Radio Society of Great Britain
Advancing amateur radio since 1913

RadCom

Peter Hart reviews the Icom IC-7610

"...a most impressive radio with some great features and a superb performance" – G3SJX

June 2018 ◆ Volume 94 ◆ Number 06 ◆ £4.95

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June 2018 ◆ Volume 94 ◆ Number 06 ◆ £4.95

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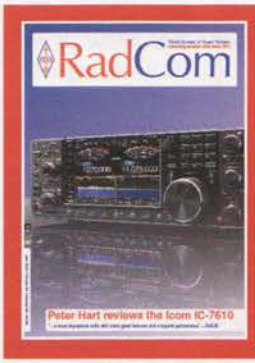

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RadCom THE RADIO SOCIETY OF GREAT BRITAIN'S MEMBERS' MAGAZINE

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RadCom Basics for Members new to the hobby can be found at www.rsgb.org/radcom-basics/
Abbreviations and acronyms we use are listed at http://tinyurl.com/RC-acronyms

The RSGB is on Twitter @theRSGB

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The role of the Regional Team

The majority of RSGB work is conducted by volunteers, coordinated by a recently refocused Volunteer Leadership Team (VLT). The VLT comprises Regional Representatives elected by Members in their regions, Committee Chairs, Honorary Officers, senior HQ staff and the Board.

The thirteen Regional Representatives (RRs) are elected by local members to represent those Members' views in the Society. They are supported by around seventy District Representatives (DRs) and, together as your Regional Team (RT), they form your interface with the Society. You can find out more about them and events in your region on our website at www.rsgb.org/regional-team

Members of the RT are well-known for visiting clubs and attending rallies, but they have a much wider role. They should always be your first point of contact as a key part of their role is to help you access the multitude of services that the RSGB provides, which are summarised in the RSGB Services Map, www.rsgb.org/services-map

Committee Chairs and Honorary Officers represent the Society by providing support and advice in their areas of expertise. As well as helping you to access this specialist knowledge, the Regional Team can put you in touch with local amateurs for hands-on support and face-to-face advice that supports the work of the committees and Honorary Officers. Improving the organisation by dovetailing together the local knowledge of the Regional Team with the specialist support of the other members of the VLT is a key strategy to improve the services provided by the RSGB. To make this support more accessible we are developing an online directory (an electronic 'Little Black Book') of key contacts at local and wider specialist levels, with details about the help they can provide.

The specialist expertise available covers a very wide range of areas including eliminating interference, providing planning advice, training and education, contests, competitions and awards. It will also include spectrum acquisition and management, National and International Representation, predicting propagation conditions, licensing, publications and Special Interest Groups, together with places and events such as the National Radio Centre (NRC) and the RSGB Convention. Compiling the information for this directory is an early challenge for the VLT, which will demonstrate how working together we can provide better services to members than we can separately.

"Members of the RT ... should always be your first point of contact as a key part of their role is to help you access the multitude of services that the RSGB provides"

When asked why they like amateur radio, many amateurs will say that mixing with and learning from other amateurs enhances their own enjoyment and understanding of amateur radio. This sense of community is one of the key values in the RSGB's strategy and the Regional Team is fundamental to ensuring that amateur radio communities grow and thrive. The RT not only supports individuals but can also help clubs to maximise the wide range of benefits provided by the Society, from advice to specialist club talks/demonstrations or practical help such as Buildathon tools. In addition, regular contact between members of the RT and clubs can encourage local clubs to work together to put on events, offer benefits to local radio amateurs and achieve goals that they do not have the resources or expertise to achieve individually.

The Regional Team will play a key role in the Society's five-year strategic goal of having "an active and thriving amateur radio community". The RT is your local interface with the Society – get to know them, use their expertise and contacts, and work with them to help amateur radio flourish in your area.

Together we can achieve our strategic intent to "protect, promote and enhance the use, understanding and enjoyment of wireless communication."

John Rogers, MOJAV, DR133

RSGB Annual General Meeting 2018

The 91st Annual General Meeting (AGM) of the RSGB took place in Birmingham on Saturday, 21 April 2018.

Formal business

Philip Willis, MOPHI was confirmed as a nominated Director to serve until the AGM 2020. From four candidates, two Directors were elected: Simone Wilson, MOBOX and Mark Jones, GOMGX who will serve until the AGM 2021.

The *Articles of Association* were amended to rename Regional Managers as Regional Representatives to better reflect their roles, and to transform the current Leadership Team to a new body called the Volunteer Leadership Team. A second agreed amendment was to allow the Board to appoint a President should no-one stand for election, or should an elected President become unable to fulfil the role.

A number of awards and presentations were made at the meeting - see page 60.

President's address

To close the first session Nick Henwood, G3RWF gave a short presentation reflecting on his two years as President. His upbeat speech made it clear that there is much to be positive about and that as experimenters and self-learners we should all embrace new things that allow us to enjoy amateur radio more. He encouraged the Volunteer Leadership Team and the members to work together and help deliver the RSGB's Strategy 2022.

Informal session

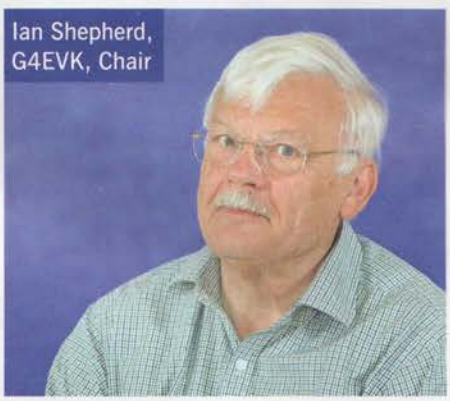
After lunch there was an opportunity for Members to ask wide-ranging questions of the Board. This was followed by two guest speakers:

- Joe Taylor, K1JT, assisted by Bill Somerville, G4WJS gave a presentation on the Weak Signal software suite that includes, WSPR, JT64 and FT8
- Martyn Baker, GOGMB, spoke about the RSGB's National Radio Centre at Bletchley Park. He explained what the centre was, how it worked and how, as the NRC Co-ordinator, he was trying to integrate the centre into the wider Bletchley Park experience. The volunteer team had enabled twenty-six thousand visitors to see the NRC last year.

A brief record of the 2018 AGM including an audio recording of the sessions is available on the RSGB website, via tinyurl.com/rsgb-agm-2018

RSGB Board changes

We are delighted to announce that Ian Shepherd, G4EVK (below) has been appointed as the new RSGB Board Chair. He takes over the role from Graham Murchie, G4FSG who served as Board Chair for four years.


Ian Shepherd, G4EVK, Chair

As they leave the Board, we'd like to thank Graham Murchie, G4FSG, Steve Hartley, GOFUW and Alan Messenger, GOTLK for the time and commitment they have given as Board Directors over a number of years.

You can see the full list of Board Directors on the RSGB website.

TEC and the Youth Committee win an award at Maker Faire UK

Winning an award for one of the most fun stands reflected the success of the weekend when members of the RSGB's Training & Education Committee (TEC), supported by the Youth Committee, attended Maker Faire UK on 28 and 29 April in Newcastle.

Maker Faire is one of the largest hands-on exhibitions in the UK for those who enjoy experimenting with all forms of technology, making and crafting.

The RSGB volunteers promoted experimentation in various forms of wireless communication and technologies and offered a number of practical workshops throughout the weekend. They used the 'snail' Morse code key designed by RSGB NRC volunteer Trevor Hughes, which allowed visitors to build and take away their own Morse key and sounder in order to learn how to send/receive messages using Morse code. Visitors to the Faire were also able to build a simple version of the amazing World War 2 Engima machine to encypher and decypher secret messages, using a standard Pringles tin!

The event was a great success and an excellent example of outreach by two RSGB committees working together.

Data Privacy

The RSGB is committed to keeping your data safe. We've updated our Privacy Policy in line with the new General Data Protection Regulation (GDPR) which comes into effect on 25 May 2018. You can see the policy on our website at www.rsgb.org/privacy-policy We use email to provide some of the services and benefits of your membership. The changes in the law mean that we need to ask you to confirm again which of those emails you still wish to see. If you currently receive by email GB2RS, the Affiliated Club Newsletter or any membership offers such as book vouchers, please look out for the 'I still want to receive this' option at the top of the next mailing. Just one simple click will ensure you don't miss out on these services and benefits after 25 May.

RSGB response to Sunday Times article

Following a featured letter in the 'Problem of the week' section of the Sunday Times on 8 April 2018 that suggested that amateur radio aerials affected nearby Wi-Fi, the RSGB submitted a full response. We are delighted that not only did the paper print one of the points we made, it also included a valid comment by another radio amateur who also referenced the RSGB. We understand from the newspaper that to publish responses like this is unusual. You can read the short piece online via tinyurl.com/the-times-response

UK team for YOTA 2018

Congratulations to the young radio amateurs chosen to represent the UK at YOTA 2018 in South Africa this summer. Peter Barnes, M0SWN will be the UK team leader, whilst the UK team will be Benjamin Chalmers, M0NBA, Nathan Prentice, 2I0NTP and Mike Jones, 2E0MLJ. On their return they will be helping to arrange events to encourage more young people to get involved in amateur radio.

New RSGB President

The Society received one nomination for President and so is pleased to announce that Dave Wilson, M0OBW (left) has been duly elected as RSGB President until the 2020 AGM. The Society would like to place on record its thanks to Nick Henwood, G3RWF for the excellent work he has done during his term as President. Dave's term of office starts on 12 May 2018.

RSGB Club of the Year 2017 Regional results

The winners of the Regional stage of the RSGB Club of the Year competition were announced at the RSGB AGM in April. The table to the right shows the winners in the two categories, Small Club and Large Club.

The National competition winners will be decided by the RSGB Board. The top three Small and Large clubs will be invited to attend the presentation ceremony at the National Hamfest, Newark, in September, when the National results will be announced and prizes awarded.

The RSGB would like to thank Waters & Stanton for their continued support of the competition.

Small Clubs (fewer than 25 members)

Region 4	Hartlepool ARC
Region 7	Carmarthen ARS
Region 8	Greenisland Electronics ARS
Region 10	Chertsey Radio Club
Region 11	South Bristol ARC
Region 13	South Kesteven ARS

Large clubs (25 or more members)

Region 1	Cockenzie and Port Seton ARS
Region 3	Stockport Radio Society
Region 4	Durham and DARS
Region 5	Wythall Radio Club
Region 8	Mid-Ulster ARC
Region 9	Reading and District ARC
Region 10	Hilderstone AR&EC
Region 11	Poldhu ARC
Region 12	Essex Ham
Region 13	Spalding ARS

Insurance renewals

Repeater and Beacon Member insurance has now been renewed for the year 30 April to 29 April 2019. The premium for this year remains at £10 and you may renew on the RSGB shop. Please allow a couple of days after renewal for your certificate to be despatched. Club insurance has also been renewed for the year 30 April 2018 to 29 April 2019. Please log in to the Membership portal to obtain a copy of your certificate.

New equipment donated to the NRC

As part of an ongoing upgrade of facilities at the National Radio Centre (NRC) the RSGB is delighted to announce that Martin Lynch & Sons (ML&S) and Yaesu have both donated new equipment that will soon be installed. ML&S have generously donated an LDG RT-600 remote antenna tuner and an Alpha Delta HF DX-LB-PLUS dipole antenna. This will now let the NRC operate on 160m through to 10m and will be used in conjunction with the existing Yaesu FTDX5000MP to demonstrate digital mode operations. Yaesu have kindly donated a G5500 elevation/azimuth rotator to enhance the satellite tracking demonstrations. The RSGB would like to thank both ML&S and Yaesu for their support. A key objective of the NRC is to demonstrate amateur radio to its visitors – some 26,000 in 2017 alone – which this new equipment will enhance. RSGB members can get free entry to Bletchley Park and the NRC by downloading the voucher from www.rsgb.org/bletchley-park-voucher

Martyn Baker (left) recieves the LDG ATU and antenna donated by Martin Lynch (right).

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YAESU

National Radio Centre listens in to ISS contact with the Kings High School for Girls

On 19 April, student Eleanor Griffin led the live question and answer session between King's High School and Warwick Preparatory School (GB4KHS) and astronaut Ricky Arnold, KE5DAU on the International Space Station (NA1SS).

RSGB Board Directors Ian Shepherd, G4EVK and Philip Willis, M0PHI represented the RSGB at the school. Volunteers at the National Radio Centre welcomed about 20 visitors to watch and listen to the ISS contact. They had a live internet video stream from the school up on a big screen for everyone to watch and they listened to the International Space Station direct on the NRC's TS-2000, plus there was a live video stream direct from the ISS itself coutesy of the N2YO website.


It was a very exciting day for everyone at the school and for those who listened in at the NRC (pictured)!

Congratulations

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

70 Years
Mr N L H Williams, G3BYG
Wirral ARS, G3NWR

60 Years
Mr G R Watts, G0EVW
Mr R J Oram, G0FXI
Mr R T Bowden, G3IXZ
Mr J Cleeve, G3JVC
Mr J E Symes, G3LNN
Mr M Scott, G3LYP
Mr J S E Pearce, G3MEC
Mr E J Landon, G3MHT
Rev J L Marshall, G3RKH

50 Years
Mr I E Davies, G3IZD
Mr J R Linford, G3WGV
Mr S Elliston, G3XKR
Mr D G Wills, G3XKX
Mr R W Moore, G3YUX
Mr F P Donovan, G4ALD
Mr R L Thake, G4HPI
D B McLachlan, G4KOW
Mr P C Johnson, G8BFC
Mr I J Gall, GM8BNH
Mr P G Howson, GM8GAX
Mr G F Drinkwater, GM8JME
Mr J R Dore, GW3XPK

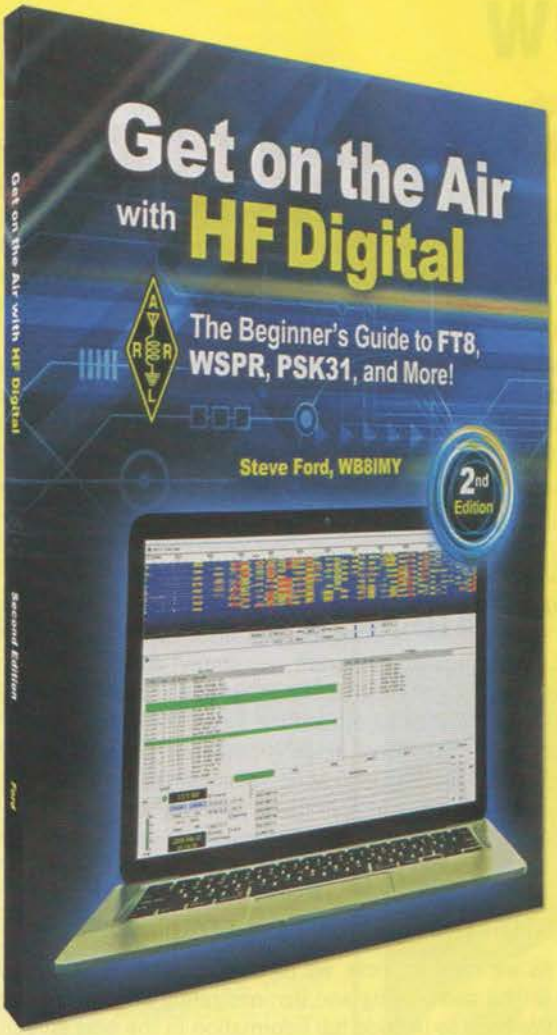
Continued on page 10

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 F Hennigan, 2E0FMK
Mr J Forbes, 2E0FTC
Mr S R Pennell, 2E0HUF
Mr P Fletcher, 2E0KUR
Mr D Cull, 2E0OBK
Mr S Helm, 2E0SHK
Mr S Orchard, 2E0SOR
Mr A Brown, 2E0VPX
Mr M Beyoglu, 2E0ZUT
Mr A Peter, AC8GY
Mr D Brown, AJ4EY
Mr M Pfeiffer, DL1MP
Mr G A Hughes, G0MYD
Mr A Brookes, G1ZPO
Mr T Forbes, G2BFC
Mr D Wright, G3VBQ
Mr J New, G4BSX
Mr M Pickard, G6MQH
Mr J Howarth, G7NOQ
Mr A Graver, G8SEY
Mr D Smith, GM6ZFI
Mr R Raawe, K6WY
Mr J May, KB2WDM
Mr F Knoll, KB3UJI
Mr D Robinson, KB7GP
Mr W Mills, KC4AA
Mr S Pastor, KC8KBK
Mr W Williams, KJ4IT
Mr C Weight, M0KPU
Mr M Cook, M0PVM
Ms S Ebbans, M1CVJ
Mr G R Pound, M1GRP
Mr D Cox, M3MYM
Mr G Machin, M3ZGM
Mr T Ng, M6ILC
Mr G Rodriguez, M6JUW
Mr J Ablett, M6LHL
Mr C Dyson, M6LZS
Mr S Finlayson, M6MFS
Mr P Smale, M6NII
Mr A Volkov, M6NIZ
Mr N Selman, M6NTX
Mr B Williams, M6NXV
Mr J Woodcock, M6NYT
Mr A Jackson, M6NZS
Miss L Kaszewska, M6OZP
Mr M Bridge-Wilkinson, M6VWM
Mr W McRoberts, M6WMQ
Mr L Grespan, M6XFF
Mr C Williams, M6YRT
Mr T Kell, M6YTK
Mr G Harmath, M6YUG
Mr R Harris, M6YXS
Mr T Washbourne, MI3BCR
East Kilbride ARS, MM0YEK
Mr W Demczur, MM6HEZ
Mr L Lewis, MW6IFE
Mr P Herborn, RS315164
Mr E Spurrier, RS315441
Mr J Moore, RS316177
Mr D Walker, RS316545
Mr C Burson, RS316825
Mr G Radley, RS316829
Mr C Hudson, RS316847
Mr C Taylor, RS316862
Dr A Kretinin, RS316869
Mr B Henley, RS316874
Mrs J Henley, RS316875
Mr R McVey, RS316888
Mr J Henley, RS316900
Mr H Bond, RS316914
Mrs W Y Henley, RS316922
Miss A Henley, RS316923
Mr R Jones, RS316933
Mr A de Mora, RS316984
Mr S Durtnal, RS316992
Mrs S Durtnal, RS316995
B Durtnal, RS316996
Mr K N Deem, RS317036
Mr A Shaw, RS317079
Dr J Saunders, RS317162
Mr C Murphy, RS317163
Mr P Rutkowski, SP4OIA
Mr L Demko, W3LPR
Mr R Dockery, W4CTM
Mr R Tyler, WQ8Q
Mr A Barron, ZL3DW

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

Mr M D Eade, 2E0ESU
Mr N Evetts, 2E0LUN
Mr K O'Hara, 2E0MPO
Mr J McGennis, EI2EBB
Mr R K Titmuss, G0AWY
Mr S T Hargraves, G0CIQ
Mr J O'Dowd, G0HUH
Mr P Warman, G0ODP
Mr J Garrett, G1PJR
Mr M Lockwood, G1XCC
Mr P M Holker, G3OIP
Mr G Clamp, G3YTX
Mr R C Ferryman, G4BBH
Mr R Taylor, G4CGU
Mr M Foreman, G4HBT
Mr T Friesner, G4WVQ
Mr L W Featherstone, G6UBM
Mr M R Steadman, G7JUN
Mr K J Turnbull, G7NQS
Mr R Erdinc, G7POQ
Mr R Nelson, G7TMR
Mr C T Garcia, G8DWW
Mr L G S Challis, G8SKG
Mr E Chambers, GM8XGI
Mr D Workman, GW0OHJ
Mr K Cooke, GW6MHV
Mr J Goodson, GW6VET
Mr N J Holms, GW8EHO
Mr L Finch, GW8PSJ
Mr J Clarey, M0CGR
Mr A Tapster, M0MME
Mr C G Gibson, M0PSK
Mr M Turton, M0VMT
Mr K Baker, M3ZHX
Mr N E Robinson, M6AZX
Mr J Hawbrook, M6FHE
Mr S Young, MM0SRY
Mr S Crowther, MM6HFC
Mr C Kenton, MW0JNI
Mr L Farrar, MW0XLF



NEW TITLE

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

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

radcom@rsgb.org.uk

New Products

AOR sets new standard for handheld receivers

The new AR-DV10 digital scanner from AOR is a direct development of the earlier AR-DV. It majors on digital modes as well as the conventional analogue modes (SSB, AM, CW, FM and wide FM). Its many digital modes include D-Star, C4FM, DMR, dPMR and Alinco's EJ47U – and it can auto-detect digital modes. The radio has a clear display, has a microSD card slot and uses a powerful SDR engine. Waters & Stanton are expecting to receive the first deliveries at the end of May. www.hamradiostore.co.uk

New Total Mast Solutions range to be unveiled at Friedrichshafen

An exciting new range of portable and static winch up steel masts will be unveiled at the Ham Radio Friedrichshafen in June by Total Mast Solutions. Based on feedback from customers, the new range of steel winch-up masts are very strong, constructed from box section and have significantly increased head load capacities. Unlike pneumatic masts there are no seals to worry about, and no worries about water freezing on or around the tubes. Ranging from 5m to 12m, the new masts are compatible with Total Mast Solutions' existing range of mounting options. Deployment is claimed to take just 2-3 minutes. As usual Total Mast Solutions will be offering significant discounts to amateur radio users so please remember to give them your callsign when contacting their sales office on 01509 416 972 (or by email to sales@totalmastsolutions.com. www.totalmastsolutions.com

STOP PRESS: New from SDRplay...

As we went to press, we received news that UK-based maker of SDR receivers, SDRplay Ltd, will be announcing and demonstrating a major new product at the Dayton Hamvention®. We hope to include full information in the next edition. www.sdrplay.com

RSGB Matters continued from page 8

Update on the G6XX project

Members may recall that G6XX was reissued to the RSGB in July 2017 after more than 90 years. It is a club callsign held by the RSGB Contest Club and is being activated in RSGB and International Contests to represent the RSGB.

G6XX is being aired and is promoting RSGB contests as we had hoped. In the first nine months, G6XX was operated by some 20 RSGB Members and had over 15,000 QSOs, most of which have been in HF contests or special events. The QRZ.com page for G6XX, which advertises RSGB HF contests and includes some history of the callsign, has had over 13,000 hits. If you have had a QSO with G6XX and would like a QSL card, please follow the instructions on QRZ.com.

In the 2018 RSGB 3.5MHz Club Championship Contests and also the 2018 RSGB 3.5MHz Autumn Series, G6XX (or one of its regional variants) is being used in each event as an RSGB HQ station; QSOs with the station score the equivalent of *five* other QSOs. The HQ station has been introduced to these contests to add interest for all entrants, with some pile-up experience combined with the incentive to search for the station to maximise the score. David, G3YYD, who was operating G6XX in the April 80m CC CW contest said "a G6XX QSO is worth 5 QSOs to you and does not give any points to one of your competitors".

In the RSGB Commonwealth Contest in March 2018, for the first time we had RSGB HQ stations representing all seven UK & Crown Dependency prefixes. The stations used G6XX and its regional variants GD6XX, GI6XX, GJ6XX, GM6XX, GU6XX, and GW6XX, with a total of 2,717 QSOs between them. There's a full report on this contest next month.

We welcome proposals from RSGB members for use of the callsign, particularly in multi-operator stations or in the context of training newcomers to amateur radio contesting. Please contact RSGB HF Contest Committee Chair, Nick Totterdell, G4FAL, by email to HFCC.Chair@rsgbcc.org

QSL Matters

Some ask if the number of QSL cards is going down. We still handle a million cards a year, seeing some reduction in callsign diversity but larger computer-generated batches from individuals and groups. Incoming consignments from active bureaux seem less frequent but larger, which may be related to rising shipping costs. We'll continue to monitor things.

In March we mentioned that we recycle stamps for charity. Thanks to everyone who now includes received foreign stamps with their outgoing cards – and particular thanks to Lew, N6QKP who sent around 900 foreign & UK stamps he'd collected over some 20 years. All will be put to good use.

Reminder: we've new volunteers covering the M0A-F and MW-2W sub groups. By press time we hadn't managed to transfer collection envelopes for M0B, MW and 2W; please will all affected Members provide new, 2nd Class stamped, C5 size envelopes bearing their callsign and membership number, printed top left front, to cover until we are unable to resolve the matter.

Finally, if you're planning to send a big package to PO Box 5 we'd ask you to hold off until after 3 June because of an interruption due to Dayton.

Beginners' SDR workshop just before RSGB Convention

On Friday 12 October, the day before the RSGB Convention at Kent's Hill Conference Centre there will be a beginners' workshop on SDR programming using the Gnu Radio companion. The event is supported by the RSGB legacy fund and hosted by the UK Microwave Group.

The course is programming-oriented, aimed at people wanting to create their own SDR applications. It will be based around the widely-used free graphical software development toolkit Gnu Radio, which provides signal processing blocks to implement SDR and signal processing systems.

The course will be led by Carnegie Mellon University graduate Derek Kozel, MW0LNA, a software design engineer at Ettus research, plus Heather Lomond MIET, M0HMO, an embedded software engineer specialising in Linux, audio and memory systems for mobile phones.

There are a maximum of 20 places. Potential delegates will be asked about their interest in amateur radio and what they plan to do with the knowledge they gain. Delegates will be required to bring their own laptop, which must meet a minimum spec. The course fee of £60 includes an RTL dongle-type SDR receiver, all necessary software on memory stick, lunch and refreshments.

This course is hoped to act as a pilot for future similar courses to be run by the RSGB. For further information see rsgb.org/sdr-workshop or to discuss the course and/or apply for a place, contact john@bravoao.co.uk

Special Event news

Lough Erne Amateur Radio Club will be running GB2MAC on the weekend of 9-10 June. Active on 160m to 6m, they will also monitor GB3CP for any visitors needing talk-in. QSL via the bureau and LOTW; for more info contact the club secretary Gi4VHO via QRZ.com

The Garden City Amateur Radio Club, www.GCARC.net will sponsor the Boy Scouts of America K2BSA/8 special event station from 24-29 June. Frequencies in use will be 3.840, 7.270 and 14.330MHz as time allows. This unique camp allows an opportunity for older Scouts to earn various merit badges at camp toward their Eagle Scout award. QSL: AC8FJ, 7371 N Farmington Rd, Westland, MI 48185-6900, USA.

GB1SCW will be operating on 24 June from the National Coast Watch Lookout on Shoreham Beach, BN43 5HY, marking the work of costal watch communities. Activity will be centred on HF and VHF.

Torbay Amateur Radio Society will run GB6GEO on 9-10 June from Kent's Cavern, Torquay for Geopark Weekend. Various awards are available, see QRZ.com. Other Geopark stations will include DK6GEO from the Harz Mountains (Unicorn Cave), Germany; GB2MAC from Marble Arch Caves, N Ireland; EI2GEO (Copper Coast), Rep of Ireland; J48GEO from Lesvos Is, N Aegean Is, Greece and YP2GEO from Tara Hateului, Romania. Main frequencies in use will be 3.680, 7.080, 14.180, 21.180, 28.380 and 50.180MHz.

FIFA World Cup Marathon

The FIFA World Cup Marathon is being organised by the Russian national radio society and at least three of the UK's nations will be participating: England, Wales and Scotland. Over 20 FIFA nations will have special event stations active between 1 June and 15 July. Following discussions with Ofcom the RSGB offered Clubs and Groups the opportunity to host special call signs.

The special call sign for England, who qualified for the world cup finals in Russia, is GB18FWC. It will be on the air for a total of six days during the finals. On 4 and 20 June plus 12 July it will be hosted by the team at the RSGB National Radio Centre. On 13-15 July it will be hosted by HF Contest Committee Chair Nick, G4FAL.

The special call of the home nations that did not qualify for the finals is MB18FIFA; a super special one-off use of the MB prefix, thanks to the Licensing team at Ofcom. That call will be hosted on 12 June & 12 July by Aberystwyth Radio Club, then on 10, 13 and 14 July by the Dundee Radio Club.

The Russian publicity also shows GB18FIFA will be on air from Scotland from 30 June to 15 July and the same call may also be active from Northern Ireland from 1 to 28 June. However, GB18FIFA was not organised by RSGB and we don't have any further details.

All those activating the special calls will receive a certificate from the Russian organisers and we understand there will be a diploma for working the special stations from around the world. For further information see www.rsgb.org/fwc

Chris Lorek, G4HCL, SK

Chris Lorek, G4HCL died suddenly on 28 April after being taken ill whilst on holiday in Goa, India. He was 61 years old. He worked as chief engineer on radio communications systems and equipment, but will be known mostly to RSGB Members as a prolific author. He wrote many equipment reviews in *RadCom* and *Ham Radio Today* magazines. He was Technical Editor of the latter for seven years. In addition to having hundreds of articles published, he wrote several books, including the *PMR Conversion Handbook* for the RSGB. He also co-edited the 7th and 8th editions of the *Radio Communication Handbook*. Our thoughts are with his family at this difficult time.

TX Factor 21 released

The latest episode of TX Factor is now available, featuring an in depth look at the Icom 7610. The TX Factor team figured that the best people to explain all the bells and whistles of this innovative transceiver would be the people that make it, so Bob McCreadie, G0FGX, goes to Icom UK to get the lowdown.

Mike Marsh, G6IAR was keen to follow up his experience of FM satellite working, so Bob invited Mike to visit him in his shack in Cornwall and have a go at working the linear transponder satellites. Bob also gets started on DMR with a handheld DMR radio and an RF Shark openspot connected to the internet. He asks, "is this real amateur radio?" Find out what he thought and decide for yourself by watching Episode 21 of TX Factor, now available at www.txfactor.co.uk along with all of the previous feature packed episodes. TX Factor is sponsored by Martin Lynch & Sons and the Radio Society of Great Britain.

Chelsea Pensioners granted GB4CP

The Royal Hospital, Chelsea, home of the Chelsea Pensioners, has been granted the permanent special event callsign GB4CP. Great Britain 4 Chelsea Pensioners went live on 2 May. The Chelsea Pensioners will be on the air as often as possible, as soon as some initial shack and aerial issues have been ironed out, and a special QSL card is being developed. To find out more about the Chelsea Pensioners, all of whom are British Army veterans, visit www.chelsea-pensioners.co.uk

Nick Henwood, G3WRF chats with a Chelsea Pensioner at the 2017 Hamfest.

First use of GR9 prefix for Royal Wedding

Ofcom granted Cray Valley Radio Society the special special callsign GR9RW to mark the wedding of Prince Harry to Ms Meghan Markle. This is believed to be the first time that the GR9 series has been officially activated in the UK. The call will be active from 19-23 May. Unfortunately this news came in too late for the May edition of *RadCom*.

This commemorative amateur radio station will be operated by members of the Cray Valley Radio Society from their shack in Eltham, south-east London. GR9RW will have two HF stations and one VHF/UHF station active on all bands from 80m to 70cm, primarily SSB and CW, plus FM on VHF and UHF. A very special QSL card will be sent on request. More details are at www.cvrs.org.

UK radio amateurs wishing to celebrate the royal wedding can apply for a Notice of Variation to do so. The RSGB has agreed with Ofcom an NoV to authorise the temporary use of the Regional Secondary Locator R after the United Kingdom callsign prefix. So M1ACB could use MR1ACB, 2E1GKR could use 2R1GKR and GW1MFG could use GR1MFG – note that the celebratory letter R replaces the usual Regional Secondary Locator. Exact details are given in the NoV documentation. You must apply for the Notice of Variation before using the R, and it is only valid from 19 - 21 May 2018. To apply for the Royal Wedding Regional Secondary Locator Notice of Variation, visit http://rsgb.org/rwrsl – the NoV is free and open to all UK licensees, regardless of whether they have Foundation. Intermediate or Full.

GB1NHS launched at National Radio Centre

RSGB Board Chair Ian Shepherd, G4EVK using GB1NHS at the NRC.

The RSGB's National Radio Centre opened its doors to the NHS on Tuesday 8 May for the launch of GB1NHS, an NHS special event station. GB1NHS is part of an NHS initiative to help promote 'end PJ paralysis', which is a nationwide campaign. Hosting the launch was a great opportunity for the RSGB to showcase amateur radio to a new audience as part of a high-profile national NHS initiative. Organised by Paul Devlin, G1SMP of NHS Care Improvement, GB1NHS will, Paul hopes, be on the air at a number of locations throughout 2018 running in conjunction with local amateur radio clubs and Hospitals on the Air. The NRC facilities provided an ideal launch for the initiative and QSOs were made on 40m, 20m plus 2m FM / SSB. Senior staff from the Care Improvement team attended, including NHS Director for Care Improvement Russell Emeny, NHS Health Policy Analyst Roy Lilley and #endPJparalysis co-creator Pete Gordon. Each was able to pass greetings messages helping to promote the initiative. Amateur radio is seen as a key part of the NHS initiative as it is an ideal hobby to enable communication and social inclusion, as well as developing friendships both locally and internationally. Assisting the NHS team with operating GB1NHS were RSGB Board Chair Ian Shepherd, G4EVK and a number of the regular NRC volunteers, who worked together to make it a hugely successful day. The launch event was covered in amateur radio news across the world. If your club would like to help the NHS by hosting GB1NHS, then please contact Paul Devlin via email to paul.devlin@nhs.net

News in Brief

IARU R3 QRP Day

17 June sees QRP Day in IARU Region 3 (that's the Asia-Pacific area, including Australia and New Zealand). All sorts of activities will be going on to promote low-power operations, ranging from Field Days and contests, QRP workshops and even distribution of QRP kits. Keep an ear open and see who you can work!

Latest *5MHz Newsletter*

The latest edition of *The 5MHz Newsletter* is now available for free download from the RSGB 5MHz page, http://rsgb.org/main/operating/band-plans/hf/5mhz/

It contains news from no fewer than seven countries, details on the Luxembourg 5MHz beacon, LX0HF, a 60m low-pass filter and, sadly, SK tributes to 5MHz stalwarts G3LEQ and G8DQZ.

New VHF spectrum for EI operators

In a landmark step, Irish regulator Comreg has given the country's Radio Experimenters (amateurs) access to a large amount of VHF spectrum. More details are on page 71.

1920s Marconi recieve site for sale

A Member recently spotted that a former Marconi Shortwave Beam receiving site near Somerton is on the market. Originally paired with the Tx site at Dorchester, the 8.5 acre partly fenced plot retains little but derelict buildings, although casual inspection suggests it may still have potential to be a low noise location for HF. Particulars are available via https://tinyurl.com/RC-0601-Marconi

Kent Foundation course

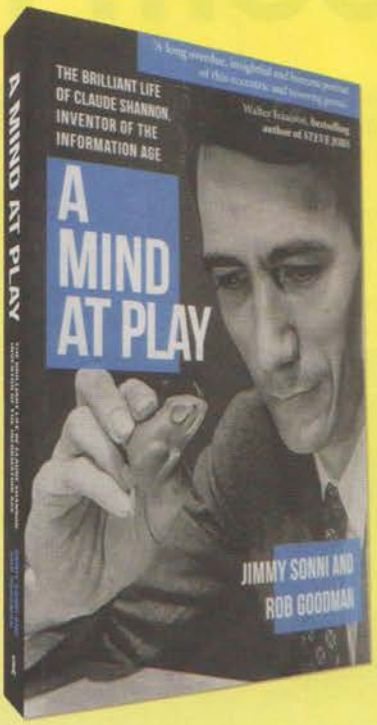
Darenth Valley RS will be holding a Foundation Course on the 9th and 16th June at the Crockehill Village Hall, Swanley, Kent. The cost of the course will be £55 including the exam fee. More details can be obtained by emailing training@darenthvalleyrs.org.

DX camp how-to talk

Joachim von Geisau, DH4JG/MOJVG will give a lecture at Friedrichshafen in English on how to organise and run a listener camp for SWL, BCL and amateurs on Saturday 2 June at 1500 in Hall 2 room A2.

Essex CW Bootcamp 2018

Following last October's very successful CW bootcamp organised by Essex CW ARC, the club is contemplating another on Sat 27 October 2018. Spaces will be limited and applications will be dealt on a first come, first served basis. To express interest, or find out more about the day, contact chief instructor Andy, G0IBN, via email to info@essexcw.org.uk



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
Non Members' Price: £16.99
RSGB Members' Price: £11.99 (£5.00 OFF)

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

Icom IC-7610

HF and 50MHz transceiver

PHOTO 1: IC-7610 front view.

The IC-7610 is the latest HF+ radio from Icom. For nearly 10 years, the IC-7600 has been Icom's main high performance workhorse for the serious HF enthusiast and has proved very popular. The new radio is intended to be its successor, similar in size but adopting full stand-alone direct-digital sampling SDR technology as used in the revolutionary IC-7300.

The IC-7610 (**Photo 1**) incorporates dual independent receivers, a high-resolution real-time spectrum scope, multicolour touch screen display and an unprecedented level of built-in features and functions.

Basic functions

The IC-7610 is a midi-sized radio measuring 340 x 118 x 277mm (w x h x d) and weighs about 8.5kg. The dual receivers (main and sub) incorporate independent signal paths with separate front-end filtering and hence no restrictions on setting frequencies and modes. Each receiver tunes from 30kHz to 60MHz and the transmitter is enabled in the amateur bands at a maximum of 100W output power. 60m transmit coverage extends continuously from 5.255MHz to 5.405MHz and includes all operating modes. There is no specific button to select 60m so setting some frequencies to memory is the easiest way to access this band. Limiting transmission to the various 60m sub-bands can be accomplished by setting appropriate band-edge beeps as these can also limit transmit coverage. 136kHz transmit operation is also provided via the transverter function at a level of about –20dBm, another candidate best to select via the memory.

SSB, CW, RTTY, PSK, AM and FM modes are provided with reverse sidebands selectable on SSB, CW, RTTY and PSK, and with AFSK data on SSB, FM and AM.

The radio requires the usual nominal 13.8V supply and draws a maximum of 23A.

The manual is split into two parts. The basic manual runs to 80 pages and is provided as a paper copy and also as a PDF file on CD in several languages. The CD also contains the advanced manual (98 pages) and a full set of circuit diagrams, but splitting the manual I found somewhat inconvenient. The radio is provided with a standard hand electret microphone, the HM-219, but other microphones are, of course, also suitable. The DC bias voltage is switchable.

Radio design and architecture

Direct digital sampling is used for both the receive and transmit signal paths. Incoming receive signals pass through a diode-switched bandpass filter unit where one of 13 narrow-band filters is selected to cover the tuning range of the receiver. A sharply tuned DIGI-SEL tracking preselector can also be enabled to further reduce unwanted off-channel signals. A low-gain (12dB) or a high-gain (20dB) preamplifier may be selected and / or an input attenuator (3 – 45dB) to allow the receiver to accommodate differing signal levels. An AGC controlled PIN attenuator is also included in the signal path. The RF signal is then sampled by the 16-bit A/D converter and passed in parallel digital format to the FPGA, a fast field-programmable gate array. This extracts a slice of input signal at an IF of 12kHz by a process of down-conversion decimation. The FPGA provides all further filtering and processing functions and delivers the audio output through a D/A converter to the audio stages. The front-end filters and A/D converter are all duplicated for the second receiver path as are the audio outputs. A separate down-conversion process in the FPGA simultaneously produces the 1MHz wide spectrum scope signal path. Direct sampling tends to produce low-level distortion products, which can be noticeable under certain situations, particularly on quiet bands. Dithering in the A/D converter can reduce or eliminate this and is enabled by the IP+ function.

On transmit the process operates in reverse. The transmit audio signal is sampled by the A/D audio codec, filtered, processed and up-converted in the FPGA to the desired output frequency where it is converted to analogue format by a 14-bit D/A converter. The usual amplifier chain follows to the PA

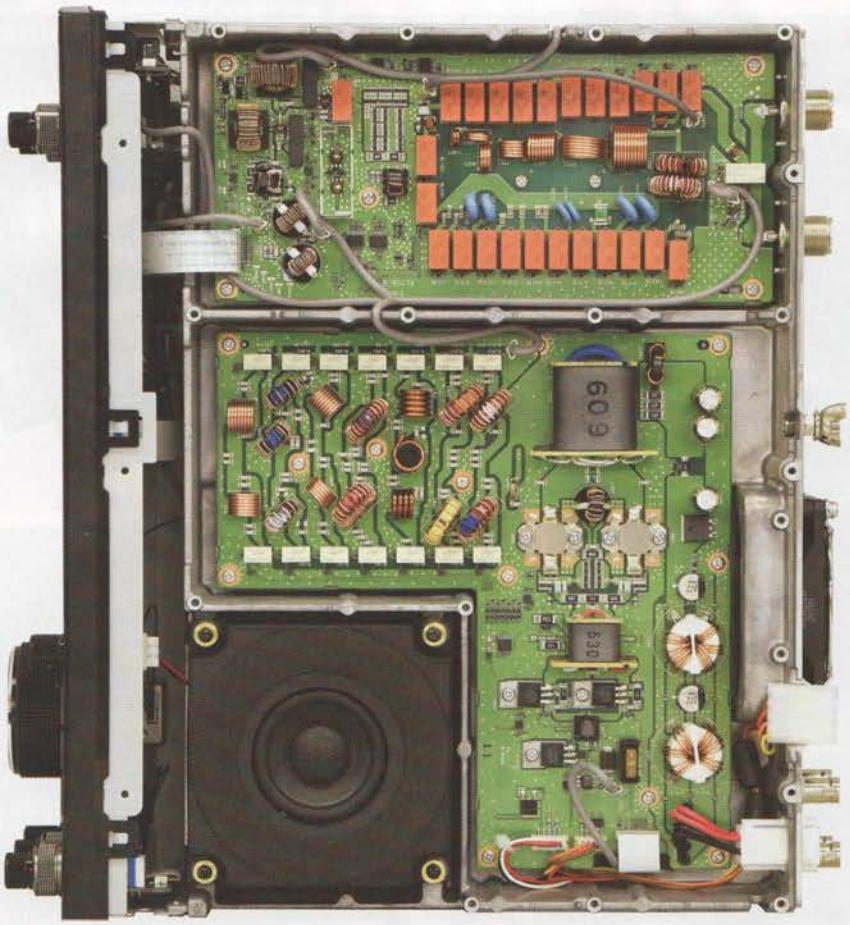


PHOTO 2: Under the top cover showing the transmitter PA, filters and ATU.

and the relay switched low-pass output filters. A high stability TCXO reference oscillator is built-in, which achieves 0.5ppm stability.

Removing the covers reveals a well-constructed, clean layout with circuit boards mounted on the usual compartmentalised sturdy die-cast frame and an integral heatsink blown by a fan on the rear panel. The transmitter power amplifier stages together with filters, and the ATU are mounted on the top side (**Photo 2**). The bottom side (**Photo 3**) houses the main signal processing board and the two DIGI-SEL units (**Photo 4**). Improved sound quality has been addressed by mounting the upward-facing 6cm speaker in its own acoustic compartment in the die-cast chassis with rubber mountings. Although this is just a single speaker for the two receivers, separate speaker outputs are available on the rear panel and separate channels on stereo headphones.

Front panel

The front panel layout of the key controls is in some ways similar to the IC-7600 although many functions are now accessed via the touch screen, in a similar fashion to the IC-7300. The multicolour LCD display measures 7 inches diagonally, larger than the IC-7600 and has a higher resolution of 800 x 480 pixels. It is particularly clear and bright, retaining readability well under bright lighting. Band, mode, filter selection, meter selection and VFO / memory functions are all selected by touching the appropriate areas on the display which brings up a grid of selectable options. In addition the usual grid of hardware buttons allows for band selection with three stacking registers for each band.

Hardware buttons along the bottom of the display gain fast access to functions such as the display menu (**Photo 5**), memo-pad and voice memory. Dedicated buttons on the front panel also provide a fast alternative way to set the various receive, VFO and memory functions. Clicking the MULTI rotary control sets adjustable functions such as transmit power level and microphone gain.

The display shows a large number and complete set of status indicators and function values. Both receive frequencies are shown continuously with dual meters for signal strength and various selectable transmit functions. The meters can be in either analogue needle display or in bargraph formats. Simultaneous metering of multiple transmit functions can also be selected (**Photo 6**). A very comprehensive Set mode allows tailoring of an enormous number of functions. These are all accessed via the touch screen display with nested menu items and many are set using MULTI or the rotary tuning knob. A keyboard is displayed on the touch screen when alphanumeric data needs to be entered (**Photo 7**). This can be in either a full QWERTY or a 10-key format and makes data entry very straightforward.

Tuning is very smooth and easy using the 50mm diameter rotary control. Tuning is in 10Hz or 1Hz steps at 5kHz or 500Hz per knob revolution with auto speed-up on fast tuning. A quarter rate is also selectable on CW and data modes. A higher rate for faster navigation is also selectable with a variety of mode dependant step sizes. AF gain combined with RF squelch and Twin PBT (passband tuning) are given separate rotary controls on the front panel and there is the usual 8-pin DIN microphone connector and a standard headphone jack.

Two USB-A connectors allow a keyboard and a mouse to be connected, or accessories such as the RC-28 remote encoder. An SD memory card slot is also provided for storing various items such as received and transmitted audio files, voice memory stores, RTTY and PSK decode logs, memory contents and setup data. Screen images can also be captured. Most of these items can also be stored to a USB flash drive and either may be used for transferring firmware updates from a PC to the radio. SD or SDHC cards up to 32GB can be used.

Rear panel

The rear panel (**Photo 8**) contains two SO-239 antenna sockets and two BNC sockets to connect a separate receive antenna or antenna feed to an external receiver. A separate in-line filter may also be inserted in the receive path and the antenna connections are fully configurable per band (**Photo 9**). Another BNC socket provides transverter input / output or 136kHz drive and another allows the connection of an external 10MHz reference. Two DIN accessory sockets are used for various purposes, including control of linear amplifiers, audio input and output for data modes, transverter enabling and band data for external control such as for ATUs. A separate socket interfaces to the Icom AH-4 ATU and AH-740 antenna. Phono connectors provide alternative switching and ALC feedback for linear amplifiers. Two external speaker connections are provided for the two receivers. Two CW key jacks are used, one on the front panel primarily for the

Peter Hart, G3SJX
peterg3sjx@gmail.com

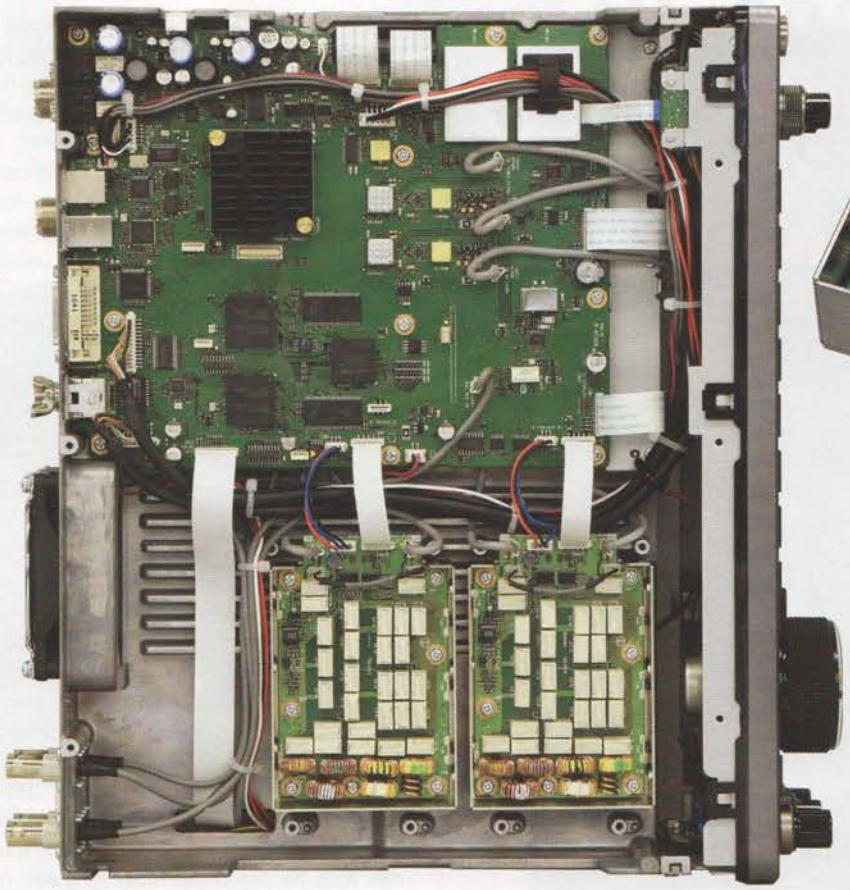


PHOTO 3: Under the bottom cover, showing the main processing board and DIGI-SEL units.

PHOTO 4: Close-up of a DIGI-SEL unit.

keying paddle used in conjunction with the internal keyer, and the second on the rear panel for straight keys or external keyers.

Two further USB-B connectors provide for PC remote control operations and digital data input and output. An Ethernet LAN connector allows the radio to be controlled through a PC network with suitable software such as the Icom RS-BA1. An external display may also be used via a DVI-D output and an external S-meter may also be connected. External keypads are useful particularly in contests for transmitting contents of message stores used on CW, RTTY, PSK and voice modes. Although Icom does not provide such an accessory, a 4-key keypad can be connected via the microphone socket or an 8-key keypad via a connector on the rear panel.

Receiver features

Both receivers are identical and all receiver functions such as filtering or noise rejection etc are duplicated and separately adjustable just by touching the left (main) or right (sub) receiver pane on the display. Incremental tuning (RIT, XIT) functions on both receive and transmit and auto-tuning is provided on AM and CW.

There are 99 regular memory channels and two scan edge channels. Memory access is very straightforward. Memory channels can be assigned names up to 10 characters in length and this is quick and easy with the on-screen keyboard. A separate quick access memo-pad stack for 5 or 10 stores is also included. A host of scanning functions is also provided.

Filtering functions are very comprehensive, as with all Icom radios. A touch-button on the display scrolls around three preset IF filter bandwidths with separate settings for each mode from a menu of over 40 different bandwidths. Both sharp and soft passband shapes are available. Twin PBT allows either side of the filter passband to be shifted independently, shifting or narrowing the overall shape to assist in combating adjacent channel interference. A manual notch filter operates at IF inside the AGC loop and hence prevents desensitisation with strong carriers. It has excellent depth with wide, medium or narrow width settings. A separate auto-tuning notch filter operating at audio removes multiple tones effectively but does not prevent strong carriers from desensitising the receiver.

A noise reduction system reduces background noise and improves readability in certain situations. A separate noise blanker eliminates pulse-type noise from car ignition and other sources. Both systems are adjustable. Three separate AGC time constants are selectable from a menu of 13 different values (0.1 to 6s) and are set separately for all modes except FM. The AGC can also be switched off.

The receiver audio response can be tailored independently for each mode. The high-pass and low-pass roll-offs can be adjusted separately and the bass and treble responses cut or enhanced: there's much to play with here. A particularly effective audio peak filter can be selected on CW with either a sharp or a soft response and with three different passband widths available: wide, mid or narrow (320Hz, 160Hz or 80Hz in the sharp position). On RTTY a sharp twin peak filter is also provided.

Transmit features

Transmit functions for SSB include the usual speech compressor, VOX and a transmission monitor. The audio transmit filter bandwidth may be set to wide, mid or narrow where the upper and lower bandwidth points are adjustable. In addition, the bass and treble responses can be cut or enhanced separately for each voice mode in a similar fashion to the receive audio.

On CW there is the usual provision for full and semi break-in with adjustable drop back delay. The keying envelope rise and fall times are adjustable between 2 and 8ms and an additional delay is selectable to accommodate slow switching linear amplifiers or other accessories. Different delays may be set for HF and 50MHz. An automatic antenna tuner is built in covering all bands including 50MHz. The tuner matches antennas up to a VSWR of 3:1 at full power or to a higher VSWR in an emergency mode when the power output is then limited to 50W. The tuner includes the usual memories to enable rapid retuning when the frequency changes.

A full CW message keyer is included operating over the speed range 6 – 48WPM with adjustable weighting and a variety of keying paddle arrangements. Eight memories will each store up to 70 characters with a provision to send automatically incrementing

PHOTO 5: The IC-7610 Menu display.

PHOTO 6: The multi-function meter displays the various transmit functions.

PHOTO 7: The touchscreen's QWERTY keyboard display makes data entry easy.

PHOTO 8: IC-7610 rear panel.

serial numbers and auto-repeat after a time delay. The message stores are programmed in text either via the touch screen keyboard display or an external keyboard plugged into the front-panel USB socket. They may be sent from the display buttons, or via the external keyboard, or via external homebrew keypads connected to either the microphone socket or the rear panel keypad socket; quite a choice.

FM mode operation includes CTCSS access and tone squelch, and repeater split frequency operation. Repeater offsets are stored separately for HF and 50MHz and are programmable over wide limits.

Data modes

For data mode operation using AFSK on the voice modes and an external PC or modem, the modulation input can be taken from the microphone socket, accessory socket or USB. There are three selectable modes and this eases operation when multiple sources are used. Appropriate receiver settings are also selected in these modes.

For stand-alone operation, a built-in receive decoder is provided for 45-baud RTTY and a separate decoder for PSK (**Photo 10**) operating in BPSK31, BPSK63 and QPSK modes. The decoder displays 47 characters per line and depending on whether a wide or narrow display window has been selected, either 11 or 6 lines in the receive area and 3 or 2 lines in the transmit buffer area. In expanded mode the upper part of the display is compressed. Different coloured text is used for received and transmitted messages, messages prior to transmission, time stamps etc.

An audio spectrum and waterfall display is provided for tuning purposes and there's a host of user setups and options, all easy to access. Messages can be transmitted from a keyboard if connected and there are eight message stores each holding up to 70 characters. These are accessed and stored in a similar fashion to the CW message stores. Receive and transmit messages can be time stamped and saved to an SD card.

Spectrum and scope displays

One of the key features that SDR brings to a radio is the high performance real-time spectrum scope display, working simultaneously with normal receiver operation. Two displays are provided: a spectrum of the signals for the band currently selected and an audio scope (**Photo 11**) showing the waveform and spectrum of the receiver or transmitter audio. Both spectrums can show an associated waterfall display. Various combinations of spectrum and audio display are possible in expanded or in mini-scope mode (Photo 9) used in conjunction with other displays such as the RTTY decoder. Spectrum displays for both receivers can be shown simultaneously but only one audio display. The displays have excellent resolution and sensitivity.

The spectrum display has two modes of operation. The centre mode will display the spectrum on either side of the on-tune frequency with spans selectable from ±2.5kHz to ±500kHz. The Fixed mode will display the spectrum between two fixed points, and three fixed edge bands can be set for each amateur band. In both modes there is a number of settings that select sweep speed, colours, VFO markers, peak hold, averaging, reference level etc. The displayed vertical range is 100dB.

One of the features of the spectrum display is touch screen tuning. When the spectrum area or the waterfall area is touched either with a finger or a stylus, the frequency span immediately adjacent to the touched area is zoomed. Then a second touch will precisely tune the radio to the wanted frequency. Zooming greatly improves the accuracy of tuning by this method. With a mouse connected tuning can also be accomplished by clicking on a signal. Sliding the mouse also tunes the radio but the mouse scroll wheel is not enabled.

Auxiliary features

The IC-7610 includes a digital voice recorder for transmitting messages such as CQ calls. These are only stored on the SD card which must be in place. Eight channels each with 90 seconds recording time are available and these can be tagged with labels up to 16 characters long for easy identification on the display screen. Messages can also be set to repeat after a time delay. Messages are sent from the display buttons or from an external keyboard or keypad in a similar fashion to the CW and RTTY stores.

As well as providing message stores on transmit, the voice recorder can also store the receive and transmit audio. Files are automatically named and placed in folders together with time and date, frequency, mode etc. The recording time is limited only by the amount of available memory on the SD card. Stored as .WAV files, the audio can be transferred to a PC or played back on the radio where the usual CD audio-style navigation buttons (fast forward, pause etc) are provided.

The receiver audio is constantly recorded even without the SD card. So if you miscopy

PHOTO 9: Antenna memory display and 'mini-scope' mode.

PHOTO 10: IC-7610 PSK decoder display.

PHOTO 11: The audio scope display.

some vital information, with no prior warning you can instantly replay the last few seconds of receiver audio at the touch of a button, many times if necessary. The record and playback times are settable with 15 seconds as default.

Transverter operation is provided with the transmit drive and receiver IF routed via a single BNC socket. The available drive is nominally –20dBm. The display can be offset to show the transverted frequency but not the digits above the 10s of MHz, eg 44MHz for 144MHz.

There's a host of other minor features including calendar, clocks and timers, screen capture, voice synthesiser for display readout and many more set-up tweaks for the various functions.

Measurements

The full set of measurements is given in the table overleaf. The receiver sensitivity is excellent and both preamplifiers are effective across the whole tuning range. The sensitivity reduces at LF, by about 20dB at 136kHz, or somewhat less with the preamps on. The sensitivity reduction with DIGI-SEL switched in was negligible. The S-meter is very linear and represents 3dB per S-unit. Readings with preamp 1 and preamp 2 are very similar. There were no spurious responses of any significance. The AGC attack time was clean with a slight hole but no overshoot and decay times are broadly according to the set values.

The strong signal performance is limited by ADC overload. With the preamplifier off, this occurs with single input signals at about –10dBm and this sets the blocking limit of the receiver. An overload indicator on the display (OVF) indicates when this point is reached. This limit applies to signals more than 6kHz away. With close-in signals the front-end AGC operates reducing input to the ADC. Where really strong signals are present turn down the RF gain control as this lowers the gain by applying AGC to the front-end PIN attenuator, or switch in the front-end attenuator. When multiple strong signals are present, it is the peak envelope voltage that determines the overload limit. With two signals, as used for intermodulation tests, this occurs at –16dBm per signal but can be much lower when more signals are involved.

The strong signal dynamic range of the IC-7610 gave similar measured figures to the IC-7300, which is surprising considering that the IC-7300 uses a 14-bit ADC and the IC-7610 reputedly uses a 16-bit device. As with most direct sampling receivers, low-level intermodulation products appear when input signals are around 40dB below the overload level and remain a few dB above the noise floor as input signals increase until the overload level is approached. Enabling IP+ removes these low-level products but degrades the receiver sensitivity by about 4dB. Discounting the low-level products, the intermodulation dynamic range with both IP+ off and IP+ on measured 98 to 100dB in 2.4kHz bandwidth, an excellent figure, and this holds at all signal spacings, even very close in. The IC-7600 measured a higher figure of 106dB at spacings greater than 30kHz but reduced to 87dB at 5kHz. Audio noise and distortion and in-band intermodulation products were very low, an excellent result.

The reciprocal mixing phase noise figures are extremely good, some 20 to 25dB better than the IC-7600 and a few dB better than the IC-7300. This allowed the IF filter skirts to be measured down to a level of about –80dB with relative ease and showed similar tight skirts to other recent Icom radios.

On transmit, the power output was well up to specification and reducible to near zero. CW rise and fall characteristics are slightly unusual with a linear rise and fall and quite a sharp transition. It is preferable to set the rise/fall time to the longer settings of 6 or 8ms to avoid the possibility of clicks. Character distortion was negligible on semi break-in but with slightly shortened characters on full break-in at the higher speeds. There was no first character shortening or overshoot at lower power levels with the ALC level set to below 50%. The default setting for drive power was somewhat on the high side, giving high ALC values and should ideally be reduced to a level as described in the manual. The adjustable delay for linear amplifier switching gives correct results but if using an amplifier, set this delay to an appropriate figure because the default setting is off.

SSB intermodulation products are reasonable for a 12V radio, but rather high on 50MHz. They are tolerant of audio overdrive, with an apparent VOGAD action. The compressor does not add significant distortion. On AM the carrier level was correctly set at all power levels and modulation was very clean.

The transmit noise output at full power is significantly better than most radios on the bands, which is a welcome improvement, but the IC-7300 was around 6dB better. The noise at lower power and low modulation levels was a little higher and this is fairly normal when ALC raises the gain of the amplifier stages.

The transverter output measured about –10dBm maximum at low distortion and with low spurii. There is a small amount of crosstalk between the antenna connectors and the transverter connection, measured as –48dB at 28MHz. So if there are ever again strong signals on 28MHz (wishful thinking!) it may be desirable to disconnect the HF antenna when operating with a transverter.

On the air performance

The IC-7610 is a real delight. Easy to use, the controls, the display and overall handling are close to ideal, a thoroughly positive experience. The touchscreen display is very responsive and undemanding even with large fingers and is crisp and clear. Tuning is easy to navigate and memories quick and easy to access. Touch tuning from the spectrum display worked well and the zoom feature generally ensured that the frequency was fairly accurately set.

The performance was excellent. Sensitivity was good and the lower frequency broadcast and timecode bands very clean. The strong signal performance was very good and no low-level intermodulation effects were observed. The channel filters, notches, noise blanker and noise reduction system all performed extremely well. The noise blanker in particular removed all traces of a nearby

electric fence and the noise reduction system was effective at lifting weak signals from noise. The audio quality and volume from the internal speaker was remarkably good, with no rattles; the quality on headphones of course was excellent.

Transmit operation was very well behaved. The fan operates only when the temperature rises and is very quiet. Audio quality reports were excellent with the supplied HM-219 microphone. CW break-in was exceptionally clean and transmit-receive switching totally quiet. Full break-in allowed listening between characters up to about 25WPM.

Dual receivers where the channels are kept separate to stereo headphones greatly eases split-frequency DX chasing and the IC-7610 is very easy to use in this mode. It is also possible to lock the receivers together on the same frequency and mode (tracking) and, with separate antennas on the receivers, make use of diversity reception to help in very marginal situations.

The spectrum scope, waterfall and audio screens were very effective with high resolution and no appreciable delay, a great improvement on the previous generation of radios. The RTTY and PSK decoders were also very effective and easy to use and allow stand-alone operation in data modes.

Conclusions

The IC-7610 is a most impressive radio with some great features and a superb performance. Adopting the latest in SDR technology, it is currently priced at around £3,500 and is an ideal radio for the serious HF enthusiast.

Acknowledgements

I would like to thank Icom (UK) Ltd for the loan of the radio.

ICOM IC-7610 MEASURED PERFORMANCE

RECEIVER MEASUREMENTS

	SENSITIVITY SSB 10dBs+n:n			INPUT FOR S9		
FREQUENCY	PREAMP OFF	PREAMP 1	PREAMP 2	PRE OFF	PREAMP1	PREAMP 2
1.8 MHz	0.28μV (-118dBm)	0.13μV (-125dBm)	0.1μV (-127dBm)	50μV	22μV	22μV
3.5 MHz	0.25μV (-119dBm)	0.11μV (-126dBm)	0.09μV (-128dBm)	50μV	22μV	22μV
7 MHz	0.22μV (-120dBm)	0.1μV (-127dBm)	0.09μV (-128dBm)	45μV	20μV	20μV
10 MHz	0.32μV (-117dBm)	0.11μV (-126dBm)	0.09μV (-128dBm)	56μV	22μV	22μV
14 MHz	0.28μV (-118dBm)	0.13μV (-125dBm)	0.1μV (-127dBm)	56μV	25μV	25μV
18 MHz	0.32μV (-117dBm)	0.13μV (-125dBm)	0.1μV (-127dBm)	56μV	25μV	25μV
21 MHz	0.32μV (-117dBm)	0.14μV (-124dBm)	0.11μV (-126dBm)	63μV	25μV	24μV
24 MHz	0.32μV (-117dBm)	0.13μV (-125dBm)	0.1μV (-127dBm)	63μV	28μV	28μV
28 MHz	0.32μV (-117dBm)	0.14μV (-124dBm)	0.1μV (-127dBm)	63μV	28μV	28μV
50 MHz	0.4μV (-115dBm)	0.16μV (-123dBm)	0.11μV (-126dBm)	80μV	32μV	32μV

AGC threshold Preamp1: 1.3μV
100dB above AGC threshold for <1dB audio output increase
AGC attack time: 3ms
AGC decay time: approx as specified
Max audio into 8 ohm: 1.9W at 1% distortion, 2.2W at 10% distortion
Max audio into 4 ohm: 3.2W at 1% distortion, 3.8W at 10% distortion
Inband intermodulation products: better than -60dB

S-READING	INPUT LEVEL USB		FILTER	IF BANDWIDTH SHARP				IF BANDWIDTH SOFT			
(7MHz)	PRE OFF	PREAMP 1		-6dB	-60dB	-70dB	-80dB	-6dB	-60dB	-70dB	-80dB
S1	3.2μV	1.5μV	10kHz FM	9.9kHz	13.7kHz	14.4kHz	15.3kHz	-	-	-	-
S3	6.3μV	2.7μV	6kHz AM	6.3kHz	9.9kHz	10.5kHz	11.0kHz	-	-	-	-
S5	11μV	5μV	2.4kHz USB	2522Hz	3452Hz	3657Hz	3918Hz	2319Hz	3450Hz	3670Hz	3917Hz
S7	22μV	10μV	500Hz CW	514Hz	664Hz	703Hz	759Hz	539Hz	771Hz	830Hz	914Hz
S9	45μV	20μV	100Hz CW	107Hz	191Hz	214Hz	264Hz	112Hz	229Hz	251Hz	284Hz
S9+20	450μV	200μV									
S9+40	4.5mV	2mV									
S9+60	70mV	25mV									

FREQUENCY OFFSET	RECIPROCAL MIXING DYNAMIC RANGE 500Hz BW 7MHz	RECIPROCAL MIXING DYNAMIC RANGE 500Hz BW 21MHz
1 kHz	114dB (-141dBC/Hz)	not measured
2 kHz	116dB (-143dBC/Hz)	109dB (-136dBC/Hz)
3 kHz	116dB (-143dBC/Hz)	113dB (-140dBC/Hz)
5 kHz	117dB (-144dBC/Hz)	119dB (-146dBC/Hz)
10 kHz	122dB (-149dBC/Hz)	122dB (-149dBC/Hz)
15 kHz	125dB (-152dBC/Hz)	overload limit
20 kHz	overload limit	overload limit

Transmitter AF distortion: much less than 1%
Microphone input sensitivity: 2mV for full output
FM deviation: 4kHz (wide), 2kHz (narrow)
SSB-data T/R switch speed: mute-TX 70ms, TX-mute 3ms, mute-RX 50ms, RX-mute 2ms

NOTE:
All signal input voltages given as PD across antenna terminal. Unless stated otherwise, all measurements made on USB with receiver preamp switched out, 2.4kHz bandwidth sharp filter selected.

TRANSMITTER MEASUREMENTS

FREQUENCY	CW POWER OUTPUT	HARMONICS	INTERMODULATION PRODUCTS 3rd order	INTERMODULATION PRODUCTS 5th order	FREQUENCY OFFSET	TRANSMIT NOISE 7MHz 100W CW O/P	TRANSMIT NOISE 7MHz 0W SSB O/P
1.8 MHz	109W	-68dB	-42dB	-35dB	1kHz	-71dBm/Hz (-121dBC/Hz)	-63dBm/Hz
3.5 MHz	110W	-66dB	-35dB	-34dB	2kHz	-74dBm/Hz (-124dBC/Hz)	-64dBm/Hz
7 MHz	105W	-66dB	-35dB	-33dB	3kHz	-74dBm/Hz (-124dBC/Hz)	-64dBm/Hz
10 MHz	105W	-70dB	-36dB	-33dB	5kHz	-77dBm/Hz (-127dBC/Hz)	-63dBm/Hz
14 MHz	105W	-62dB	-33dB	-33dB	10kHz	-79dBm/Hz (-129dBC/Hz)	-71dBm/Hz
18 MHz	105W	-70dB	-34dB	-33dB	20kHz	-79dBm/Hz (-129dBC/Hz)	-77dBm/Hz
21 MHz	104W	-68dB	-33dB	-33dB	50kHz	-84dBm/Hz (-134dBC/Hz)	-84dBm/Hz
24 MHz	104W	-60dB	-33dB	-33dB	100kHz	-91dBm/Hz (-141dBC/Hz)	-87dBm/Hz
28 MHz	103W	-65dB	-33dB	-32dB	150kHz	-90dBm/Hz (-140dBC/Hz)	-88dBm/Hz
50 MHz	108W	<-70dB	-26dB	-32dB			

Intermodulation product levels are quoted with respect to PEP.

Convention update

RSGB Convention, proudly sponsored by

RSGB 2018 Convention

K3LR's multi-multi station in operation.

Planning and preparation for the RSGB 2018 Convention at Kents Hill on 12 – 14 October is going well.

After dinner speaker

We are delighted that Tim Duffy, K3LR has agreed to be our Keynote and after-dinner speaker. As the summary below reveals, Tim is amongst the leaders, if not *the* leader, in the field of amateur radio contesting. He will be talking about his contest station but also, as he puts it, focusing on 'keeping ham radio fun and alive'.

Tim has been a very active contest operator for over 46 years. He has hosted over 130 different operators as part of the very well-known K3LR multi-multi DX contest efforts since 1992 – making over 700,000 QSOs. He served on the ARRL Contest Advisory Committee as a member and multi-year Chairman and has been an active member of the CQ Contest Committee for 28 years. Tim was moderator of the Dayton Contest Forum for ten years and of the Hamvention Antenna forum for 35 years. He is President of The Radio Club of America (RCA) and was elected to the CQ Contest Hall of Fame in 2006.

Tim Duffy Tim says: "The very best part of this hobby is the people you meet and the long-time close friendships that happen as a result of the common interest in amateur radio. It is no surprise that nearly all of my best friends are amateur radio operators. There is no question in my mind that this is the best hobby in the world! I am thrilled to be a part of more than 95 multi-multi team operations from the K3LR station in the last 25 years. These extensive competitions test the capabilities of the K3LR station and its operators to communicate effectively with other amateur radio stations around the world. I am looking forward to meeting old and new friends at the RSGB Convention in October."

We will be announcing further talks and presentations in next month's *RadCom* but registration for the Convention is already open at www.rsgb.org/convention

K3LR's impressive, multi-contest-winning antenna system.

Construction competition

One successful aspect of the 2017 Convention was the increased number of entries for the Construction Competition. You can see an article by winner of the Beginner section, Peter Barnes MOSWN on page 32 of this edition of *RadCom*. We will be repeating the Construction Competition this year and hope for even more entries. The aim of the competition is to encourage home construction, experimentation, design and innovation.

The competition can be entered by individual members or by groups of members – in the latter instance the build team will be treated as a single entrant. Entrants may submit any project that they have built, other than one that was a previous winner in this competition. Entries must have an amateur radio context and must contain an element of home construction, whether that is mechanical, electronic, software or system. Examples might include receivers, transmitters, transceivers, aerials, instrumentation, test equipment and software, but are not limited to those examples. Any RSGB member, or group of members, is eligible to enter, free of charge. All entries must be available for judging at the RSGB Convention in October but the constructor need not be present. All entries will be judged together and the judges will consider awarding a prize in each of the following categories: Innovation, Construction, Beginner and Junior. The judges will also select an overall winner who will receive the Pat Hawker MBE, G3VA trophy. Further information and entry registration details can be found on the RSGB website at www.rsgb.org/construction-competition

The closing date to register an entry is the end of September.

Data

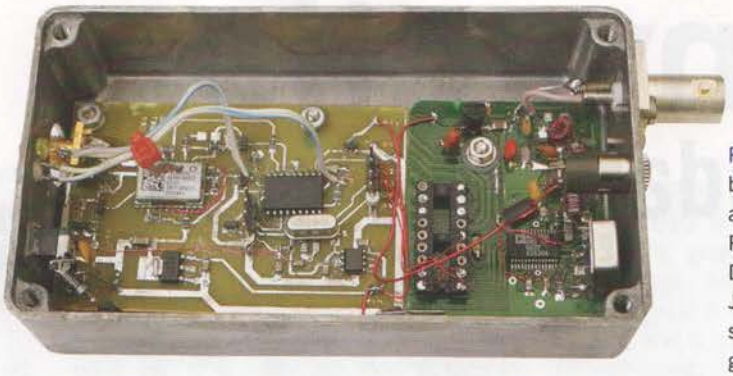


PHOTO 1: A standalone beacon source comprising a GPS receiver for timing, PIC controller and AD9850 DDS. This will generate JT9 messages in any of its slow or fast submodes, all generated in real time.

New version of WSQ

Back in April 2014 I mentioned a new data mode for LF communications developed by Murray Greenman, ZL1BPU. WSQ uses differential multi frequency shift keying, where information is encoded in the change of frequency from one tone to the next. Data is encoded by transmitting one of 32 tones on a 1.95Hz grid. There is no error correction as this would greatly slow down real time operations. The use of differential, or incremental frequency encoding coupled with a symbol rate of 2.048 seconds reduces the S/N needed for reliable copy. A faster version for HF chat was described a year later in the April 2015 Data Column.

But now those ZL chaps have improved the mode, particularly the decoder, making it better-able to cope with noise and interference. They have introduced synchronous decoding. Previously WSQ (and FSQ) compared the power level in each of a number of FFT bins over the received audio spectrum, to determine which tone was received and make a decision as to which character was sent. Called the 'peak hits' technique, it was first used in Jason, a weak signals mode by Alberto, I2PHD. This amplitude decision process is non-coherent, or asynchronous.

The latest version of WSQ uses synchronous detection. This is quite a complex process to describe but essentially means the received signal is sampled continuously and the transitions from one tone to the next are 'mapped out' in real time. Murray, ZL1BPU states:

"One of the major benefits of a synchronous decoding process is that, while errors in content can be made, it is not possible to generate insertion or deletion errors (extra or fewer symbols) in the data stream and this in itself leads to much better decoding accuracy, as each symbol is decoded on its own merits, not dependent on the history of prior decodes. Of course the process also benefits from accurate sampling in the middle of each symbol, where the energy in the FFT bins is greatest, and samples are more likely to be stable.

"Apart from the better decoder, the new version has:

- Synchronous decoding as well as the 'peak hits' decoder
- Three speeds: 1, 0.5 and 0.25 baud
- A new version of *WSQplot*
- S-meter as well as SNR, with both recorded in the log
- An audio gain control
- Oscilloscope, linear and log signal overlays on the waterfall
- One new command: '+' (repeat last message)
- Menu rearranged, hopefully more logically
- Updated Help information

"The software will also operate without Selective Calling, and also still runs the old WSQ2 mode. The synchronous decoder works in all modes. We have already worked across the Tasman (VK/ZL) with the new software, and VK4YB has worked into west coast USA". Full details and the software for download can be found at [1].

Data modes direct from synthesisers

As many readers who follow 'JNT Labs experiments will know, for a long time I have been making beacon and test generator sources that generate messages using the various multi frequency modes direct from a PIC microcontroller and a frequency synthesiser [2]. Initially, direct digital synthesisers were used for bands where these could directly generate the signal – such as for GB3VHF. They were also incorporated using the 'Reverse DDS' technique into a number of UK microwave beacons. Later, Fractional-N synthesisers were used to directly generate at high frequencies, although this technique is a bit fraught and prone to short glitches if synthesiser chips with internal VCOs are used. The DDS remains the cleanest way to directly generate rapidly switched multi-tone waveforms.

The latest hardware being worked on at 'JNT Labs combines the glitch-free tone generation advantages of DDS and the clean-when-not-continually-being-switched Fractional-N synthesiser for fine tuning resolution. The combination of the two sources is done in a quadrature mixer. By generating at baseband using an I/Q DDS source [3], image filtering is not a problem and we can have a clean beacon or data transmitter using a hardware concept that can be applied from LF to microwaves.

Three of the WSJT modes (WSPR, JT4 and JT9) use a similar convolutional encoding plus interleaving technique for adding error correction to 13 characters of plain text to get the transmitted symbols. Only the final assembly into transmitted symbols and the addition of synchronisation differ for the three modes. Convolutional encoding is easy to implement on a small microcontroller like a PIC and all three of these can now be generated on the fly with the symbols formed for each message in real time. This opens up all sorts of possibilities of using the weak signal capabilities of the WSJT decoder for decoding telemetry sources, multiple small beacons and trackers. In the September 2015 *RadCom Plus* [4] I described such a technique for sending real time GPS location. The latest versions of WSJT-X allow all multiple JT9A signals within the passband to be decoded, so several such sources could all share a common 2kHz of spectrum. The WSJT software's UDP broadcast allows other user software on the same computer or network to pick up the decoded messages and break down the contents for their own use.

Of the three modes, JT9 is easily the most versatile and useful as a generic mode for use across the entire RF spectrum. In its normal slow mode, operating with a 60 second cycle time and 1.74Hz symbol rate, it has eight tone spacing options from 1.7Hz all the way to 220Hz spacing. This makes it ideal as a weak signal mode on any band from LF to SHF with a sensitivity comparable to WSPR. But in addition, it also has four fast modes where messages can be sent with 5s, 10s, 15s or 30s cycle times for more rapid message delivery. **Photo 1** shows a breadboard source generating real time JT9 in any of its slow or fast submodes with an AD9850 DDS.

Websearch

[1] WSQ details and software
http://www.qsl.net/zl1bpu/MFSK/WSQweb.htm
[2] Generating data modes directly:
http://www.g4jnt.com/JTModesBcns.htm
[3] An example is the MSK144 Beacon Source using a DDS and I/Q upconverter
http://www.g4jnt.com/MSK144_Sources.pdf
[4] http://rsgb.org/main/blog/news/rsgb-notices/2015/09/30/radcom-plus-vol-1-no-2/

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The radio... YAESU

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Feature

Using the Reverse Beacon Network to test antennas

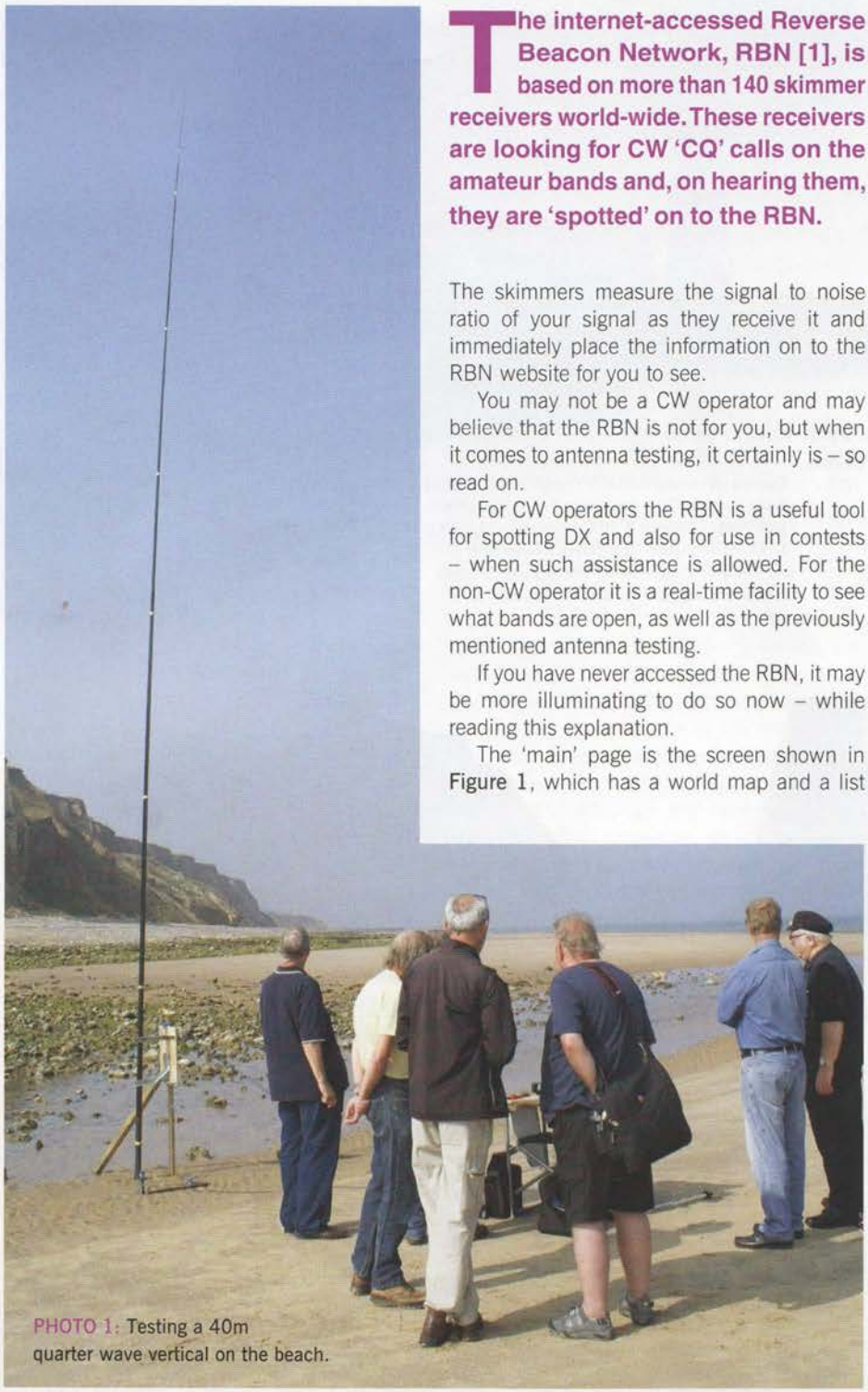


PHOTO 1: Testing a 40m quarter wave vertical on the beach.

The internet-accessed Reverse Beacon Network, RBN [1], is based on more than 140 skimmer receivers world-wide. These receivers are looking for CW 'CQ' calls on the amateur bands and, on hearing them, they are 'spotted' on to the RBN.

The skimmers measure the signal to noise ratio of your signal as they receive it and immediately place the information on to the RBN website for you to see.

You may not be a CW operator and may believe that the RBN is not for you, but when it comes to antenna testing, it certainly is – so read on.

For CW operators the RBN is a useful tool for spotting DX and also for use in contests – when such assistance is allowed. For the non-CW operator it is a real-time facility to see what bands are open, as well as the previously mentioned antenna testing.

If you have never accessed the RBN, it may be more illuminating to do so now – while reading this explanation.

The 'main' page is the screen shown in **Figure 1**, which has a world map and a list of up to 100 spotted stations. It is refreshed every minute. On this page is also a list of the skimmers currently online and the bands that they are monitoring.

Unless filters are applied, the list of spotted stations includes every CQ call received by every skimmer world-wide. The columns of the spots list are:

de – callsign of the amateur who is running the beacon / skimmer. If needed, the exact location of the beacon can usually be obtained by simply looking up the callsign on QRZ.com.

dx – callsign of the station that has been spotted, along with its country flag. The same call may appear several times from the various skimmers that have heard it.

freq – frequency of the transmission.

cq/dx – this column shows that it was a CW CQ that was received. Some skimmers are now able to receive PSK31 / 63 and RTTY and this is also shown here. This column also shows whether the station participates in Logbook of The World.

snr – the signal to noise ratio of the received signal. This is not an absolute figure that can be directly equated between skimmers nor can it be equated to an S-point. It is, however, a true comparison of one received signal to another and so is of value when comparing antenna performance.

speed – the speed of the received Morse transmission, in words per minute (or of data in bits per second for data modes).

time – time and date of the received transmission. The time refreshes each minute.

The map shows the path between the transmitter and the beacon for every spot in the one minute cycle. The green dot is the beacon and the red dot the transmitting station. Each path line is of a specific colour, indicating the band the transmission occurred in. So even if you intend to operate on SSB, this is a useful real-time indication of which bands / paths are open.

As previously mentioned, all you have to do is to send "CQ" and your callsign in Morse code and you will see the spots of any skimmer that hears you. Of course you should always listen for a response to your CQ and

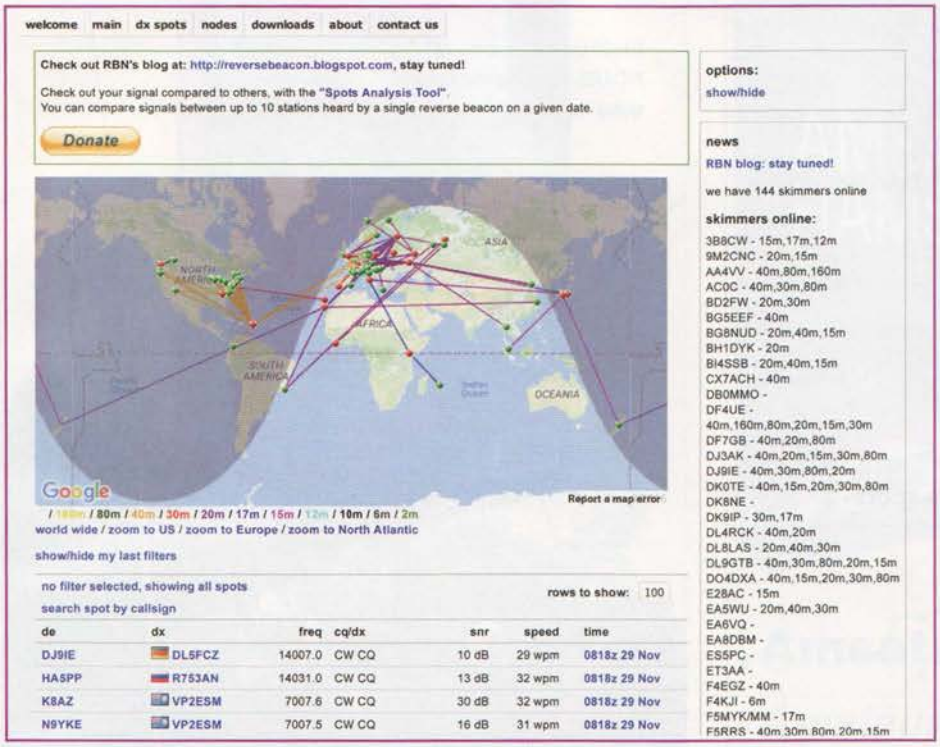


FIGURE 1: The 'main' page of the Reverse Beacon Network.

Norfolk Coast ARS - Antenna Test
Location - East Runton Norfolk
Date - 21 April 2016
Time - 10.30 to 15.12 z
Band - 40m

	Average S/N dB's			
Beacon	40m dipole	200' inv L	85' sloper	40m vert
DF4UE	17	13	7	10
DF7GB	30	13	18	22
DJ3AK	26	22	14	15
DK0TE	10	15	5	11
DK3UA	21	17	15	18
DK9IP	22	12	10	18
DL9GTB	26	27	22	24
ES5PC	19	20	16	14
F5RRS	9	20	5	5
F6IIT	40	30	26	28
F8RRS	11	12	2	10
HA2KSD	21	7	14	23
HB9BXE	13	12	7	12
SE0X	9	10	5	7
SE5E	22	25	14	9
SK3W	20	10	6	20

FIGURE 2: Results from simultaneous test of four antennas.

have at least a short QSO: their signal report will be useful added data.

While it really is this simple, you will find the following additional points helpful.

a If you are not a CW op, there are other ways to send a call and callsigns, such as from your rig or a computer-based keyer.
b Some Reverse Beacons respond to "TEST" and "TESTING" as well as "CQ". If you don't intend to respond to any replies to your call, then transmit the sequence "TESTING TESTING TESTING" followed by your callsign three times.
c Rather than have to search for your call in the full list of spots, you can enter your call in the filter 'search spot by callsign'. The list will then only contain your spots.
d Not all of the skimmers will see you in a single transmission – you may have to transmit three or four times to be sure that you get a spot from every skimmer that is hearing you.
e Once you have received a spot from a beacon, you won't receive further spots from that beacon for the next 10 minutes unless you change frequency by a few kHz.

Testing antennas

So you have erected your new antenna, you have sent "TESTING TESTING TESTING" plus your callsign and you're waiting for your spots to appear in the next 60 seconds. This will happen and you will have a lot more information in a short space of time about your antenna than you would have had without the availability of the Reverse Beacon Network.

But this is just the start and all you have obtained is data relating to your antenna's performance at one moment in time and under one set of propagation conditions.

Change frequency and repeat your transmission. You may well receive spots from some additional beacons and any spots you receive from the same beacons may well indicate a different signal to noise ratio. It is amazing how much the S/N can fluctuate over a matter of only minutes and it is important to be aware of this, particularly when comparing the performance of two antennas. I am a member of the Norfolk Coast Amateur Radio Society (NCARS), a club that focusses on constructing and testing HF antennas. The information I am sharing here is gained from the work of NCARS over the past two years.

In terms of the short-term variation of S/N, we have found that the averaging of at least three successive reports mostly takes out these perturbations.

The most useful information about your new antenna is gained when you compare it directly with an existing antenna whose performance you are familiar with. The simplest way to do this is to transmit with antenna A and note the frequency, change frequency and then transmit with antenna B. You will see the spots and can determine to which antenna they relate from the reported frequency. To get a more meaningful comparison, you will need to change frequency again and repeat this at least twice more. An alternative is to use different Morse speeds on each antena and use the reported WPM to differentiate between the antennas.

Norfolk Coast ARS - Antenna Test
Location - East Runton Norfolk
Date - 15 September 2016
Time - 10.30 to 11.30z
Band - 40m
Antenna - Quarter wave vertical with local earth
*** = Sea path**

	Antenna Location		
	On Beach	600m inland	
Beacon	Average s/n dB's		Difference
DF7GB	23.5	14.8	8.7
DJ3AK	11.7	8.3	3.4
DJ9IE	24.3	23.4	0.9
DK0TE	5.3	2.0	3.3
DK9IP	13.0	5.7	7.3
DL8LAS	3.5	12.8	-9.3
DL9GTB*	18.6	17.0	1.6
DQ8Z	14.0	7.6	6.4
ES5PC*	11.5	7.3	4.2
F5RRS	11.7	9.3	2.4
GW8IZR	26.3	16.5	9.8
HA2KSD	12.3	10.7	1.6
HB9DCO	5.8	8.3	-2.5
HB9BXE	4.3	0	4.3
OG6G*	14.8	6.3	8.5
OE6TZE	2.0	0	2.0
OK1IAK	15.6	7.0	8.6
ON6ZQ	27.4	20.4	7.0
PA0MB0	4.3	3.5	0.8
SS0ARX	5.0	0	5.0
SK3W*	9.5	0	9.5

FIGURE 3: Results from the beach tests.

An even better way is to use one callsign for one antenna and a different call for the other: this opens up further techniques, as explained later. At NCARS we often compare the test antenna with the club dipoles using the club call MXONCA for the dipole and a member's callsign for the test antenna.

Steve Appleyard, G3PND
sfappleyard@btinternet.com

FIGURE 4: Results from the cubical quad test, DF7GB beacon.

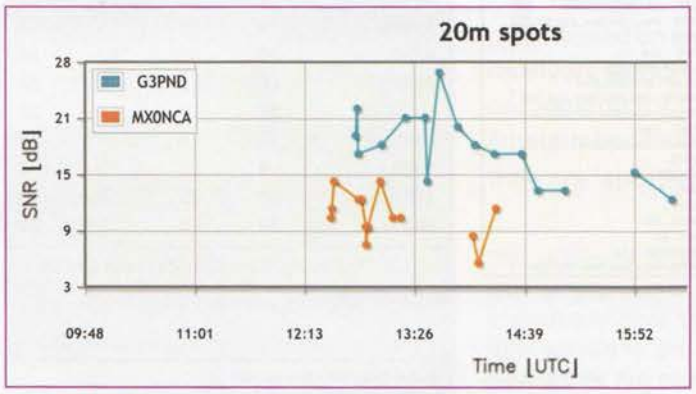


FIGURE 5: Results from the cubical quad test, W7ZI beacon.

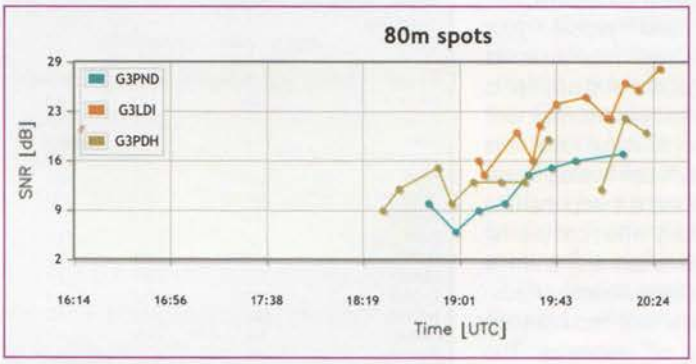


FIGURE 6: Transmissions during an 80m contest.

We sometimes erect more than one antenna and carry out simultaneous testing. **Figure 2** shows the average results from over almost five hours of testing of four antennas at the same location: (a) the club's 40m dipole, (b) a 200ft inverted-L, (c) an 85ft sloping long wire, and (d) a 40m quarter-wave vertical. The club call plus the calls of three club members were used.

Photo 1 shows members of NCARS erecting a 40m quarter wave vertical on a beach in Norfolk in order to test the effects of sea water as an earth and the effect of a take-off over the sea. This was compared with the same antenna erected 600m inland. The S/N figures shown in **Figure 3** are the average of the spots received from one hour of transmissions. The asterisked beacons are where the transmission path was over the sea. No attempt is made here to analyse or explain the results, but it is noted that mostly (and not unsurprisingly) the beach antenna has the better reports – except in two instances. We have determined the distance and bearing of each reverse beacon from the test location and we factor this information in when trying to make sense of the results.

PHOTO 2: Members of NCARS erecting the cubical quad for testing.

Spots analysis tool

As previously mentioned, there is an alternative way of seeing the data on the RBN website. This is by using the 'Spot Analysis Tool', which can be found by using the drop down-box of 'dx spots'.

Here you first select a date – this can be an historical date when the transmissions took place, or the present time. You then select one specific beacon and then finally the associated callsigns.

The result is that the S/N figures for the spots are presented graphically for the selected beacon. **Photo 2** shows NCARS members erecting a cubical quad antenna for testing. **Figure 4** shows the 20m spots from the beacon DF7GB, when testing the quad (MX0NCA) and comparing it with the club dipoles (G3PND), while **Figure 5** shows the same at beacon W7ZI. In this instance DF7GB is in the forward direction of the quad while W7ZI is in the reverse direction and the results are as you would expect.

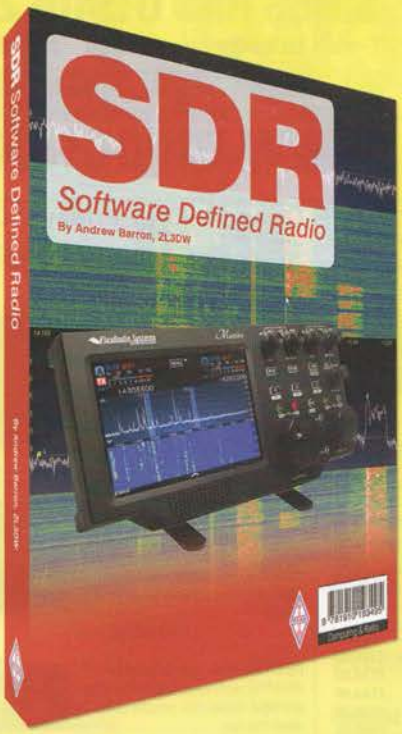
This analysis can be carried out at any time after the event and you can compare up to 10 different callsigns used.

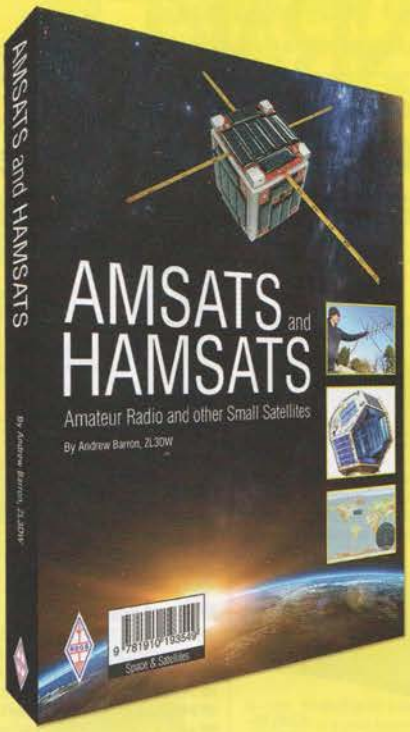
Finally, as well as comparing two or more of your own antennas, you can compare with any other amateur who is transmitting at the same time as yourself. I find this particularly informative after a contest. **Figure 6** shows the data from the beacon DK9IP after the 80m RSGB CW club contest in June 2016. Roger, G3LDI (who is 40km from me) has by far the strongest signal, which is unsurprising as his 80m dipole is at 70ft, significantly higher than that of either Malcolm, G3PDH, or myself. The gaps in the data are at times when the operator would have been searching / pouncing, rather than sending "CQ TEST". You can also see that all the signals get progressively stronger as the evening progresses and the path between the UK and Germany improves.

In conclusion, I hope I have demonstrated the potential power of the Reverse Beacon Network, providing you with a tool to simply see whether you are 'getting out' or as a means of carrying out an in-depth study of your antenna's performance.

Websearch

[1] www.reversebeacon.net





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FT-817ND HF/VHF/UHF 160-70cm 5W backpack transceiver **£525.00**
FTM-400XDE Dual band 2/70cm digital mobile transceiver **£479.00**
FTM-100DE Dual band 2/70cm digital mobile transceiver **£299.00**
FT-8900 Quad band 10/6/2/70cm mobile transceiver **£269.00**
FT-7900 Dual band 2/70cm mobile transceiver **£249.00**
FTM-3200DE 2m digital mobile transceiver **£179.00**
FT-2980E 2m FM 80W mobile transceiver **£149.00**
FTM-3100DE 2m analogue transceiver **£129.00**

Handheld

FT-2DE Digital dual band 2/70cm handheld transceiver **£379.00**
FT-70DE Digital dual band 2/70cm handheld transceiver **£189.00**
VX-8DE Triband 6/2/70cm handheld transceiver **£289.00**
VX-6E Dual band 2/70cm handheld transceiver **£159.00**
VX-3E Dual band 2/70cm handheld mini transceiver **£139.00**
FT-65E Dual band 2/70cm entry level handheld transceiver **£89.95**
FT-25E Single band 2m band transceiver **£69.00**

TYT

Now you can go digital on the road with the TYT MD-9600 DMR Digital Mobile Two-Way Radio! The MD-9600 gives you crystal clear, noise-free audio of over-the-air digital communications in your vehicle, full analogue transceiver capabilities, and bundles it all together at a price you can afford!..... **£279.95**

Inrico®

TM-7 Network Mobile Radio £184.99
Android based POC Radio (PTT over Cellular)
The Inrico TM-7 network radio is the first mobile network Radio. Great for amateur radio use with the new IRN platform, for Zello, Team Speak 3 and Echolink via 3G or WiFi. And it works as WiFi hotspot too!

T320 4G/WiFi Network Handheld Radio £229.99
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)

bhi

Bhi NES10-2 MK3 Noise Eliminating Speaker £99.95

The NEW NES10-2 MK3 Noise Eliminating Speaker replaces the MKII version and removes unwanted background noise, hiss, hash, QRM, QRN, computer hash, plasma TV interference, white noise etc from speech, so that you can hear more clearly and listen stress free.

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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Club of the Year
overall winner

Barry Amateur Radio Society members proudly display their National Club of the Year 2016 prizes, plaque and certificate, presented at the 2017 National Hamfest.

The Barry Amateur Radio Society were not only the Small Club winner in the 2016 National Club of the Year competition, but were also chosen as the overall winner for the whole RSGB Club of the Year competition.

BARS is a very active club both on the air and in the support of the local community. In addition to various Hamfests and shows in the UK, club members have made an appearance at Friedrichshafen to 'wave the flag' every year for the past 15 years.

Training courses

The club has two dedicated training officers. They do their utmost to instil in their students the idea that amateur radio is a fun hobby that will last students a lifetime. Another constant thread running through the training is there is always something new to try. BARS ran three Foundation, one Intermediate and two Advanced courses in 2016.

Special event stations

The club made 2016 a Special Promotion Year and actively sought out politicians and the general public and targeted higher profile events.

BARS ran six Special Event stations in 2016. One, on Flat Holm, attracted interest from day-trippers wanting to be part of an historic commemorative recreation. Another, part of the Barry at War commemoration, had on display a WW2 BP5 spy radio, which caused great excitement amongst the public. The event was visited by many VIPs, including the Secretary of State for Wales and the Leader of the Welsh Senedd, and helped cement their awareness of the role amateur radio plays in South Wales.

Outreach events

BARS is active in Jamboree on the Air and use the opportunity to promote the hobby to the young Cubs and Brownies. One little lad commented: "this radio stuff is better than a PlayStation!" – he had just sent his name in Morse and was issued with a certificate to prove it. His face was a joy.

A public lecture was given on the 'Life and Times of Marconi', which incorporated amateur radio today.

Amateur radio in the community

Practical support was given to two amateurs who were facing emotional and physical isolation. They are now able to leave their homes and have joined BARS to enjoy the social activity.

Local Councillors were briefed on the benefits of radio to the community, including helping lonely, housebound elderly residents. Also explained was the club's work in RAYNET and the Civil Aid Voluntary Rescue Association (CAVRA).

Some BARS members are leaders in CAVRA and the club has trained them for their radio licenses. They are invaluable in search and rescue and in supporting emergency services and RNLI. BARS is very proud of this extra service given to the community by a small section of the club.

Entries have now closed for the 2017 Club of the Year competition but it's not too late to think about entering your club for the 2018 contest. Details will be announced later in the year – Ed.

Time Difference of Arrival direction finding antenna

The RSGB Construction Competition 2017 was judged at the RSGB Convention last October. Student Peter Barnes, M0SWN was the deserving winner of the Beginner Section with the interesting project he describes here.

PHOTO 1: The fully developed PCB mounted on the lid of its box, showing the coax connections.

Shortly after joining the Thornbury and South Gloucestershire Amateur Radio Club I took part in a 2m pedestrian fox hunt. I started researching into different methods of radio direction finding and was keen to find something that could be built at home fairly easily and at low cost. Soon I found a blog post that introduced me to the concept of a 'time difference of arrival' (TDOA) antenna system [1].

What is TDOA?

TDOA uses the effect where two identical antennas, spaced a short distance apart, will receive a transmitted signal at very slightly different times. The only occasions when the times are identical is when they are pointing exactly at the transmitter or exactly away from it.

To detect the difference between the received signals, the receiver is rapidly switched between each antenna at an audio frequency. If the signal reaches both antennas at the same time, the receiver sees a standard FM signal and demodulates it. If, however, the signal reaches one dipole before the other there will be a phase difference that, when switched by the diodes, results in an audible tone being demodulated along with the radio signal. Using this effect, the user can locate an accurate bearing to an RF source by sweeping the DF antenna from side to side and listening for *minimum* tone.

The beauty of this method is that it makes no difference whether you are miles away or up close to the signal: the antenna will function in both scenarios. The biggest downside, however, is that the bearing is bilateral. It could be from directly in front of or behind the antenna, so taking cross bearings is key to using it successfully.

Circuit development

The circuit (**Figure 1**) was based on a mixture of a design by Byon Garrabrant, N6BG [1], a PDF from Sun Country ARS [2] and my own input based on previous experimentation. It works as follows. The 555 timer, configured as an oscillator by the RC network R2/R3/C1, generates a 1kHz square wave with an amplitude of 9V. C3 level-shifts the signal down to between -4.5V and +4.5V. VHF switching diodes D1 and D2 take either the positive or negative half of the square wave (respectively) and allow it to pass through to their respective dipole antenna.

I have been developing my TDOA antenna design since my first fox hunt in 2015. Since then I've been improving my circuit in a number of areas including reliability, portability and effectiveness – all making it better at direction finding!

I have been through several prototypes, had some horrendous failures but also some good successes. I've walked miles in the wrong direction but also found highly accurate bearings that have led me straight to the 'fox'. One of the biggest things I have learned in the process is that if something's going to break, it will break when you are on a fox hunt: running around with poorly-made electronics and antennas is a good way to make them break. Any DF kit needs to be resilient to being thrown about and rained on. And you need to know when the unit is switched on: my first two circuits had no power indicator LED and I inadvertently left them on, draining the batteries.

I aimed to use all that I learned to create a TDOA antenna that is easy to build, reliable, portable and works well as a tool to guide the operator towards the fox.

I started off with designing my own circuit. I used the *DesignSpark PCB* software from RS [3] to produce a schematic and then a

PHOTO 2: Mounting and connecting the elements.

PCB layout. I then used the toner transfer method followed by ferric chloride etching to turn this design into a PCB. To my surprise this design pretty much worked straight away, after I had fixed a couple of problems caused by my etching process.

From this stage I knew I needed to shrink down the design and start to build it into an enclosure. I used a PCB mount right angled SMA connector and a PCB mount LED to help the design fit. The result was a homemade PCB that could fit inside an enclosure from Rapid Electronics [4] (**Photo 1**).

Getting this design to work was not as simple as I had hoped. I had wired the LED backwards, and kept getting thwarted by problems. After a lot of PCB rework and time I managed to diagnose the problems with my circuit, and fix the design. I ordered ten boards from EasyADA [5] and they arrived within the week.

I then had the antenna boom laser cut from acrylic material, which wasn't terribly difficult or expensive. Mounting holes were included so that the dipoles would be exactly a quarter-wave apart. **Photo 2** shows how the elements are mounted and connected to the coax that leads to the PCB. The professionally manufactured PCB, laser cut boom and ABS enclosure gives me confidence that the design can withstand the most frantic and wet foxhunts that it may get exposed to. The finished unit is shown in **Photo 3**. The hinges on the telescopic antennas enable them to be folded down for ease of storage and transport (**Photo 4**).

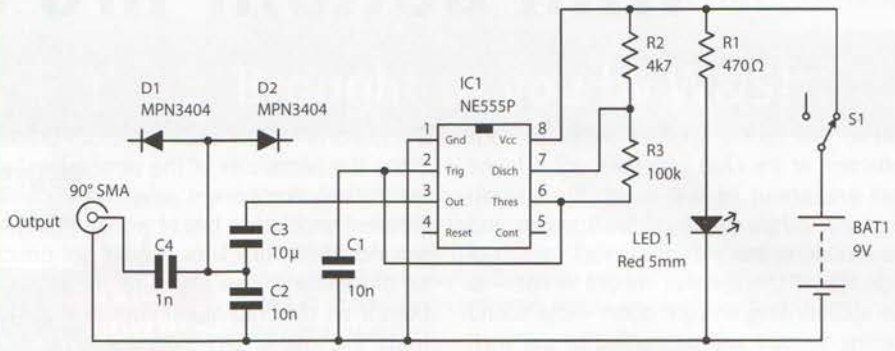

FIGURE 1: Circuit of the TDOA antenna unit. The dipoles connect between 0V and D1 / D2.

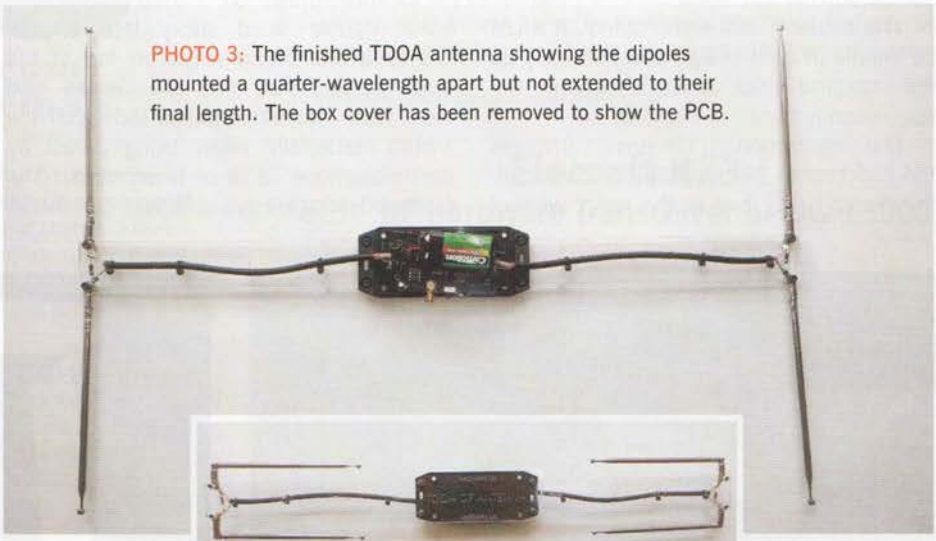

PHOTO 3: The finished TDOA antenna showing the dipoles mounted a quarter-wavelength apart but not extended to their final length. The box cover has been removed to show the PCB.

PHOTO 4: The TDOA antenna with the telescopic antennas retracted and folded into a compact unit.

The TDOA in use

To use the antenna you need to connect it to 2m radio with a short length of coax. Note that It is important to disable transmit on your radio as transmitting through the circuit could damage it. Once everything is connected, switch on the antenna and extend the telescopic elements. They should be a quarter wavelength each (51cm). As the antennas are spaced a quarter wavelength apart, an easy way to measure this is to extend each folded element it reaches the mounting point of the other dipole!

To check all is working, get someone (the fox) to stand 10 meters or so away from you and transmit. You should find that when you are pointing the antenna towards the fox (ie holding the boom perpendicular to the fox) that you just hear the person talking on the radio. If you then aim the antenna either side, you will hear a tone through your radio's speaker. Also take this time to note that you get two nulls in the tone: one when you are facing the fox and one when you have your back to them. Remember this as it will be important information when you are in the field!

Finally

Remember, when direction finding on 2m your antenna only does half the work for you (OK, maybe 25%). The rest is down to you as the operator. VHF signals bounce off everything so you need to be methodical. It is important to avoid the temptation to chase down a promising bearing: instead, mark the bearing on the map, walk in a perpendicular direction and take a cross bearing. This is the key to DF on 2m and will stop you chasing reflections and shadows.

Towards the end of August I am planning to make a kit of parts available for this project and details will appear on my website [6].

If you would like to consider entering the 2018 RSGB Construction Competition there are more details on page 47. Further information and an application form can be found at http://rsgb.org/main/about-us/rsgb-convention/convention-construction-competition/

WEBSEARCH

[1] www.byonics.com/tdoa
[2] www.146970.com/PDFs/TDOA%20Phasenpeiler.pdf
[3] www.rs-online.com/designspark/pcb-software
[4] www.rapidonline.com
[5] http://easyeda.com
[6] https://m0swn.uk/ (note: *not* .co.uk)

Peter Barnes, M0SWN
peter@m0swn.uk

Mount for radios with bottom-fire speakers

You've just found another radio for your collection at the club junk sale, got it home and are about to fire it up. One small problem: it has a bottom-fire speaker and the mounting bracket for the radio was not included. If the speaker mount is flat – ie the speaker fires straight down – the sound coming out of it will be muffled by the shelf or bench the radio is lying on. If the speaker is angled a bit (**Photo 1**) you might be able to hear what's coming out of the speaker, but it won't lie flat like the rest of your radios. What do you do?

The solution is a radio stand. It must be simple in both design and assembly so it's easy and quick to put it together. My suggestion is shown in **Photo 2**.

The only important dimension involves the two bottom pieces sitting on the shelf: they must be as long as the radio, without the radio falling through the cross-braces. Since the remainder of the dimensions are not critical, component selection becomes simple. I used some bits of wood I had lying around; the L brackets, whilst not critical for dimensions, can either be home-made from a bit of scrap aluminium or obtained from the usual DIY sources. The only significant requirements are that the brackets are sufficiently strong and hold the cross-braces up high enough to allow for speaker clearance and allow sound to escape.

To finish things off, I used automotive-grade double sided sticky tape to put L-shaped aluminium strips on top of the cross braces. Hot melt glue would also work well. This stops radios sliding off the mount (especially when being pulled by the microphone cable or heavy coax). The L-shaped strips are available from DIY shops.

The finished bracket is seen in **Photo 4**, where it's used to support two similar old bargain radios for different bands. As long as you have enough wood, you can make the bracket for as many (or few) radios as you like. The more industrious builder may want to add a finish to the wood such as varnish or paint, but it's not mandatory since the mount will be used indoors.

An additional benefit was realised when I noticed enough clearance below the radios to allow for some paperwork to be stored there (in my case a log book) without impeding the function of the shelf.

Klaus Spies, WB9YBM
WB9YBM1@yahoo.com

PHOTO 1: Propping a radio up on its mic is not a long-term solution.

PHOTO 2: Overview of the mount. The end closest to the camera is lowest.

PHOTO 3: One of the brackets that elevates the front. The rear is similar, but lower. The L-shaped aluminium strip can be seen on the extreme left.

PHOTO 4: The finished bracket in use. The space underneath is handy for a logbook or other paperwork.

WATERS & STANTON
EUROPE'S HAM STORE

This month I am able to reduce the prices on the **Elecraft K3S** transceiver range. This is good news because this radio is still the best buy - as confirmed by Sherwood Engineering web site. I would also like to remind you that you can save money by building the radio yourself. It is not a difficult project and requires no soldering. So how long does it take to build? Probably around 12 - 15 hours. Take it steady and read the very comprehensive instructions, and you will not find it difficult. We offer a two year warranty and if you have any problems we are here to sort them out.

Peter Waters G3OJV

ELECRAFT® Brought to you by W&S!

Elecraft K3S Transceiver
'Best' HF Hardware Transceiver*

100W Models:	Kit: **£2699**	Built: **£2849**
10W Models:	Kit: **£2199**	Built: **£2329**

The Elecraft K3S HF transceiver is right at the top of the performance tree. And it has been there for a long time. That's why it is so popular with contest operators and DXpeditions. Today's operating conditions demand the very best in receiver performance and that is one of the strengths of the K3S. Strong signals and weak signals are handled with equal and excellent capability.

There are many options to make operating even more pleasurable such as the additional 8-pole roofing filters and the second receiver that it totally in-dependent. There's the voice recorder (rx & tx) as well as extra high stability xtal references and even a 2 meter transverter.

Above all, it is a very pleasurable transceiver to own that can be fitted out with bits you want without paying for the bits you don't need. And you can even save by building it yourself. Either way you get a UK 2-year warranty

* This claim is based on www.sherweng.com

Elecraft KX3
'Best' HF Hardware Transceiver below £3000!*

The Elecraft KX3 is quite an amazing transceiver that has a receive performance that leaves most other radios way behind. And you would have to spend around £3000 on a K3S to get anything better. Quite a claim, but it is true. Covering 160 to 6m it is a complete station that fits easily into a large coat pocket. Add to it the amazing antenna auto tuner and you have a transceiver that can directly feed most antennas including an end fed wire.

There is an optional dual band roofing filter that is great for narrow SSB and CW. The voice recorder comes as standard as does the AA cell internal battery tray. There is a whole host of menu items that lets you set the radio up just so that it suits your operating style and preference.
(Mic & Paddle extra).

* This claim is based on www.sherweng.com

Kit: **£1089.95** Built: **£1139.95**

Elecraft Accessories

KAT500 1kW Auto ATU

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

PX3 Spectrum Display

Plugs directly into the KX3 to give same spectrum display as P3. Bandwidth 2kHz-200kHz
Kit **£599.95** Built **£639.95**

XG3 Signal Generator

A highly accurate portable signal source with spot frequencies on all bands 160m to 2m with levels of:
107dBm (1 uV)
-73 dBm (50 uV, S9)
-33 dBm (S9+40)
0 dBm **£259.95**

T1A Portable Auto ATU

The T1A is a fully assembled auto ATU that covers 160m to 6m up to 20W and matches whips, end fed wires and coax cable. Great for FT-817 etc. Totally self contained **£189.95**

KPA500 600W HF-6m Amplifier
Matches Any HF Transceiver

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

Kit **£2449.95** Built **£2699.95**

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

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ICOM

ID-5100E Mobile

+ FREE MFJ 10% Discount Voucher

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

ID-4100E Mobile

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

Part Exchange Saves You Money PHONE TODAY

IC-7100 Mobile/Base

+ FREE MFJ 10% Discount Voucher

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

IC-7200 HF Base Station

+ FREE MFJ 10% Discount Voucher

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

SP-10 Mobile Speaker

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

IC-7300 HF - 4m Transceiver

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

New!

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

- 10kHz - 3GHz SDR Wide Band Performance
- Absolute S-Meter Measurements
- Supr FPGA for ultimate processing
- Great Dynamic Range for modern band conditions
- 2000 Memories with full scanning
- Spectrum Scope with Waterfall
- SD Card slot and I/Q output

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ICOM IC-7610 Transceiver

New!

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

Regular Price **£3499**

£2899 - or less when you trade in your IC-7300!
Call for PX on other Radios - We can offer you a great DEAL

ICOM ID-51E Plus 2

The ID-51E PLUS2 is the latest generation of D-STAR handportable from Icom. This new model incorporates popular features found in the original including integrated GPS, an inde-pendent AM/FM receiver and V/V, U/U, V/U Dual-watch, but now includes new 'Terminal Mode' and 'Access Point Modes' enabling you to make D-STAR Callsign routed calls through the Internet, even from areas where no D-STAR repeater is accessible.

New modes in the ID-51E PLUS2 enable you to make Gateway calls through a PC (Windows) or an Android device, even from areas where no D-STAR repeater is accessible.

£378.95

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Antennas

Last month the design and operational concepts for an HF vertical antenna were summarised. The theme continues this month with an overview of the practical aspects associated with VHF vertical antennas.

Technical summary

A vertical antenna usually comprises an upright electrical quarter-wavelength (λ/4) radiating element that is worked against a ground plane, as described last month. The ground plane is often formed by the actual ground surrounding the upright element. However, the electrical conductivity of the ground has a major influence on the antenna's performance and, particularly for HF, many stations bury a series of wires (radials) to improve the ground's conductivity [1].

For the VHF bands it becomes a practical possibility to construct a ground plane using three, or more, quarter wavelength (λ/4) radials with the vertical element situated above, as shown last month. If the λ/4 radials are angled down towards the ground's surface, a point can be found where the feed point is close to 50Ω, enabling a good match to be obtained [2].

A 6m band vertical antenna

During the summer months Sporadic-E openings allow contacts to be made over several hundreds of kilometres on the 6m band. To take advantage of this, a vertical antenna for the 6m band was constructed and is summarised here.

As outlined previously, a reasonable calculation of the electrical length for the λ/4 vertical element and for each radial can be made using the general antenna formula [3] and halving the result:

Electrical λ/4 (m) = (142.5 / f) x 0.5
(where f is in MHz.)
Using f = 50.175MHz:
(142.5 / 50.175) x 0.5 = 1.42m

This conveniently gives the design lengths for the vertical element *and* each radial wire.

The vertical element was made from a length of 12mm diameter aluminium tube. The ground plane's radials were made from 5A-rated insulated stranded copper wire and these shared a common connection at the feed point.

To mount the λ/4 vertical element in position, a commercially-available dipole centre was used that was obtained from an online supplier. To support the radials, they were first fastened to a short section of 12mm diameter aluminium tube and this was attached to the dipole centre's other connection. The radials' ends were paired, soldered to a tab and held in place using an M4 nut and bolt passed through the short tube. A hose clip was used to hold the radials in position over the tube and the arrangement is shown in Photo 1.

PHOTO 1: The simple physical assembly of the 6m vertical antenna.

A 150mm section of sturdy plastic pipe was used to attach the dipole centre to a mast using a two-way U-bolt clamp. RG58 50Ω coaxial cable was used as the antenna's feeder with the inner conductor connected to the λ/4 vertical element and the shield conductor connected to the radials as shown. A current choke was formed using twelve turns of the coaxial cable wound on a former made from a 200mm length of 25mm diameter plastic tube. By calculation [4], this introduced around 1.24μH of inductance (or a reactance of about 400Ω at 6m) into the coaxial cable's outer screen to minimise any common mode skin currents flowing along the outer of the screen from skin effect. The choke has little effect upon the RF currents flowing along the inner surface of the screen, or the inner conductor, due to skin effect that effectively isolates the inner and outer surfaces of the screen. The choke was fastened below the radials to the mast clamp using a hole drilled at one end and then secured with a nut. This type of dipole centre has the advantage of protecting the feed point from the weather, although it is suggested that the radials' connection to the short tube should be protected with grease. By the way, I'll return to coax chokes in a future column.

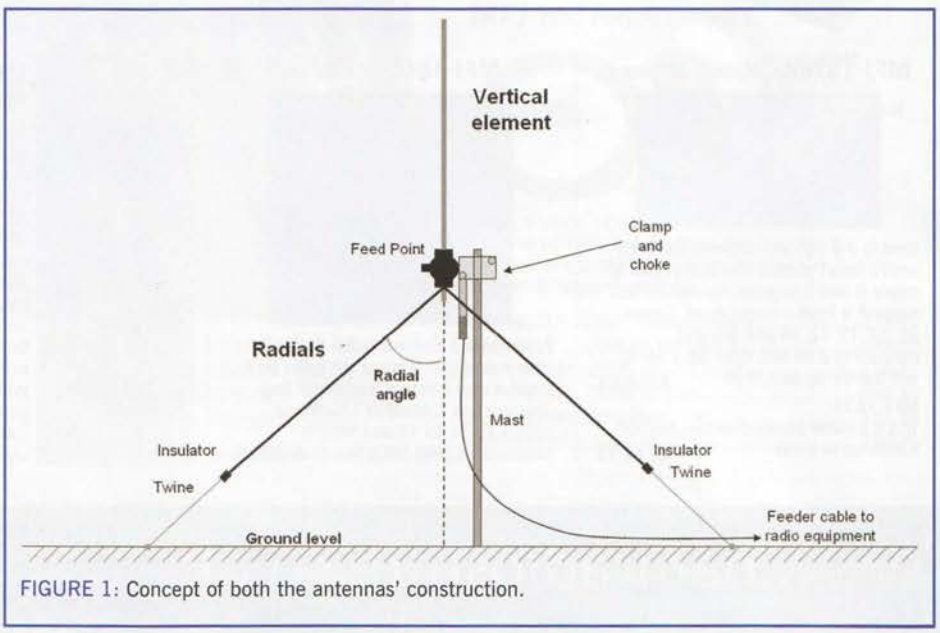

FIGURE 1: Concept of both the antennas' construction.

PHOTO 2: The 6m vertical antenna in use.

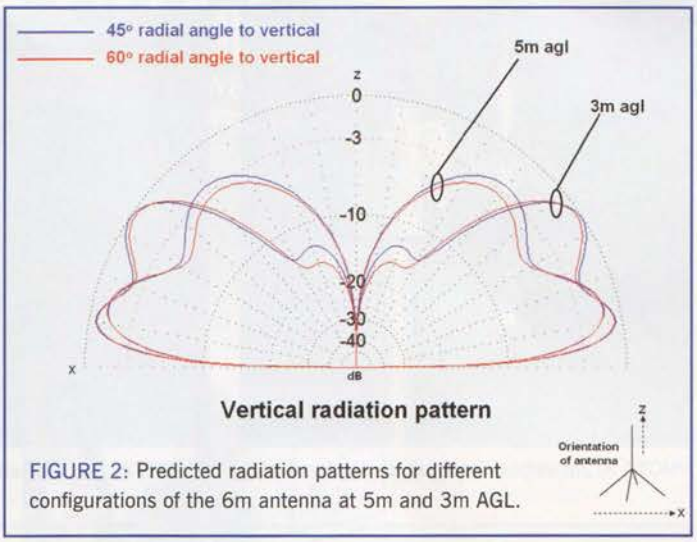

FIGURE 2: Predicted radiation patterns for different configurations of the 6m antenna at 5m and 3m AGL.

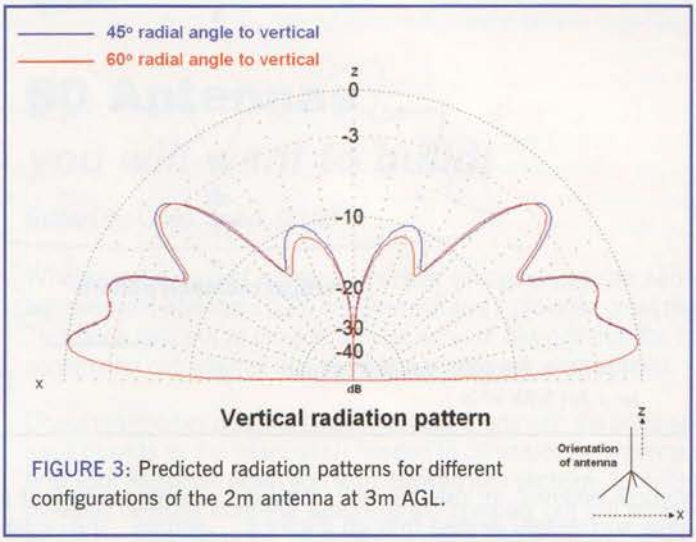

FIGURE 3: Predicted radiation patterns for different configurations of the 2m antenna at 3m AGL.

Miniature 'dog-bone' insulators were used to terminate the end of the radial wires. Each wire end was passed through one end of the insulator and secured using a cable tie. This allowed the length of the radial to be adjusted during tuning. Once tuning had been completed, the ends of the radials were soldered and covered using heatshrink sleeving.

Tuning and performance

The lengths of the vertical element and the radials were adjusted for minimum SWR at 50.175MHz with the antenna at a height of 3m AGL. The minimum SWR corresponded with a vertical element length of 1.25m with each radial 1.41m long, slightly shorter than calculated, but that's not unusual. **Table 1** summarises the SWR measured at various frequencies with the ground plane radials set at an angle to the vertical element as illustrated in **Figure 1**. Using MMANA-GAL **[5]**, the antenna's radiation patterns with the radials at 45° and 60° were predicted and are illustrated as **Figure 2** with the antenna at 3m and 5m AGL. The predicted gain for the antenna was up to 2.5dBi when at 5m AGL with the radials angled at 60°. As expected, the predicted horizontal radiation pattern was omnidirectional. The vertical pattern shows significant radiation towards the horizon for the configurations modelled that should enable longer distance stations to be worked when the conditions allow. However, with the antenna modelled at 5m AGL, both radial configurations indicated more RF power radiated skywards at about 40°. Angling the radials at 45° gave a reasonable match to 50Ω and enabled the radials to form a section of the guying to hold the antenna upright, as shown in Figure 1. Once tuned, the antenna was capable of handling RF powers of up to 100W. **Photo 2** shows the 6m vertical antenna in use.

During testing, the antenna was tested on the 2m band where it operates as a 3/4λ long vertical antenna. When the radials' angle was set to 60°, the antenna loaded with a low SWR (see Table 1), enabling the antenna's use on the 2m band. However, operation using powers up to 10W is suggested because of the mismatch measured.

A vertical antenna for 2m

The calculations were re-run using a frequency of 145.5MHz as a basis for a 2m band vertical antenna. This gave design lengths for the vertical element and each radial wire close to 490mm.

The construction of the antenna was similar to the 6m vertical antenna, using the same dipole centre and choke. However, to obtain a good match the radials' connection needed to be closer to where the coaxial cable feeder's screen was connected. This necessitated a redesign of the radials' connection arrangement using a shorter length of aluminium tube, as shown in **Photo 3**. The radials' ends were protected using heatshrink sleeving and fishing line was attached to ends rather than using miniature dog-bone insulators. This was necessary because the insulators tended to end-load the radial wires, making matching the antenna to the 50Ω coaxial cable difficult. This redesign for the radial wires did not provide a sufficiently sturdy guying arrangement for the antenna and the mast. Consequently, separate guy ropes were used for the mast and the fishing line served to allow the radial wires to be fanned out around the antenna at the designed angle.

The lengths of the vertical element and radials were adjusted for minimum SWR at 145.5MHz with the antenna at 3m agl. The minimum SWR corresponded to a vertical element length of 400mm, with each radial 500mm long. **Table 2** summarises the SWR measured at various frequencies with the ground plane radials set at an angle to the vertical element. Using MMANA-GAL, the antenna's radiation patterns were predicted with the radials at 45° and 60° and are illustrated as **Figure 3**.

The predicted gain for the antenna was up to 4dBi when the radials were angled at 60°. As expected, the predicted horizontal radiation pattern was omnidirectional. The vertical pattern shows significant radiation towards the horizon for both of the configurations modelled. Once tuned the antenna was capable of handling RF powers of up to 100W. **Photo 4** shows the 2m

Mike Parkin, G0JMI
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PHOTO 3: 2m vertical antenna's physical assembly.

PHOTO 4: The 2m vertical antenna in use.

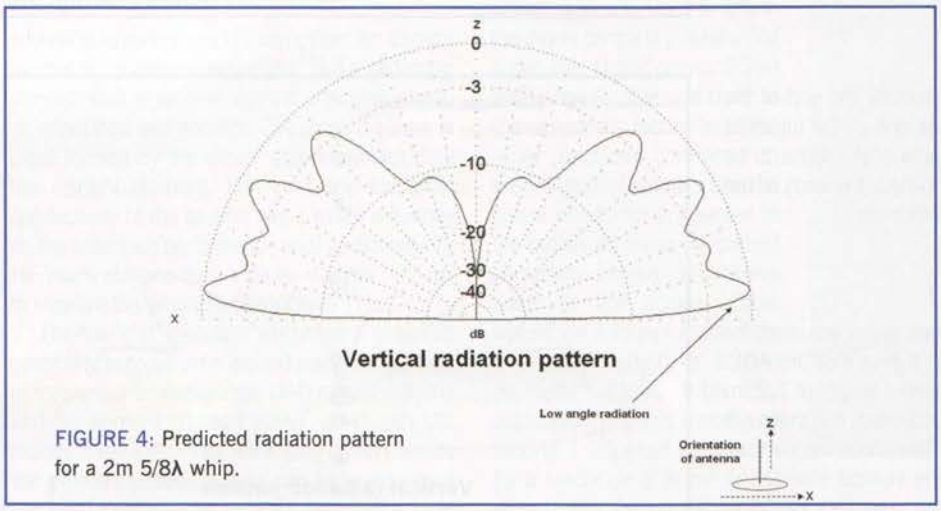


FIGURE 4: Predicted radiation pattern for a 2m 5/8λ whip.

vertical antenna in use. Several stations were successfully worked through the local repeaters.

The 5/8λ vertical antenna

A commonly used antenna by mobile stations on the VHF / UHF bands is the 5/8λ vertical antenna, or 'whip'. This antenna has an omnidirectional horizontal radiation pattern, while the vertical radiation pattern includes energy radiated at a low angle towards the horizon. This antenna has a typical gain of around 4dBi. This is often useful when accessing a remote repeater or working a distant station in the direction of the horizon. When used with a magnetic mount ('mag-mount') to hold the antenna in place, this antenna usually includes matching arrangements within the mount because the the antenna's impedance at resonance is not 50Ω. When used mobile, the metal vehicle roof provides a convenient ground plane. **Photo 5** shows a typical example of a 2m 5/8λ vertical whip and its mag-mount while **Figure 4** illustrates its predicted radiation pattern.

TABLE 1: Summary of a 6m vertical antenna's SWR measurements for two different radials angles at 3m AGL, checked at 6m and 2m frequencies.

Frequency (MHz)	SWR measured at radial angle 45°	60°
50.050	1.2:1	1.3:1
50.100	1.2:1	1.4:1
50.175	1.3:1	1.4:1
50.250	1.3:1	1.4:1
50.350	1.3:1	1.4:1
50.500	1.4:1	1.5:1
145.000	-	1.7:1
145.500	-	1.7:1
145.900	-	1.7:1

TABLE 2: Summary of a 2m vertical antenna's SWR measurements for two different radials angles at 3m AGL.

Frequency (MHz)	SWR measured at radial angle 45°	60°
145.000	1.1:1	1.1:1
145.250	1.15:1	1.1:1
145.500	1.2:1	1.1:1
145.700	1.2:1	1.2:1
145.900	1.25:1	1.25:1

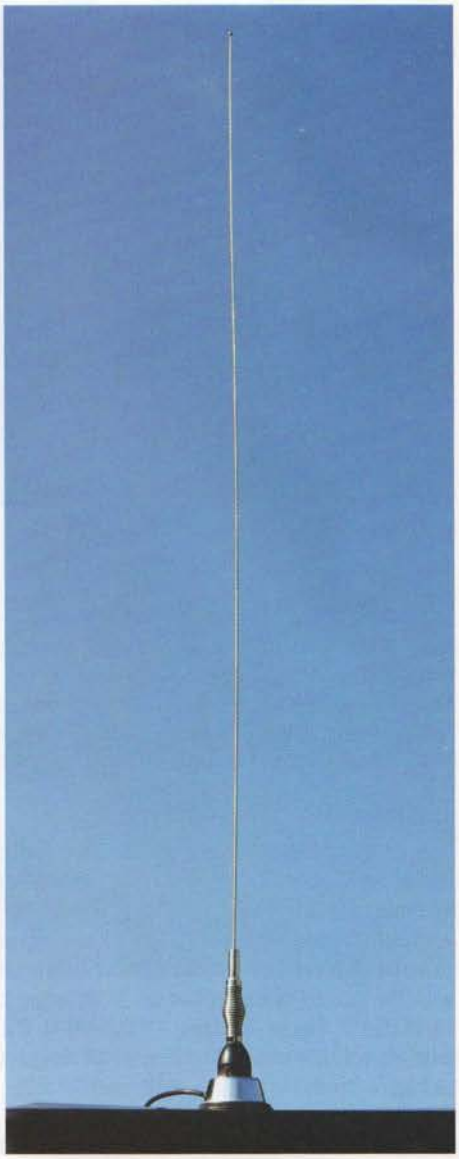


PHOTO 5: An example of a 2m 5/8λ whip and its mag-mount.

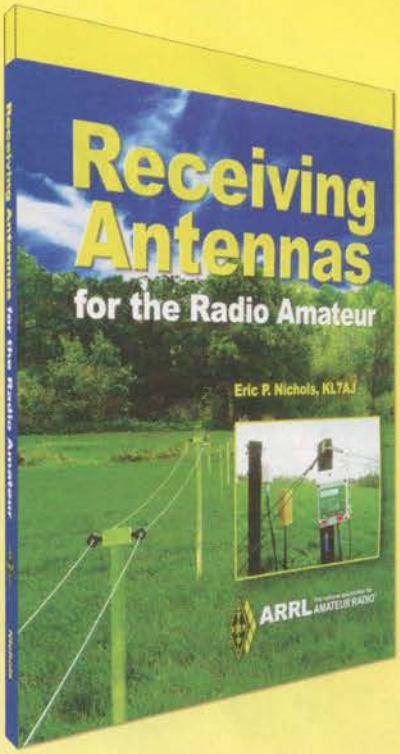
Conclusion

If the space available at your QTH is limited, then possibly a vertical antenna may be an option to enable access to a VHF band, or it may be a suitable antenna to monitor conditions on the 'magic band', 6m.

References

References [1] to [4] are from the *RSGB Radio Communication Handbook*. 13th edition, edited by Mike Browne, G3DIH:

[1] Section 15 Practical HF Antennas, page 15.2.
[2] Section 15 Practical HF Antennas, page 15.12.
[3] Section 13 Antenna Basics and Construction, page 13.2.
[4] Appendix A, page A.3.
[5] MMANA-GAL basic V3.0.0.31, freeware antenna analysing application. Original code by Makoto Mori, JE3HHT. MMANA-GAL Basic and MMANA-GAL Pro by Alex Schewelew, DL1PBD, and Igor Gontcharenko, DL2KQ. 1999 onwards.



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.

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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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GENIE microcontroller shack alarm

Modern microcontrollers allow the development of projects that are small, versatile and inexpensive. In describing how to make an alarm for the shack using a GENIE chip, this article provides an insight into how to make almost any small device you like based on a microcontroller – not even necessarily a GENIE.

GENIE is part of an ecosystem that consists of programmable microprocessors (the GENIE chip itself, which is actually based on a PIC pre-programmed with special firmware), a design environment for circuits that includes simulation, PCB layout and more, and a programming environment where you can use a flowchart-based approach or write directly in BASIC. I find it very user-friendly and a very easy way to introduce yourself to simple microprocessor-based projects.

It has been some time since a shack alarm project has appeared in *RadCom* and I was in need of one for my shack. The alarm is a simple system with very few components, yet cheap to build and flexible. The alarm is based on a GENIE C14 V2, and the finished main unit is shown in **Photo 1**. The project and program will function perfectly well with the older Genie C14, but I suggest the later version as this has more memory and additional features. The circuit of the shack alarm is shown in **Figure 1**.

An important feature of the GENIE is the ability to upload a modified program at any time. Do not worry about the programming as this is very straightforward. I will deal with this later.

The alarm design includes a facility for battery backup, which is charged automatically. The charging current is set by R8 and the value shown is suitable for a 9V rechargeable battery. A key switch is used to power the alarm on and off. Either two single pole key switches (easier to source) or one double pole switch needs to be used. One pole is used to switch the power for the main circuit on and off; the other is used to isolate the battery backup.

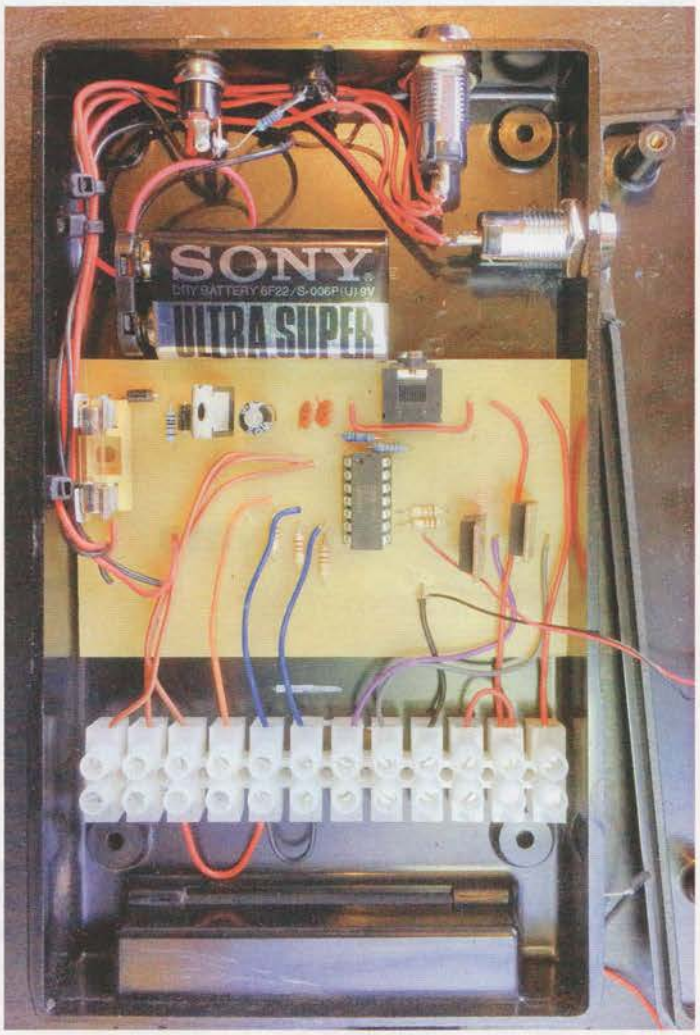

PHOTO 1: The completed GENIE-based shack alarm. The GENIE chip is the 14-pin device just right of centre.

Inputs and outputs

The Genie microcontroller range is very adaptable and pins can often be re-allocated as inputs or outputs. Input pins are mainly digital although there is always at least one input which can be configured as analogue. Analogue inputs have an 8-bit analogue to digital converter (ADC) with a range of 0-255. The digital pins are read as either high (logic 1) or low (logic 0). For this project all inputs are digital and will be read as high or low by the GENIE C14.

In its basic configuration the C14 type GENIE has five inputs, consisting of three digital-only plus two analogue/digital inputs. There are five digital outputs. Pin 4 (input 3) can also be used as a reset but this is not used in this project. Pin 13 can be used as an output but here it is used as the 'status' pin for programming. Pin 2 is the programming pin. Pins 1 and 14 are V+ and 0V. Pin functions are summarised in **Table 1** and a full datasheet is available at **[1]**.

I use magnetic reed switches as sensors. The reed switches are normally closed when a magnet is close to them, and the contact opens when the magnet moves away. So you could put a reed switch on a door frame and a magnet on the door to sense whether the door is open or closed. When, for instance, a door is closed the input is high (5V) from the 7805 rail. When the door is opened the input will go low as the 10k pull down resistor will be 0V. Likewise, the commercial passive infrared (PIR) sensor used is normally closed (1) before any movement is detected, when it will open (0). Although I have used one input per reed switch, it is possible to wire a number of switches in series and treat each input as a separate 'zone' for your alarm (see **Figure 2**).

You will need to choose how many inputs and outputs you wish to use. In this project three inputs are being used; the C14 has two further unused inputs that could be utilised to expand the functionality of your alarm. An example of this is to use one input 1, pin 6, for an anti-tamper line. To do this you would need to add an additional pull down resistor (10k) and an additional pad on the 5V rail. The anti-tamper system is purely a loop that triggers the alarm if broken.

The maximum output current per pin is 25mA and the maximum total pin current is 85mA. The alarm described here has three outputs: a piezo sounder, a siren and a high output piezo flasher. The piezo sounder is a low current device and runs straight from a pin (output 5, pin 8). The siren and flashing lamp require more current than the GENIE can supply – and also run from 12V – so power MOSFETs Q1 and Q2 are used as interface devices. Their gate current is <250μA thus 10k resistors (R4, R5) are used to drive them from the GENIE.

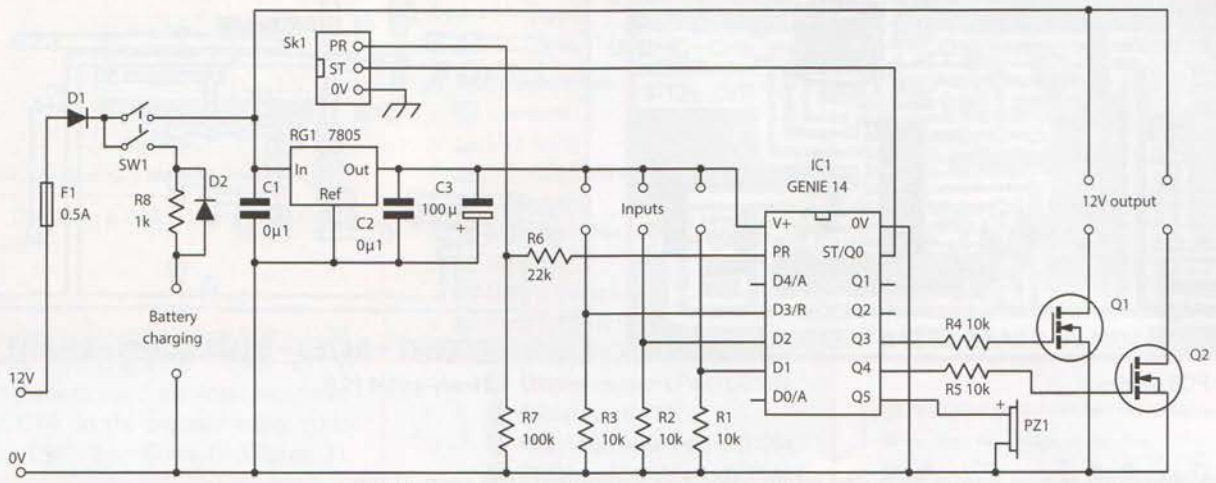

FIGURE 1: Overall circuit diagram of the shack alarm.

Circuit and PCB

I drafted the circuit in *Circuit Wizard 3* (which can be purchased from New Wave Concepts [2] for around £50). It is a great little program for drawing simple circuit diagrams, PCB design plus simulations and GENIE microcontroller programming. The whole GENIE ecosystem has its roots in education, which makes learning that bit easier.

I built the circuit in two different forms: on Veroboard (seen in **Photo 2**) and a PCB version, designed in *Circuit Wizard 3* (seen in Photo 1 and elsewhere). I'll concentrate on the PCB version here, although there are no particular layout requirements that prevent you laying it out on stripboard.

I have given up using sodium hydroxide developer and ferric chloride etchant, as I find this rather too messy. I used a CAM machine to cut out the PCB (a process also known as 'isolation milling'). I've made the original CAD files available in industry-standard Gerber format, plus a version for 2D PCB (Techsoft) and these can be downloaded from the RSGB website [5].

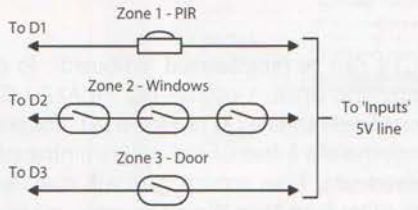

FIGURE 2: How the different zones are wired up. A typical input setup might include a PIR alarm and reed switches at entry points. Any or all of the switches can be connected in series (as shown here with the window circuits, Zone 2). Note that in the 'secure' state, the switches are normally closed (NC) but when one opens (OC) the alarm will sound.

Construction

First make a PCB with a method of your choice, or cut your stripboard to size. I've already mentioned the Gerber files but, for reference, a newly-milled PCB is shown in **Photo 3**. Note how the isolation milling process leaves a lot of unused copper that would have been etched away if I'd used the traditional photomask and chemicals method. The extra copper has no effect on how the circuit works (although it could be an issue for some high frequency RF circuits).

Figure 3 shows the PCB overlay. Mount the passive components. Insert and solder the DIL sockets and the 3.5mm stereo jack socket (used for programming). Mount the 7805 voltage regulator and the two MOSFETs. Check carefully and solder the link wires. Finally, solder the input and output wires and terminate them in a barrier strip.

I find it is best to stop any further construction at this stage and go through some simple checks. Complete a good visual check of the PCB/stripboard, looking for any solder bridges and dry joints. Check that the electrolytic capacitors, diodes and MOSFETs are orientated correctly.

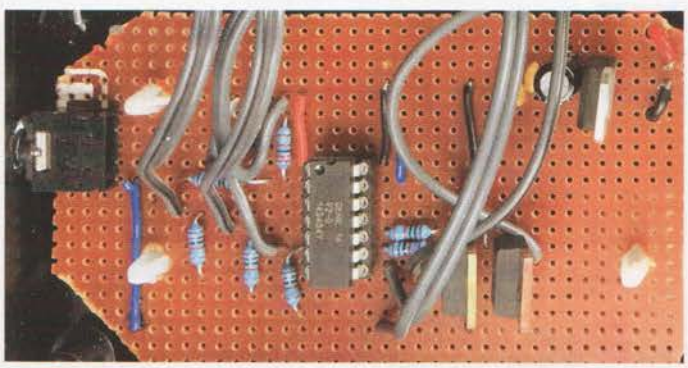

PHOTO 2: Veroboard variant of the alarm.

Testing the hardware

For the power supply I used a 9V 1A battery replacement PSU that had an off-load DC output of 11.6V. You could of course use a '12V' shack supply but watch that the 7805 regulator doesn't get too warm. You can also use a standard PP3 style 9V battery. It is best to connect this on the fuse side of the PCB but you could instead connect the battery to the battery back-up socket for testing – but it must not be left there after the full 12V supply is connected, unless it is rechargeable.

Power up the board *without* the Genie C14 in circuit. Check that the voltage across pins 1 and 14 of the GENIE socket is 5V. After that simple check, power down and insert the Genie C14 V2. Now would also be a good time to install wire links from the

Robert Coombes, G4ZEJ
g4zej@btinternet.com

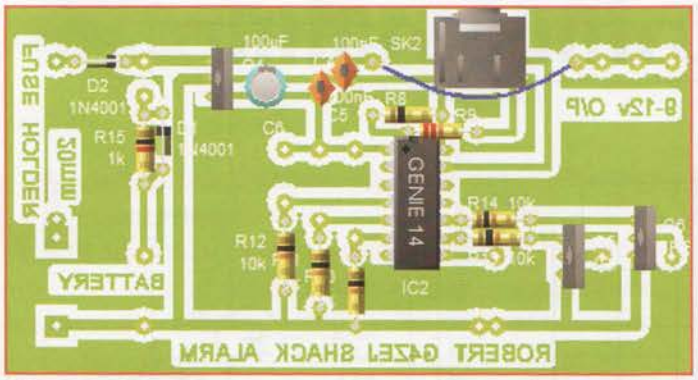

FIGURE 3: PCB overlay.

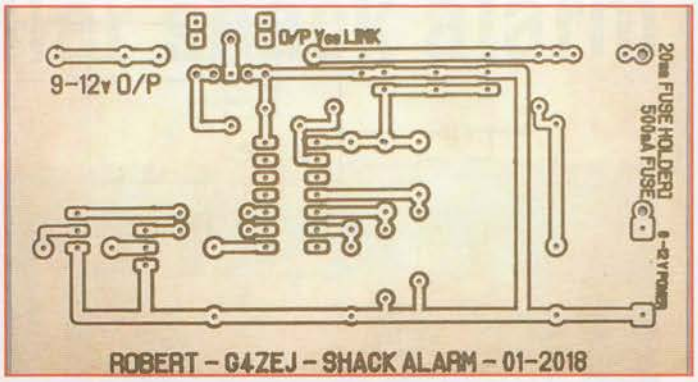

PHOTO 3: Newly-milled PCB.

PCB inputs and outputs to a barrier strip (the white 'choc block' terminal strip seen in the lower third of Photo 1) so you can later make connections for testing and, later still, wire the circuit up to your sensors. It really isn't a good idea to solder wires directly from the sensor onto the board: it makes testing, installation and possible later modification a nightmare.

Programming

The GENIE C14 can be programmed 'on-board'. To do this you will need appropriate software and a programming cable. I use an old PICAXE USB download cable but new ones can be purchased from Rapid Online **[3]** or Picaxe **[4]**. If you are not using *Circuit Wizard3,* which is not truly necessary, there is a free GENIE programming editor available from New Wave Concepts.

If you're developing from scratch, you will now need to write a program. The sample, made using the free editor from New Wave Concepts, is shown in the tinted box.

Figure 4 shows a flowchart for the project. For those who are not used to using flowcharts, the key to its right gives a step by step guide.

If you prefer to work in BASIC, right click on the <Flowchart> tab in the NWC editor and then left click the <convert to BASIC> option (**Figure 5**). This generates a BASIC tab. A sample BASIC program is on page 48 and can also be found on the RSGB website **[5]**.

You are now ready to program the GENIE C14 IC. Connect the USB programming cable to the PCB download socket and a USB port on your computer. Note that you will need to load the appropriate driver: the PICAXE driver can be found at **[6]** and the New Wave Concepts cable driver is at **[7]**.

TABLE 1: GENIE C14 pin functions.

Pin	Function
1	+ve supply
2	Program
3	Input 4 (A/D)
4	Input 3
5	Input 2
6	Input 1
7	Input 0 (A/D)
8	Output 5
9	Output 4
10	Output 3
11	Output 2
12	Output 1
13	Output 0
14	0V

(A/D) = analogue or digital input, depending on programmed use.

Other GENIE processors have more or fewer I/O pins and can be chosen according to the complexity of your project.

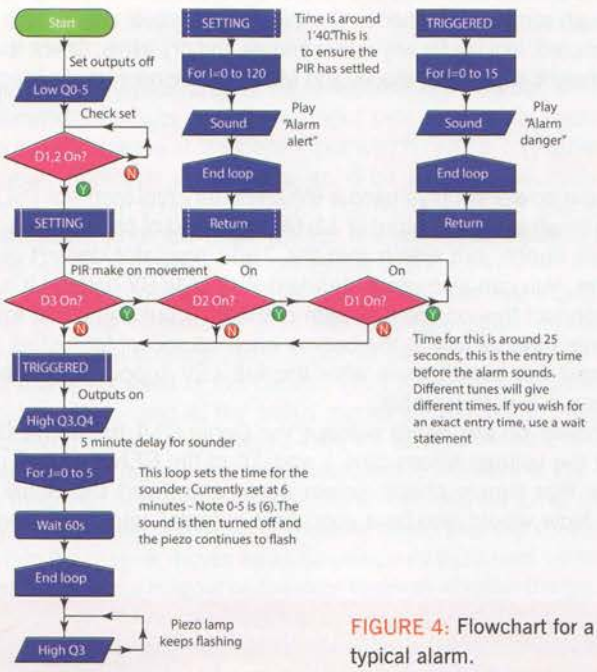

FIGURE 4: Flowchart for a typical alarm.

Start
Low Q0-5 — Input/output – LowQ0-5 sets all the outputs to Off
D1,2 On? — Decision D1,2 checks to see if D1 & D2 are set/closed; this will 'loop' the program until they are closed. Note the Yes/No syntax – these are logic 1/0 and can be set either way
SETTING — Process SETTING calls the subroutine SETTING. You can call this whatever you want but the name on the symbols must be the same on both.
D3 On? — Decision – checks each input in turn to see if the state has changed. If any change to 0, break state then call the TRIGGERED subroutine
TRIGGERED — Process – TRIGGERED subroutine called
High Q3,Q4 — Input/output – High Q3,4 Sets the outputs Q3 & Q4 high, activating the siren and flasher
For J=0 to 5 — This sets the duration of the siren-on timer using a FOR-NEXT loop. Using For J=0 to 5 means it will execute 6 times.
Wait 60s — Wait command – wait for 60 seconds – so the siren sounds for 6 minutes
End loop — Ends the FOR-NEXT loop
High Q3 — Output – use the outputs command, not just the High command, as you want to set output Q4 off (0) to turn the siren off and leave output Q3 on while leaving the light flashing to indicate the alarm has been triggered. This is the reason for the loop at the end of the program.

The program uses two 'subroutines', called Setting and Triggered. These both contain For-NEXT loops that repeat the selected 'sound', Sound To select the sound, select the 'sample' radar button and then choose the sound you want. You could instead use the 'Tune' Tune function. If you decide to use Tune take care not to use too much memory by using long tunes. This can be checked when you program the Genie. The v2 version give you more useable memory than the earlier type so longer tunes are more practical.

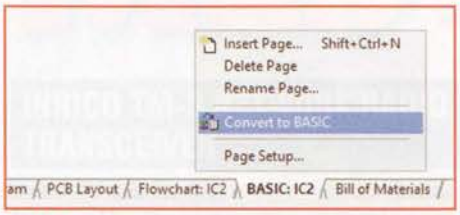

FIGURE 5: Obtaining a BASIC listing from the NWC free editor.

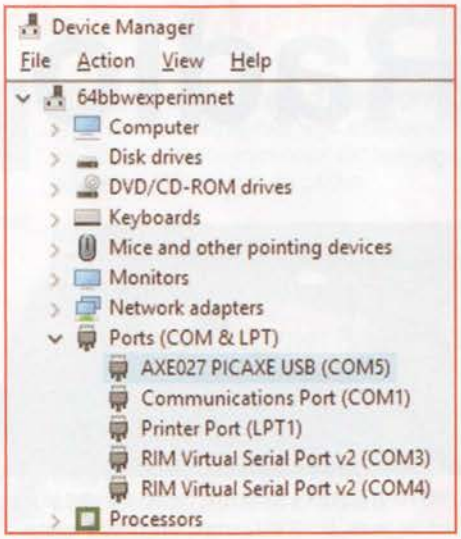

FIGURE 6: Checking the programming cable COM port in Windows Device Manager.

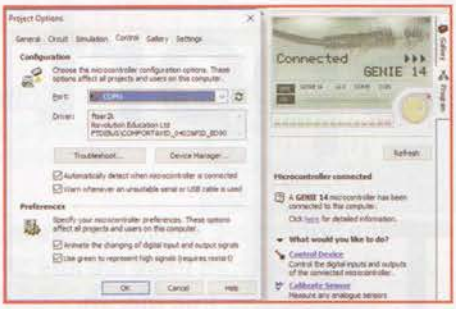

FIGURE 7: Checking that the editor recognises the GENIE 14.

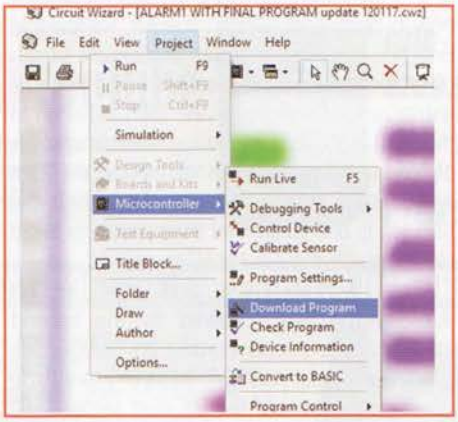

FIGURE 8: Starting to download the program to the GENIE.

First, in Device Manager check which COM port is being used (**Figure 6**). Power up the circuit and check to see if the editor recognises the GENIE C14. In the program editor go to <Project><Options><Control> (**Figure 7**). When you see "Connected" you are ready to download the program by using the menus <Project><Options><Download Program> (**Figure 8**). Progress will be indicated by the status display (where it says 'Connected' at the top right of Figure 7). *Et voila*: you have programmed the GENIE C14 – it really *is* that straightforward.

Testing the software

I suggest that you now test your program. First, save this 'master' version. For testing purposes, shorten all the timings and download the modified program. Power up and test the program. You will need to simulate the inputs by using tinned copper wire links across the barrier strip.

Connect your piezo sounder to check the sound output and also use a 12V bulb and buzzer. I suggest you do not use the siren at this testing stage (unless you want to become rather unpopular with your family, rather quickly, as I found out). If all is OK then it is time to download the 'master' program with the correct timings and install the alarm.

Other circuits

We've seen that it's possible to use just a small number of components to create a microprocessor-controlled circuit with various digital inputs and outputs. It doesn't take a great leap of imagination to see how the fundamentals shown here could be adapted to a whole host of other uses – how about one input from the shack PTT and outputs set up as a transmit/receive sequencer? You'd need very similar hardware and simply a different program. I hope you've seen how uncomplicated that can be, using either the flowchart-based approach, writing your own BASIC code, or a combination of both.

The GENIE range wouldn't be described as particularly fast or powerful processors but they are inexpensive and easy to program. I suggest them to you as a first step: you can do anything from building test circuits on prototyping board and running your programs like that, through to buying professionally-produced development boards, using Veroboard or etching (or milling!) your own PCBs. Either way, the various types of GENIE (ranging from an 8-pin device with 5 I/O pins through to a 20-pin variant with 8 inputs, 9 outputs and even built-in MIDI) have a lot to commend them.

Websearch

[1] www.genieonline.com/files/genie-14-microcontroller.pdf
[2] www.new-wave-concepts.com/
[3] www.rapidonline.com/genie-usb-download-cable-13-6023
[4] www.picaxe.com/Hardware/Cables/PICAXE-USB-Download-Cable/
[5] http://rsgb.org/main/blog/category/publications/downloads/
[6] www.genieonline.com/editor/download.html
[7] www.picaxe.com/Software/Drivers/AXE027-USB-Cable-Driver/
[8] https://www.genieonline.com/cable/

Sample BASIC program for the Shack Alarm

```
  start
  out %xx000000 ' SET OUTPUTS OFF

label_1:
  if inputs = %xxxxx11x then goto label_2 ' CHECK SET
  goto label_1

label_2:
  gosubsub_SETTING

label_3:
  if input 3 = 1 then goto label_6 ' PIR MAKE ON MOVEMENT

label_4:
  gosubsub_TRIGGERED
  out %xxx11xxx ' OUTPUTS ON
  for J = 0 to 5 ' 5 MINUTE DELAY FOR SOUNDER
        wait 60
  next

label_5:
  out %xxx01xxx ' PIEZO LAMP KEEPS FLASHING
  goto label_5

sub_TRIGGERED:
  for I = 0 to 15
        sound sample 5, "Alarm Danger"
  next
return

label_6:
  if input 2 = 0 then goto label_4 ' ON
  if input 1 = 1 then goto label_3 ' ON
  goto label_4

sub_SETTING:
  for I = 0 to 120
        sound sample 5, "Alarm Alert"
  next
return
```

Sport Radio

The Sporadic-E season peaks in the summer, so there are lots of 6m contests this month.

CW NFD runs for 24 hours over the weekend of 2-3 June. This year the contest includes a new 6-hour 'QRP Get on the Air, Renewable Energy, Unassisted Portable' section, for single-op stations. Also for the first time, non-UK entries will be welcomed. We then move on to the 80m Club Championships, with datamodes on Monday the 4th, CW on Wednesday the 13th and SSB on Thursday the 28th. This month the SSB leg is one week later than usual, to avoid clashing with the 4m FMAC and UKAC.

The 144MHz FMAC and UKAC are on Tuesday the 5th, followed by the second 144MHz Backpacker contest on Sunday the 10th. Last year G8BGV (G3YBY) was the convincing winner of the 25 watt section. His low-tech station is seen in **Photo 1**. In the week that follows we have more Activity Contests; the 432MHz FMAC and UKAC on the 12th, followed by the 50MHz FMAC and UKAC on the 14th. The 50MHz Trophy Contest runs for 24 hours over 16-17 June. A lot of DX is often worked on the so-called Magic Band this weekend. The 1.3GHz UKAC is on the 19th, followed by the 70MHz FMAC and UKAC on the 21st. The 50MHz CW Contest takes place on the morning of Sunday the 24th. It's the second VHF CW Championship event. In the afternoon the fourth in this year's series of 70MHz Cumulative contests takes place. The final UKAC of the month is SHF, on Tuesday the 26th.

PHOTO 1: G3YBY's set up has hardly changed in the last ten years, but it still permits him to be a winner.

The UK Six Metre Group's Summer Marathon continues all month. Over the weekend of the 2nd and 3rd we have two very different events. The SEANET Contest takes place on the HF bands. Given the current state of the ionosphere and the fact that only South East Asia stations will score points for UK stations, I doubt people in the UK will work much. The UK Six Metre Group Summer Contest should be another matter, with plenty of activity on the band. On Sunday the 3rd the UKuG has a Low Band contest, then a High Band contest on the 24th. The IARU ATV contest lasts for 30 hours over the weekend of the 9-10th. Activity is on analogue and digital TV. On Sunday the 10th the *Practical Wireless* 2m QRP contest and the UK Microwave Group mm-wave contest take place. The CW leg of the All-Asian Contest is on for the 48 hours of the weekend of 16-17 June, while the WAB 6m Phone event takes place for six hours on the Sunday.

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RSGB HF Events

Date	Event	Times (UTC)	Mode(s)	Band(s)	Exchange
Sat-Sun 2-3 Jun	CW National Field Day	1500-1500	CW	1.8-28	RST + SN
Mon 4 Jun	80m Club Championships	1900-2030	Data	3.5	RST + SN
Wed 13 Jun	80m Club Championships	1900-2030	CW	3.5	RST + SN
Thu 28 Jun	80m Club Championships	1900-2030	SSB	3.5	RS + SN

RSGB VHF Events

Date	Event	Times (UTC)	Mode(s)	Band(s)	Exchange
Tue 5 Jun	144MHz FMAC	1800-1900	FM	144	RS + SN + Locator
Tue 5 Jun	144MHz UKAC	1900-2130	All	144	RS(T) + SN + Locator
Sun 10 Jun	144MHz Backpackers #2	0900-1300	All	144	RS(T) + SN + Locator
Tue 12 Jun	432MHz FMAC	1800-1900	FM	432	RS + SN + Locator
Tue 12 Jun	432MHz UKAC	1900-2130	All	432	RS(T) + SN + Locator
Thu 14 Jun	50MHz FMAC	1800-1900	FM	50	RS + SN + Locator
Thu 14 Jun	50MHz UKAC	1900-2130	All	50	RS(T) + SN + Locator
Sat-Sun 16-17 Jun	50MHz Trophy +	1400-1400	All	50	RS(T) + SN + Locator
Tue 19 Jun	1.3GHz UKAC	1900-2130	All	1.3G	RS(T) + SN + Locator
Thu 21 Jun	70MHz FMAC	1800-1900	FM	70	RS + SN + Locator
Thu 21 Jun	70MHz UKAC	1900-2130	All	70	RS(T) + SN + Locator
Sun 24 Jun	50MHz CW Δ	0900-1200	CW	50	RST + SN + Locator
Sun 24 Jun	70MHz Cumulative #4	1400-1600	All	70	RS(T) + SN + Locator
Tue 26 Jun	SHF UKAC	1830-2230 ~	All	2.3-10G	RS(T) + SN + Locator

Best of the Rest Events

Date	Event	Times (UTC)	Mode(s)	Band(s)	Exchange (info)
Sat 5 May - Sun 5 Aug	UKSMG Summer Marathon	All	All	50	Locator (first 4 digits)
Sat-Sun 2-3 Jun	SEANET	1200-1200	CW, SSB	3.5-28	RS(T) + SN
Sat-Sun 2-3 Jun	UKSMG Summer	1300-1300	All	50	RS(T) + SN + Locator + Member Number
Sun 3 Jun	UKuG Low Band	1000-1600	All	1.3/2.3/3.4G	RS(T) + SN + Locator
Sat-Sun 9-10 Jun	IARU ATV	1200-1800	TV	432 & up	P# + SN + 4-digit code + Locator
Sun 10 Jun	PW 2m QRP	0900-1600	All	144	RS(T) + SN + Locator (5W max.)
Sun 10 Jun	UKuG mm-Wave	0900-1700	All	24-248G	RS(T) + SN + Locator
Sat-Sun 16-17 Jun	All Asian DX	0000-2359	CW	1.8-28	RST + age
Sun 17 Jun	WAB 6m Phone	0800-1400	Phone	50	RS + SN + WAB square
Sun 24 Jun	UKuG High Band	0600-1800	All	5.7/10G	RS(T) + SN + Locator

+ VHF Championship event. 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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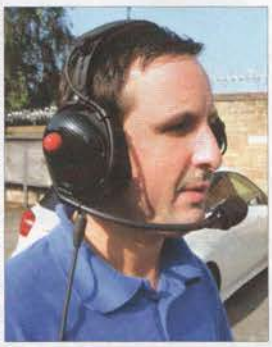

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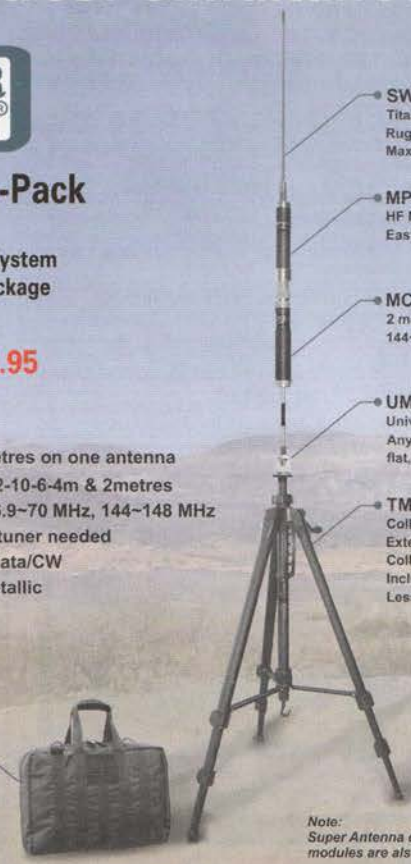

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HF Manual Sliding Coil
Easy set up to frequency

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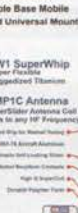

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Feature

APRS:
6228 miles from Idaho to Istria

PHOTO 1: View to the west towards the Adriatic.

PHOTO 2: SignalStuff 'Signal Stick' 2m/70cm antenna with tape for scale.

Background

The Automatic Packet Reporting System, APRS, is an amateur radio-based system for real-time digital communications of information of immediate value in the local area. Data can include Global Positioning System (GPS) coordinates, weather station telemetry, text messages, speed, and other telemetry.

APRS was originally invented by Bob Bruninga, WB4APR, a senior research engineer at the United States Naval Academy, in the 1980s.

This article is based on my recent use of a Kenwood TH-D74E handheld transceiver plus an additional portable antenna. It is *not* a technical review but simply a summary of observations whilst driving to (and whilst at) our holiday home in Istria, Croatia.

Although based in Surrey with my family, we have a holiday home in a village about 7km from the town of Porec (JN65TF), 450ft ASL with considerable visibility to the Adriatic Sea in the west (**Photo 1**) and towards the Dolomites to the north.

I use a simple dipole on my roof for HF but my VHF / UHF usage is currently the Kenwood handheld.

My own background is not in radio or electronics and my field of work is on the financial side. In the UK my radio interest is mostly VHF and UHF and I have made great friends at The Radio Society of Harrow (repeater GB3HR), who have supported and helped me greatly.

Antenna used

I use a Kenwood TH-D74E handheld with a dual-band SignalStuff **[1]** 'Signal Stick' antenna from the US (**Photo 2**). My experience is that these 18in antennas provide a potential 1 – 2dB gain compared with other similar antennas available. I am clear this antenna played a critical role in what was achieved and described here. They are strong and very flexible, being made from Nitinol, an alloy of nickel and titanium, and I think they are very reasonably priced at US $20 each (plus P&P) as of April 2018. If you decide to use one, it is crucial to keep your handheld radio perfectly still to avoid the antenna tip swaying back and forth. Please also treat these antennas with considerable respect from a safety point of view: a significant length of the antenna will be moving around above your head if you use raise the handheld to your face, posing a potential safety hazard to those around you!

I have used APRS handheld in my car and portable around my UK home and work QTH. Usually I pick up packets a few miles away from local stations travelling by my area. On occasion, I have picked up stations from the south coast and as far away as Belgium, though the latter is rare. For some reason my local pub, The Jolly Farmer in Weybridge, in a highly built-up area seems to act as some sort of a gateway and I have picked up signals from as far away as Bristol whilst the handheld was on the car dashboard with the Signal Stick antenna connected.

Our journey to Croatia

On our annual journey to Croatia last year, the portents seemed good. I sought and obtined operating permission on the ship across to Calais and received an APRS signal from EI7JQ, 190 miles away, whilst in the English Channel.

On account of the travel speed on the autobahn and the awful weather, I decided to remove the roof antenna on the first day. I placed it in a cup holder on the passenger side and the next day it appears I was tracked for some of the way. Rather promisingly, I could see when stopped in the Alps that the radio seemed to be reaching digipeaters from as far away as Hungary.

After 12 hours of wearying driving we finally arrived late in the evening in Buje, at 620ft ASL, in north Istria and stopped for a late evening meal. The first thing I noticed was that the radio was pinging within minutes on the table with almost 50 APRS packets coming through, mostly from the western part of Italy and beyond. **Figure 1** shows my main path radio settings used whilst at my holiday location. I did not use any special APRS settings apart from having 'smart beaconing' switched on, a data speed of 1200bps and the interval was 10 minutes.

FIGURE 1: The APRS main path radio settings used at 9A/M0ZCO. (The latitude and longitude data have been removed.) Source: APRS.fi.

Istria for a family and radio holiday

There is substantial detail on the net about Istria as a tourist destination. Flights from the UK are about 2.5 hours to Pula, Trieste or Rijeka. If you pack your HF radio or handheld and licence there are many mountains or beaches to set up on. Radio noise is low and the elevation does give great coverage across the sea and towards the horizon.

My experience on HF has led to contacts into the UK, Ireland, Belgium, Netherlands, Portugal and Germany on 28MHz despite the poor conditions and fading during the summer of 2017. I do sense you can 'pack a punch' from there – I have worked G stations on 21MHz on a portable tripod antenna sitting on the ground at my holiday home, despite the poor propagation conditions.

Istria has breathtaking scenery, the people are friendly and there are many levels of accommodation from package holidays, to campsites, to boutique and high-class accommodation and hotels. If you come here, do bring your UK licence but – if you see lightning out at sea or the locals packing up the restaurants in a hurry – it may not be a wise idea to play radio! The changeable conditions may also announce themselves through crackling and static.

Sample APRS data received in Istria Summer 2017

Time	Date	Distance Miles	Station ID	First Access Point	Last Access Points	NOTES
7.59	26th July	470	IR0DA-12	TCPIP	IW4EGP	
8.22	26th July	566	IR9BP	TCPIP	IW4EGP	Object
8.31	26th July	492	IT9UI	TCPIP	IW4EGP	Object
10.01	26th July	421	Statua IK8VKW	TCPIP	IW4EGP	Object San Francesco di Paolo 25 mt profondit
21.08	27th July	434	IR0UGL	TCPIP	IW4EGP	DMR Repeater Details
21.10	27th July	565	IR9BQ	TCPIP	IW4EGP	Fixed RNG0062 Repeater Details
21.14	27th July	6228	IDAFLS	TCPIP	IW4EGP	
21.29	27th July	500	IW9GTD	TCPIP	IW4EGP	MicE Moving 29 mph
18.23	28th July	494	IR8DA	TCPIP	IW4EGP	Fixed
18.41	28th July	573	IT9ZQL	TCPIP	IW4EGP	Fixed RNG0016 repeater details
9.24	29th July	494	IW8RGI	TCPIP	IW4EGP	MicE en route
9.32	29th July	197	IW2GUI	IR4BA		FTM - 400D In service 164 altitude
6.19	1st August	776	M0ZCO	IR4BA		
18.25	1st August	99	IZ4EFV	IR6UCA	9A4QV	TM-D700 Enroute plus facebook details
7.37	2nd August	131	IQ3LK	IR3BT	IK3SVW	Fixed Wx3IN1
17.03	2nd August	67	IR3DJ	IR3DP		APRS Venezia
17.30	2nd August	148	IR3UHI	IR3AO		
19.54	2nd August	104	IZ4ISN	IR4AS		Link Adriatico in DMR
19.59	2nd August	40	9A1DD	9A1DD	9A4QV	
19.57	2nd August	185	IW5CBL	IZ3VIV	IR3CA	Radio Club Spezzino Alt 4757
20.00	2nd August	101	IQ3CW	IR4U		Object IR3DP +Echolink details
19.57	2nd August	146	HFEST-146	IR4U		Mercatino Marzaglia 14 Magg object IQ4AX
19.56	2nd August	156	IZ4EKD	IQ4SC		
19.56	2nd August	116	IK3PQG	IR3CA		Rete Wifi Veneto 2.0

FIGURE 2: Summary of sample signals received on handheld in Istria. (Source: data from Kenwood screen shots.)

FIGURE 3: Screenshots from the Kenwood handheld of packet received from IDAFLS in Idaho, USA.

There are about 89 analogue VHF and UHF repeaters within 100 miles of this area. I have worked repeaters on my handheld as far away as 160 miles and have had a few friendly QSOs with Italian and Croatian operators. On the beach one day I reached a repeater in Slovenia, some 85 miles away. Sadly, though, listening to one or two of the Italian repeaters, it does appear they have the same challenges with abuse that we seem to increasingly have in the UK.

The peninsula of Istria is some 60km in width and 70km in length. My friend Igor Kizem, 9A7BBD, is secretary of the 9A1AAM Amateur Radio Club Rovinj [2]. He kindly gave me some details on the radio scene in this part of Croatia. He tells me that there are about 400 licensed operators in Istria and that there are six clubs in Pazin, Porec, Pula and Rovinj (the latter three locations are the main tourist centres). The preferred frequencies of use are 3.5 and 7MHz as well as VHF and UHF. Note that if you come during summer, you may not hear many local operators on HF as many operate radio only out of the busy tourist season. For details of repeaters available I suggest you download the RepeaterBook [3] or RFinder [4] to show what is available and the frequencies etc.

What I received on APRS

Figure 2 is a summary of sample signals picked up on the handheld at various times, along with the paths. For data simplicity purposes, I have used the main station identifier rather than the full callsign. As you can see the paths shown on the radio screen are diverse with some very long paths achieved both by digipeater and directly. The stations are a combination of clubs, individuals, weather stations etc received by direct RF or through a digipeater.

My main 'prize' this holiday was the packet received from IDAFLS in Idaho, USA, some 6200 miles away (Figure 3). This digipeated packet reached me from IW4EGP in Rimini (the 'radio' distance is some 100 miles). Given that the radio was on my couch behind balcony glass and Istrian stone walls that are over 16in thick, so I was quite surprised to receive this packet!

M0ZCO used the following digipeaters:

Callsign	Icon	User Pos	Digi Pos	Dist U->D	Dir U->D	Frames	First Heard	Last Heard
9A4QV-11		JN65UF	JN75BA	41.3 km	121 / ESE	3	2017-08-01 18:25:37	201 10-1 19:35
DB0DLG-10		JN58CL	JN58FM	19.6 km	72 / ENE	2	2017-08-19 14:53:35	201 08- 15:01
DB0HZG		JN48OQ	JN48MP	14.0 km	235 / SW	2	2018-04-08 14:07:40	201 04- 14:13
DB0KIT		JN49EA	JN49EA	1.7 km	58 / ENE	16	2017-08-19 16:51:58	201 08-1 05:37
DB0OFI		JN48OQ	JN48PR	8.9 km	75 / ENE	6	2017-08-19 16:06:28	201 04- 14:18
DB0RBB-10		JN48MR	JN48MQ	5.7 km	227 / SW	1	2018-04-06 17:18:55	201 04- 17:18

FIGURE 4: APRS.link screenshot showing some of the digipeaters used.

FIGURE 5: Screenshots from positionreport.de that tracked my entire journey from Croatia to UK.

I contacted the operator of IDAFLS, Steve Galbraith, KB7ITU, who was as surprised as me. He operates this and another APRS digipeater covering his area around Idaho Falls.

Figure 4 and Figure 5 are screenshots of internet data I found to show some of the places where your movements with your radio may show up. I particularly like the link from 'positionreport.de' that has tracked my entire journey. Figures 1 and 4 cover the APRS.fi website that collects information from the APRS internet system and presents it in various forms.

A few final points

If you operate APRS portable, I suggest you consider taking a manual GPS position and set this as the default position, then switch the GPS off. Live GPS will reduce battery life very quickly.

Don't forget your UK licence along with a copy of the local regulations, and be familiar with the places where operating under CEPT rules is allowed.

Setting your international prefix with APRS may be an issue: the 'fix' here appears to be to insert (in my case) 9A/M0ZCO into the text line so that you transmit according to the regulations.

APRS can be fun when travelling and height is your undoubted friend, even on a simple handheld with the stock antenna.

After 13 years of visiting Istria I can thoroughly recommend it as a holiday destination. There are significant radio possibilities on account of its topography, access to the sea and wide horizons. Happy operating.

Websearch

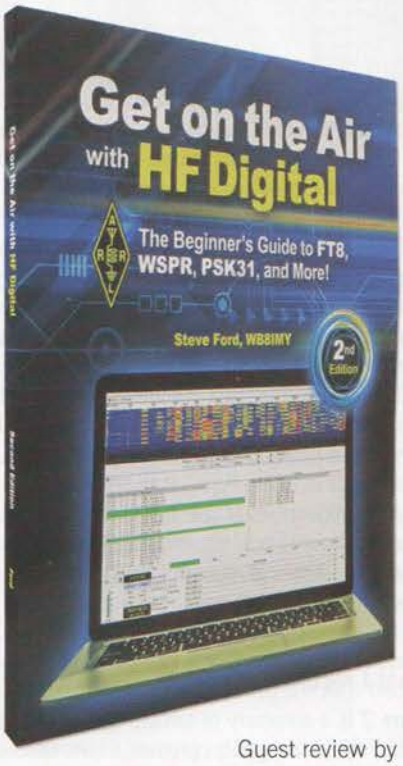
[1] SignalStuff, manufacturer of 'Signal Stick' antenna: https://signalstuff.com
[2] Amateur Radio Club Rovinj, 9A1AAM on Facebook.
[3] RepeaterBook: www.repeaterbook.com
[4] RFinder: www.rfinder.net

Conor O'Broin, M0ZCO
Conor@financialfront.co.uk

Book Review

Get on the Air with HF Digital

by Steve Ford, WB8IMY



Get on the Air with HF Digital is a down-to-Earth, practical guide to getting going and operating with digital communications on the HF amateur bands. It starts by walking through choosing a suitable transceiver for data communication and discussing the pros and cons of various computer types, including the latest tablets. Steve then shows how the computer is interfaced to the radio for audio and digital control of PTT, plus other areas, covering the various pitfalls and trade-offs in some detail. A number of homebrew and commercial designs for interfaces are described. The use of COM ports for PTT interfacing is covered in some depth, looking at both 'real' and 'virtual' options, along with various steps towards eliminating computer interference.

When it comes to on-air operations, there are individual chapters for PSK31 and RTTY, the latter including contest and DX-chasing techniques. A chapter on the WSJT-X suite covers just the two modes used for HF: JT65 and the latest mode, FT8. Two weak-signal HF chat modes, MFSK and Olivia, are also described in detail. To add a bit of variety, there is a dedicated chapter for PACTOR. Although hardly used in this country these days, it is popular among emergency communications groups around the world and has a larger user-base in the USA.

Finally, WSPR operations are described in depth, including options like small beacon sources and the Raspberry Pi, with emphasis on the necessity of ensuring the spectral purity of these simple transmitters and the need to keep them at low power. There are notes on maintaining the stability and frequency accuracy needed for WSPR and digital communications generally.

Appendices cover RTTY contesting in more detail, operating with Olivia, and a homebrew VOX-PTT interface. Finally, there are details of setting up SDR transceivers and interconnections for WSJT, including CAT control and the use of virtual serial and audio cable software.

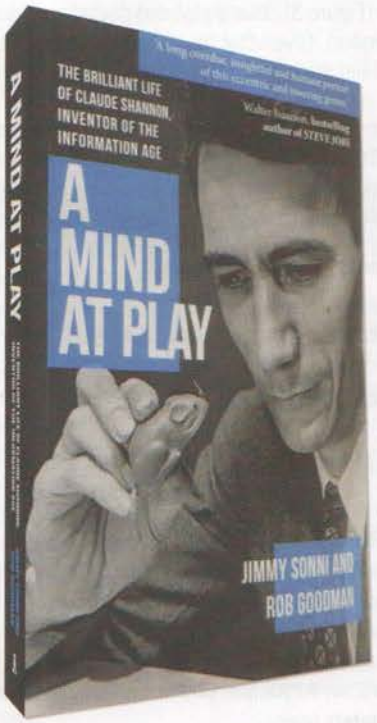
Although primarily for the US reader, as the book is specifically aimed at HF digimodes most of what it covers, including most frequency and band-planning, is applicable world-wide. Very little needs to be read with a copy of the UK licence conditions to hand. All-in-all, it's a very useful handbook for anyone, whether new to or experienced in digital communications.

Size: 184 x 227mm, 144 pages, ISBN 9781 6259 5083 3
Non Members' Price: £22.99, RSGB Members' Price: £19.54

Guest review by
Andy Talbot, G4JNT

A Mind at Play

By Jimmy Sonni & Rob Goodman



It is not often that we review biographies and even less common that they are of figures that have influenced the world in such a fundamental way as Claude Shannon. He is the largely-unsung inventor of the Information Age. His paper, 'A Mathematical Theory of Communication', created a technological vision that led to the computer age, the internet, email and more.

This biography describes the man and his works. Starting with a child that turned the barbed wire of his country farm into an electrically charged communication system, it progresses through his career and breath-taking thoughts. Before the work for which he is most remembered there was an unpublished dissertation that theorised about DNA sequences (decades before Watson & Crick's work). In WWII he worked on fire control systems for anti-aircraft batteries – and worked with Alan Turing. He is, though, best remembered for his work on communications theory at US telecoms giant Bell Labs. After 15 years there Shannon moved onto MIT and continued ground-breaking work. He also developed some more outlandish ideas including a 'sarcasm machine' and a device that predicted roulette results (which, in the days of the Mob, saw him beat a hasty retreat from a Las Vegas casino). He built unicycles and even a flame-throwing trumpet. There was much more unpublished work such as a theory about the mathematics of juggling – and the maths that he used to make his fortune on the stock market.

Claude Shannon was without doubt a huge intellect and the father of the information age. This book is an immensely readable account of his life and works and is highly recommended.

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DX-SR9
Easy to use HF transceiver with SDR capability
RRP £599.95 NOW ONLY **£499.95**

DX-R8E
- 150kHz-34.999MHz
- AM/FM/LW/MW/CW LSB/USB

Top selling desktop HF communications receiver
£469.95

DJ-G7E
Tri-band Radio, die-cast chassis
- 2m/70cms/23cms
- 1000 memory channels
- Full duplex

£299.95

DM-30E
Lightweight 30A Switch Mode Digital Volt/Amp meter
£89.95

DM-330MW MkII
30A Deluxe Supply variable voltage, low noise, extra filtering
£129.95

DR-735E
Twin Band Mobile 'Rainbow' display, VHF/UHF transceiver
- Extended RX 108-174MHz, 400-479MHz
- Power 50/20/5W output

£299.95

More Alinco

DR-138HE	VHF/FM mob TX 144-148MHz £169.95	DJ-500E	Dual Band 5W H/Held Li-Ion Battery £129.95
DR-185H	VHF/FM TX 136-174MHz £169.95	DJ-AXD1	VHF DMR Digital Handheld £149.95
DX-R8E	HF comms RX £469.95	DJ-AXD2	UHF DMR Digital Handheld £149.95
DM-330FXE	30A standard switch mode supply £119.95	DJ-MD40	UHF commercial grade DMR H/Held £159.95
DJ-175E	2m 5W Rugged handheld ~~£109.95~~ £99.95	DJA-446	PMR446 Licence free Handheld £79.95

KENWOOD

TS-590SGE
160- 6M Transceiver with ATU. Cracking performance for the money!
LATEST VERSION
£1299.95

Kenwood TS-480SAT
100W Mobile/Base
Still as popular as ever!
• HF + 6m • Built-in ATU, DSP
£849.95

Kenwood TH-D74E
Dual Band Handheld with APRS and Digital (D-STAR) capability
• Built in GPS
IN STOCK!
Soft Case....£29.95
£599

TS-480HXE
Powerful 200W Mobile with DSP noise reduction
160-6m Transceiver
£899.95

More Kenwood

MC60A	Classic desktop microphone £122.95	SP23M	Mid-Size external speaker £68.95
MC90M	Deluxe desktop microphone £189.95	MC43S	Handheld Microphone – 8pin £24.95
HS-6M	Lightweight Headphones £35.95	KES-3W	5W extension speaker (50x90mm) £27.95
HS-5W	Deluxe Headphones £69.95	SO3-W	TCXO unit for TS-590 £99.95

TYT

MD-9600
Dual Band DMR mobile Transceiver. Supplied with software & cable
£279.95

MD-UV380
NEW Dual Band DMR Handheld
GPS version £149.95
Non- GPS £139.95

SKY-ONE 5W SDR Transceiver

A superb receiver with direct conversion, razor-sharp adjustable filters, noise reduction, noise blanker, audio equalizer and band scope. Speech processor, audio equaliser and hand mic included.

- All Modes
- 160m - 6m (incl. 60m)
- 7 LP & 7 Bandpass Filters
- Electronic key
- Size: 147 x 60 x 107mm
- Weight: 580g

£699

AMERITRON

AL-811HXCE
800W HF Amp
~~£1199.95~~ **£1099**

AMPS

AL-811XCE	600W HF amp £949.00	ALS-500MXCE	500W Solid State £1128.00
ARB-704	Amp to rig interface £65.00		

REMOTE SWITCHES

RCS-4X	4 Way 2.5kW £169.95	RCS-4LX	4 Way w/lightning pr £216.00
RCS-8VX	5 Way 5kW £183.00	RCS-10X	8 Way 5kW £194.00
RCS-10LX	8 Way 5kW (lightning) £237.00		

DUMMY LOADS

ADL-1500X	1.5kW (no oil supplied) £59.95	ADL-2500	2.5kW w/cooling fan £237.00

SWR/POWER METERS

AWM-22	200W 1.8-200MHz £96.95	AWM-30B	3KW 1.8-200MHz £159.95

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Generous Part Exchange or Cash waiting for your used Gear

ELECRAFT

K3S HF+6m transceiver
Latest version with many improvements
Available in kit form or fully built 10W or 100W versions - your choice.
2 year Warranty!

From **£2199** in kit form

K3S HF+6m transceiver		
K3S/100-F	100W (Assembled)	£2849
K3S/10-F	10W (Assembled)	£2329
K3S/10-K	10W (Kit)	£2199
K3S/100-K	100W (Kit)	£2699
KX3 160-6m all modes + DSP		
KX3-K	(Kit)	£1099.95
KX3-F	(Fully assembled)	£1149.95
KX2	80-10m 10W (Assembled)	£899.95
KPA-500 160-6m 500W Amplifier		
KPA-500	(Kit)	£2449.95
KPA-500	(Assembled)	£2649.95

Large stocks of Elecraft accessories - call!

ACOM

NEW ACOM A1200S
- 1.2kW solid state amp
- Covers 1.8-54MHz

£2895

ACOM A600S
600W solid state amp
- Covers 1.8-54MHz
- Weighs just 12kg

£2399.95

NEW

ACOM ATU-04AT
1.5kW Remote ATU
Covers 1.8-54MHz, weatherproof, 4-way antenna switch.
Works only with Acom Solid State Amps
No extra cables required

£1099

BEKO

HLV-950
Dual Band solid state amplifier
- Covers 50MHz & 70MHz
- Output 1kW for input from 1W to 25W

£2575

German engineered - high spectral purity

Pre-Amps
HPP-144 2m pre-amp
2.5kW thru power ..... ~~£669~~ £599
HPP-432 70cms pre-amp
2.5kW thru power..... ~~£669~~ £599

Amplifier
HLV-350-7 ...400W 23cms 7W drive power £2,695
HLV-770 .....770W 70cms amplifier £2,595

PALSTAR

AT-2K
- Covers 6-160m • Output: 2000W PEP
- Optional 4:1 Balun for
- Balanced Wire Feeders

£599.95

More Palstar

AT-5K	3.5kW manual tuner	£1249.95
AT-4K	2.5kW manual tuner	£1024.95
DL-1500	1500W high power dummy load	£199.95
BK4C/1:1	4kW 1:1 ratio current balun	£99.95
BK4C/4:1	4kW 4:1 ratio current balun	£99.95

CUSHCRAFT

MA6B
2 element 6 Band Beam
- 20/17/15/12/10/6m
- 7ft Boom
- Power: 1,500W

£699.95

HF Beams

A3S	10/15/20m 3 el. 1.5kW	£629.95
A-743	40/30m add on kit for A3S	£209.95
A3WS	12/17m 3 el. 1.5kW	£599.95
A-103	30/40m add on kit A3WS	£229.95
A4S	10/15/20m 4 el. 1.5kW	£749.95
A-744	30/40m add on kit for A4S	£219.95
TEN-3	Skywalker 3 el 10m 1.5kW	£329.95

20% DISCOUNT this MONTH — Hy-Gain - USA

Using T-6061 Aluminium - built to last! Designed by G0KSC

Compact Dual Band 4/6m Yagi

- 8 el (4 per band)
- Gain: 8.52dBi 50MHz 7.86 dBi 70MHz

~~£299.95~~ **£239.95**

New 6M LFA Yagi

LFA-6M4EL
- Gain: 10.7dBi
- Length: 3.9m

~~£379.95~~ **£299.95**

LFA-6M5EL
- Gain: 11.8dBi
- Length: 6.2m

save £100

~~£499.95~~ **£399.95**

PRO Antennas

Dual Beam Pro
Covers:
20, 17, 15, 12, 11, 10 plus 6m (with a suitable ATU)
- Power: 1kW 600W 30/40m)
- Turning radius: 2.5m
- Overall span of main element: 5.0m

£249.99

I-Pro Home
Very efficient Vertical covering:
20, 17 ,15, 12, 11, 10 plus 6m (with suitable ATU)
- Height: 5.0m
- Span of end elements: 2.5m
- Weight (inc matching unit) 4.5kg
- Power: 1kW PEP

£259.99

InnovAntennas

NEW

XR6 MkII 11 Element HF plus 6m Yagi
- 20/17/15/12/10/6m
- Boom just 3.5 metres
- Power: 5kW plus!

£1195

DB-664	6/4m dual band 3+3 el	£149.95
4-2-12	2/4m dual band 7/5 el	£199.95
144LFA-9	2m 9 element LFA beam	£195.00
144LFA-Q	2m 2 element quad	£69.95
100log-750	Log periodic 100-750MHz	£199.95

See our website for more InnovAntennas

APACHE LABS

- Improved receiver
- 100W TX with Specs. 'off the chart'
- Pure signal mode for ultra-clean TX
- Ultra-low phase noise Receiver
- Two 16 bit phase synchronous ADCs
- True diversity reception & more!

NEW ANAN 7000DLE
100W SDR
On display in our showrooms - pop in and have a play!

FREE UK MAINLAND DELIVERY!

£3099.95

Peter Hart says: "excellent audio quality" "Impressive pan adaptor and waterfall displays"

ANAN 8000DLE
Top of the range
HF & 6m 200W SDR Transceiver

- Astounding IMD performance
- Pure Signal (Predistortion) for clean TX
- Diversity reception with 2 x DDC

FREE UK MAINLAND DELIVERY!

£3999.95

ANAN 100DE **Used but in excellent condition!**
100W SDR covers HF plus 6 metres - 6-month warranty
£1499

CN-901HP
Professional Quality Cross Needle Meter
- 1.8- 200MHz, Power 20/200/2kW
- Reads Average & PEP power

£129.95

More Daiwa

CN-801VN	140-525MHz 20/200W N type	£119.95
CN-103LN	140-525MHz 20/200W N type	£89.99
CN-501H	1.8-150MHz 15/150/1.5kW	£89.99

DAIWA SWR Meters

CN-101L
- Freq: 1.8-150MHz
- Power: 15/150/1.5kW

£89.99

CN-501H2	1.8-150MHz 20/200/2kW	£89.99
CN-501VN	140-525MHz 20/200W N type	£89.99
CN-901	1.8-200MHz, Power: 20/200/2kW	£129.95

High Quality Switches

CS-201A	2Way 600MHz, 1kW SO239	£24.95
CS201G11	2 Way 1.3GHz, 1.5kW HF N type	£39.95

Morse Keys

Bencher BY-1 — Vibroplex Iambic Standard — HK-708

Bencher

Bencher BY-1	£189.95
Bencher BY-2	£239.95

Vibroplex Keys

Iambic Deluxe Single lever Chrome	£239.95
Iambic Standard Single lever Black	£179.95
Iambic Standard Paddle Black	£179.95
Iambic Code Warrior Junior Black	£169.95
Iambic Code Warrior Junior Satin	£189.95
Vibrokeyer Standard single lever Black	£189.95
Vibrokeyer Deluxe single lever Chrome	£239.95
Hand Key Standard Eco Black	£179.95
Hand Key Deluxe Chrome	£229.95

Hi Mound

HK-705 Affordable Hand Key	£42.95
HK-708 Quality Hand Key	£69.95
HK-709 Deluxe Hand key with heavy base	£79.95

MFJ

MFJ-422D Bencher Curtis Keyer combo	£224.95
MFJ-490X Memory Keyer + Bencher Paddle	£143.95
MFJ-564 Iambic Paddle Chrome	£82.95
MFJ-557 Morse Key + Oscillator	£47.95
MFJ-550 Basic Hand Key	£17.95

MetroVna

DELUXE Network Antenna Analyser with Bluetooth connectivity
- Frequency: 1-250MHz
- Measures: SWR, R, Z, X, phase, filters, return Loss Transmission Loss Bluetooth & USB

£274.95

PRO Model.....Covers 1 - 180 MHz..... £244.95

nevada Telescopic Masts

33 ft	Aluminium 7 ft. retracted	£99.95
26 ft	Aluminium 5.5 ft. retracted	£89.95
20 ft	HD Fibreglass 5.5ft retracted	£179.95
30 ft	HD Fibreglass 7.5ft retracted	£249.95
50 ft	HD Fibreglass ...8ft retracted	£349.95

Cables & Wires

Ecoflex 15
per metre.....£6.45 price per 102m drum £579
PL259 connector (Part: 7350).....£8.95
N type connector (Part: 7395) £9.95

Ecoflex 10
per metre.....£3.79 price per 102m drum £345
PL259 connector (part: 7378).....£5.95
N type connector (part: 7367) £6.50
BNC type connector (part: 7379) £6.50

Aircell 7
per metre.....£2.99 price per 102m drum £269
PL259 connector (part: 7390).....£2.65
N type connector (part: 7392) £5.25
BNC type connector (part: 7391).....£5.25

Aircell 5
per metre.....£2.75 price per 102m drum £247
PL259 connector (part: 7760).....£2.25
N type connector (part: 7700) £3.95
BNC type connector (part: 7720) £3.25

OTHER 100M DRUMS

Westflex 103	Ultra low loss	£159.95
RG-213 (Cabnex)	Low loss high quality	£99.95
RG-213U	Mil spec	£116.00
RG-Mini 8	Super XX	£59.95
RG58/CU	Mil spec	£39.95
450 Ohm	Twin feeder	£89.00
300 Ohm	Twin feeder	£76.50
Coated flexweave	Antenna wire	£59.95

Nevada Antenna Wire

Military style, low visibility, antenna wire, uses central fibres of Aramid (Kevlar) for incredible strength.
Chrome Green finish

Nevada 28	2.8mm 2kW	per metre £0.99
Nevada 28D	2.8mm 2kW	100m Drum £89.95
Nevada 32	3.2mm 5kW	per metre £1.20
Nevada 32D	3.2mm 5kW	100m Drum £99.95

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YAESU FT7250
Dual Band Radio
50W Digital/Analogue
Fusion 11 compatible
Civil Airband RX coverage
£229.95

T-320
Handheld version **£229.99**

INRICO
TM-7 Network Mobile Radio
Use the new IRN network to access Echolink, Team speak and Zello. Uses 3G or Wi-Fi
£159.99

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BIGGER CHOICE • BETTER SERVICE • FAST DELIVERY • BEST UK PRICES!

COMET

H-422
Rotary Dipole covers: 7, 14, 21, 28MHz
1kW PEP, 10.3m (straight), 7.4m (Vee)
£289.95

CHA-250BXII
Wideband Vertical Antenna

Latest version - ideal for small gardens. Works with or without radials, (depending on mounting). High quality construction (beware cheap imitations)

- TX: 3.5-57MHz
- RX: 2–90 MHz
- Power: 250W (max) SSB
- Length: 7.13m

£349

CAT-273
VHF/UHF Antenna Tuner
- Covers: 120-150MHz VHF 340-450MHz UHF
- Reads: AVG & PEP power
- Two antenna inputs

£169.95

CAT-300
HF+6m Antenna Tuner
- Frequecy: 1.8-60MHz
- Power: 30W/300W
- Reads: AVG & PEP power
- Cross needle

£199.95

HF BASE ANTENNAS
H-422.....Trap Vee Dipole 7/14/21/28MHz 289.95
CHA-250BX11....3.5 - 57MHz (RX: 2.0 - 90MHz).....349.00
CWA-1000...Multi Band dipole 3.5/7/14/21/28MHz....124.95

VHF/UHF FIBREGLASS BASE ANTENNAS
GP-15N....50/144/430MHz, length 2.4m N Type 99.95
GP-1M .....144/430MHz length 1.2m (SO239).....49.95
GP-3M .....144/430MHz, SO-239 Lgth 1.78m (SO239)...59.95
GP-6M .....144/430MHz, SO-239 Lgth 3.07m (SO239)...99.95
GP-93N....144/430/1200MHz, Length 1.78m N Type ...99.99
GP-9M .....144/430MHz SO-239 Lgth 5.15m (SO239) .149.95

VHF/UHF BEAMS
CYA-1216E....6 Element 1200MHz, N Type.....99.95
CA-52HB.....2 Element HB9CV for 50MHz 79.95
CA-52HB4....4 Element HB9CV for 50MHz 129.95

HF MOBILE ANTENNAS
UHV-4 .....Whip 28-29/52/145/430MHz.....89.95
UHV-6 .....Whip 7/21/28/50/144/430MHz.....99.95
L-18 .....18MHz Coil for CA-UHV/UHV-6 .....25.95

VHF MOBILE ANTENNAS
CA-285 ....50/144 MHz, 1.32m 300W.....25.95
CSB7900...144/430MHz 5.1/7.7dBi 1.56m 150W 69.95
SB-15.....50/144/430MHz 2.15/4.5/7.2dBi 1.53m 120W..49.95
SBB-2.....144/430MHz, 2,15 / 3.8dBi 0.46m 60W .29.95
SBB-4.....144/430MHz, 3.0 / 5.5dBi 0.92m Black.....39.95
M-24M ....144/430MHz Magnetic Mount c/w Coax ...36.95

ANTENNA TUNERS
CAT-10.....Mobile 3.5-50 MHz, 10W (CW) 99.00
CAT-273 ...144/430MHz, 250W (PEP).....169.95
CAT-300 ...1.8-56MHz, 300W (PEP).....199.95

BALUNS
CBL-1000..1.7-30MHz, 1kW/CW 34.95
CBL-2500..1.8-56MHz, 2.5kW/CW 39.95

LOW PASS FILTERS
CF-30MR..1.8 - 32MHz, 1kW/CW 59.95
CF-50MR..1.8 - 57MHz, 1kW/CW 59.95

DUPLEXERS
CF-360A...1.3-30/49-470MHz 2xleads SO239 socket..49.95
CF-4160B.1.3-170/350-540MHz SO239 N Type, SO239....39.95
CF-416A.1.3-170/350-540MHz SO239 + 2 x PL259 leads..39.95
CF-416B..SO239 + 1 x PL259/N leads.....39.95
CF-503C..1.3-90/125-470MHz, PL259 lead, 2xSO239 ...49.95
CF-530....1.3-90/125-470MHz 2x SO239,PL259 lead ...49.95
CF-530C..1.3-90/125-470MHz, SO239 2 x PL259 lead..49.95
CF-706....1.3-57/75-550MHz,SO239, 2 x PL259 leads...49.95
CF-706N..1.3-57/75-550MHz, SO239 N type, PL259 leads.49.95

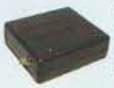
CROSS NEEDLE SWR/POWER METERS
CMX-200..1.8-200MHz, 30/300/3k.....79.95
CMX-400..140-525MHz, 30/60/300W 89.95

SDR Receivers

NEW

AIRSPY HF+
HF/VHF SDR Receiver
One of the very best for weak signal reception and strong signal handling
- 9kHz- 13MHz
- 60 MHz - 260MHz

£229.95



SDRplay RSP-1A
HF/VHF SDR Receiver
New entry level model with great performance
1 kHz-2GHz **£89.95**

SDRplay RSP2 ..1kHz - 2GHz 2 antennas.....£156
SDRplay RSP2 ..Pro as above w/Steel case...£189.95

SMArt XTR Premium Low cost high performance SDR, 65MHz-2300MHz (gap @ 1100MHz).....£49.95

Free Delivery (UK Mainland)

AOR Scanner

NEW

AR-DV10
Digital Handheld Scanner
- 100kHz-1300MHz analogue and digital modes
- 10 Digital Modes
- TETRA, P25 (Phase 1+2), DMR, Mototrbo, dPMR, NXDN, D-STAR, Alinco, Yaesu
- IPX5 water resistant
- Auto detection of digital modes
- Micro SD card slot for recording, backup and updates
- Lithium-ion battery, charger, belt clip
- Memory data management software

£999

MFJ We hold HUGE STOCKS!

If you don't see it in the list below, visit our web site for lots more!

MFJ-1836
6 Band Cobweb
20m-6m 300W
£229.95

MFJ-1836H ..Cobweb 20-6m 1.5kW £269.95
MFJ-1838.....Cobweb 40-6m 1.5kW.....£419.95

NEW

MFJ-1846
6 band Hexbeam
20-6m 1.5kW
11ft radius
£499.95

MFJ-1848 Hexbeam .....40-6m 1.5kW.....£699.95

225.....1-180MHz graphic analyser £349.95
226.....Graphic analyser (1-230) MHz £399.95
259C.....HF/VHF portable antenna analyser....£329.95
266C.....New style HF/VHF/UHF analyser.....£424.95
269C.....HF/VHF Digital Analyser £399.95
385B.....Deluxe Comms. Speaker.....£47.95
407D.....Deluxe CW Keyer.....£88.95
461.....Morse Reader-pocket sized £99.95
492-X.....CW Memory Keyer.....£148.95
550.....Popular Morse code practice key £19.95
557.....Morse code key with oscillator.....£47.95
826B.....Digital SWR/Wattmeter.....£198.95
912.....Remote 4:1 balun box £77.95
921.....2m Antenna Tuner £99.95
923.....2m Tuner & SWR/Power.....£219.95
931.....Artificial ground unit.....£121.95
934.....300W Tuner + artificial ground.....£231.95
941E.....300 Watts max Versa Tuner II.....£159.95
945E.....1.8-60MHz 300W manual tuner.....£145.95
948.....300W PEP reading antenna tuner.....£187.95
949E.....300W tuner + Dummy load.....£199.95
959C.....Receive antenna tuner + pre-amp.....£145.95
969.....300W tuner 160-6m £253.95
971.....Portable Ant. tuner 1.8-30MHz.....£143.95
986.....1.5kW HF tuner.....£399.95
989D.....1.5kW HF tuner.....£451.95
993B.....Auto Tuner 150W/300W.....£297.95
994BRT.....600W remote Auto Tuner.....£440.95
998.....1.5kW Auto Tuner 1.8-30MHz £771.95
998RT.....1.5kW remote Auto ATU.....£848.95
1020C.....Tunable Active Antenna £110.95
1025.....Noise canceller/signal enhancer £199.95
1026.....QRM eliminator + active antenna.....£220.95
1118.....High Current DC Multi outlet.....£94.95
1700C.....6 Way coax switch.....£132.95
1701.....6 Way coax switch 2kW (SO239) £89.95
1704 (P).....4 way coax switch 2.5kW (SO239) £94.95
1704 (N).....4 way coax switch 2.5kW (N type).....£99.00
1705H.....RF By-pass switch.....£32.95
1707.....Auto RF sensing Ant switch £99.95
1708.....RF Sensing T/R Switch.....£89.95
1763.....3 Element 2m beam £60.95
1782X.....Super Loop 10-30 MHz £479.95
1786X.....Loop (10-30)MHz 3ft dia.....£529.95
1788X.....Loop (7-21)MHz 3ft dia.....£589.95
1799X.....9 Band vertical £440.95
1868.....Discone antenna with cable.....£79.95
2980.....Wire vertical (40m-6m).....£99.95

nevada

QUALITY POWER SUPPLIES
2 YEAR WARRANTY!

PS-40M Linear
- 40A (max) with meter
- Voltage: 1.5-15V DC
- Cigar adaptor output

£129.95

PS-30M Linear
- 30A (max) with meter
- Voltage: 3.0-15V DC
- Cigar adaptor output

£99.95

PS-08 .....Linear 8A (max) 13.8V DC £34.95
PSW-50 ....Switch mode 50A (max) 9-15V DC....£129.95
PSW-30 ....Switch mode 30A (max) 9-15V DC.....£79.95
PSW-30H...Switch mode 30A (max) 9-15V DC.....£69.95
PS23-SW1.Switch mode 23A (max) 13.8V DC £59.95
PSW-07 ....Switch mode 7A (max) 13.8V DC £29.95
PSW-04 ....Switch mode 5A (max) 13.8V DC £24.95

TYT Digital Radio

NEW

TYT MD-2017
Dual Band Digital
- DMR digital & Analogue
- Dual time slot
- Colour screen
- Large frequency display
- Commercial grade
- IP67 waterproof rating

SPECIAL OFFER £149.95

1kW End Fed Antennas

MyAnt EFW 80-10
Resonant on 80/40/30/20/17/15/10m
NO ANTENNA TUNER REQUIRED! Length: 130ft

MyAnt EFW 40-10 **£159.95**
Resonant on 40/20/15/10 + WARC with tuner Length: 63ft **£149.95**

MASTRANT

Quality Guy Ropes & Accessories
Full range in stock!

P type Ideal for general guying polyester braided rope with twisted cores

P2..2mm 100kg B/s £14.95
P3..3mm 200kg B/s £21.95
P4..4mm 400kg B/s £29.95
P5..5mm 500kg B/s £46.95
P6..6mm 850kg B/s £79.95
P8..8mm 1,300kg B/s £89.95

M type Thinner higher performance with Dyneema (Kevlar style) centre core

M2 ..2mm 240kg B/s £31.95
M3 ..3mm 100m 390kg £49.95
M4 ..4mm 900kg B/s £119.95
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Annual RSGB trophy presentations

The Founders Trophy went to ETCC Chairman John McCullagh, GI4BWM.

Dr John Rogers, M0JAV receiving the Courtenay-Price Trophy on behalf of his EMC team.

The Ostermeyer Trophy was awarded to Michael Booth, G8HKS for his *RadCom* article on his Arduino-based SWR analyser.

Stealth beam work earned Chris Zeal, G4BGM the Bennet Prize.

At the AGM the RSGB President, Nick Henwood, G3RWF presented the major Society trophies for 2017. These recognise the contribution and achievements of appointed volunteers, Members and eminent radio amateurs.

The Founders Trophy is awarded for outstanding services to the Society. It was presented to John McCullagh, GI4BWM for his many years' service as the Chairman of the Emerging Technology Coordination Committee (ETCC).

The Norman Keith Adams prize is for the most original article published in *RadCom* in 2017. It was awarded to Noel Matthews, G8GTZ for 'The Portsdown Digital ATV Transmitter'. It is hoped to present this at the RSGB Convention.

The Courtenay-Price Trophy, awarded for the most outstanding published technical contribution to amateur radio in 2017, was presented to Dr John Rogers, M0JAV (Chairman of the EMC Committee) and the EMC team for the VDSL Study.

The Ostermeyer Trophy is awarded for the most meritorious description of a piece of home constructed or electronic equipment published in *RadCom* in 2017. The cup was presented to Michael Booth, G8HKS for 'Arduino based SWR Analyser'.

The Bennet Prize for a significant contribution or innovation which furthers the art of radio communications was presented to Chris Zeal, G4BGM for his work on the Moxon Rectangle stealth beam for 20m.

The Wortley-Talbot Trophy is awarded for the most outstanding experimental work in amateur radio. It was presented to Joe Taylor, K1JT; Steve Franke, K3AN; and Bill Somerville, G4WJS for the *RadCom* article 'Work the World with WSJT-X'.

The Kenwood Trophy for a significant contribution to training and development in amateur radio within the UK was awarded to Essex Ham, represented by Peter Sipple, M0PSX. It recognises the work they have done since their launch in 2011 to promote, support and share amateur radio as a hobby, in particular providing online training materials that have formed the basis for very many amateur radio licence courses at clubs throughout the UK.

The Harold Rose Plate is awarded for an outstanding contribution to 50MHz. It was presented to Jim Bacon, G3YLA for his great work uncovering the weather-related mechanisms which drive Sporadic-E.

The Don Cameron Award for an outstanding contribution to low power amateur radio communication was presented to Roy Kavanagh, GM4VKI for his inspiration and encouragement to many QRP operators.

The Louis Varney Cup for advances in space communication was not awarded this year.

The Fraser Shepherd Award is for research into microwave applications for radio communication. It went to the late David Powis, G4HUP for the development and provision of SDR interfaces (as well as other contributions including helping enthuse people about surface mount construction). The plaque was received by Graham Murchie, G4FSG on behalf of Dave's family.

The 1962 Committee Cup, for outstanding amateur development at VHF/UHF, was awarded to Chris Deacon, G4IFX for research into polarisation changes of VHF signals in the ionosphere.

Joe Taylor, K1JT (right) and Bill Somerville, G4WJS (L) receiving the Wortley-Talbot Trophy.

The Kenwood Trophy was received by Peter Sipple, M0PSX on behalf of Essex Ham.

Jim Bacon, G3YLA being presented with the Harold Rose Plate for 50MHz work.

The Don Cameron Award for low power communication went to Roy Kavanagh, GM4VKI.

Graham Murchie, G4FSG accepted the Fraser Shepherd Award on behalf of the family of the late David Powis, G4HUP.

VHF/UHF polarisation research earned Chris Deacon, G4IFX the 1962 Committee Cup.

Colin Thomas, G3PSM receives the Roy Stevens G2BVN Award from IARU President Don Beattie, G3BJ. *All photos courtesy of Steve Hartley, GOFUW.*

The Jack Wylie Trophy is awarded to the Scottish club, society or RSGB member thought to have done the most for amateur radio in Scotland during the past year. It went to Chris Tran, GM3WOJ who is an active contester based in the north-east of Scotland. The cup had already been presented at the GMDX Convention.

The Jock Kyle Memorial Trophy is for the Scottish club, society or RSGB member thought to have done the most in Scotland in the field of VHF in the past year. It was awarded to Ian White, GM3SEK, a prolific experimenter who is very active particularly on VHF and VHF contesting in Scotland. The trophy had also already been presented at the GMDX Convention.

One of the Society's most prestigious trophies, the Calcutta Key is awarded for outstanding service to international friendship. This year it was won by the Dayton Amateur Radio Association who, every year since 1952, have sponsored and organised the Dayton Hamvention. This event brings in amateurs from across the world and encompasses and welcomes participants in every aspect of amateur radio. Not only is there the main event, which attracts nearly 30,000 people, there are also many side-meetings and dinners held during and immediately before the event which provide a basis for special interest groups to meet. The award will be presented at the next Dayton Convention.

Following the RSGB awards, Don Beattie, G3BJ, the President of IARU Region 1, presented a very special award to Colin Thomas, G3PSM. The Roy Stevens G2BVN Memorial Award had only previously been made 10 times in 35 years, which underlined the monumental contribution Colin had made to the work of the IARU over the years.

Design Notes

Well! I was certainly taken to task after signing off May's column with the name for positioning satellite modules. Shortly after that was published, three emails arrived from readers pointing out that the correct name is Global Navigation Satellite System, or GNSS, receivers. Hence the 'N' replacing the 'P' in the SGPRMC string.

Amongst the emails was one referring to a study made into the impact of disruption to the GNSS system [1]. The report is in the public domain and makes fascinating reading, showing just how reliant the world has now become on such systems, perhaps *too* over-reliant now.

ICOM CAT Interface

I recently had to help GOAPI interface his IC-746 transceiver to a PC for Computer Aided Transceiver control (CAT) [2]. In particular he needed to set up the WSJT software to allow automatic tuning for correcting Doppler shift while working EME. John had a standard COM port RS-232 connector on his PC that was already being used for PTT or Tx / Rx switching and needed a suitable bit of circuitry to interface to the ICOM standard CI-V port. The ICOM CI-V interface is less used now that the latest generation of radios have USB ports with internal serial converters and sound cards, but the older equipment appears regularly on the secondhand market and is every bit as useful, so worth describing.

Amongst the big three manufacturers, ICOM's CI-V interface is unique in having just two wires, ground plus signal, connected via a 3.5mm jack on the rear panel. It carries bidirectional signalling, reading frequency and other information from the rig to the PC direction and sending new commands to set frequency or mode etc. A relatively complex signalling protocol is used, involving header and terminator bytes, rig and controller addresses and information in binary / BCD format. We don't need to go into the signalling format here – the WSJT suite (and any other software) looks after that when an IC-746 is specified.

The RS-232 connection, which is a 9-way D-Type male connector on the PC, carries four signals of interest for this application. Transmit data, TXD on pin 3, outputs serial data from the PC that has to ultimately go to the rig. Received Data, RXD on pin 2, carries data from the rig in the opposite direction. Ground is on pin 5. Those are the important ones, but there are two more control signals, both outputs from the PC, that are useful but not essential. They are Request to Send (RTS, on pin 7) and Data Terminal Ready (DTR, on pin 4). In the old days these were used for hardware handshaking over serial interfaces. They are never normally used nowadays but remain as useful control signals. Both are easily toggled from driver software. One or the other, but usually RTS, is often used for PTT control of rigs via a simple transistor interface. All the COM port outputs, when asserted, deliver a voltage somewhere between 5V and 12V (typically about 8V) and are capable of supplying up to 10 – 20mA of current. So the otherwise unused DTR can form a useful low capability power supply for any applications that need it. When not asserted, these 'true RS-232' ports deliver a negative voltage that must be taken into account in any circuitry connected.

There are two issues that have to be solved to make a CI-V to RS-232 interface: the TXD and RXD signals have to be combined into the single port with its 5V signalling level and the polarity has to be inverted. The circuit of

PHOTO 1: RS-232 to CI-V interface made with SMT components on a small PCB.

Figure 1 does all this and offers a PTT interface on the RXD line as well. On ICOM radios, as well as those from other manufacturers, Tx / Rx switching can usually be done with CAT commands, so the RTS control isn't essential, but I thought it might as well be included 'just in case'.

TR1 provides polarity inversion and interfaces the TXD signal of typically ±8V to the 0/5V CI-V port. It could equally as well be a bipolar device, but I use small MOSFETs universally now for all low level logic switching applications like this. The diode on the gate (or base) is almost certainly superfluous with a MOSFET, but is there to prevent the negative voltage present during logic low level from breaking down, or avalanching the base-emitter junction of a bipolar device. With modern silicon

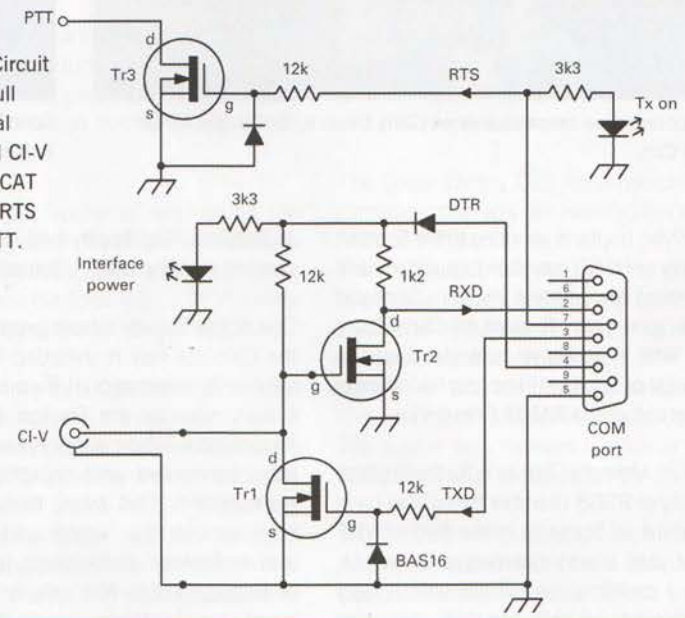

FIGURE 1: Circuit diagram of full RS-232 serial port to ICOM CI-V interface for CAT control with RTS controlled PTT.

devices this probably no longer matters, but in older transistors it can eventually lead to long term failure. It's something I was taught once, back in the good old days and I always now add a protection diode, even if using an FET!

Inverting the polarity and driving the RS-232 RXD line from the CI-V port needs a bit more attention to detail. The CI-V is an active low signal and is only pulled up properly via an external pull-up resistor. Therefore it cannot be relied upon to deliver much more than a few hundred microamps when in its high state. Without a separate pull-up resistor, the IC-746 itself can only source a few tens of microamps. A MOSFET of the 2N7000 (or 2N7002) type is perfect for the interface: it has a switching threshold of a couple of volts and, being an FET needs no input current (as a bipolar would). However, a power supply is needed to allow the driven RXD port to be toggled between 0V and a few volts positive **[3]**. This is where DTR can be used. Provided it is asserted in any driver software, it can be used as a power supply for such applications. A series diode protects against the situation of its being switched low and going to minus volts. To complete the circuit, TR3 (again with its almost-certainly superfluous diode) is the RTS controlled PTT switch. Two LEDs serve as indicator; one to show power is present (DTR asserted) and one for transmit (RTS active). As no more than a few milliamps are allowed, these need to be high brightness types. Although the CI-V port is supposed to be a 0/5V signalling level, looking at the internal circuitry of the IC-746 shows that it is tolerant, protected by a series diode, of voltages higher than 5V. So it is entirely permissible to add a pull-up resistor, 12k in Figure 1, to the somewhat higher voltage delivered from the DTR line. Had the CI-V line been less tolerant of overvoltage, it would have been necessary to clamp it with a 5V Zener diode.

Remember in any driver software to set DTR active, forced high, and to enable RTS PTT if needed, and 'No Handshake'. The WSJT setup screen is shown in **Figure 2** and shows where these options are set. **Photo 1** shows a small PCB I made up for John's interface, containing all the components of Figure 1.

Other connections & simplifying things

All the above applies only if a 'true' RS-232 port is to be used, or an external one with 'proper' voltage levels. These days most modern PCs don't have COM ports as standard, so an external USB COM port is more likely to be used. While these often emulate the original COM port with its plus / minus voltages and nine-way D connector, you don't *have* to get one of that type. There are also USB serial ports with 'TTL' output **[4]**. These deliver properly defined 0/5V logic levels and all the signals are now the inverse polarity of RS-232. In addition, they usually have a +5V supply available on their

FIGURE 2: The WSJT software setup screen showing the settings needed to use the RS-232 to CI-V interface.

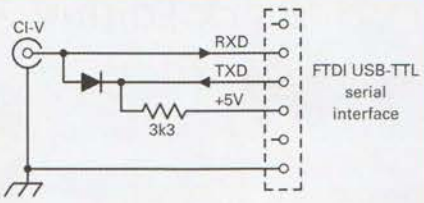

FIGURE 3: The much simpler arrangement possible if a TTL 5V level external serial USB interface is used. No PTT control circuitry is shown.

connector. This polarity is that needed for all the internal UARTS and serial interfaces in standard microcontrollers. So now the logic polarity is the same as the CI-V interface, the voltage levels are the same and a 5V supply is present – perfect. Now the interface can become much simpler. Just a diode and resistor is needed to combine the signals, as shown in Figure 2. Unfortunately, PTT interfacing is harder as now logic inversion is required on the RTS line if the usual ground-to-transmit of an undetermined voltage level on the rig is used, so two transistors or some sort of non-inverting driver is now needed. In this eventuality, provided the transceiver accepts it, CAT controlled Tx / Rx switching is to be preferred to keep the interface simple.

The FT-817 (and probably other Yaesu radios) adopt this TTL level signal on their own CAT interfaces, so a direct pin-to-pin connection works here. To connect this FT-817 connection to 'real' RS-232 the same inverters as for the CI-V interface are needed, except now the TXD and RXD lines to the transceiver need separating and they may be less tolerant of the pull-up voltage than is the CI-V port. Check before using such an interface. The October 2014 Design Notes shows how a PIC can be connected directly to the FT-817 CAT interface to make a keypad for direct frequency entry.

Shielding material thickness

A recent post on RSGBTech **[5]** asked about the minimum thickness for shielding materials. At RF, currents only flow on the surface of a conductor, with current density falling off exponentially with depth. The degree of roll-off depends on the square root of frequency, the conductivity, and the magnetic permeability of the material. The depth where the current has fallen to 1/e, about 37%, is called the skin depth and in general, after about 10 skin depths, can be considered insignificant, it being around –87dB by then. Call it 8.7dB per skin-depth.

Using SI units, the skin depth is given by the equation $d = 503 \cdot \sqrt{(\rho / (F \cdot \mu_r))}$, where ρ is the resistivity of the conductor, F the frequency in Hz and μ_r the relative permeability (unity for non-magnetic materials).

For copper, $\rho = 1.7 * 10^{-8}$ and $\mu_r = 1$ so at 10MHz, skin depth, d, is around $21*10^{-6}$ metres, or 21 microns. For 10x skin-depth, 0.2mm of aluminium or copper foil is adequate for full shielding, or 0.1mm for less critical applications. At 137kHz, d = 0.18mm so 0.8 to 1.6mm sheet aluminium becomes necessary. However, if tin plate were to be used, its steel core has a high μ_r of, let's say, 1000. That means the skin depth reduces by a factor of about 32 and thin tinplate will suffice.

As an aside, the skin depth in copper for 50Hz is about 9mm and it's about 11mm in aluminium. This is why, for power transmission, you never see solid conductors much more than about 20mm diameter. For iron and steel, the skin depth is a fraction of a millimetre at 50Hz. This explains why induction furnaces work so well and why the Underground and third rail trains must run on DC.

References

[1] Report on a the implications of a serious GNSS outage www.gov.uk/government/publications/the-economic-impact-on-the-uk-of-a-disruption-to-gnss
[2] 'CAT' used to apply exclusively to the remote control on Yaesu radios, but has now become a term used generically. A bit like GPS and GNSS.
[3] 'Officially', RS-232 uses dual polarity signalling: ± 3V to 15V is the specification. However, in practice the threshold of receiver chips is typically set at around +1.5V so 0/5V signalling has always worked reliably, even at maximum speed. Proper transmitter chips, though, still usually deliver ±8V or so, generated from an internal switched capacitor voltage inverter.
[4] See, for example, those made by FTDIChip: www.ftdichip.com/Products/Cables/USBTTLSerial.htm
[5] see http://rsgb.org/main/technical/forums/

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LF

Conditions on LF have remained good over the past couple of months with none of the doldrums experienced on the HF bands affecting the bottom end of the spectrum.

136kHz

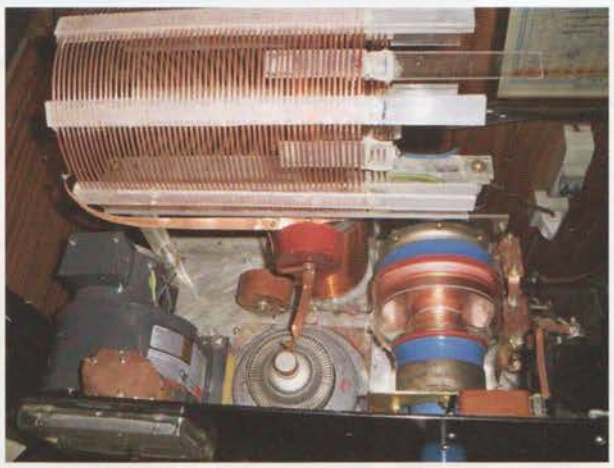
In response to some encouraging results on MF, Paul, N1BUG recently turned his attention to 136kHz with the ambition of making the first two-way US trans-Atlantic contact. Strange as it may seem, up until now there has been no true amateur two-way QSO between Europe and the USA. The reason is that all the previous US activity has been by special experimental radio service 'Part 5' stations with WD2 callsigns, which were not operating under general amateur conditions – despite most of them being held by amateurs.

Paul had built a 100W transmitter and started sending DFCW transmissions to see if his low ERP was going to make it across the pond. By the end of March he had copied snippets of G3XDV and DF2JP's test transmissions so all was set for a QSO attempt. It was Chris, 2E0ILY who devoted several nights to the effort using DFCW at 60 second 'dot' length. Paul's copy of Chris's transmission was very good at times but not so good in the reverse direction due to the low ERP from N1BUG. The QSO was completed over several nights in order to ensure that full calls and reports were exchanged.

Paul is now building a larger amplifier which should make faster modes such as JT9 feasible in future. Congratulations to Paul and Chris for this landmark contact.

EbNaut has been tried on 136kHz before, but following recent developments in the software needed to transmit and decode the mode a few more experiments have taken place. In March Rob, K3RWR sent the message "K3RWR" with 0.5W ERP from his Maryland QTH, which was successfully decoded by Marcus, DF6NM in Nuremburg with a best signal to noise ratio of 11.9dB. The distance between them is 6,763km, a new record for EbNaut at LF. EbNaut relies upon consistent phase of the received signal so it's interesting to discover how stable such a long path can be over the 30 minute period required for this test.

Later in the month Rob upped the message length to 30 characters and was received and decoded by Stefan, DK7FC in Heidelberg. Stefan's receive antenna was a simple e-probe. Riccardo, IW4DXW also managed to decode Rob's 30 character message, upping the distance record to 7,048km with a 2.2dB signal to noise ratio. If software developments regarding ease of use continue then EbNaut could become a very effective QSO mode for LF DX.



LU1DOW's big amplifier

A new 'voice' on 136kHz could be heard outside South America soon as Oscar, LU1DOW has been working on a big amplifier that should enable his signal to go considerably further than hitherto.

He is using his IC-756 Pro to produce a 13.7MHz signal, which he divides by 100 and then feeds to the driver stage. The final amplifier is a 4CX1500A with 4kV on it. This beast can produce 1400W and an antenna current of 8.6A has been measured so far. A little more fine-tuning and Oscar will be ready to put Buenos Aires on the LF map. He hopes to use the system on 472kHz too.

Meanwhile on 472kHz

Joe, VO1NA has been transmitting a CW beacon that has been regularly received by Roelof, PA0RDT. Joe is keen to make a 2-way CW QSO over the Atlantic whilst conditions remain good.

DP0GVN is a club station located at the German Antarctic Research Station *Neumayer III* in Dronning Maud Land, Antarctica. Recently they have set up a receiver using a Red Pitaya STEMlab system with a preamplifier, to receive and decode WSPR signals. The setup is quite versatile and can monitor up to eight frequencies simultaneously. The low bands antenna is a 180m circumference delta-loop in an electrically very quiet environment.

When Stefan, DK7FC heard about this facility he contacted the group and persuaded them to temporarily include 472kHz in their receive schedule. It is a long shot for any northern hemisphere stations to make it to Antarctica: even the closest known active 472kHz station, VK4YB, is about 9,000km away!

In March a few of the bigger signals – G3KEV, DK7FC and EA5DOM – made it over the 9,000km path to Reunion Island where FR5DH has a good receive setup, but so far nothing has been detected in Antarctica.

Next (Antarctic) summer they are hoping to upgrade the receiver so that it can monitor more frequencies simultaneously, which would mean that 472kHz could become a permanent feature.

VLF and ULF firsts

Stefan, DK7FC has been carrying out a number of VLF experiments over the last few months. After his success in crossing the Atlantic on 8.27kHz reported last time, experiments continue to try and get a five-character EbNaut message across. A possible route to success may be to combine reception at two sites: W1VD in Connecticut and K3SIW in Illinois, to see if that will lift the signal above the threshold for a successful decode. This ground-breaking work continues.

Up on the heady heights of 17.47kHz, where Stefan has a special permit to operate, his single-character EbNaut transmission has been decoded at a distance of 16,805km by Edgar J Twining in Tasmania. Stacking the files from two consecutive days yielded a signal to noise ratio of better than 8dB. Even SAQ with its big station on 17.2kHz would be happy with that report!

Finally, Stefan's tests on 907Hz (yes, less than 1kHz!) have passed their first hurdle, to reach approximately the limit of the 'near-field' across Heidelberg and out into the countryside some 40.5km away where Stefan had installed a temporary receiver in a forest. After a 72 hour transmission a 5-character EbNaut message was successfully decoded and Stefan now hopes to increase the distance to over 50km, which would be in the 'far field' at this frequency. He is planning to increase ERP by 3dB – to about 36nW – but of course summer noise levels due to static will be a problem.

Dave Pick, G3YXM
daveyxm@gmail.com

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Count on us!

HF

Attendees at the Mauritius Amateur Radio Society (MARS) March 2018 meeting: Jacky, 3B8CF (MARS Secretary); Patrice, 3B8FA; Patrick, 3B8GF; Dr Dokhony; Jean-Marc, 3B8DU; David Bastien; Johnny Nemo; Gérard, 3B8FV; François, 3B8BAN; Gérard, 3B8DX; Yusuf, 3B8FO; Michel Sinnott; Clive, 3B8CW; Jacques, 3B8GC; François 3B8GZ and Ashwin, 3B8GL. Photo courtesy of Nigel, G3TXF.

There was an occasional sunspot during April but the solar flux index rarely moved above 70. Nevertheless, there was still DX around on 7-18MHz for those with reasonable antennas, and 21-28 MHz opened on occasions. Now we are heading into the summer doldrums so let's hope for lots of sporadic E to keep us amused on the higher bands.

The 2018 IOTA Honour Roll and Annual Listings have been posted on the website at iota-world.org. There has been a 4.6% increase in participation compared with 2017. 221 participants have scores of 1000 or more IOTA groups. G3KMA leads the UK with a score of 1116 followed by G3NDC with 1108.

The *2017 ARRL DXCC Yearbook*, which includes the Clinton B DeSoto Challenge top scorers and the Annual Listing, can be found at arrl.org. The Annual Listing contains the callsigns and credited totals for new awards and endorsements during 2017. The DXCC Honor Roll includes those who are within nine entities of the 'current' Entity count for Mixed, Phone, CW, and Digital modes. As of 31 December 2017, there were 339 Entities on the DXCC List, and entry level DXCC Honor Roll was achieved at 330. Les, GM3ITN is UK leader in the Mixed DXCC list with 384 current and deleted entities. G3KMA is UK leader in the DeSoto Challenge list with 3135 slots.

The final result of the CDXC LF Challenge for DXCCs worked on 40m and down during March was a clear win for Andy, M0NKR with 181 DXCCs. Norman, 5B4AIF was in second place with 170.

ZL3GA, Geoff, is heading to Vanuatu as YJ0GA from 18-25 July. He'll be operating with an FT-450D, CrankIR and an AL811 amplifier. QSL revenue will be donated to the Little Lights Preschool in Mele Village.

The 1-9 August CY9C DXpedition to St Paul Island has been cancelled. The team say they will go when band conditions improve (which I guess could mean a wait of a few years). This is sad news for Europe as we would have been able to work them on various bands even at sunspot minimum. The announcement reminded me once again that St Paul is a rather strange DXCC entity as it is simply a small island not far off the Canadian coast. I believe it was added to the list when there was a vague criterion about distinct administration – in this case from a federal agency in Ottawa rather than any of the neighbouring provinces.

Eric, KV1J will be active as FP/KV1J from Miquelon Island (NA-032) from 3-17 July. He plans to operate mainly SSB and RTTY with some CW and FT8 on 80-10 metres. He will also check 6m for openings. Activity on 160 metres will depend on how much space there is for an antenna. The Cambridge University team last September left an 18m Spiderbeam pole on St Pierre, which Eric may be able to erect. For more information see http://www.kv1j.com/fp/July18.html

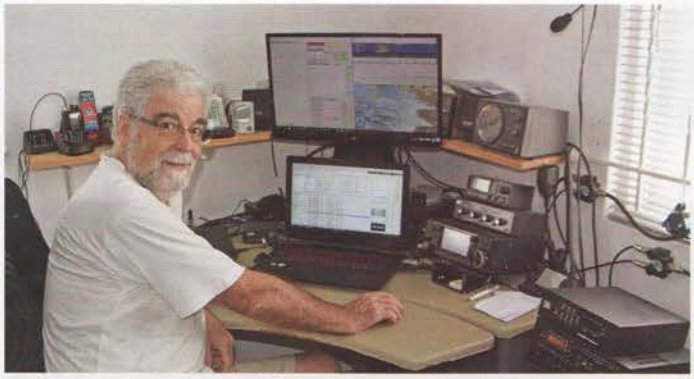
Four German ops will be active in Estonia from Kihnu Island (EU-178) on 11-15 June, and from Hiiumaa Island (EU-034) on 15-19 June. See https://baltic2018.blogspot.com/ for more information and updates.

TI2CDA, TI2CC, N3KS and possibly two or three other operators will be active as TE6DX from Uvita Island (NA-155) on 7-11 June. They will operate CW, SSB and possibly RTTY and FT8 on 160-6 metres.

Correspondence

Fred, G3SVK, found the bands much quieter after the deluge of African DXpeditions. He worked: 17m – SO1WS, TJ2TT, PJ5/SP2GCJ, JY5HX; 20m – XT2AW, HS3NBR, VU2TMP; 40m – 3V8SS, 4U1ITU, 3C0W, PJ4/KK9A, C7A, V31GS, 3B8MM, HK7AAG, 3B7A, V44KAI and Z66D.

Peter, G4XEX was operating GB2FWW for the Welland Valley Club for much of the month. He writes: "There was some rather odd propagation on 20 April, when after a day of severely reduced signals caused by the solar storm, the 20m band jumped into life around 1900 hrs when stations from China, Japan, South Africa, Australia and the rest of the Far East suddenly started appearing. Scraping along the bottom, the sun spot cycle still holds some good openings at unusual times of day. Best DX was 9M0W,



Clive, 3B8CW, in his shack in Mauritius. Photo courtesy of Nigel, G3TXF.

EI2JD operating 7Q7EI.

and to be honest it was not a hard contact. Stunning 59 signal." His best DX included: 15m – PJ5/SP2GCJ; 17m – VP8LP, HK3W; 20m – JW2US, 5H0JK, XV1X, JA6GCE, 3B9FR, 9M0W and on FT8 *YC4CHP, VP8LP, CE4WJK, BI8AWX, BH8NSC, JA4LKS, 7N4SJX, JE7JDL, YB1HK, 5A1AL, XQ3MCC, VK6OZ* and *VR2XYL*.

Tom, G4IDL worked: 17m – 3B7A; 20m – 4S7AB, TJ2TT, XT2MAX, VU2RAK, DS4EOI, V85T, 9M2ZAK, 3B9FR, VK9X/N1YC, HZ1TT, S01WS, TZ4AM, TR8CA, HR5/F2JD, 9V1OW, FJ/N0KV, 5R8UI; 30m – Z66D; 40m – HC2AO, S01WS.

Peter, G3HQT missed out on 3B7A and was struggling to work VK9X/N1YC through massive DQRM. But he did find: 17m – 7Q7EI; 20m – XT2MAX, V85T, OA1F; 80m – FY5KE.

Ken, CT7AGZ has been steadily improving his antenna farm down in the Algarve with good results: 10m – CX8AF, LUs, PYs, CP6CL, VP8LP; 12m – 3B7A, TZ4AM, XT2MAX, 7Q7EI; 15m – 3B7A, 9G5ZS, 3B9FR, 4S7VR, PJ2GT, XT2MAX, 7Q7EI, ZD7BG; 17m – 9Q6BB, HR5/F2JD, S01WS, ZS1ANF, HV0A, 8P6DR, PJ5/AI5P, V31MA, 3B7A, 3B8MM, HZ1HZ, 6W7JX, 7Q7EI; 20m – HP3SS, HV0A, 3B9FR, LU6OA, 9K2NO, 5Z4/LZ4NM, D4IA, EL2DT, 9M2YDX, TR7CA, HZ1TT, ZD7BG, 9J2BO; 30m – VK7BO, VK3XU, XT2MAX; 40m – ZL1ALA; 80m – V31MA. It looks like the higher bands are actually working in southern Europe at the moment.

Gordon, G3PXT has also improved his station with a 20m collinear (two half waves) that claims a 2dB improvement over a dipole in the favoured directions. On 17m he retuned a 34ft vertical to a 5/8 wave with 4 radials. Almost all his DX QSOs were on FT8. He found: 15m – 7Q7EI (RTTY); 17m – *BX4AL, 6W/IV3FSG, AP2IA, JAs, YBs, VU2MSA, SU9JG, CE2SV, XT2AW, VKs, LUs*, 3B7A (RTTY); 20m – 3B7A (SSB), *LU1PA, BG2QMO, VU2EKJ, YBs, JAs, AP2AM, 9Z4DZ*; 30m – 3B7A (CW); 40m – 3B7A (CW), *CM3HVY, 3D2AG, FG4PK, YBs, ZLs* and *4S7AB*.

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).

Call	CW	SSB	Data	All
G4TUK	95	92	169	230
M0NKR	128	160	148	229
G0DWV	148	120	112	223
G3TBK	206	108	94	204
G3PXT	74	104	184	203
GI4DOH	137	6	75	158
CT7AGZ	139	1	84	155
G8APB				145
G4IDL	144	0	0	144
G3SVD	61	88	0	132
G4XEX	37	52	106	131
G3HQT	126	0	0	126
G3SVK	101		117	117

TABLE 2: Forthcoming DXpeditions.

Until 18 May	VK9LI
13-25 May	E51 activity
Mid-May – mid Aug	JG8NQJ/JD1
25 May – 25 June	II1ITR
7-11 June	TE6DX
11-15 June	EU-178 by DL ops
15-19 June	EU-034
Late June	KH1/KH7Z
27-29 June	OJ0Y
3-17 July	FP/KV1J
18-25 July	YJ by ZL3GA
12 Sept – 1 Oct	T32AH
20-25 Sept	JW by DLs
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
20–25 Sept	JW by DLs
2–29 Oct	WH8/DL2AH
16–30 Oct	VK9X by 6Gs
20 Oct – 3 Nov	VP6D Ducie I

The 7Q7EI team.

Andy, M0NKR, kept busy after the CDXC LF Challenge with: 15m – 3B7A; 17m – FM/F2VX, TI8II, 3B7A, ZS6DJD; 20m – PJ4/M0SDV, EL2DT, 3B7A, 5W20SAMOA, H44MS, VP8LP, FM/F2VX, PJ4DX, 9Z4AF, 9M6MI, VK9X/PE7T, EL2EF, EL2BG, FJ/AI5P, 9Q6BB, 9X9PJ, J88PI, ZD7RB, 9L/KW4XJ; 30m – 3B7A; 40m – 3B7A – VK5CE/P, VE7ACN/VE2, ZL1WN, 9W2SAF and VK9X/N1YC.

Andy, G3SVD returned from his overseas travels to pick up quite a bit of DX in April but is now having to catch up on work in his garden. During his window of opportunity he worked: 10m – 7Q7EI, 3B7A; 12m – 3B7A, SU8WD; 15m – 9X9PJ, 3B9FR, 3B7A; 17m – VK9X/N1YC, S01WS, XE2X, FM/F2VX, CX2DZ, CE2SV, VD1BOOM, 3B7A, 9Q6BB, ZD7BG; 20m: – TR8CA, 9V1OW, 5W20SAMOA, 5V7SM, 9M6MI, VP8LP, EP7AHN, HS0ZMR, V85T, 3B7A, 3B8/P43KV, HC2AO, E51JD, 5H0JK, FR3EC; 40m – 7Q7EI, ZLs, VK5MAV/9; 80m – ZL2OK and VE7ACN/VE2.

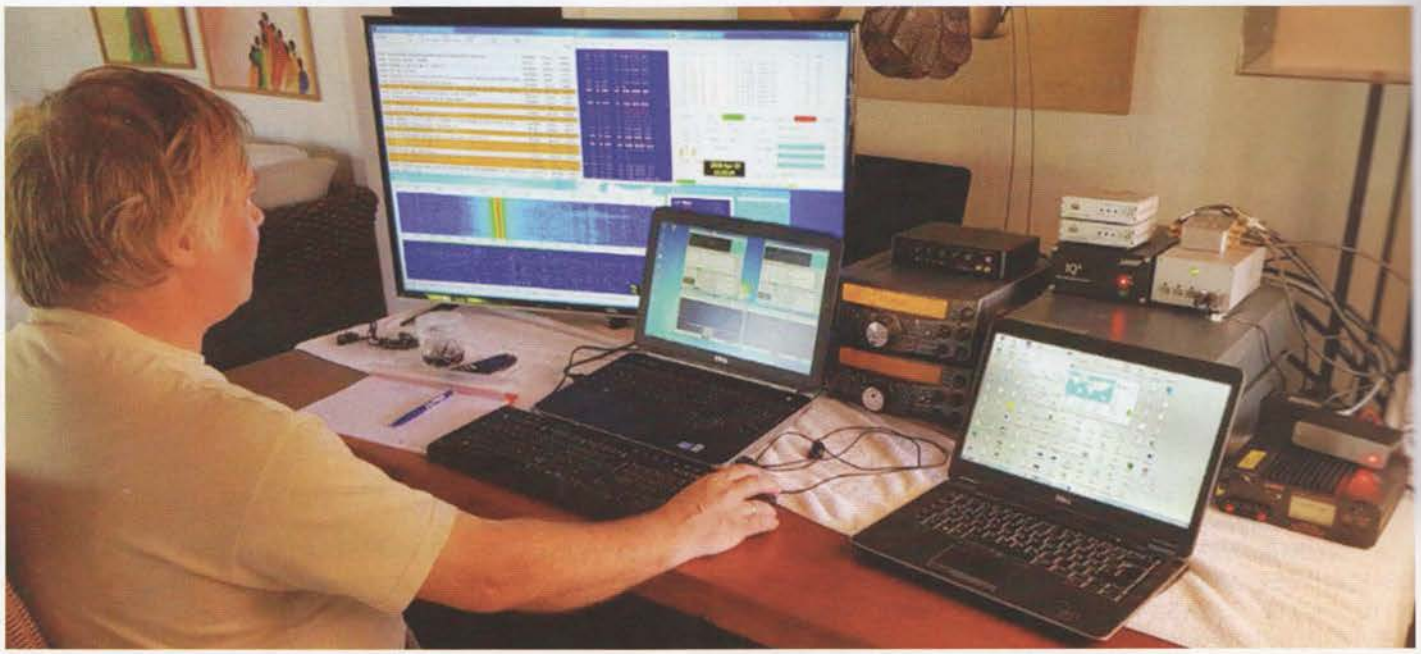
Finally, Pete, MM0TWX found ATNOs RI1ANO (#290) and 3B7A (#291) for his single wire antenna challenge.

Finally

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

Martin Atherton, G3ZAY
g3zay@btinternet.com

VHF/UHF



DF7KF operating the Saba Island EME DXpedition, PJ6E.

A very busy month with Sporadic-E openings beginning on 6m, meteor scatter activity with the April Lyrids being in evidence, albeit with poor reflection rates, plus the continuing rise of FT8 activity and the 1st RSGB MGM Contest gave something for everyone in the world of VHF DXing.

During the 24 hour contest period on 21/22 April there was decent tropo propagation on 2m thanks to a significant high pressure system over Europe and, not to be outdone, 6m provided some Sporadic-E conditions on Saturday down to Iberia and on Sunday to central Italy just before the contest finished.

EME enthusiasts also had rare expeditions to work with one in particular to Saba Island which was not really advertised beforehand and this resulted in a massive pile up once the 2m station was QRV.

Saba Island Expedition PJ6E

Dithmar, DF7KF and Angelo, DM1AC activated Saba, a Caribbean island in the Lesser Antilles chain, which is a special municipality of the Netherlands. Measuring just 13 square kilometres, it consists of the top of the dormant Mount Scenery volcano. Its surrounding Saba Marine Park is well known for its coral formations, dolphins, sharks and turtles. There are also offshore seamounts, or underwater mountains, created by volcanic activity. Sounds like an idyllic QTH for any operation.

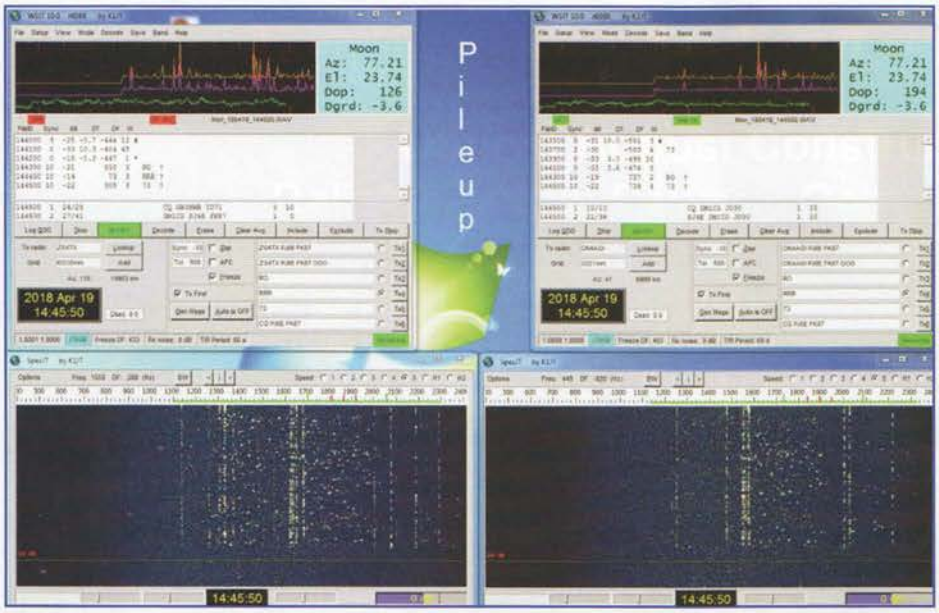
The locator square for the DXpedition was FK87jp but the DXCC entity was all important. They were a two man only expedition and the aircraft was a De Havilland DHC-6-300 Twin Otter with very limited space for themselves and boxes of kit. Because they had to limit the weight there was no chance to take any equipment for other bands onto the island.

The system included: 1 x 14-element X-polarised yagi, 2 x HA8ET LNAs in either receive line, 2 x TS-2000, IQ+ and max legal output SSPA. They were transmitting CIR polarization and receiving +45 / -45 with adaptive capability. The ten day trip was not without its issues, particularly with takeoff, where the team needed around 10 degrees of elevation to clear Saba island's hills and mountains. Dithmar and Angelo were very pleased to be able to activate this DXCC entity and bring it into the VHF EME community. Statistics up to 23 April showed 316 EME OSOs logged and just one JT65B Tropo QSO.

Correspondence

The non-FT8 log of John, G4SWX (JO02) shows plenty of new EME stations and a few expeditions. V26PD (Antigua) was a new DXCC in the log. He also worked RA0ACM (NO76) who was only using only 2 x 9-element yagis and 350W output. Another highlight was UA0ZGX in the extremely rare locator QO93 who, despite considerable local QRM in JO02 was worked with the UA0 station running only a 9-element vertically polarised Yagi and 300W. PJ6E (FK87) was worked with John being 2nd in their log. All in all it has been a good time on EME in JO02 with more expected DXpeditions to come in the next few months. There are around 10 stations now active in JO02 on EME

Flemming, G4MJC (JO00) last wrote to *RadCom* when the late Norman Fitch, G3FPK was writing this column. He has been nearly QRT for the last 20 or so years but on coming up to retirement he has re-vamped the shack and antennas for 6 and 2m. This spring he plans to do the same for the other mast, which has 4m and 70cm Yagis, but this system needs a new rotator and new chimney lashings as the existing ones are about 30 years old! His last big outing was a maritime mobile DXpedition to the North Sea in 1987, which was going to be repeated last year but there is sadly no longer any passenger ferry between Harwich and Esbjerg (OZ). His Danish call was OZ1EVA. During the MGM Contest weekend Flemming had his first outing on 2m FT8 and worked 30 plus stations, with the best being EI9E in IO61, GM3SEK in IO74, GW1JFV in IO71 and GW8JLY in IO81. He decoded GM4JIB in IO85 many times, as well as GI4OWA, but had no luck calling them.



Part of the WSJT display at PJ6E showing their EME pileup.

Martin, G8OFA was also QRV on 22 April for the RSGB MGM contest and comments on some interesting MS reflections. His observations were: "I have had similar findings before. I presume that these one way contacts are due to MS; however, the maximum bursts that I have seen today were only about 16ms. Perhaps I just got lucky or perhaps there was very short lived Sporadic-E opening at the time even at this time of the year. I think that MS is more likely though. Most of my distant contacts on FT8 are almost certainly AS, often correlating well with *AirScout* predictions. So far since March, I have worked 54 squares on 2m, the great majority being by FT8. It is great to see the levels of activity on 2m that FT8 has encouraged, despite the fact that it is a suboptimal mode at this frequency."

Jean-François, F4HRD (JO00) was also QRV in the MGM Contest and was instrumental in posting details of the event on the French REF Contest Reflector. Always a strong signal in the UK, he made 47 contacts in total on 2m including EI9E at 570km, all on FT8.

Bob, G8HGN (JO01) enjoyed the MGM contest and over the month has also been testing FT8 to see how it performs. Bob has made 174 contacts, 63 of those in the contest, and he was away for a week on holiday! Highlights in his log (all 2m) were DK1FG (JN59), F8DYR (JN07), DJ6GK (JO40), DK5AI (JO51), DG4KLK, DD3CF (JO41), DK6XY (JO53), DL1BAK, DK0IZ (JO43), F6BYJ (JN05), DK0IZ, DH3FBI, DL2GWZ (JN49), EI9E (IO61), DG9BFE (JO33), DK5DV, DK9WB, DL6KR (JO30), DL4LAB (JO53) and DK5EW in JN48. Having enjoyed the contest, like others Bob comments on some logging issues and also operating procedure/ signal issues that also need to be considered going forward using this kind of mode.

A big thanks to Stuart, GW3XYW (IO71) for his EME report – always a pleasure to receive an actual letter in the post rather than by electronic methods! Good news is that Stuart's EME window has been extended from 210° to 270° due to one of his neighbours, for their own reasons, cutting down three conifer trees. This gives a welcome extension to his western window on 2m. On 26 March, Stuart completed with F1GRB, UA6LCN, W1PV, DH9OK, I3LDP, WA1NPZ, AA4FF, IK0IXO, W8TN, IZ2DJP and G4SWX. Stuart's major noise source, some solar panels, mean that he can't be QRV below 25° during the daytime.

RSGB 1st MGM Contest

The contest was very well received by many with the main comments being that it was *fun*! That was one of the main drivers behind it, and the fact that it was open to all brought stations on both bands who maybe have never entered a contest before.

Probably FT8 should be considered more of a data mode, ie the design bandwidth being 50Hz is in common with PSK 31 and 63. It was clear that having such a range of report structure, eg 26, R26, 59, R-22 etc, would need the logging programs to be modified for free text entry to cope with a 4-character report. Another issue was the scoring, ie locator-locator distances were set to score from the centre of each square. This was to avoid the situation where, as the full six digit locator wasn't being exchanged, it would lead to stations having to research databases to get the locator info, which is against the spirit of what we are trying to do.

Paul, G3YDY did a great job in promoting the contest on *ON4KST Chat* that certainly added to the activity numbers.

So all in all it was a good test and probably it will throw up plenty of issues. One that need urgent attention is the correct driving of the transmitter and its effect on signal quality. This is key in such a narrow bandwidth. Also the number of stations QRV who were rooted on one frequency lost numerous contacts. There is an opportunity here to work split frequency to alleviate the congestion.

Germany re-releases 70MHz temporary allocation

The Telecom Administrators in Germany have once again released a section of the 70MHz band for use by radio amateurs. The allocation of 70.150-70.180MHz will be available from 2 May to 31 August 2018. In previous years when the allocation has been available DL stations have been very active on 4m as many already have a receive capability on the band. Whilst Sporadic-E monitoring on 6m gives a good indication of increasing MUF, when 4m propagation begins thoughts turn to rapidly rising MUF and possibility of 2m Es. Whilst diminished from previous years, OIRT Eastern European broadcast stations still use 65.8 to 74MHz. With high power, the characteristic 'howl' from these stations can completely drown out SSB signals on 4m.

IRTS (Eire) information

The 70MHz band has been extended from its current allocation to 69.9MHz to 70.5MHz. This is an increase of 275kHz over the existing band of 70.125 to 70.450MHz and is the full band that may be allocated to the amateur service under the European Common Allocations table.

Further spectrum release covering all modes (including digital) has been granted on a Secondary basis from 30 to 49MHz and 54 to 69.9MHz The latter band also includes digital television in addition to all other modes.

The new bands in the 40MHz and 60MHz regions will, among other things, facilitate modern-type beacons on these frequencies. Additionally, the changes to 4m will allow moving the existing 70MHz beacon on 70.130MHz to the section of the band normally designated for beacons.

The Irish Radio Transmitters Society has expressed its appreciation to The Irish Government ComReg for the release of this extensive spectrum to the amateur service on a Secondary basis.

Richard Staples, G4HGI
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GHz Bands

Martlesham 2018

The annual Round Table and UKuG AGM was held at Adastral Park, Martlesham over the weekend of 14 and 15 April. People who attended both days were treated to a trip in glorious Spring weather to the nearby Bawdsey Radar Museum. A fascinating visit and a look into the work of Robert Watson-Watt and his colleagues on wartime radar development. As well as the AGM, the Sunday featured plenty of traders and a selection of talks ranging from SDR using Gnu Radio by Heather, M0HMO to Aircraft Scatter by John, G3XDY. The construction competition, judged by G4DDK, G3XDY and myself was very well supported, with plenty of microwave electronics, plus several Raspberry Pi projects through to a beautifully engineered 3.4GHz SM6FHZ Septum dish feed built by John, PA7JB. The final winner, going through to the final of the UKuG's G3WB trophy competition, was Mike, G8CUL's multi-range RF power meter.

The UK's first 288GHz system

On display at Martlesham and operating under the RSGB's 'Above 275GHz' NoV [1] was a 288GHz transmitter and receiver built by Roger, G8CUB. The transmitter (**Photo 1**) produces -22dBm of CW at 288GHz by multiplying up from an 8GHz 'ZLPLL 14G' synthesiser by ZL2BKC [2] in three stages via 96GHz to a Terratech passive tripler feeding a 20dB horn antenna. The receiver (**Photo 2**) uses an ultra-low noise 100MHz Wenzel reference with another ZLPLL 14G at 4.8GHz multiplied up to 19.2GHz as LO, feeding a 15th-harmonic 140-220GHz TeK mixer with a 45dB Quasi Optical horn antenna. The mixer has a conversion loss of almost 60dB at 288GHz (!), so receiver sensitivity is quite low. I'll leave you to do the sums, but the transmitter could be clearly heard across the room at about 3 metres range. Roger is hoping for a QSO partner soon, but this sort of equipment is very hard to find at 'reasonable' amateur prices!

13cm EME activity

There was quite a lot of activity in the ARRL 13cm CW/SSB EME contest over the weekend of 24-25 April. I enjoyed my weekend working two new CW initials #26+27, K2UYH and SP6OPN. On Saturday (my report 2nd) I worked OK1CA 579/559, PA3DZL 559/559, OH2DG 569/559, G3LTF 569/559, ES5PC 569/549, UA3PTW 539/569 and K2UYH O/O I saw many more CW and SSB signals on my waterfall on both 2304 and 2320 but mostly just too weak to make out calls with my little system. Amazingly I missed HB9Q this time; I guess I was lost under the pileup. Interesting to note that the strongest stations I heard on 2304 (the main US allocation) were European. On Sunday I worked SP6OPN 579/559, LX1DB 559/ 559, and OK1DFC 539/539. 'Got away' for me was KL6M in Alaska who I saw on the HB9Q chat but never heard. He posted a report on HB9Q of my last CQ, but only after I'd closed for the night! Peter, G3LTF was also QRV and started off on Saturday with CW QSOs with OK1CA, UA3PTW, OH2DG, ES5PC, SP6OPN and OK1DFC, then concentrated on 2400MHz. He worked JA8ERE, JA4BLC and JA6AHB who is now the loudest JA on the band. Calling on 2320.060 and listening on 2400.060 worked well for Peter. He went back to 2320 and worked ZS6EME on SSB plus OH1LRY, SM3BYA, F1PYR, HB9Q, PA3DZL, G4BAO (smallest station worked), S53MM, F5JWF, OZ5G and F5HRY but had to stop at 1645, before the US / NA window. He returned at 2300 to work VE6TA, KL6M and K2UYH. On Sunday, Peter had PSU problems but then worked DL7YC, SP7DCS, OK2ULQ, SP3XBO, OZ4MM, DF3RU, LX1DB, WA9FWD, N4PZ, WA6PY and PE1LWT. He heard W7JM, but John has no 2320 receive facility. Peter's totals were a bit down on the best years and several well-known calls were missing. His 6m dish shows 16.6dB sun noise with a solar flux of 65 and moon noise 1.0dB.

I agree with Peter that 13cm is a great band for EME, probably the best, but it's possibly more of an engineering challenge with the different frequency allocations. In Europe at least, it seems to be fairly easy to find 200W+ PAs from 2.1GHz cellular surplus, which makes a big difference with small dish systems like mine. Get ready for the 13cm Activity Weekend on 4-5 August, there should be good activity then.

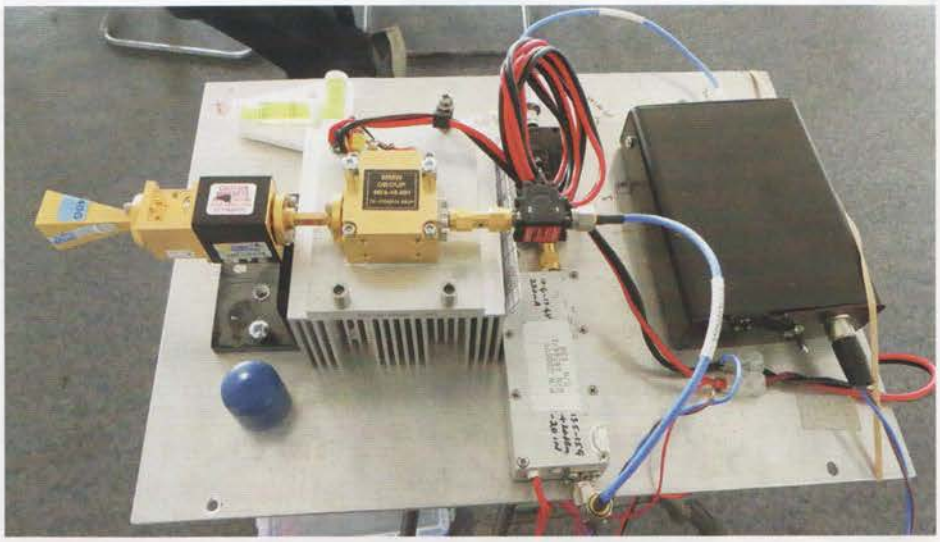

PHOTO 1: G8CUB's 288GHz transmitter. Photo courtesy G4BAO.

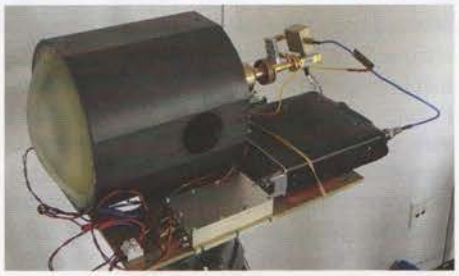

PHOTO 2: G8CUB's 288GHz receiver. Photo courtesy G4BAO.

Finally

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

Websearch

[1] UK 'above 275GHz' NoV: https://bit.ly/2H6dqZF
[2] ZLLPLL 14G: https://zl2bkc.com/store/

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Low Band DX with a G5RV

Anyone planning to operate on 160m will almost certainly have to build their own antenna or at least adapt an existing installation such as shunt-driving a tower supporting an HF beam.

PHOTO 1: Preferred forms for RF antenna insulators.

PHOTO 2: One corner of a PLR counterpoise.

Alternatively it is recommended to join the balanced feeder wires of a G5RV doublet or horizontal HF dipole and drive them against a ground connection [1]. If, like me, you are interested in working DX – as I assume you are because you are reading this – a competitive signal needs application of some old fashioned technology to overcome the common problem of achieving an effective ground connection.

Some might question why be so masochistic when you can buy an antenna and use it to work the world with relative ease on the higher frequencies? At sunspot minimum that argument may not be valid – and, anyway, where is the challenge? [2].

Three years ago I moved my station from where the 1.8MHz transmitting antenna was a pair of phased half-wave spaced 25m (80ft) masts each resonated with radial top loading and accompanied by 120 radial ground wires of 45m (150ft) average length. Beverages were used for reception. Many amateurs spend thousands on a radio and begrudge a hundred for their antenna. I did the opposite and after building the station I set myself the challenge of working all US states on 1.8MHz. Success came after about two years, with all but Hawaii worked on SSB – for Hawaii I had to resort to CW. In 2010, I tried entering 1.8MHz contests as a single operator with my 30-year old radio, no second receiver, no automated calling, everything else home-made and no previous contesting experience. The M8M call was not the advantage that had been expected because valuable time was wasted convincing others that there were no missing letters. Even so I was World winner, 1.8MHz SSB, in the ARRL International DX contest. In the CQWW contest I set a new 1.8MHz country record, came World second and Europe first place. I include this information not in vanity but because it confirms that on 160m – except for location – the antenna / ground system overrides everything else.

But now my antenna is a G5RV-type suspended between an insulated 12m (40ft) mast and a TV pole on the chimney stack at the mast height. It has drooping ends and is driven in the normal way with open wire feeder and a balun on higher frequencies and as a T on the 1.8 and 3.5MHz bands.

Advantage of a T

The T connection is supposed to produce a low angle pattern of vertically polarised radiation, which is desirable for DX working, because currents in each top half flow in opposite directions, thus causing no net radiation; their purpose being to reduce reactance and increase radiation resistance of the short vertical section. **Figure 1** shows the reception advantage, over 10dB, for low elevation arrival angles achievable from a T-connected G5RV doublet with an elevated ground system like that in **Figure 2**.

Tony Preedy, G3LNP
g3lnp@talktalk.net

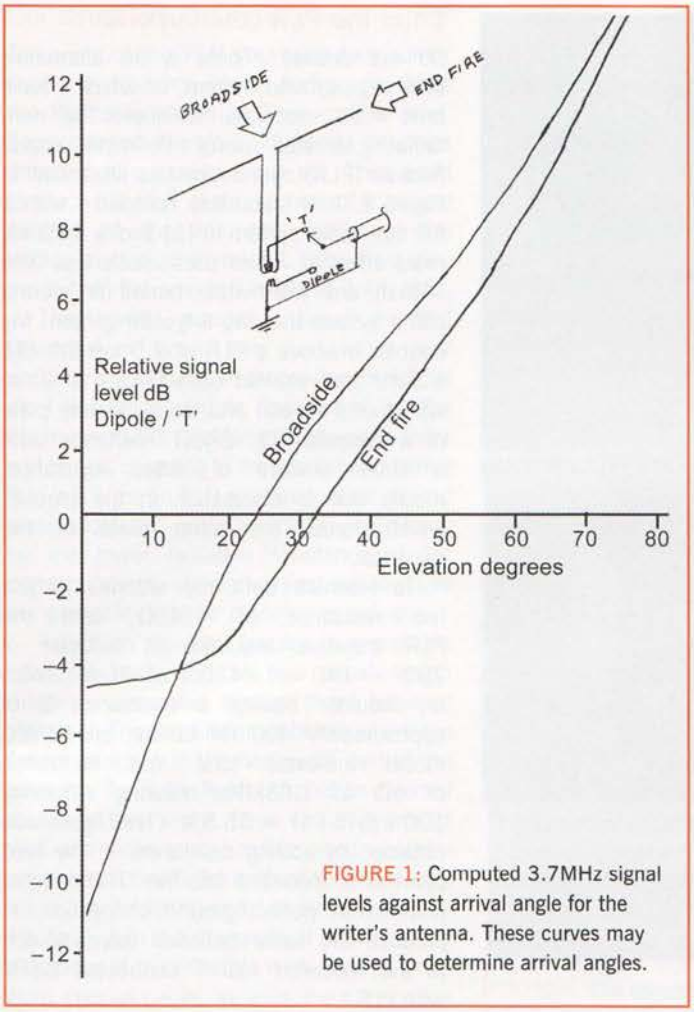


FIGURE 1: Computed 3.7MHz signal levels against arrival angle for the writer's antenna. These curves may be used to determine arrival angles.

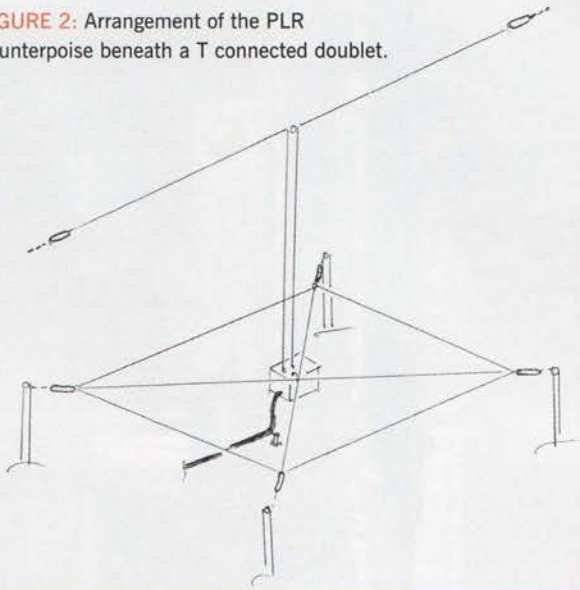


FIGURE 2: Arrangement of the PLR counterpoise beneath a T connected doublet.

An aspiration at 1.8MHz, from a typical domestic vertically-polarised installation, may be to radiate half of the power available to the antenna, which for equal PEP should produce a signal only half an S-point below that from a quarter-wave vertical antenna with a big ground system (requiring perhaps eight miles of wire). Not many of us have these, implying that our signal could be competitive, but it is advisable to use an amplifier on this band where the competition is allowed up to 3kW PEP *[but 400W maximum in the UK of course, and only 32W PEP in the upper part of the band – Ed]*.

Where do the losses come from?

When connected as a T a hypothetical loss-free G5RV at 1.83MHz has only 5Ω of radiation resistance. Radiation efficiency of a short vertical antenna relative to an ideal quarter-wave radiator does not depend on its size, but on the ratio of its radiation resistance to the sum of radiation and all the loss resistances referred to the feed point. Let us see from where these losses come:

Start with the support mast(s). They are parallel with, and relatively close to (in wavelength terms) the vertical part. Therefore the mast(s) and antenna share significant mutual impedance. For example, a pair of grounded 12m (40ft) masts supporting the ends of a G5RV reduce feed point resistance from 5Ω to 4Ω. By itself this need not reduce your signal because the masts are also radiators, but the lower feed resistance makes it more difficult to achieve reasonable efficiency. If the masts are not solidly grounded but have, for example, ground connections of 50Ω, they add 0.45Ω of loss at the feed point. This is why metal masts, and their guys, supporting a T antenna should be insulated from ground.

Next, consider the antenna's end insulators. A consequence of improving efficiency when T connected is to reduce the feed point resistance and this increases the impedance at the ends of the antenna which, with more power being available for radiation, raises the potential across insulators. (Resistance at the ends of the resonant short antenna is approximately the surge impedance of the antenna, typically 400Ω, squared and divided by total feed point resistance. Knowing the power it is then possible to calculate end insulator potentials.) The requirements of an RF insulator are not the same as those for DC or 50Hz where dielectric loss is not too important and annular ribs are often incorporated to increase the leakage path. Ribs cause additional dielectric loss at RF, where they increase the cross sectional area without increasing tensile strength. At RF a long leakage path and low dielectric loss require a rod shape with cross section only sufficient for the anticipated tensile load. A smooth surface is necessary to shed ice and to assist rain in washing away pollutants.

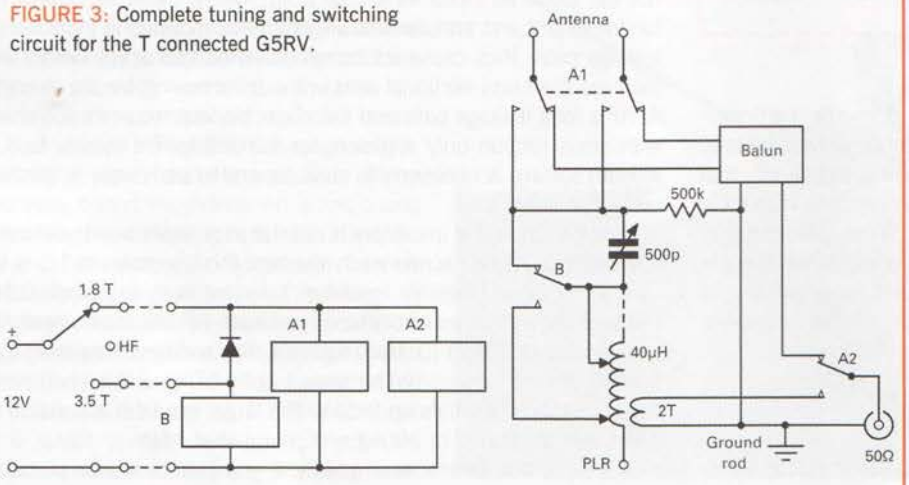
Dissipation at end insulators is difficult to quantify but if polluted to the extent of 250kΩ across each insulator this translates to 1Ω at the feed point. Clean porcelain insulators are more likely to provide 0.1Ω. **Photo 1** shows examples of glazed porcelain RF insulators, against a background of 20mm (0.75in) squares. The smallest is suitable for a doublet of wire up to 2mm tensioned up to 50kg. Even when wet it will withstand potentials up to 5kV. The larger insulator is suitable for 5mm wire tensioned to 200kg and potential of 15kV.

A simple test for insulator quality, if you cannot source porcelain types, is to put them in a microwave oven for a few minutes *[along with a cup of water as a load for the oven – Ed]*. If the insulators get warm use them elsewhere in a less critical position. Although HDPE insulators pass the microwave test, some unmarked black ribbed plastic insulators on the market soon lose their gloss after solar exposure and also get very hot in the microwave.

The T connected G5RV itself provides 0.5Ω of loss if made of 2mm copper for the horizontal wire and ribbon feeder with joined copper conductors for the vertical part. If the ribbon, which carries much more current than it did in doublet mode, is of the plated steel variety intended for VHF applications, loss will be up to 3Ω because at 1.8MHz the copper plating does not adequately prevent dissipation in the steel core. A magnet will confirm which type you have. If replacing the steel type or building from scratch I would reduce loss in both T and doublet modes by using ladder line of 1.5 – 2mm bare flexible copper wire, like Flexweave (not tinned or plated

PHOTO 3: PLR wires and elevated tuning box at the feed point of an experimental top-loaded 12m mast for 3.7MHz. In this example the PLR wires of copper plated steel support the whip type mast which is driven across a GRP insulator above the box, out of the picture.

FIGURE 3: Complete tuning and switching circuit for the T connected G5RV.



unless by silver) with spacing of 20cm (8in) and only enough 'rungs' sufficient, with mild tension, to prevent twisting. Flexible wire is preferred because it looks neat without a lot of tension.

Wide feeder wire spacing helps to increase bandwidth in T mode by reducing reactance at the expense of a reduction of resistance at the feed point. This will usually be offset by less loss in a lower inductance tuning coil. A typical moderate Q (ratio of reactance to resistance) inductor for tuning will add 0.85Ω of loss.

A ground connection will invariably be the most significant loss contributor. If, like me, you only have the space to erect a G5RV you will probably not have the area necessary to install a conventional ground system capable of providing the remaining loss resistance of 2.2Ω necessary for 50% efficiency from the hypothetical G5RV. In fact you need an area with radius 54m (180ft) in which to install 120 radials or 6.5km (4 miles) of wire. At this point I would not be surprised if you lost enthusiasm for chasing DX with a G5RV on Top Band.

Enter the PLR counterpoise

Do not despair! There is an alternative to a large ground system, of which I have built three successful varieties. The non-radiating elevated resonant Perimeter Loaded Radials (PLR) counterpoise is illustrated in Figure 2. It is favourably compared with a full size radial system in [3] and is certainly more effective – and uses much less wire – than any worthwhile buried or ground plane system that fits a typical garden. My doublet is above a PLR of 9.5 x 9.5m (31 x 31ft) that required 65m (213ft) of 2mm wire (not 4 miles!) and looks like one plate of a capacitor of -280Ω reactance with a small amount of series resistance, mostly due to dissipation in the ground, which forms the other plate of the capacitor.

To resonate both my antenna, which has reactance of –140Ω, and the PLR therefore required an inductor of 280 + 140 = +420Ω or 36mH. With an inductor having a measured Q of approximately 400 for tuning, an *EZNEC* model indicates total loss resistance of 4Ω at 1.83MHz, making efficiency 100 x 5/(5+4) = 55.5%. (This figure was obtained by adding resistance, at the feed point of a modelled loss-free T connected G5RV with perfect ground connection, to produce the same radiation intensity due to the modelled real T connected G5RV with PLR.)

Because it is above head height the PLR does not disrupt normal use of the garden. I will assume that you have a standard G5RV but the method described here can be adapted for any horizontal doublet, or even an inverted-L, straight mast radiator or tower supporting an HF beam, providing the counterpoise can be fitted around the vertical part. It is not recommended that you try this with an inverted-V because of both its very low radiation resistance due to the currents in the wires opposing that in the vertical part and inevitable close coupling to the support mast.

The PLR is quite sharply tuned, an indicator of high efficiency, and when combined with the selectivity of the relatively short antenna it will provide a narrow bandwidth of 25 – 30kHz between 2:1 SWR points. Narrow bandwidth may not in practice be too much of a problem because 1.8MHz DX activity is confined to the higher power section of the frequency allocation, 1810 – 1850kHz. Most of this is allocated to CW and data, with only two SSB channels in the UK band plan. The mid-band frequency for tuning is 1830kHz, from where a tuner near the radio may be used to expand coverage.

Bandwidth is approximately 100kHz for T connection on the 3.5MHz band.

Construction

To construct the PLR you need four corner supports, four insulators, and seven times the PLR side length of 2mm copper wire. Supports can be trees, buildings or posts attached to a garden fence etc. They need to place the PLR at the corners of a square centred on the antenna's feeder or the vertical part of an inverted-L etc, where they are to hold the wire at a height of 2.4m (8ft).

They will normally be 'permitted development' when they are within your property's boundary. In theory it is beneficial at 1.8MHz to double the height to the optimum 0.03-wavelength because there will be less coupling to the ground and hence less influence on PLR resistance from ground dissipation. In practice this is countered by the lower radiation resistance of the correspondingly shorter vertical radiator and the probable need for planning approval.

Attach an insulator (plastic is acceptable here) at each end of two equal length diagonal wires and tension them between supports. They should cross below where the feeder attaches to the horizontal part of the antenna. If not, the feeder should be diverted to where they cross. Next, run a perimeter wire and make sure it makes good weather-proof contact with the ends of the diagonals, ideally by soldering and / or clamping, as in **Photo 2**. Join the diagonals at their crossing to a piece of thick flexible wire, such as braid from coaxial cable, to form the connection to the PLR tuning inductor. Keep this short because it will have the same current as the antenna and can therefore radiate.

At the centre you need a weather-proof non-metallic box to house the tuning components shown in **Figure 3**, with three insulated terminals on which to connect the feeder and PLR wires, plus a socket for your coax cable. Ideally the box should be at the same height as the PLR to minimise the length of the connecting wire, like **Photo 3** which shows the arrangement I used for a mast radiator. Have the coax feeder to the radio dropping vertically from here to ground where its braid should be joined to the ground rod(s). Alternatively the box may be at ground level, as in **Photo 4**, close to the ground rod(s) and with feeder and PLR wires extended down to it.

Tuning circuit

Figure 3 shows the tuning circuit with relay control, which otherwise uses a low count of components and is designed for minimum loss. On 1.8MHz the inductor resonates the antenna and counterpoise. This is analogous to the loading coil on a mobile whip antenna that simultaneously tunes both the whip and the body capacitance of the vehicle. To minimise introduction of local noise the coax braid is isolated from the antenna by inductive coupling to the tuning inductor. The circuit for 3.5MHz is more complex than it looks because the capacitor not only cancels the combined reactance of antenna and PLR, it also forms the series element of an L-network of which the inductor is both the shunt element and the primary of a transformer.

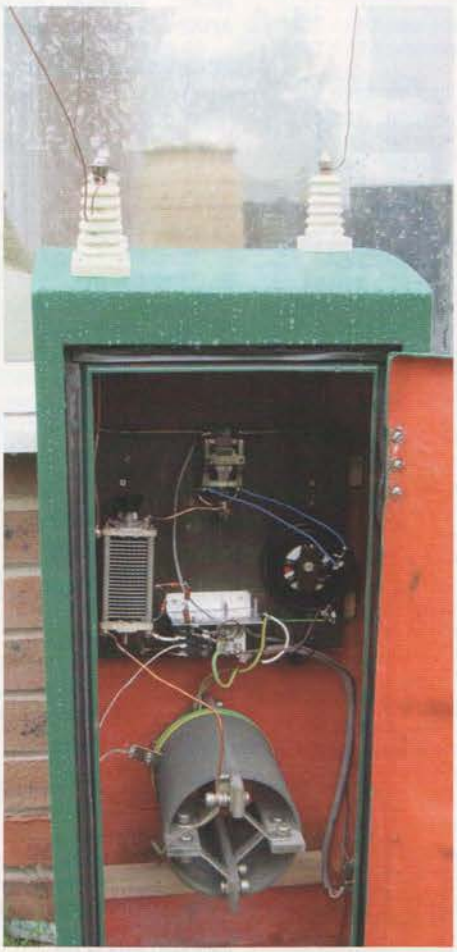


PHOTO 4: The components of Figure 3, installed in a weatherproof cubicle.

The resistance of the antenna plus that of any losses is thereby presented as a higher value across the active turns of the inductor and then transformed to 50Ω at the secondary or coupling winding. As the coupling turns that were established for 1.8MHz are fixed, impedance matching to 50Ω requires adjustment of inductor and capacitor.

The value of the static leak resistor is not critical and can be from 500kΩ upwards, but it has to withstand the antenna potential plus any short term static charge. I used 5 x 100kΩ 1W resistors in series.

Relays A1 and A2 switch between a balun for normal HF operation and T mode. Relay B switches between the 1.8 and 3.5MHz bands in T mode. The coax braid is connected to local ground rod(s), which complete the static discharge path and assist the balun to reject common mode noise from the vertical feeder. The ground rod(s) are not otherwise part of the antenna system. Operational tuning on 1.8MHz is accomplished by adjusting the upper tap on the inductor after optimising coupling turns for minimum SWR or for 50Ω if using an analyser. Tuning on 3.5MHz requires adjustment of the capacitor after pre-adjustment of the lower tap on the inductor.

A suitable inductor of high Q may be made from 17 self-supporting turns of 3 – 4mm bare copper wire. Small bore copper pipe, as used in caravan gas lighting, is easier to handle and equally effective. The wire should be close wound on a diameter of 130mm and opened to a winding length of 85mm, or more if you need less inductance. I used a surplus inductor of edge wound 5mm x 1mm silver plated copper strip. Silver plating will improve Q by about 10%. Crocodile clips with their ends flattened can be used for tuning adjustments. An easy way to confirm that you have sufficient inductance is to put it in circuit and check for resonance at 1.8MHz by coupling a dip oscillator to it. As an alternative you may use a roller coaster of the type with fixed coil and internal roller contact. (MFJ sells the roller coaster inductor that is currently used in their high power antenna tuners.) The lower tap requires a clip on the outside of the coil. My coupling winding is formed from two and a half turns of 1500V insulated 1.5mm copper wire, wound between the lower turns of the inductor.

The variable capacitor is rated at 2kV for 100W and can be 250pF or more. As with the inductor both sides are at high potential so they need to be mounted on insulators. A centre off toggle switch is shown controlling band / mode selection.

I used another, PTT controlled, relay to interrupt the supply to the antenna relays when receiving because although T mode gave higher S-meter readings from low angle signals, at my noisy location doublet mode frequently gave a better signal-to-noise ratio on the 3.5MHz band. Choice of relays A1 and B requires care because potentials are likely to be several thousand volts on this band. The relays that I found satisfactory for 100W were Schrack RM805012, which were tested at 1500V. For high power, depending on the antenna type, it may be desirable to use vacuum components for A1, B and the capacitor. Relay A2 can be a 230V 5A type.

References

[1] 'Forgotten Antenna Lore', Bruce Edwards, G3WCE, *RadCom* September 2017

[2] *Low-band DXing*, Fifth edition, chapter 2, John Devoldere, ON4UN, ARRL 2010.

[3] 'Reducing an Antenna's Footprint', Tony Preedy, G3LNP, *RadCom* February 2016.

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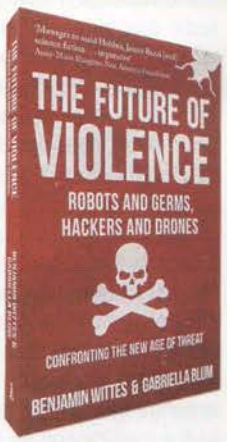

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EMC

Induction cooking appliances

Induction cooking heats a cooking pan by magnetic induction, instead of direct heat from a gas flame or an electric heating element. As it heats the pan directly, it heats up quickly and is more efficient, with less waste heat. An induction hob is called 'induction cooktop' or 'induction stove' in the USA. These have been available for a number of years but it seems that they have become more popular in the UK recently and the EMC Committee is investigating EMC aspects such as harmonics in amateur bands.

The principle of an induction hob is shown in **Figure 1**. There is a flat coil of copper wire under a ceramic hob and a high power oscillator drives AC into the coil. The operating frequency is in the range of 20kHz – 100kHz and one that we have measured operates at 43kHz with a power of up to several kilowatts for each induction cooking ring.

The cooking pot needs to be made of ferromagnetic material such as iron or steel or it needs to have a layer of ferromagnetic material in the base. Some types of stainless steel with suitable magnetic properties can also be used. The powerful AC magnetic field heats the base of the cooking pot due to eddy current loss and hysteresis loss.

Photo 1 shows the electronics and the coil inside an induction hob. The coil appears to be wound with heavy gauge 'Litz' wire, which would reduce copper losses. The circuit board in the top right corner looks like a mains RF interference filter and there appear to be further interference filtering components to the left of the main induction coil.

For EMC purposes, induction hobs are covered by the household appliances standard EN55014-1 for emissions and EN55014-2 for immunity. EN55014-1:2017 includes various limits that only apply to induction cooking appliances. These include conducted emissions into the mains supply from 9kHz – 30MHz and radiated limits for magnetic field strength from 9kHz – 30MHz. The magnetic field strength is measured at a distance of 3m using a loop antenna in the vertical plane with the lower edge of the loop 1m above the floor. As the coil in the induction hop is horizontal, this test method may understate the field strength.

The magnetic field strength limits are high compared to field strengths used for amateur radio and also LF/MF/HF broadcasting. The lowest limit from 4MHz – 30MHz is 3dB(μA/m) magnetic field strength, which would be equivalent to 54.5dB(μV/m) electric field strength under far field conditions. The way these limits scale to a greater measurement distance such as 10m is complex due to near-field effects and information on this can be found in various publications including *ETSI EN 300 330 Annex H*.

One of the EMC Committee members has an induction hob and is currently testing it for emissions of interference in amateur bands. Preliminary results show that under operating conditions, such as a small pan on a larger induction ring, the radiated spectrum resembles a hedgehog, with significant harmonics up to 12MHz. Possible sources are the electronics, due to 'amplifier underload' causing clipping, 'saucepan overload' where the saucepan's metal is driven into magnetic saturation causing non-linearity, or metal parts not making good contact, leading to rectification caused by the 'rusty bolt' effect.

In the meantime, we would be interested to hear of any reports of RF interference from induction cooking appliances.

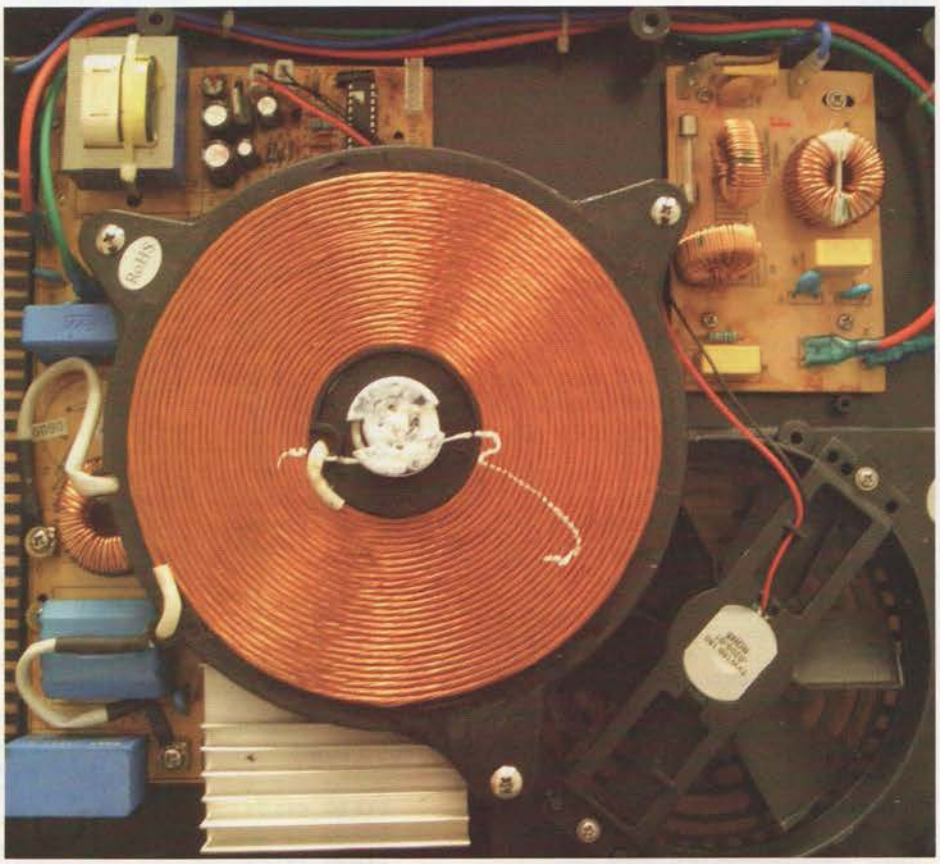


PHOTO 1: Electronics and coil inside of an induction cooker. [Source: https://commons.wikimedia.org/wiki/File:Induktionskochfeld_Spule.jpg, „Induktionskochfeld Spule", https://creativecommons.org/licenses/by-sa/3.0/legalcode].

EU Directives

The item on LED floodlights in the April 2018 *EMC* Column referred to "European Commission EMC Directive 2004/108/EC and LVD 2006/95/EC" but it has been pointed out that these Directives are not actually European Commission instruments. They are made in the name of the (European) Parliament and the European Council (of Ministers) and are properly called 'EU Directives'.

The Directives mentioned above were still in force when the EMC & LVD ADCO Working Group Joint EMC & LVD Market Surveillance Campaign 2015 started on 1 January 2016 and these would have applied to LED floodlights that were purchased for testing before 20 April 2016. After that date, a new EMC Directive EC 2014/30 and a new LV Directive EC2014/35 came into force. These EU Directives were transposed into UK law by Statutory Instruments SI 2016/1091 and SI 2016/1011 respectively. These SIs will remain in force after the UK leaves the EU, unless they are amended or repealed, but will become part of domestic law.

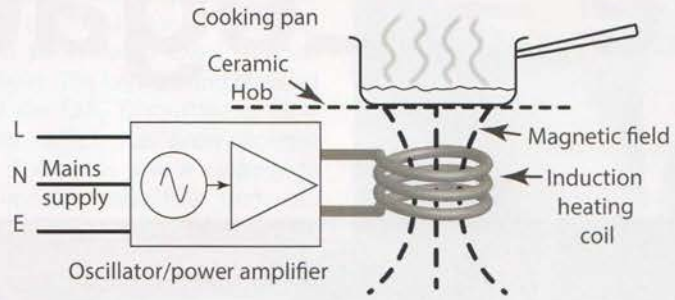


FIGURE 1: The principle of an induction hob.

These changes were made to take account of the EU New Legislative Framework. This was adopted in 2008 and enhanced (or was supposed to enhance) market surveillance and put more responsibility on all parties in the supply chain – but see later.

The Radio and Telecommunications Terminal Equipment (RTTE) Directive was also updated for the same reason but the opportunity was taken to revert non-radio telecommunications equipment to EMCD and LVD compliance only. This left only radio equipment within scope, hence the RTTED was replaced by the Radio Equipment Directive (RED).

LED light market surveillance

A Member commented that he thought that the item in April 2018 *EMC* Column was a very interesting and comprehensive article on LED light EMC matters. He reports that about two years ago, he bought a 10 watt outdoor LED floodlight from a store that is part of a chain of home, leisure and garden stores. He found that it produced very high levels of RFI, apparently directly into the mains supply. This effectively wiped out all HF bands but he did not test its effects at VHF.

The light was CE marked and the label included a UK distributor's name and post code. Our Member reports that the light failed to work after a very short period, so he was unable to provide a recording of the RFI itself. He contacted the retailer to advise of likely EMC non-compliance, but they claimed not to know which product it was, despite full details being provided. He also contacted the UK distributor, which only deals with trade customers, but received no response. He comments that without robust enforcement of the Regulations, this kind of non-response is not unexpected.

Enforcement of the EMC Regulations in the UK appears to be far from robust however. The new EMCD and RED mentioned earlier have led to what some might regard as a bizarre situation in the UK. The New Legislative Framework was supposed to enhance market surveillance and Ofcom has appointed a Market Surveillance Officer but Ofcom is not designated as a Market Surveillance Authority in either of the transposing UK Statutory Instruments (SIs) mentioned earlier. Ofcom is designated as an Enforcement Authority and it has expertise in interference matters, but getting Ofcom to use its enforcement powers in cases where products are suspected of non-compliance with the EMC Regulations is another matter. If we refer such cases to Ofcom, we are asking them for enforcement action, not market surveillance.

In the UK, Trading Standards are designated as both Market Surveillance and Enforcement Authorities but they do not appear to have the expertise or the funding to undertake either role effectively. The ADCO report mentioned above does not mention any involvement by UK Trading Standards organisations. In any case, Trading Standards are not responsible for protecting the radio spectrum in the UK whereas Ofcom is, so referring EMC compliance cases to Trading Standards rather than Ofcom could be regarded as letting Ofcom 'off the hook'.

This raises the question of whether, after 10 years, the New Legislative Framework has actually enhanced market surveillance in the UK and who is actually *doing* market surveillance in the UK for EMC compliance at the moment. The answer appears to be no-one!

Digital TV interference?

Since the change to digital terrestrial TV (DTTV), the symptoms of breakthrough of amateur radio transmissions on terrestrial TV reception have changed. Previously with analogue TV transmission, breakthrough of amateur radio transmissions caused characteristic light and dark horizontal bands across the picture. With DTTV and any other form of digital transmission, noise or interference below a certain threshold generally causes no noticeable effect but above a certain threshold, there is a sharp transition from a near perfect picture to no picture at all.

If strong RF signals above or below the UHF TV band cause blocking of a DTTV receiver, the symptoms are complete loss of signal and the TV displays a message like 'no signal or bad signal'. It appears that a similar effect can occur with some satellite TV receivers due to RF pickup on the braid of the coaxial cable from the dish or possibly via other routes into the satellite receiver box such as via the mains cable or via the screen of an HDMI cable or network cable.

With any type of digital TV, the symptoms of interference are the same as the symptoms of no signal or a poor TV aerial, so the cause may not always be clear. This may lead to enquiries from neighbours about why they have lost certain DTTV channels or why they sometimes lose reception of all DTTV channels.

The first thing to do would be test transmissions on all amateur bands that you use while the neighbour checks to see if there is any effect on their TV reception. If there is any effect, then advice is available via the RSGB EMC page. This includes a link to the RSGB EMC Matters Forum and Helpdesk email address (see Websearch). If the effect the neighbour reports is not caused by amateur transmissions it is still worth offering technical advice if you can because it is always useful to be on good terms with neighbours.

If the TV aerial cable comes direct from the aerial to the TV without a coaxial socket on the wall, is the centre pin soldered in to the coaxial plug (it should be) and is the braid of the cable properly connected? Is the coaxial plug wet? If so, the cable or aerial have probably deteriorated, allowing rain to get into the semi-airspaced coaxial cable.

Have they lost certain channels since retuning? There is a '700MHz Clearance Programme' taking place in 2018 to reallocate UHF TV channels 49 – 60 for mobile phone data services. For example, London Crystal Palace changed its RF channels on 21 March 2018. Previously, only UHF TV channels in the range 22 – 35 were used but after 21 March, two channels have moved up to Channels 55 and 56. This is well outside the designed frequency range of millions of existing Group 'A' TV aerials that are currently in use and it is only a temporary 'parking' allocation as these channels have moved into the range that is to be cleared.

Web search

Wikipedia Induction Cooking – https://en.wikipedia.org/wiki/Induction_cooking
The Induction Site (US based) – http://theinductionsite.com/
RSGB EMC page – http://rsgb.org/main/technical/emc/
http://www.forums.thersgb.org/index.php?forums/emcmatters/

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

Back to the Future – Legacy

If you enjoy the fascination of technology and experimentation, there is a huge choice these days. The challenges for amateur radio are obvious but they are also opportunities. We can now do things our founders just dreamed about! Of course amateur radio is not what it used to be; it is what it is now and what we make of it for the future. Use it or lose it.

The YOTA 2017 Buildathon kits were paid for by the RSGB Legacy Fund.

Much is down to individual radio amateurs who continue to work away at new ideas and new ways of doing things. That includes your activity on the air, the equipment you use and the kind of club you have. Those of us who were at the AGM in Birmingham recently had the privilege of hearing Nobel Prize winner Joe Taylor, K1JT talking about the development of FT8. It was fascinating stuff and showed that amateur radio can still be innovative and exciting. We must move with the times both in terms of technology and how people live their lives, and do all sorts of other things to attract new people and interest them in our passion.

Some of this costs money and the RSGB is very privileged to have a substantial fund – the Legacy Fund – available to support the development of amateur radio in its widest sense. This fund has now been going for about seven years and here I describe some of what it has helped to achieve.

So where has the money come from? We had a magnificent start in the form of a major bequest from the late Ken Rowell, G5RL. Other legacies have come from members who have been kind enough to remember amateur radio either in a will or as a donation. They are very much appreciated and enable the RSGB to offer financial support to projects which sustain and grow amateur radio. Financial legacies can thus be turned into a different kind of legacy – one related to innovation and change.

Early Legacy Sub-Committee meetings focused on promoting the fund. It was made very clear that the fund was not for individuals' benefit or that of individual clubs. Proposals have to benefit the wider aims of amateur radio – things which take it forward for as many people as possible. This is still a pretty wide target and there are very few rules in order to allow scope for good ideas. After a slow start, things are now moving better and it is hoped that the descriptions here of some projects already agreed may encourage more.

Here are a few facts:

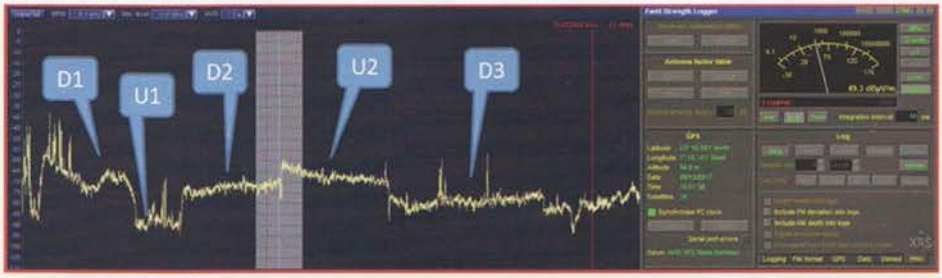
- The Board has agreed 19 applications for financial support
- The fund has distributed £58,130 so far
- It stood at £182,000 at the last year-end (which included some commitments)
- Organisations and groups to have received Legacy Funding are: EMC Committee, ARDF Committee, Youth Committee, Camb-Hams, IOTA Foundation, Bittern DXers, Buildathon, Mid-Lanark ARS (CQ Scotland), Widnes, Kettering, Harrow and Mid-Ulster Clubs and G4BAO/MW0LNA/M0HMO.

Now, let's look at some of the projects. They are grouped under the headings of the 2022 Strategic Priorities [1], though there is a lot of overlap between them. Looking at the Strategic Priorities is worth doing if you are preparing a bid as they provide signposts. Incidentally there is no minimum or maximum amount that can be requested – each case is considered on its merits.

Spectrum

One of the very real problems these days is managing to communicate in a pretty hostile environment. The spectrum is under major pressure and we have to both fight and innovate to keep on the air. Spending legacy money on this seems good sense.

One of the earliest legacy-funded projects



RSGB Legacy Funding helped with tools to measure VDSL emissions at locations identified by Members.

was to measure noise. Much of amateur radio is about communication at low signal strengths and so increased levels of noise make life difficult. The Legacy Fund provided resources for the EMC Committee to do a detailed study, which has been reported in *RadCom*. There was also a proposal to do a more in-depth noise floor study but unfortunately it failed to find sponsorship. Funding is still available.

A second project by the EMC Committee was for equipment to measure accurately and analyse types of noise. This has proved invaluable in backing up assertions of noise problems with accurately measured facts – essential these days. A third and important project is work being undertaken to mitigate the effects of broadband noise. This is a subject dear to many of us, and of course links directly to the 2017 VDSL survey.

These are all important projects that relate to the continuance of amateur radio in a modern environment; important to Members as well as providing vital information when discussing such matters with OfCom and others.

The Legacy Fund made a significant contribution to the Youth Committee DX15 event.

Participation and Membership

In 2015, financial support from the RSGB and the RCF for the Youth Committee's Youth Camp and DXpedition in Wales resulted in an excellent experience for younger enthusiasts building for the future. Similarly, provision of a trailer and generator for the Bittern DXers was in support of their innovative education outreach programme, which takes amateur radio to young people and gives them their first experience of its possibilities and excitement.

Funds have gone to two projects for construction, again looking at attracting younger people. Equipment has been funded for the Buildathon project and now passes between user groups. It was also used at the YOTA International Camp at Gilwell Park. In a separate allocation, CQ Scotland has embarked on innovative construction-led initiatives to draw young people to technology and amateur radio.

The RSGB has many Members for whom remote operating may be the only means available of enjoying amateur radio. Camb-Hams received legacy funding for a project to enable operation via the internet using a high quality remote station. The project was written up by G3PJT in the January 2016 edition of *RadCom*. Further funding has been made available for the Cambridge Amateur Radio project Community Extension.

Growth

An early grant was made for hardware and software to ensure that the popular ARDF contests have up-to-date recording systems. ARDF continues to be a major attraction at events for young people, including the international YOTA 2017 Summer Camp at Gilwell Park.

During 2017, the RSGB Islands on the Air Programme became a separate company and part of the transition was a legacy grant to rewrite existing software. The IOTA programme gives pleasure and challenge to many radio amateurs worldwide, and of course to RSGB Members.

Further small 'catch up with technology' grants have been made to four clubs to explore the challenges of the new on-line examinations. This is to help pump-prime its introduction and the general principle has been to give support to one club in each region if requested.

Research – and Participation

A very recent grant has been agreed to part-support an SDR Basic Project – a programme to encourage and develop the use of SDR. A programme is being planned to link with the National Convention this autumn.

Find out more

Steve Hartley, GOFUW has taken over from me as Chair of the Legacy Committee (as it is now known) and the Committee's web pages **[2]** list the other trustees. Also on the web pages are guidance notes and an application form.

It is worth mentioning that none of these projects would be running without the enthusiasm and drive of their volunteer supporters. There is a requirement that proposals come from RSGB Members and/or Affiliated groups and, from what you have read here, it can be seen that projects have been proposed by RSGB Committees, local radio clubs and a group of Members.

The Legacy Fund is an important means of adding innovation and investment to the RSGB Strategy 2022. If an idea sounds worthwhile, please put it forward. There is no limit on the size of projects so get thinking!

Websearch

[1] www.rsgb.org/strategy

[2] www.rsgb.org/legacy-committee

Nick Henwood, G3RWF
(Legacy Committee Chairman to April 2018)

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 July issue is 23 May and for August it's 20 June.** 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,
Rally June: Rutland Water

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
1, 29 Club night
16-17 GB2MOF, Museum of Flight-East Fortune

Kilmarnock & Loudoun ARC
Len Paget, GM0ONX, Klarcinfo@gmail.com
5, 19 Training & construction, all welcome
12 Club night, all welcome
26 Dusk to Dawn talk, all welcome

Livingston and District Amateur Radio Society
Cathie, 2M0DIB, 01506 433 846
5, 19, 26 Operating and training
12 Visit to museum

Lothians RS
Mike Burgess, MM0MLB, secretary@lothiansradiosociety.com
13 AGM
27 Summer barbecue

REGION 2: SCOTLAND NORTH & NORTHERN ISLES

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

Dundee ARC
Martin, 2M0KAU, 0776 370 8933
2-3 NFD
5 2m contest & hands-on eve
12, 19, 26 Club night & training
16-17, 23-24 Museums weekend

REGION 3: NORTH WEST

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

Bolton Wireless Club
boltonwireless@gmail.com
11, 25 Meeting, talk

Chester & DRS
Bruce Sutherland, M0CVP, 01244 343 825, www.chesterdars.org.uk
5 UKAC contest
12 Committee meeting
16 70th Anniversary Dinner
19 Surplus sale
26 Field Day planning

Macclesfield & DRS
Greg, M0TXX, info@gx4mws.com
4 Shack on the air
11 Film night
18 Funny stories from the fire service
25 Club maintenance night

South Manchester R&CC
Ron, G3SVW, 01619 693 999
7 Hidden messages, Alan, M0HYI
14 A+B divided by C, Ron, G3SVW
21 Microphone night
28 RTL SDR dongle, Phil, M1CYV

Southport & DARC
Brian Woods M0SSN, 0777 169 5525
18 G2OA on the air

Stockport Radio Society
Heather Stanley, M6HNS, 0750 690 4422, info@g8srs.co.uk
1, 8, 15, 17, 22, 29 Net, 2pm, 433.525MHz FM
2 Foundation exam
3-4 RSGB CW NFD, SRS Contest Group
5 Society night
7 Committee meeting
12 Net, 7.30pm, 51.550MHz FM
14, 27 Net, 7.30pm, 145.375MHz FM
19 Radio night
26 Skills Night
28 Advanced primer 2

Thornton Cleveleys ARS
John E Rodway, G4FRK, 01253 862 810
2-3 NFD
4 Natter night & practical evening
11 On the air
18 Social night
25 Fox hunt or video

REGION 4: NORTH EAST

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

Angel of the North ARC
Nancy Bone, G7UUR, 01914 770 036, nancybone2001@yahoo.co.uk
4 Intermediate & Foundation training; OTA
11 Plan for Museums OTA + training
16-17 Museums OTA, 9am-3pm, Bowes Railway
18 Talk
25 On the air

Bishop Auckland RAC
Gail, M3GBB 0191 372 0473
7, 14 Club night & training

Blyth Radio Club
John, 2E0DCV, 0191 237 1729
6, 13 Club night & Foundation course
20, 27 Club night

Denby Dale RC
Darran, G0BWB, 0797 442 3227, g0bwb@g0bwb.com
3, 10, 17, 24 Club net, 10.30am, GB3HD
6, 20 Club night
17 WAB contest, 10am

Hornsea ARC
Gordon, G3WOV, 01377 240 573
2-3 NFD
6 Committee meeting
13 80m CW CC + video
20 Digital drive for magloop
27 Fox hunt
28 80m SSB CC + video

Ripon & DARS
David Cutter, G3UNA, 01423 860 778, d.cutter@ntlworld.com
7, 14, 21, 28 Club night

Sheffield & District Wireless Society
Krystyna, 2E0KSH, 0788 406 5375, info@sheffieldwireless.org
6 Marconi's footsteps, Andrew, G0HSA
13, 27 Social night, training
20 Bring and Buy
27 VHF FD final planning

Sheffield ARC
David, G6DCT, littlewood20@btinternet.com
4, a25 GX3RCM on the air
11 Club night
18 Technical & practical hands on

Spen Valley ARS
Russell, G0FOI, 01274 875 038
7 Bring your latest project
21 Meeting and on the air

York Radio Club (www.yorkradioclub.uk)
contactus@yorkradioclub.uk
3 Breakfast meeting, 10am
6, 13, 20, 27 club net, 8pm, 145.450MHz
7, 14, 21, 28 Club night, 8pm

REGION 5: WEST MIDLANDS

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

Bromsgrove & DARC
John, G4OJS, 0788 967 8303
1 Emergency comms, Mark, M0LQX
8, 15, 22, 29 Club night
13, 27 VHF activity night, 7pm

Burton ARC
Mike Lewis, M0XMX, 0785 068 5961, Mike@M0XMX.co.uk
3 Club net, 10am, 145.575MHz

Coventry ARS
John, G8SEQ, 0795 877 7363
4, 11, 18, 25 Open net, 8pm, 145.375MHz and/or 7.16MHz ± QRM SSB
7, 14, 21, 28 Open net, 8pm, 50.175MHz SSB
8 Castles on the air
15 G4ZMC Portable Trophy, 2nd Round Hatton locks
22 Portable challenge
29 Net on 145.375MHz

Gloucester AR&ES
Anne, 2E1GKY, 01242 699 595 daytime, www.g4aym.org.uk
4 Construction competition
11 DF hunt
16 G4BGLM, Glos Life Museum, 0900-1600
18 Informal activities
25 Dxpedition to Surinam talk, Roger, G4BVY

Mid-Warwickshire ARS
Don, G4CYG, 01926 424 465, mwars@gmail.com
12 Intermediate mock exam, M0OAE
26 Picnic at Bidford on Avon

Rugby ATS
Steve, G8LYB, 01788 578 940, stephen@tompsett.net
2, 9 DF antennas, on air, projects
3 Hut maintenance
5, 12, 19, 26 CW practice, training, on-air, projects
5 UKAC 144MHz
12 UKAC 432MHz
16, 23, 30 Prep for VHF NFD, on air, projects
19 UKAC 1296MHz
23 Using Minos

Solihull Amateur Radio Society
Roger Hancock, G4BBT, 0121 743 7277
7, 14, 28 Net, 8pm, 145.450MHz
21 Club night

Stratford upon Avon & District Radio Society
Clive, G0CHO, 01608 664 488,
cousbey@theiet.org
4, 18 Club net, 145.275MHz FM, 8pm
11 Experimental 80m antenna, Ron, 2E0EKW
25 SDR kit build pt 2, Quentin, M0OAE

Sutton Coldfield ARS
Robert Bird, rob2e0zap@gmail.com
4, 18 Open net, 7.30pm, 145.250MHz
11, 25 Club meeting
12 Open net, 7.30pm, 70.475MHz
26 DMR open net, slot/local 2 GB7FW, 7.30pm

Telford & DARS
John Humphreys M0JZH, 0782 473 7716,
m0jzh@yahoo.co.uk
1 Friedrichshafen visit
2 GB50TEL at Wappenshall Jct, 1000-1600
6 Committee meet, GX3ZME OTA
13 6m Trophy prep
16-17 G3Z from IO82NN for 50MHz contest
20 BBQ on the field
27 Fox hunt

Wythall Radio Club
Chris, G0EYO, 0771 041 2819
3, 10, 17, 24 Club net, 8pm, 144.225MHz or GB3WL
5, 12, 19, 26 Club meeting, Morse night
12 Committee meeting

REGION 6: NORTH WALES

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

North Wales Radio Society
Liz Cabban, GW0ETU, 0776 019 0355
7 General meeting
14 Technical topic
21 Using a spectrum analyser, Martyn, GW4CQZ
28 Discussion night

Porthmadog and District ARS
Peter, GW0DFK, 0773 177 1319
21 Fox hunt + BBQ on beach

Wrexham ARS
Eifion Parry, wrexham.ars@gmail.com
2-3 HF National Field Day
5 2m UKAC & BBQ

REGION 7: SOUTH WALES

RM: Glyn Jones, GW0ANA, RM7@rsgb.org.uk

Aberystwyth & DARS
Ray, GW7AGG, 01970 611 853,
ray@clocktower.go-plus.net
14 Visit to Museum of Internal Fire
28 Club net, starting on 145.500MHz

REGION 8: NORTHERN IRELAND

RM: Philip Hosey, MI0MSO, RM8@rsgb.org.uk

Bangor & DARS
Harry, GI4JTF, 0289 042 2762
7 BBQ, Drumawhey Mini Railway

Mid Ulster ARC
Dave, muarc.secretary@yahoo.co.uk
5 Shack attack night
10 Digital selective calling talk, all welcome
12 Rig test evening
19 QRP night
26 BBQ, bring your own burgers

REGION 9: LONDON & THAMES VALLEY

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

Aylesbury Vale RS
avrs@rakewell.com
20 BBQ hosted by G7VFV

Edgware & DRS
Mike, G4RNW, 0208 950 0658,
michael.stewart5@ntlworld.com
14 Table top sale

Hammersmith ARS
Selim, M0XTA, 0751 090 0731
7, 14, 21, 28 Club net, 8pm, GB3LW
8, 22 Club night & on the air

Harwell ARS
John, G6LNU, 01235 223 250,
john.g6lnu@virginmedia.com
14 Fuelling systems in a 747, John Boden

Radio Society of Harrow
Linda, G7RJL, lcasey100@outlook.com
1 Show & tell, Blackwell Hall
3, 10, 17, 24 Club net, 1938kHz LSB, noon
4, 11, 18, 25 Club net, 8.15pm, 145.500MHz
16 Antenna project, 10am, shack
24 Outdoor event, Old Redding car park 2-5pm

Reading & DARC
Laurence James, G2DD, 0758 470 6625,
lozdjames@gmail.com
14, 28 Antenna evening, Reading RFC, RG4 6ST

Shefford & District ARS
David, G8UOD, 01234 742 757,
davide.lloyd@ntlworld.com
7 Planning for IARU Contest
14 2m mobile DF hunt, foxes M0CKA & G8UOD
21 Visit to Moonraker
28 DXpedition DVD

Shoreham Coast Watch
24 GB1SCW on HF & VHF from National Coast Watch Lookout, BN43 5HY

Silverthorn Radio Club
Robbie, M0HVC, 0742 913 1105,
m0hvc@protonmail.com
1, 8, 15, 22, 29 Club night, 7.30pm

Southgate ARC
Keith, G8RPA, g8rpa@arrl.net
23-24 Museums on the Air

Verulam ARC
Greg Beacher, M0PPG, 01582 413 345
19 Antenna shootout

Whitton Amateur Radio Group
Ian, G0OFN, 0776 565 7542
1 Social meeting in the bar
8 Friedrichshafen visit highlights
15, 29 Club night, HF / VHF on air
22 Presentation on FT8 by G0MRF

REGION 10: SOUTH & SOUTH EAST

RM: Michael Senior, G4EFO, RM10@rsgb.org.uk

Bromley & DARS
Andy, G4WGZ, 01689 878 089
6, 13, 20, 27 Net, 9pm, 145.500MHz then QSY
19 Direction finding, Steve, 2E0DIZ
26 Club meal

Chippenham & District ARC
secretary@g3vre.org.uk
5, 12, 19, 26 Meeting at Sea Cadets HQ SN15 3JZ
10 Taking part in *PW* VHF Low Power contest

Crawley ARC
Richard, G3ZIY, 01342 843 545
27 Meteor scatter, Mike, G0KAD

Cray Valley RS
Dave Lee, G8ZZK, 0773 954 9822
7 Antenna Clinic, Dave, G4BUO
21 DF hunt

Crystal Palace R&EC
Bob, G3OOU, 01737 552 170, g3oou@aol.com
1 Intro to PSUs, Bob, G3OOU
6, 13, 20, 27 Net, 8pm, 145.525MHz ± QRM

Darenth Valley Radio Society
Mike, G8AXA, 0788 415 7776
9, 16 Foundation course

Dorking & DRS
David Browning, M6DJB,
djb.abraxas@btinternet.com
26 An engineer's distrust, Philip, G0LFE

Echelford ARS
John, G4GSC, 01784 451 898,
jho_g4gsc@btinternet.com
14 CW practice, on air, natter night
28 VU4G Andaman Is DXpedition, John, G4IRN

Farnborough & DRS
sec@farnboroughradio.org.uk
2-3 NFD & social at HF contest site
9 FDRS Buildathon
13 On the air
27 VHF propagation, Kevin, G7BCS

Folkestone Repeater Group
admin@folkestonerepeatergroup.org.uk
6 DMR network update

Fort Purbrook ARC
Chris, G3WIE, g3wie@fparc.org.uk
4, 11, 18, 25 Open net 144.275MHz, 8pm
29 Planning for VHF NFD, Room FP-1

Hastings E&RC (www.radioclubs.net/herc)
Gordon, 01424 431 909, gordon@gsweet.fsnet.co.uk
3, 10, 17, 24 Net, 144.575MHz, 11am
27 My lifelong electronics hobby, Rodney

Hilderstone R&EC
Ian, 2E0DUE, secretary@g0hrs.org
14 Club night
17-18, 23-24 GB1MSM at Manston Spitfire Museum for International Museums Weekend
28 Talk

Hog's Back ARC
Ray, G4LUA, 0118 981 4174
11 Weather satellites by Frank, M0AEU
25 Natter night + Morse practice

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

Mid-Sussex ARS
Peter, G4AKG, 01444 239 371
1 Natter night
8 open evening for Town Day
15 Fox hunt
22 Windmills Evening at Jack and Jill Mills
29 Radio night

North Kent Radio Society
Stephen Osborn, G8JZT,
secretary@nkrs.info, 0798 575 3370
5 Natter night and club on air
19 Rig talk by Ian, G7PHD
26 Summer 2m DF hunt, 8pm

Southdown ARS
John, G3DQY, 01424 424 319
4 Military history: Stuart Angel
6 Hailsham Shack meeting 10.30am
6, 13, 20, 27 FM net, 145.275MHz, 8.30am, cafe meeting, 12.30pm; CW net, 144.060MHz, 7pm

Surrey Radio Contact Club
John, G3MCX, 020 8688 3322
1, 8, 15, 22, 29 Net, 145.350MHz, 8pm
3, 10, 17, 24 Net, 1905kHz, 9.30am
4 RSGB propagation video evening
7, 14, 21, 28 Net, 70.300MHz, 8pm
18 Chat and Fix-it, John, G8MNY

Swindon & DARC
Jonathan, M0ZGB, 0789 409 0423
7 AGM
14, 21, 28 Activity night

REGION 11: SOUTH WEST & CHANNEL ISLES

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

Appledore & DARC
Alan Fisher, M6CCH, 01237 422 833, fisheralan@btinternet.com
18 Capacitance loaded antennas, Terry, G4CHD
30 SES at Bideford Fair, Victoria Park

Blackmoor Vale ARS
Keith, M0TMO, 01747 851 260
5, 19, 26 Club evening
12 Talk on HF propagation

Bristol RSGB Group
John, G4DVV, johnthomas@blueyonder.co.uk
25 Portishead Radio, Larry Bennett, G4HLN

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

Cornish Radio Amateur Club
Steve, G7VOH, 01209 844 939, G7VOH@btinternet.com
6 Committee meeting
7 Main meeting
21 Social evening

Exmouth Amateur Radio Club
Mike, G1GZG, 01395 274 172
6 G0XRC on HF & VHF; social
20 Arduino & R-Pi programming & apps

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

Mid Somerset ARC
David Edwards, 01749 670 085, info@midsarc.org.uk
11 Exeter University radio telescope talk
25 Social meeting

Newquay & DARS
Terry, 2E0XTM, 01841 540 142
7, 21 Club night

North Bristol ARC
Mat, G7FBD, g7fbd@gb3bs.com
1, 15, 22 Relax & chat, operating
1 Committee meeting
8 BBQ evening
15 Preparation for West Rally
29 45 minute video

Riviera ARC
rivieraarc@gmail.com
23-24 GB100RAF operated by Steph, G4XKH

South Bristol ARC
Andrew Jenner, G7KNA, 07838 695 471
7 Prep for VHF NFD
14 Summer table top sale
21 Briefing for VHF NFD
28 Open house and on air
29 Activation team set up

Torbay ARS
John, G4VUD@tars.org.uk
1, 15, 22 Club night
8 Club night & business meeting
29 Peter, G3ZVI tack-on repeaters

Weston Super Mare RS
Martin Jones, G7UWI, 01934 613 094, g7uwip@googlemail.co.uk
4, 11, 25 Construction, operating, Morse tuition & natter night
18 Main meeting

Yeovil ARC
Rodney Edwards, M0RGE, 01935 825 791, rodney.edwards@uwclub.net
1, 15 Construction and on-air, Sparkford
7 Short dipole aerials, G3MYM
14 2m fox hunt, Sparkford
16 Coffee morning / tabletop sale, Sparkford
21 Morse practice, G3MYM
28 Problem solving evening

REGION 12: EAST & EAST ANGLIA

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

Braintree & DARS
Edwin, G0LPO, 01376 324 031
5, 19 Club net, 8pm 145.375MHz
12 Talk on the Air Ambulance
29 Club barbecue

Cambridge & DARC
Richard, G4AWP, 0770 229 5300
8 RSGB HF Prop video plus Q&A with G0KYA
22 club night

Essex Ham
Pete, M0PSX, news@essexham.co.uk
2 Essex YL Net, GB3DA, 8pm
3 Online Foundation course
4, 11, 18, 25 Net, GB3DA, 8pm

Felixstowe & DARS
Paul, G4YQC, pjw@btinternet.com
10 ESWR Rally

Harwich Amateur Radio Interest Group
Kevan Pugh, 2E0WMG, 0749 352 1049
13 Talk by Kevin, M0JVC

Huntingdonshire ARS
David, M0VTG, secretary@hunts-hams.co.uk
14 Natter night
16 Hosting Train the Trainers
23-24 GB2RRM, Museums on the Air, Ramsey Rural Museum
28 Kenwood by Mark Haynes, M0DXR

Loughton & Epping Forest ARS
Dave De La Haye, M0MBD, 0798 016 5172, pro@lefars.org.uk
7, 14, 21, 28 Net, 144.725MHz, 8pm

Lowestoft & District PYE ARC
secretary@ldparc.co.uk
7, 21, 28 Club evening & sorting out the caravan
11, 25 Open night at the club
14 Talk

Norfolk ARC
Chris Danby, G0DWV, 01603 898 308, cmdanby@btinternet.com
6 Friendly fox hunt
13 Informal
20 How NOT to win NFD, Quin Collier, G3WRR
27 Informal + Bright Sparks

Peterborough & DARC
Alan Ralph, secretary@padarc.co.uk
4, 11, 18, 25 Net, 1.980MHz, 8pm
5, 19 Net, 145.400MHz, 8pm
13 Natter night + Museums on the Air planning
27 Talk by RSGB RM Keith, G3WRO

Thames ARG
Patrick Higham, G8JLM, 01621 855 461, patrick.higham@virgin.net
1 Talk by M0FZW
9-10 GB2HBT field event, Hadleigh Country Park

Thurrock Acorns ARC
Gordon, M0WJL, acorns@taarc.co.uk
5 2m SSTV open net 1930 to 2030 GMT, plus start of RNLI SOS Month activities
7, 13, 14, 21 Club net, 7.30pm, 145.500MHz
19 Club meeting
23 GB2HFF for Horndon Feast & Fayre

REGION 13: EAST MIDLANDS

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

Leicester RS
Sandra Morley, G0MCV, 0793 027 4044
4 The RSGB: Mark Burrows
11 Morse class, free & easy, cttee meet
18 Morse class, bingo
25 Morse class, construction

Loughborough & DARC
Chris, G1ETZ, 01509 504 319
5 Shack on the air
12 70cm portable, Lymeswold
19 Natter and construction
26 Radio ramble

Nunsfield House ARG
Paul Gamble, G1SGZ, pr@nharg.org.uk
1 Projects evening
4, 11, 18, 25 Shack night
7, 14, 21, 28 Club net, 145.325MHz, 8pm
8 TX Factor 20
15 Club night & prep for Museums on the Air
22 Club night
29 Club night & prep for Armed Forces Day on the Air

RAF Waddington ARC
Bob, G3VCA, 07971 166 250
1, 8, 15, 22, 29 Club night
4, 11, 18, 25 Club net, 145.325MHz, 8pm
8 Understanding HF Propagation video

South Normanton Alfreton & DARC
A Lawrence, 2E0BQS, 01246 456 625, adylawri@btinternet.com
4 Rally planning
10 Junction 28 rally
11 Post rally meeting
25 Natter night

Welland Valley ARS
Peter D Rivers, G4XEX, 01858 432 105, g4xex@fsmail.net
1-28 GB4FWW at Mail Street Great Bowden
4 Club net, 8pm, 145.275MHz
18 GB4GW, all modes 2m/70cm + Bring & Buy

REGION 2: SCOTLAND NORTH & NORTHERN ISLES

DUNDEE RADIO CLUB had a visit by Gav, GM0GAV from the GMDX Club, when he gave a talk about DXing. Later, the club chose a nice sunny day to test some equipment after being repaired. Some of the International Marconi Day stations were worked, plus some FT8 QSOs were made on various bands including 6m.

REGION 3: NORTH WEST

South Manchester Club meets in a "homely" shack – in other words "there's lots of everything all over the place!" they say. They have a large 19" rack trhat holds a triple-diversity receiver system donated to the club at the NARSA rally some years ago. The (new) owner said he didn't dare take it home! The membership all has different interests throughout the spectrum.

Furness Amateur Radio Society celebrated World Amateur Radio Day in 18th April by running special events station GB4ARD from 9am to 5.30pm on 40m and 20m. Conditions weren't great but perseverance resulted in 63 QSOs in 23 countries. The 5.6GHz ATV team has been doing good work since the weather improved. Teaming up with members from the Wirral club (who travelled to a number of Welsh sites), a number of 2-way ATV contacts were achieved between South Cumbria and North Wales with distances of 92km, 101km, 120km and 139km worked at P5 / P4. There's plenty of signal left for further distances in the future. It has been discovered that some of the so-called '600mW' commercial transmitters only actually produce some 50mW so these paths are even more remarkable on considerably lower power than expected. On 21 April a path of 153km was worked from Kirkstone Pass in Cumbria to near Bylchau in North Wales with an average of P4 both ways. The picture shows Chris, M0KPW and Nick, G0HIK with their ATV stations. Please contact info@fars.org.uk if you want to arrange a 5.6GHz ATV sked into South Cumbria.

REGION 5: WEST MIDLANDS

Stratford-upon-Avon and **District Radio Society** moved to their new HQ in Foundation House, Masons Road, Stratford earlier this year. The first meeting saw the chairman, Ron MacDonald, 2E0EKW welcome members and visitors. He explained Foundation House is a new community hub run by the charity, Stratford Town Trust and it is now home to various community groups and charitable organisations. He outlined the plans for the shack and aerial, this was followed by a tour of the building. The evening concluded with a sale of society items and books which were surplus after the move. The programme and location details can be found at www.stratfordradiosociety.org.uk

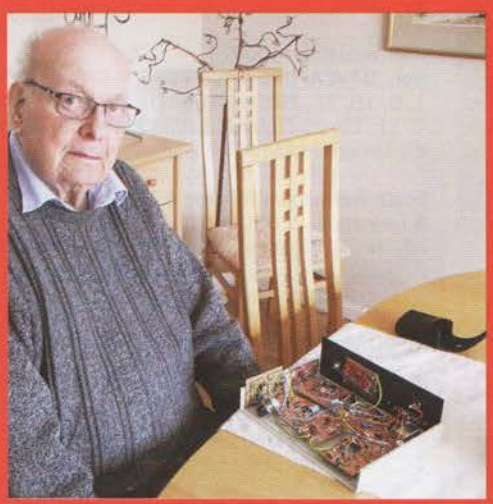
REGION 6: NORTH WALES

Wrexham Amateur Radio Society congratulates Steve Duncan, MW6NUI; Carl Dace, MW6TVD; Barry Adamson, MW6NSY and Kevin McLean, M6SNI on achieving their licences.

REGION 8: NORTHERN IRELAND

Causeway Coast & Glens ARC celebrated the exam success Phillip Gibson and Charly Adjey, who passed their Intermediate Exam in January. Eddie Johnston and Gerrad Curid passed their Foundation Exam in February. Well done to all!

Lough Erne Amateur Radio Club will be running special event station GB2MAC on the weekend of 9-10 June, hoping to be on the air on all bands from 160m to 6m. They will also be monitoring GB3CP for anyone needing directions to come and visit and maybe operate – everyone is welcome. Setup is usually on Saturday morning and the station on the air by 10am, running until about 4pm on the Sunday. Several club members stay overnight to take advantage of the enhanced 80m and 160m evening propagation. QSLs will be via the bureau and LOTW and there's more info, including contact details, on the GB2MAC QRZ.com page.



Bangor & District Amateur Radio Society's Constructor's Competition in April gave 1st prize to Jack McKinney, GI3TZB with his excellent 'dead bug' Top Band transceiver (photo). Second prize went to Richard White, GI4DOH with his series-regulator power supply for his portable KX3 transceiver and finally third prize was awarded to John Grant, GI7UGV for his 35-4400MHz Arduino-controlled ADF4351 signal generator. The June meeting, on the 7th, is the annual BBQ at Drumawhey Model Railway, Four Road Ends, Donaghadee, starting at 7.30pm. For details, email Norman via samanumi11@gmail.com

REGION 9: LONDON & THAMES VALLEY

Congratulations go to five new radio amateurs who recently completed a foundation course held by **Reading and District Amateur Radio Club**. Jem Freeman, Chris Stevens, Richard Sadowski, Paul Jones and Tom Dawes. Welcome to amateur radio; the club is looking forward to hearing them all on the air.

At **Verulam ARC's** April meeting, club chairman Alex, M0UKR, gave an illustrated talk on his top ten tips on how to overcome the challenges presented by low solar conditions. His message was that by paying attention to conditions, station equipment and adjusting operating techniques there is no reason why we cannot keep filling our log books.

REGION 10: SOUTH & SOUTH EAST

Chippenham and District Amateur Radio Club will be running a classroom-based Intermediate training course from 3 July to 28 August, 7pm to 9pm, with the exam scheduled for 4 September. This is made possible thanks to the support and assistance of

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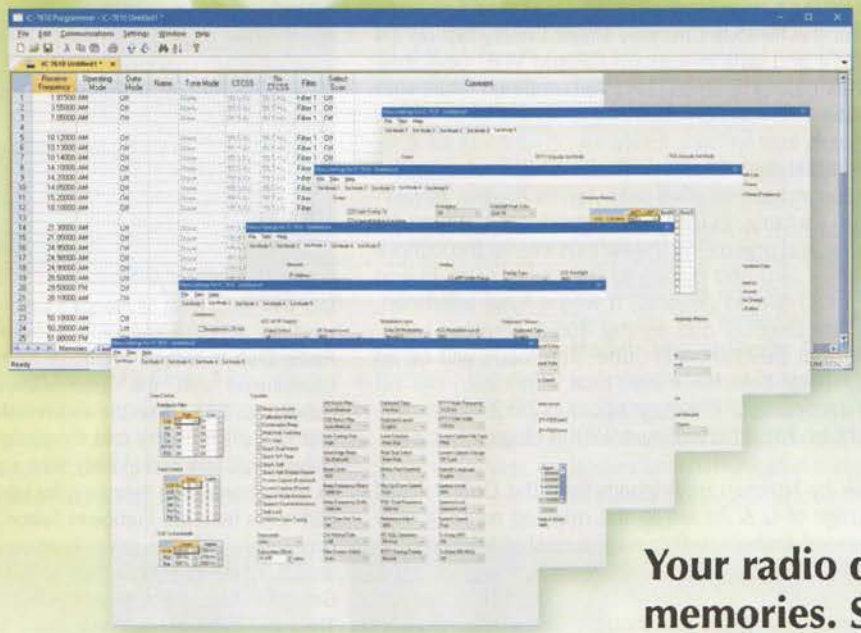

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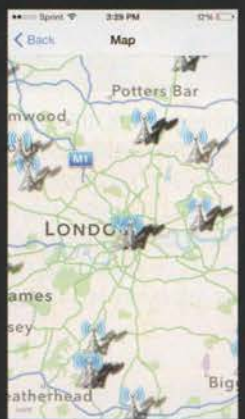

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their colleagues from the Bath Radio Classes, who will be volunteering their time as the trainers and assessors for the duration of the course. For more information – or to apply for a space – visit www.g3vre.org.uk

Echelford Amateur Radio Society will be taking part in National Field Day in the first week of June. They will also have a presence at the famous Chertsey Black Cherry fair on 14 July, using GB8BCF and running CW, SSTV and data modes on HF and VHF. Operating frequencies will be posted on social media nearer the time. This is a combined effort with **Chertsey Radio Club,** who will help prepare and run demonstrations from a local office.

At the RSGB AGM in April it was announced that **Chertsey Radio Club** had won the Region 10 Small Club of the Year for the second consecutive year. James Preece, M0JFP, Bob Conduit, M6FLT (Chairman) and Ian Parbery, 2E0IPP (Secretary) are thanked for their hard work and commitment to running and organising the various events throughout the year. M0JFP attended Egham Raspberry Jam and displayed the club's Astro-Pi and Virtual Buildathon kits along with other radio related projects. It was a busy afternoon, with lots of people showing interest in the projects and asking about amateur radio. Chertsey radio club will be running its Virtual Buildathon in June. The focus will be on simple circuits including an audio amp, metal detector, magic dice, FM radio and VU meter. For more information, or to register, contact chertseyradioclub@hotmail.com – you'll also find more info on the club website, https://chertseyradioclub.blogspot.co.uk

Worthing ARC has been busy, with a talk by Norman Bellingham from the University of Sussex Department of Chemistry. A barrage of Q & As led to the meeting running over time! At the next meeting there were general technical discussions, including adding a Wi-Fi link for the hired hall. The 11 April talk and video on espionage, signalling and coding was well attended. The speaker explained his experiences as part of a 'foreign language unit' monitoring Russian telecoms. The next week thoughts turned to why few newly-licenced members attend meetings, plus the loose ends for the forthcoming Mills on the Air DXpedition were tied up.

Izzy and Betty from St Joseph's Catholic Primary school used an antenna and radio provided by Hilderstone Radio Club to receive an image from the ISS showing cosmonauts and the International Space Station, callsign RSOISS, all on the anniversary of Yuri Gagarin's first spaceflight. Betty said the signal sounded like lots of bleeping! Izzy had already sent a greetings message to the astronauts in February, for which she received a certificate from the European Space Agency. The girls' connection with the space continues on 1 May with an ISS amateur radio contact with a school in Atlanta, Georgia. Three of the questions will be from the girls! They won't be able to ask them in person but the children at the school in Atlanta will say "this question is from Izzy, a student Broadstairs, England".

REGION 11: ENGLAND SOUTH WEST & CHANNEL Is

The Royal Air Force amateur radio society (RAFARS), working together with the Ministry of Defence, gained Ofcom approval to use the callsign GB100RAF all year round for RAFARS members and affiliated clubs. Riviera Amateur Radio Club will be running a special event station on the weekend 23/24 June, celebrating the 100th anniversary of the Royal Air Force. Steph Foster, G4XKH (who served in the RAF for many years) has been granted permission to use GB100RAF as a special event station. The club will be operating a Kenwood TS590S into an inverted-V antenna at about 35 feet atop the club's trailer mast. The station will be running full legal power, hoping to reach as many people as possible. It is intended to operate around the clock, subject to enough people being available. Special QSLs are available for stations who work GB100RAF; QSL via RAFARS HQ. Details of Riviera ARC are at www.rivieraarc.org.uk

Flight Refuelling Amateur Radio Society, based at Merley near Wimborne in Dorset, is famous for the annual Hamfest on the 2nd Sunday of August. Visitors find many traders, about 50 private sellers, some 100 car booters, plus indoor sellers, special interest groups and high-quality speakers, all thanks to Cobham Sports and Social Club (and their café & bar!). Celebrating its 36th anniversary this year, FRARS' 50+ members haver diverse interests including contesting – the club's contest call G4R placed 1st in England, 15th in Europe and 29th in the world in the 2017 IARU HF World Champs. G4RFR was 1st England and 3rd in Europe in the YO HF DX Contest 2017. Members also take part in National Field Days, often with good results and much light entertainment. A dedicated team uses the club's trailer-mounted 3.7m dish, originally from the London Post Office Tower 2GHz system, for EME from 1.3-10GHz. Its controller and actuators are being upgraded to make them more 'plug & play'. Several members are interested in ATV; there are satellite enthusiasts, antenna gurus, microwave specialists, the Romanian CW champion and constructors – a wealth of knowledge and experience. The training team runs at least four Foundation and two Intermediate courses annually, plus technical primers. With RSGB help, FRARS was the first in the UK to hold online Advanced exams. Open from 7pm on Wednesdays & Sundays, visitors are welcome. See www.frars.org.uk

REGION 12: EAST & EAST ANGLIA

Following a very successful CW boot camp organised by **Essex CW ARC** last October, the club is considering running another on Saturday 27th October 2018. Interest from enthusiastic Morse operators has already been indicated and an invitation to attend the day is now being made public. Spaces will be limited and applications will be dealt on a first come, first served basis. To express interest, or to learn more about the day itself, contact chief instructor Andy, G0IBN, via email to info@essexcw.org.uk

James, M0JFP from the **Chertsey Radio Club** is preparing to drive 1500 miles from UK, through France, down to Benidorm in Spain. The event kicks off June 12 and ends on the 18th. James and the team are raising funds for their local children's ward at Saint Peters Hospital in Chertsey. James will be driving an old Vauxhall Vectra and is inviting people to send him stickers to add to the car before they set off. If you happen to have anything that may keep the team entertained on the journey it would be much appreciated (radio-related equipment can be literally road tested!). James will be working a lot of radio over the week including satellites, HF and some local repeaters. You can contact him and the team via the club email address, chertseyradioclub@hotmail.com

At the 2018 **Essex RAYNET** AGM, Steve G8UDD was awarded the Len Crane Memorial Trophy. This is awarded to the member who has worked working over and above expectations. Essex RAYNET is currently looking for new members to help support the group's work. More details at www.essexraynet.co.uk

Norfolk Amateur Radio Club set up at Caister Lifeboat for International Marconi Day (IMD) operations. Visitors to the station included many local amateurs and members of the public. The photo shows Chris Danby, G0DWV on the air during International Marconi Day. Roger Cooke, G3LDI looks on. More details in next month's *RadCom*, where we hope to have a feature on IMD 2018.

In a busy spring programme **Braintree and District ARS** welcomed Matt Phillips, G6WPJ to give a captivating talk on the subject of FreeDV Digital Voice. Matt spoke about the equipment suitable for DV, the open source software and its superior performance over analogue modes. Perhaps the most impressive part of the evening was a convincing audio comparison of analogue LSB against FreeDV, copying Matt's signals received at Hack Green SDR. Members, in particular those already involved with 70cm DMR, went away inspired to experiment with this mode. The next meeting saw a talk by Essex CC Fire and Rescue Service Community Safety Officer Scott Kincaid. We were reminded that we have suffered some domestic fire tragedies within our district, and Scott spoke about the pointers raised with householders in order to try and minimise such events: Protection, Prevention and Escape. One aspect of Prevention of particular pertinence to our hobby related to electrical fires caused by overloading and overheating of electrical sockets and under-rated and/or coiled extension leads.

The April get-together for **South Essex ARS** included an excellent talk on software defined radios running GNU Radio, presented by Henry, 2E0XHK. Using a £30 Raspberry Pi and a cheap RTL USB dongle, Henry explained how to create a powerful SDR able to cover the radio spectrum above 24MHz. He demonstrated how easy it was by tuning in to a live signal.

Anthony (Tony) Herbert became the first person to take and pass their Foundation Licence Exam online at home. Tony studied the Foundation course with the **Peterborough Club** last August but fell ill before he could take the exam. However, Tony was determined to pass so on 29 March the online exam was done from his bedroom, organised by Peterborough club and with independent monitors present. Congratulations Tony, now M6NWF. Tony wishes to pass on his thanks to the members of Peterborough Club who helped him and the RSGB who made it possible. The guest speaker for the late March meeting was vintage broadcast radio restorer and author Tony Thompson. Accompanied by a slide show of examples and circuit diagrams, he explained ticks of the trade like replacing now-unavailable wax condensers sympathetically with modern components. Peterborough put on a Special Event Station to commemorate the centenary of the RAF. An unusual venue was found, the last recognisable building from RAF Langtoft, a WW2 and early Cold War radar station. Formerly the mess hall, it's now the HQ of Market Deeping Scouts. Permission was granted for club members to put up a station plus a display of RAF memorabilia. Lots of contacts were made, including good DX. The event was locally publicised and led to much interest from members of the public. There were also enquiries from Scout and Cub leaders for communication badge training, which will be followed up. Thanks to Market Deeping Scouts for the use of their HQ building.

This year's non-radio related club talk at Thames Amateur Radio Group was on archery by Debs, M6PTD. Ably assisted by Huw, M0LHT (see photo), members were shown four different types of bow. The talk was peppered with interesting facts, like carbon fibre arrows are difficult to find in long grass so need a detectable metal strip in them. Also, narrow light-weight arrows are more accurate in the wind than the chunkier wooden ones. Accessibility is no problem for archers who are disabled, who regularly compete at international standard against thair able-bodied compatriots.

A group of Essex Hams were out in force in support of St George's Day. This was the fifth outing of the callsign GB1STG, organised by Charlie, M0PZT. The event involved two full days of operating from Galleywood Common near Chelmsford. Several stations were active, including various HF CW and SSB stations, 2m FM for the locals, plus digital voice. Contacts were made with places including Africa, the US and Canada, and Pete M0PSX made contact with fellow TX Factor presenter Bob, G0FGX at the other side of the country in Cornwall. As always, the focus was on experimentation and fun, aided by the proximity to the local pub where, after a busy two-day activation, the team toasted St George's health in style.

The April Thurrock Acorns ARC club meeting was on the subject of the humble grid dip oscillator. Steve, G4HXY gave an excellent talk on how these handy bits of shack kit can be used to check traps in dipoles, and how an absorption wavemeter can be used to check if your transmitter is radiating in-band. They're useful tools for testing your station "from time to time" as per our licence conditions. Also at the meeting, members got the chance to get hands-on with the new Baofeng dual-band DMR handset, one of which is the newest member of Dorothy M0LMR's family of radios (see photo, left).

REGION 13: EAST MIDLANDS

RAF Waddington ARC celebrated the 100th Anniversary of the RAF over the Easter period. One club group set up a special event station at the RAF Binbrook Heritage Centre. The weather was not very good but the group had the luxury of operating from a former Nottingham Fire Brigade Mobile Command Centre. Many contacts were made, the furthest being VP8RAF/100 in the Falklands. Another group representing RAFARS set up a station in the Dakota aircraft at RAF Metheringham. The weather was poor and very cold.

Five candidates were successful in their Foundation Exam taken on Sunday 15th April 2018 at Nunsfield House Amateur Radio Group. They were Adrian Harvey, Nick Yates, John Raybould, James Woodcock and Andrew Jackson. They are now looking forward to taking the Intermediate course and exam later on this year. Special thanks to the course tutor Adrian, M0OJR, exam invigilators Tony, G6MWS and Ken, G0JKC. Also thanks to Ken, G3OCA for organising the course.

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FT-991 HF/VHF/UHF all mode transceiver in good condition. Boxed with manual and standard mic. £800 plus carriage or near offer. Dave Penny, G6ZSN, 0787 893 1954, dmpzsn@gmail.com (Taunton).

ICOM IC-275H Hard to find Icom 275h 100 watt multimode VHF transceiver. Beautiful condition, no scratches/dents. Fully working, UT34 tone squelch unit fitted. Boxed with manual power lead and HM12 mic. £400. Peter, G4WWY, 0794 606 2572, pbepping@aol.com (Epping, Essex).

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YAESU FT-736R fitted with 6m, 2m, 70cm and 23cm units. One owner, complete with microphone, manual and circuit diagrams. £925 plus shipping. Mike, G3WPH, 0118 940 3648, g3wph@cliftonrise.com (Reading, Berkshire).

YAESU FT-450D HF/6m transceiver with built-in ATU and DSP. Excellent condition, non-smoking home, original packaging / paperwork / accessories / optional carrying handle and spare (non-Yaesu) mic/power lead. Tx expanded by dealer. £420, no offers. Prefer buyer collects / carriage extra. Mark, G0OIW, 0118 948 3593, g0oiw@qsl.net (Caversham, Berkshire).

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WORD 97 (OFFICE 97) installation disc for this Microsoft application. Godfrey, G4GLM, 020 8958 5113, cgmm2@btinternet.com (Edgware).

YAESU FC-102 ATU, FV102-DM remote VFO for FT-102, WHY? Thanks. Ken, G3XSJ, 01179 683 003, g3xsj@btinternet.com (Bristol).

WANTED FOR RESTORATION PROJECTS: FT-220 VHF transceiver, power lead for Belcom Liner 2. Colin, G3VTT, g3vtt@aol.com (Kent).

***QST* JANUARY 2005**, complete magazine if possible, your price paid including postage. Or borrow for photocopying with full costs reimbursed. Howarth Jones, GW3TMP, 01352 771 520, jhj43@btinternet.com (Mold, North Wales).

UP FOR GRABS

LOOKING FOR A LOVING HOME for Racal RA17 Mk2 with LF converter in correct metal cabinet. All working, would benefit from a service and overhaul, nice project for someone who can lift heavy things. Need to collect. Brian, G0MJI, g0mji@rocketmail.com (Liverpool).

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

1-3 JUNE
HAM RADIO SHOW, FRIEDRICHSHAFEN
Messe, Friedrichshafen, Germany
Trade stands, special interest groups and IARU Member Societies all have stands in the main hall. Large flea market. Lectures each day, some in English. Large RSGB book stall. [www.hamradio-friedrichshafen.de].

3 JUNE
SPALDING DARS ANNUAL RALLY
New venue: Holbeach Community Sports Academy, Pennyhill Lane, Holbeach PE12 7PR
Easy access off A17, large area for boot traders, modern hall for indoor traders. Doors open 9.30am, admittance £2.50. Car boot sale, catering, flea market, RSGB book stall, special interest groups, trade stands, prize draw/raffle. Graham, G8NWC, 0775 461 9701, rallysecretary@sdars.org.uk.

10 JUNE
EAST SUFFOLK WIRELESS REVIVAL (Ipswich Radio Rally)
Kirton Recreation Ground, Back Road, Kirton IP10 0PW (just off A14).
Doors open at 9.30am, free parking. Entry is £2. Trade stands, car boot sale, Bring and Buy, special interests groups, GB4SWR HF station and an RSGB book stall. Catering on site. Kevin, G8MXV, 0771 004 6846. [www.eswr.org.uk].

10 JUNE
JUNCTION 28 RALLY
Bowls Hall, Alfreton Leisure Centre, Alfreton, Derbyshire
Anya, 01246 456 625, adylawri@btinternet.com.

17 JUNE (NEW DATE)
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24 JUNE (NEW DATE)
NEWBURY RADIO RALLY
Newbury Showground, next to M4 J13, Berkshire. Display of an amateur radio station, exhibits, special interest groups, clubs and societies. Opens 9am (sellers 8am). Free parking. Entry £2.50 (£12.50 CBS pitch). Advance bookings (with discount) via website. On-site catering. Disabled facilities. NewburyRally@nadars.org.uk. [www.nadars.org.uk].

1 JUL – BARFORD NORFOLK RADIO RALLY
7 JUL – STOCKPORT RS RALLY
7 JUL – BANGOR & DISTRICT ARS RALLY
15 JUL – CORNISH RAC RALLY
22 JUL – FINNINGLEY ARS RALLY
22 JL – McMICHAEL RALLY
29 JUL – CHIPPENHAM & DARC RALLY, FAIR, CBS
29 JUL – HORNCASTLE AMATEUR RADIO RALLY
5 AUG – KING'S LYNN ARC Gt EASTERN RALLY
5 AUG – LORN RADIO RALLY
10 AUG – COCKENZIE & PORT SETON MINI RALLY
12 AUG – FLIGHT REFUELLING HAMFEST
19 AUG – RUGBY ARS RALLY
26 AUG – TORBAY ARS COMMS FAIR
26 AUG – MILTON KEYNES ARS 60th ANNIV. RALLY
1 SEP – G-QRP CLUB + TELFORD & DARS MINI CONV.
2 SEP – TELFORD HAMFEST
15-16 SEP – BATC CONVENTION (CAT18)

SILENT KEYS

We regret to record the passing of the following Members.

Name, callsign	Date
Mr R O Lowson, G2HKG	18/03/18
Mr H A A Bourner, G3NCB	03/04/18
Mr D J Penny, G3PEN	04/04/18
Mr L Kirby, G4CRT	03/04/18
Mr H S Charlesworth, G4FMQ	24/04/18
Mr R G Dawkins, GW4FRH	27/03/18
Mr C Lorek, G4HCL	28/04/18
Mr M Brooke, G4SKO	28/11/17
Mr P R Werba, G7FXO	12/04/18
Mr M Seaward, M0SMJ	12/03/18
Mr P B Revill, EA5DFE	22/04/18
Mr M Winterbourne, RS93913	25/3/18

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.

15 SEP (new date) – FOG ON THE TYNE RALLY
16 SEP – WESTON-SUPER-MARE RALLY
28 & 29 SEP – NATIONAL HAMFEST
7 OCT – WELSH RADIO RALLY
7 OCT – HACK GREEN BUNKER RALLY
11-14 OCT – MICROWAVE UPDATE (USA)
12-14 OCT – RSGB CONVENTION
14 OCT – HORNSEA AMATEUR RADIO RALLY
21 OCT – GALASHIELS RADIO RALLY
4 NOV CANCELLED – W LONDON R & E SHOW
17 NOV – RADARS TRADITIONAL RADIO RALLY
18 NOV – CATS RADIO & ELECTRONICS BAZAAR
25 NOV – BISHOP AUCKLAND RAC RALLY

SPECIAL EVENT STATIONS

These callsigns are valid for use from the date given, but the period of operation may vary from 1-28 days before or after the event date. Details published here were kindly provided by Ofcom on 20 April.

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
01/06	GB1BOV	Beckford Open Village	Tewkesbury
	GB4FWW	First World War	Great Bowden
02/06	GB50TEL	Telford	Telford
	GB2CRS	Chester Radio Society	Hawarden
	GB6COD	Collingwood Open Day	Fareham
08/06	GB6GEO	Geo Park	Torquay
09/06	GB4RSF	Ranskill Scarecrow Festival	Ranskill
	GB6CGC	Coventry Gliding Club 65 years	Lutterworth
10/06	GB4SWR	Suffolk Wireless Revival	Kirton, Suffolk
	GB0CRC	Castle Rising Castle	Castle Rising
15/06	GB1HA	Headcorn Aerodrome	Ashford
	GB0MFC	MFC	Stockport
	GB0FFP	Flag Fen Peterborough	Peterborough
	GB2NCM	National Coalmining Museum	Wakefield
	GB1WWM	Whisky Whisky Mike	Portsmouth
16/06	GB8WOL	War On Line	Hants
	GB6MH	Middleton Hall	Tamworth
	GB0PIT	Museums on the Air	Astley
	GB2JCM	ASE	Parton
	GB4LMG	Life Museum Gloucester	Gloucester
18/06	GB0PSS	Polish Saturday School	Northampton
	GB4NR	Newbury Rally / NR	Thatcham
20/06	GB13COL	Charlie Oscar Lima	Bowburn, Co Durham
22/06	GB2HFF	Horndon-on-the-Hill Feast & Fayre	Horndon-on-the-Hill
22/06	GB2RAM	Romeo Alpha Mike	Portsmouth
23/06	GB6AR	Amerton railway	Stafford
24/06	GB1SCW	ASE	Shoreham By Sea
28/06	GB8AFD	Armed Forces Day	Teignmouth
30/06	GB8LAF	Littlehampton Armed Forces	Littlehampton

RadCom

HF F-Layer Propagation Predictions for June 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.....255	643211123466	553433234556	125554255552	..122111232.	...11...11..	.....	.....
*** Asia								
Yakutsk	.....	11.111....12	221221...122	...122.....	.....	.....	.....	.....
Tokyo	.....	.....	.....121..	.....111111.	.....	.....	.....	.....
Singapore	.....21.	2311	.....221.2	.....1....	.....	.....	.....	.....
Hyderabad	233	2.....3444	2.....23343	.....2111.	.....	.....	.....	.....
Tel Aviv	53.....55	552.....3455	25421.134555	.1433314453.	...1....22..	.....	.....	.....
*** Oceania								
Wellington	.....	.....	.....	.....	.....	.....	.....	.....
Well (ZL) (LP)	.1.....	341.....133	331.....44	11.....33	1	.....	.....	.....
Perth	111	3323	.....22.3	1	.....	.....	.....	.....
Sydney	.....1..	.....34..	.....1331.	.....112.	.....	.....	.....	.....
Melbourne (LP)	.....	223.....	223.....1	1.1.....2	1	.....	.....	.....
Honolulu	.....	.....	..11.....	...11.....	.....	.....	.....	.....
Honolulu (LP)	.....	.....	.....	.....1...	.....	.....	.....	.....
W. Samoa	.....	.....	.....	...11.....	.....	.....	.....	.....
*** Africa								
Mauritius	1.....222	2321	.....121..	.....	.....	.....	.....	.....
Johanesburg	22.....122	11.....2111	.....2...	.....1....	.....1....	.....	.....	.....
Ibadan	553.....345	5542....2455	3.5311113555	..442112452.	...21..145..	...1....23..	.....1..	.....
Nairobi	33.....233	44.....2344	.42.....3444	..3111.2341.	.....2..21..	.....	.....	.....
Canary Isles	664.....156	66531...2466	665532224566	214532225666	..1532225542	...221113521	...11...121.	.....11..
*** S. America								
Buenos Aires	221.....1	433.....24	321.....34	232	.....22.	.....1..	.....	.....
Rio de Janeiro	33.....3	441.....45	32.....344	1.....343	.....132.	.....21.	.....1..	.....
Lima	221.....	433.....24	2121.....33	22	.....1.	.....	.....	.....
Caracas	332.....3	4432.....14	31311.....24	132	.....1.	.....	.....	.....
*** N. America								
Guatemala	222.....	333.....2	322.....13	12	.....	.....	.....	.....
New Orleans	231.....	333.....1	31.....2	.....1.	.....	.....	.....	.....
Washington	3431.....1	44321.....12	42..211.1123	2111222	.....	.....	.....	.....
Quebec	342.....	4432.....12	32..11111123	.....2.	.....	.....	.....	.....
Anchorage	.....	.....	.....	.....	.....	.....	.....	.....
Vancouver	.....	.....	.111.....	.....	.....	.....	.....	.....
San Francisco	.....	122.....	122.....	.....	.....	.....	.....	.....
San Fran (LP)	.....	.....	.....	.....	.....	.....	.....	.....

Key: The figures represent approximate S-meter readings, whilst the colours represent expected circuit reliability. **Black** equals low to very low probability, **Blue** equals good probability and **Red** equals a strong probability. No signal is expected when a '.' is shown. The RSGB Propagation Studies Committee provides propagation predictions on the internet at www.rsgb.org.uk/propagation/index.php. An input power of 100W and a dipole aerial has been used in the preparation of these predictions; therefore a better equipped station should expect better results. The predicted smoothed sunspot numbers for May, June and July respectively were (SIDC classical method – Waldmeier's standard) 4, 2 & 0 and (combined method) 8, 7 & 7. The provisional mean sunspot number for March 2018 was 2.5. The daily maximum / minimum number was 15 on 17 March / 0 for 25 days in March.

THE LAST MAN OF SPARK

George Woods, G3LPT

Thank you for the interesting article in May's edition on spark operator John Tuke, GM3BST. I was a Radio Operator years ago but was never on a ship with a spark transmitter. However an old friend (now SK) Moray Rash, G3MQU told me he was on a ship, registered in Cyprus, with a spark transmitter, just after the war. Whether it was the main TX or emergency I know not but, he said, once you fired it up and called a station, it quickly cleared the frequency of others who, wisely, held up their traffic until the spark transmitter had finished – so you quickly cleared your own traffic! We were both at sea from wartime to the 1950s. I remember hearing Portuguese ships using spark circa 1946. I think they were banned, after that, even for emergency use.

Michael Kirwan, EI3KO

I read with interest the feature 'Last Man of Spark'. I recently met another retired Radio Officer (or Wireless Operator as they were known up to World War II). He is 104-year-old Michael O'Connor (below). He told me he corresponded with John Tuke last year and spoke with him on the phone about their experience with spark transmitters.

Michael was a Wireless Operator with Marconi Marine and worked a spark transmitter on a voyage from Bombay to Calcutta on the SS *Nowshera* in June 1939. He said it was a 3 or 5kW transmitter and during the voyage he would typically broadcast weather reports. On transmitting it was necessary to tell anyone on board with a wireless to disconnect it in case of damage. Also, during transmission it would block out adjacent frequencies. The year after he left the SS *Nowshera* she was attacked by the German raider *Penguin* on a voyage from Adelaide to Durban. All the crew were taken prisoner and the ship was scuttled.

Like John Tuke, when he left the sea Michael O'Connor got a job as a ground radio operator. He was with the Aviation Communication Service (now Irish Aviation Authority) in Shannon Aeradio, working aircraft crossing the North Atlantic. He retired in 1979 as Operations Manager and today leads a healthy active life in Killarney, County Kerry. He has fond memories of his time at sea. At 104 he is probably the oldest Radio Officer in the world.

Colin Topping, GM6HGW

My father was a Merchant Navy marine engineer for most of his life and in the late 1940s was returning to the UK from the USA in a slow cargo ship. His forthcoming wedding arrangements and associated leave were being arranged through a series of telegrams but due to the high volume of traffic between coastal stations and the many transatlantic passenger ships with the latest transmitting equipment it was often a struggle for Radio Officers on lowly older cargo ships to be heard and get in the queue to pass traffic.

He was mid-Atlantic when my father wished to let my mother know the date of his arrival in Avonmouth. 'Sparks' was having great difficulty working Portishead to get on the traffic list as my father watched in the shack. "This will wake 'em up, laddie", said Sparks to my dad as he fired up the emergency – spark – transmitter. The rough note of the spark transmitter was indeed heard by all and sundry and the telegram successfully passed. My dad did make the wedding, arriving at St Andrews railway station after a long arduous overnight journey with six hours to spare.

Photo: John Power

Roger Western, G3SXW

Thank you for the excellent article in May *RadCom* about John Tuke, GM3BST. It was really fascinating and a lovely mix of personal interest, history and technical input. I find it a shame that accomplishments are often only acknowledged in obituaries – folks really deserve to be recognised during their lifetime, so I am delighted that this happened in this case.

The HB9ANY article 'Bridging the Atlantic' was also an excellent read. Along with the TARS article on training, the May edition is one of the best for a long time to suit my particular tastes.

I enjoy the personal interest content but fully appreciate how difficult it is to attain the right balance of articles in a hobby with such wide-ranging interests. Keep up the good work, team.

LIGHTNING SAFETY

Bruce Morris, GW4XXF

Paul Elliott, M3PSE wrote in May 2018 *RadCom* of his experiencing a "nasty jolt" when disconnecting an aerial during an electrical storm. During many years of house calls as a TV repairer I was frequently told by customers that they always unplugged their aerial during such storms. I would patiently explain that the chances of being actually hit by a lightning strike were vanishingly small, and that there would be a build-up of charge on the aerial from the atmosphere, which was being safely dissipated to earth via the mains while the aerial was connected. By grasping the (invariably metal) plug and removing it from the TV that charge now had a new path to earth – via you! I would counsel never, ever go anywhere near your aerial cables/connectors during a thunderstorm.

TRAFFIC, WEATHER AND VOLTAGES

Bob Houlston, G4PVB

Information on local roads and weather can be crucial when travelling to work. Conventional sources may be slow or even inaccurate, but amateur radio is both fast and reliable as it is coming directly from people in your own community whom you will be able to trust. Here at Verulam ARC our SWL and licensed amateurs have access to the GB3VH 70cm repeater that, together with the early bird net (0630 to 0730), keeps us well informed of mishaps on the roads to work.

Separately, during a spell of SWL nostalgia I searched on eBay just to look at a picture of an old Yaesu FRG-7, which was my receiver years ago. I noticed several advertised from continental Europe rated at 220V and that caused me consternation with regard to the power supply requirement. In 1994 when Europe 'harmonised' our mains supply voltage to a nominal 230 volts it merely changed the specification manufacturers

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have to adhere to. Here in UK we're still 240 volts. That's OK with new equipment but older radios may well suffer if imported from continental Europe to the UK. A pre-1994, 220 volt radio brought to the UK and exposed to our mains supply will likely be outside of its original specification and may fail. So if you do import an old FRG-7 at 220V you may be advised to use a leisure (not car) battery or UK rated mains 12V PSU to operate it.

Wikipedia notes "220V and 240V fall within the lower 230V tolerance bands (230 V ±10%). Some areas of the UK still have 250 volts for legacy reasons, but these also fall within the 10% tolerance band of 230 volts." – Ed

FT8 IS BAD NEWS

David Smith, A92GE/G4UQU

I would like to express my disappointment in the development of FT8 as a mode for use on the HF bands, and I am appalled at the very idea of the proposed 'DXpedition mode'. Working five stations at once, sharing an absolute minimum of data and all automated, is surely not in the spirit of amateur radio.

The so called 'weak signal' modes were developed to allow communications at the extreme ends of the spectrum under very marginal conditions. They have opened up a world of communication for smaller, cheaper stations via the moon or meteor scatter for instance which can be considered a good thing. They demonstrate the great technical ability of their designers. I am all for pushing technological boundaries and inspiring people's interests and activity. However, I do not see how these modes in their present form can translate into a useful or necessary system at HF.

It will be argued that they open up HF to smaller low power stations with marginal antennas. But just go back a few tens of years and there is plenty of evidence to see that contacts were being made with very modest home-constructed valved rigs at low powers. It only takes a little bit of perseverance and skill. Since FT8 (in particular) gained popularity I can assure you that finding today's weak signals amongst a spectrum display that is filled with red lines is becoming an impossibility.

One of the reasons for the justification of amateur radio is emergency communication. For this reason it is essential that any mode used at practical communication frequencies should be able to convey useful information. The current family of weak signal modes just cannot do that. It is a crippled system that serves no useful purpose. It is what 'ping' is to the internet; proves connectivity but otherwise pretty useless.

It could be argued that it is useful to determine when bands are open but I have been on 10 and 12 metres when there have been no CW or SSB signals but a bunch of FT-8 signals at over S9.

I am not against the evolution and progression of technology; in fact I try all modes as they appear and develop. However it seems to me that there should be some definitive guidelines that govern the eligibility of digital modes. Without compliance with these guidelines a mode should not be endorsed for use at certain frequencies and particularly not for the purposes of gaining 'digital' awards. As a minimum any mode should be able to report quality of signal as well as signal strength. It should be able to handle complex callsigns properly. It should be able to handle messages of say at least 140 characters. The software should not be able to complete a contact unattended.

FT8 and similar modes are not the way forward at HF but dilute the essence of our hobby. It is time to set a minimum specification for what constitutes acceptable communications with digital modes and challenge the software engineers to conquer them. It seems to me that the tail is wagging the dog at the moment and we are not getting anything useful from it.

CW... YET AGAIN

John McDonald, G8PJC

As someone trying to improve my CW copying skills having made a start with Morse somewhat late in life, I read with interest all the comments made in the March *RadCom*.

What was not mentioned was that there are specific frequencies on most bands for slow speed Morse (see the RSGB Band Plan). Also FISTS, the organisation for promoting CW, has a specific frequency on each band where good quality Morse can be heard (see www.fists.co.uk). I have my rig programmed with these frequencies so I can quickly listen to what CW is on the bands, which is likely to be in the 12-15 WPM range (or even slower).

Notwithstanding any errors in sending Morse code by newcomers to the mode, the real challenge to copying the code received over the air is the conditions, ie noise, fading, and other interference on the bands. Listen to on-air CW as soon as you know the code and start collecting callsigns as a start. It is also very good if you can find a tutor (I mean a real person).

If you practice your CW on or around 3.555MHz or 14.055MHz, you will find others in a similar situation. Also listen to FISTS operators on 3.558MHz and 14.058MHz. If you can find nothing suitable on the air, fall back on computer software. You can also send into a dummy load and check your sending using a code reader (more software) to build confidence. The hard part is to make time to listen and practice every day.

G3LEQ AND CADETS

Mike Buckley, M1CCF
former Senior Cadet Monitor (NRN)

I did not know Gordon Adams, G3LEQ well but met him in later years through the 5MHz Experiment and his 'need to know' about the Cadets' (ACF/CCF) use of various 5MHz frequencies, then in the exclusive MOD band. He came to lecture on NVIS propagation to a meeting of those involved in Cadet Signalling at the time. I have vivid memories of him in the car park outside the Museum in Blandford with a collection of traffic cones on which he had strung his wire antenna as part of his demo on how easy it all was! We loved the Clansman PRC320, and I think he quite liked it as well and did manage to inspire a few to participate in HF activities, now largely a thing of the past, regrettably. Gordon's great radio leadership. in this and other worlds has become legendary.

Gordon's obituary fails to mention this early involvement in radio though the Cadet Inter School Network (Subsequently the National Radio Net or the Inter-Command radio network). Somehow Gordon managed to wangle, as he was entitled to as a licenced amateur under the G3LEQ call, a personal call for the Cadet net. Pictured below is one of the QSL cards from the late 1950s, when surplus WW2 radio equipment was abundant.

Gordon was really just one of many school pupils who endured the CCF for the Radio benefits it gave them, and subsequently went on to much greater things in the world of radio, electronics and much more. He is remembered fondly by so many people.

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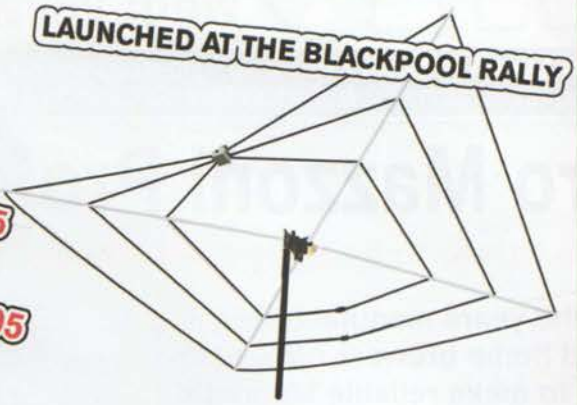

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The tuning capacitor on both loops is not a simple variable capacitor but a huge variable plate capacitor fabricated out of aluminum, with an air-dielectric. Both plates are also welded directly to the loop and are virtually indestructible on high power. The distance between the plates is 14mm (ca. 1/2 inch) on the smallest Baby-Loop antenna.

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Capacitance can be varied by the motor and can be adjusted to achieve best SWR via a control unit in your shack. In spite of their compact size, the antennas are resonant in a wide frequency-range - do you know of any antenna which has a diameter of just one meter (ca. 38 inch) but a frequency range of 40m-10m without gaps?? Check out the new Baby & Midi-Loops from Ciro-Mazzoni.

The automatic control unit has a tuning circuit installed and is operated via a small keypad: just enter the desired frequency, wait a few seconds for automatic tuning of the antenna and go. No trying, no lost notes on settings, no checking with the SWR meter. The current frequency and SWR is shown on the LCD display. Maximum power load is 250W continuous with the automatic control unit.

For more info see www.HamRadio.co.uk/ciro