak you can talk privately for just the cost of your sim! Please note this radio does not transmit on the amateur bands For the Radio amateur you can link to many networks using the International Radio Network For the non-amateur think of it as well behaved CB with worldwide coverage or Private 1 to 1 calls! For the private use all the advantages of cell phone coverage while looking professional Please note this version uses unlocked Android and allows you to fully utilise the PTT functions

Features

- Intelligent Global Intercom • More than 80 Hours standby time
- Dual chamber speaker to give Enhanced audio • GPS built in
- Micro 5 pin data line • Supports MP3 & MP4 • 2.4 inch High Quality Screen
- Extended memory up to 32GB • Waterproof IP54

WHISTLER

Moonraker have worked with Whistler to customise a UK band plan for the scanners! This ensures the radios cover UK bands in the correct steps and the correct mode. When a user does a service scan it will search in the correct steps for the selected band ensuring maximum received stations. The radios will receive both amateur and commercial DMR transmissions, as (apart from the frequency) they are fundamentally the same mode. The radio is supplied with software and users can select mode when writing memories or select auto and it will work out the mode itself!

TRX-1 25-1300MHz Digital Handheld Scanner (left) **£419.95**
TRX-2 25-1300MHz Digital Base Scanner (right) **£479.95**

DMR Dual Band Transceiver

MOONRAKER

Dual Band DMR has arrived with twice the fun with the MOONRAKER HT-500D Dual Band DMR Digital & Analogue hand held Radio!
The HT-500D takes the experience of DMR to a new level with features designed for the amateur radio user.
Amazing value £199.99!

MT-270M

Dual band mobile transceiver
136-174/400-450MHz 25W
Amazing value £79.95!

MT-SC Software cable **£9.95**
MT-DC Cigarette lighter and power cable **£9.95**
MT-RM Replacement microphone **£12.95**

PRESIDENT ELECTRONICS

Ronald

10/12m mobile transceiver
AM/FM 50W+ PEP
Amazing value £169.95!

Lincoln II Plus 10/12m mobile transceiver AM/FM/LSB/USB/CW 35W ... **£239.95**

AnyTone

AT-778UV

Dual band 136-174/400-490MHz
30W FM mobile transceiver
Amazing value £99.95!

AT-D868UV

VHF/UHF DMR Handheld **£139.95**
The AnyTone D868UV radio was developed to conform to the DMR Tier I and II requirements. The radio offers 4,000 Channels, 10,000 Digital Talk Groups with 150,000 Contacts. The large colour display offers clear information about the radio operation and function, including displaying who you are connected to. The powerful transmitter is very reliable and offers up to 7 Watts of power for a hand-held. The Anytone AT-D868UV has been designed for radio amateurs and has the ability to take the radio outside of the code plug in VFO mode (Single button press) So it is a dual band Hand held with DMR rather than a DMR radio with a dual band handy!

LEIXEN

VV-898 £59.95
Dual Band
136-174/400-470MHz 10W
mobile transceiver
VV-898S Dual Band 136-174/400-470MHz 25W mobile transceiver **£69.95**
VV-898SP Dual Band 136-174/400-470MHz 25W mobile backpack transceiver, this mobile backpack transceiver you can take virtually anywhere you need it! Leixen combined their micro-compact, 25 watt Dual Band UHF/VHF Mobile Radio with a powerful 12A Li-ion rechargeable battery and put it all in a sturdy chassis you can fit in your pack or emergency bag for use anytime, anywhere! .. **£149.95**
VV-8SC software and cable for all Leixen transceivers

BAOFENG

UV-5RC+ Dual band 136-174/400-480MHz
4.5W handheld transceiver **£29.95**
BL-5 Replacement 1800mAh battery **£12.95**
UV-5SM Fist speaker microphone **£9.95**
UV-5BE Battery eliminator **£9.95**

ICOM

Base

IC-7610 HF/50MHz SDR base transceiver **£3499.95**
Following on from the technology incorporated into the IC-7300, the IC-7610 adopts the same RF direct sampling system for signal processing. By converting the analogue signal directly to a digital signal and processing it within the FPGA (Field Programmable Gate Array), it provides improved transmission phase noise and excellent RMDR of 105 dB (at 1 kHz detuning).

IC-7300 HF/50/70MHz base transceiver **£1199.00**
The IC-7300 is a revolutionary compact radio that will excite HF operators from beginners to experts. This new model has a high-performance real-time spectrum scope and employs a new RF direct sampling system.

Mobile

ID-4100 D-Star dual band mobile transceiver **£475.00**
The ID-4100 makes using DSTAR more fun and more comfortable thanks to the terminal mode / access point mode for the first time in mobile devices . This feature enables DSTAR via the Internet from any location you do not have access to a DSTAR repeater.
IC-2730E Dual band mobile transceiver **£289.00**
This stunning new dual band mobile transceiver features a large high-contrast LCD screen with backlight, V/V and U/U simultaneous receive capability and optional Bluetooth® connectivity for hands-free and remote control communications.

Handheld

ID-51E PLUS2 D-star dual band handheld transceiver **£379.00**
This is the third generation of the successful D-Star handheld transceiver. Like the original ID-51E, it covers 2 meters and 70cms and receives two bands simultaneously (V/V, U/U & V/U)

Helitron

DV4mini UHF USB 430MHz stick for D-Star and DMR £109.95
is a tiny but powerful USB stick that can change any PC into a HOTSPOT for the modes D-Star and DMR (C4FM Fusion is being prepared). It contains a powerful 32-bit micro controller as well as a complete 70cm transceiver and modulator/demodulator for GMSK and 4FSK (including raised cosine) as well as a USB interface. It does not require its own power supply as it is powered through the USB interface

DV4mini VHF USB 144MHz stick for D-Star and DMR **£119.95**
DV4mini AMBE USB 430MHz stick for D-Star and DMR **£229.95**
This version contains an AMBE chip which allows the use of your computer's microphone and speaker to talk simultaneously to reflectors and through the DV4maini to other digital radios in range. DMR, DStar, NXDN and C4FM/Fusion are supported with the AMBE chip

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Inrico T320 Network Radio

Inrico T320: a very modern device, packaged in a familiar format. This photo is about 90% of life size.

I must admit I hadn't heard about so-called Network Radio until the article on page 16 was proposed to me. Then, coincidentally, Chris Taylor at Moonraker told me he had some shiny new network radios and asked if we'd like a look. Always one to respond to an interesting possibility I took him up on his offer and this is what I found.

As a completely new and naïve user of Network Radio I wasn't quite sure what to expect. My nearest equivalent experience – albeit one-way only – was using BBC iPlayer to listen to Just A Minute. That's like paddling in the sea at Margate as preparation for captaining an oil tanker. Thankfully, the consequences of getting something wrong with the radio were somewhat less disastrous than one might get from absent-mindedly trying to park a supertanker at a supermarket in Nuneaton.

What's in the box?

The T320 arrives in a simple brown cardboard box. The radio itself is in a bag on the top; beneath it I found a mains adapter with a UK-style plug and standard size USB socket, a USB cable, a short 4G LTE aerial, a 3500mAh battery, a belt clip with screws and a slim manual in English and Chinese. Some variants come with a drop-in charger that engages with a couple of gold studs on the radio's back panel; the review sample relied on the micro USB socket for charging.

Unfortunately the belt clip arrived in bits – I think it may have worked loose in transit. It took me and a colleague about half an hour to reassemble it. Whether we are just pathetically inept or it really *is* fiddly is an open question, but I would recommend you *don't* try and disassemble the belt clip into its component parts!

The hardware

There's no escaping the fact that the T320 is basically a very, very rugged Android smartphone in a walkie-talkie-style case. The screen is smaller and lower resolution than many smartphones, but perfectly adequate. In common with most LCDs I've used, it was a bit hard to read in direct sunlight but fine under all other lighting conditions I tried. The operating system is Android 7.0. The sample I received had 1GB of RAM and 4GB of internal storage, but there is also a microSD slot that you can use to expand the storage if needed. I fitted a 16GB card, simply because I had one handy, and it showed up in the file explorer exactly as expected. One thing I found, but don't know if it's standard, was that I couldn't access either the internal memory or the microSD card from a Windows 7 PC via the T320's USB socket, although the device itself did show up in Windows. It didn't bother me but might be an issue if you wanted to transfer, say, photos from the T320. I simply emailed them to myself – more on the cameras later.

On the top panel is a reversed SMA-type connector for the supplied short, non-flexible antenna. I didn't get the chance to check the radio in anything other than good-signal locations; performance seemed the same whether or not the antenna was connected. Beside the socket is a click-type rotary volume control. On the sample I tried this was a bit wonky and sometimes turned the volume down-up-down-up as you rotated it. In practice I tended to use the lowest volume setting, which I found quite adequate (or

The PTT button, with its natty orange outline, is perfectly placed. The belt clip feels very robust and the rear camera looks well protected. A small moulding provides for a wrist strap.

possibly even a bit much) for quiet locations like the office and at home. The T320 has bags of audio welly if you need it.

On the left side there's a big, orange-outlined traditional-looking PTT, round camera shutter button and a bright orange 'SOS' button that no-one seems quite sure how to use; on the right there's a micro USB charging socket (I couldn't transfer data but that's probably a changeable setting). Under a cover secured by a screw is a gold multiway connector for an earphone/mic interface. I had no accessories I could try with it.

The front panel is dominated by the keypad and LCD. Keypad action is firm and precise, although I was surprised to find I barely used it. Most of the actions were done via the touchscreen LCD. I do have to say that the touchscreen wasn't as responsive as the one on my (much more expensive) phone; I wonder if this is the price we have to pay for its ruggedness. Its small

size also made it tricky for a while as I learned the art of precision touchscreening: as you'll see from the photo, the characters are really small compared to my big fingers. But it sufficed.

As a smartphone, the T320 just plain *works*. In truth, it's not a particularly special smartphone, but it certainly doesn't feel like a budget device – the responses were speedy, with none of the lag that I associate with cheap phones.

There are two cameras, front and rear, that are perfectly adequate. I took a couple of test images with the rear (main) camera and a selfie with the front camera. Onscreen, as I was taking the selfie the image had a pronounced blue tint but the colour balance of the resulting photo was fine. I wouldn't want to use either of the cameras as my main image-making device (I normally use a DSLR so I have high expectations) but for casual use in good light they're fine. Zello, and possibly other Network Radio software, lets you send photos via the system, which is interesting to explore and has exciting possibilities for things like incident response and management.

Setting up from scratch

Once I'd opened everything up, figured out how to fix the belt clip and so on, it was time to set up the device. Although the T320 will operate perfectly well on Wi-Fi alone, I put in a SIM card that I had handy. It will work with any network provider because the device is not network-locked. As I understand it, a 500MB-per-month allowance is more than adequate for all but the most intensive users; you don't need one if you plan only to use the T320 within range of a Wi-Fi hotspot but adding a SIM and 3G/4G connectivity hugely extends its versatility. Someone I spoke to mentioned they'd got a £17 per *year* SIM card in theirs. Fitting the SIM was no more or less fiddly than the mobile phones I've encountered over the years and, as mentioned earlier, the optional microSD card went in fine, too. The T320 has two SIM slots, making it very flexible in use.

The battery seems to be very slightly thicker on one face than the other. This sounds strange but it means that if you try to put it the wrong way round it 'feels wrong', whereas if you have it the right way up it slips right in. Once that was done I simply replaced the battery cover and clipped the restraining strap into place: sorted.

I then had to go through the usual straightforward routine of setting up a new Android device. I chose to set up a new user account but it would have worked equally well on my personal Google ID.

It was suggested that the best place to start was with Zello, so that's what I did. Zello is a free app that can be downloaded from the Google Play store. It installed without fuss. Then I had to set up a Zello account – again, a fairly painless process.

Channels, channels, channels

Zello is based on 'channels' – each with a name – and you can join as many as you want, or set up your own. As I understand it only public channels show up in the search list; there could be any number of private channels. I started searching around and added a few channels, including 'Network Radios', a very active publicly available channel that's well worth a listen.

I listened 'on the side' for a while and then tried to join in. That particular channel is 'lightly moderated' – your transmissions can only be heard by a Moderator until you're approved for transmit participation. My 'interview' lasted just one 'over' and I was immediately made very welcome. At that time, teatime on Friday, I was listening to and communicating with people from all over: Durban, South Africa, New York, USA, Kos, Greece and even exotic places like Scarborough. I was also interested to hear a gentleman in Scotland who said he was in the middle of a power cut due to a major thunderstorm. He was running his network radio from a 12V battery in his shack, operating over the mobile network rather than his usual Wi-Fi.

One of the things that came through from hanging around the Network Radios Zello channel was the sheer enthusiasm of the participants. At the time I started there were over fifty people on the 'frequency' but this varies according to time of day. I was told that in the previous 48 hours the largest number seen was 72. Almost all the users online had amateur callsigns, and the conversations I heard were well-mannered and well-disciplined: a model of amateur radio operating. Callsigns were given with overs (even though they're technically not necessary). Topics I heard discussed ranged from (unseasonably foul) weather through to detailed technical questions. It was very much like a repeater net of yesteryear, except that the audio was Q5 with no flutter, doubling, interference or fading. The nature of the system means there's usually a pause between overs, allowing the odd 'break' if needed.

I was surprised how many people I found whom I knew via other routes. One was a person I've spoken to many times before but, although we're not far apart, we've never actually worked each other. So this was a first amongst firsts!

This isn't really the place to discuss whether it is "real amateur radio", but it is worth noting that it *felt like* operating amateur radio to me.

If you don't have the possibility of erecting outside aerials, suffer from high local noise levels, or have any similar issues, the T320 *does* give you the certainty of communicating with like-minded people around the world.

Audio quality

As mentioned earlier I was particularly struck by the very high audio quality on the Network Radio channels – and the sheer *volume* that the T320 could produce. Unlike even the best mobile phones I've come across, this is a LOUD device and can easily be heard outdoors over the hubbub of life. The output is similar to that of any conventional handheld radio and, although I didn't spot any figures in the slim manual, I'd guess it's up to a watt or two of audio. The speaker is a decent size and built into the back of the case, unlike the tiny, compromised transducers that you get in most smartphones. Ten out of ten on that score.

When I tried it on other apps, such as BBC iPlayer, the volume was equally impressive, though I think the audio response is tailored for speech rather than music. I'd definitely use the T320 in the morning to overcome the noise of the bath running whilst I listen to the Today programme online: it would be audible with ease, whereas my normal phone (itself a fairly loud one) is drowned out by the running water.

I'm rather sensitive to audio compression artefacts and find many modern digital compression systems hard on the ear or even downright impossible to understand what's being

Don't try this at home, folks. No, really. Don't.

I found the onscreen keypad a little fiddly but you don't have to use it much. A cheap Bluetooth keyboard works fine, or you can set up your account and channels on a desktop computer.

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

Underneath everything, the T320 is an Android device that runs standard apps.

A captive cover conceals the micro USB charger socket, contributing to the T320's IP54 rating. A removable panel (retained by a screw) covers the accessory port's gold contacts.

The volume control and antenna connector are on the top panel.

said (no, I'm not saying which). I am delighted to report that the audio I received via Zello was exemplary, what we used to call "BBC quality" – even though in my opinion some contemporary R4 long-distance interviews and even studio recordings leave a lot to be desired! But I digress.

Transmit audio is also good. Reports said that the quality was pretty much the same as everyone else on the 'band' – ie excellent.

The only thing that *seemed* wrong was that the speaker went 'pop' every time the screen was pressed (and on many other occasions). Initially I thought this was down to the audio amplifier being turned on and off but I was completely wrong: it's intentionally done for feedback and is easily turned off from the Settings menus. I ended up turning it back on because I found it was actually a useful feature. (The option to vibrate-on-tap didn't seem to work, though I know the vibration hardware is functional).

Ease of use

The things that really set the T320 apart from running a radio app on a smartphone are its volume and the fact that it has a push-to-talk (PTT) button. It is amazing the psychological difference that makes. It is the difference between something like Zello being just another app, or telephone interface, or whatever, and feeling like a true radio. Add that to the way the channels I used work – they're very self-disciplined – and frankly I forgot I wasn't on a 2m or 70cm handheld. I was talking to amateurs, all using callsigns as per good amateur practice, about the sort of things you'd normally chat about on an amateur net. But, as I've mentioned, people were effortlessly popping up from all over the world and joining in with perfect audio; I know of no amateur band that can achieve that without internet-backed infrastructure.

Keys on the keypad are very positive in action but I found it mostly superfluous except for things like phone calls.

A drop-in charger, which I didn't have, would be an ideal accessory, because – as with phones – I found charging via the micro USB plug a bit fiddly. On the other hand, suitable USB chargers are *everywhere* so there's never any scrabbling about for the *only* wall wart that will work with your kit (step forward, my Camileo P30 camcorder). Battery life is excellent: I've seen figures like 60 hours mentioned and indeed when I used it for many hours during this review I didn't have to recharge the 3500mAh battery. And, as it's easily removable (unlike most phones), it's possible to keep a spare, which would keep you in contact with the world for ages.

Other applications

I've mostly talked about Zello in this review because, for various reasons, I had only a limited time to try the T320. However, it will run pretty much any Android application – I installed Echolink, among other things – and although I didn't get the chance to test other apps I have no reason to think they wouldn't work just as well as Zello. Having tried this truly portable form-factor with a proper PTT I don't want to go back to being tied to a PC for internet comms – or even a PTT-less phone!

Summary

The T320 is a super platform for accessing network radio and similar applications. Its killer features are the PTT, removable long-life battery, the audio quality and volume: these are what set it apart from any smartphone-based system. You can use it to access public channels or set up your own private one, which can only be heard by invited users. I can also see it being useful when you're out and about, whether alone or in a group: you don't have to mess around making phone calls and everyone on your channel can hear you wherever they may be. Whether you're in a car (it's essential to use a hands-free kit if you're driving), at home or exploring, you get solid, reliable communications for which distance is irrelevant.

Above all the T320 is a robust piece of kit that looks like it will take a lot of punishment without complaint, unlike the more delicate alternatives. And at about £170 it is very affordable, costing about the same as a conventional brand-name dual band handheld of similar robustness.

My thanks to Moonraker for the loan of the review sample (www.moonraker.eu).

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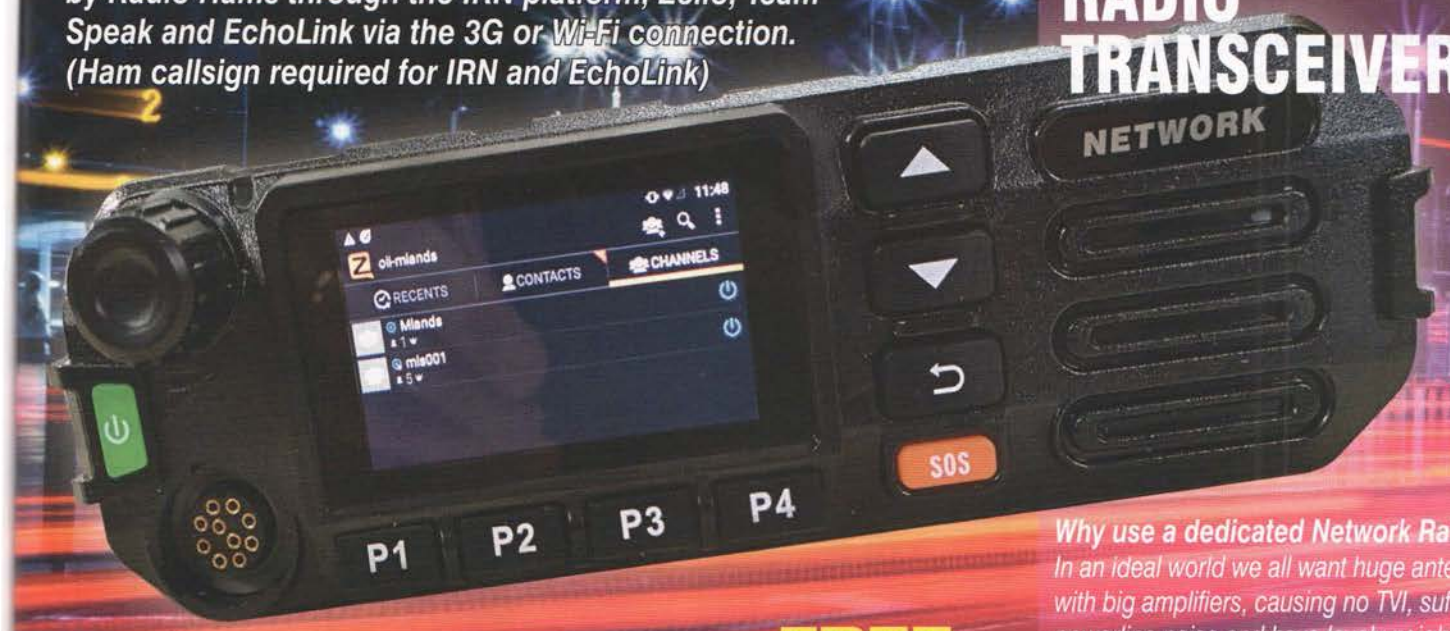
INRICO TM-8

NETWORK RADIO TRANSCEIVER

Inrico TM-8 is the first mobile network Radio. Designed for the commercial world, but supported by Radio Hams through the IRN platform, Zello, Team Speak and EchoLink via the 3G or Wi-Fi connection. (Ham callsign required for IRN and EchoLink)



Available now ML&S £159.95. **FREE** UK Shipping on this product

The unit will require simple programming before use.

See MLandS.tv & click 'Videos' for full info.

Why use a dedicated Network Radio?
In an ideal world we all want huge antennas with big amplifiers, causing no TVI, suffer no powerline noise and have lovely neighbours that welcome a 100ft tower in the garden.

Maybe you used to have a great shack full of gear with a moderate antenna system, but in later years your move into a more compact home doesn't allow you the room for all the gear or indeed outside antennas.

That's where Internet Radio comes in.
Basically, the TM-8 is a modified Android Phone in a radio-like looking case, (with speaker and PTT microphone just as you would have in a standard 2m FM mobile).

Once you've configured the unit for your particular needs, (see "how-to" video on our MLandS. TV channel on YouTube), you can then communicate anywhere in the world via Ham Radio networks with users calling in from their normal 2/70 transceivers through repeaters, or to other Internet Radio operators. Please note that this is ***not*** *a 2m/70cm transceiver.*

YouTube

INRICO T320 HANDIE NOW AVAILABLE!

RRP: £229.95. ML&S Only: £169.95.

The new Incrico TM-320 is the first hand-held Network Radio Transceiver. Originally designed for the commercial world but supported by Radio Hams throughout the IRN platform, Zello, Team Speak and EchoLink via the 3G/4G or WiFi connection. (Ham callsign required for IRN and EchoLink)
PLEASE NOTE This is a Network Radio Transceiver & will not TX/RX directly on 2m or 70cm.

ML&S offer the transceiver unprogrammed allowing the user to configure to individual set-up. This is readily and easily available and the typical cost is under £5.
DON'T FORGET TO ADD THE CHARGER BASE IF REQUIRED
Basic setup will require:
Teamspeak (Play Store)
Button Mapper (Play Store)
Echolink (Play Store)

Antennas

This month, we examine how a horizontal HF wire dipole antenna can be multi-banded by the addition of a reactive impedance into each leg of the antenna.

Concept of operation

Using an HF dipole antenna as an example, its wire-span's length is made an electrical half wavelength (λ/2) corresponding with the desired resonant frequency of operation (F1). It is possible to operate the HF antenna on a lower frequency (F2) by adding a reactive load at each end of the wire-span comprising a reactive component (Z) and a short length of wire (H) as shown in **Figure 1**.

When operating at the lower frequency F2, the effect of the reactive load is to extend the dipole electrically to bring it into resonance at F2. However, when operating at the higher frequency F1, each reactive component (Z) now introduces a high impedance that effectively isolates the wire (H) extending beyond them and the antenna now functions as the λ/2 dipole resonant at F1.

Using loading coils

As an example of the use of this technique, a G5RV antenna **[1]** designed to operate on the 80m band can be retuned to extend its coverage to the 160m band. The reactive load connected to each end of the antenna's wire span comprises a loading coil (L) and a short length of wire (H) to tune the antenna. This technique does extend the overall length of the antenna's wire-span, although the length of the modified antenna is still less than a G5RV antenna constructed for use on the160m band. The wire (H) extending beyond each loading coil has a capacitive reactance and this is used, in conjunction with the loading coil's reactance (L), to bring the antenna to resonance at the lower frequency F2.

The concept of this antenna is shown in **Figure 2**. This version of the G5RV antenna had a wire span 31.1m long. The space available allowed the wire span to be extended by at least 6.25m at each end, giving a theoretical length of 44.1m.

Assuming 5pF/m **[2]**, 6.25m of wire has an equivalent capacitance of about 31.25pF. There are two lengths of wire used to extend the antenna, giving an overall capacitance of 62.5pF. This capacitance (C) is required to resonate the loading coils (L) on the 160m band. Taking 1.85MHz for this frequency (f), it is possible to calculate the inductance using:

$$L\,(\mu H) \simeq \frac{1}{4.\pi^2.f^2.C} \simeq$$

$$\simeq \frac{1}{4.\pi^2.(1.85 \times 10^6)^2.(62.5 \times 10^{-12})}$$

$$\simeq 118\mu H$$

This inductance is equally divided between each leg of the wire span as two 59μH loading coils. The approximate number of turns required to wind an inductor is given by **[3]**:

$$\text{Number of turns} \simeq \frac{\sqrt{(457.2).(L).(D) + (1016.Len.L)}}{D}$$

Using a loading coil of length 120mm (Len) and a diameter of 40mm (D), the number of turns required for a loading coil of 59μH (L) is given approximately by:

$$\frac{((457.2 \times 59 \times 40)+(1016 \times 120 \times 59))^{½}}{(40)} \simeq \textbf{72 turns}$$

Two loading coils were made up of 72 turns wound using 0.7mm diameter stranded copper wire on to a PVC tube of diameter 40mm. These were connected to the ends of a full-size G5RV antenna (intended for 80m to 10m operation). 6.25m of the same wire was then connected to the end of each loading coil. Initially the antenna was found to resonate at around 2.0MHz and the extension wires (H) were lengthened to 6.8m. This allowed the antenna to resonate on 1.9MHz enabling its use on the 160m band. The antenna's final length was 44.7m and while this may seem long, it is around 18.5m shorter than the wire span required for a double-sized G5RV antenna (intended for 160m to 10m operation, ie 63.2m long).

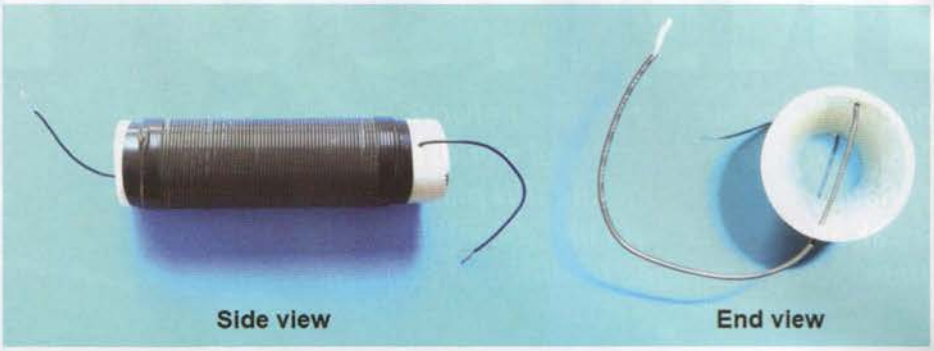


PHOTO 1: The loading coils used to modify a full-size G5RV for operation on 160m.

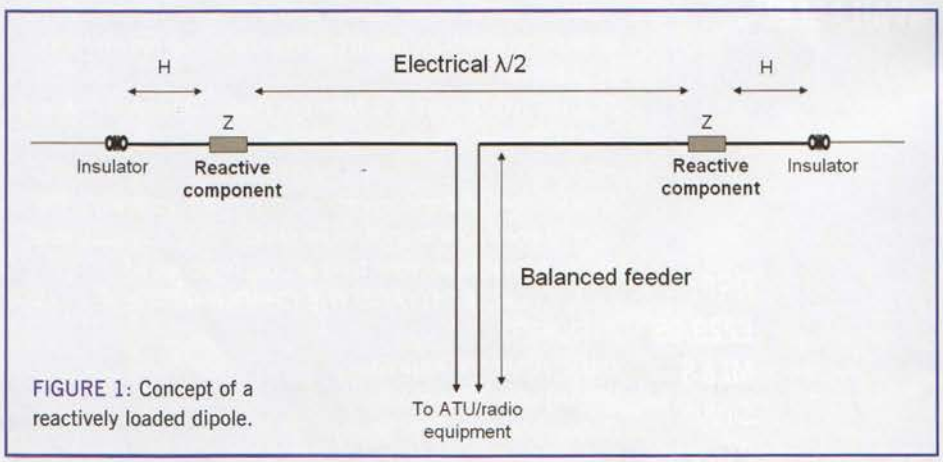


FIGURE 1: Concept of a reactively loaded dipole.

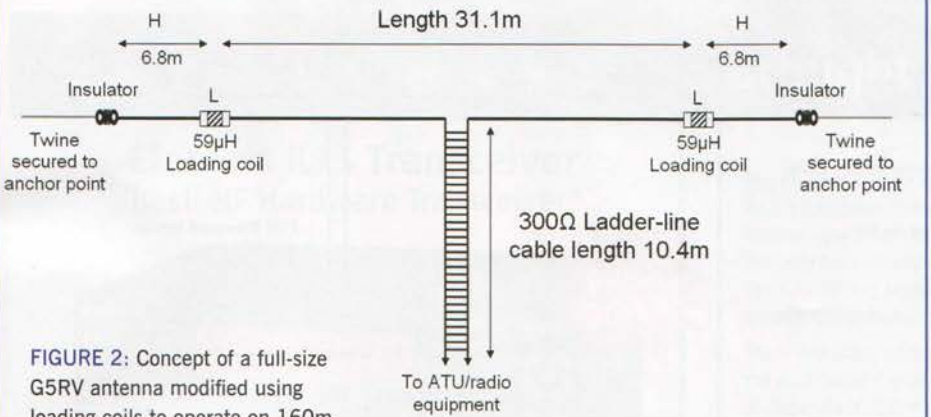


FIGURE 2: Concept of a full-size G5RV antenna modified using loading coils to operate on 160m.

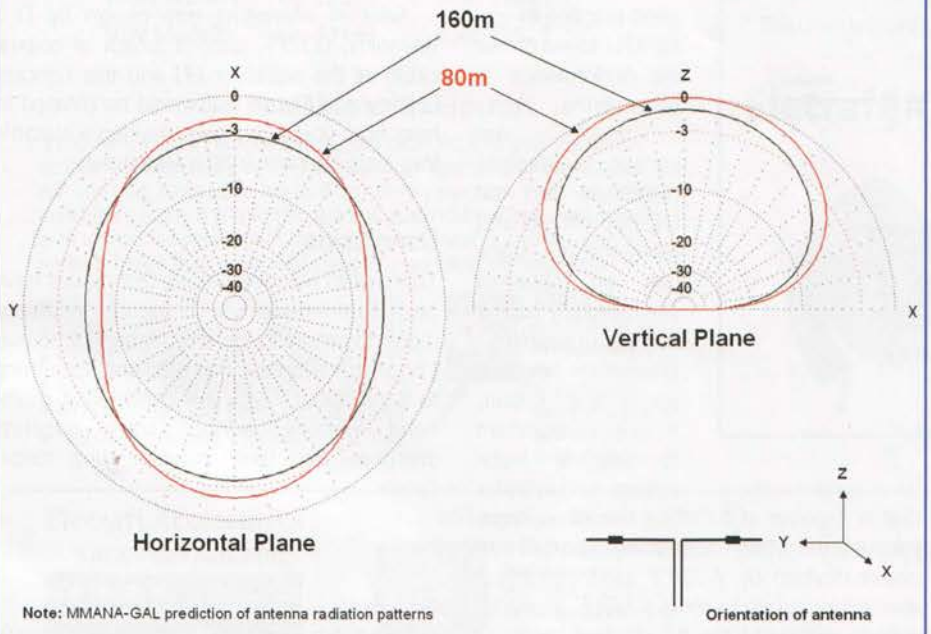


FIGURE 3. Comparison of MMANA-GAL predicted 160m and 80m radiation patterns with the loaded G5RV antenna, modelled at 11m AGL.

The loading coils act as chokes on the bands above 160m, enabling operation on the bands from 80m to 10m, although the use of an ATU is recommended to obtain the best performance for all the bands.

Using MMANA-GAL [4], for comparison, the predicted radiation patterns for the loaded G5RV antenna on the 160m and 80m bands are shown in **Figure 3** with the antenna at 11m AGL. The horizontal and vertical patterns are similar and indicate the antenna's suitability for shorter skip contacts on the 160m and 80m bands. However, longer skip contacts should be possible when conditions allow.

The loaded version of the G5RV antenna was used for several years enabling many contacts to be made across the UK, Europe and into North America on the 160m band. The antenna's details have been included in Figure 2 and an example of one of the loading coils used is shown in **Photo 1**.

The trap dipole

The coverage of a centrally-fed dipole antenna can be extended by connecting at each end of the wire-span a reactive load comprising a parallel tuned circuit (L/C) and a short length of wire (H) as shown in **Figure 4(a)**.

When the wire's length between the parallel tuned circuits' connection is made an electrical half-wavelength (λ/2), the central section of the antenna forms a dipole that is resonant at frequency F1. When both parallel tuned circuits are resonated close to F1, they introduce a high impedance that effectively isolates the wire ends (H) beyond them.

The wire ends (H) extending beyond the tuned circuits enable the antenna to resonate at frequencies above and below the inner dipole's resonant frequency F1 to enable multi-band operation. The tuned circuits are usually referred to as *traps* and the arrangement is usually referred to as a *trap dipole* or *trap antenna*.

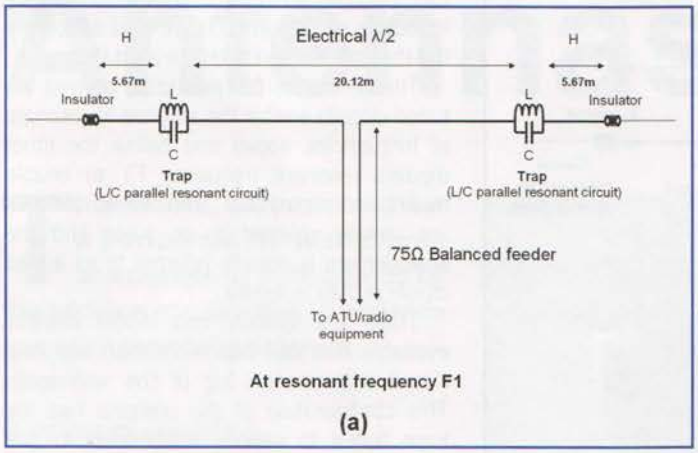
There are various trap dipole designs available that can use more than one trap circuit within each leg of the wire-span. This configuration of the antenna has the traps tuned to various frequencies to suit the bands required. Some forms of the trap dipole use traps that are not resonant on the desired band and rely on inductive or capacitive loading to enable the antenna to work on several bands.

As an example of this technique, the antenna devised by Chester L Buchanan, W3DZZ, [5], [6] has been summarised where two traps are used. This antenna, and its derivatives, continues to be a popular and widely-used antenna whose dimensions are shown in Figure 4(a).

At a much lower frequency F2, below frequency F1, the traps are no longer resonant and act as loading inductances, as shown in **Figure 4(b)**. These, in conjunction with the wire extensions (H), effectively extend the electrical length of the wire-span into a second dipole. Careful choice of the extension wires' length (H) and the inductors (L) used can enable the second dipole to resonate at F2, where this is half of F1. In this way, if F1 was 7.10MHz then F2 becomes 3.55MHz enabling the antenna to be operated on both the 40m and 80m bands. The length of an 80m dipole designed using a frequency of 3.55MHz is close to 40.1m in length. The overall length of the W3DZZ dipole (including the traps' lengths) is close to 31.5m and so this has the advantage of being around 8.6m shorter.

At a much higher frequency F3 above the frequency F1, again the traps are not resonant and now act as series capacitances as shown in **Figure 4(c)**. This effectively electrically shortens the antenna and by a careful choice of the extension wires' length (H) enables it to perform as a 3/2-wave antenna on 20m, a 5/2-wave on 15m and a 7/2-wave on 10m. However, it is important to install the antenna as high above the ground as possible and clear of any close objects to enable the antenna to perform well.

Mike Parkin, G0JMI
email2mikeparkin@gmail.com



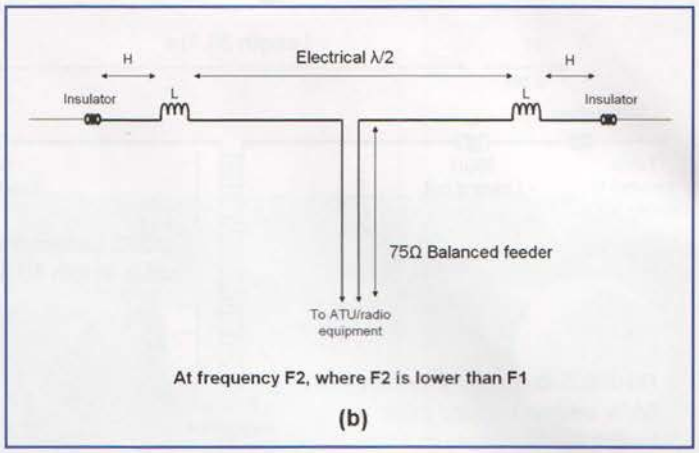
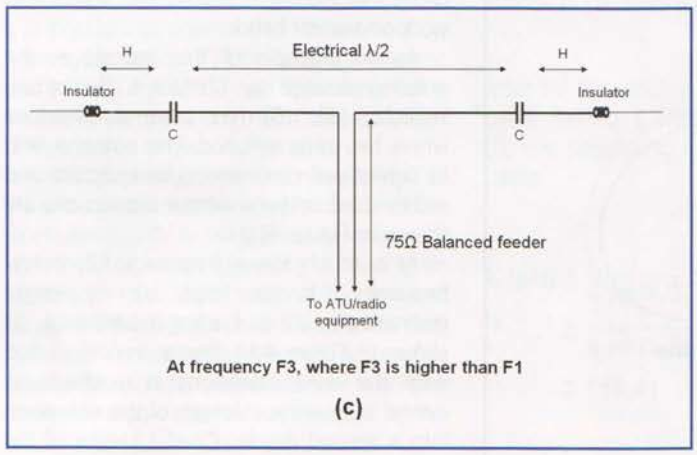


FIGURE 4: Concept of a trap dipole's operation, (a) at resonant frequency F1, (b) at frequency F2, where F2 is lower than F1, and (c) (below) at frequency F3, where F3 is higher than F1.



With the antenna clear of close objects, the antenna's feed point impedance at these frequencies is close to 70Ω allowing the wire-span to be centrally fed using a balanced 75Ω twin feeder cable enabling a low SWR to be achieved. If coaxial cable is connected to the balanced feeder cable, a 1:1 balun [6] should be used to minimise the effects from common-mode currents. However, it is good practice to use an ATU to maximise the performance of the antenna.

There are various designs published for the L/C trap circuits and ready-made traps can be obtained commercially from a number of suppliers. When making up a trap circuit, it is important to use a high-voltage capacitor that is capable of handling the RF voltages encountered when transmitting. The L/C trap circuit devised by W3DZZ used concentric aluminium tubes to form a 60pF capacitor able to withstand the RF voltages, with an inductor of 8.2μH wound above the outer aluminium tube (other versions have L/C variants of 12μH with 42pF or 10μH with 50pF).

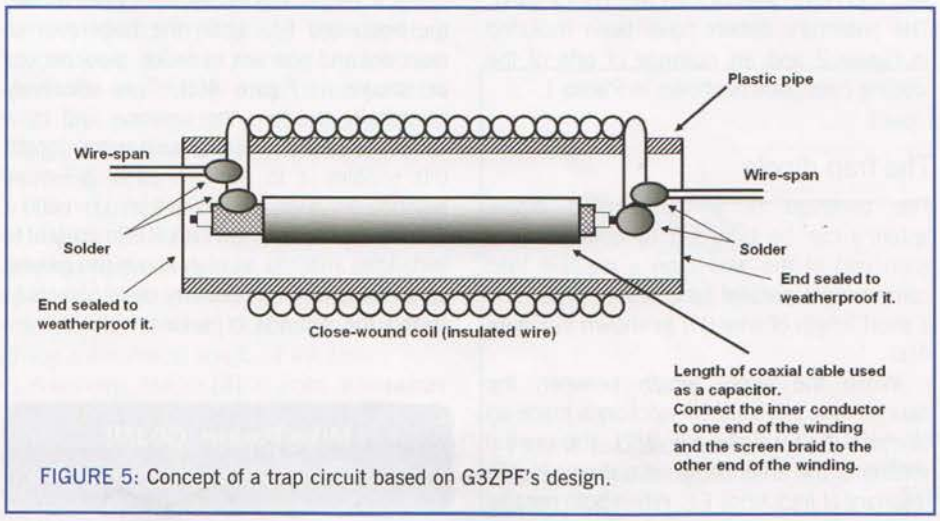


FIGURE 5: Concept of a trap circuit based on G3ZPF's design.

Another interesting trap design by D J Reynolds, G3ZPF, used a length of coaxial cable as the capacitor [7] and this concept is shown in **Figure 5**. I would be pleased to hear from you if you have devised a suitable trap circuit for use with a trap dipole.

Conclusion

This month reactive loading techniques have been summarised whose use can enable a dipole to be turned into a multi-band antenna. I hope this overview has provided something to think about if you are considering multi-band working without using separate antennas and their corresponding feeder cables.

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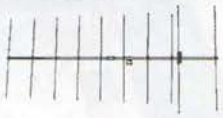

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This very compact and handy antenna analyser covers 1 - 60MHz. It has a full colour LCD which offers a very clear graphic display. Includes rechargeable battery with USB lead. A great little bit of test gear. **£352.95**

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This is a lower powered version that will handle up to 300W **£229.95**

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ATV

Simple SDR-based digital ATV transmission

The availability of affordable software defined radio (SDR) is now making it much easier to generate digital ATV transmissions. More importantly, the associated software is moving out of the 'geeks only' zone and is ready for use by those of us whose prime interest is not in computers, but in amateur radio and amateur television.

The most recent SDR to market is the LimeSDR Mini, which is available for about £115 plus about £28 import duty from CrowdSupply [1].

The LimeSDR Mini (**Photo 1**) covers the frequency range 10MHz to 3.5GHz and has 12-bit resolution on transmit and receive. The power output is in the region of 5mW depending on the frequency and the transmission mode. It connects to the host computer through USB 3.0, but works with USB 2 for some transmission and reception modes. It uses power from the USB connection so does not need a separate power supply.

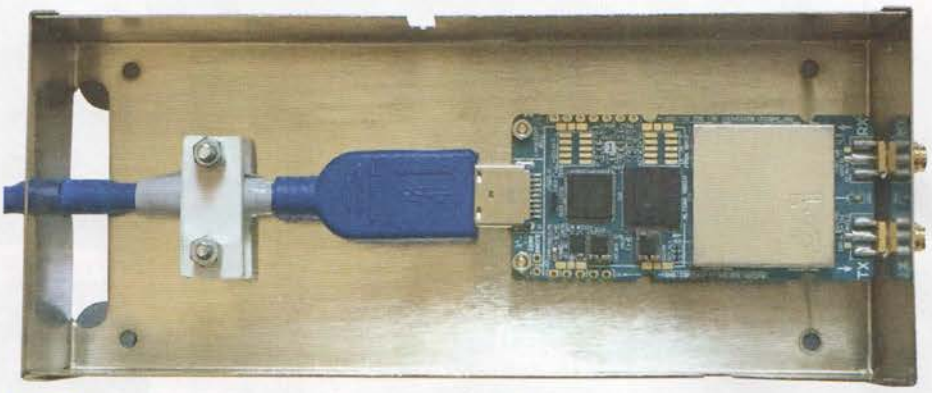


PHOTO 1: LimeSDR Mini mounted in a metal box for RF and mechanical protection.

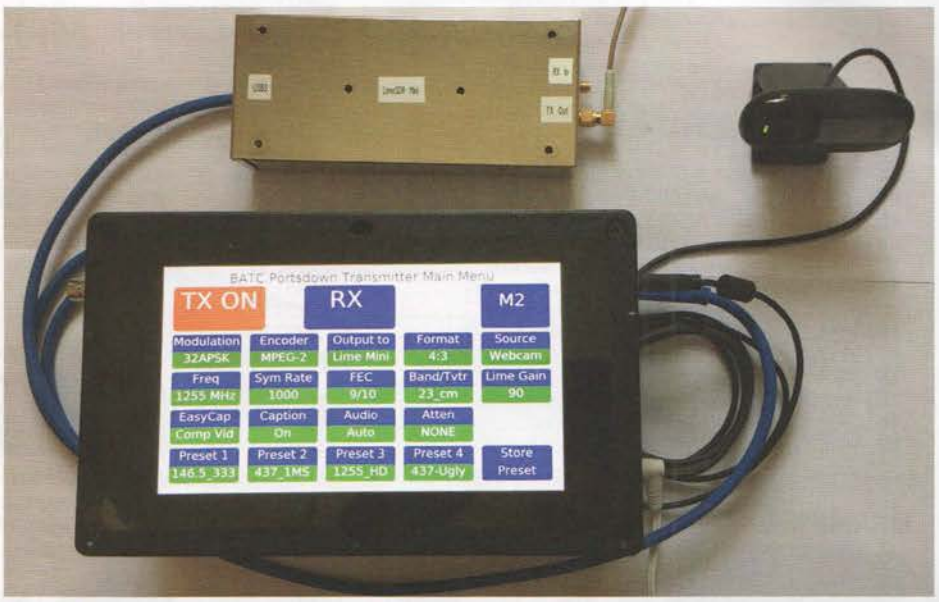


PHOTO 2: Portsdown transmitter with 7 inch touchscreen, webcam and Lime SDR Mini.

Digital ATV SDR software

Most of the digital ATV SDR software has been developed through open source initiatives, with a number of enthusiasts collaborating online using the code-sharing website GitHub to share ideas in order to achieve the best results. The most capable Windows software for digital ATV SDR transmitters is DATV Express [2] designed by Charles, G4GUO. The latest development versions of this software are capable of driving the DATV Express board (as described in March 2017 *RadCom*, but no longer in production), the Analog Devices Pluto (see November 2017 *RadCom*), the LimeSDR and the cheaper Lime SDR Mini. The LimeSDR has good output spectral purity (see **Figure 1**).

An alternative to the PC-based solution is the Portsdown transmitter [3], which uses a Raspberry Pi 3 and a touchscreen. The core software for this unit was written by Evariste, F5OEO, but it includes contributions from many other enthusiasts. Although originally designed to work with a companion Portsdown modulator board, the Portsdown transmitter can now be used to control a DATV Express board and is being developed to control a Lime SDR Mini. This development adds a DVB-S2 capability to the Portsdown transmitter.

From a convenience perspective, the Portsdown solution has a lot to offer as no PC is required (**Photo 2**). The system can easily be built to run from a 12V supply and is touchscreen-controlled. Pictures can be transmitted from the Raspberry Pi camera, a webcam or a standard video camera. No computing knowledge is required, as pre-programmed Portsdown SD cards for the Raspberry Pi are available from the BATC Shop [4]. With a touchscreen and a Lime SDR Mini, it really is plug and play.

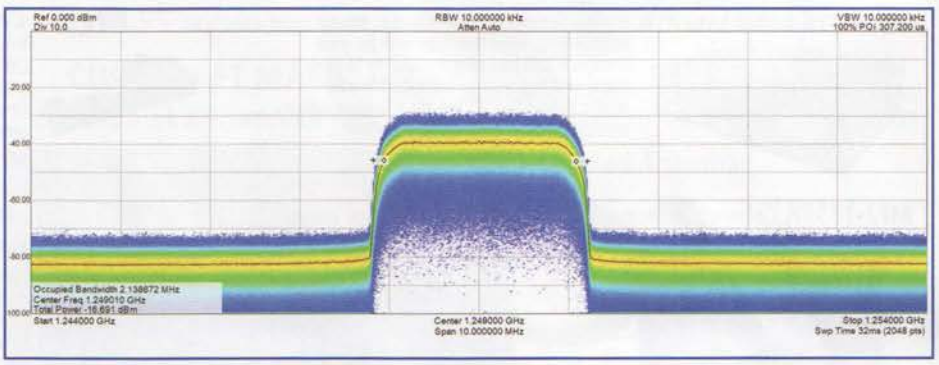


FIGURE 1: 2MS 8PSK digital ATV output spectrum from a LimeSDR Mini.

Completing the digital ATV transmitting station

The only additional equipment that is required to complete a TV transmitting station is a suitable power amplifier for the band in use (and of course an aerial).

Amplification to raise the level from the few milliwatts from the SDR up to a few watts for transmission sounds easy, but the requirements for linearity of the power amplifier are quite stringent to avoid 'spectral

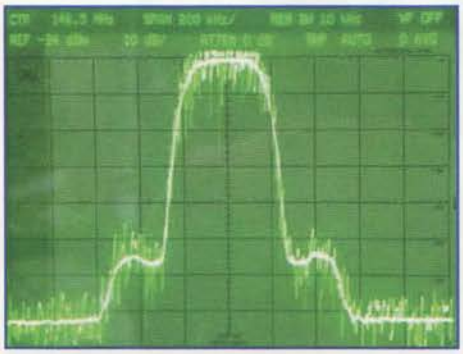


PHOTO 3: Spectrum of a clean digital ATV signal showing -55dB 'shoulders'.

PHOTO 4: GW3NWR/P in North Wales looking towards Kirkstone in the Lake District.

PHOTO 5: The Norfolk group: G8JAN, G0FVG, G4NJJ, M1BKF and G8GTZ.

PHOTO 6: The Yorkshire end: G8AGN and G0RPH.

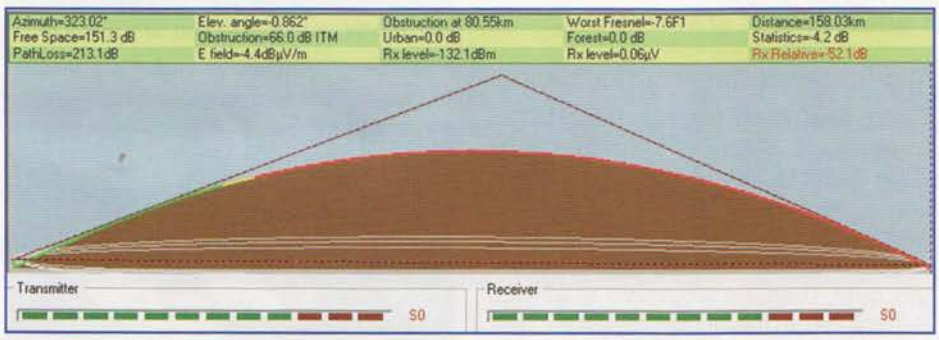


FIGURE 2: Path plot from Bridlington to Cromer showing the requirement for ducting.

regrowth'. This is where non-linearities in the amplifier cause the transmitted signal bandwidth to widen (and can also cause interference *within* the transmitted signal itself so, perhaps counter-intuitively, getting more power from your amplifier can actually *reduce* range!)

The digital TV output spectrum from modern SDR transmitters (**Photo 3**) typically has the first set of 'shoulders' at least 50dB below the main signal. A well-engineered power amplifier should not degrade this to more than about 35dB below the peak. Power amplifiers should typically be run at no more than 20% of their rated (1dB compression point) output power to make sure they operate with sufficient linearity.

There are no special requirements for the digital ATV aerial. Any antenna tuned for the frequency in use is suitable.

Two new UK records – 5.6GHz FM ATV at over 150km

A team from Furness ARS (Chris, M0KPW and Nick, G0HIK) went to Kirkstone with their 5.6GHz FM ATV equipment and exchanged pictures with the Wirral Amateur Radio Society (Brian, G4EWJ, **Photo 4**) at Blychau in North Wales on 21 April. This set a new UK record of 153km for ATV on the 5.6GHz band.

The transmitters and receivers used at each end were standard drone modules set to 5665MHz. G4EWJ used the TS352 1200mW transmitter and the RC305 receiver with a flat panel antenna that had a specified gain of 24dBi; M0KPW also used two flat panels (one for receive and one for transmit) while G0HIK used a dish. The Kirkstone to Blychau path is line of sight, but the temperature inversion that caused the trapped haze layer to be visible in the photograph probably helped with propagation.

This record of 153km stood for nearly 3 weeks, until 9 May. A team from Yorkshire (Barry, G8AGN and Richard, G0RPH) activated a 158km sea path from Bridlington to Cromer in Norfolk, where G8JAN, G0FVG, G4NJJ, M1BKF and G8GTZ were on the cliff top. This path is by no means line of sight (**Figure 2**), but there was a clearly visible temperature inversion over the sea. The over-sea duct enabled both stations to exchange P5 (noise-free) pictures with each other. The signals were so strong that pictures were even received on small turnstile aerials.

As can be seen from **Photo 5** and **Photo 6**, the aerials were a mix of dishes and flat panels. G8AGN used a 1700mW TS582000 module with a 21dBi panel for transmit, and a RC832 module with a 24dBi panel for receive. Across all the equipment, the highest transmitted power was less than 2W, so there is clearly lots of potential for greater distances to be achieved. Well done to all involved.

Websearch

[1] www.crowdsupply.com/lime-micro/limesdr-mini
[2] www.datv-express.com/CustomPage/Downloads
[3] https://wiki.batc.org.uk/The_Portsdown_Transmitter
[4] https://batc.org.uk/shop/

Dave Crump, G8GKQ
dave.g8gkq@gmail.com

International Marconi Day

International Marconi Day takes place annually on the weekend closest to Marconi's birthday. This year's event took place on the 21st of April; many clubs and individuals took part, many operating from sites historically associated with Marconi. Here are some of their stories.

Lisa, 2E0PXI and Rich, 2E0TGK operating GB4IMD.


Marconi's workshop hosted GB5LT.

Cornish Radio Amateur Club

Based in Redruth, Cornwall, the Cornish Radio Amateur Club is the driving force behind IMD, running it for some 31 years. Steve Holland, G7VOH worked very hard to make this year's event a success, registering 73 stations from around the world.

This year, setting up started on Friday afternoon at Stithians Showground, near Redruth, and took about three hours. Most of the club equipment is looked after by committee members so each set up their 'own' bit. The station comprised two Kenwood TS-570Ds (for voice) and a Yaesu FT-450D (for FT8/CW). Antennas were a Carolina Windom, a 40m Zepp and a multiband vertical built by John, G0FKF.

The 24-hour event stated at midnight, using HF voice and CW, mainly on 20m, 40m and 80m. At 7am the 'day' crew started, adding FT8 to the mix. IMD is an important event in the club calendar and many members drop in for a chat and/or to operate. Around 5pm the 'night shift' started again, ending at 2359. Overall, 332 stations were worked, 213 on voice, 41 CW and 78 on FT8.

James Richards, M6ZXZ

Waterside New Forest Radio Club

Our members made their way to Marconi's Workshop in the Manor of Cadland, just west of Calshot, Hampshire. Here, with kind permission from Aldred and Fiona Drummond, they set up GB5LT, using a transceiver and the club G5RV.

The station operated towards the higher end of 40m. Conditions were initially not good but improved in the afternoon. We had a total of 98 contacts, including Israel, Finland, Belgium, Norway, France, Germany, Spain, Italy (including one from Sardinia), Switzerland and the UK of course, including a few from the Orkneys and elsewhere in Scotland. Highlights included Aland Island, from Foehr Island, a Belgian maritime mobile OM on his 30' yacht, the Swiss Museum of Transport permanent station, Portland Bill Lighthouse permanent special event station, a Canadian (VE) Maritime Mobile in the Irish Sea, and our old friend and member of the original GB5LT group, Mike, F8VOU.

The station was set up, operated, and taken down by Tim, G4YVY; Robin, G0OSG; Tony, G6MNL; Colin, G4GBP; Bob, 2E0CZK; Darren, M6DPY; John, G1MKY and Rod, G6LVJ. All agreed that the activity had been well worthwhile.

Rod Hickley, G6LVJ


Tim, G4YVY and Tony, G6MNL in a corner of Marconi's workshop.

Mid-Somerset Amateur Radio Club

The operated GB0NFF from Wells Library for IMD on Saturday 21st April. NFF was the callsign of the American Marconi Station in Somerset County, New Jersey, used to provide cross-Atlantic communication during World War 1, using a spark transmitter on long wave (see also QRZ.com). Operation was limited to Saturday morning since the library closes at 2pm. Equipment used was a FT-991 and an off-centre fed multiband dipole. Unfortunately, due to a high local noise level, almost S9, a screened location and poor band conditions, only 20 or so QSOs were made on 80m. However, there was considerable interest from the general public, particularly for the display of vintage equipment and the Morse practice facility. The hobby was very well presented (the RSGB introductory video was also shown). The library staff thought it was very successful, despite the lack of internet access on the day.

David Wade, G8BFV

David, G8BFV operating GB0NFF in Wells Library.

Norfolk Amateur Radio Club

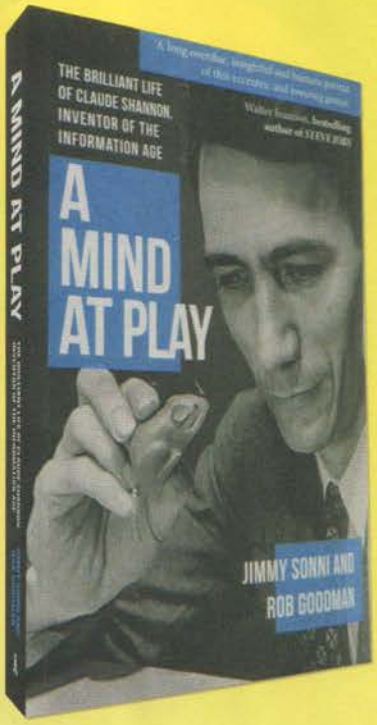
NARC ran GB0CMS at Caister Lifeboat in Norfolk on International Marconi Day. A photo from the event appeared on page 90 of the June edition of *RadCom*.

A Marconi Wireless Station was established at Caister in 1900. The station was in a house in the High Street known as Pretoria Villa and its original purpose was to communicate with ships in the North Sea and the Cross Sands lightship.

Conditions on the day weren't great but over 100 stations were contacted, including Italy, Ireland, Weston-Super-Mare and the Marconi Centre in Poldhu, from where Marconi made the first transatlantic transmission in 1901. Modes used included CW, SSB and FT8. An Icom IC-7400 feeding a W5GI dipole was used for 20m, whilst for 80, 40 and 30m, G0KYA-designed monoband end-fed half-wave verticals were used. Power was 100W maximum. FT8 was used for the first time, running only 20-25W, with pleasing results.

Visitors to the station included many other local radio amateurs and members of the public.

Steve Nichols, G0KYA



NEW TITLES

The Voices

Spying and Radio Warfare During the Cold War

By Gordon Adams, G3LEQ

Many are aware of the spying activity that took place following WWII until the demise of the Soviet Union in 1991. Few though are aware of the radio jamming, broadcasts of encrypted messages or any of the other electronic skulduggery that took place during this time. This book shines a light on these activities.

Readers of *The Voices* will find the details of the radio warfare engaged in the Americans, Soviets and British along with a number of other countries and groups from the Middle-East to the Caribbean. You will find details of the author's first experiences of radio jamming that lead to his deep fascination as to what was happening on the airwaves at this time. There is discussion of the activities of propaganda stations such as Radio Marti, Radio Liberty, Radio Free Europe and many others. The mysterious Numbers Stations, their coded messages and the non-attributable callsigns are explained here. The author talks about where the spies operated from and the radio traffic they generated.

The Voices is an eye-opening book. Thoroughly recommended reading for those interested in the Cold War and the radio warfare of the 20th Century.

Size: 174x240mm, 120 pages
ISBN: 9781 9101 9353 2
Non Members' Price: £9.99
RSGB Members' Price: £8.49

Also available on amazonkindle

A Mind at Play

By Jimmy Sonni & Rob Goodman

An acclaimed biography of one of the foremost intellects of the twentieth century: Claude Shannon, the unsung architect of the information age.

This is the extraordinary story of the little-known man who influenced every computer built, email sent, video streamed, and webpage loaded. He wrote the seminal text of the digital revolution, which has been called 'the Magna Carta of the Information Age.' His discoveries would lead contemporaries to compare him to Albert Einstein and Isaac Newton. His work anticipated by decades the world we live in today and gave mathematicians and engineers the tools to create the digital technology we rely on.

Claude Shannon's career stretched from the era of room-sized computers powered by gears and string to the age of Apple. His life shows us the beginnings of modern technology: in the 'idea factory' of Bell Labs, in the 'scientists' war' with Nazi Germany, and in the work of Shannon's collaborators and rivals, including Alan Turing. He also constructed customized unicycles, a flame throwing trumpet, outfoxed Vegas casinos and even built juggling robots. With access to Shannon's family and friends, *A Mind at Play* brings this singular innovator and creative genius to life.

Size: 156x233mm, 384 pages
ISBN 9781 4456 8277 8
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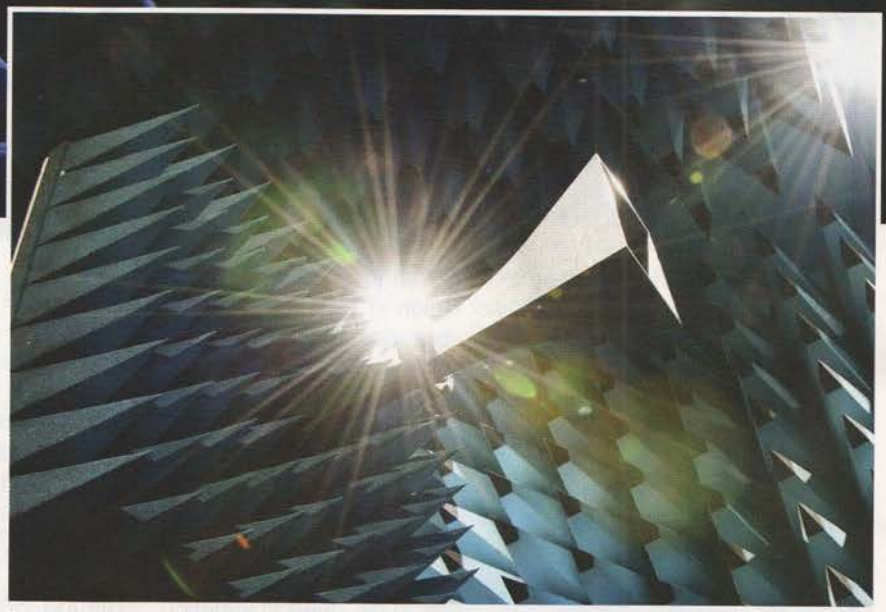
NPL Open Day

Tucked away in a quiet suburb of SW London is the country's premiere measuring facility, the National Physical Laboratory. Every couple of years they have an Open Day: we went along.

Andy Talbot, G4JNT admires one of the microwave anechoic chambers. He was one of several high-profile amateurs I bumped into on the day.



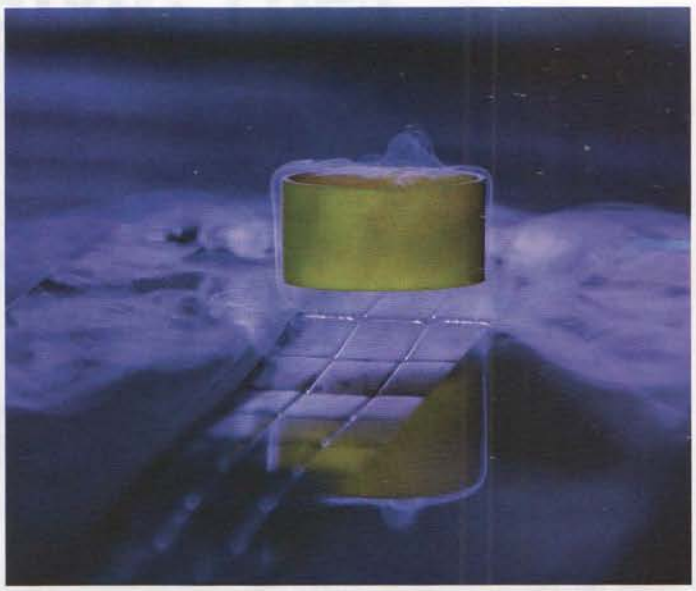
A microwave horn used for testing. The blue pyramids are microwave-absorbing material. If you could coat a fighter plane in these it would be invisible to radar (but probably wouldn't fly).

The National Physical Laboratory (NPL) is a modern-looking building but it's not until you get inside that you realise its sheer scale – I estimate its two floors total some ten acres. And all of it is dedicated to cutting-edge physics research and world-class measurement.

Their biennial Open Day provides the public with the chance to see what they do, and have free access to the scientists and innovators. There isn't enough space here to do justice to what I saw there. Even the six-hour maximum visit was only sufficient to glimpse perhaps half of what goes on. To give just one example, I had a chat with some of the people working on terahertz technology. They used two ~800nm lasers of carefully controlled frequency separation feeding via fibre to a lump of DC-biased semiconductor, which heterodynes the beams to produce a lower frequency – THz – result. Demodulation seems to use a similar process. They are beginning to explore the possibility of modulating the system with something more complex than Morse – FM is easy enough to transmit by wobbling the frequency of one of the lasers but detecting it is a problem. I felt I was seeing the equivalent of Marconi with his spark transmitter and coherer receivers: very primitive, as yet, but it may be the start of something revolutionary. Time will tell.

NPL's building complex is on a site of some 20 acres.

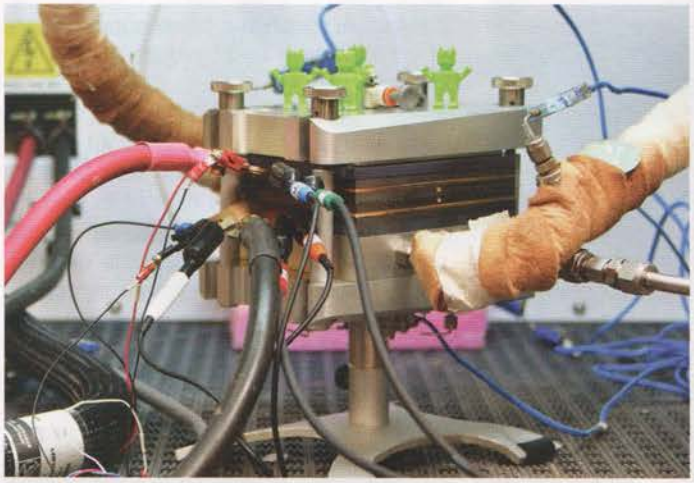
I enjoyed the 'Liquid Nitrogen Show' best. Liquid nitrogen is cheap (70p/litre) and fun, if handled with care. One demo poured it over someone's hand, but it's definitely not recommended to try that without expert advice.



Several demonstrations levitated small superconductors to show the Meissner–Ochsenfeld effect. This yellow puck was about an inch across.

This is part of a large setup on an optical bench associated with atomic timekeeping. Many optical systems from UV light to low-THz were on show.

Ruby spheres of <1mm dia are the probes in this robotic precision measuring device, which manages wavelength-of-light-class accuracy in a volume of some 1.5m³. The machine is over 3m high and contains tonnes of granite.



An experimental fuel cell. The red and black cables emerge from an aperture in the panel, labelled 40VDC, 250A, 90°C (under the yellow hazard triangle).

Real cars are being powered by real fuel cells, as shown to visitors by this Toyota demonstration vehicle.

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

Feature

UK to Newfoundland, 1901 Style – the Possibility of HF Communication by Marconi

Some years ago I decided to try to calculate the performance of Marconi's path from Poldhu, Cornwall to St John's, Newfoundland, and see what sort of signal he might have received.

Of course, the information is very patchy, so here I am reporting my intermittent and unfinished detective work. Whether signals were truly received has been disputed, though they were certainly received at nearly the same distance on the SS *Philadelphia* two months later.

Background

The transmitter used for the tests was a spark type, giving a peak power of many megawatts. The antenna was a multi-wire fan about 45m high, looking straight out over the sea from a cliff top. At St John's, another hilltop site, the antenna was a 304m long wire supported by a kite. The receiver used a coherer, which I will explain later.

John Belrose, VE2CV [1], suggested the frequency used was about 500kHz (there is some doubt about the exact frequency), and has rightly pointed out the extreme difficulty of communicating across the Atlantic at this frequency during daylight. Another suggestion has been that communication took place on short waves. During the voyage of the *Philadelphia*, various results were obtained both during the day and the night [2], and this suggests that two frequencies were being received, one around 500kHz (night time) another at HF (daytime).

The transmitter

A basic spark transmitter (**Figure 1**) is noticeably similar to a Class C amplifier, where the transistor or valve is used as a switch. The capacitor is slowly charged up from the supply, via the RF chokes. The spark gap operates like a switch, closing in picoseconds when a certain voltage is exceeded. When it breaks down, the resistance falls to something like one ohm, and the capacitor discharges into the inductor, creating a magnetic field. When discharge is completed, the current falls to zero and the magnetic field collapses. This creates a back EMF which charges the capacitor once again with the reverse polarity. In this way, an oscillatory action happens, gradually running down as energy is lost. On a 'scope, the spark transmitter produces bursts of remarkably pure sine waves, exactly as drawn in the old books. Its transmission can be fairly narrow, provided the Q of the circuit is high.

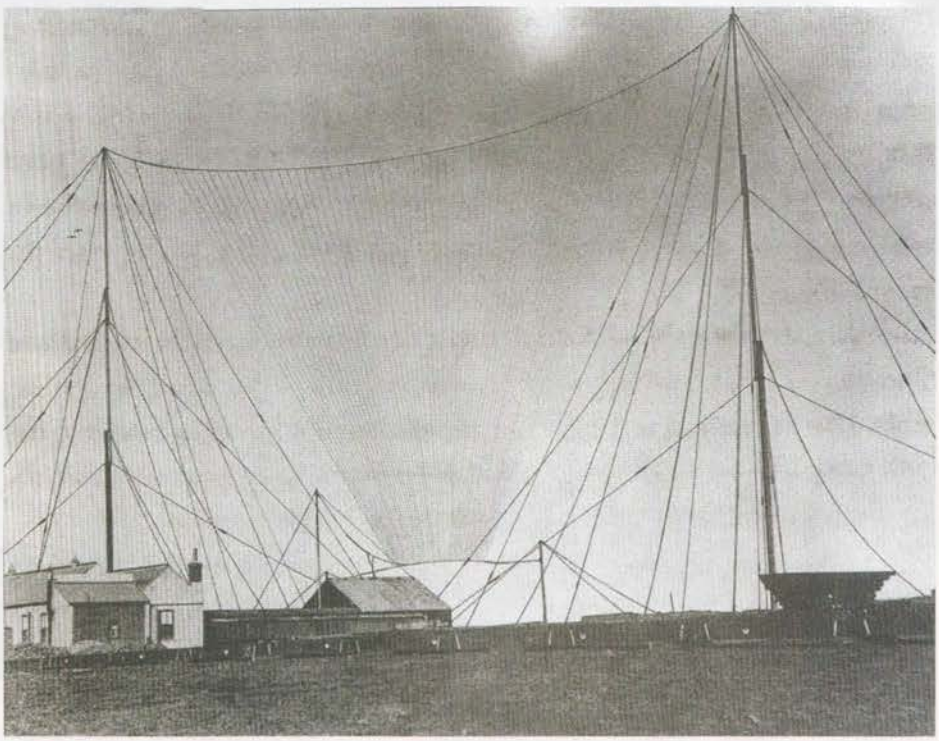


PHOTO 1: The broadband fan monopole used by Marconi.

Marconi specified a power supply voltage of 100kV, which would require a spark gap of about 50mm. The capacitor was to be 20nF, a large value, able to store 100 joules and deliver a peak power of about 10MW. Marconi's technical advisor was Sir John Ambrose Fleming, who brought to bear his knowledge of power engineering on the problem of producing megawatts of RF. It seems, however, that Fleming's equipment was making big sparks but not much RF, so Marconi took over personally and applied

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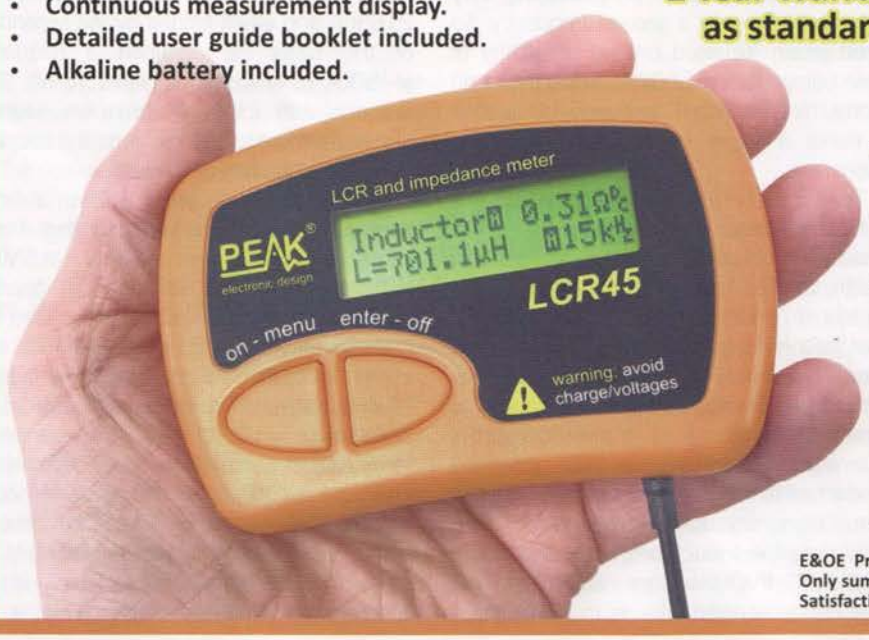

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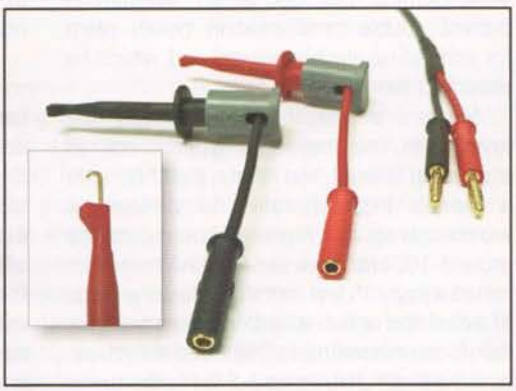

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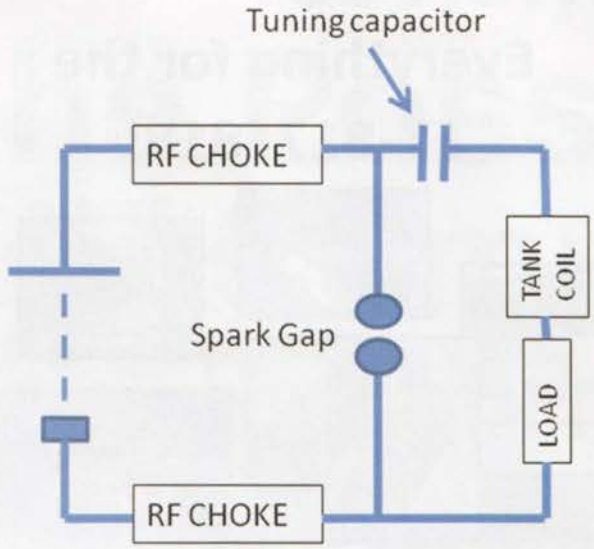

FIGURE 1: Basic spark transmitter.

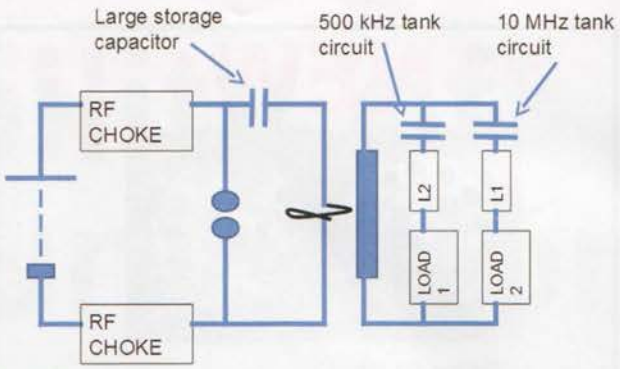

FIGURE 3: Spark transmitter with two tank circuits.

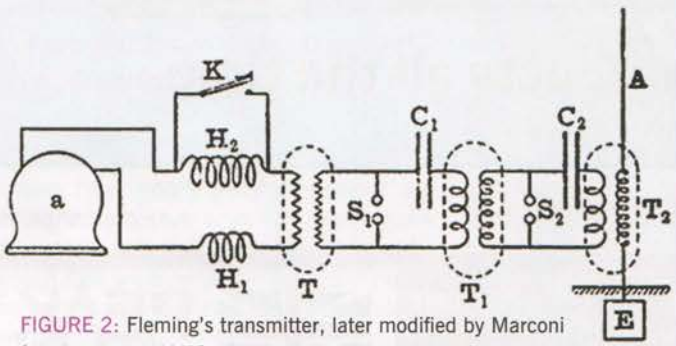

FIGURE 2: Fleming's transmitter, later modified by Marconi (a, alternator; H1H2, choking coil; K, signalling key; T, step-up transformer; S1S2 spark-gap; C1C2 condensers; T1T2, oscillation transformers; A, aerial; E, earth plate).

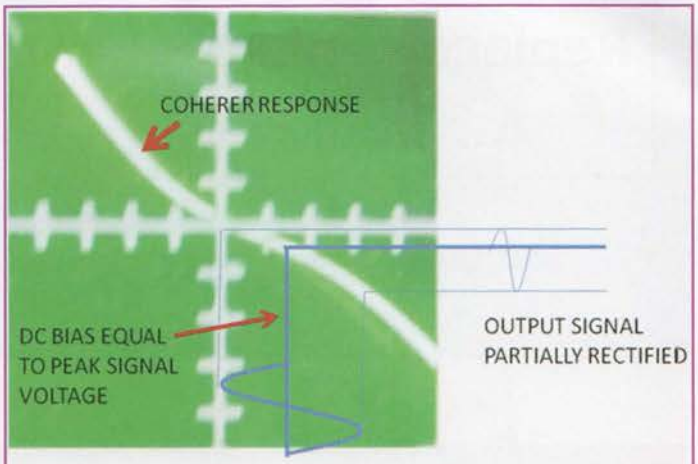

FIGURE 4: Charcteristic of a typical coherer.

his 'green fingers' to the transmitter [3]. As an RF experimenter myself, I have tried to get inside his head and make sense of the sketchy descriptions that we have.

Fleming found it necessary to use a two-stage circuit to obtain the very high voltage, the first being essentially a 'spark inverter' running at a few kilohertz. **Figure 2** shows what Fleming described as an "alternating-current double-transformation power plant for generating electric waves" and which he describes more fully in [4].

Marconi seems to have changed the inverter to use the same type of coil as the aerial circuit, so that, together with a variable inductor, called Long Henry, it would operate at a higher frequency, maybe around 100kHz. The aerial transformer was called a jigger. A few months before the tests, Marconi had achieved a 14mm spark across 66nF, corresponding to 38kV and 47 joules.

I realised that if, instead of the series-tuned tank circuit, *two* series-tuned circuits are placed across the spark gap, both capacitors will charge to the gap voltage, and when it breaks down, both circuits will oscillate with the same peak voltage (**Figure 3**). This means that any spurious resonance in the jigger and aerial could be producing very high peak power at a second frequency. So investigation focussed on the possibility of there being both a 500kHz resonance and another one at an HF frequency. I decided to make a jigger in order to study the resonances.

There is a lot of uncertainty about the jigger, so I did my best using historical clues. It is based on a typical 23 inch square, wooden design, as described by Fleming [5]; I used 54 feet (17m) of wire for the secondary, as used for the first tests at Poldhu, giving seven turns. The primary is wound first and consists of two turns of wire, connected in parallel to form a single wide turn. In the original, the wire was made of several small insulated conductors to reduce the resistance, like Litz wire, but as my main interest was in just measuring the inductance, I used ordinary 7/22 SWG PVC insulated cable. I did not have cotton covered wire as in the original, so my stray capacitance will be a little higher. The inductance came out to 47μH, the same figure as assumed by Belrose.

Belrose considered the antenna to be 2165pF, and when loaded by the secondary of the jigger he obtained a frequency of 500kHz. I confirmed this result. The primary, with its 66nF capacitor, seemed also to resonate to 500kHz, and the coupling seemed reasonably optimum.

When I tested my jigger with an antenna analyser and open circuit secondary I was surprised to find a major resonance at 5MHz. With a short circuit secondary it became 10MHz. The winding was behaving rather like a transmission line 15m long. At 5MHz I was seeing an open circuit quarter wave, and at 10MHz, a short circuit half wave. To explore the performance when connected to the antenna, I terminated the secondary with a 150Ω resistor. This is a typical figure for aerial feedpoint resistance as obtained by Belrose. I discovered that there is a large peak at 10.1MHz. Of course the aerial reactance, which is not certain, would pull this resonance a little.

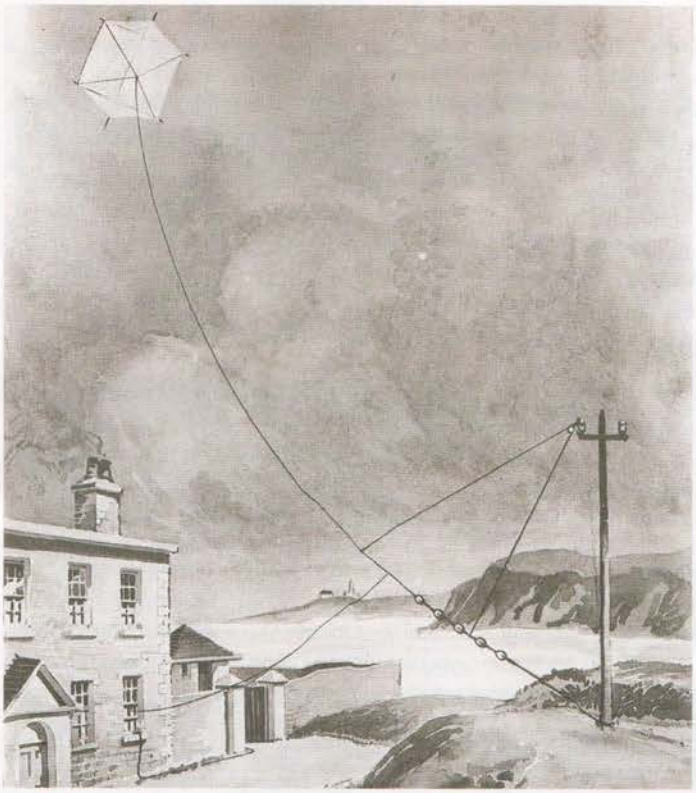

PHOTO 2: The kite aerial at St John's, Newfoundland.

PHOTO 3: Marconi's mercury coherer at the Oxford Museum of the History of Science.

If the jigger secondary acts as a half-wave line at 10MHz, the 150Ω aerial resistance will appear across both ends of the line. The resistance at the transmitter end of the line will be transformed down by the square of the turns ratio to a series resistance across the spark of $150/7^2 = 3\Omega$. In this way, two series resonant circuits are present across the spark, at 500kHz and 10.1MHz.

The Poldhu antenna

The fan monopole (**Photo 1**) is a broadband antenna and was physically modelled by Belrose.

Its input impedance behaves as follows:

1. At around 1MHz it has a quarter-wave resonance, having a radiation resistance of about 30Ω.
2. Below about 1MHz, it is capacitive, roughly 2nF, with low radiation resistance.
3. Above 1MHz, the fan behaves as a transmission line having the low characteristic impedance of around 100Ω. The input impedance swings around this value, ranging from about 50 -200Ω.

At all frequencies, we must expect high earth resistance in series with the antenna, due to the poor soil at Poldhu and the small earth electrode system which was used. This loss resistance could be in the region of 50Ω. As a consequence, the aerial efficiency at 500kHz, where the radiation resistance is just a few ohms, might only be around 10%. On the other hand, the radiation resistance at 10MHz is more like 150Ω, so the efficiency could be in the order of 75%.

I was unable to find a published radiation pattern for a fan monopole 1.5 wavelength high. My crude measurements of a foil / wood model at UHF located over a foil ground plane showed elevation lobes at about 75° and 5° in the broadside direction. This lower lobe is very sensitive to the position of the feed wire, which at Poldhu was in the form of an inverted-L and is around half a wavelength long. It is possible that much of the low-angle radiation comes from this feed wire. I decided that it was reasonable to assume a gain of –3dBd, as for monopole radiation. The aerial was on top of a cliff having a height of two wavelengths, so the sea reflection would give a 6dB reflection gain, with a maximum in the vertical plane at about 8° at 10MHz.

I spent some time studying photographs and drawings to estimate the orientation of the antenna, and concluded that it was facing roughly west. As the great circle direction is 283°, the broadside pattern of the antenna seems applicable.

The receiving aerial

The station was established on a high hill, overlooking the Atlantic (**Photo 2**). The old brick building in which it was located would give protection from the sound of the gale outside. Marconi took two wires 504 feet long, obtaining best results with just one of these, supported by a kite. Two wires, at 1008ft, would have been half a wavelength at 500kHz, delivering maximum voltage to the coherer, so the fact that 504 feet was better is evidence against 500kHz reception. At 10MHz, the 504-foot length would form a sloping long wire of 2.5 wavelengths and would have gain amounting to perhaps 4dBd.

The kite antenna seems, from the various pictures, to be blowing out to sea. I recently discovered a website giving historical weather charts **[6]**, and for the days involved it shows a south-westerly gale, so the kite *would* be extending out over the sloping cliff and lying near the great circle path towards Poldhu. The location on a high cliff, with ground sloping steeply towards the UK, is extremely favourable at HF.

The aerial had a long lead-in, so we cannot be certain about length. Marconi used a coherer connected directly to the aerial, with a battery and earphone, although he said that he later used an air-cored step-up transformer to the coherer. At HF we would expect the aerial to have an average feedpoint impedance of perhaps 1000Ω, although it could vary widely from this value. A high impedance would deliver maximum voltage to the coherer. It should be remembered that Marconi used a buzzer noise source for adjustment – we must consider him to be an artist with RF, so he would not miss anything.

The receiver

A coherer is a radio wave detector that relies on light contact between metals. Its fascinating history goes back to Hughes who, in 1879, walked around Portland Place with a mobile receiver, obtaining a range of half a mile. Marconi favoured two types. In one, a small glass tube was fitted with metal plugs, between which some filings of nickel and silver were placed. In another, the gap between the plugs contained a drop of mercury. He used this version for the tests (**Photo 3**).

There are two modes of operation. In the first, the metals are touching but the resistance is very high, possibly due to a thin film of oxide. When a large signal is received, the barrier breaks down and a permanent connection is made. It is believed that, for the filings coherer, micro welding takes place. The connection has to be broken again by tapping in order to receive another signal, and this was often accomplished automatically. In the second mode, the coherer is

PHOTO 4: Collier-Marr telephone receiver on display at the Oxford Museum of the History of Science.

used with earphones. It is adjusted until it is slightly conducting and acts as a non-linear device, demodulating the incoming signal. I have made and tested numerous coherers to discover the mechanism of the non-linearity and the sensitivity that might be obtained.

For use as a detector with 'phones, it is necessary first to tap the coherer to obtain slight conduction. Marconi had a buzzer as a local signal source for initial adjustment. I tried to plot the characteristic of some coherers (**Figure 4**). Occasionally, diode action can be obtained, like a crystal detector, but there is more often a symmetrical S-shaped response, like back-to-back diodes. By biasing the device slightly one way or the other, rectification of a signal occurs. The curvature is slight, but with the bias adjusted to suit the amplitude of the signal, a sensitivity about 6dB below that of a germanium diode is possible. Using old high impedance phones, I could detect a signal into the coherer of 70mV RMS (30% modulation), whilst my assistant in his 30s could detect 20mV. I was able to just hear a strong HF broadcast station. By comparison, a good crystal set has been described by Roger Lapthorne, G3XBM. He seems to obtain a minimum detectable signal at the detector in the same region, 15 to 30mV. Note that a coherer operates on RF voltage, not current.

Previous work on coherer curves has been done by Groenhaug **[7]**. His curve is more asymmetrical and diode-like than mine but shows similar sensitivity.

I originally thought that the coherer would be used in the 'threshold' mode so that it would react to the high peak power of the transmitter. But Marconi used it with phones, so it was in 'linear' mode. I realised that the coherer has a square-law characteristic, and this makes it much better when used with a pulse transmission. Concentrating the power into a brief pulse sweeps the coherer up its characteristic curve.

The earphone used was unusual, being of the Collier-Marr type, **Photo 4**. It is described in **[8]**. It is thought to be much more sensitive than the candlestick type of telephone or later conventional earphones. This is because it has a huge magnet and a big coil. The penalty was poor audio quality caused by resonance. Marconi seems to have wound extra wire onto the magnet to increase its strength. It is interesting that the pulse of RF is too short for the mechanics of an earphone, but the energy is stored and is then slowly converted to sound. One storage mechanism might be the capacitance of the windings. Another is the inertia of the diaphragm. We can imagine the incoming pulse giving a mechanical impulse to the diaphragm, which then begins to resonate. It is similar to the ballistic galvanometer, where a brief discharge from a capacitor sends the needle sweeping across the scale.

I made a large number of tests with coherers to discover the source of the non-linearity. One possible reason is the action of a metal-semiconductor junction – a Schottky barrier. This is the basis of the crystal detector, with its cat's whisker. If we imagine the coherer containing two of these diodes, say steel-mercury oxide and mercury oxide-steel, we have the problem that they are in series, not parallel, so will never conduct. But why are there always two back-to-back diodes in parallel, no matter how often we tap the device? It points to only one junction being involved, with a bi-directional characteristic. This rules out the Schottky junction.

My first theory was that we could be seeing cold cathode action, also called Electron Field Emission. If there is a small air gap between electrodes, and the negative one is very sharp or rough, there is the possibility of electrons being pulled out due to the very high potential gradient. With just 1 volt applied, it is possible to obtain a gradient of a million volts per metre due to the sharp point. I thought that the oxide layer might act as a spacer, giving very close electrode spacing. I also tested a back-to-back valve diode to see the shape of the curve, and it does have a very similar S-shaped characteristic, without a 'knee'. The objection to electron field emission is that one of our electrodes, being mercury, is very smooth, and the carbon is rough, yet we see a symmetrical curve.

I next discovered that research is going on at the moment into Metal-Insulator-Metal, (MIM) diodes. These use flat metal electrodes with a thin insulating layer of oxide between them. Electrons cross the insulator by 'tunnelling' action, and the device has a very similar S-shaped bi-directional characteristic to the coherer. I also found out that smooth electrodes are used for the MIM diode, which seems to favour mercury. The paper by Groenhaug **[7]** suggested electron tunnelling in 1979.

In order to find out where the action was taking place, I took a carbon-mercury-steel coherer and tilted it, so that one junction was solid and the other sensitive. I found that carbon, which does not form a surface oxide, did not work very well with mercury, whilst steel was excellent. I therefore think that the action usually takes place across the iron oxide layer, and copper may be similar. In 1879 Hughes also found that carbon-carbon was not successful, but had good results with oxide coated metals in contact with bare metals such as iron, copper, zinc and mercury. The results might have been from the S-shaped curve or from rectifier action, although if the latter, I would have expected Hughes to notice it.

It is interesting that in 1899, Bose **[9]** tested every element he could find in conjunction with mercury. He seems to have considered coherer action as a unique property of the element, rather than as one part of a semi-conductor diode. As each element has its own oxide-forming properties, these observations seem in line with the MIM theory rather than the semi-conductor one.

The path

The great circle path from Poldhu bears 283° east of north, and actually goes ashore at Penzance and crosses the Land's End peninsula. The path is therefore slightly imperfect for 500kHz, but no problem at 10MHz, where sky-wave transmission is used. 500kHz propagation is excellent across sea water. Marconi travelled to the delightful fishing village of Crookhaven in Ireland to make reception tests at 225 miles. If the frequency being received was 500kHz, we would expect 10mV/m ground wave from a 1MW ERP transmitter at Poldhu. The mast was 150 feet, so if we assume an effective height of, say, 30m, the aerial would deliver 300mV to the receiver. It seems that Marconi actually used a tuned receiver at Crookhaven, so he might have obtained a step-up of typically 10 times, giving 3V across the coherer. Marconi expected ground-wave propagation all the way to Canada, the

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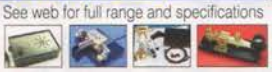

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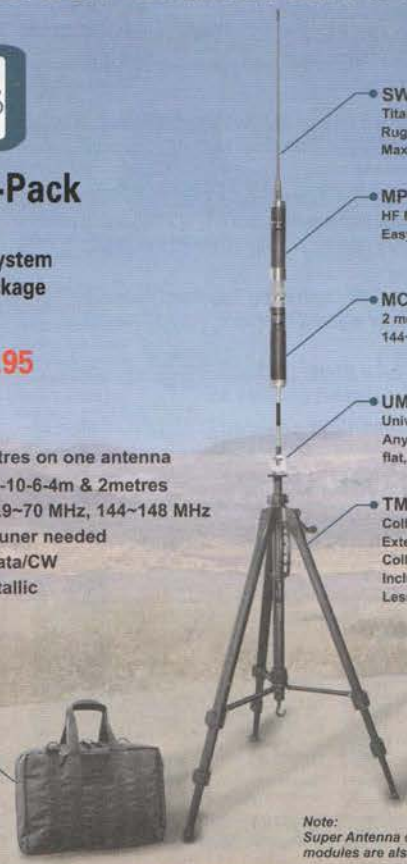

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voltage falling in proportion to distance, so might have expected the signal voltage to weaken 10 times, corresponding to, say, 300mV at the coherer at St John's.

To study the 10MHz path from Poldhu to St John's, I made a VOACAP plot for a sunspot minimum year such as 1901, assuming a Smoothed Sunspot Number of 1 (**Figure 5**). The times of the reception were 1600, 1640, 1708 and 1750UTC. From the plots, it can be seen that at the times indicated, 10MHz was below the MUF, and the best times at this frequency were between 1500 and 1800UTC, so Marconi seems to have listened at a lucky time.

The average path loss between isotropic antennas according to VOACAP is −144dB.

The free space path loss over a path of 1838 miles at 10MHz is 130dB between isotropics, so VOACAP is showing an additional ionospheric absorption of 14dB. This seems a fairly typical figure, even when the band is 'open'. Of course, HF propagation is extremely variable and VOACAP is subject to large errors in predicting signal strength.

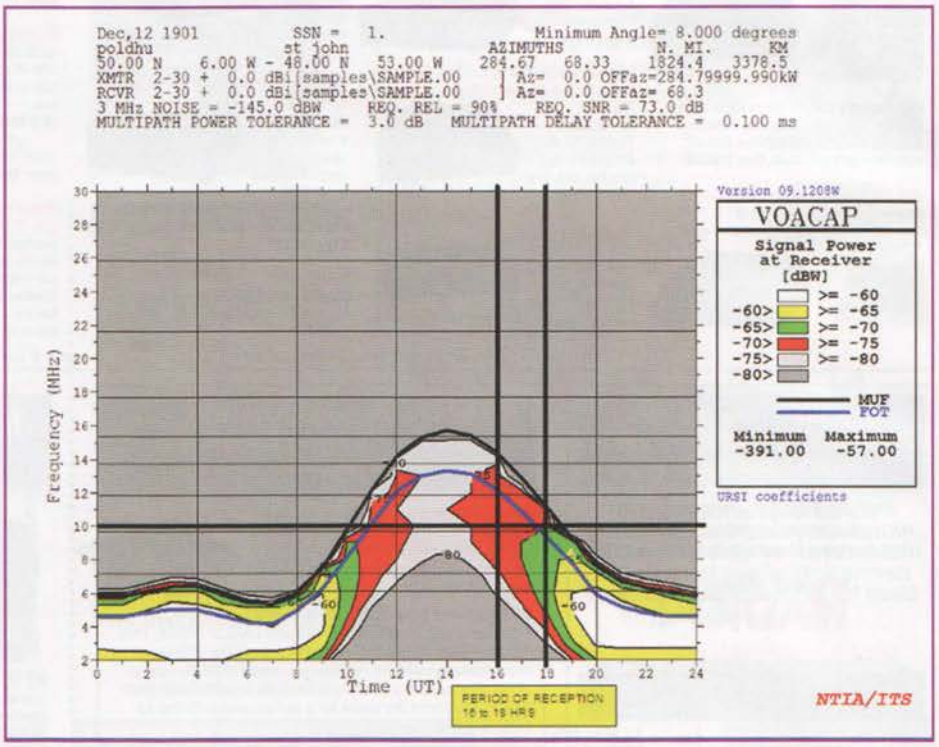

FIGURE 5: VOACAP plot of received signal power with 10MW Tx and isotropic antennas in free space.

Path budget at 10MHz

These are suggested 'typical' figures to see if communication was likely in 1901:

TX peak power (10MW):	70 dBW
Antenna gain at Poldhu:	–3dBd
Earth loss at Poldhu at 10MHz:	1dB
Sea reflection gain at Poldhu:	6dB
Sea reflection gain at St John's:	6dB
Antenna gain at St John's:	4dBd
Earth loss at St John's:	1dB
Path loss (VOACAP):	140dB
between dipoles in free space	
	(144dB
between isotropics in free space)	
System loss:	129dB
Received power:	–59dBW

Voltage into hypothetical 1000Ω load: 35mV
Minimum detectable signal: 20mV

Technical summary

1. The spark transmitter can generate a second frequency with the same peak power as the first.
2. The transmit jigger may have a self-resonance at about 10MHz.
3. The jigger may transform the antenna impedance at 10MHz into a suitable value across the spark.
4. The Tx antenna may be effective at 10MHz, possibly from the long, elevated lead-in.
5. The receive antenna could form an efficient sloping long wire at 10MHz.
6. Wind direction would position the kite-borne long wire near the great circle path.
7. The receiving antenna has a likely feed-point impedance at 10MHz that suits the coherer, but not at 500kHz.
8. The path MUF was likely above 10MHz; the times of reception agree with the best propagation times at this frequency.
9. The coherer, when used in conjunction with earphones and a small bias, forms a fairly sensitive detector able to receive HF broadcasting.
10. The bi-directional action of Marconi's coherer is likely caused by electron tunnelling in the iron oxide layer – a metal-insulator-metal, or MIM, diode.
11. A square-law detector, such as a coherer in linear mode, is efficient with pulse transmissions.
12. The earphone used by Marconi was the Collier-Marr type (Photo 4), which is very sensitive.
13. System budget calculations indicate that HF signals might be audible if propagation was normal on the days in question, but we cannot be certain about propagation on the relevant days.

In conclusion

We will never be able to replicate the experiment exactly,and the unknowns make it impossible to be sure if HF propagation was involved, but with the assumptions I have made, transmission at 10MHz seems distinctly possible. Reception seems to have occurred at the optimum times for 10MHz – an amazing coincidence? – and, according to Marconi's assistant Kemp, there was fluctuation of the tuning due to the wind, which could in reality have been due to HF fading.

Thanks to John Belrose, VE2CV, for his extensive work on the subject, to the Oxford Museum of the History of Science, who look after the Marconi artefacts, and to Gwyn Williams, G4FKH, for introducing me to VOACAP.

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HF

PHOTO 1: M0PCB operating GB80FOC.

PHOTO 2: The 3B7A QTH and some of the antennas.

Despite a solar flux index around 70 there was plenty of Sporadic-E on the higher bands and plenty to chase in May. The FOC 80th anniversary stations were very active and at the time of writing the leading UK station on the Club Log Leaderboard was G3SJJ, in 25th place.

The 2018 inductees to the *CQ* DX Hall of Fame were announced at the Dayton Hamvention and are Kimo Chun, KH7U and Krassimir Petkov, K1LZ. KH7U is based in Hawaii and has been a participant in numerous DXpeditions. K1LZ is also a veteran of numerous DXpeditions and co-founded the Young Hams Contest Program.

Sebastien, F5UFX, published a lengthy statement recently about negotiations with the French authorities for DXpeditions to the islands of Crozet (#3 Most Wanted) and Glorioso (#13 Most Wanted). It seems that despite having demonstrated a track record of sensitivity and responsiveness to environmental concerns the team have had all their applications denied on the grounds that their antennas are a threat to birds and there is a risk of introducing alien species. One can sense the team's frustration from the statement, which includes: "Numerous research projects, supported by several notes from expert scientists, have ruled out the risk presented by our modest antennas on the bird populations of these territories... Despite the research work done, the innovative solutions proposed, and a complete and documented dossier, our requests were rejected. The arguments put forward focus on the danger posed by our antennas for the bird population and the risk of introduction of new species during our landing. Despite our work to demonstrate that these elements are controlled and in no way invalidate our activities, it is the precautionary principle that is privileged for the moment. The logic remains to say that if there is no project then there is no risk."

This seems to be yet another example of environmental authorities wielding power in an illogical and arbitrary way. I suspect that researchers are allowed to visit the islands, however uncertain the value of their work may be. The French team is continuing to meet the relevant TAAF authorities so let's hope a more open minded approach is eventually shown.

The 3B7A team wrapped up its activity from St Brandon with around 71,100 QSOs. They were worked from the UK on every band from 160 to 10m, and 17m had the most UK QSOs.

DXpeditions

The KH1/KH7Z Baker Island operation (5th in the Most Wanted listing) should be starting around June 27th but I am not too optimistic about the chances of working it from the UK on the traditional modes unless you have a beam and a linear. FT8 enthusiasts may have more chance if they have mastered its expedition mode of operating. 18 and 14MHz will be the best possibilities. The optimum times on these bands are likely to be 07-09z and again around 18-20z. 10MHz operators will need to be on just after sunrise. Please let me know how you get on.

Nobby, G0VJG will be QRV from Grenada as J3/G0VJG from 14-28 June on all bands (including 5 and 50MHz).

Pista, HA5AO will be active as 3DA0AO from eSwatini (Swaziland) during the second half of September. He will operate CW, RTTY, FT8 and some SSB on 80-10 metres. Log search and OQRS will be available via www.ha5ao.co.

Harald, DF2WO is active again as 9X2AW from Kigali, Rwanda until 24 June.

Haru, JA1XGI will be active as H44XG from Guadalcanal (OC-047), Solomon Islands from 21-27 June. He will operate mainly CW and FT8 on 40, 30, 20, 15 and 10 metres.

Pete, VE3IKV and Bill, VE3MMQ will be active as VQ5Z from Providenciales, Caicos Islands (NA-002) from 1-11 July. They will operate SSB and CW, as well as FT8, MSK144 and JT65, on 6 metres and the HF bands.

Geoff, ZL3GA will be active again as YJ0GA from Efate (OC-035) Vanuatu on 18-25 July. He will operate CW and FT8 with some SSB on 80-10 metres.

Craig, VK5CE should be in the middle of his IOTA tour with the following stops remaining: 15-18 June VK5CE/6 Cheyne Island (OC-193), 20-23 June VK5CE/6 Woody Island (OC-170) and 26-28 June VK5CE/P St Peter Island (OC-220). He will operate SSB and some RTTY and PSK63 on 40-15 metres. Check https://vkiota.wordpress.com/vk5ce-6 for the latest information.

The Italian DXpedition Team will be active as 9X0T from Rwanda from 27 September to 12 October.

G0FDZ, G0VJG, G4FNL, M0MDR, M0TBS and M0TGV will participate in the IOTA Contest (28-29 July) as MJ8C from Les Minquiers (EU-099). Before the contest, starting on 25 July, they will use GJ3RCV.

The EIDX Group will activate all of the Irish IOTAs this summer, using the callsign EJ0DXG. They start with Little Saltee Island (EU-103) on June 15-18. Later in the summer they will do EU-006 (Sept 13-16), EU-007 (July 20-22) and EU-121 (Aug 24-26). DXwanted.net is supporting a plaque available for working all four. EI0DXG will be QRV from mainland Ireland, EU-115, as a wildcard, until September 30.

The Kanton Island (T31T) and Conway Reef (3D2CR) DXpeditions appear to have been delayed. The aim is to make them back-to-back DXpeditions but some equipment to be installed for the Kiribati government on Kanton has been delayed.

The V6J team will activate Ta Island in the Mortlock group (OC-254) in early July. They will be operating CW, SSB, RTTY and FT8 on 40, 30, 20, 17, 15 and 6.

Uli, DL2AH will be active as T32AH from

PHOTO 3: The 3B7A Shack on St Brandon.

Kiritimati (Christmas Island, OC-024), East Kiribati from 12 September to 1 October, on SSB, RTTY and FT8 on 80-10m. Then he will be WH8/DL2AH from Ofu Island in American Samoa (OC-077) from 2-29 October.

Correspondence

John, G3HTA needed two of the rare Solomon Island IOTA groups activated by Cezar, VE3LYC last month and was pessimistic about his chances. But in fact he worked them both on 20m with little difficulty around 0900 and 1300. He used his TH5 beam to make the QSOs but was also copying Cezar on a vertical and thought that might also have got through. Conditions were very patchy though, with some stations copying well and others nearby not copying at all.

Chris, G8APB thought the grid-squares challenge (where he is 79th out of 35,000) had really livened up the bands. He found a wide range of DX including: 10m – 7X, A6, TR8; 12m – C9; 15m – A4, ZP, YB, 9M2, TR8, DS, EK, VU, PU2F, HK, YV, J7, CE, 9L, CX; 17m – CP, TG, XP, 4S, VK5, ZP, CE, A7, DS, AP; 20m – S, KL, 6Y, FR, HK, 9G, VR2, T7, 7X, JY, OA, OD, 4X, YB, J7, A9, HI ; 30m – XP, VK7, VK5; 40m – JW (Svalbard and Bear island) C3, 9K, T77, AP, EK, DS, ZS; 80m – A7.

Ken, CT7AGZ, found a lot of propagation on 10m and his overall report includes: 10m – OG0Z, CN3A, PY's, LU's, V44KAI, KP4JFR, TI3ATS, KG4WH, TR8CA, ZD7BG, 9L/KW4XJ, CE3EPN, 7X2KF, SU9JG, ZP4KFX, FY5KE, A45XR, 5T5AI, HP1RS; 12m – ZD7BG, VP2ETE; 15m – P33W, UP0L, 8P5A, PY's, LU's, ZS9FOC, K1XM/HR9, PZ5XX, TG9ANF, OY1CT, ZS6AI, P4/DF5AU, HH70A, FY5KE; 17m – HI8CSS, A45XR, TI8II, PZ5XX, 5R8UI, A61QQ, PY's, ZP6CW, C96RRC, FJ/AI5P, EA9CD, HR5/F2JD; 20m – TU2CI, A61EK, V44KAI, V51MA, 3B8FA, ZP6CW, E51EH, FR5AB, PJ7/AI5P, OJ0W, YF9CDL, YC6AM, A45XR, 9Q6BB, C96RRC, 5H0JK, XQ3SK, 9Y4AJ, FJ/AI5P, OA1F, 7X4AN, HP3SS; 30m – KP4TF, VK7BO; 40m – 8P5A, C98RRC, HK7AAG.

Andy, G3SVD, was trying to work as many of the FOC stations as possible but also found a lot of DX including: 10m – TY2AC, 9X9PJ; 12m – 4U80FOC (Rome); 15m – C98RRC, ZS9FOC, 9J80FOC; 17m – CX6DZ, ZS9FOC, C98RRC, J72HGL, ZP5DA, VP2ETE, PZ5XX, JA3AOP; 20m – SU1SK, 8J1ITU, LU8VLE, PJ7/AI5P, 6W1PZ, AH6U, KT7WW/KL7, 5W20SAMOA, RI1FJ, WH6R, PZ5XX; 30m – KP4TF; 40m – EP2LMA, UA2FF, C37ITU. Andy said a lot of DX (FK, FO, HI, DU etc) that would have been easily workable on phone or CW in the past is now only on FT8.

Peter, G4XEX, used about 5 different calls during the month including the GR prefix and several GB calls. His "ground effect Hexbeam" is still at 1m height but is set to be raised to 2m to allow grass cutting. He reports: 20m CW ZD7BG, 5H0JK, V44KAI; 20m data OD5ZF, YB5BOY, JH8JYV, 9G5AR, 7N4SJX, AP2HA, SO1WS, JY5IB, 9G1SD, BD0AAI, VU2EEI, AP2AM, YB1BJV – and 11 other JA's; 20m SSB – JF2XGF, JA1IFP, VP8LP.

Richard, GI4DOH updated his score and commented that 20m has been open surprisingly late. He worked KL2R at 2248.

Ron, GW3YDX, is now active from his vacation QTH in SW France as F4VSM. He set himself the target of working 100 QRP DXCCs in the WPX CW contest with his Elecraft K1 running just 4W and achieved it in about 15 hours. Best DX was: 40m – (4W to a doublet) ZL4YL, FY5KE, 8P6A, FM5BH, KP2M, PJ2T; 20m (4W to a 3-ele SteppIR) JT5DX, VP5M, HZ1TT, ZY5T, KH6LC, JN4MMO, JW2US, BY8AC, ZF9/ZF2XA, 6Y6N, HP3SS, TI2OY, AH2R, KL7SB, CO6RD. The KH6, AH2 and KL7 QSOs took a lot of calling and some persistence at the far end.

Fred, G3SVK, had a quiet month: 20m – 6Y6N, 9J80FOC, KH7XS, XV1X; 40m – 9V1YC.

Gordon, G3PXT reports that he spent most of the month on 6m but down on HF he found: 17m – RA9AU, ZS2MIC, S79LD; 20m – VK6KXW, VE2BVV, YB1HDR, EX7DY; 40m: CO8LY, UN8PC.

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

M0NKR	139	171	152	244
G4TUK	112	112	178	240
G0DWV	163	136	138	236
G3TBK	217	108	94	219
G3PXT	75	104	187	204
CT7AGZ	161	1	103	180
G3SVD	102	116	0	170
GI4DOH	149	6	80	169
G8APB				145
G4IDL	145	0	0	145
G4XEX	48	53	109	137
G3HQT	127	0	0	127
G3SVK	101		117	117
G3SVK	101		117	117

TABLE 2: Forthcoming DXpeditions.

Until 18 June	EJ0DXG EU-103
Until 18 June	VK5CE/6 (OC-193)
Until 24 June	9X2AW
Until mid Aug	JG8NQJ/JD1
14-28 June	J3/G0VJG
20-23 June	VK5CE/6 (OC-170)
21-27 June	H44XG
26-28 June	VK5CE/P (OC-220)
Late June	KH1/KH7Z
27-29 June	OJ0Y
Early July	V6J (OC-254)
1-11 July	VQ5Z
3-17 July	FP/KV1J
18-25 July	YJ0GA
20-22 July	EJ0DXG (EU-007)
25-29 July	Les Minquiers (EU-099)
24-26 Aug	EJ0DXG (EU-121)
12 Sept – 1 Oct	T32AH
13-16 Sept	EJ0DXG (EU-006)
15-30 Sept	3DA0AO
20-25 Sept	JW by DLs
27 Sept – 12 Oct	9X0T
28 Sept – 14 Oct	5W0GC
2-29 Oct	WH8/DL2AH
15 Oct – 4 Nov	YJ0GC
16-30 Oct	VK9X by 6Gs
20 Oct – 3 Nov	VP6D Ducie I
3-6 Nov	VK9XQ
6-10 Nov	VK9CH
10-17 Nov	VK9XQ

Finally

We have been informed by an eagle-eyed Member that last month G8BGV was shown as also being G3YBY; it should have read G3YDY. Apologies all.

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

Martin Atherton, G3ZAY
g3zay@btinternet.com

VHF/UHF

Excellent Sporadic-E throughout May with intense openings to Nordic areas and the Iberian Peninsula.

Right on cue the 2018 Sporadic-E (Es) season kicked off in earnest, with prolonged openings on 6m and sporadically on 4m and 2m. A major opening to the Nordic countries coincided with the 6m UKAC contest on 10 May (**Figure 1**) with many stations taking advantage of the DX available. Distances of >1900km were worked but again it was interesting to note that the opening was very late in the evening and was still there when the contest ended at 22:30 local time.

Outside of contests there was considerable activity using FT8, which seems to have found a bolt hole on 50.313MHz and as many get used to the software setup, with a few exceptions signal quality has certainly improved.

There were also openings to North America and Caribbean areas that seemed to favour the South West part of the UK with many of the 6m Big Guns working into East Coast USA states.

As May 2018 came to a close the last weekend was frankly a bonanza of single and multi-hop Es on 6m & 4m. Extensive openings to EU, Africa and North America provided excellent DX. Not to be upstaged, 2m also opened with Es to Southern Europe with stations in Italy, The Balkans and Iberia all worked from the southern parts of the UK.

Two stations of specific interest that caused a spike in activity were D41CV (Cape Verde) and SO1WS (Western Sahara). D41CV (HK76) was operated by the Monteverde Contest Club, to celebrate 41 years of Cape Verde independence. They operated on 6m FT8 remotely, mainly from Switzerland and made QSOs to EU North/South America etc [1]. SO1WS (IL46) was operated from Western Sahara by Sahrawi Amateur Radio Club on 6 & 4m [2]. They worked all over Europe but probably the most impressive contact on 4m was with Clive, GM4VVX in IO78. This was achieved on 28 May at 1800UTC with Clive using just 80W into a 6 element Yagi. SO1WS uniquely used the 'FOX' or 'Expedition' mode within FT8 (**Figure 2**), whereby they could conduct 4-5-6 QSOs at once, all using the same timing period. Each 50Hz slot is visible and the QSO exchanges are quite straightforward. The only downside to this is that on a very crowded frequency such as 50.313MHz one station takes up considerable bandwidth. This however isn't a problem for real DX like SO1WS, but many stations commented that if mainstream stations had been using it then the frequency would be more chaotic than it was already – see **Figure 3**.

Transmit/receive protocol

Thanks for the comments on last month's column highlighting this issue, as with such high activity levels coexistence is the key. However there is another issue that has caused many stations to post on the various chat channels regarding the choice of periods of transmit and receive. This may seem obvious; however, as FT8 activity particularly on 6m has increased, it is clear that maybe a clarification is called for.

The original protocol – which dates back some years but still holds valid – was compiled in the days when meteor scatter operation increased in popularity, initially with the use of high speed CW and then using WSJT variants. The IARU Region 1 *VHF Managers Handbook* V8.01 is quite clear on the best protocol [3]:

"Section 4.4.4 Transmit periods

"In order to minimise the overall interference with other stations standard transmit periods are recommended. Stations in central and Western Europe should use second period. All MS operators living in the same area should, as far as possible, agree to transmit simultaneously in order to avoid mutual interference."

So in essence stations in the same or adjacent squares should transmit in the same period to minimise interference. Many times QSOs have been lost by two stations in the same locator square transmitting in different periods. It is clear that, despite all best efforts, the FT8 software is very prone to de-sensing within a strong signal environment.

FIGURE 1: 50MHz May UKAC Nordic Sporadic-E.

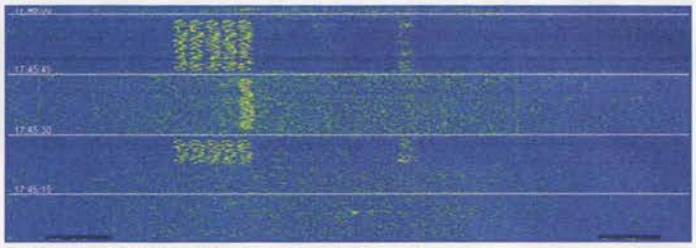

FIGURE 2: SO1WS using FT8 Expedition mode.

The next issue is to consider which period a station should transmit in? Convention again on meteor scatter procedures shows that for stations in UK (ie Western EU) in an azimuth arc from north to south through east should transmit in the second period. Moving into central Europe this protocol still holds true and there is a choice again using this convention – as stations will need to be transmitting in the first period to work west and the second period to east.

Transmitting period duration

Depending on the mode used there can be a number of different requirements here to suit individual operation. FT8/MSK144 use a default 15 second period, FSK441 uses 30 seconds and JT65 and its variants 52 seconds (but is classed as a full minute.)

Thankfully the band plans for VHF/UHF operations are constructed to cope with this. So, in essence, a station in IO83 would be transmitting in the second period using these timings. Also for the majority of activity they would in fact beam east. For a station located in JO01 however, to work DX to the west it would be first period and to the east second period.

Obviously there will be grey areas but this simple protocol will help minimise interference and avoid instances of stations for example 10km apart transmitting in different periods, which is quite pointless.

Another excellent guide, which also includes "Bad or Invalidating Behaviours" has been compiled by Bo, OZ2M, which also drills down into the subject in great detail [4].

Multipath testing

As previously mentioned, FT8 seems to have taken over as the mode of choice on 6m. It has been very noticeable that while FT8 frequencies have been very busy, a subsequent tune down through the SSB section shows a drop in usage of that mode. CW seems to hold its own and it's fair to say from a speed point of view it's probably quicker to make a CW QSO than FT8 in fleeting openings. There have been a number of tests made to try and look at how multipath affects signals on different bands. Observations on 6m show that FT8 really seems to decode well and if it suffers minor multipath distortion then continues to decode. Interestingly, as you would expect, 4m shows slightly more multipath. This can be observed by the 'shadowing', ie evidence of 2 or 3 additional signals on the waterfall. Many think that this is due to a badly adjusted transmitter but is in

FIGURE 3: Crowded 6m FT8 thanks to Sporadic-E.

fact true reception of scattered signals. On 2m this is clearly evident, where aircraft scatter and reflections from hills etc cause extensive shadowing. This is not much different from the classic SSB warble or flutter when listening to a scattered SSB signal – albeit a much wider bandwidth.

DX window for FT8 on 6m?

Comments made on the various forums focused on the congestion around 50.313MHz and the need to spread out. Looking back to 2017, FT8 was in its infancy and mainly being used on HF. 2018 is the first year that a full test can be made during high signal strength Sporadic-E openings and it is clear that rooting oneself onto 50.313MHz is not very productive. During two North American openings DX activity moved up to 50.323MHz, thereby clearing the now familiar CQ DX or CQ NA calls on the original frequency. Another way would be to CQ on '313', with a split frequency to receive on. This could be a couple of kHz higher, for example, thereby giving a better opportunity to copy any weaker signals on a clearer frequency.

Band reports

Dale, MM0INH (IO85). Last year Dale was hoping to improve his station, however it didn't really come to pass. A Full licence was obtained instead, which means that MM0INH now replaces 2M0WDG. On 6m Dale reports a mixed bag of QSOs from IO85OX, with a strong opening building on 4th May, with some hope that the season had begun properly. Sadly that didn't occur as the more southern parts of the UK enjoyed the Es DX and it stubbornly refused to move further northwards!

Undaunted, Dale made a QSO with EB1DJ, whom he later also spoke to on 10m. EB1DJ confirmed that he had made over 100 QSOs during the opening. 11 May provided three more FT8 Spanish contacts and a phone QSO with EA1SAL. It was also nice to get EA7AH, who was working RTTY during that brief opening. 12 and 13 May brought another two EA and two Italian stations along with CT and ISO FT8 contacts, during the all too brief openings. It took until 14 May when there was a strong GM to Nordic Area opening that lasted a number of hours. 16 stations were worked, all except one using FT8. The stations were mostly OH, with a couple of SM and, oddly, a single EA station that faded in for a FT8 QSO and faded out again. Conditions were good enough briefly, to once again have a phone QSO with OH0Z. All in all, that opening gave Dale more Nordic stations than he achieved all last year.

Within the first three weeks of May he has managed to work 41 stations (excluding GM) that, for the modest setup, Dale reckons he shouldn't complain about! It was 24 May last year before any Es opening on 6m so this could be a good year!

Gordon, G3PXT (JO01). The well-known tree that is the support for the 2-ele InnovAntennas Quad has had a haircut at the G3PXT QTH. Now that the leaves and branches have been trimmed the antenna is working well and Gordon is looking forward to the Es season. Even with excess foliage around the antenna Gordon has worked 49 DXCC entities in 2018 so far to the end of May, which included a new all time DXCC working D41CV. This brings his tally to 72 DXCC entities overall on 6m. He also entered the 6m section of the new RSGB MGM Contest on 6m and gained 4th place. In the UKSMG Summer Marathon he currently stands in 4th place with 187 grids worked. All Gordon's QSOs are a mixture of FT8, MSK144, CW and SSB. Surely plenty more DX to come from Gordon in the months ahead.

G4HGI (IO83). During the 50MHz May UK Activity Contest I went on to CW only. Conditions were excellent and running 10W into a 9-ele dual band 6m and 4m antenna gave the following results in just 25 minutes: OH1TM (KP01), OH4LA (KP20), OH3MF (KP20), OH5LK (KP30), SM5KQS & SM5P (JO88), OH0Z (JP90), ES2DF & ES1AO (KO29), OH6VV (KP22), SM5EPO (JP80), ES0NW (KO18) and best DX OH7RJ (KP32) at 2039km. FT8 operation has been very busy and 4m propagation has in parts been very good. S01WS was a real all time first worked, along with many others, as conditions were so good. I worked them on both SSB and FT8 just to make sure. The path from IO83PL to IL46RD is over 3000km but nothing in comparison to the GM4VVX QSO reported earlier!

Paul, G3YDY (JO01). Bands have been pretty flat until 15 May when there was an opening over the North Sea resulting in QSOs on 2m using FT8 with SM6CEN (JO67) at 980km, OV3T and OZ1BEF in JO46, later working both stations on SSB at S9+. On 70cm with OZ1BEF (JO46) on FT8 and SM6VTZ (JO58) on CW. Conditions remained good and on 16 May in the evening there were 2m FT8 QSOs with DJ6AG and DL5ZA (JO51), DL5VAE (JO64) and DL3LST (JO61), with the QSO with DJ6AG being completed with 10W output.

At 1630UTC I was late to the Es opening on 28 May but had a good session on 4m SSB and FT8, having 10 QSOs and working one all time new DXCC and 6 new locators, the best being SV3AQO in KM08. 50 QSOs went in the log for 6m but nothing of real note. On 4m I run the legal limit and 300W on 6m. I use a dual band 2-ele antenna at about 12m AGL.

Beaconspot: 10 years of extraordinary service

On 21 April 2018 beaconspot celebrated its 10th anniversary of providing beacon information to the amateur community. Congratulations to all at the UK Microwave Group for developing this excellent resource **[5]**. Changes around GDPR were made on 20 May 2018 as beaconspot.eu changed to beaconspot.uk. It looks and feels the same and will accept the same username and password. Beaconspot.eu will remain in place until 31 October 2018 for the purpose of redirecting users. You will be asked to agree to beaconspot.uk holding your email address in order to comply with new GDPR legislation.

Sign off

It's fair to say that there have been quite polarised views about the use of FT8, other digimodes and more traditional modes like SSB and CW on VHF. Also, it seems clear that the higher the frequency the less effective JT8 is. Perhaps there are other solutions for digital operations on higher bands. JT9F seems more tolerant of fading and multipath so experiments need to be made there. Distance-wise it's hard to see much difference between FT8, SSB and CW, though many regular users find it a more convenient method of transmission.

All in all it is another tool in the box to work stations on VHF. No doubt usage will level off, but one extraordinary thing is that while we seem to talk about the sheer number of stations using the mode, congestion etc, I wonder if these stations would be using SSB or CW at the same level ? The jury's still out.

Websearch

[1] www.qrz.com/lookup/d41cv
[2] https://www.qrz.com/lookup/s01ws
[3] http://iaru-r1.org/index.php/downloads/func-startdown/991/
[4] www.rudius.net/oz2m/ms.htm
[5] www.microwavers.org/

Richard Staples, G4HGI
g4hgi@live.com

GHz Bands

This month focuses on 24GHz. A somewhat unloved band, especially by fixed stations. To drive this fact home, and to my embarrassment, I won the 24GHz fixed station section of the RSGB 432 and up contest this year with a *single* QSO of 77km with M1CRO/P. Remember this is an 'exclusive' allocation in the UK, so we should encourage its use. Beacon licences are easy and quick to get if you need a signal to listen to.

PHOTO 1: Trying to diagnose problems with GB3PKT.

First terrestrial 24GHz G-DL

The first ever 24GHz UK to Germany contact was made via EME between G4NNS and DF1OI in 2006, but during the May UHF Contest M1CRO/P (JO01pu) had a 381km QSO from their coastal site at Walton-on-the-Naze with DK0PU (JO31jn). This is believed to be the first *terrestrial* G-DL QSO on 24GHz. CW signals were not very strong, at 519 each way. M1CRO/P used a GPS-locked PLL, subharmonic mixer/transverter and Rx preamp, all from DB6NT, plus a solid state power amplifier (SSPA) delivering 3W to a Flann 30cm lens horn. DK0PU used 430mW into a 35cm Andrew dish at 5m AGL and 80m ASL. While not a record, as the current 24GHz tropo distance record is held by DL7QY and F6DKW for a 581km contact and the UK record is by G4EAT and PA0BAT at 408km, it's a remarkable QSO nevertheless. This shows the power of sea ducts on this band so I'd like to see more activity from the East coast on 24GHz.

24GHz beacon GB3PKT back on air

I finally fixed the fault on the 24048.945MHz beacon I built for GB3PKT (JO01mt). It has always suffered from a severe power drop every time the co-sited 10MHz WSPR beacon transmitted, which drove me nuts because I could never reproduce the fault at home. Beacon keeper Tony, G0MBA and I always suspected a PSU problem, but site measurements (**Photo 1**) showed a steady 13.6V supply to the outdoor unit and solid 1336MHz drive that did not change while the WSPR beacon transmitted. The breakthrough came when Tony noticed that the current to the outdoor unit increased by about 50% as the beacon power dropped. I got the unit home (yet again) and injected 10MHz up the drive coax and PSU leads using a bias tee. Sure enough, I could make the beacon power drop by injecting enough 10MHz up the drive coax! Further investigation showed that the first 1336MHz buffer stage after the synthesiser, a wideband MMIC, was being modulated with 10MHz sidebands causing the overall output of the stage (driving a varactor multiplier) to drop by more than 10dB. A 500MHz high pass filter on the input to the stage fixed the issue and the beacon is now back and running normally.

24GHz upper atmosphere Tropo propagation

The repair of GB3PKT has thrown up some interesting 24GHz propagation. On 11 May, while low pressure was approaching East Anglia and despite no visible trace whatsoever on the WSJT-X waterfall display, I saw averaged decodes from GB3PKT's 24GHz JT4G signal. This seemed to be an example of what I've called 'drizzle scatter' in the past, but it may be something different. Over a 77km, totally obstructed path from sea level here on the Fen Edge to sea level at Clacton, signals varied from -19 to -21dB. To study this further, I'm now monitoring the beacon 24/7 using a Raspberry Pi running WSJT-X and a FUNcube Dongle behind my transverter. I had an email exchange on the US microwave reflector with Bob, W7PUA. He pointed me to comprehensive experiments done in the USA on 1.2, 10 and 24GHz. The 1.2 and 10GHz parts were reported in May/June 2003 QEX **[1]** but he has data for 24GHz waiting to be written up. These data recorded multiple observations where the scattering efficiency at 24GHz exceeded that at 10GHz. In all cases the enhancements were associated with approaching low pressure systems producing ice crystals that are elevated to the upper troposphere, typically at altitudes around 6 to 10km. Elevating the antennas to correspond to those regions was very beneficial.

Just like my isolated observation, at 24GHz, Bob's team observed major drops in signal strength when the rain portion (with attenuation) of the low-pressure system arrived. Hopefully we will have more about this in upcoming columns.

Microwave talkback channel changes to 144.390MHz

In recent months it has become apparent that 144.174MHz has been taken over by a huge upsurge in activity on FT8. Using a dial frequency of 144.174 USB as suggested in the software results in signals that are often audible when listening on 144.175MHz, the recognised UK microwave talkback calling frequency. For some time, our French neighbours have used 144.390MHz as a calling frequency and it seems a good step to align with them. This proposal was discussed at the Contest Forum at the Martlesham Round Table and met with no adverse comments, so it is proposed that we adopt 144.390MHz as a microwave talkback calling frequency, with immediate effect.

RSPDuo dual tuner SDR

The 2018 Dayton Hamvention saw the launch of the new RSPduo, a high-end product from UK company SDRplay, which is reviewed elsewhere in this issue. Its two independent tuners allow for diversity applications. What immediately springs to mind for me is that this would be perfect for my project monitoring GB3PKT's 24 and 10GHz beacons simultaneously. I'm looking forward to getting one to play with!

Finally

Please keep band reports and technical snippets coming in to me by email. Why not join the conversation on Twitter @g4bao and @ukghz using the hashtag #GHz_bands – but above all, get active on the GHz Bands!

Websearch

[1] https://bit.ly/2rK5Old

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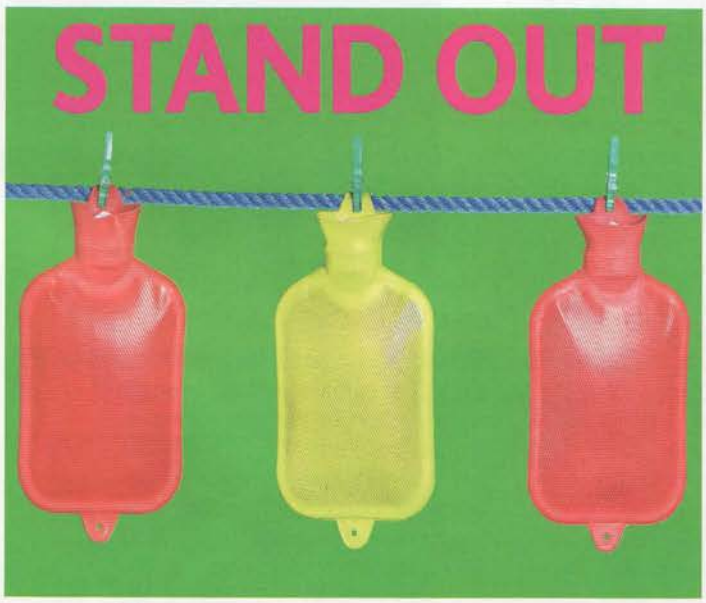

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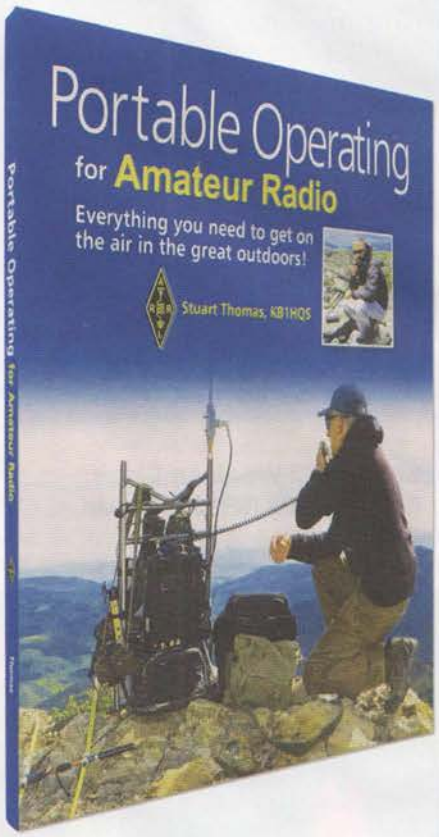
Book Review

A timely look at radio in the great outdoors

Portable Operating for Amateur Radio

by Stuart Thomas, KB1HQS



Could there be a better time than summer to take your amateur radio hobby into the fresh air and sunshine? Many people will be operating /P (portable), with everything from casual car-on-a-hilltop to full-blown mountaintop Summits on the Air (SOTA) and similar expeditions, to full-on Field Day efforts with many club members striving to wring every last kilometre of propagation out of the sky. This book makes the bold claim that it contains "everything you need to get on the air in the great outdoors" – and it's not far wrong.

The book is divided into sensible chapters, each addressing one aspect of going portable. It just so happened that I first opened my copy at Power Sources, chapter 5, so I'll describe that because it gave me my first impressions. In this chapter we learn things like assessing the *actual* power requirements of your chosen radio, the pros and cons of different battery chemistries (including an assessment of the latest rechargeable lithium polymer types that weigh just a third as much as a comparable capacity lead-acid, though they cost three times as much), thoughts on portable generators, solar panels, power connection technologies and more. This is representative of the thorough approach that Stuart takes to describing his subject, leaving few if any stones unturned. The ten chapters cover everything from choosing your radio to logging contacts; different types of portable operating; portable antennas and much more.

Author Stuart Thomas, KB1HQS is a highly seasoned portable operator and has been an amateur since a very early age thanks to his father who, too, was a licensed amateur all his life. Stuart's love for the outdoors possibly stems from his years as an Eagle Scout, or maybe his professional sailing experience. Being a Wilderness First Responder, Emergency Medical Technician and Search and Rescue team member are likely to contribute, too. He really knows what he's talking about on the subject of the great outdoors and he has brought all of that experience to bear on his portable operating, too. I don't get the impression that he is the sort of chap who'd be content calling CW from a suburban garden-shed shack, beslippered, and with a cup of tea cooling quietly by his side!

So what are the secrets to mounting a successful portable operation? I think the one thing that came over most strongly to me from this book can be condensed into one word: preparation. Even if you use only a fraction of the information in this book, you WILL be better prepared. And as we all know (even if we rarely admit it to ourselves), preparation is the key to success in any endeavour. The level of detail in this book is astonishing: KB1HQS even covers things that sound trivial such as making sure you put distinctive markings on your bags when travelling, thus reducing the chances of someone else accidentally picking up your bag from a luggage rack or airport baggage conveyor. (Imagine your fellow-traveller's dismay when they arrive home and discover a bag jam-packed with carefully designed and integrated QRP gear when they were actually expecting some nice familiar dirty socks!)

But back to the point. This book is copiously illustrated with photographs covering pretty much everything you can think of for portable working – and a good bit more besides. There are also diagrams, screendumps and so on to help support the text. The book is packed with useful information, operating tips, hints and advice that make it an invaluable preparation aid for any portable operation. Whether you are casually calling CQ on a 2m handheld while going for a walk or preparing for a full-blown Field Day operation, I am certain that you will find ample useful information that will more than justify the purchase price.

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Design Notes

Wideband noise as a test source

A while back I needed to align the 3.4GHz bandpass filter shown in **Photo 1** and, lacking a network analyser for that band, I needed another way to measure its frequency response. The filter passband was 60MHz and I needed to adjust it, and to see its stopband response to about 100MHz from the centre. I have a microwave signal generator and a spectrum analyser that cover the band, but any attempt to use the signal generator in swept mode was futile as it was impossible to make the spectrum analyser see a swept response rapidly enough to allow the filter to be adjusted. Then I remembered the broadband noise source built some years ago and reported here originally in the March 2010 edition of *Short Circuits*. That design used a 31-bit shift register with exclusive-OR gate feedback to generate a pseudo random sequence clocked at 64MHz, resulting in a substantially flat noise spectrum from DC to about 20MHz. The circuit arrangement is called a Linear Feedback Shift Register (LFSR). Could I do something similar using 74VHC CMOS shift registers clocked at an even higher rate? I could then upconvert using a double balanced mixer with the signal generator as an LO placed close to the filter centre frequency. The resulting mixed-up double sideband output would then be twice the width of the noise and could show the complete filter response in one hit on the spectrum analyser. The signal generator could be adjusted to investigate the response further out.

I had a 125MHz TTL clock oscillator and I 'knew' very high speed CMOS logic, the 74VHC family, could go at that frequency. Actually it doesn't, properly, but we'll come to that later! Looking at various tap positions for LFSRs, I decided on a 23-bit long sequence as that could be generated with two taps and one XOR gate. The sequence would be 2^{23}-1 = 8388607 long. At 125MHz that repeats at 14.9Hz. So my pseudo noise would actually be a comb of frequencies spaced by this value. I built the circuit of **Figure 1** using rats-nest construction, as shown in **Photo 2**. The second XOR gate in the feedback path is there to ensure the start-up sequence is randomised and can never get locked up in the all '0's condition. It inverts the feedback until the capacitor is charged, so there will always be some change in the initialisation feedback pattern, enough to allow it to enter the correct sequence.

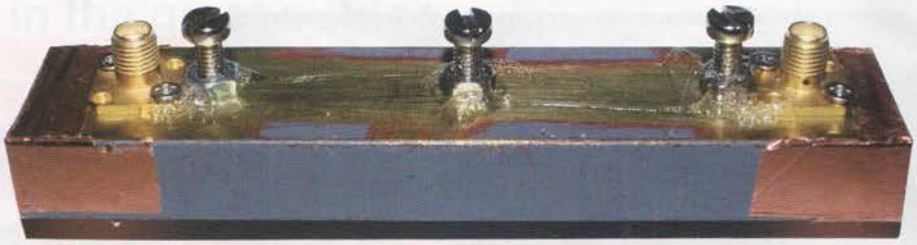

PHOTO 1: 3.4GHz evanescent mode bandpass filter.

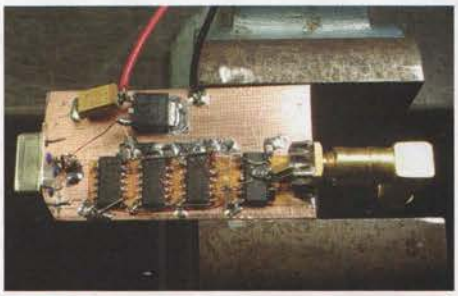

PHOTO 2: 23 BIT LFSR built using rats-nest construction.

The resulting noise spectrum was exactly as expected and can be seen in **Photo 3**. The nulls in the spectrum are every 125MHz, with some clock leakage due to the slight asymmetry of the '0' / '1' pattern of any LFSR. The amplitude spectrum can be described mathematically as SIN(π.X) / π.X where X is the frequency normalised to the clock; the expression is often referred to as SINC(X). So at 50MHz, X = 0.4 and SINC(π x 0.4) = 0.757, or -2.4dB. So, while any frequency response shown on the spectrum analyser will not be that due only to the filter, the correction can be quickly determined.

After upconversion to 3.4GHz the resulting signal looks like **Photo 4** and, when passed through the tuned-up filter, the result is shown in **Photo 5**. Exactly what I wanted. When the filter was finished and put into service in a 3.4GHz transverter, the LFSR module was put to one side in the junk box and forgotten about – until now.

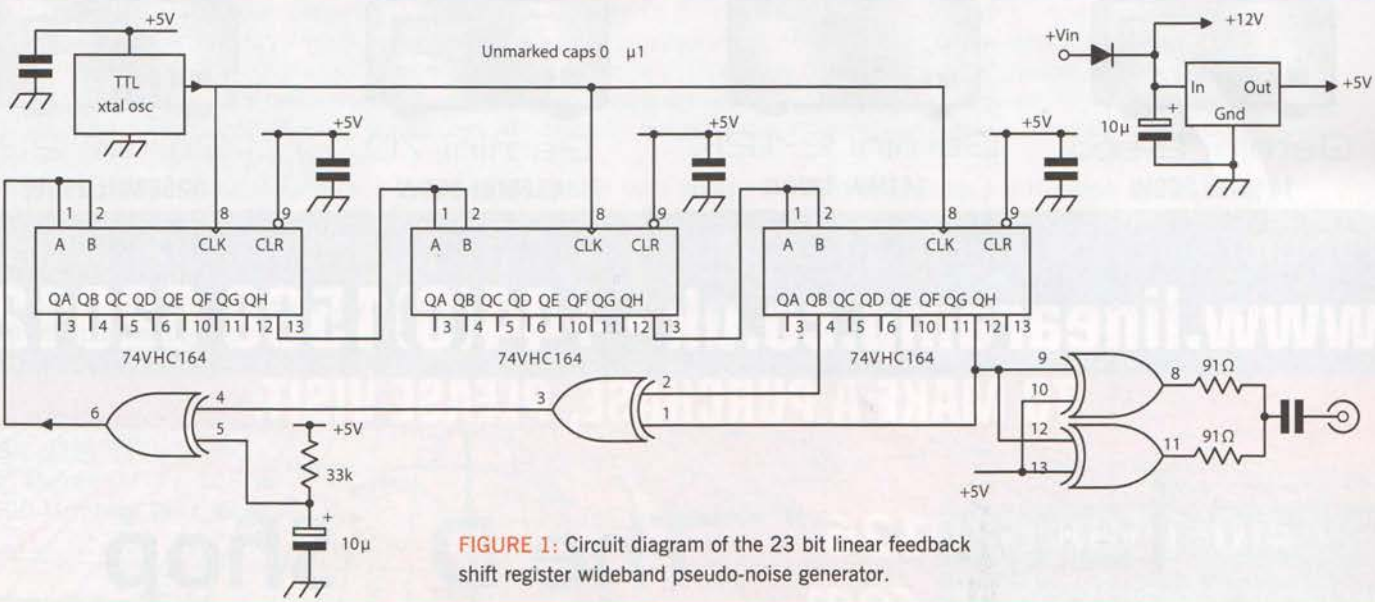

FIGURE 1: Circuit diagram of the 23 bit linear feedback shift register wideband pseudo-noise generator.

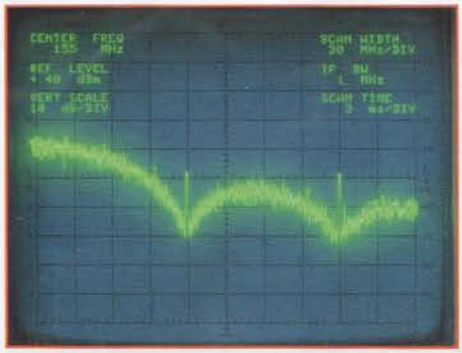

PHOTO 3: LFSR output spectrum when clocked at 125MHz.

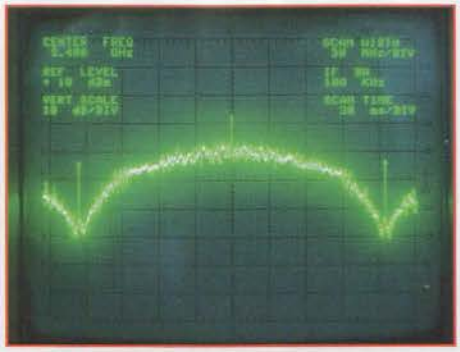

PHOTO 4: LFSR spectrum double sideband spectrum after being upconverted in a double balanced mixer.

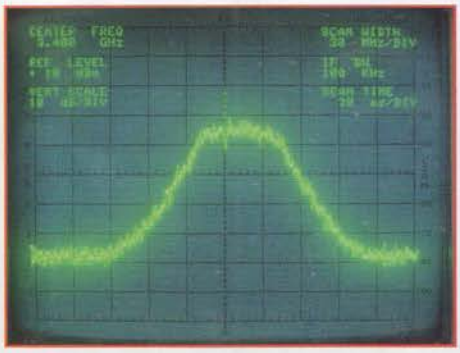

PHOTO 5: Upconverted spectrum after passing though the bandpass filter.

But the tone spacing's wrong, Gromit!

Moving forward to the present day; I needed a noise source for mixing with audio tones to test some soundcard based decoding software. Remembering this LFSR source, I recovered the module from the junk box and connected it into circuit. Knowing it should have generated a comb spectrum spaced at 14.9Hz, I was very surprised to see on the waterfall display associated with my decoder software that the spectral lines were spaced only about 7.4Hz apart. This meant the PN sequence was repeating after twice the number of clocks it should have been. I double checked the LFSR construction to make sure I had the tap positions correct, since theoretically a 2^{24}-1 long sequence could have been generated by that arrangement if I'd used the final shift register stage – although not with just a single two input XOR gate. Connections were correct, so after wracking my brains a bit I posed the conundrum on the RSGBTechnical Group to see if anyone could suggest why I was getting a PN sequence that looked correct, but with twice the repeat length. The answer finally came from Glyn, M0XGT, who, after a bit of simulation, made this comment:

"I think what's happening is something like this: the shift register is essentially a discrete delay line with feedback taps at 23 and 18. If there is additional delay between the input and output from propagation delays / cascade ripple, then this will add storage into the system which is equivalent (when operating stably) to adding extra integer delays. In other words it is just the same as shifting the taps along by one (or two, etc). This will very likely increase the period although the resulting LFSR won't be the maximal period for the number of bits.

"I tested this idea by swapping the polynomial from [23 18 0] to [24 19 0] in the simulation and the frequency spacing did indeed shrink and looks to be around 7.4Hz.

"I did a bit more checking on which stable states your 23-bit LFSR with taps at 23 and 18 (as per the circuit diagram) could settle down into for integer clock slips /delays – the most obvious one is a single clock slip which pushes the effective tap positions by one clock delay to [24 19]. The period of this is 16,766,977 – it's not quite maximal for 24-delay, as that would be 16,777,215 and using FOUR taps, but is incredibly close, at 99.94% of max possible. The comb spacing when clocked at 125MHz clock is 7.455Hz, which fits your data very closely and very likely explains your 'half-comb-spacing' results.

"This is interesting, because the period is longer by very close to 2x and also longer than the max length of the 23-bit you've implemented – here the max length would be 8388607 and a comb spacing 14.901Hz at 125MHz clock.

"This means that your hardware implementation (24-bit with TWO taps, currently 23 & 18, 24 unused) can be rewired to produce an approx. 2x longer length just by shifting the existing taps by one step from 23 & 18 to 24 & 19. No other change in hardware is required, and the two tap system achieves 99.94% of the maximal possible with the optimal four taps [24 23 22 17 0]."

Playing with the clock rate

Another comment received via the RSGBTechnical Group post pointed out that the 74VHC164 was only specified up to 100MHz clock frequency, so I was operating it beyond its capabilities, even without the additional delays introduced by the two XOR gates. *Mea culpa* for not reading the data sheet and just assuming all VHC logic would work at that sort of frequency. The writer suggested I try feeding with an external adjustable clock to see exactly where things started to go wrong.

So I knocked up a simple 74AC00 buffer with feedback resistor to square up an input waveform (and yes, this time, single gates do work at high frequencies well beyond their specification – I'd already tested that arrangement). Feeding the LFSR from this buffer at up to 90MHz clock input, the output spectrum and comb spacing were exactly as they should be with a 2^{23} repeat rate. Above about 95MHz it went wild, with rapidly changing and chaotic-looking behaviour and a comb spacing that went all over the place from narrow to wide and back. It looks as if the 'additional storage or delay' is beginning to come into play but is random in its behaviour. Above 115MHz input, the output settled back to a nice SINC(X) shape, but now with the reduced comb spacing. The additional delay was now stable. Which is how it's going to stay. But every time I use that wideband noise generator, the uncomfortable feeling that 'it's not working as it should' will continually pervade my consciousness; but since it generates the ideal wideband spectrum with a comb even narrower than design – it can stay just as it. It's just not *right*!

Better solution for audio

The 7.4Hz comb spacing is a bit too wide for most audio applications – it doesn't 'sound' like noise: it throbs. So for future use I built up a PIC-based noise generator [1] that implements a 24 bit LFSR in software. Using the 12F629's internal 4MHz RC oscillator, the LFSR sequence can be generated and sent to an output pin using a loop just 30 instruction cycles long, leading to a clock rate of 33.3kHz. Noise is substantially flat to 6kHz and the comb ought to be spaced by 0.002Hz. When using a crystal source for the PIC, these very narrow spaced lines could just be seen (after a very long wait) using the *Argo* software for QRSS [2]. With the PIC's own RC oscillator, its inherent instability caused the lines to wander and it was impossible to make out any discrete spectra – a perfect noise signal for testing, even for very narrow band working.

Websearch

[1] www.g4jnt.com/*LFSRGen.zip* See the.ASM file for connections and functionality
[2] www.weaksignals.com/

Andy Talbot, G4JNT
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PHOTO 1: The Czech visitors celebrate their success after the prize giving. (All photos by David Williams, M3WDD).

International British ARDF 2018 Championships

The RSGB ARDF Championships returned to the Midlands this year and were staged on Cannock Chase and the Wyre Forest. We welcomed overseas visitors from the Czech Republic and Germany.

The late April weekend chosen, coupled with the late spring this year, meant that the forests were at their very best with the summer undergrowth barely emerging let alone being a serious impediment to movement.

Shoal Hill was used for the Sprint event and traditionally this format starts the weekend programme. Planner Andrew, G4KWQ had concentrated the ten hidden transmitters and two beacons in the southern corner of the area, setting the scene for some fast and furious DF. By the end, most of the competitors admitted losing track of where they were on the map amid a plethora of paths in the largely runnable forest.

David Williams, M3WDD came in with the fastest time of an RSGB competitor but he was outclassed by Jiri Marecek, OK2BWN, one of the top Czech runners, who came in just over three minutes ahead of him and just under the 30 minute mark.

Day 2 saw the participants assemble at Castle Ring, the Iron Age fort that stands on the highest ground of Cannock Chase. From here the competitors were able to get a superb set of first bearings, given that there was near line of sight to all the hidden transmitters. However, this early advantage did not persist for some. Whilst Cannock Chase does not have any precipitous mountain sides to deflect VHF signals, it is well contoured with many small hills scattered in the terrain. This caused some competitors a bit of grief, together with the usual poor choice, by some, of the sequence in which to visit the transmitters.

Planner Andrew, G4KWQ made the 'near-far trick' work by placing transmitter

PHOTO 2: Robin, RS213497 (L) receives the trophy from planner David, M3WDD.

PHOTO 3: David, M0CJO (left) was winner of the M40 category on Day 2.

#3 on a distant high spot in clear view of the start across the broad valley and putting a 'stonking' signal into the start. He then had transmitter #5 rather closer, located in a hidden valley away to the east and, as a result, much weaker. There were one or two competitors who chose to head for #3 as their first transmitter to be hunted, and they duly paid the price.

The format adopted to determine the RSGB Champion is to assign more of the five hidden transmitters to the younger age groups and then the smallest number (three) to the M70 (men 70+) and W60 (women 60+) age groups. This year the planner placed two of the transmitters well away from the start, one to the west and one to the east. The RSGB winner was G3ORY, who only had to find the three transmitters closest to the start.

The top of the results list was dominated by the visitors. A notable performance came from Pavla Hazmukova, a W35. She managed to beat the hugely experienced Jiri Marecek OK2BWN (M50), by just 45 seconds when, by chance, they had been assigned the same set of four transmitters to find.

RSGB newcomer David, M0CJO, who only came to try ARDF after hearing about it at the 2017 RSGB Hamfest, also put in a notable performance to win the M40 category. In the early stages of participating in ARDF, the performance of an individual fluctuates quite a lot as they gain experience. David managed to put all his prior experience over the winter to good effect.

For the final day, the event moved to the Wyre Forest located just west of Kidderminster. It was the turn of 80m and on this band surface wave propagation provided the ground wave coverage. As a result the bearings are generally very good. The two things that can have an adverse effect on the direction of 80m signals are power lines and metal fences. Therefore it may not have been a coincidence that planner David, M3WDD had obtained permission to use Postensplain, which contains a munitions testing facility surrounded by 1.6km of high metal security fencing.

Notwithstanding this challenge, the top competitors were coming back in under an hour. The best RSGB competitor was Robin, RS213497 who was just over four and a half minutes behind the overall fastest Jiri, OK2BWN. This was a 'head to head' match since they were both in the M50 category. Robin's achievement put a new name on the RSGB 80m trophy.

Full results (and the events programme, including the new 'Midlands Summer Series' that takes place from May to September) are at www.nationalradiocentre.co.uk/ardf. Select 'results' from the drop-down menu. .

PHOTO 4: The youngest competitor was Jarmila Hazmukova, a W12 from the Czech Republic.

Bob Titterington, G3ORY
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A simple up/downconverter test source for datamode testing and demonstration

This box is a simple frequency source and mixer made from junkbox components. It is intended primarily as an upconverter to allow soundcard output from datamode software or other test signals to be upconverted to a low level RF output. That can be fed to a receiver's input and subsequently into a second PC for datamode demodulation. It will also work backwards as a simple fixed frequency receiver, albeit one with a fixed gain. This allows bidirectional datamode testing at RF with only one 'real' transceiver needed as part of the link. The resulting setup can be useful for club demos of datamodes using transmission on short-bit-of-wire antennas across a room.

Needless to say, such a simple mixer arrangement generates a double sideband signal but when used in conjunction with an SSB radio, the 'wrong' sideband is just filtered out in the receiver and ignored.

Hardware description

Figure 1 shows the circuit diagram of my prototype. The components were selected from my junkbox and, as will be described, there is an almost infinite choice in selecting frequency and other parameters to suit whatever components you may have available. The output frequency can be anything the receiver can cover but if bidirectional testing is desired, it makes sense for this frequency to fall in an amateur band; if only so the transceiver will actually transmit there. I chose 50MHz as this allows small bits of wire to act as test antennas and I happened to have an odd crystal on 16.94MHz whose third harmonic comes out on that band. Another possibility is 14.318MHz, where low cost crystals are available. If you don't have a suitable junkbox crystal, look in the suppliers' catalogues for anything that is cheap and at a workable frequency. Don't go too low as any practical demonstration using short bits of wire as antennas may not work too well when local noise is present.

Since this is likely to be used as a very low power transmitter, it is prudent to make sure spurious radiation direct from the local oscillator (LO) is eliminated.

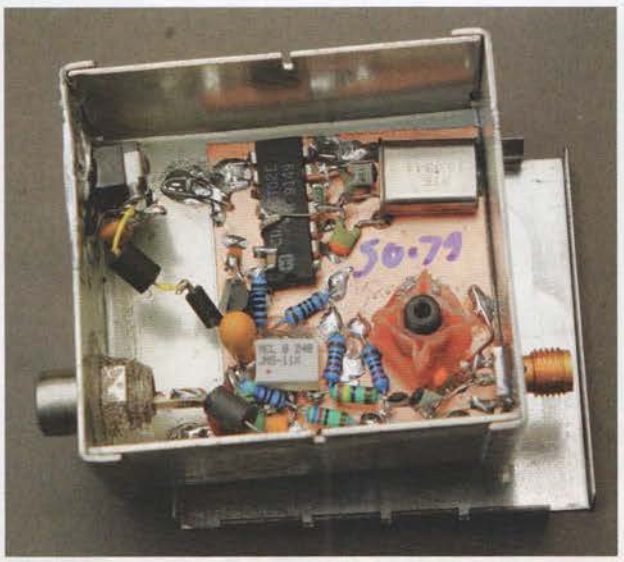

PHOTO 1: The breadboarded up/downconverter test source.

Harmonic mixer

Diode ring mixers like the venerable SRA-1 and more modern equivalents such as the one used here all have a reliable and predictable conversion characteristic when the local oscillator is an ODD submultiple of the wanted LO. Here it is one third. The typical loss of such diode ring mixer is around 7dB when driven with its fundamental LO. At $F_{LO}/3$ the loss is typically 20-22dB. At higher orders, 5th, 7th etc, loss progressively increases, but the mixer is still useable. Don't try even-order LO mixing. Mixer loss will be very high and totally unpredictable. Harmonic mixing works well when the LO is rich in harmonics itself, in other words a square wave drive is best.

Audio interfacing

The audio input to the mixer IF port will be from a soundcard output, which from a laptop usually means drive for a low impedance pair of headphones with up to 3V peak-to-peak, ie around 1V RMS. Even if this is a proper line level signal, it should be capable of driving the 500Ω input resistance here. A simple low pass filter with a cut off around 80kHz is mainly there to prevent RF leakage up the audio input cable. A 10x attenuator serves the dual purpose of presenting a 500Ω input resistance and also presenting the mixer with a 50Ω termination. This attenuator means that the maximum soundcard output of 1V RMS, or about 3V peak-to-peak is reduced to 0.1V RMS, or around -7dBm in 50Ω. This is about the maximum a diode ring mixer should be driven to in order to preserve linearity.

Local oscillator

The simplest crystal oscillator is just a linearised CMOS logic gate. I used a 74HC02 NOR gate as it was one of the few DIL-packaged logic chips I had left sitting in the junkbox, but any inverting logic gate will do. The circuit will work up to at least 30MHz with fundamental mode crystals.

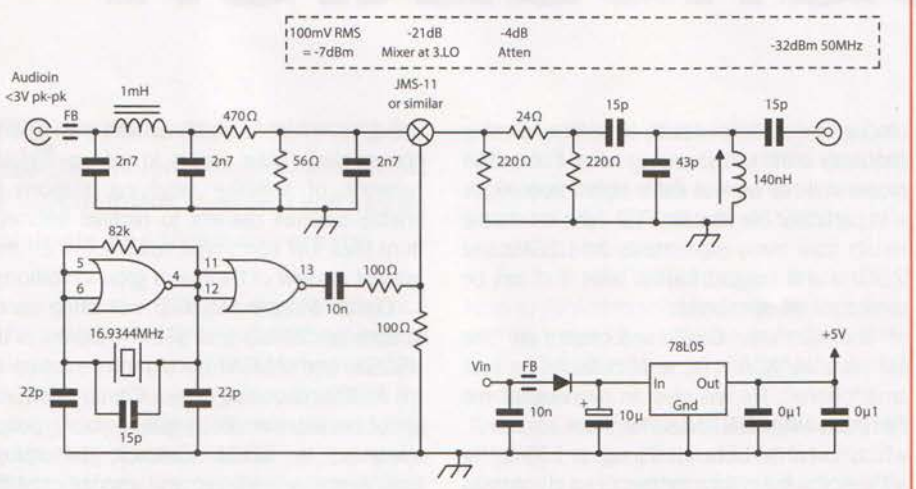

FIGURE 1: Circuit diagram of up/downconverter test source.

When using CMOS, don't forget to ground all unused gate inputs to prevent them floating, which would result in unpredictable results including the chip drawing excessive supply current, taking off into oscillation etc. If a TTL oscillator module running at a suitable frequency is to hand, an even simpler design can be achieved by replacing the CMOS chip and associated components with a single canned component.

The logic level output is a 0/5V square wave that needs to be attenuated by a half to give the ideal drive level to the mixer. The two 100Ω resistors forming the attenuator appear in parallel looking backwards from the mixer, so its LO port sees a 50Ω source.

Output circuitry

If the aim is to provide just an extremely low level test signal input directly to a receiver's aerial socket there is no real need for any filtering – the receiver will do the job of ignoring and getting rid of spurious products. But as I envisaged this being used as a transmitter, although only over a few metres or perhaps from one room to another, some filtering really had to be incorporated. The mixer first goes into a 4dB pi-attenuator, which ensures the mixer sees a reasonable match at all frequencies. This feeds a tuned circuit at 50MHz: a basic top-coupled single resonator bandpass filter operating with a loaded Q of around 20. It provides sufficient attenuation that all unwanted signals (mainly the 16MHz fundamental) are at least 30dB below the wanted 50MHz output. If you build this circuit using fundamental rather than third harmonic mixing, perhaps for the 14, 21 or 24MHz bands, there will be appreciably more RF output and a low pass filter would be a better solution than a single tuned bandpass design.

Construction and screening

If the source is used across-the-room with short antennas, direct leakage from the LO signal bypassing the mixer needs to be eliminated. The mixer itself provides 30dB or more of carrier rejection, but any coupling from the oscillator into power leads or the audio cable needs to be eliminated. Putting the whole assembly into a screened box is advisable. A diecast box would be fine, but I had some tinplate boxes and just used one of those. A couple of ferrite beads on the DC and audio feeds and capacitive decoupling direct to chassis where they enter the housing near-eliminate RF leakage via connection leads.

Photo 1 shows my version using rats-nest construction **[1]** with a mixture of wire ended components and a few surface mounted ones. Although I have a lot more of the latter components, breadboarding with SMT can be a bit mechanically unsound as the connection plating on resistors and capacitors is easily pulled off – they really *are* only designed for PCB mounting.

With third harmonic mixing, output power at the full 1V RMS drive was -32dBm. The signal levels assuming maximum drive signal throughout the RF chain are shown in the diagram. For a fundamental LO design, output power may reasonably be expected to be in the region of -18dBm.

There is no real reason why an amplifier couldn't be added to turn this into a low power test beacon source. But if you do, *please* add whatever extra filtering is needed to get the spurii down to lower and more acceptable levels. And remember it is a double sideband signal – the presence of the unwanted sideband could cause QRM, and will certainly confuse any listeners who tune in to the wrong sideband!

Transceiver operation

Although this was designed mainly as a transmit source, it can be used bi-directionally for demonstration purposes with transceiver operation. In receive mode the converter operates with fixed gain. A maximum output voltage into the PC soundcard of up to around 100mV RMS is possible before the mixer loses linearity. So bi-directional operation with a low power transceiver such as an FT-817 can be achieved using a fixed attenuator of some description and coax between the external kit and the converter. Ideally, the maximum input power to the converter should be kept below 1mW, so the 5W output from an FT-817 needs to pass through an attenuator of at least 50dB. With this value of fixed attenuation, and assuming 3rd harmonic mixing with an overall converter loss of 25dB, the result is 75dB attenuation of the transmitter output power when measured at the mixer output, which will then be delivering -38dBm. This means around 2.8mV RMS to the PC soundcard, which is quite low for a line level input although most datamode software will cope happily enough. If the soundcard microphone input is used even this voltage amplitude may need a bit more attenuation.

In general, RF attenuation in the range 50dB to 100dB ought to work – but some playing around and experimentation will be needed for reliable two way transceive operation. Make sure the transceiver is fitted with a resistive pad of at least 20dB that will provide a good match and can absorb the bulk of the generated power. The rest of the attenuation can be provided by all sorts of means, it's up to your ingenuity. But do be aware that when you're considering very high levels of attenuation in the region of 100dB you have to be very careful to avoid leakage.

The audio out and in for the soundcard will also need to be combined into the single port of this converter. A resistor of 100Ω to 300Ω on the audio output and direct connection of this to the converter in parallel with the high impedance soundcard input will suffice.

Notes

[1] Many people call it 'bird's nest' construction. But as I sit in the garden typing this and being watched by a friendly blackbird, a couple of pigeons and a whole bush full of sparrows tweeting away, I just know they will be offended by the term 'bird's nest' used in this context. Especially as they are in the process of weaning youngsters. No doubt the birds will start demanding still more food – and leaving deposits on the car – if I insult their home building abilities.

[2] If you use a mic input to the soundcard, a further audio attenuation of typically 100 times will be needed to get the level down to the millivolt or so these require.

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The RSGB Convention

We will announce soon more HF/DXpedition talks but here are tasters of the talks in the 'VHF and Up' and 'AMSAT' streams.

'VHF and Up' stream

We are delighted that Ian White, GM3SEK will be talking about "VHF Baluns – Fact and Fancy". Our ideas about HF baluns have changed dramatically in recent years. The focus today is very much on suppressing unwanted common-mode RF currents, to reduce both the received noise levels and the risks of causing interference on transmit. Now Ian extends those ideas into the VHF-UHF spectrum, taking a critical look at some long-established methods for feeding Yagi antennas and identifying a new list of do's and don'ts John Worsnop, G4BAO will cover "The Wednesday Night Digifest". He will explain why he initiated a regular Wednesday night 'Digifest' to encourage activity above 1GHz. The various digital modes will be covered and John will describe why the propagation path is critical. Doppler and other frequency shifts and spreading mean that certain modes will not work at these higher frequencies – in particular the popular FT8! John covers the results from many experiments on 1.3GHz and 2.3GHz and suggest further trials that can be carried out on other bands.

Noel Matthews, G8GTZ will present on "The Farnham WebSDR – DC to Microwaves on your smartphone". He will give an overview of the Farnham WebSDR (http://farnham-sdr.com/), which covers the LF bands through to 10GHz. He will describe the system architecture and antennas currently used and how they use RTL dongle receivers, available for under £10, to give good RF performance on all bands from DC to 10GHz. There will be a demonstration of the SDR in use on both PC and smartphone.

'AMSAT' stream

Naomi Kurahara, Founder and CEO of Infostellar Inc, will introduce people to "INFOSTELLAR" and speaking about their activities, which is partly amateur and partly commercial. Their aim is to set up a global network of satellite receiving stations to enable satellite owners to receive telemetry from their low earth orbit satellites when they are not in view of their own ground stations.

Ciaran Morgan, MOXTD will bring us up to date on "ARISS and STEM". Ciaran is the RSGB's and AMSAT-UK's representative on the ARISS controlling board. Ciaran will speak about his experiences in getting young people interested in STEM (Science, Technology, Engineering and Maths) and also describe the future for amateur radio activities on the ISS.

Peter Gülzow, DB2OS will give an "Update On ES'HAIL-2". describing the satellite and its amateur radio payload. This Qatari spacecraft is due to be launched in 2018. It will be the first satellite to carry an amateur payload to be launched into geosynchronous orbit. It will have two 'phase 4' analogue transponders, operating in the 2400 and 10450MHz bands. One of these will be wide enough to support some forms of HD TV.

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Preparations and planning for the National Hamfest are almost complete. This year will see us celebrate our 10th anniversary.

The event relies on many volunteers from the local clubs; without their support and dedication it would be impossible to organise and implement the show.

The large trading hall houses most of the national traders, along with many from outside the UK. Many of these have exciting offers and new products to tempt visitors. Interlaced with these stands are the specialist traders, groups and clubs all offering advice and specialist kits, equipment spanning the diverse range of the hobby.

Catering is available in the hall, offering a variety of cooked meals and supported by a licensed bar, with plenty of seating available to rest and catch up with old friends.

Outside the main hall is the usual flea market, continually evolving and offering the small hobby traders the opportunity to sell redundant equipment, components and preloved gear. Each year we rely on feedback from the visitors and traders to ensure we provide a relaxed, organised experience; many of the comments are taken on board and we hope this part of the show is the usual must-visit area.

For those who still want to visit the show and have equipment to sell, please see the large Bring and Buy marquee outside the main doors to the hall, which offers a secure alternative to the flea market area.

Special event station GB18NH will be operated once again by our good friends Camb-Hams. The starion will be in operation for the duration of the show. Please visit the team in their mobile contest-grade shack, 'Flossie 2'; you will be sure of a warm welcome and they always have time for a chat, to answer questions and give advice.

The RSGB will be in attendance with the usual large book stall. Many of the specialist committees will each have a booth area to offer advice and answer questions. These range from planning, EMC to licensing and more. Many of the local regional teams will also be in attendance.

Onsite camping is available, but must be booked in advance. We cannot accommodate any turn-up-on-the-day requests. For booking, please see the National Hamfest website, www.nationalhamfest.org.uk

Advance entry tickets will be available online from early July, giving a more rapid entry to the show. Many clubs and groups take advantage of this facility for speedier admission.

The winning entries and presentations for the Club of the Year award, sponsored by Waters & Stanton, will take place in the main hall close to the RSGB stall. This is always popular and gives a chance to see what others are doing within the hobby.

The organisers of The National Hamfest would like to thank the members of Lincoln shortwave club, Spalding DARS, Grantham ARC, Waddington ARS, Thorpe camp ARS, VMARS and Camb-Hams for their continued support, time and dedication to providing the backbone to the premier event in the UK ham radio calendar.

We look forward to seeing you all and being part of the 10th anniversary.
www.nationalhamfest.org.uk

NH National Hamfest

10th Anniversary Show

28-29 September 2018

Britain's BIGGEST amateur radio event!

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Dayton 2018

The weekend of May 18-20 saw ham radio operators from all over the world attending the Hamvention at the Greene County Fairgrounds in Xenia, Ohio, USA. This was the 67th edition of the annual show, which is organised by the Dayton Amateur Radio Association (DARA). Formerly held at the Hara Arena in Dayton, the event recently moved to its new home in Xenia and this was the second year at the new location.

The indoor exhibit areas included new transceivers from five manufacturers, including FlexRadio Systems who had demonstration radios at their booth. There were a host of other new product offerings from other manufacturers. The American Radio Relay League continued its tradition of having a significant presence. One feature was the opportunity to meet the authors of some of their recent publications. The largest exhibit was a Luso tower, which was on its way to a US customer. The RSGB had its usual large bookstall and many Members stopped by to say hello.

Mother Nature played her part in the proceedings. It rained on both Friday and Saturday. The main area of the flea market had pathways of asphalt millings and survived the effects of rain much better than a year ago. The flea market remains the place to find items ranging from the rare and exotic to the simply obscure. One ham was delighted to find an antenna for a WW2 radio altimeter and so complete his set. There were many similar stories.

A highlight for the RSGB was Board member Stewart Bryant, G3YSX awarding the Calcutta Key to the Dayton Amateur Radio Association in recognition of their many years organising Hamvention (see also RSGB Matters). Ron Cramer, KD8ENJ accepted a crystal trophy on behalf of DARA because, as Stewart explained, the fragile Calcutta Key "does not travel well". Thanks are due to DARA and their 600 volunteers for putting on the show. They continue to make improvements at the new location and look forward to an even bigger and better show next year.

The RSGB was pleased to welcome many visitors to the book stall, including the following who signed our visitors' book.

AA4ZZ	G8EMY / 2E0VAA / WA5VJB	K8NQ	KG4Y	N6MVX	W8AAZ
AB1OC		K8RKS	KK6YO	N7OEI	W8GWI
AB1QB		K9LA	KL7YL	N8PI	W8HFJ
AC0XP	G8IFF / W8IFF	K9MHZ	KO8SCA	N8TR	W8HUD
AC0XQ		K9SE	KT3E	N8VZ	W8PT
AE0DC	G8NWC	K9TRV	KU3N	N9BGW	W8SAI
AG9P	G8NWC	K9UTQ	LA2RR	N9HFW	W8SE
AI4VV	GM3PDI	K9VB	M0AJE / KE4KDY	N9NWS	W8TEE
AJ4XM	GM3WOJ	K9XT		N9WQO	W9CYN
AL7ID	GM4ZUK	K9ZEE	M0LJD	NF6O	W9TOC
CQ3PA	GM7LJE	KA0HMQ	M0LJD	NQ1H	W9TRC
DF2OO	GU4CHY	KA4RRU	M0NKR	VK3GK	WA3ENR
EI5EM	GU4YOX	KA8IMZ	M0NKR	VK3LDB	WA3MMM
G0DWV	JR2SCJ	KB6UN	M1GWZ	W0FAA	WA3VAT
G0NBJ	K0WPS	KB9SOG	M6LPQ / DL8GM	W0GJ	WA4THR
G0TSH	K1BG	KC0G		W1PJE	WA9AQN / G0UCE
G2KQ	K1WCC	KD0ORH	MW0ZUS	W2APF	
G3MFJ	K2EZ	KD0SER	MW1BQO	W3IU	WA9KPZ
G3YSX	K2JB	KD2KOG	N1VU	W3RFC	WB2FVE
G4AFS	K3NVI	KD4PBJ	N2GM	W4CHI	WB9DBD
G4EBY	K4JC	KD8RJU	N2MH	W4HG	WD4ASW
G4FAD	K4NNW	KD8ZYO	N3AM	W4KRN	WD4LBR
G4LUE	K4WNW	KE8CEO	N3OAW	W4PH	WG8S
G4UDU	K5UZ	KE8IZT	N4TZ	W4ZST	WR9V
G8EBM	K8HUG	KE8UR	N4UED	W5QR	XE1EFQ

The well-stocked RSGB stand was visited by a huge number of amateurs – Members and non-Members alike. Many of course wanted to buy books but some were looking for Membership services, advice or even just a chat. Some took the opportunty to renew their Membership, join or re-join the Society.

Like many, the FlexRadio stand was really buzzing with visitors thronging to see the displays, talk, and take the opportunity for some hands-on time with the latest amateur radio technology.

Kenwood and all the other major manufacturers had big stands, giving them the chance to meet customers face-to-face.

You could find just about anything you wanted from the main traders or flea market.

One of the people waving the flag for Britain was Graham Somerville of bhi, demonstrating his ever-growing range of products.

Elsewhere, Jon Hudson of SDRplay launched the new RSPduo twin-tuner software defined receiver at Hamvention. It's reviewed on page 80 of this edition.

Quicksilver Radio had travelled some 700 miles from their home in Conneticut on the East coast.

"Take me to your reciprocal licencing office..."

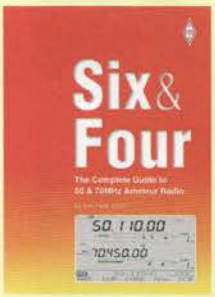
As is usual for Hamvention, a number of people expressed their dedication to amateur radio exuberantly by way of unusual headgear.

Elecraft's stand encouraged a hands-on approach.

MFJ had everything from atomic watches upwards.

John Crabtree, KC0G
crabtreejr@aol.com

History, Satellites, Microwaves, VH



Six & Four

The Complete Guide to 50 and 70MHz Amateur Radio

By Don Field, G3XTT

Six Metres (50MHz) - the 'Magic Band' - has always been 'different'. It sometimes behaves as an HF band, with world-wide propagation, but at other times acts more like a VHF band, enjoying the benefits of Sporadic E, meteor scatter and other occasional propagation modes. Because it has so many facets, 6m is both a challenge and an enigma and it draws amateurs from both the VHF and HF worlds. *Six & Four* is the complete guide to this fascinating band and the similar Four Metre (70MHz) band.

Six & Four is based on the hugely popular 6 Metre Handbook, which is credited by some with doing much to popularise the 50MHz band. This book has moved on and is intended as a handbook for both the 6m and 4m bands. It includes a host of new material on the 4m band and the 6m material has been extensively rewritten.

Six & Four is essential reading for all radio amateurs, especially those who want to try something new and different.

Size 210x297mm, 288pages,
ISBN: 9781 9050 8690 3
Non Members' Price: £13.99,
RSGB Members' Price: £11.89

Microwave Know How

Edited by: Andy Barter, G8ATD

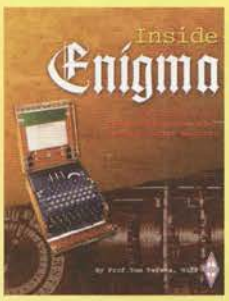
This book is a new compilation of articles aimed at those who are interested in building equipment for the amateur radio microwave bands. The designs in this book are from authors all around the world who are keen microwave constructors themselves. This ensures that the all of the projects use modern techniques and up to date components. The book includes chapters covering:

Antennas with designs for 23cm, 13cm, 6cm.

- Power amplifiers for 23cm and 10GHz. Measuring equipment.
- Filters and design of filters.
- Modifying commercial equipmen.
- Converter for S band using a YIG LO and a 2m down converter for SDRs
- Oscillators showing how to use a DDS and MMICs

If you are already active on the microwave bands or simply looking for interesting projects *Microwave Know How* will show you how easy it is to become more active.

Size 174x240mm, 192pages
ISBN: 9781 9050 8656 6
Non Members' Price £12.99
RSGB Members' Price £11.04



Inside Enigma

The Secrets of the Enigma Machine and other Historic Cipher Machines

The breaking of the Enigma Codes in WWII was one of the defining actions of the whole war. Many books have been written about this. Few, however, have looked right inside the Enigma cipher machine itself, but *Inside Enigma* does just that.

Inside Enigma brings to life how the Enigma machines were used, how the messages were encoded and why the Enigma code was virtually unbreakable. With more than 500 pictures this book explains exactly how these machines were constructed and worked.

Written by Enigma expert Professor Tom Perera, W1TP, *Inside Enigma* provides a history of these fascinating machines from their predecessors through to the cipher machines of the Cold War. The wartime Enigmas used by the German Army and Navy are covered in much depth, as is, the development of coding machines. Readers will even find a guide to finding and buying their own Enigma machine and, if that fails, instructions to build their own modern day version.

Inside Enigma is a comprehensive and copiously illustrated handbook.

Size 202x254, paperback, 208 pages,
ISBN: 9781 9050 8664 1
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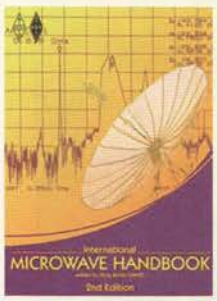

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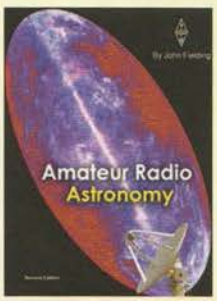

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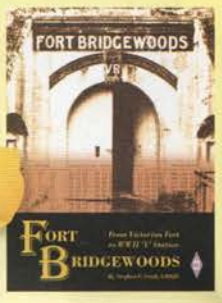

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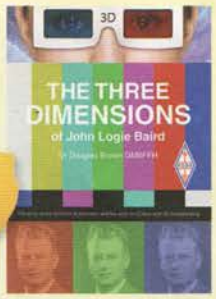

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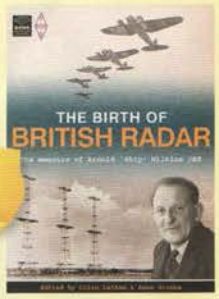

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F/UHF & Short Wave Listener

Restoring Old Radio Sets

By Philip Lawson, G4FCL

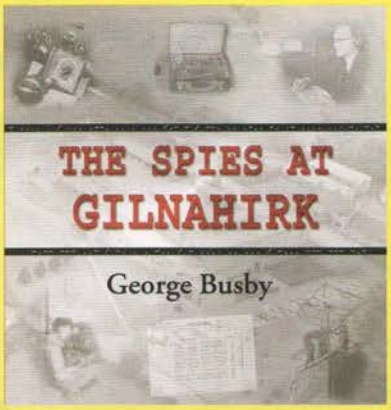
For many there is nothing more charming than an old broadcast receiver glowing away in a substantial wooden or Bakelite case. However these are now a rarity and it is much more likely that old radio sets will be non-working curios found at car boot sale in a dusty, unloved condition. *Restoring Old Radio Set* is a book that sets out to provide a step-by-step guide to bringing an old set back to life, getting it working properly and restoring its looks.

Restoring Old Radio Sets is a practical guide that explains what you need to do and how to do it. You will find topics that include cleaning methods for electrical and mechanical parts, making typical electrical repairs and the process for performing live tests. There are sections on fault-finding methods and alignment & calibration of the working set. There are even useful guides to one of the major keys to completing a successful restoration - knowing how to treat the cabinet, be that - wood, Bakelite, or plastic. The tools, materials and techniques needed for your restoration are all discussed along with the care and maintenance of the finished item. Safety issues are not forgotten and the hazards inherent in such a restoration are discussed and what can be done minimise them.

Restoring Old Radio Sets provides a fascinating insight into the world of the radio set restoration. This book is one of the few available on this topic that is aimed at someone with a basic knowledge of electronics but wishes to restore an old set. Philip Lawson, G4FCL gives you the benefit of his knowledge, skills, and experience to help you undertake the job within a safe environment. Armed with this book, the reader should be able to tackle an old set, get it working safely and finish-up with a really attractive piece of domestic furniture.

Size 174x240mm, 80 pages
ISBN: 9781 9101 9322 8
Non Members' Price: £8.99
RSGB Members' Price: £7.64

Also available on amazonkindle



The Spies at Gilnahirk

By George Busby

Whilst many know about Bletchley Park's role in WWII breaking the Enigma codes, fewer know the hugely important role of the Y service and the many radio amateurs involved in the collection of signals in WWII. This book focuses on the Y service station in Gilnahirk in Northern Ireland and sets out the story of those radio amateurs involved and why Gilnahirk was such an important centre in the Y service operations.

Many who know about the Y Service will know that in WWII many RSGB Members became 'Voluntary Interceptors' who collected German signals at home and posted these logs to the mysterious PO Box 25, Barnet, London. For those in Northern Ireland, Gilnahirk was the final destination of PO Box 25 that collated the amateur logs along with the logs from the larger military 'Y' listening station, before they were telexed to the codebreakers at Bletchley Park. Operations carried out here were of the upmost secrecy and its work carried on well beyond WWII, despite the closure of Bletchley Park. The unpretentious buildings largely attracted little attention despite a burst of press attention in 1951 when the Ministry of Finance tendered for the construction of a radio station but refused to comment on who it was for. Working in utter secrecy until its eventual closure in 1978, the Gilanhirk site was heavily involved in collecting signals during the Cold War.

The Spies at Gilnahirk provides a fascinating insight into the activities of the Radio Security Service and this little known site at the core of the Enigma story. Recommended reading for anyone interested in WWII codebreaking and the Enigma story.

Size: 215 x 205mm, 144 pages,
ISBN: 9781 9106 5708 9
Non Members' Price: £12.99,
RSGB Members' Price: £11.04

HAMSAT

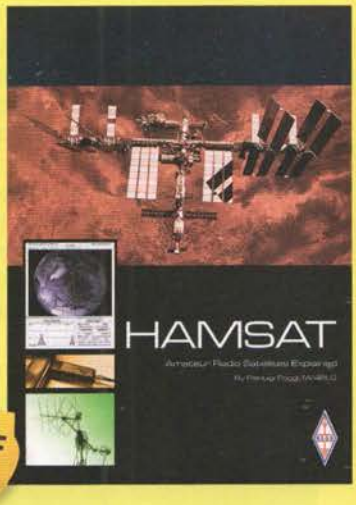
Amateur Radio Satellites Explained

By Pierluigi Poggi, IW4BLG

Since 1957 Radio Amateurs have been listening to artificial satellites. A mere four years after the launch of Sputnik, Radio Amateurs put their own satellite into orbit, thus beginning a series of amateur satellite launches that continues today with the CubeSat operations. *Hamsat - Amateur Radio Satellites Explained* sets out to give you details of what you need to know about Amateur Radio Satellite operation.

This book explains what is needed in an amateur radio ground station from the antenna through to the receiver. You will find rotator information for tracking the satellite, designs for pre-amplifiers and all manner of technical detail. There is a chapter dedicated to the ground station antennas, giving details of the performance of many commercially available systems.

For anyone interested in operating Amateur Radio satellites *Hamsat - Amateur Radio Satellites Explained* is the book to have. It provides a guide to the history through to what is possible.



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SDRplay RSPduo

The new RSPduo from SDRplay was released at this year's Hamvention in Dayton and provides a dual tuner SDR receiver.

Each of the two tuners can operate independently and on any frequency between 1kHz and 2GHz, with no coverage gaps! Based on the same Mirics chipset as previous models, the new RSPduo employs new filter combinations and retains the signal level measurement facility introduced last year. To complement the new receiver, a new version of their SDRuno software is available for free download from the SDRplay site.

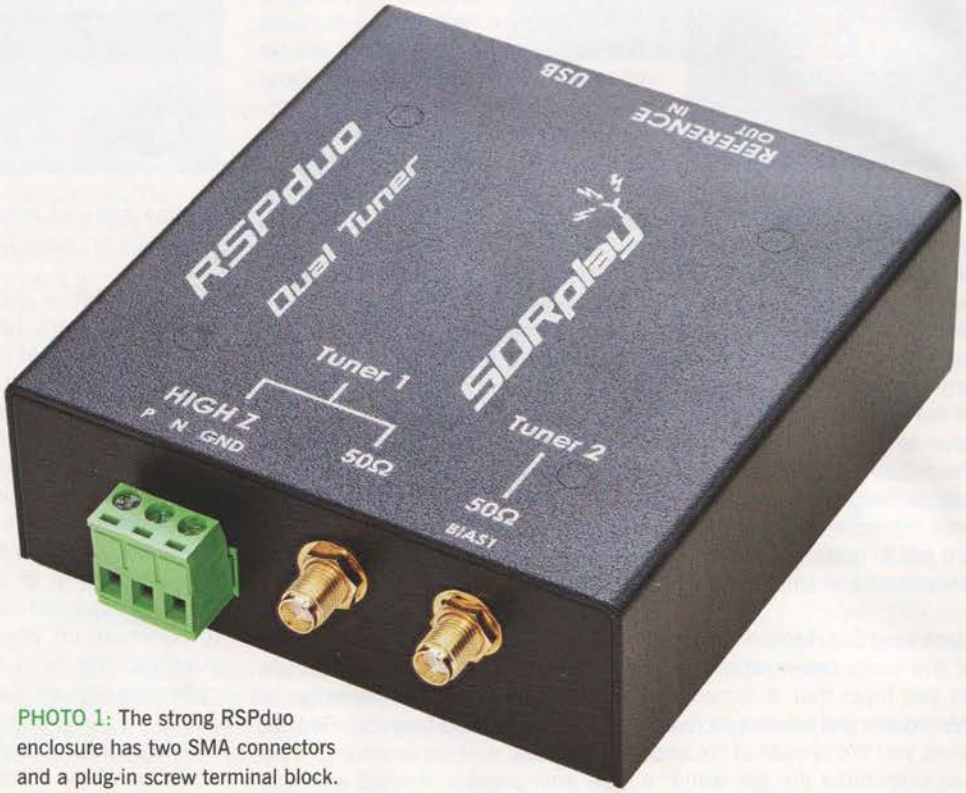

PHOTO 1: The strong RSPduo enclosure has two SMA connectors and a plug-in screw terminal block.

Dual tuners

The provision of dual tuners is an interesting idea that opens up many new possibilities. Fairly obviously this means you can monitor any two frequencies between 1kHz and 2GHz with the same receiver. However, the more exciting prospect is the potential for noise cancellation using diversity reception techniques. For those unfamiliar with the concept, this is where your main antenna is connected to one receiver and a secondary (noise) antenna is connected to the second receiver. The outputs from each receiver are then mixed using an adjustable phase shifting network. In a practical system, you alter the mixing parameters until you achieve the best null in the noise level. The benefits can be significant, and I've seen 20dB of noise reduction reported by ANAN users. For this system to work, you need a two channel, phase-coherent receiver – and the RSPduo fits the bill. Whilst the RSPduo has the hardware to support diversity reception, there is currently no supporting software available. However, the SDR Play team are working on a diversity enhancement for SDRuno, although there is no release date available. I'm sure other 3rd party SDR software developers will be exploring the opportunities for diversity reception once they've had a chance to get to grips with the new API (Application Programming Interface).

Let's now look in a bit more detail at the architecture of this twin tuner receiver. I've shown a simplified block diagram of the tuner sections in **Figure 1**. Here you can see that the 50Ω inputs follow identical paths to each of the two Mirics MSi001 tuner chips. The tuner itself is an analogue device with several band-defined input channels and a dual mixer designed to provide analogue I and Q outputs. The mixers can operate in direct conversion mode with an IF bandwidth of 8MHz or in low-IF mode with a bandwidth of 1.536MHz. Each tuner has its own fractional-N synthesiser, but both are driven by the same, high stability, on-board, TCXO reference. For critical applications an external 24MHz reference can be used and daisy-chained to other SDRplay RSPs. One very useful enhancement here is its direct compatibility with the popular Leo Bodenar GPS Referenced Clock. The previous RSP-2 required a sine-wave input so the square wave output of the GPS source needed filtering to round off the waveform. The change means the RSPduo is now directly compatible with any reference source that can deliver a 24MHz, 3.3V CMOS level output signal.

A silicon RF switch handles the connection between the two tuner outputs and the analogue to digital converters (ADC) in the Mirics MSi2500 chip. When used in single channel mode, this switch connects the appropriate tuner's I and Q outputs directly to the MSi2500's dual ADCs, see **Figure 2**. When used in dual-channel mode, the tuners are operated in low-IF mode with a 1.536MHz bandwidth. In this mode the low IF signal from tuner 1 is routed to ADC 1 and tuner 2 routed to ADC 2, as seen in **Figure 3**.

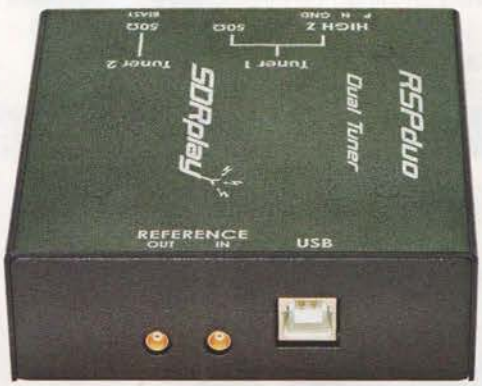

PHOTO 2: The rear panel carries the USB connector and 24MHz reference in and out sockets.

Connections

The new RSPduo is housed in a very sturdy steel case (the same as the RSP2 Pro) with SMA connectors for the 50Ω antenna inputs, see **Photo 1**. The High-Z input is fitted with a pluggable, screw-terminal block and can

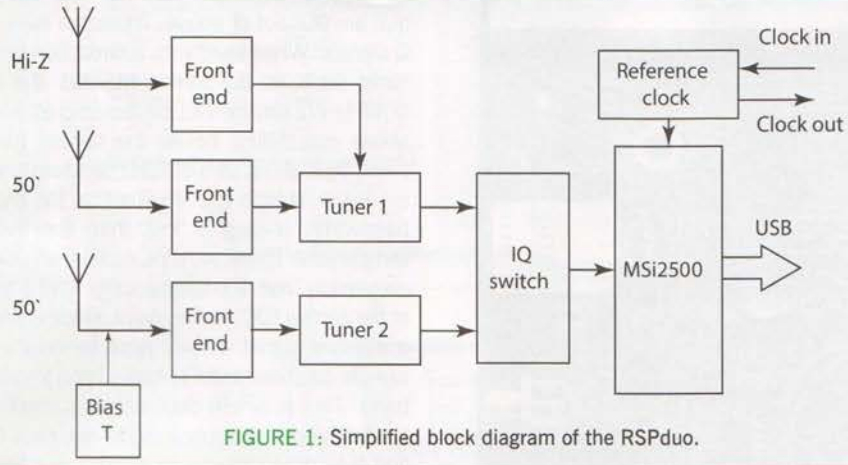

FIGURE 1: Simplified block diagram of the RSPduo.

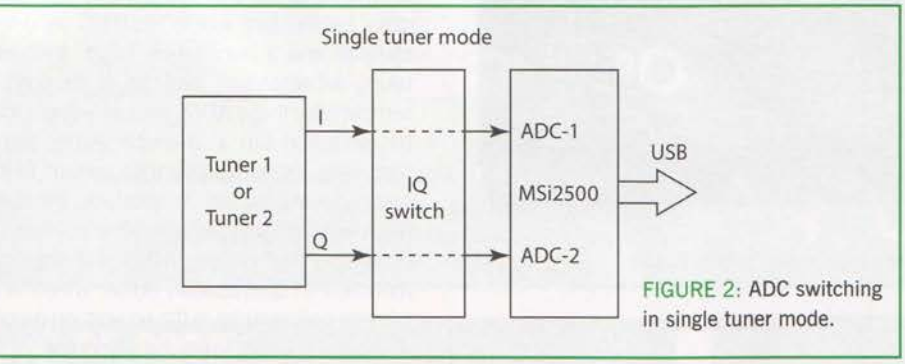

FIGURE 2: ADC switching in single tuner mode.

be used for both balanced and unbalanced high-impedance antennas. The connection back to the computer uses a standard USB-B connector and you will need a high-speed USB-2 adapter to handle the higher sample rates. Whist the frequency accuracy of the RSPduo is very good, you can enhance this by adding an external frequency reference, as mentioned before. It is also interesting to note that the reference can be hot-plugged without causing the receiver any stability problems.

New filters

Wideband receivers represent a significant design challenge and this is particularly true for receivers in the sub-£250 bracket. Most of these receivers use analogue tuners to mix down the incoming RF to a low frequency intermediate frequency (IF) or direct to baseband ('zero IF'). The challenge for these designs is protecting the analogue mixer from strong out-of-band signals that will cause intermodulation products. The standard solution is to employ pre-selection filters to tame the troublesome signals before they reach the mixer. The SDRplay team has been very active in this area and have been fine-tuning their designs in response to customer feedback. However, for the RSPduo, they decided to use their accumulated knowledge to create a new set of filters. Both tuners have identical filter banks in their 50Ω ports and I've shown the architecture in **Figure 4**. Here you can see that the filters have been split into two groups with the 1kHz to 60MHz filters located before the RF gain stage and the higher frequency filters placed between the gain stage and the tuner inputs. In addition to the split location for the filters, a new 0-2MHz low-pass filter has been included in both 50Ω paths and the Hi-Z port to improve the LF performance. The main filter switching is fully automated but there are some manually controlled filters available to deal with specific problem areas. For the two 50Ω inputs there is a switchable and combined MW and VHF/FM notch filter designed to knock out these strong signals before they can cause any problems. Similarly, there is a VHF/DAB notch filter located after the gain stage to tame the strong signals in that band. The balanced Hi-Z input has also benefitted from an upgrade with two new, automatically switched, filters. The first is a 30MHz low-pass filter which is automatically replaced with a 2.0MHz low-pass filter when tuning the lower frequencies. There is also a manually controlled MW notch filter on this input to attenuate the strong medium wave broadcast signals that can easily cause overload. The new filtering makes the RSPduo a much better prospect for LF work.

New API

The API (Application Programming Interface) is an essential part of most computer hardware as it provides the mechanism for software applications to communicate with the hardware. In an SDR, the API would be used for all the control functions required to make the hardware behave as an SDR. In previous SDRplay models, the API has been embedded in the SDR software or supplied as a separate dynamically linked library (DLL) file. However, with two tuners and the flexibility of having each tuner accessed by a different application, a new approach was required. For example, if SDRuno is active using tuner 1 and a second SDRuno instance is started, the second instance needs to know which tuner to use. A similar situation would arise if you wanted to use the other tuner with an entirely different SDR software package. The solution developed by the SDRplay team is to run the API as a Windows service (it runs as a dæmon under Linux and Mac). Whenever an application needs access to an RSP device, it communicates via the API service to determine which tuner is available along with any other critical information such as sample rates, etc. With this configuration, you can easily operate with two different SDR software packages, the first connected to tuner 1 and the second to tuner 2. The change to a new API may cause a delay whilst 3rd party developers adapt their code, but the added flexibility will be worth the wait.

Sample rates and decimation

I think this area of the SDRplay warrants an explanation as sample rates and decimation are often misunderstood. Let's begin with sample rates. When we digitise an analogue signal, we need to convert the incoming analogue signal into a series of numbers that can tell us the strength of the signal and the rate at which it is changing. The standard technique for this is to take voltage readings of the signal at regular intervals. The conversion device is the analogue to digital converter (ADC) but, to capture a realistic representation of our incoming signal, we need to take frequent measurements. This is where the familiar Nyquist theorem comes in play as this shows us that we need to sample a signal or a bandwidth at a rate that's twice as fast as the highest frequency or bandwidth we want to capture. From that you would expect to sample at 20MHz to digitise a 10MHz bandwidth. Whilst that is true for a single channel, the situation is slightly different

Mike Richards, G4WNC
mike@photobyte.org

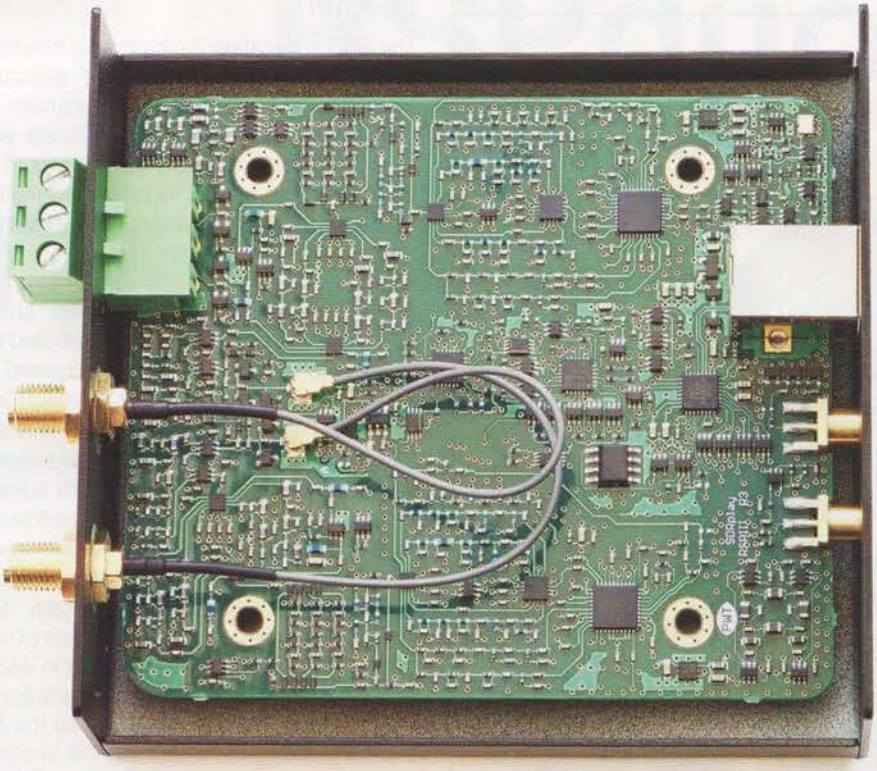

PHOTO 3: Neat, tidy modern construction techniques are employed throughout.

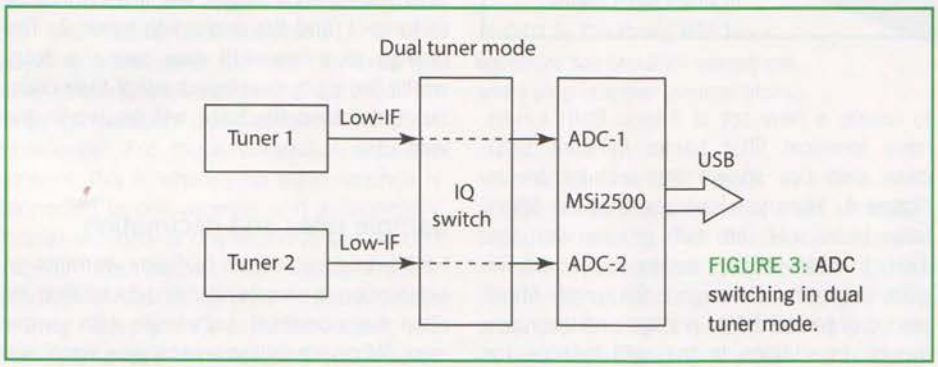

FIGURE 3: ADC switching in dual tuner mode.

in most SDRs because we use two samples that are 90° out of phase. These are the I and Q signals. When used with a direct conversion tuner such as the Mirics MSi001 the two 10MHz I/Q samples let us tune up to 5MHz above and 5MHz below the central tuning point, thus giving us a 10MHz bandwidth with a 10MHz sample rate. In practice, the usable bandwidth is slightly less than the overall sample rate. This also helps explain why direct conversion (zero IF) designs suffer from a spike at the central (DC) tuning point. Once we have a digitised signal we will want to reduce the sample rate/bandwidth to home in on a specific band. This is where decimation is used and the first step is to apply a digital low-pass filter and then drop samples to achieve the desired sample rate.

The ADCs used in the RSPduo use sigma-delta architecture where the ADC includes a sampler and a decimation stage. Instead of taking full resolution readings at the specified sample rate, these ADCs sample using a lower bit resolution but at a much higher sample rate. This high-speed sample stream is then internally decimated to produce the target resolution and sample rate. One of the many benefits of sigma-delta ADCs is a significant reduction in quantisation noise, which is the primary noise source in the conversion process.

Now that we have an overview of the digitisation process, we can look at the RSPduo. The default resolution of the MSi2500 ADCs is 12 bits but it can be switched to 14-bit resolution when the sample rate is 6MHz or less. 14-bit operation doesn't increase the dynamic range of the ADC but is does reduce digitisation artefacts because the digitised samples are a better fit to the original signal. Because of this, it's worth using the lower sample rates when you zoom in on a band. The RSPduo has selectable decimation in the

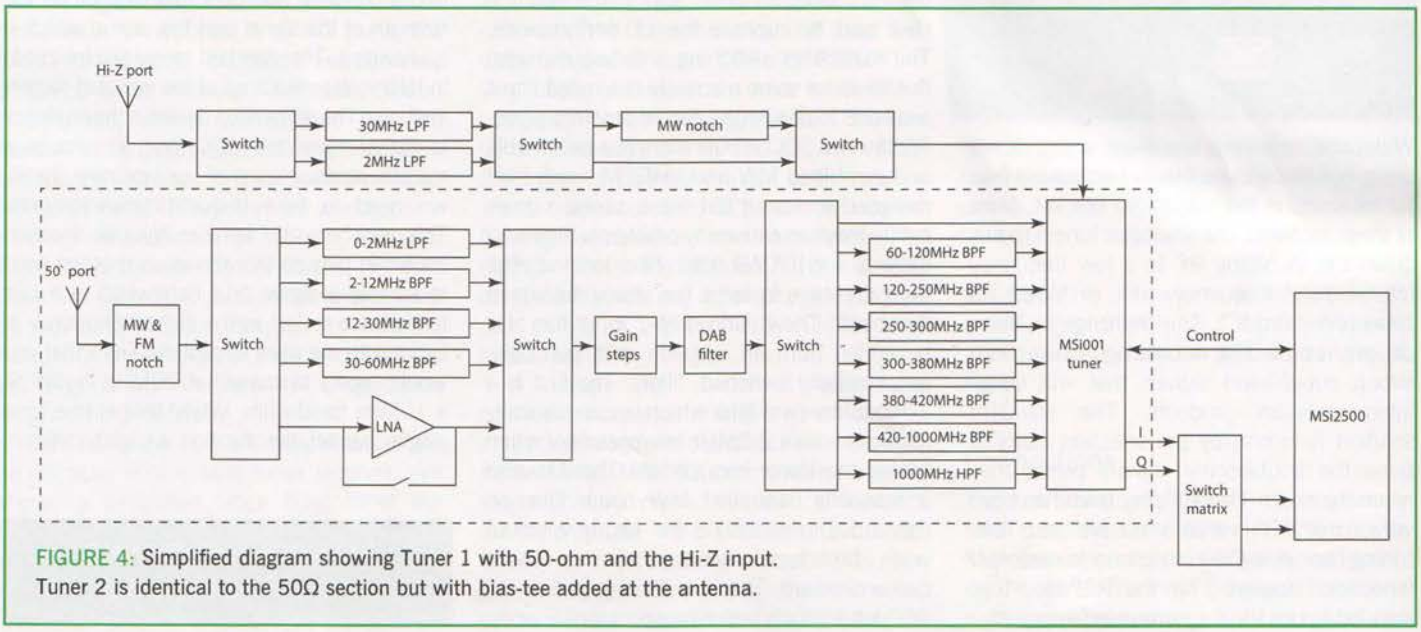

FIGURE 4: Simplified diagram showing Tuner 1 with 50-ohm and the Hi-Z input. Tuner 2 is identical to the 50Ω section but with bias-tee added at the antenna.

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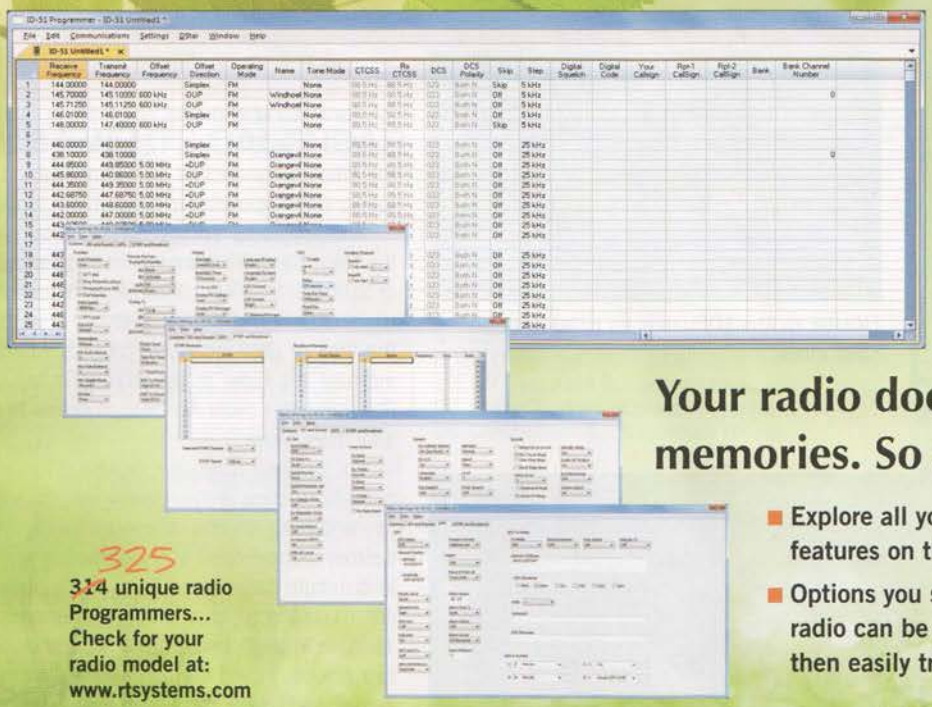

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*RSPduo is Windows SDRuno only, until mid 2018

FIGURE 5: The new API receiver selection panel.

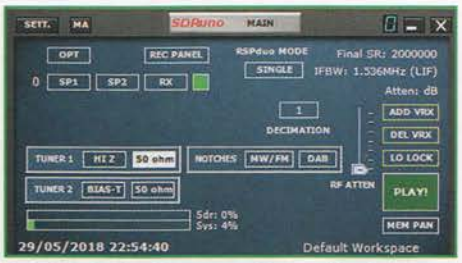

FIGURE 6: The SDRuno main panel in single tuner mode.

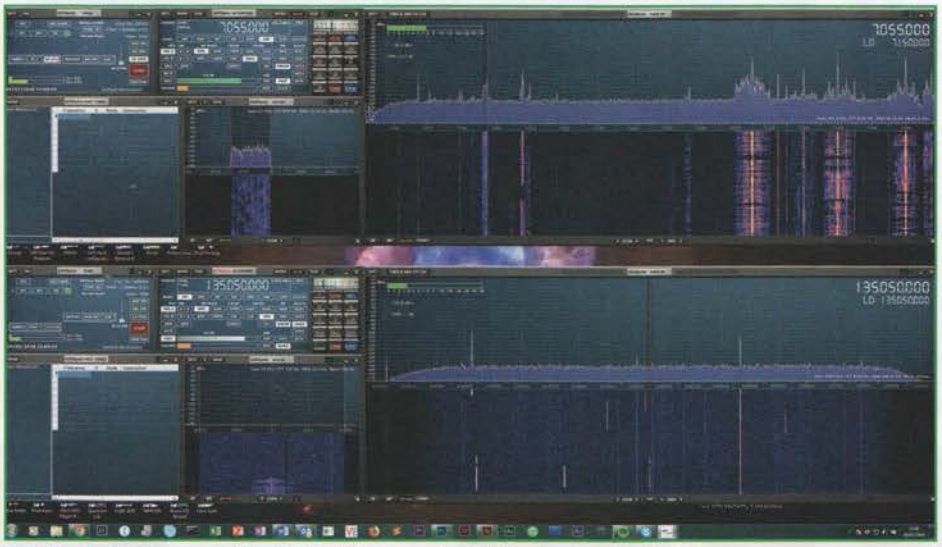

FIGURE 7: RSPduo operating in dual tuner mode with two instances of SDRuno.

main panel and the operation has been refined over successive SDRuno releases. The latest release inhibits decimation for sample rates above 6MHz, simply because you can get better performance by selecting a lower sample rate. Say you wanted a 5MHz bandwidth, if you use divide by 2 decimation on a 10MHz sample rate, you would get the desired 5MHz bandwidth but the resolution would be 12 bits. However, if you selected a 5MHz sample rate and no decimation, you would still get the 5MHz bandwidth but with 14-bit resolution. SDRuno has now been modified to steer you to the right settings by disabling decimation on all sample rates above 6MHz. The higher sample rates are still useful, particularly on VHF where you want to be able to see a wide bandwidth to check for activity. However, once you start to home in on a signal or band you should select sample rates of 6MHz or less and make use of decimation.

Using the RSPduo

At the time of the review, the only software available with full support for the RSPduo was SDRuno version 1.23, so that was used for this review. However, you can expect to see updates for SDR-Console and HDSDR appearing soon. The PC used for the review was an Intel i5 based machine and this proved to have plenty of processing power to handle the RSPduo at all sample rates.

As explained earlier, the new API service provides a revised start-up sequence that opens a small RSP selection box, **Figure 5,** if you have more than one RSP (any model) connected or if you are opening up a second instance of SDRuno to access RSPduo tuner 2. When utilising both receive tuners of the RSPduo, the tuner opened first assumed the role of master with the other tuner automatically designated as the slave. The API service also provided continuity when I closed an application and prevented me from closing the master channel if another application was using the slave channel.

Once the SDRuno was up and running, receiver management was handled via the Main panel, **Figure 6**. The buttons toward the bottom left of that panel were used to select both the tuner you want to use along with the input connection and the Bias-Tee switching. In the review setup, I connected my Butternut HF vertical or a Wellbrook loop to channel 1 and VHF/UHF antennas to channel 2. The provision of a 5V 100mA bias-tee on channel 2 makes it ideal for use with a 5V powered VHF/UHF masthead preamplifier but, with a bit of homebrew, could be used to drive an antenna switch. Next to the tuner selection buttons is the manual switching for the MW/FM and DAB notch filters. Although the on-screen buttons are lined up with tuner 1, the filters were applied simultaneously to both tuners when operating in single tuner mode.

Another useful improvement can be seen in the Main panel RF attenuator. In earlier versions of SDRuno, this was called Gain Reduction and users often found it difficult to get to grips with the idea of gain reduction controls where you increase the slider to get more gain reduction! Renaming this slider Attenuation seems to make a lot more sense.

For amateur band use, the band buttons, or band-bracketing worked very well. In addition to switching to the appropriate frequency, custom sample-rates and decimation are used to distribute the selected band neatly across the entire spectrum display width. All the bands from 135kHz through to 1.27GHz were included in two groups. I used the band-bracketing in both Zero-IF and Low-IF modes but Low-IF offered the best performance as it eliminated the central spur.

To activate both tuners, I started the first SDRuno instance as normal with the default panel layout then selected Dual mode from the Main panel. There are two dual modes on offer, one of which is specially configured to work with Dump1090 which is a specialist application for receiving ADS-B messages from aircraft. Next, I used the Options button in the Main panel to arrange the SDRuno panels in Master configuration. I then started a second instance of SDRuno and this opened directly on top of the first instance. This was easily resolved using the Options button in the Main panel to select the default layout for a slave tuner. This rearranged the panels as shown in **Figure 7**. At this point both tuners could be tuned anywhere between 1kHz and 2GHz, the only commonality being the sample rate which was fixed at 2MHz in Low-IF mode. However, decimation is available separately in each tuner as is the band framing.

Summary

The RSPduo represents the top end of the SDRplay RSP line-up and has lots of potential for the future. Given the high noise levels suffered by most of us, the opportunity to access diversity reception for noise cancellation is very appealing. This technique should be feasible with the RSPduo, though we will have to wait for the software developers before we can enjoy the results. The RSPduo is also one of the toughest receivers in this class thanks to the substantial steel enclosure. With continuous coverage from 1kHz to 2GHz and a signal level readout that's accurate to a couple of dB, this is a hugely versatile receiver with myriad uses in the shack. The RSPduo is available from SDRPlay (www.sdrplay.com) or their authorised dealers and costs £239.94 including VAT. My thanks to SDRplay for the loan of the review model.

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, talk on Meerkat Farming, Phil, G9ABC. 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 August issue is 20 June and for September it's 20 Aug.** For GB2RS, the deadline is 10am Thursday on the week of broadcast.

CLUB EVENTS CALENDAR

INTERNATIONAL

Pafos Radio Club, Cyprus
Richard, 5B4AJG, 00 357 97 857 891, 5b4ajg@gmail.com www.cyhams.org
Meets 3rd Thursday at various locations.

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

NATIONAL

Amateur Radio Caravan & Camping Club, membership@arcc.org.uk,
Rallies July: Elvaston Castle & Newstead Abbey

REGION 1: SCOTLAND SOUTH & WESTERN ISLES

RM: Anthony Miles, MM0TMZ, RM1@rsgb.org.uk

Cockenzie & Port Seton ARC
Bob, GM4UYZ, 01875 811 723, www.cpsarc.com
7-8 VHF field day
28-29 RSGB IOTA Contest from Tiree

Livingston and District Amateur Radio Society
Cathie, 2M0DIB, 01506 433 846
3, 10, 17, 24, 31 Operating

REGION 2: SCOTLAND NORTH & NORTHERN ISLES

RM: Andrew Burns, MM0CXA, RM2@rsgb.org.uk

Dundee ARC
Martin, 2M0KAU, 0776 370 8933
3 VHF contest & practical evening
7-8 VHF NFD
10, 13, 14 Operating MB18FIFA
17 Equipment prep session
19-22 Operating GB2BAJ
24, 31 Club night

Inverness & District ARS
John, GM0OTI, 01463 791 444
4 Club net, 145.575MHz & GB3BI, 8pm
11, 25 Club night & CW training

REGION 3: NORTH WEST

RM: Kath Wilson, M1CNY, RM3@rsgb.org.uk

Bolton Wireless Club
boltonwireless@gmail.com
9 Club meeting and talk
23 RSGB video, Selecting a VHF/UHF Radio, Alwyn Seeds, G8DOH

Chester & DRS
Bruce, M0CVP, 01244 343 825, www.chesterdars.org.uk
3 UKAC contest
10 Committee meeting
17 Annual review of the society's assets
24 ZS6BKW Mk2 & use of Smith charts
31 Pie and pint night

Morecambe Bay ARS
Mark, M0NOM, 07917 653 012
3 RSGB VHF 2m contest basics
10 Social evening
17 How accurate is your multimeter? Mark, M0FUC
24 Social evening
31 Logging tools and techniques

Oldham Radio Club
Mike, M1CVL, 0740 276 3203, m1cvl@burwood.myzen.co.uk
1, 15, 29 C4FM net, FCS004-55, 9.30am
4, 11, 18, 25 2m FM net, 8pm
5 Construction comp & Intermediate course
8, 22 D-Star net – REF 14B
12, 19 Club night & Intermediate course
22 RAF 100 years SES with Royton ATC
26 Construction & Intermediate course

South Manchester R&CC
Ron, G3SVW, 01619 693 999
5 Aerial and propagation clinic, G3SVW
12 Discovery of the neutron, G8RSI
19 Basic aerial construction
26 History of valves, G8ZCJ

Stockport Radio Society
Heather, M6HNS, 07506 904 422, info@g8srs.co.uk
3 Society night
6, 13, 20, 27 Net, 2pm, 433.525MHz FM
6 Rally prep night
7 Rally
8 SES at AVRO Air Fair
10 Net, 7.30pm, 51.550MHz FM
12, 25 Net, 7.30pm, 145.375MHz FM
17 Radio night
24 Skills Night
28-29 IOTA Contest + 24hr CW SSB contest

Thornton Cleveleys ARS
John, G4FRK, 01253 862 810
2 Natter night and practical evening
7-8 VHF National Field Day
9 Fox hunt
16 Railway signalling, Mike, 2E0MKH
18 Committee meeting
23 Top Band antenna project
30 Auction, run by Mike, G4EZM

Warrington Amateur Radio Club
Jeff, G1DYN, secretary@warc.org.uk
31 Club night

REGION 4: NORTH EAST

RM: Ian Douglas, G7MFN, RM4@rsgb.org.uk

Angel of the North ARC
Nancy, G7UUR, 01914 770 036, nancybone2001@yahoo.co.uk
2 Training, on the air
16 Talk
23, 30 On the air

Blyth Radio Club
John 2E0DCV 0191 237 1729
4, 11 Club night
18, 25 Morse training

Denby Dale RC
Darran, G0BWB, 0797 442 3227, g0bwb@g0bwb.com
1, 8, 15, 22, 29 Club net, GB3HD, 10.30am
4, 18 Club night
28-29 IOTA contest from Holy Island

Hornsea ARC
Gordon, G3WOV, 01377 240 573
4 Talk by M1ASR
11 RSGB Club Contest & video night
16 G3GBH Cup quiz at SARS
18 Fox hunt with G4YTV
25 Administrative prep for IOTA contest
28-29 IOTA contest

Ripon & DARS
David, G3UNA, 01423 860 778, d.cutter@ntlworld.com
5, 12, 29, 26 Club night

Sheffield & District Wireless Society
Krystyna, 2E0KSH, 0788 406 5375, info@sheffieldwireless.org
4 Getting going on FT8, Bill, G4ZVB
7-8 G5TO/P, Wharncliffe Est., VHF NFD
11, 25 Social & training night
18 Portable evening

Sheffield ARC
David, G6DCT, littlewood20@btinternet.com
2, 16, 30 Club night
9, 23 Shack night operating GX3RCM

Spen Valley ARS
Russell, G0FOI, 01274 875 038
5, 19 Shack meeting
19 On the air night

York Radio Club
www.yorkradioclub.uk, contactus@yorkradioclub.uk
1 Breakfast meeting, 10am
4, 11, 18, 25 Club net, 8pm, 145.450MHz
5, 12, 29, 26 Club night, 8pm

REGION 5: WEST MIDLANDS

RM: Martyn Vincent, G3UKV, RM5@rsgb.org.uk

Bromsgrove & DARC
John, G4OJS, 0788 9678 303
6, 13, 20, 27 Club night

Coventry ARS
John, G8SEQ, 0795 877 7363
6 Reflections on Victor 5 visit
13 Castles on the Air, Kenilworth Castle
20 G2FDC 2m DF Trophy 3rd round
27 Video night

Malvern Hills RAC
Dave, G4IDF, 01905 351 568
10 Talk on the Salop Repeater Network, by Dave, G4VZO
24 Informal meeting

Mid-Warwickshire ARS
midwarwicks@gmail.com
10 DF experiments, M0JDB
24 Technical topics

Rugby ATS
Steve, G8LYB, 01788 578 940, stephen@tompsett.net
3, 10, 17 UKAC, CW practice, training, operation, projects
6 VHF NFD setup
7-8 VHF NFD
14 On the air, projects, NFD post mortem
21 On the air, projects, committee meeting
21 Barbecue, on the air, projects
24, 31 On air, CW practice, training, projects

Salop ARS
salopamateurradio@gmail.com
3, 10, 17, 24, 31 Club CW net, 4.30pm, 144.070MHz
4, 11, 18, 25 Club net, 8.30pm, GB3LH
5 Prep for NFD
7-8 VHF NFD at Long Mountain site
12 Natter night
19 Pedestrian fox hunt
26 Shack night, G3SRT on the air

Solihull Amateur Radio Society
Roger Hancock, G4BBT, 0121 743 7277
5, 12, 26 Net, 8pm, 145.450MHz
19 Club night

Stratford upon Avon & District RS
Clive, G0CHO, 01608 664 488, cousbey@theiet.org
23 Construction competition

Sutton Coldfield ARS
Robert, rob2e0zap@gmail.com
2, 16, 30 Open net, on 145.250MHz, 7.30pm
9, 23 Club meeting
10 Open net, 70.475MHz, 7.30pm
14 Club call on the air for demo at Middleton Village Fete, 1pm
24 DMR open net, slot/local 2 gb7fw, 7.30pm

Telford & DARS
John, M0JZH, 0782 473 7716, m0jzh@yahoo.co.uk
4 VHF NFD prep
7-8 G3ZME/p for VHF NFD, IO82NN
11 Committee meeting, GX3ZME OTA

REGION 6: NORTH WALES
RM: Ceri Lloyd Jones, 2W0LJC
RM6@rsgb.org.uk

North Wales Radio Society
Liz, GW0ETU, 0776 019 0355
5 General meeting
12 Technical Topic
19 Discussion night
26 Talk on 'The Hum' by Dr Chris Barnes

Porthmadog and District ARS
Peter, GW0DFK, 0773 177 1319
19 Treasure hunt

Wrexham ARS
Eifion, wrexham.ars@gmail.com
3 Fox hunt
7-8 VHF National Field Day
17 FT8 & JT64, Mark Harper, MW1MDH

REGION 7: SOUTH WALES
RM: Glyn Jones, GW0ANA, RM7@rsgb.org.uk

Aberystwyth & DARS
Ray, GW7AGG, 01970 611 853, ray@clocktower.go-plus.net
12 Barbecue, HF on the air
26 Club net, starting on 145.500MHz

Carmarthen ARS
Andy, GW0JLX, 0776 828 2880
17 NITROX scuba diving, Andy, GW0JLX

Cleddau Amateur Radio Society
Heinz, MW0ECY, 0774 804 7008
2, 23 Barbecue at new venue, Patrick Hill
16 Financial meeting

Llanelli ARS
Steve, MW6CCG, 0787 849 4337, williams-steven12@sky.com
2, 23 Social evening
9 On the air & raffle
16 DVD night
30 Junk sale & raffle

REGION 8: NORTHERN IRELAND
RM: Philip Hosey, MI0MSO, RM8@rsgb.org.uk

Bangor & DARS
Harry, GI4JTF, 0289 042 2762
7 Rally

REGION 9: LONDON & THAMES VALLEY
RM: Tom O'Reilly, G0NSY, RM9@rsgb.org.uk

Aylesbury Vale RS
avrs@rakewell.com
11 Discussion evening

Hammersmith ARS
m0xhs@outlook.com
5, 19 Club net, 8pm, GB3LW
6, 27 Club night and on the air
13 Nicolai Telsa, Brian, G3YKB
27 Polish radio in WWII, Peter, G3YXZ

Harwell ARS
John, G6LNU, 01235 223 250, john.g6lnu@virginmedia.com
12 DF hunt

Milton Keynes ARS
Phil, G4FVZ, 0780 263 6998
9 RSGB update, Steve Thomas, RSGB GM. Other clubs welcome
16 Discussion: ham radio websites

Newbury & DARS
Rob, G4LMW, 0797 088 5614, g4lmw@btconnect.com
21 Summer barbecue

Radio Society of Harrow
Linda, G7RJL, lcasey100@outlook.com
1, 8, 15, 22, 29 Club net, 1938kHz LSB, noon
5, 9, 16, 23, 30 Club net, 145.500MHz, 8.15pm
6 Club night in the shack, 8pm
20 Chinese handhelds & their history, Steve, G4WWK
29 Outdoor event, Old Redding CP, 2-5pm

Reading & DARC
Laurence, G2DD, 0758 470 6625, lozdjames@gmail.com
12 Construction show & tell evening
26 Investigating test equipment, 8pm

Shefford & District ARS
David, G8UOD 01234 742 757, davide.lloyd@ntlworld.com
5 Public safety comms, Steve, G3ZPS
13 IARU contest setup
14 IARU contest
15 IARU contest & takedown

Silverthorn Radio Club
Robbie, M0HVC, 0742 913 1105, m0hvc@protonmail.com
6, 13, 20, 27 Club night, 7.30pm

Southgate ARC
Keith, G8RPA, g8rpa@arrl.net
12 SpOTA

Whitton Amateur Radio Group
Ian, G0OFN, 0776 565 7542
6 RSGB Understanding Propagation video
13, 20 Club night, HF / VHF on the air
27 Prep for IOTA, social meeting in bar

REGION 10: SOUTH & SOUTH EAST
RM: Michael Senior, G4EFO, RM10@rsgb.org.uk

Bromley & DARS
Andy, G4WGZ, 01689 878 089
4, 11, 18, 25 Net, 145.500MHz and QSY, 9pm
17 Show and Tell evening
31 Club meal

Chippenham & District ARC
secretary@g3vre.org.uk
3, 10, 17, 24, 31 Intermediate training, club meeting
29 CHIPPENHAM & DARC rally, electronics fair & car boot sale

Crawley ARC
Richard, G3ZIY, 01342 843 545
25 Communications on the QE2, Duncan Brooker

Cray Valley RS
Dave, G8ZZK, 0773 954 9822
5 Beginning SOTA, Richard Perzyna, G8ITB
19 Minquies IOTA expedition & natter night

Crystal Palace R&EC
Bob, G3OOU, 01737 552 170, g3oou@aol.com
4, 11, 18, 25 Net, 8pm, 145.525MHz ± QRM
6 Compact VHF/UHF antennas, Bob, G3OOU and Damien, 2E0EUI

Dorking & DRS
David, M6DJB, djb.abraxas@btinternet.com
24 South Downs evening

Farnborough & DRS
sec@farnboroughradio.org.uk
11 Debrief from VHF NFD, natter night
25 Talk by Derek, G3HEJ

Folkestone Repeater Group
admin@folkestonerepeatergroup.org.uk
4 Radio scanning talk

Fort Purbrook ARC
Chris, G3WIE, g3wie@fparc.org.uk
1 Fort Purbrook Family Fun Day demo
2, 9, 16, 23, 30 Open net, 8pm, 144.275MHz
7-8 HF operating & VHF NFD

Hastings E&RC
Gordon, 01424 431 909
1, 8 Net, 144.575MHz, 11am
25 Bring & Buy, 7.30pm, Taplin Centre

Hilderstone R&EC
Ian, 2E0DUE, secretary@g0hrs.org
7-8 RSGB VHF NFD
12 Club night
26 Talk

Horndean & DARC
Stuart, G0FYX, 02392 472 846, www.hdarc.co.uk
6 Natter night
20 Club night

Mid-Sussex ARS
Peter, G4AKG, 01444 239 371
6 Radio night & prep for VHF NFD
13 Chairman's barbecue
20 Radio night table top sale
27 Treasure hunt / walking fox hunt

North Kent Radio Society
Stephen, G8JZT, secretary@nkrs.info, 0798 575 3370
3 Natter night & club station on the air
17 Talk by guest speaker

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Surrey Radio Contact Club
John, G3MCX, 020 8688 3322
1, 8, 15, 22, 29 Net, 1905kHz, 9.30am
2 Annual barbecue
5, 12, 29, 26 Net, 70.300MHz, 8pm
6, 13, 20, 27 Net, 145.350MHz, 8pm
16 Chat and Fix-it, John, G8MNY

Trowbridge & DARC
Ian, G0GRI, 01225 864 698, secretary@tdrac.uk
4 Building a simple beam antenna, G3ZXX, 7.45pm, admittance £2

REGION 11: SOUTH WEST & CHANNEL ISLES

RM: Pam Helliwell, G7SME, RM11@rsgb.org.uk

Blackmoor Vale ARS
Keith, M0TMO, 01747 851 260
3, 10, 24, 31 Club evening
10 HF Propagation video

Bristol RSGB Group
John, G4DVV, johnthomas@blueyonder.co.uk
30 Annual dinner

Callington ARS
John, G4PBN, 01822 835 834, lumley85-cars@yahoo.co.uk
4 Club night

Cornish Radio Amateur Club
Steve, G7VOH, 01209 844 939, G7VOH@btinternet.com
4 Committee meeting
5 Main meeting
19 Social evening

Exmouth Amateur Radio Club
Mike, G1GZG, 01395 274 172
4 Digital, datamodes & computers pt 3
18 FM, D-Star, Fusion & DMR talk & demo

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

Mid Somerset ARC
David, 01749 670 085, info@midsarc.org.uk
9 EME, Brian, G4NNS
30 Afternoon social meeting

North Bristol ARC
Mat, G7FBD, g7fbd@gb3bs.com
6 Sea Walls field ops evening
13 Spacecraft talk by Dennis
20 Relax, chat & operating
27 Video evening

South Bristol ARC
Andrew, G7KNA, 0783 869 5471
5 Committee meeting, contact activation team
7-8 G4WAW/P for VHF NFD
9 Decommissioning NFD site
12 VHF NFD debrief
19 Summer BBQ
26 Open house and on air night

Torbay ARS
John, G4VUD@tars.org.uk
6, 20 Club night
13 Club night, Business meeting
27 Colossus, Don, G4NNP

Weston Super Mare RS
Martin , G7UWI, 01934 613 094, g7uwip@googlemail.co.uk
2, 9, 23, 30 Construction, Morse tuition, operating

Yeovil ARC
Rodney, M0RGE, 01935 825 791, rodney.edwards@uwclub.net
5 Direct conversion receivers, G3MYM
6, 20 Construction & on-air, Sparkford
12 Barbecue at Ham Hill
19 Morse practice, G3MYM
21 Coffee morning & tabletop sale, Sparkford
26 Problem solving and committee

REGION 12: EAST & EAST ANGLIA

RM: Keith Haynes, G3WRO, RM12@rsgb.org.uk

Braintree & DARS
Edwin, G0LPO, 01376 324 031
3, 17, 31 Club net, 8pm, 145.375MHz
10 Construction contest
24 Aerial clinic evening

Cambridge & DARC
Richard, G4AWP, 0770 229 5300
13 Summer Social, Foxton Village Hall

Essex Ham
Pete, M0PSX, news@essexham.co.uk
1 Online Foundation course
2, 9, 16, 23, 30 Net on GB3DA, 8pm
7 Essex YL Net on GB3DA, 8pm

Felixstowe & DARS
Paul, G4YQC, pjw@btinternet.com
11 Natter night
25 Felixstowe Beach operation

Huntingdonshire ARS
David, M0VTG, secretary@hunts-hams.co.uk
12 Natter night
26 Talking to birds, Andy Dunham, G6OHM

Loughton & Epping Forest ARS
Dave, M0MBD, 0798 016 5172, pro@lefars.org.uk
5, 12, 19, 26 Net, 144.725MHz, 8pm

Lowestoft & District PYE ARC
secretary@ldparc.co.uk
5, 9, 19, 23, 26 Club evening, informal and operating
5 Sorting out weeds around the mound
12 Quarterly business meeting; film

Norfolk ARC
Chris, G0DWV, 01603 898 308, cmdanby@btinternet.com
4 WSPRlite & DXplorer.net, Richard Newstead, Sotabeams
11 Informal
18 Trophy fox hunt
25 Informal + Bright Sparks

Peterborough & DARC
Alan, secretary@padarc.co.uk
2, 9, 16, 23, 30 Net, 1.980MHz, 8pm
6, 17 Net, 145.400MHz, 8pm
7-8 Weekend radio camp
11 Natter night, planning Museums on the Air
25 Beam antenna design, Andy, M0PXY

South Essex ARS
Terry, G1FBW, 07986 070 040
11 Log 40m software, Terry Genes, G4POP
22 Castle Point Show, Waterside, Canvey I

Thurrock Acorns ARC
Gordon, M0WJL, acorns@taarc.co.uk
3 2m SSTV open net, RNLI SOS Month starts
5, 11, 12, 19, 26 club net, 7.30pm, 145.500MHz
17 Investigation of fatal collisions, Nigel, M0ICH. Members only. NB: some may find this talk distressing

REGION 13: EAST MIDLANDS

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

Kettering & District ARS
Ed, M0TZX@yahoo.com
5, 12, 19, 26 Net, 7pm, 145.300MHz FM

Lincoln Short-Wave Club
Pam, G4STO, 01427 788 356, pamelagrose@tiscali.co.uk
1 GB2CWP, East Kirkby Squadron Reunion, 10am, NAAFI
4 Nibble & natter night
5 Club net, GB3LM, 8pm
7 Surgery & open shack, 9.30am, VHF NFD
8 VHF National Field Day
11 10-minute talks by members
12, 26 Club net, 145.375 8pm
14 Mentoring & open shack, 9.30am, Boultham Summer Fair
16 Committee meeting
18 Formal meeting
19 Club net, GB3LS, 8pm
20 Induction & open shack, 9.30am
25 Club talk, 8.15pm
28 Open shack

Nunsfield House ARG
Paul, G1SGZ, pr@nharg.org.uk
2, 9, 16, 23, 30 Shack night
5, 12, 19, 26 Club net, 145.325MHz, 8pm
6 Watching TX Factor
13 Animal photography, Ken, G3OCA
20 Tesla technology, Derek Woodroffe
27 Club & shack night, projects evening

RAF Waddington ARC
Bob, G3VCA, 0797 116 6250
2, 9, 16, 23, 30 Club net, 145.325MHz, 8pm
8, 13, 20, 27 Club night

Welland Valley ARS
Peter, G4XEX, 01858 432 105, g4xex@fsmail.net
4 Club net, 8pm, 145.275MHz, PSK
16 DF Hunt in Welland Valley

INTERNATIONAL

Members of the Marconi Amateur Radio Circle in Malta have transformed their HQ into a place where all radio hams can come along & use the premises. The office and shack have been revamped and an extra floor has been put into the generous roof space. It contains, among other things, a sleeping area were one can rest while the others are DXing! There is still work to be done but we've made a great place for local and visiting amateurs. The club building has no mains electricity so we've installed solar pannels and a little wind turbine. We use a generator when we need more power, for example in the 2017 RSGB 80th Anniversary CW Contest, where we came 2nd in the Multi Operator Section. Thanks to Peter, G3TJE, Dave, G4CXQ and David, G3RXP gave us a helping hand during their holidays.

Along with Field Days, barbecues and other social activities we had a Scout camp at the shack. We had ham visitors from many countries including the UK, Germany, Poland and Belgium, some making return visits. We are generously sponsored by EAntennas from Spain and would like to thank Rodrigo for donating a 3Bmox 10/15/20m 7-ele beam. Once it's up we'll take some photos. Meanwhile, why not visit our Facebook page, www.facebook.com/marcmlt/, where you will be made most welcome, or drop in if you visit Malta!

REGION 1: SCOTLAND SOUTH & WESTERN ISLES

Wigtownshire Amateur Radio Club held a 'Video Exploration' night on Thursday 19 April. Ian Macdonald, GM8AVM gave a talk on the various cameras available, ranging from mobile phones to professional video cameras. Members were invited to film an interview between Club Secretary Ian White, GM3SEK and Richard Hopkins, MM1BHO on their first encounters with amateur radio. It was a most enjoyable evening, and one that will certainly be repeated, not least because the interview was edited down to a DVD that will be screened at the club later in the year.

Photo by Nadine White, MM0WNW.

REGION 2: SCOTLAND NORTH & NORTHERN ISLES

The Dundee club were actively taking part in the RNLI SOS week at the start and end of May. Thanks to all we talked to.

REGION 3: NORTH WEST

East Lancs Radio Club won the Club Stand competition at the recent NARSA rally. The club partnered with Retevis, a Chinese manufacturer of radio equipment, who also sponsored our raffle prizes. The new Ailunce HD1 DMR hand-held graciously donated by Retevis was won by Bill Harper, G4NVN. From left to right we see Brian Harper (Equipment Officer), M1CEM, Michael Hodgkinson (Treasurer), G4HCC, Neil Mooney (Chairman), M0NFI, Peter Martin (Secretary), M0NWI and Roger Padmore (Vice Chairman), G4MLB.

South Manchester Club also had an impressive stand at the NARSA rally in Blackpool.

Furness Amateur Radio Society moved its traditional January RNLI SOS event to the entire month of May. Members activated GB5LBC from Barrow Lifeboat Station for two weekends. The first weekend saw 109 QSOs, reaching 16 countries and three other lifeboat stations. Poor conditions on the second weekend allowed fewer than 50 QSOs on the Saturday, but did yield some /MM stations including a Tall Ship from Bergen that was located just off Shetland. The second Sunday brought the total tally to 213 QSOs. Mid-May brought Mills on the Air, for which we activated GB2GW at Gleaston Water Mill and made 80 QSOs, including 18 other MOTA stations. The club nights were well attended and included a very entertaining and informative talk by Mark, M0NOM on SOTA. A portable evening on Birkrigg Common was well attended and included a 5.6GHz ATV sked so members could "see what all the fuss is about". Some 2-way ATV QSOs were made. Thanks to club members who took part and/or supported all events.

REGION 4: NORTH EAST

John Nowell, G4FUO gave a talk on practical HF antenna to members of **York Radio Club**. He covered different aspects of how to construct wire antenna, the difference between a balun and unun, plus comments on different types of antenna anaylser. This was followed by a good question and answer session, when John was able to answer members' queries. Well done John: it was a great night. The club prides itself on being very proactive and has a variety of different activities planned for established and new members.

REGION 7: SOUTH WALES

Western Valleys RAYNET had a successful day of mast erecting (left), leaving them prepared for any call outs in the urban hills. They said that the fabulous weather was on their side.

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REGION 10: SOUTH & SOUTH EAST

On the 19th of May the Mayor of Tunbridge Wells, Cllr Julia Soyke (see photo, right), was a special guest at a gala dinner held at the Spa Hotel in Tunbridge Wells, to celebrate the 70th anniversary of **West Kent Amateur Radio Society**. John Gould, G3WKL was also present and gave an address following that from the Mayor, recalling his earlier days and having been a member of the West Kent ARS back in the 60s. The current Society was formed in 1948, after the war, and a key figure who became President at the inaugural meeting – and remained in that post for 21 years – was Bert Allen MBE, G2UJ, who lived in Tunbridge Wells. Bert was a very active radio operator, designer and builder of radio equipment and wrote many technical articles for the RSGB magazine. Other founding members at that inaugural meeting in 1948 included Laurie King, G4IB and Frank Barnard, G4FB, both of whom were very active in directing the society's activities in the early years. Our current monthly meetings take place from 8pm at Bidborough Village Hall on the 2nd Monday. Full details are at www.wkars.org.uk

Chertsey Radio Club ran the very special event callsign GR9HAM from Friday 18th to Sunday 20th May to celebrate the wedding of Harry and Meghan. The two-man effort of James, M0JFP and Bob, M6FLT managed 105 contacts on Saturday evening using 20 and 40m HF and one contact via the SO-50 satellite. They also used DMR on the Friday. They also gave away some points in the Sunday 2m SSB contest.

REGION 11: ENGLAND SOUTH WEST & CHANNEL ISLES

G4LZD was licenced in the early 1980s but went QRT in 1986. He had no intention of returning to the hobby until, by chance, in June 2017, he met up with old pal G4VHL, who had also been QRT until he returned around 2012. G4VHL persuaded G4LZD to come back to the hobby. They met each Friday with G3WCB, who had been a low-profile amateur in Dartmouth. Hence was born the very informal West Dart Radio Group. G3WGN, 2E0BXR and G4CST also joined; the group started meeting in a local garden centre with café facilities. They were all also members of Torbay Amateur Radio Society and were soon joined by a few more from that club for a chat and refreshments. At one of these meetings G4VHL brought along an old QSL card of G3JEV, the Dartmouth and District Amateur Radio Society, which had been active in the 1950s but folded in the 60s. In March the club persuaded G4LZD to apply to Ofcom to re-activate the callsign, with help from G3WCB and G4VHL. Ofcom were very helpful and re-issued the call, which first went on the air on 24 April 2018 via the group net on 28.400MHz SSB. This will become regular; more activity is being planned. All this came about as a result of one slight by chance encounter between two old amateur friends, both of whom had spent time QRT.

Riviera Amateur Radio Club in Torbay, Devon operated their annual special event station GB4LBW in support of SOS Radio Week, highlighting the work of the RNLI and the maritime emergency services. Husband and wife team Debbie, M6IXR and Phill, 2E0WZP (left) ran the HF and VHF stations respectively. They love to take part in special event station working. Also operating was Roy, M6XDV, who thrives on pile-ups. Getting Foundation licensees on the mic is a priority for Riviera ARC as nerves can stop otherwise keen new hams from enjoying the bands. Special events are a great way to capture the spirit of amateur radio and break the inertia of those first few contacts. The club provides Foundation and Intermediate training and exams.

Thornbury & South Gloucestershire ARC meets every Wednesday from 7.30pm at the Chantry in Thornbury. At a recent meeting most of the club members were involved in building R3500D direction finding units ready for trials to be held later in the year, whilst at the far end of the club room three or four were carrying out beacon tests ready for those field trials.

REGION 12: EAST & EAST ANGLIA

The gorgeous warm May weather drew a large group of **Essex Hams** out for another impromptu field day at Galleywood Common. Several stations were active, running voice, data and, for the first time, FT8. As with most of the Essex Ham events, training and skills development is key, with people trying out new kit. The Essex Ham team was also active for the Royal Wedding weekend, running field days in Shoeburyness and Galleywood. The event gave members the chance to use the "R" NoV, and also to take part in the RSGB 144MHz contest. Andrew and Carl, two candidates working towards their first licence with Essex Ham's online course, also had the opportunity to get hands-on ahead of their exams. Andrew also had the chance to test a Raspberry Pi running FT8 using a homebrew data interface.

Amateur radio is all about communication, and at the May meeting of South Essex ARS the subject of emergency services comms was discussed. Presented by Steve Shorley, G3ZPS, the talk covered comms for the police, starting with rattles and whistles, right up to today's 4G-based emergency comms.

The photo shows Laura, M6LHT with a traditional police whistle and truncheon.

Peterborough and District ARC's April ended with an EGM for constitutional updates followed by the AGM, where Ron Smith, G4DXW, announced he was standing down after being Chairman for 41 years. A new Chairman, Tony, G0IAG was duly elected. After the formalities were completed, Ron was presented with the Frank Brisley Cup. Frank was one of the founders of PADARC and initiated the cup for members who had, in the eyes of the committee, done the most to help the club.

Following a well-attended AGM, the **Loughton and Epping Forest ARS** executive committee was elected back *en masse* except for the secretary Marc, who stepped down for health reasons after many years of sterling service. Marc will still be co-opted by the committee with special responsibilities for organising LEFARS training dates and exams. The Secretary's post has been filled by Dave Priest, M0VID. The month also saw an impromptu presentation on SDR by John Ray, D8DZH, Dave De La Haye, M0MBD and Dave 'Taz' Cutts, M0TAZ during a show & tell evening. Many members expressed an interest in the club putting on a 'clinic' to help people get set up with software and drivers to make their SDRs work! John, G8DZH and Dave, M0MBD gave a presentation detailing their excursion to the Netherlands for the Dutch Nation Hamfest at Rosmalen. The May Day bank holiday weekend saw the club at the Royal Gunpowder Mills for the VE Day event. John Mulye, G0VEH dusted off the extensive collection of military radios and vintage equipment whilst the permanent NOV GB2RGM was put to use, even if the poor condition of the bands meant there was hardly any business to be had.

The **Martello Tower Group** will once again be running special event station GB5RC from the Radio Caroline ship the *MV Ross Revenge* over the long weekend 3 to 5 August. Six boat trips have been organised out to visit the ship for a tour including studios, the transmitter room and so on, three trips each on Saturday and Sunday. Up to 11 visitors can be carried and the £275 cost is shared by participants, so a group of 11 would pay £25 each. Sailing times are 1.30, 4 and 6.30pm and each round trip is around 2½ hours from Mersey Island in Essex. The Group can't take individual bookings but clubs are invited to get together and share a trip, which must be paid in advance and is on a first come first served basis. Details are available from Paul, G0HWC on 0781 060 7766.

At the May meeting of Thames Amateur Radio Group, Mark M0IEO, gave a presentation on amateur satellites. He showed how mounting VHF and UHF antennas on a rod and tripod overcomes the limitation of only have two hands when needing to hold multiple bits of kit for the uplink and downlink. The wooden plinth in the middle is where the receiving radio is clipped. Mark's talk included a live demo on satellite tracking, accessing pass information from the AMSAT website, followed by a live demonstration of receiving a satellite communication from John, M0JRW in the car park. The next step is a Satellite field day at Hadleigh Country Park to attract club members and members of the public.

Dave, G6KWA on the mic at Willingham Smock Windmill.

Cambridge and District Amateur Radio Club activated Willingham Smock Windmill as GB0CMW over the weekend of 12-13 May. The club's new tent was well tested with a downpour on Saturday afternoon, but dry weather prevailed on Sunday. SSB contacts were made, mainly on 80m, with 15 other Mills around the country, plus one in Holland. The club's remote station G2XV was also activated, but suffered technical problems on Saturday, resolved on Sunday allowing contacts as far afield as Moscow. It is thought that this is the 19th year the club has activated Willingham Smock Windmill and remains very grateful to the mill owner and his wife for their hospitality as well as the cream teas they provided.

REGION 13: EAST MIDLANDS

The winner of this year's construction competition at Spalding DARS was Nick, G4BMS (left) with his superbly constructed valve regenerative receiver for 160m. Much thought went into its design and construction; his attention to detail was a big talking point after the results were announced. This year's entries highlighted the fact that home construction is still undertaken my many people.

RAF Waddington ARC has a tradition where members bring cake to the club when they have had a recent birthday. With over 70 members and only 52 weeks in the year a lot of cake is eaten! The photo on the right shows Ben, M0ORY, presenting his 'radio cake' to the club.

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FOR SALE

150W 23cm LINEAR AMPLIFIER, £325, can be collected or plus shipping at cost. 4M6DX 4m Yagi by Vinecomm, £110, HB Super Moxon, £60. Antennas collection only. John, G4NTY, 0161 790 7673, jhigson42@gmail.com (Manchester).

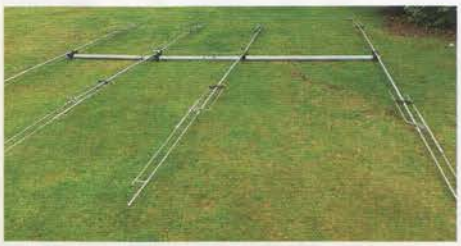
AIR BOARD TECHNICAL NOTES. Rigging of WW1 aircraft. Bristol F2B, RE8, SPAD etc. Dated January 1918. Illustrated. Cover well worn. Contents in good condition. Proceeds to RAF Benevolent Fund. Offers please. Ray Edginton, G3AGF, 01323 491 516, ray@rayg3agf.plus.com (Seaford).

ATLAS DCA55 AND ESR60. DCA55 semiconductor component analyser and ESR60 capacitance and equivalent series resistance meter. Both in good condition with original packing. £25 each, posted. Richard, G3VZG, 01743 356 195, richardg3vzg@gmail.com (Shrewsbury).

BRAND NEW NUE PSK DIGTAL MODEM. Standalone battery operated digital modem using Microchip dsPIC technology. Easy visibility in high/ambient light. Portable unit for PSK, RTTY and CW Modes. Full description in eHAM.NET reviews. Cost over £300. £120 plus postage. Eddie Hayden, G4LZU, 01823 442 477, edward.hayden2@btinternet.com (Taunton).

CLEARING OUT JUNK BOX! 29 UHF/BNC plugs and cable connectors. More detailed info via email / phone. Asking price £10 + P&P. Weight approx 1.4kg. RM 2nd postage £3/£3.50. Prefer buyer collects. Peter, G3UXH, 0114 245 9081, g3uxh@stanage-edge.com (Sheffield).

HEIL PRO-SET K2 headset & mic in original box, virtually unused, £110. Western HF-10 antenna, 160-6m, unused, £50. AV-200 VSWR power meter, hardly used, £40. Great Circle DX Map (420x595mm), £2. P&P extra at cost, or collect. Chris, M0PSK, 01568 610 186, chrism0psk@gmail.com (Leominster).



HF BEAM KLM KT34 stayed lattice tower, 4 section, up to 80 feet. Head unit and HyGain rotator with control box. Yaesu FT-757gx with FP-757gx power supply. HF linear alpha 347A. Offers by e-mail please. Buyer collects. John, G4DUW, 01425 610 944, johngoldbey@hotmail.com (New Milton, Hampshire).

HUSTLER BTV4 antenna with extras, cost me £400, bought Jan 2018, never used, started to build it then changed my mind so for sale at £250. Buyer collects. Len Stockwell, M1DPE, lenm1dpe@hotmail.com (Grays, Essex).

I AM A WHITE STICK OPERATOR (blind) and cannot now cope with antenna maintenance etc so selling Mosley TA32 junior triband beam, £75, also homebrew trap dipole for 18/24MHz, £25. Wouxun KG-UV6D handheld transceiver, used once, boxed + charger, £50. John, G3WFM, 01707 651 532, g3wfm@yahoo.co.uk (Potters Bar, Hertfordshire).

ICOM IC-706 & AT-180 ATU complete HF base/mobile station. 160m to 2m (not 5 & 70MHz), including 13.5V 20A linear PSU, mic & separation cable. Good (smoke free) condition (never used mobile), boxes and manual, £550. Buyer collect. Peter, G4CQV, 0777 995 3407, peter@hamnlace.co.uk (Wilmslow).

ICOM IC-756 pro 3, £1000. Icom IC-9100, fully loaded inc D-Star, filters, 1296MHz, £2500. All delivered to UK mainland at price shown. Please no time wasters this time. Trev, g2kf@btinternet.com (Cornwall).

MFJ-868B VSWR/PWR METER 1.8-60MHz. 20/200/2kW. Large meter. £45. MFJ-891 VSWR/power meter, 1.6-60MHz, 20/200/2kW, crossed needle, £40. Daiwa CN801 VSWR/power meter, 140/ 525MHz. 20/200W, crossed needle, £45. All boxed, carriage at cost. Bob, G8BCA, 01638 714 051, g8bca@talktalk.net (Mildenhall, Suffolk).

RADIO TRUCK WITH ELECTRIC MAST, radio room and two built-in 12.5kW generators (need servicing). Ex-government (Aldermaston). Petrol, 4 wheel drive. Masses of storage, power outlets, antenna inputs, mains hookup. £4000 ono. Graham Mather, M6GMR, 0783 632 5133, mather@outlook.com (Newbury).

SHACK STUFF: Tektronix 455 oscilloscope with probes, Fluke 99 scopemeter SII with PSU & probes (needs new battery), Weir Electronics bench PSU. Offers to Dave, G6AAR, 01903 746 977 (Surrey).

TILT OVER CRANK UP MAST by Altron. Similar to Tennamast. Top section with rotator cage. Single winch stainless wire. Good working order. Both sections 4.5m plus cage 80cm. Quality galvanised item. Transports in 3 sections, longest 5.3m. £250, collection only. M0JND, 0797 395 4429 (East Sussex).

WW2 USA ARMY RADIO MAST, up to 40ft, on a swivel base. Made from 5 aluminium tubes. Base tube 86mmx4.5m, top 50mmx3m. Assembled into each other, adjustable to heights 7.5-12m. Mounted on swivel base allowing horizontal to vertical positions. £150. Dave Johnson, G0IES, 0161 442 4158, dave.johnson37@btinternet.com (Stockport).

YAESU FT221R 2m multimode transceiver. Good working order, excellent cosmetic condition. Fitted with a muTek front end board, includes mains lead and a copy of the user manual, £300. Prefer collection in person or carriage at cost. Mike Ayres, G4OQG, 01249 443 037, g4oqg@hotmail.co.uk (Wiltshire).

YAESU FT-450D, YT-450 autotuner, speaker SP-8, QJE-30 amp, noise offset PSU, FDKMulti-750X 2m all mode transceiver, full size G5RV, GPA HF vertical antenna, RG213 and other coax, cable, connectors. Loads of spares. £895, collect. Also FeatureTech AW07A HF-UHF antenna analyser. John Grint, 2E0PPO, 0777 343 8435, john2e0ppo@icloud.com (Norfolk).

YAESU FT-901DM, not working, Yaesu YVM-901, YK-901 keyboard, Yaesu YR-901, Yaesu FT-200 with supply, working, Yaesu FTdx-401, not working, FT-101ZD mk3, Yaesu FL2000B amplifier, working, YO-901 scope, SP-901P speaker, open to offers on any, separately or together. Ian, G4UGD, 0791 957 1136, ian.clover@tiscali.co.uk. (Cheshire).

WANTED

DESKTOP CHARGER BC-177 for Icom E92-D. Original or compatible. Trevor Bunce, M3TVN, 01642 452 189 (Middlesbrough).

ELECRAFT P3 PANADAPTER in good condition. Ray, M1FJL, 0775 645 3134, ray@collins05.plus.com (Wells, Somerset).

HANSEN FS-50HP SWR/watt meter. Must be in good working & cosmetic condition. Mike Swift, G4MJA, 0191 389 2822, mfswift@hotmail.com (Durham).

HQ-1 MINI QUAD ANTENNA, USA model with brass spokes please not the MQ-1 Canadian model. Either complete antenna or the 4 end mounting coils. Mike Giddings, G3XLB, mikegiddings1@yahoo.com (Liverpool).

ICOM IC-703 PLUS HF/6m in clean condition with original box or what you have, non-smoking home please. Please email price and picture. Elan, G0UUT, 0748 200 4890, paimg0uut@gmail.com (Norfolk).

KENWOOD 6-PIN MIC TYPE MC-46 for venerable TR-9000 from SK sale. Also power lead for same – type 8 but with square ends (see drawing) or alternatively BO-9 system base. Joe Kirk, G3ZDF, 01243 536 586 (Chichester).

OLD TIMER looking for a Yaesu FT-800 transceiver, complete & working. Please email or leave your name, number and details on the answerphone. Alan, G3WXI, 0114 288 1692, g3wxi@qsl.net (South Yorkshire).

SILENT KEYS

We are sorry but it is not possible to include a Silent Keys list this month. We will include this month's Silent Keys in the next list.

To notify us that a Member has passed away, email details to sales@rsgb.org.uk or phone 01234 832 700, option 1. This will ensure that their Membership will be ended properly and that they appear in the Silent Keys list. We need to know the name, callsign and date of death.

Please note that Ofcom must be informed separately, on 0207 981 3131 – we are not permitted to pass on details on your behalf.

SPECIAL EVENT STATIONS

These callsigns are valid for use from the date given, but the period of operation may vary from 1-28 days before or after the event date. Details published here were kindly supplied by Ofcom on 21 June.

RSGB will do its best to publicise your special event and its callsign, but you must help us to help you. On the back of Ofcom's Special Event Station NoV application form there is a Data Protection section. Unless you specifically tick the Yes box, Ofcom cannot tell RSGB about your event, which means it won't appear here, on GB2RS, or on the RSGB website. (If you don't tick either box, it's automatically assumed to be 'no'). So please tick Yes!

Start Date	Callsign	Event details	Location
01/07	GB5GW	Great War	Great Bowden
13/07	GB2TAC	The Aeroplane Collection	Ellesmere Port
13/07	GB8BCF	Black Cherry Fair	Chertsey
14/07	GB2NGG	Northern Greyhound Gathering	Wetherby
16/07	GB4RFR	Flight Refuelling ARS Hamfest	Wimborne
17/07	GB2BAJ	Blair Atholl Jamborette	Pitlochry
20/07	GB4BLC	30th Signals Regiment Open Day	Warwickshire
21/07	GB6MMR	McMichael Radio Rally	Sonning on Thames
25/07	GB4WP	War and Peace (show)	Beltring
27/07	GB1PF	Papa Foxtrot	Portsmouth
28/07	GB0KHF	Kingsteignton Hobbies Fair	Kingsteignton

WANTED FOR AN EXHIBITION: Cathodeon Crystals crystals, filters and oscillators, especially 1.4MHz SSB filters used in RA1772 etc. Also interested in a complete RA1772 or similar. Bill Metcalfe, G8XLE, 0783 160 0165, bill.metcalf@physics.org (Cambridgeshire).

YAESU FTV-901 70cm module. Also Yaesu FT-225 Tx/Rx, in working order please. Cash available, can collect. Meeko, M0FVD, 0759 287 3706, meekoblue@hotmail.co.uk (Manchester).

EXCHANGE

LARGE QUANTITY of ex-workshop components new and salvage. Includes reels of coax, multicore, connecting wire and IT equipment etc. No cash wanted.

Will exchange for basic general coverage receiver (preferably valve). OAP returning to hobby by way of SWL. John, G4FZG, 01242 582 169, john.marino@btinternet.com (Cheltenham).

LOOKING FOR A YAESU FT-817 OR FT-817ND to exchange for my two month old 2018 version LNR Mountain Topper MTR5B, QCX QRP 40m kit and SOTA ATU (built or unbuilt upon request). New MTR5B bought from Kanga UK. Anthony Keane, RS315913, 0753 864 2538, anthonykeane.29@gmail.com (Birmingham).

RALLIES & EVENTS

Members of the RSGB Regional Team will be present at the rallies this month marked with an RSGB diamond.

If *your* rally or event is not listed here, PLEASE SEND US FULL INFORMATION by email to radcom@rsgb.org.uk

1 JULY 2018

BARFORD NORFOLK RADIO RALLY

Barford Village Hall & Green, Barford, Norwich NR9 4AB

Doors open 9am (traders from 8am) with talk in on S22. Car parking is free. There will be trade stands, car boot sales, Bring & Buy, raffle and repeater groups. Catering is available on site. Entry £2 per person / under 16s free. Pitches £8, indoor tables £10. Contact radio@dcpmicro.com [www.norfolkamateurradio.org].

7 JULY 2018

STOCKPORT RS RALLY

Walthew House, 112 Shaw Heath, Stockport SK2 6SQ

Car parking is available around the venue and a talk-in station will be on the air. Doors open from 10am to 4pm, with disabled visitors gaining access at 9.30am. Entry is £2. There will be trade stands, special interest groups and an RSGB book stall. Contact Nigel Roscoe, G0RXA on 0750 690 4422 or by email to info@g8srs.co.uk.

7 JULY 2018

BANGOR & DISTRICT ARS ANNUAL RALLY

Donaghadee Community Centre, Parade, Donaghadee BT21 0HB (100m from harbour).

Doors open 11.30am, admission £3. Free car parking, disabled facilities, Harry's RSGB bookstall, traders, Bring & Buy, raffle, refreshments. Harry, GI4JTF, 02890 422 762 [www.bdars.com].

15 JULY 2018

CORNISH RADIO AMATEUR CLUB RALLY

Penair School, Truro, Cornwall, TR1 1TN

Doors open 10.30am, admission £2. There will be traders, Bring & Buy, club stalls, car parking. Catering is available onsite. Contact Mike, G1NRF 01209 211 069, mike.g1nrf@hotmail.com

22 JULY 2018

FINNINGLEY AMATEUR RADIO SOCIETY RALLY

The Hurst Communications Centre, Belton Road, Sandtoft, Doncaster DN8 5SX

Doors open 10.30am. There is free parking. Large indoor /outdoor traders' area with microwave components to QRP. Hot food and drinks all day. All on one level. Admission £3. Contact Kevin, G3AAF on 0783 161 4640, kevin.avery@tunstall.com.

22 JULY 2018

MCMICHAEL RALLY

Reading Rugby Football Club, Holme Park Farm Lane, Sonning Lane, Sonning-on-Thames, Reading RG4 6ST

Talk-in will be on S22. Parking is free. Doors open at 9.30am and entry is £3. Tables and car boot spaces are £10. There will be trade stands and special interest groups. Catering and a licensed bar will be available on site. Due to venue rules, no dogs are allowed other than assistance dogs. Andy, 0777 594 0016. [http://mcmichaelrally.radarc.org/].

29 JULY 2018

CHIPPENHAM & DARC RALLY, ELECTRONICS FAIR & CAR BOOT SALE

Kington Langley Village Hall & fields, Church Road, Kington Langley SN15 5NJ

Doors open 9am to 1pm (disabled: 8.30am), admission £2. Car boot sale, catering, flea market, special interest groups, talk-in, trade stands. Sellers £10 per pitch (or per indoor table). Sellers can set up from 7-8.30am. Brian Tanner, G6HUI, 0772 224 2741, rally@g3vre.org.uk.

29 JULY

HORNCASTLE AMATEUR RADIO RALLY

Horncastle Youth Centre, Willow Close, Cagthorpe, Horncastle (satnav: LN9 6DZ)

All on one level, suitable for people with mobility problems. Hot food & drinks available. Room for traders outside. Entry £2. RSGB bookstall in attendance. Details (and table bookings): Tony, G3ZPU, 01507 527 835.

5 AUG – 29th King's Lynn ARC Great Eastern Radio Rally

5 AUG – Lorn Radio Rally

10 AUG – 25th Cockenzie & Port Seton Mini Rally Night

12 AUG – Flight Refuelling ARS Hamfest

19 AUG – Rugby Amateur Radio Society Rally

26 AUG – Torbay ARS Annual Comms Fair

26 AUG – Milton Keynes ARS 60th Anniv. Rally

27 AUG – Huntingdonshire ARS Annual Rally

1 SEP – G-QRP Club and Telford & District ARS Mini Convention and Buildathon

2 SEP – Telford Hamfest

15-16 SEP – BATC Convention (CAT18)

15 SEP – (new date) – Fog on the Tyne Rally

16 SEP – Weston-Super-Mare Rally

28 & 29 SEP – 10th National Hamfest

7 OCT – 45th Welsh Radio Rally

7 OCT – Hack Green Bunker Rally

11-14 OCT – Microwave Update 2018

12-14 OCT – RSGB Convention

14 OCT – Hornsea Amateur Radio Rally

21 OCT – Galashiels Radio Rally

4 NOV – CANCELLED – West London R & E Show

17 NOV – RADARS Traditional Radio Rally

18 NOV – 41st CATS Radio & Electronics Bazaar

25 NOV – Bishop Auckland RAC Rally

29-30 DEC – Hamfest India, Bangalore

RadCom

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HF F-Layer Propagation Predictions for July 2018

Compiled by Gwyn Williams, G4FKH

	3.5MHz	7.0MHz	10.1MHz	14.0MHz	18.1MHz	21.0MHz	24.9MHz	28.0MHz
Time	000011111220	000011111220	000011111220	000011111220	000011111220	000011111220	000011111220	000011111220
(UTC)	246802468020	246802468020	246802468020	246802468020	246802468020	246802468020	246802468020	246802468020
*** Europe								
Moscow	52.....256	554211123466	355332224563	.13353235521	..111111221.	....1...11..	.....	.....
*** Asia								
Yakutsk	.....	111111111112	211221221222	.....	.....	.....	.....	.....
Tokyo	.....	.....1...	.....111..	.....1....	.....	.....	.....	.....
Singapore	.....21.	2212	.....11..1	.....	.....	.....	.....	.....
Hyderabad	233	2.....3444	23332	.....2....	.....	.....	.....	.....
Tel Aviv	53.....155	552.....3455	15421.134553	..323112451.	.....11..	.....	.....	.....
*** Oceania								
Wellington	.....	.....	.....	.....	.....	.....	.....	.....
Well (ZL) (LP)	.1.....	232.....132	221.....33	22	.....	.....	.....	.....
Perth	111	2313	.....11.2	.....	.....	.....	.....	.....
Sydney	.....1..	.....33..	.....1221.	.....1.	.....	.....	.....	.....
Melbourne (LP)	.....	223.....	212.....1	1	.....	.....	.....	.....
Honolulu	.....	.....	...1.....	.....	.....	.....	.....	.....
Honolulu (LP)	.....	.....	.....	.....1...	.....1...	.....	.....	.....
W. Samoa	.....	.....	.....	....1.....	.....	.....	.....	.....
*** Africa								
Mauritius	1.....222	2321	.....121..	.....	.....	.....	.....	.....
Johanesburg	22.....122	.1.....2211	.....2...	.....11...	.....	.....	.....	.....
Ibadan	553.....355	5542....2455	3.5311113555	..232112351.	...1....25..	.....1..	.....	.....
Nairobi	33.....233	241.....2344	.22.....3441	..1111.132..	.....1...	.....	.....	.....
Canary Isles	664.....156	66541...2466	535532223566	113532225663	..1322213521	...21111231.	...1....12..	.....1..
*** S. America								
Buenos Aires	221.....	333.....23	212.....33	121	.....11.	.....	.....	.....
Rio de Janeiro	33.....2	431.....34	21.....243	332	.....21.	.....1..	.....	.....
Lima	222.....	333.....13	1.2.....23	.....2.	.....	.....	.....	.....
Caracas	333.....3	4432.....14	1.2.1.....24	.....12.	.....	.....	.....	.....
*** N. America								
Guatemala	222.....	333.....2	211.....12	11	.....	.....	.....	.....
New Orleans	232.....	332.....1	1.....1	.....	.....	.....	.....	.....
Washington	4431.....1	44321.....12	21..211.1123	.....2.	.....	.....	.....	.....
Quebec	3431.....1	44321.....12	11..11111122	.....2.	.....	.....	.....	.....
Anchorage	.....	.....	..1.....	.....	.....	.....	.....	.....
Vancouver	.....	..1.....	..1.....	.....	.....	.....	.....	.....
San Francisco	.....	122.....	.12.....	.....	.....	.....	.....	.....
San Fran (LP)	.....	.....	.....	.....	.....	.....	.....	.....

Key: The figures represent approximate S-meter readings, whilst the colours represent expected circuit reliability. **Black** equals low to very low probability, **Blue** equals good probability and **Red** equals a strong probability. No signal is expected when a '.' is shown. The RSGB Propagation Studies Committee provides propagation predictions on the internet at www.rsgb.org.uk/propagation/index.php. An input power of 100W and a dipole aerial has been used in the preparation of these predictions; therefore a better equipped station should expect better results. The predicted smoothed sunspot numbers for June, July and August respectively (SIDC classical method – Waldmeier's standard) 1, 0 & 0 and (combined method) 6, 6 & 6. The provisional mean sunspot number for May 2018 was 13.2. The daily maximum / minimum numbers were 36 on 27 May / 0 on 1-3 & 14-20 May.

THE 'R' PREFIX

Ian Wooller, M3NMQ

Why are we again having a stupid addition to the Prefix for the Wedding later this month. This is making a mockery of the callsign system and there is no need for it.

I'm sorry that you don't personally like the idea of the callsign prefix, but we were asked by a number of our members to investigate the possibility, so we were happy to do so. In the first three days after the prefix was announced we issued over 450 NoVs on behalf of Ofcom and nearly a thousand in total, so it does seem to be a popular idea.

Steve Thomas, M1ACB
General Manager

FT8 – AMATEUR RADIO IS LOSING THE PLOT

Alan Clayton, G7HZZ

With poor HF conditions making 'good' QSOs difficult, the widespread use of "59 73 all details on QRZ.com" and the poor communications skills of many radio hams (not only Foundation licensees churned out by licence factories which then 'throw them to the wolves'), why does amateur radio need more and more sophisticated ways to say less and less?

FT8 is of no use for emergency communications, and no real value for propagation studies or antenna testing, let alone a meaningful conversation.

Amateur radio is losing the plot; it is dying a lingering death and FT8 does nothing to reverse this: however reliable it is, *it just enables those with nothing to say to say nothing.*

In reality, even in the worst of radio conditions some contacts can be made, when a few spoken words exchanged by humans in challenging circumstances have more value than a few squeaks conducted automatically between computers.

FT8 IS BAD NEWS

Neil Whitham, G4SEN

I am confused and dismayed to read David Smith's letter last month concerning FT8. Whilst FT8 and digimodes in general may not be everyone's cup of tea they most certainly have garnered a lot of interest from amateurs all across the globe and, as he points out make 'DX' contacts possible for even the most modest of stations.

In support of David's argument, I personally agree that fully automated contacts – and there are many doing it – are not in the spirit of amateur radio. But using forms of technology to assist making contacts is, and always has been, in with the spirit of the hobby. Yes it can be argued that even without the assistance of digimodes one can evidence examples of contacts being made through perseverance and innovation, but to say that "finding today's weak signals amongst a spectrum display filled with red lines is becoming an impossibility" is most certainly not true. Only this morning, on a very busy 40m band on FT8 I exchanged a -8 to -19 report with north America. If one finds a particular band is too busy, or conversely too quiet, select another band where the degree of activity is more acceptable.

It does not stack up to isolate FT8 in an argument about the ability to convey useful information in order to justify amateur radio, as one could say the same about slow scan TV for example. FT8 and the JT suite of modes all have 'free text' boxes, though admittedly the time constraints of FT8 make this facility limited in its usual format of preset 3-step QSO. FT8 is not an isolated case in regard to having its own controversies. But randomly suggesting a 140 character minimum message capability is entirely arbitrary. Every day one hears cases for similar argument across the bands on all modes: the 59 contest exchange or the single line QSO being examples.

Whilst the bands are quiet FT8 can indeed often be heard as the first traces of signals showing the band is open and indeed this does prove beneficial. This past 7 days has seen significant levels of activity on 10m where, on hearing FT8 signals, I have moved to SSB and made contacts that I might not have thought possible due to 'anticipated' band conditions.

Surely one of the major attractions of our great hobby is its diversity. We should celebrate this; not everyone wants to partake in sport radio as not everyone is comfortable with rag-chewing. One thing is for certain however: digimodes certainly do not stop or interfere with anyone wishing to enjoy amateur radio.

SMITH CHARTS

Tom Thompson, W0IVJ

Recently Mike Parkin, G0JMI, published an excellent two part series on the Smith chart in the March and April 2018 issues of RadCom. Ward Harriman, Jr, AE6TY, has written an excellent program called SimSmith. Larry Benko, W0QE, has made a number of videos explaining SimSmith. These videos go into great detail to explain many powerful tools SimSmith has. Anyone who is interested in antennas, matching networks, or linear circuits in general should take a look. Just search for W0QE on YouTube to start exploring the many possibilities of SimSmith.

HIGH VOLTAGE HELP!

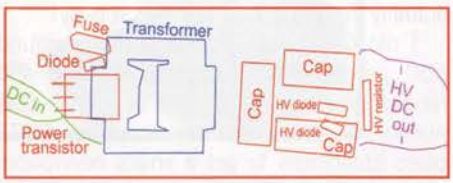
Giles Read, G1MFG (writing as a Member)

Some while ago I purchased a cheap "one million volt" inverter via eBay. Whilst it produces impressive (and noisy) sparks an inch or so long, I think it's nearer 100kV than 1MV.

The device is potted in a small tube. Intrigued to find out what made it tick and unable to remove the potting compound, I X-Rayed it (because, why not?). I've managed to identify most of the components but there are two two-wire parts – the black blobs on the right – that, irritatingly, I can't identify. Can anyone suggest what they may be?

A high res version of the X-Ray is at www.flickr.com/photos/ultrapurple/31823826565/ where there are also more detailed comments.

With my RSGB hat back on again, you may be interested to know I had this device with me when I visited John Tuke, GM3BST ('Last Man of Spark'), intending to use it as a conversation piece. He found it fascinating and 'sent' his callsign by spark one last time. In later email correspondence he asked me to buy one for him; unfortunately I don't know if it reached him from China in time to be of any use.



LAST MAN OF SPARK

Steve Chuter, 2E0BUI

What a fascinating article about John Tuke and the spark transmitters(RadCom May 2018). What was for me so amazing is that in 1955 I got my 2nd class PMG certificate just like John's and the first ship I was sent to by the Marconi Office in Southampton was the same RMS *Alcantara*. By that time she did not have spark transmitters in the radio room but the 1950s standard Marconi equipment. However in the two motor lifeboats, emergency spark transmitters and batteries were still there. My job as 4th Sparks was to check the batteries & equipment. I never sent messages by spark, only tested the gear.

Mike Baker, G3TMB

I too would like to add my comments re the letter about John Tuke's memories of the spark transmitter. I got my ticket in 1952 and after my first voyage in the *Mataroa* joined the old *Empire Trooper* (which was an old WW1 reparations vessel from the 1920s) in 1952 and that indeed had a spark transmitter as the standby! In fact that exact circuit diagram shown was on the wall of the radio room. Indeed, in the exam one of the

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compulsory questions was "draw the circuit diagram of a typical spark transmitter with component values".

Of course it was never used as a day to day transmitter in normal communications. We had permission to use it in an emergency because we sent and received urgent government traffic as we were of course carrying troops into a war zone in Korea and were permitted to test it at least once a day, which was carried out by the Chief Radio Officer. It was quite spectacular, as you can imagine!!

By the way I was amazed to read that Mr Tuke was the sole operator and was on duty all the time! On the *Trooper* we had four watch keepers keeping a 24 hour watch. I, as 3rd sparks did the 12 to 4 watch; there was a first tripper and the Chief so there were actually five of us, and boy was it busy!

I did Christmas 1952 and, with around 650 people aboard wanting to send and receive greetings, QTC 300 at a time was normal. I also remember receiving GTZZ press broadcasts to get a ship's newspaper out for the morning. The way Mr Tuke coped was an eye-opener.

Ah, happy days.

TALK GROUP TROLLING

Nigel Newman, M0ICH

Talk Group 235 on DMR is the National Calling Channel (and there are Regional Calling Channels too). The idea is to make contact and then QSY to another Talk Group specifically set aside for longer QSOs (like TGs 80 to 84).

Some newer operators to DMR may not realise that holding a QSO on TG235 means their chat is rebroadcast on every repeater in the country, thereby preventing other amateurs making a CQ call on the calling channel.

Let's lead by example. National and Regional Calling Frequencies may be needed in an emergency – so let's keep them clear of chatter.

2X1 LC CALLSIGNS

Hugo Ark, LA5YJ,
happy owner of LC5K, ex MI0YJR

Sir, you got it all wrong in the GB2RS broadcast of 6 May 2018.

The LC contest call signs are only issued as a personal contest call to hams holding a LA or LB call. Not to radio clubs at all. The call can only be used in Norway only, and only, *only* in contests.

The fee is €100 as admin fee to NRRL and €100 to the government issuer NKOM, and is valid for 5 years, a reissue for another 5 years costs €100 as admin cost to NRRL only, not NKOM.

OXYGEN OF PUBLICITY

Ray J Howes, G4OWY/G6AUW

Roger Western, G3SXW (June 2018) quite rightly notes that it would be a far better idea that those people whose accomplishments make a large dent in our knowledge of the technical world or whatever, should be given the oxygen of publicity before they expire from this world, rather than when they are six feet under.

So in that vein, knowing that G3SXW is, or was, an avid advocate of travelling to many corners of the world in the guise of numerous DXpeditions – which has no doubt brought forth much DX excitement and happy times to countless numbers of dedicated HF country chasers – maybe it might be time to applaud and expose Roger's selfless acts of generosity and time in providing so much joy to so many DX chasers? Just a thought.

QRM, FREE AND OVERSIZE BATTERIES

Bob Houlston, G4PVB

In response to Bill, G4GHB (*RadCom* May) I find that some QRM problems are solved by going off the mains electricity grid by using a battery.

Golf cart manufacturers are selling a 12V lithium rechargeable battery (50% the weight of lead acid) complete with an appropriate charger for just £150. As a result, many more mature golfers are disposing of their old and, heavy deep cycle lead acid leisure batteries before they actually expire.

Write a nice letter to your local golf course. They will put it on the notice board and pretty soon you will be offered a free 12V deep cycle lead acid leisure battery (or three!) and charger. I've been given one. In golfing use it expired at the 17th hole but still works a treat for radio.

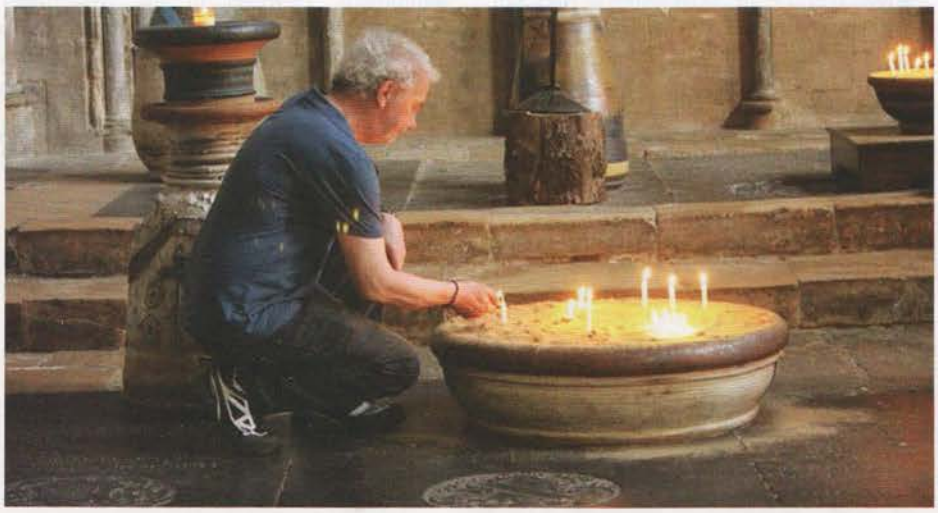
Most golf batteries now use PowerPole connectors and are fitted with a fuse. The fuse is important so use it. If you don't understand the difference between a deep cycle leisure battery and a car battery then, briefly: don't use a car battery for light duty extended radio work because you will quickly ruin it. Car batteries need to work extremely hard. They turn the high-current starter motor at 1200RPM, then recharge quickly from the alternator.

Separately, my electro-acoustic guitar has an on-board preamp that requires a PP3 battery. I've found that only the Panasonic Alkaline 6LR61 size 9V brand made in Belgium will fit easily. (Wilko Extra Alkaline made in China will also fit, but firmly.) Other brands I've tried are such an over-tight fit that they may cause damage. This may be of interest to SWL radio scanner & test gear equipment operators. For more information, follow tinyurl.com/pp3oversize

REMEMBERING ABSENT FRIENDS

Steve Daniels, G6UIM

On a recent trip to Lincoln Cathedral I decided to light a candle for a couple of recent SKs that I'd known. It was a spur of the moment thing and not intended in any religious way; it was just a quiet place for me to remember them and pay my respects. My YL took pictures, not really knowing what I was doing. I posted them on Facebook and was surprised by the number of fellow amateurs who liked and commented on the picture (left).



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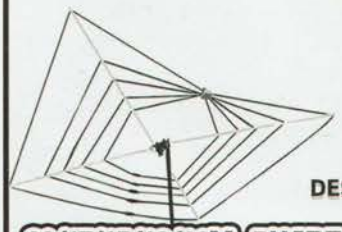

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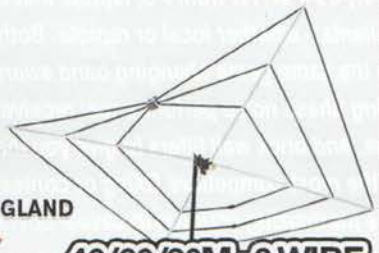

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