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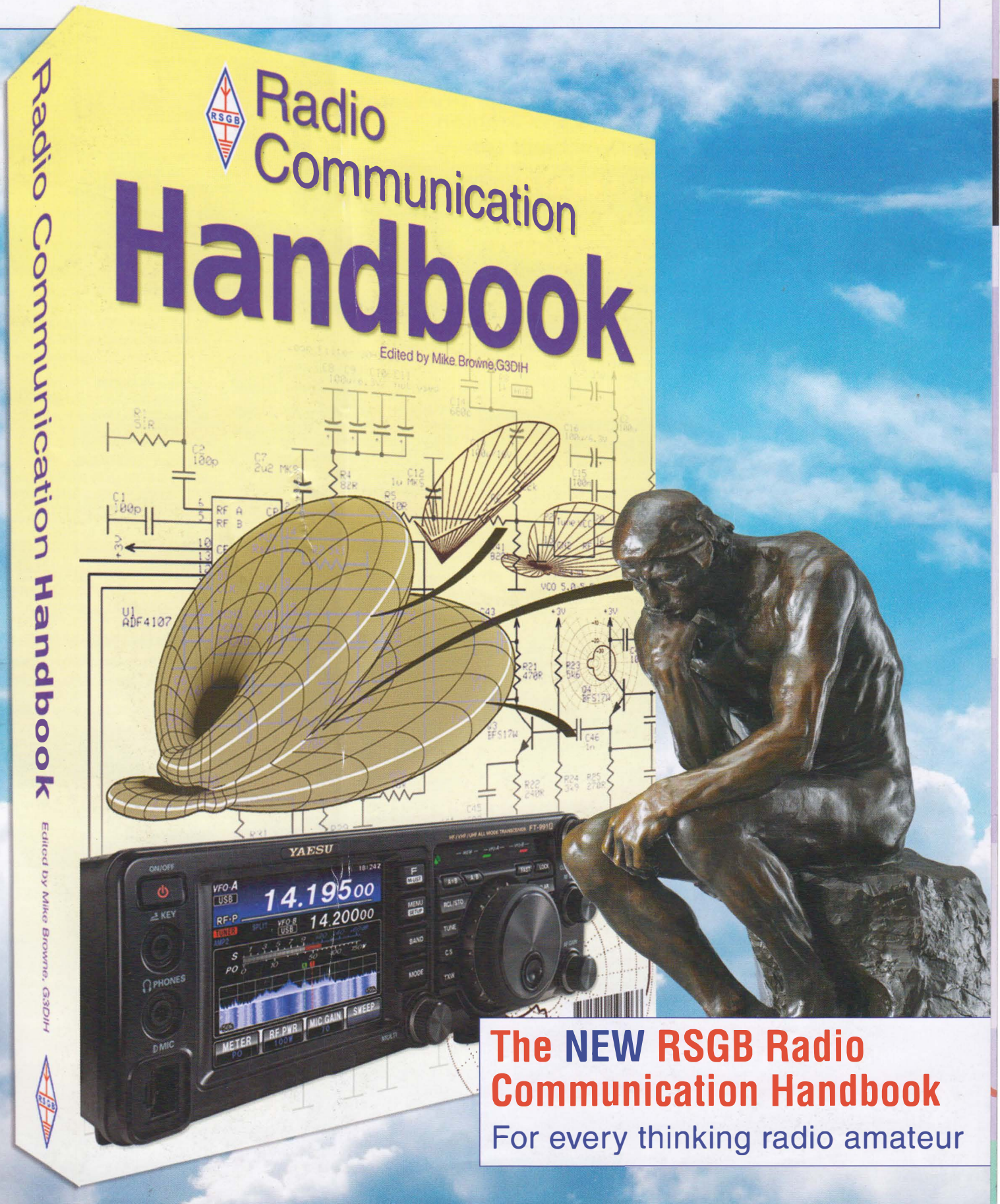

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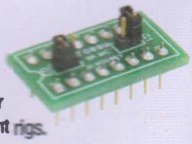

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2 slice Rx 100 watt HF and 6m software defined radio multi-mode transceiver. The receiver is Direct Down Conversion, providing continuous, uninterrupted, receive coverage from 10KHz to 55MHz. Can also support up to two receivers (sharing the same antenna) each at the same time.

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Anan-10E

Up to 7 slice Rx 15W All-Mode SDR transceiver covers from 160 - 6m.

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Anan-100E

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PiHPSDR Controller

The PiHPSDR Controller is a stand-alone interface for the ANAN/OpenHPSDR Hermes SDRs,

it is ideal for mobile applications and for users who prefer physical knobs and buttons, and it eliminates the need for a Computer to run the ANAN/OpenHPSDR Hermes based radio transceivers.

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80 Amp 12V distribution board complete with 2m cable and 24 connectors

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RIGBLASTER NOMIC

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ELECRAFT

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ELECRAFT KX2

Elecraft's new KX2 "stealth" transceiver can go wherever your imagination takes you. Thanks to state-of-the-art construction techniques, it's only 5.8 x 2.8 x 1.5" and weighs just 13 ounces—making it the smallest full-featured HF radio on the planet. Yet it puts out up to 10 watts, covers 9 bands, and shares many features with the KX3. It also works with the KXPA100 amplifier.

To maximize your freedom to roam, you can outfit your KX2 with an internal 2.6 amp-hour Li-ion battery. Current drain is as little as 135 mA, yielding up to 8 hours of typical operation on a single battery charge.

There's also an internal automatic antenna tuner module (KXAT2), which can tune a random wire, dipole, or whip on multiple bands.

Purchase yours today from Waters and Stanton!

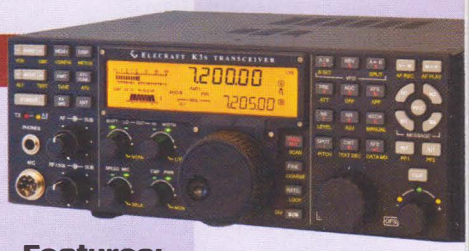
KX2 £859.95

ELECRAFT K3S

Options available:

- Elecraft K3S/100-Kit (100W)
- Elecraft K3S/100-Built (100W)
- Elecraft K3S/10-Kit (10W)
- Elecraft K3S/10-Built (10W)

The new K3S transceiver features a number of improvements and additions. These include: New synth board for lower Tx/Rx phase noise; IF interface board; 12m-6m low noise pre-amp; USB interface that carries data and audio; New 10W driver board; New motherboard layout for reduced noise; 100W PA upgrade; New Rx Speaker Amplifier.



Features:

- Accurate, high-speed CW transmit.
- Ultra low-noise synthesizer.
- KXV3A board now replaced with KXV3B board which will now be included as standard.
- Redesigned AF output circuitry for outstanding speaker audio.
- USB port which eliminates need for PC sound card and line-level audio cables.

K3S/100-F £2999.95
K3S/10-F £2449.95
K3S/100-K £2849.95
K3S/10-K £2299.95

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ELECRAFT PX3

The PX3 is the perfect, high performance companion for the KX3!

Features include:

- Full colour waterfall display and spectrum display.
- Simple plug & play operation.
- No PC, soundcard, software drivers or setup required.
- Fast sweep and excellent sensitivity.

PX3-K £569.95
PX3-F £629.95

KXPA100

The KXPA100 is a compact unit, ideal for both desktop and mobile use! Specifications are as follows:

- 100W Power Amplifier for KX3 as modular kit.
- Suitable for use with most QRP radios.
- Quiet and reliable operation.
- Options available:

KXPA-100-K £899.95
KXPA-100-F £949.95

KPA500

160-6m 500+ Watts Solid State Auto Band Switching Linear Amplifier in a compact package the size of the K3

Kit £2449.95
Full £2649.95

RADIOWORKS

G5RV-PLUS

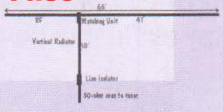
80m-10m all band antenna which is shorter than the full size 80m making it ideal for limited space.

£89.95

CW-40LP

Carolina Windom 40m-10m wire antenna measuring 66 feet long and includes WARC bands.

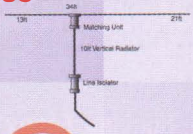
£144.95



CW-20

Carolina Windom 34 feet wire antenna working on 20m, 15m & 10m

£149.95



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Buddipole

40-2m portable antenna kit with Balun.

£219.95

Buddistick

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£184.95

FT-991

The Yaesu FT-991 is the next generation in all band HF to UHF transceivers which includes Yaesu's own System Fusion Digital FM capability. It has more traditional modes too which include CW, AM, FM, SSB.

Call for latest price

FT-2DE

2m/70cm dual band handheld transceiver designed with ease of use in mind such as its 1.7 inch full back-lit touch panel display providing loads of information through an easily navigation.

£294.95

FT-1XDE

Take the FT-1DE dual band handheld transceiver anywhere with its rugged case, IPX7 water protection rating and up to 8 hour battery life with the optional FNB-102LI battery. Enjoy 2m and 70cm operation on digital and analogue with four communication modes: V/D, Voice FR, Data FR and Analogue FM.

Call for latest price

FTM-100DE

The FTM-100DE incorporates a wide range of System Fusion and analogue features with the Single Feature Design equipped with a Dot-Matrix Display. Order yours today.

Call for latest price

FT-DX1200

The FT DX 1200 provides up to 100 Watts on SSB, CW, FM and AM (25 Watts carrier) and a rugged state of the art highly balanced receiver circuit configuration for top performance on today's crowded bands.

Call for latest price

FT-817ND

The Yaesu FT-817ND is the world's first self-contained, battery-powered, Multi-mode, Portable Transceiver covering the HF, VHF and UHF bands!

Call for latest price

FTM-400XDE

The FTM-400DE is the first mobile introduced to be a fully compatible radio partner for use on the YAESU System Fusion Dual Mode system.

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FT-450D

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

Call for latest price

KENWOOD DEALS

KENWOOD DEALER OF THE YEAR

TS-480HX/TS-480SAT

200W (HX) 100W (SAT) with a DC 13.8V supply perfect for base station use with the separating control panel and a built in ATU.

Call for best prices

TS-590SG

Be witness to the evolution of KENWOOD's pride and joy - the TS-590SG HF transceiver - pushing performance and technology to its utmost limit, with the receiver configured to capitaliae on roofing filter performance and IF AGC controlled through advanced DSP technology.

Call for best prices

TS-990S

The TS-990 is designed from the ground up, providing you with unique features. The receiver has been created with advanced techniques that have only recently become available to the radio market. Find out more at www.wsplc.com.

Call for best prices

TH-D74

New 144/430 MHz handheld featuring Kenwood's APRS, Automatic Packet Reporting System, and the popular D-Star. Kenwood has made it possible to use this handheld in a wide range of radio applications with wideband reception function allowing the user to use HF SSB and CW.

£599

ICOM DEALS

OFFICIAL RE-SELLER

IC-7300

Icom's first offering of its very own SDR transceiver with HF – 4m operation and a 60m or 11m option available at Waters and Stanton. With a built-in integrated wide-frequency Automatic Antenna Tuner making ideal for field operation. The radio provides 100 watts output power on HF/50MHz bands and 50 watts on 70MHz. Available for Demo on contest grade antennas at Europe's Ham Store.

£1049.95

ID-51E-PLUS

5W twin band VHF/UHF D-Star handheld with built-in GPS and dual watch letting you receive two bands simultaneously including two frequencies in the same band. - Range of colours available

£279.95

IC-7100

The IC-7100 is a HF 6m compact transceiver with touch screen ability and up to 50MHz frequency. Not only is it D-STAR ready, but you don't need an SD card either!

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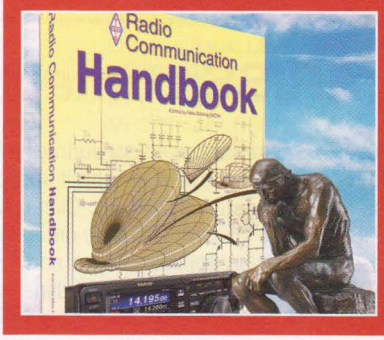

Cover image:
The new RSGB Radio Communication Handbook

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

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

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

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

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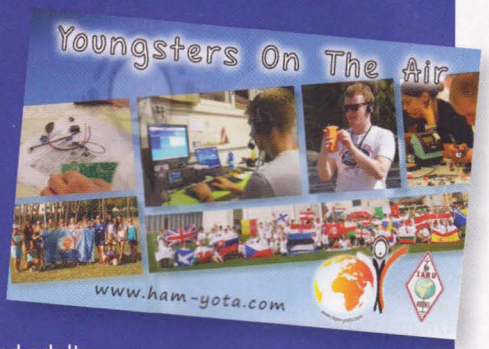
December is YOTA month



Attention all clubs! December is Youngsters on the Air (YOTA) month and again the RSGB will be applying to Ofcom for a special callsign. We are asking schools, youth groups and clubs to apply to the RSGB Youth Committee via email to yota.month@rsgb.org.uk to host the call sign (probably GB16YOTA) for a day or two.

This is a great opportunity to get youngsters into the hobby and the RSGB will fully support any club that hosts the callsign. Please apply before Friday 7 October to the above email should you wish to host the callsign.

We would like to ask that anyone applying seriously considers their application so that they do make QSOs on the day and that youngsters will be operating. We don't mind adults applying, setting up, teaching and supervising but we would like the youngsters to be having at least an over or passing a 'greetings message' in every contact.

August Board Meeting

The RSGB Board does not normally meet in August but did so this year due to the additional work required for the strategy review. That work continues to progress and included the President seeking input from the Regional Council in Birmingham on the same day that the Board met in Bedford. Further work will involve the whole of the Leadership Team in September before wider members' consultation later in the Autumn.

The Board noted that plans for the RSGB Convention and National Hamfest were nearing completion. Board members will be attending both events and look forward to meeting with Members. Plans were agreed for the rollout of a presentation on the results of the RSGB amateur radio survey. Past President John Gould, G3WKL, has recorded a narrated slideshow presentation that can be requested by affiliated clubs. Following the presentation a Q&A session with a Board member will be offered. This may be in person or using Skype, depending on location and broadband availability.

Proceedings of all Board meetings are available on the RSGB website; http://rsgb.org/main/about-us/board-of-directors/board-proceedings-and-reports/

Booking an ARISS contact

Following on from the successful ARISS contacts carried out during the Tim Peake Principia mission, schools from across Europe are being invited to submit applications to be part of the ARISS programme for September 2017-January 2018. Ciaran Morgan, M0XTD, is the RSGB Representative to ARISS and the UK Operations co-ordinator. He is available to give advice and support to those planning an application and early interaction can help avoid many of the pitfalls of ARISS selection process.The deadline for applications is in November. Contact Ciaran in the first instance at ciaran.morgan@rsgb.org.uk

Congratulations

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

70 Years

Mr V A Tomkins G4KEE
Mr K Wilks G8MVD

60 Years

Mr P Craw G3CCX
Mr P T Burt G3NBQ
Mr D W Stevens G3NWG
Mr A J Balmforth G3RKQ
Mr R Scrivens G3LNM

50 Years

Mr C Davis G3VM
Mr M J Fereday G3VOW
Mr P Burgess G3VPT
Mr P Bolton G4CXE
Mr I R Butson G4HKC
Mr S R Lucas G8APZ
Mr A MacFarlane GM0MAC
Mr D Bowers M0DKV

Train the Trainers

Leicester Radio Society is hosting an RSGB Train The Trainers event for RSGB Members. It will be on Saturday 19 November. If you are you a trainer or would you like to be one, this event may be for you. There are a maximum of 25 places available on a first come first served basis – it is not a 'drop-in' event. It will start at 9am and finish at 5pm with a break halfway for lunch. Tea / coffee is provided but you will need to provide your own packed lunch. Please contact John, G0IJM by email at john.g0ijm@btinternet.com to book a place.

QSL Matters

Work at the bureau is more than just sorting cards, there's the checking of Membership, checking unusual callsigns or routing and sending out the 'Help us to help you' cards that are aimed at helping Members get their cards through the bureau quickly and efficiently. We are always looking for ways to speed up the QSL process and the latest guidelines are in the 2017 Yearbook and on the website.

The RSGB QSL Service will be at the National Hamfest and we look forward to meeting many of you there. Each year we like to show you something different so we are running a QSL-Quiz. Visitors will have a chance to win one of several prizes, including three first prizes of 500 professional, custom made, QSL cards to the winner's own design. It's just ten multiple choice questions and the winners will be announced next month and notified by post. So brush up on the guidelines if you are attending the National Hamfest!

We have started the sorting process of the W1AW Centennial cards we told you about last month. We are processing them in batches alongside the normal workload.

We made a request for QSL sub-managers recently and we have received a number of offers of help. We will be contacting those that have enquired shortly.

Finally, a reminder that the G4A-F and G4G-L sub group managers have changed as of 1 September – see the website for for details. Currently there is no change to other G4 sub groups as these remain under review.

Brian Rix, G2DQU, Silent Key

The Lord Rix, Brian Rix, Baron Rix, Kt, CBE, DL, G2DQU passed away on 20 August 2016. He was 92.

His interest in amateur radio was kindled in his early years by his older brother, Malcolm, G5GX. He obtained an Artificial Aerial licence – 2DQU – in 1937 at the age of 13. He got his 'proper' licence after the War, when he was still in the Air Force. He operated a ZC1 that he converted himself, using his bunk as a shack. He remained active on the air for many, many years.

Rix rose to prominence as an actor. Starting in his late teens, he quickly turned professional and, in his early twenties, formed his own theatre company. He juggled both careers for the next several decades, becoming very well known.

Brian Rix used his high profile to promote amateur radio. On a number of occasions he was interviewed on broadcast radio and television for his views concerning amateur radio, and even featured the subject on his 'Open Door' television series. In 1979 he was made an Honorary Vice President of the RSGB in recognition of the assistance he had given in the publicity sphere for amateur radio. He was also Patron of RAIBC.

In 1951 he became involved in the world of learning disability following the birth of his first daughter, who was diagnosed with Down Syndrome. In the then-absence of any meaningful welfare provision for such people, he and his wife Elspet became involved in various charities fighting for support. He had many roles, including in the early 1960s becoming the first Chairman of the Special Functions Fundraising Committee of what was later to become known as MENCAP. He became chairman of MENCAP in 1987 and President in 1988, a position he held until he died.

Rix was given a CBE in the 1977 Birthday Honours and knighted in June 1986 for his services to charity. In 1992 he was created a Life Peer. On entering the House of Lords he campaigned tirelessly for disability rights, and also used his position to champion amateur radio causes such as interference from PLT.

In 1992, *RadCom* published a detailed interview with Brian Rix just as he was elevated to the Lords. If you wish to read this, please go to http://rsgb.org/main/files/2016/08/G2DQU-Lord-Rix-interview-1992.pdf. (Note that the contact details for Mencap have changed since that article was published in 1992 and their website is now www.mencap.org.uk).

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

Mr C Overson, 2E0AJX
Mr K Lynch, 2E0DUA
Mr P Haygarth, 2E0HYG
Mr P Sewell, 2E0PES
Mr P Ferris, 2E0SYK
Ms S Skerratt, 2M0PCW
Mr R Houghton, AD6QF
Mr E McCann, AG6CX
Mr A S Williams, G1YWI
Mr M Smoker, G1ZAW
Mr T Whateley, G3NMW
Mr P Hainsworth, G4JVD
Mr P Bowyer, G4MJS
Mr G Buxton, G4VXG
Mr D Woodhouse, G6ORL
Mr C Seearam, G6XHM
Mr I Morris, G7UAV
Mr K Fagan, G8CHB
Mr B Rhead, G8KVM
Mr B Roberts, GW0HGC
Mr J Carlini, K2JN
Mr J N Saxon, K7CBH
Mr K Lumpkins, K7VBG
Mr D Hammer, K9NN
Dr M Power, KA1R
Mr A Johnson, KG7BZ
Mr M Jakubowski, M0TNB
Mr D Liddard, M1DKL
Mr J Hickey, M3JHJ
Mr D Gordon, M6ALA
Mr P Cuthbertson, M6BTZ
Mr J Dumpleton, M6CTR
Mr N Ngan, M6GZJ
Miss S Sturman, M6HHI
Mr D Killingley, M6HKJ
Mr D Wetherilt, M6HKK
Mr A Lamont, M6HKQ
Mrs P Petty, M6KYM
Mr P Schoenmaker, M6LUG
Mr P Marlow, M6MQP
Master M Amos, M6OMX
Mrs P Sayles, M6PNY
Ms T Frost, M6TNF
Master G Amos, M6UGA
Mr C Brown, M6VWE
Mr A Wilson, M6VWW
Mr R Wheeler, M6WHE
Mr J Stokes, M6WXZ
Mr L Graham, M6XLG
Mr M Read, M6YEU
Mr C Docherty, M6ZCD
Mr D Gill, M6ZRZ
Mr A J Siddall, M6ZZV
Mr G Brass, MM6GYR
Mr L Davis-Edmonds, MM6HEO
Mr R Shipman, MW0RCZ
Mr S Gordon, MW6GXU
Mr G Hodges, MW6TJE
Mr M Suddaby, MW6WMW
Chertsey Radio Club, MX0MXO
Mr L Vincent, N4LXP
Mr G Elmore, N6GN
Mr P Haenebalcke, ON3MM
Mr K Woodthorpe, RS308597
Mr W Rogers, RS309358
Mr M Bizeray, RS309415
Mr J M Clark, RS309508
Ms L Hicks, RS309512
Mr A Jepson, RS309526
Mr C Gleeson, RS309569
Mr S Padwick, RS309635
Mr S Clewes, RS309693
Mrs L Simmons, RS309728
Miss E Simmons, RS309729
Mr G Morrison, RS309740
Mr T Humphreys, RS309757
Mr S Banks, RS309786
Mr P Ryan, RS309803
Mr C Robertson, RS309817
Mr R Wande, SM5COP
Mr G Dumbleton, VE3NYF
Ms S Thorn, VK4CMV
Mr G Willox, VK4LGW
Mr D Irani, VU2DNI
Mr D Wood, W4EJ
Mr R R Difiore Jr, WA6K

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

Mr C Sayles, 2E0CVV
Mr S Carpenter, 2E0SJQ
Mr D Binns, G0DOW
Mr R Bishop, G0SQL
Mr B M Cutts, G1FNS
Mr K Doswell, G1OET
Mr M Foster, G1TZZ
Mr M Richards, G3WKF
Mr M Davidsohn, G3ZCC
Mr S Tidmarsh, G4VMM
Mr G A Vallely, G4YRS
Mr D Ferguson, G6RXY
Mr N Mansfield, G6ZPV
Mr T Carroll, G7NHD
Mr K Adams, G7OAH
Mr K J Waters, G8HOD
Mr P T Corkrum, G8OTJ
Mr T Parsons, GW6XPO
Mr M L Busson, GW8MER
Mr G M Woodworth, K3EEE
Mr C M Alton II, KB0PKO
Mr D Ireland, KD8KZS
Mr M Smith, M0INI
Mr M Winward, M0MWC
Mr T Papadopoulos, M0SVA
Mr A Thornton, M1EAB
Mr J Stewart, M3EIR
Mr R Krawczyk, MM1FAS
Mr G H Drzyzga, NA4N
Mr S Elovaara, OH1SA
Mr R A Jordan, RS177207
Mr P Jarvis, RS187971
Mr B Vernall, ZL2CA

A diary from YOTA 2016

This year the Youngsters on the Air camp took place in Wagrain, Austria and was hosted by ÖVSV, the Austrian National Society, it was one of the biggest with over 100 young people from IARU Regions 1 and 2.

The purpose of the event is to bring together young people who share the same interests and passion for amateur radio. The initial invite went out to all young RSGB Members, who were invited to apply for a place on the UK team. We were a team of three young people and a youth leader – Kieran Clarke, M6RZR, Nick Ravenscroft, M6NJR, Arthur Loukes, 2E0RTY and Sara McGarvey, 2I0SSW. Once chosen, the preparation work began. Skype meetings were held, telephone conversations took place, emails were exchanged and flights were booked. The three months following the initial contact flew by.

Saturday 16th July

Before we knew it the RSGB team were at Birmingham International Airport waiting to catch the 9:10 flight to Salzburg. When we arrived we were collected by bus and transported to the beautiful market town of Wagrain about 70km from the airport.

Not wasting any time, workshops began almost immediately with an introduction to FlexRadio given via Skype by Steve Hicks, N5AC. The rest of the extensive schedule was outlined in the first of many meetings with the rest of the participants. After dinner we all took part in games aimed at getting to know each other.

Sunday 17th July

We all met at breakfast and prepared for the day's events. We were beginning to make new friends and learn new things. Nick, M6NJR said the VHF antenna building on was his favourite activity as it was something he had never done before. We also learned about meteor scatter and how to configure a Raspberry Pi for WSPR use.

An intercultural evening gave us the opportunity to learn about each other and our countries a bit more. Each team brought some traditional food or drink and made a short presentation about what they had brought. We were all then given the opportunity to try the food and drink from each country. The event went on well into the night giving everyone the chance to get to know each other a little more.

Monday 18th July

We were captivated by a topic that Kieran had never heard of before, HAMNET, a high speed amateur radio multimedia network based on commercial wireless devices. This was followed up by a workshop using the Raspberry Pi, supplied by the camp, that we configured into an APRS station.

Tuesday 19th July

We had a day out visiting the Hohenwerfen castle in Salzburg, first going on a tour. The falconry show that we were treated to after the tour was amazing! We then focused our attention on a 2m contest and were able to use the antenna we built during Monday's workshop. Following the castle tour it was a short bus ride to the Ice Cave. After what felt like a long, slow hike we made it to the top only to discover that once inside we had to climb a lot of stairs to get to the top! We tried to use our radios inside the cave to contact the others outside but it did not work.

Wednesday 20th July

It was an interesting day for all the team members as we were given an insight to how emergency operations were carried out in times of need. The greatest shock was when we were given radio equipment to send an email! We used a wire antenna and that's it. To test it we sent an emails to Kieran's dad back in the UK (Dave, G7JGD) and the Region 8 Manager (Philip, MI0MSO). Later that day we took part in a DV workshop in which we experimented with DMR and D-Star communication using a dongle with the Raspberry Pi we were supplied with at the beginning of the week.

Most people we knew back home had managed to talk to Kieran and Sara on 20m using the station on site and we could hear amateurs calling in from all corners of the UK and the rest of the world!

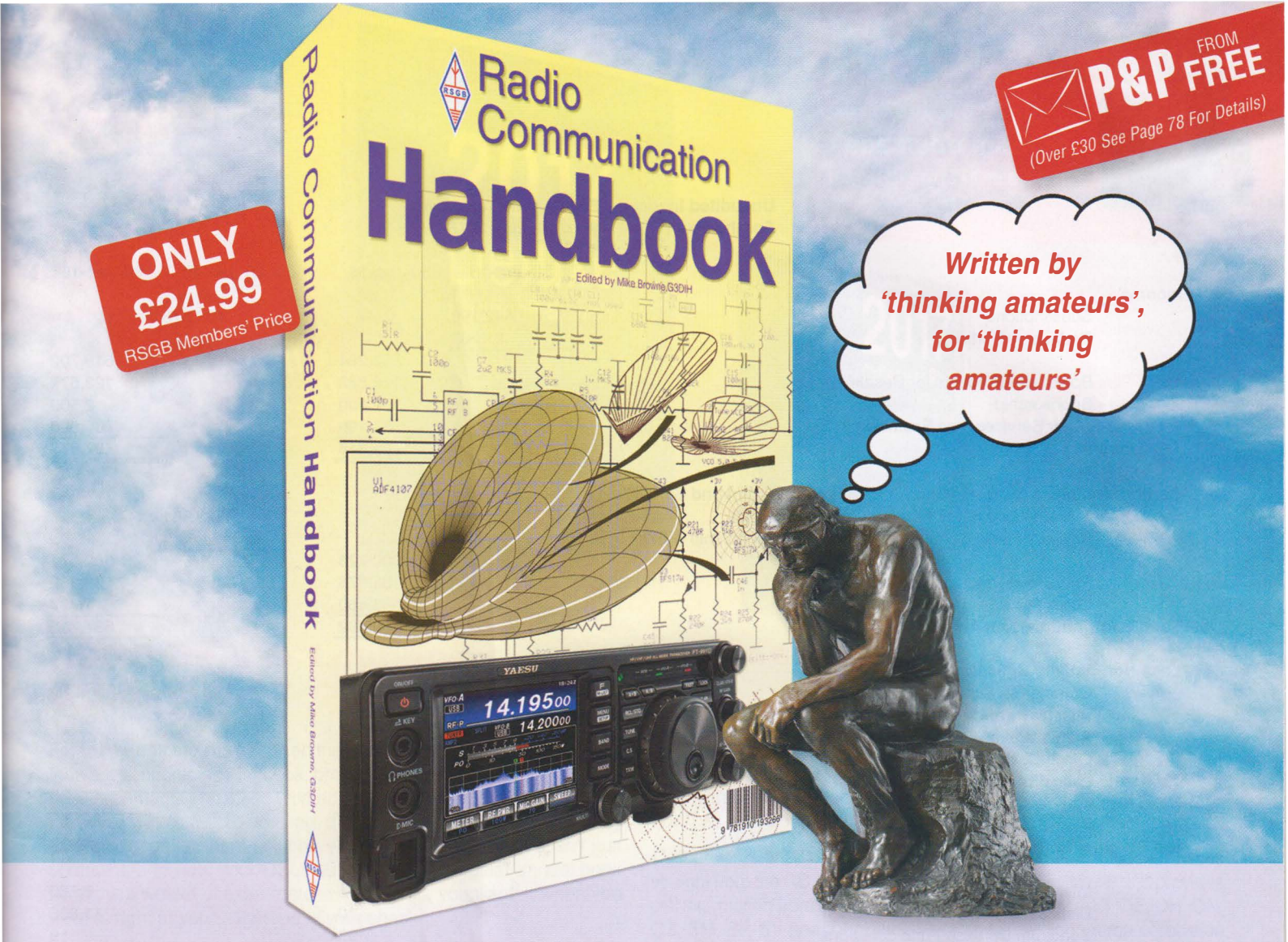
Thursday 21st July

It was a day for SOTA lovers as we were given the option to go to one of three mountains to experiment with our antennas from the previous days. We decided to go for the biggest mountain. It was, to say the least, one of the best views we had seen. You could see all over the Austrian mountains and down below – amazing. It was one of the best moments of YOTA 2016.

Friday 22nd July

This was definitely the most active day for Arthur and Kieran who took part in the ARDF event. The heat didn't do them any favours as it was one of the warmest days. The day was finished off with a talk on LTE, which we found very interesting.

Continued on page 10



RSGB Radio Communication Handbook

Edited by Mike Browne, G3DIH

Since 1938 the RSGB has published the *RSGB Radio Communication Handbook* and it remains one of the most enduring guides in the world to amateur radio technology and practice.

As always, this new edition of the *RSGB Radio Communication Handbook* has been updated, rewritten and provides an invaluable guide to amateur radio theory and practice. With around 600,000 words, 2000 illustrations and diagrams in 25 chapters and two appendices in 864 pages it covers the breadth of amateur radio.

Readers will find explanations from the basic components of amateur radio to semi-conductors through oscillators, amplifiers, mixers, transmitters, receivers and even a complete transceiver project. There are chapters covering design and practice in VHF/UHF, Microwaves and frequencies below 1MHz. *RSGB Radio Communication Handbook* does not stop here and you will find chapters dedicated to propagation, antenna basics and transmission lines. Antenna design is not forgotten and you will find whole chapters dedicated to practical antennas for HF, VHF/UHF and Microwaves. There are further chapters covering a wide range of topics from Morse code, Data communications, EMC, Measurement & Test Equipment and even practical guides to the 'the great outdoors' and 'construction and workshop practice'.

You will find hundreds of pages packed with the distilled knowledge and experience of acknowledged experts on each topic. In amateur radio there is always plenty to learn and this book is the ideal way to expand your knowledge on your favourite activity, or to discover and explore something new. Whatever you use it for, the *RSGB Radio Communication Handbook* will become a valuable tool that helps you get the very best out of amateur radio.

Written by 'thinking amateurs', for 'thinking amateurs' the RSGB Radio Communication Handbook is simply the book that every radio amateur should have.

210x297mm 864 pages, ISBN: 9781 9101 9326 6
Non Members' Price: £29.99
RSGB Members' Price: £24.99

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RSGB SHOP

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Unaudited Income & Expenditure Account
For the six months ended 30 June 2016

	30-Jun-16	30-Jun-16	30-Jun-15	30-Jun-15
Income				
Subscriptions	442,199		423,578	
Radcom Advertising	91,085		92,124	
		533,284		515,702
Books and Products for Resale		116,863		123,577
Sponsorship		2,500		2,500
Other Services - inc Examination Services		53,199		65,898
Total Income		**705,846**		**707,677**
Contribution from Subscriptions, Radcom, Publication and Services				
Subscriptions net of Radcom Publication Costs	336,567		323,561	
Amateur Radio Costs, (net of Income), Sponsorship & Exams	(35,841)		(20,987)	
		300,726		302,574
Books and Products for Resale		35,576		33,362
Other Services net of expenses		3,460		1,777
Total Contribution from Activities		339,762		337,713
Less Non Activity Specific Overheads				
Commercial Costs	(79,935)		(88,474)	
Bletchley Park	(18,031)		(16,943)	
Administration	(203,856)		(191,046)	
Office Costs	(51,087)		(40,583)	
Landlord Costs	(9,323)		(9,319)	
Total Non Activity Specific Overheads		(362,232)		(346,365)
Net Surplus/(Deficit) from Activities		**(22,470)**		**(8,652)**
Interest Income		2,995		2,720
Disposal of Fixed Assets		0		11,805
Spectrum Defence Fund donations		99		19
Legacies		5,849		(8,637)
Net Surplus (Deficit)		**(13,527)**		**(2,745)**

The result for the six months ending 30 June 2016 was a deficit of £13,527, (2015 deficit of £2,745).
Income for the half year to 30 June 2016 amounted to £705,846 (2015 - £707,677). An increase in subscription income is offset by a reduction in book sales and exam income.

Operating costs for the half year to 30 June 2016 amounted to £362,232 (2015 - £346,365). The increase arose primarily from expenditure on the ISS schools contacts and the renewal of trade marks.

Non-operating income of £6,066 was received during the period and £217 of expenditure was incurred to provide test equipment for calibrated measurements for the ElectroMagnetic Compatibility committee. Both of these items were attributed to the Society's Legacy Fund.

In line with its financial objectives, the Society expects to report a roughly break-even result at the end of the year.

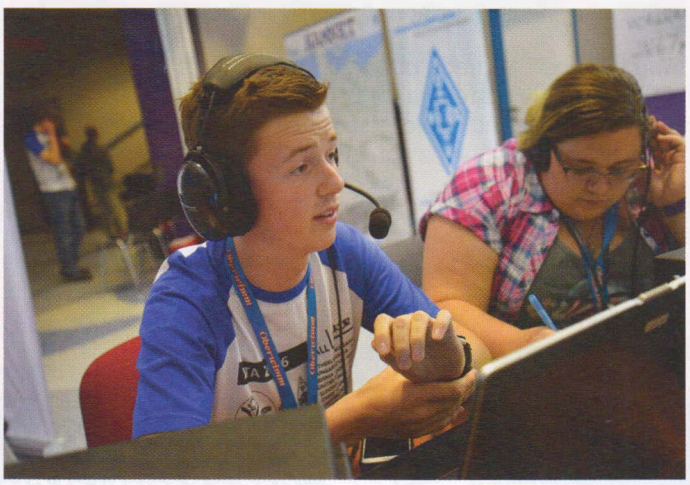
Continued from page 08

Saturday 23rd July

A tough day, not just because we had to say goodbye to everyone but also because our journey home did not go quite as planned. Thankfully, we all made it home safely.

Summing up the event, Arthur said "I had a fantastic time, I never thought I would have learnt so much in such a short time." Nick's views was "I have been inspired by the passion other young people have in the hobby." Kieran decided that "It has been amazing to meet so many people who share my love for amateur radio, I can not wait to keep in contact with the friends I have met and I hope to be involved in other events in the future." Sara, the team leader, said "I have been given this amazing opportunity thanks to the RSGB. My passion for radio has been reignited. I am looking forward to sharing the knowledge I have gained and to encouraging other young people to get involved."

Sara McGarvey, 2I0SSW
drm84@rsgb.org.uk



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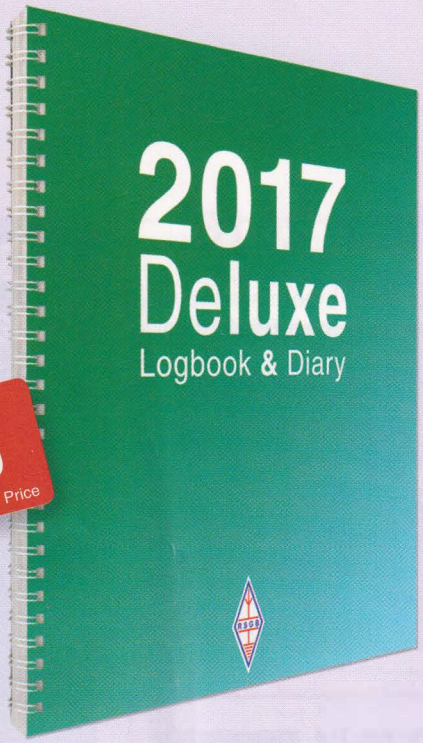

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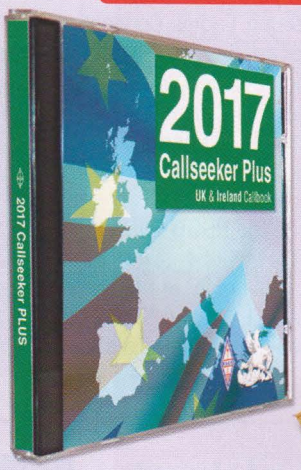

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RSGB Deluxe Logbook & Diary 2017

For many, nothing sits better on the bench of an amateur radio shack than a well maintained logbook, providing at a glance records of those special contacts and those worked over time. If you are looking for an attractive way to record your log, the *RSGB Deluxe Logbook & Diary 2017* provides an ideal solution. Attractively designed this isn't just somewhere to note your QSLs but this hugely popular annual book contains a wealth of extra material just where you want it, when you want it, right at your fingertips in your shack.

RSGB Deluxe Logbook & Diary contains the latest UK Band plans, RSGB Contest Calendar, DXCC prefix list and RSGB QSL Bureau information. The information doesn't stop there either, a locator map (and an explanation of how locators work), repeater information, diary section, notes pages, handy lists of operating abbreviations & codes - pretty much everything you want to know when operating is included. The logbook section isn't forgotten either and there is a generous log section with plenty of space for you to record a whole year activity. Even the attractive design means you will also want to keep the *RSGB Deluxe Logbook & Diary 2017* for years to come.

The *RSGB Deluxe Logbook & Diary 2017* includes:

- Current UK band plans
- European locator map
- Prefix guide
- Repeater listings
- QSL bureau information
- RSGB Contest Calendar
- Generous Log section
- 2017 Diary
- Handy lists of abbreviations & codes

Much more than a standard logbook - yet it the same price!

Size 210x240mm
Non Members' Price: £4.99
Members' Price: £4.24

Callseeker Plus 2017

The latest UK and European callsign information = the RSGB Callseeker Plus 2017

Whilst the *RSGB Yearbook 2017* provides the latest UK and Republic of Ireland callsign data you can have even more with the *Callseeker Plus 2017*, as it also provides a host of European callsign data as well.

Callseeker plus 2017 takes up no computer hard disc space as it runs straight from the CD or memory stick, it is really easy to use and provides call information from 9A, DL, EA, ES, F, HA, HB9, I, LX, LY, OE, OH, ON, OZ, SM, SP, SV and Z3. You can search by callsign, name or location and navigating through the search results is quick and easy. You can print the results in a variety of formats including straight to an address label. *Callseeker Plus 2017* is the ideal way to search for European QSLs

Callseeker Plus 2017 also boasts a host of "extras" from across Europe, including the *RSGB Yearbook 2017* reference information pages in an easily searchable PDF format providing the very latest amateur radio reference information from the UK and around the World.

RSGB Videos

This year we also include four amateur radio videos produced by the RSGB. These exciting new videos include:

- GB1SS schools calling Tim Peake
- 21st Century Hobby - youth video
- Amateur radio - a world of possibilities
- RSGB volunteers video

These videos are produced in the popular MP4 format that will play in most computers and some DVD players

Two formats – one price

The *Callseeker Plus 2017* is also available as either a traditional CD ROM or an USB Memory Stick version. The CD is in the full jewel case whilst the memory stick is encased an Eco bamboo shell. Both are highly portable and easy to use and provide a great alternative to the traditional *RSGB Yearbook*.

Cheaper than a RSGB Yearbook 2017 – what a bargain!

Non Members' Price: £16.99,
RSGB Members' Price: £14.44

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RSGB SHOP

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International YLs Convention 2016

The annual International Young Ladies Convention is a get-together like no other and there are ladies and their partners arriving from Australia, Canada, Denmark, Great Britain, France, Germany, Iceland, Scotland, Sweden and the USA. Taking place at the Novotel in Milton Keynes from 3 to 11 October, visits have been arranged to Bletchley Park, Woburn Abbey and, of course, a visit to local facilities in Milton Keynes. A radio station will be set up in the foyer of the hotel by kind permission of Novotel and they have been granted the special event callsign GB16IYL, so please listen out for them.

They have also linked with the RSGB Convention on the 8th and 9th. IYL visitors will attend both days and Carol, 2E1RBH will be giving a talk on Sunday at 11.45am on BYLARA. The ladies (and partners) have a gala night at their hotel on Saturday with a grand draw with prizes donated by Ham Tek UK, Vine-LAM and ML&S Ltd.

More information, by email, to carolhodges1@btinternet.com or go to www.bylara.org.uk.

BATC President

Graham Shirville, G3VZV, has been chosen to be the next president of the British Amateur Television Club (BATC). He succeeds Peter Blakeborough, G3PYB, who became SK at the end of 2015. BATC chairman Noel Matthews, G8GTZ said he was delighted Graham had agreed to take up the role. "Graham has the experience and gravitas, is passionate about ATV, and has contacts throughout the amateur radio community. He will serve the BATC well in the role as president." The appointment is for two years.

Special event stations

From 19 September until 9 October Pontefract & District ARS will be operating GB4SL to mark the visit of two more astronauts to Pontefract. They are Captains Mark and Scott Kelly who have both flown on the ISS (see www.space-lectures.com for full details).

Cray Valley Radio Society will be operating GB70CV for the month of October to celebrate its 70th anniversary. There will also be a 'Platinum' award available for contacting/hearing the special event callsign, G3RCV, G1RCV and member stations. A specially engraved plaque will be available to those who obtain the required 70 points. To help licensed amateurs and short wave listeners obtain the points, a number of short activity periods have been arranged between 8 and 16 October. Visit www.cvrs.org for further details.

ON35CLM will be on the air from 15 October to 14 November to commemorate the Canadian Liberation March. This event, the 35th year, has been organised by the ONZ section of the Belgian National Society, UBA. The shack in 't Walletje 50c te Knokke-Heist is open permanently from 30 October until 1 November for visitors. More information is at www.qrz.com/on35clm

CDXC donates to IOTA Ltd

CDXC, the UK DX Foundation, has made a donation to the newly formed Islands on the Air (IOTA) Ltd. The donation, which was announced at the July CDXC AGM, was made to help IOTA Ltd with its new IT system. Chris, G3SVL, CDXC Chairman, said "As many of our members are keen IOTA chasers we believe this donation will help IOTA Ltd deliver its important new IT system, and adds to CDXC's support and sponsorship of IOTA DXpeditions."

Roger Balister, G3KMA, IOTA manger, said "We appreciate the very generous donation from CDXC. This will go a long way to help us reach our target. We are so pleased to welcome CDXC at the IOTA Group Level in Friends of IOTA."

GB3UHF 70cm beacon is back

The 70cm beacon GB3UHF came back into service in early June, located at the same site as GB3VHF and sharing a rack with its lower frequency sibling. The two GB3UHF 70cm Yagi antennas are installed between the existing two GB3VHF Yagis. The system uses similar types of 3 element Amphenol Jaybeam Yagis beaming the same 288° and 348° azimuth as those used at 144MHz. The new beacon, operating on 432.430MHz, will provide a very useful tool together with GB3VHF for determining propagation at both VHF and UHF over long distances from the same site with time co-ordinated JT65B and CW identification using FSK. A very interesting observation so far is the path from both beacons on different bands. The 70cm beacon is heavily affected by aircraft scatter and it is not uncommon to hear two tones – the direct tone and a second Doppler-affected tone reflected from multiple aircraft. Using the Airscout software (www.airscout.eu), Richard, G4HGI, *RadCom*'s VHF / UHF columnist says it would be an excellent project for stations over the UK to try monitoring both beacons and feed back information to the Propagation Studies Committee. Thanks go to the beacon keeper, Chris, G0FDZ, and the RSGB Beacon Team who planned, negotiated and deployed this beacon, a tremendous job done by the team. See www.gb3vhf.co.uk/GB3UHFhome.html

Online Foundation course

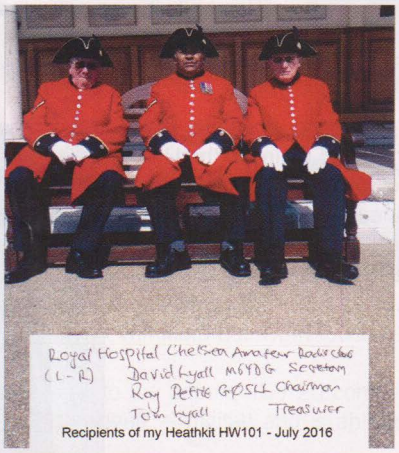
Essex Ham started its 18th free Foundation Online course in August with 34 students on the waiting list. Over 200 people have enrolled since January. The course is available to anyone studying for the Foundation level, via www.hamtrain.co.uk

N Wales rally cancelled

It is with great regret that the organisers of the North Wales Rally have had to cancel this year's event, which was scheduled for October. They are looking for the event to return, perhaps on a smaller scale, in 2017.

HW101 gone to a good home

In a recent edition of *RadCom*, Ian, G4DSI offered a Heathkit HW101 receiver to a good cause. As you would expect he received a fair amount of interest. The first email was the one he eventually chose. The radio was given a new home at a new club at the Chelsea Hospital. The Royal Hospital Chelsea Amateur Radio Club now have the HW101 and PSU and look forward to using it as soon as they can rig up an aerial on a Grade I listed building. The photo shows the chairman, secretary and treasurer. Some Members who attended the 2015 RSGB AGM in London had the opportunity to meet some members of this new group of amateurs.



Recipients of my Heathkit HW101 - July 2016

Dutch National Convention

On 5 November, the Ham Radio Convention (Dag voor de RadioAmateur 2016), will take place in the Netherlands. The organising committee of the Dutch Radio Society (VERON) has create an interesting programme including lectures on Near Vertical Incidence Skywave (NVIS) research, antennas and propagation by Ben Witvliet, PE5B; Actual noise sources and rules of thumb to reduce noise for radio hams by members of the EMC/EMF commission and A simple 23cm FM Transceiver for homebrew by Bas de Jong, PE1JPD.

PA6DRA will be on the air for talk in as well as working local stations on 145.500MHz and there will be a special QSL card available. See www.veron.nl for details.

BRARS AGM

Membership of the British Railways Amateur Radio Society (BRARS) is open to anyone with an interest in amateur radio and railways. The annual general meeting is on 22 October at the Reading Parlour in the Brunswick Inn in Derby (the Inn is conveniently close to the railway station). Members are welcome to arrive from noon onwards. The AGM will commence at 1pm. For catering and admin purposes the BRARS Secretary would appreciate members letting him know that they plan to attend. Contact Ian Brothwell, G4EAN via email to G4EAN@BRARS.info

Advance training

Humber Fortress DX ARC is starting an Advanced training course on 7 November at Cottingham Road Baptist Church, Hull. The exam date will be 15 May 2017. For more information please contact Bob, M0RWL by email to rwlane@rwlane.karoo.co.uk

ARDF Stop Press

David Williams, M3WDD took the gold medal in the Men's 50 Year Plus age group Sprint race at the World ARDF Championships on 5 September with a massive winning margin of 15 seconds.

HAREC with new Full licences

Following discussions with Ofcom, the UK licensing authority, the RSGB has agreed to issue a UK Harmonised Amateur Radio Examination Certificate (HAREC) alongside every new UK Advanced examination pass certificate from 5 September 2016. This simplifies the existing process where a separate application to Ofcom was required. The process for existing licence holders remains unchanged at this time.

A Harmonised Amateur Radio Examination Certificate (HAREC) is required for UK radio amateurs who would like to apply for an amateur radio licence in another country that participates in CEPT Recommendation T/R 61-02.

Poole RS 40th anniversary

To celebrate their 40th anniversary, Poole Radio Society will put GB40PRS on the air throughout the month at locations in and around Poole. Visitors are welcome to visit and to send greetings messages. The station will be operating from Kingston Lacy on 1-3 October; Worth Matravers on the 5th and 6th; Norden Railway Station on the 8th-10th; Poole museum on the 11th and 13th and, finally, the Havel hotel on the 19th. The station will be operational on the 20, 40 and 80m bands as well as 2m. A full schedule is available at www.g4prs.org.uk

E Day at Gateshead Public Library

Angel of the North Radio Club has been asked to provide workshops for all ages at E Day on 1 October at Gateshead Public Library. They have planned a crystal radio build and demonstration as well as an HF radio and oscilloscope display. Lots of other activities will be available on the day both radio and non radio based. Tickets are free and should be booked online at www.gateshead.gov.uk/whatson

New bands for Latvia

Latvian amateurs have two new bands following the introduction of their new amateur radio licence on 9 August. Access has been allowed to the new WRC15 60m / 5MHz allocation 5351.5 – 5366.5kHz, with a power of 15W EIRP. 472 – 479kHz (630m) has also become available, with a power of 1W EIRP. Both bands are subject to a narrow transmit bandwidth of 800Hz and are permitted to Category A (ie top level) licence holders only.

Cray Valley RS 70th anniversary

Activities to celebrate the Cray Valley club's 70th anniversary will include a talk about the Society in the 1940s and 1950s, an anniversary party for members past and present with guests of honour Nick Henwood, G3RWF, RSGB President and Clive Efford, the local Member of Parliament, as well as an anniversary special event station and award scheme. For more details visit www.cvrs.org

New Products

DAB radios

Albrecht are well known for their amateur radios, CBs and scanners, but Nevada is delighted to introduce the range of Albrecht DAB radios to the UK. In Germany Albrecht DAB radios have become one of the major brands in the high street stores. Top of the range DAB is the Albrecht DR-850 with both DAB, DAB plus and FM reception. The radio has a stylish wooden finish with multi-colour TFT display and Bluetooth transfer capability. Priced at £99.95 it is available from Nevada, see www.nevadaradio.co.uk

Whistler Scanners

Moonraker has just received their first delivery of Whistler digital scanners. Now in stock is the digital handheld, model WS1088, and digital desktop version, WS1098. Both are supplied with a UK optimised frequency range and DMR enabled. These two models are available direct at £349.95 & £399.95 respectively. See www.moonraker.co.uk

Antenna Analyser

Following the review in *RadCom* of the MetroVna Pro Analyser that covers up to 180MHz, the company have just released a new model. The MetroVna Pro Deluxe covers up to 250MHz with all the same functions as the previous version. Priced £299.95 (including delivery) see www.nevada.co.uk.

Enclosure kit

As the result of customer demand, SOTABEAMS has introduced an enclosure kit for their popular Laserbeam-Dual range of SSB and CW filters. The enclosure kit incorporates an audio amplifier and laser-engraved panels to give a professional finish. It is available fully built and tested or as a kit suitable for all abilities. Details at www.sotabeams.co.uk/

Pro Antennas

UK manufacturer Pro Antennas has appointed Nevada as exclusive UK dealers for their Dual Beam Pro and I-Pro Home antennas. Of particular interest is the I-Pro home antenna, which is a very efficient centre fed vertical covering 40m through to 6m (with a suitable ATU). Owner Carl, G4GTW said "this move will allow me to spend my time on the production and development of antennas, whilst Nevada can offer same day dispatch and great customer service." See www.proantennas.co.uk for full details of the products, customers should then contact Nevada on 02392 313 090.

New Icom models at Tokyo Ham Fair

After an online teaser campaign featuring silhouettes of mystery radio models, the secret is out and Icom Inc has shown the very first samples of the IC-7610, IC-R8600, IC-R30 and ID-51 PLUS2 to the public at the Tokyo Ham Fair in August. Details are relatively scarce but here is some preliminary information:

IC-7610 HF/50MHz transceiver: the successor to the IC-7600 will be a dual-watch capable HF+50MHz 100W base station with built-in antenna tuner. The LCD will be touch screen and you will be able to connect an external display.

IC-R8600 wideband receiver: replaces the IC-R8500 wideband receiver and will feature the technology incorporated into the IC-7300. The IC-R8600 will be able to receive from 0.01-3000MHz in analogue and various digital modes (D-Star, P25, NXDN and dPMR). It will feature a 4.3in touch screen display with a fast moving spectrum scope and waterfall display.

IC-R30 communications receiver: this is the successor to the popular IC-R20 compact handheld receiver. It can listen to two signals under certain conditions (analogue + analogue or analogue + digital) and is able to decode D-Star, P25, NXDN and dPMR digital (conventional) modes.

ID-51 PLUS2 dual band D-Star digital transceiver: a special edition model that will come in several colours/patterns. The new 'Terminal Mode' and 'Access Point Modes' enable you to make D-Star calls through the internet, even from areas where no D-Star repeater is accessible.

Further details will be available nearer to each product's launch. Keep an eye on www.icomuk.co.uk for more information.

The new shop at Moonraker

Started in 1978, Moonraker UK Ltd has recently made some big changes to their shop and *RadCom* went to visit.

Many radio amateurs will be familiar with the name Moonraker, especially those attending rallies up and down the UK. In fact the next rally they are attending is the National Hamfest. The company is based on a small industrial park at Woburn Sands near Milton Keynes (a very short trip from M1 junction 13).

The shop has expanded considerably since our last visit and the level of stock was quite impressive. There were plenty of radios from handhelds to base stations, even receivers and scanners but, probably more important on a day to day basis, there were lots of accessories. Radio amateurs always need connecting cables, connectors, batteries, antenna parts, cable and so on; all those small items that you run out of on a regular basis! One of the benefits of enlarging the shop so much was to make room for all those essential items that are used so often. When you think of an amateur radio shop you can be forgiven for assuming that it's the radios that make up most of the business. Chatting to Justin as we toured the shop was instructive as he explained that the smaller accessories, antennas and things like telescopic masts make up much more of the sales. The extra space has allowed them to expand the range of things like antennas on display giving customers more choice when they visit. Should you want something as small as a connector then look no further than the display on the counter! Just about every type of connector you could want was on show including plugs, sockets and adapters.

The new Moonraker shop has plenty of space for those essentials that amateurs need – cables, leads, connectors, antennas and so on.

Yet the shop is only part of the facilities on site in Woburn Sands. Customers will be pleased to know that there is plenty of free car parking around the two buildings that house the company. One building houses the stock waiting to be assembled, sent out mail order or placed in the shop. The other houses the shop, dispatch department and the offices (and some more stock storage!).

When we were there, magmounts were being assembled and Justin told us that they make around 300 every month for dispatch – both wholesale and retail. Goods were also being packaged for dispatch from orders placed both on the website and through their eBay shop. One very clever system they have incorporated is that as an item goes out of stock it is removed from all the selling platforms automatically, thus avoiding disappointing customers.

See www.moonraker.eu for information.

Homebrew

Over the next few months, we will design and build some simple test instruments and calibration equipment. We will start with a look at precision voltage references.

The volt is the standard unit for measuring electrical potential difference. The value of the volt is derived from several other standard units. The simplest definition of the volt is found in Ohm's law as V=I*R. This shows that one ampere of current through a 1 ohm resistor will result in a 1V potential difference across the resistor.

The precise value of the volt is defined in internationally agreed standards.

Historically, the volt was defined relative to the potential across the output terminals of a standard cell. For most of the 20th century, a type of wet-chemical cadmium cell known as the Weston Cell was used as the agreed standard. This type of cell produces 1.018638V across its terminals. Under ideal conditions, this voltage will remain constant to within a few μV per year.

The Weston cell was designed as a laboratory standard and would not be well suited to portable applications.

Since 1990 the volt has been defined by the Josephson voltage standard [1]. A practical Josephson standard is a complex system involving supercooled arrays of superconducting junctions and very stable microwave sources – not exactly kitchen table technology.

For the amateur constructor, the obvious way to measure voltage is to use a voltmeter. Analogue multimeters will usually claim to be accurate to within ±3-4% of the full scale (FSD) value. My own cheap analogue meter is very accurate close to full-scale, but becomes progressively less accurate at lower readings. A 10V standard measured on the 50V range shows an indicated 9.5V. This is within specification, but hardly suitable for critical measurements.

Digital meters tend to be better. A cheap digital multimeter with DC voltage accuracy of around 1% will be quite adequate for most purposes. Digital meters with even greater accuracy are readily available. A typical bench DMM will cost around £100. Laboratory-grade meters with 6-8 display digits and accuracy of better than 0.002% are available. Such performance comes at a cost, so you can also expect to see quite a few digits displayed on the price tag.

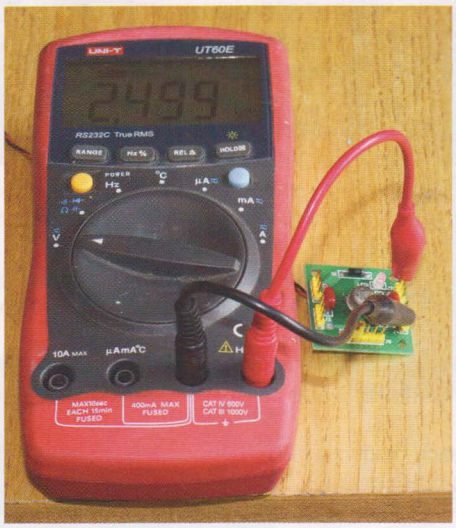


PHOTO 1: Checking a DMM with the 2.500V output from an AD584 module.

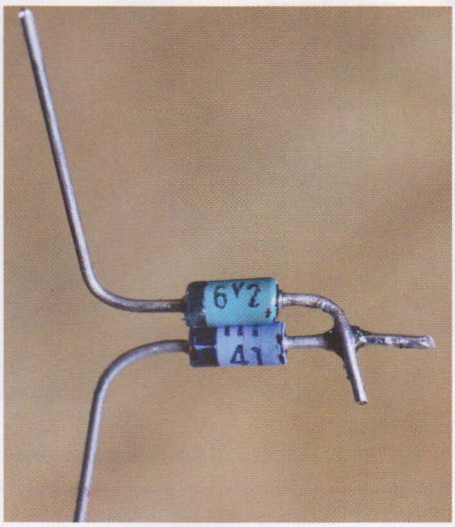


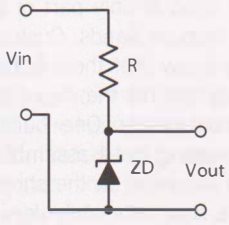
PHOTO 2: A 6.2V Zener and 1N4148 (or similar) in series – and in good thermal contact – cancel out each other's drift with temperature (see text).

I have four digital multimeters (DMMs) in the shack. Some of these are more than 10 years old and have seen a lot of abuse. For DC voltage measurements, all tend to agree to within 1%. The newest of these meters was checked against an AD584 precision voltage reference (see **Photo 1**). The test shows that the meter is within its specified accuracy of ±(0.5% + 3). The AD584 IC is a very useful device that is easily configured to produce outputs at 2.5, 5.0, 7.5 and 10.0V. Other voltages can be set using external resistors. You will probably find that the cheapest and easiest way to obtain an AD584 is to buy a complete voltage reference unit on eBay. Most sellers include a calibration sheet showing the exact output voltages as measured on their own lab-grade meter. The going rate for an assembled module is around £3, which compares rather favourably with £10, or sometimes considerably more, for the IC alone.

The AD584 datasheet [2] shows maximum output error of 0.3% for the 'J' version and 0.1% for the higher spec 'K' device. My 'AD584JH' device is well within specification with maximum error of less than 0.15% at any output voltage. The 5V output is particularly accurate at 4.9960V (0.08%).

The degree of accuracy required for a shack reference will depend on its intended application. As mentioned earlier, typical DMMs will hold to within 1% for several years. This degree of accuracy is very easily achieved using standard bandgap or Zener diode based references.

For critical applications like DMM calibration or for use as a precise reference for an analogue to digital converter (ADC), an accuracy of 0.1% will be good enough for most purposes. Higher accuracy is more difficult to maintain unless you can make frequent calibration checks against a known good standard.



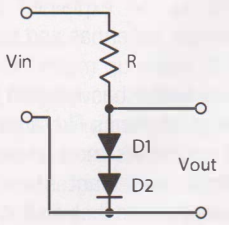


FIGURE 1: Simple shunt regulators based on a Zener diode (left) or forward-biased diodes (right).

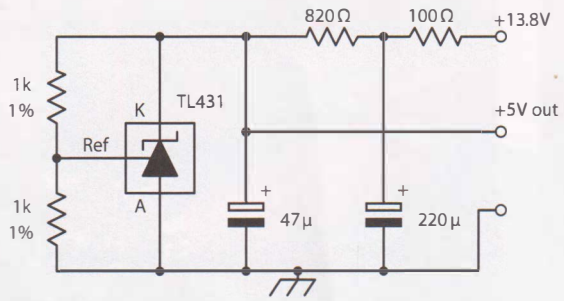


FIGURE 2: Precision +5V reference based on a TL431 adjustable shunt regulator. The two resistors on the left set the output voltage and should be chosen for 2.5V on the Ref pin.

Types of voltage reference

Figure 1 shows two of the most commonly used voltage reference circuits. Both are shunt type regulators, where the unregulated voltage is applied via a resistor or preferably from a constant-current source). The Zener diode regulator (left) is widely used in amateur radio designs. The alternative circuit (right) uses the forward voltage drop of approximately 0.6-0.7V across ordinary forward-biased diodes. This circuit is prone to voltage change caused by variations in temperature or diode current. This can be seen as a problem or a useful feature, depending on your particular application. A silicon diode junction shows a negative temperature coefficient (voltage reduces with increasing temperature). The voltage change is around -2mV per °C, or if you prefer, -2mV/K. The silicon diodes can be used as a temperature sensor. They are often used in the bias networks of high power amplifiers, to ensure accurate control of transistor bias over a wide temperature range.

[Another cheap and cheerful voltage reference is a LED, though they're relatively current-hungry and not necessarily the most stable. The voltage depends primarily on the colour [3], ranging from about 1.2 to 4V. It's a useful trick to remember if you need a rough and ready voltage reference *and* a power-on light! – Ed.]

Zener diodes

All diodes will 'break down' at some level of reverse bias voltage. Diodes that are classed as 'Zener' types will have a clearly defined and relatively low reverse breakdown voltage. There are two distinct types: Zener diodes, which break down at voltages below around 5V and avalanche diodes, which break down at higher voltages. Both types are generally described as Zener diodes, named after Clarence Melvin Zener [4].

Zener diodes show a negative temperature coefficient (NTC). Avalanche types show a positive temperature coefficient (PTC). At the crossover between modes, a Zener diode will have a TC close to zero. This is why many voltage stabiliser circuits use a 4.7, 5.1 or 5.6V Zener diode as a reference. A Zener regulator operating in this voltage range will tend to show good voltage stability over a wide temperature range.

Ordinary silicon diodes have a negative TC, which results in a voltage change of just over -2mV/K. A Zener diode with a breakdown voltage of around 6.2V will have a positive TC of approximately +2mV/K. If these two diodes are wired in series, voltage changes due to variations in temperature will be almost completely cancelled out. Photo 2 shows how a 6.2V Zener and a 1N4148 silicon diode can be soldered together to maintain close contact. This arrangement will ensure that both packages are at the same temperature. The gap between diodes can be filled with a blob of heatsink compound or silicone grease. This method of temperature compensation is used in some zero-TC type Zener diodes like the 1N829A.

A simple 5V reference

The TL431 is a simple shunt type voltage reference [5]. The device behaves like a programmable Zener diode. The internal voltage reference is a 2.5V bandgap type and the output voltage can be set for any value between 2.5 and 37V by using external resistors. Versions are available with voltage tolerance of 2%, 1% or 0.5%. The bandgap reference is based on the voltage difference between a pair of semiconductor junctions. This type of voltage reference is particularly easy to fabricate on an integrated circuit, because it can be implemented using only transistors and resistors.

The 5V reference circuit is shown in Figure 2. The circuit was built on a strip of PCB laminate. The circuit is very simple. The only critical components are the two 1k resistors in the voltage divider network. I used a pair of 1k, 1% tolerance metal-film types that were hand sorted to within 1Ω (0.1%) of each other using a DMM. In this instance, close matching is much more important than absolute value.

Output voltage is determined by R1/R2 ratio. A pair of 1.5k resistors would work just as well, once they were carefully matched. The other components in the circuit are not critical. The assembled reference is shown in Photo 3.

Testing

The measured output from the 5V reference was 4.98-4.99V, exactly the same as from the 5V output of the AD584 reference. To increase the resolution of my voltage measurements, I measured the potential across the outputs of the two 5V references using the 200mV range of my bench DMM. The measured difference was less than 0.1mV over several hours and never more than 0.2mV over several days. This is much better than expected performance from a low-cost reference IC. To create a more severe disturbance, I pinched the TL431 plastic package between my thumb and forefinger to cause a sharp change in temperature. This resulted in a 0.3mV change (0.006%). The output error returned to zero less than one minute after withdrawing my fingers from the package.

A 10V reference based on a Zener diode

Our next project is a 10V reference based on a temperature compensated Zener diode. This has been my DC calibration reference for several years.

The circuit uses a 6.2V Zener diode in series with a 1N4148 silicon diode as the main voltage reference. As mentioned earlier, the opposite TC of the two different types of diode should effectively cancel out any voltage variation due to changes in diode temperature. Zener diodes tend to be very stable over time, but standard types have fairly loose specifications for breakdown voltage. A 5% tolerance is typical for commonly available types. In practice, this means that a precision reference based on a Zener is difficult to calibrate, but will tend to remain relatively stable after calibration. My particular diode combination gives a drop of 0.7V across the 1N4148 and 6.1V across the Zener, for a total of 6.8V.

The schematic of the 10V reference is shown in Figure 3. The AD OP-07 is an ultra-low offset opamp. This device is used as a buffer amplifier, constant-current source for the Zener and a precision voltage amplifier to scale the 6.8V reference up to a more useful value of 10.00V. As the Zener

Eamon Skelton, EI9GQ
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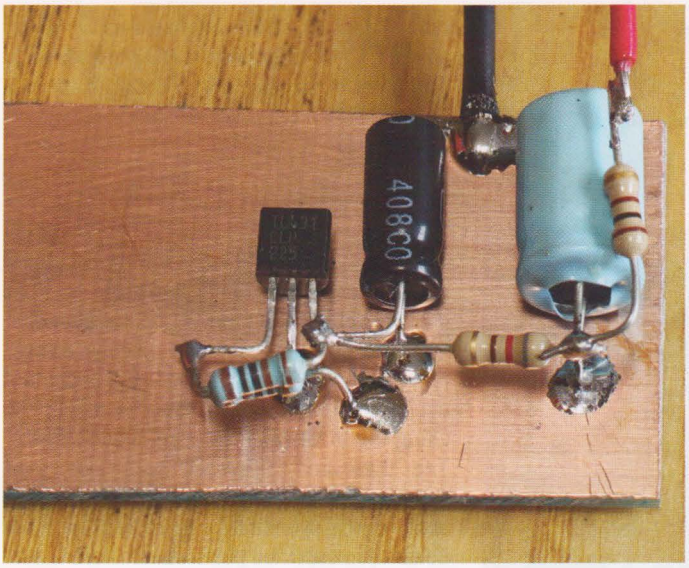

PHOTO 3: Precision +5V reference based on a TL431. The blue-ish colour 1k 1% resistors were hand-picked to be within 1Ω (0.1%) of each other.

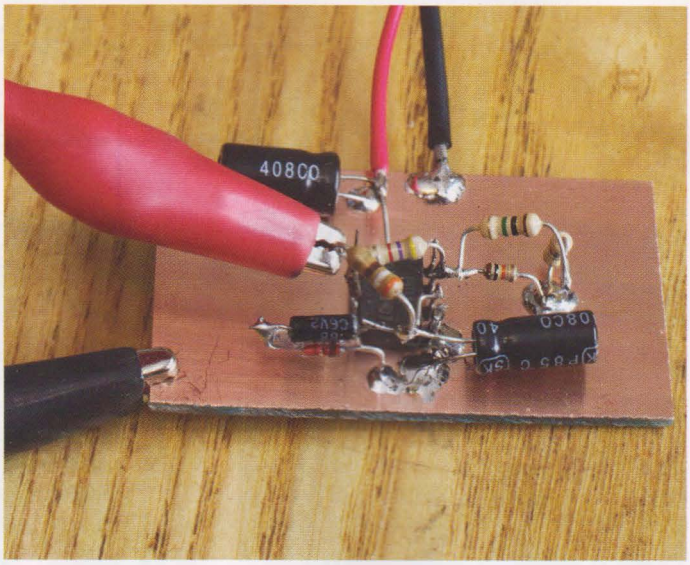

PHOTO 4: Prevision 10V reference based on a Zener and standard diode (foreground, left) and an OP-07 ultra-low offset opamp.

current is taken from a resistor connected to the stabilised 10V output, this circuit has excellent immunity from variations in the DC supply voltage.

Construction

The circuit was built dead-bug style on copper PCB laminate. The DIL IC is mounted upside down, with pin 4 (V-) soldered directly to the ground foil. The reference diode pair are closely bonded, as described earlier. The output voltage is determined by the resistors in the feedback network. Using the standard formula for a resistive potential divider, $6.8\times((4.7+10)\div10) = 9.996V$. In this case, it was possible to achieve the desired ratio using standard values of 4.7kΩ and 10kΩ. The resistors should be high stability metal film types. Close tolerance (1% or better) types are recommended. As an alternative, you may prefer to test and hand-pick 5% tolerance resistors to achieve the desired resistance ratio. The assembled 10V reference is shown in Photo 4.

It is relatively easy to provide for fine adjustment of the output voltage. Figure 4 shows how a potentiometer can be used trim the output voltage. The pot should be a high quality multi-turn type. As an alternative, high value resistors (typically several MΩ) can be placed in parallel with one of the fixed resistors. This can be done empirically using a voltmeter and a handful of resistors, or you can calculate the values required based on measurement of the initial output voltage. Using fixed resistors for fine calibration is a slightly tedious job, but this option is likely to result in a more stable and reliable circuit.

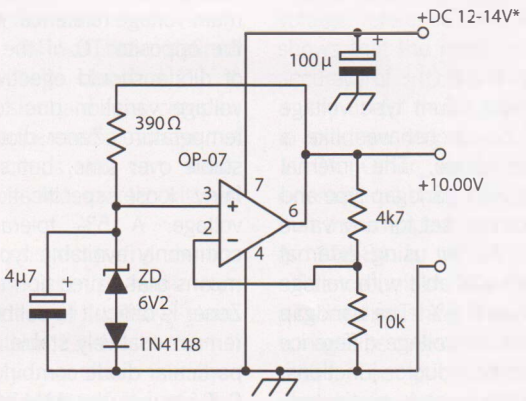

FIGURE 3: Precision 10V reference based on the series diode combination shown in Photo 2. See text and Figure 4 (below) for output trimming information

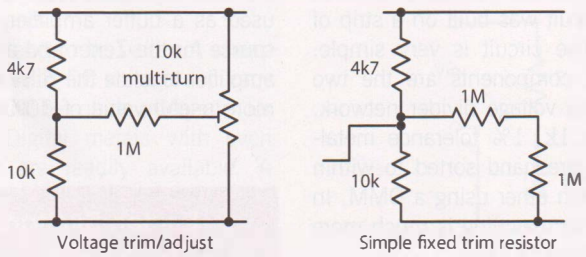

FIGURE 4: Methods of fine-trimming the 10V reference output voltage.

Testing

The 10V reference was tested against the 10V (9.9895) output of the AD584. It is currently sitting at +2.2mV, which suggests an actual output of 9.9917V.

The voltage reference can be used in combination with a handful of 1% (or better) tolerance resistors to check the calibration of the DC current ranges of your multimeter. Simply place the resistor in series with the meter leads. For example: a 10k resistor will draw 1mA from the 10V reference, 100k = 100µA and so on.

Next month: time and frequency.

Websearch

[1] http://nvlpubs.nist.gov/nistpubs/sp958-lide/315-318.pdf
[2] AD584 datasheet – www.analog.com/media/en/technical-documentation/data-sheets/AD584.pdf
[3] http://i.stack.imgur.com/zpoOM.png
[4] https://en.wikipedia.org/wiki/Clarence_Zener
[5] https://www.fairchildsemi.com/datasheets/TL/TL431.pdf

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Restoring Old Radio Sets

By Philip Lawson, G4FCL

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

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

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RSGB Convention 2016

There's an absolutley packed programme of lectures, forums and workshops for this year's delegates. Whether you are interested in construction, technology, HF or the higher bands, there will be something to interest you.

The Convention is, once again, sponsored by Martin Lynch & Sons, whom the RSGB would like to thank for their continued support. It will take place at the Kents Hill Park Training & Conference Centre, Timbold Drive, Milton Keynes MK7 6BZ. The Centre is well signposted from the A421. We will be using five large lecture rooms as well as various side rooms for exams, workshops and forums, including two social areas where you will find special interest groups, the display from ML&S, the RSGB bookstall and displays from Icom, Kenwood and Yaesu. We are pleased to welcome the ladies from the International YL Convention increasing the number of overseas visitors.

Glen, WOGJ, one of last year's lucky winners in the raffle receiving his prize from John Turner, GOKFO (Icom UK).

Lectures

The programme is shown on page 25 and the RSGB website contains more detailed descriptions of the lectures at www.rsgb.org/convention. There's only space to mention a few of the highlights – check out the website for all the other details – as there are around 50 different talks taking place over the weekend.

The time to socialise with fellow amateurs.

One of the big DX talks is on the VP8SGI and VP8STI DXpedition. Mike McGirr, K9AJ was an operator and the team physician on the Intrepid DX Group DXpedition to the remote British territories of South Georgia and the South Sandwich Islands earlier this year. He will describe the challenges, hardships and problems they faced and the experience of operating round-the-clock from some of the wildest parts of the planet in order to make around 140,000 contacts.

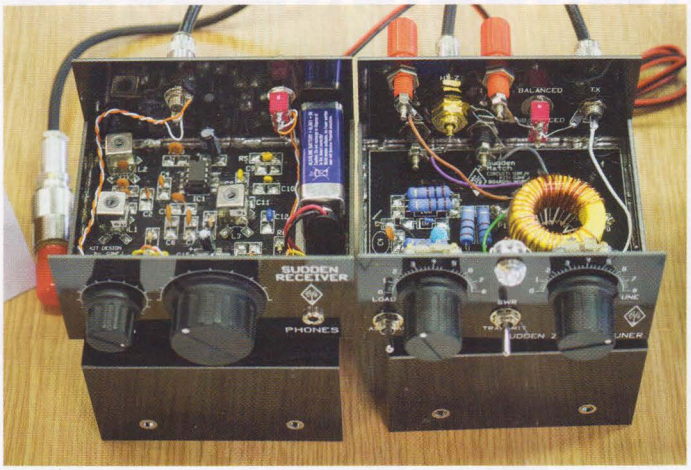
If you are interested in the higher bands, then Professor Alywn Seeds, G8DOH will be discussing what to look for when choosing a VHF/UHF radio. There is a wide choice of radios for the VHF and UHF bands – integrated transceivers, transverters with HF transceivers and SDRs. Adverts describe the operating features available but can give little idea of how effective the radio will be in your station. G8DOH will describe the requirements for a high performance radio and give some suggestions on what to look for when making your choice with measured performance data on some very good and very bad VHF/UHF radios.

We are delighted that the founder of FlexRadio Systems, Gerald Youngblood, K5SDR will be joining us with an insight into the workings of Software Designed Radio.

If you followed Tim Peake on the International Space Station story earlier this year, then you will be aware that 10 schools had the opportunity to speak to him, using amateur radio. Several of the contacts were covered by many of the news channels as well as national and local newspapers. We have two talks about this from those involved. Graham, G3VZV and Noel, G8GTZ will talk about the technical aspects of making these contacts a reality, then Ciaran, MOTXD, Heather Parsons and Susan Buckle from the UK Space Agency will look at how this work has inspired a new generation in science, technology, engineering and maths.

Large lecture rooms with plenty of space and audio/visual facilities.

www.rsgb.org/convention



Don't forget to enter the annual RSGB Construction Competition.

Learn to solder surface mount components at the workshop on the 8th.

Dave Powis, G4HUP will be presenting a new SMD project aimed at beginners in this technology, and potentially with applications across all radio users. The presentation will introduce and explain the project, as well as the techniques and tools needed to construct it. This will be followed during the day by a number of workshop sessions with full construction support. Registration details for the workshop sessions is at http://huprf.com/huprf/smd-workshops-2016/

If you are interested in antennas there are talks on where to put your HF antenna to work DX and contests as well as imrpoving your VHF and HF antennas. Then we have lectures on different elements of home construction, how oscillators and transverters work and experiments using the Raspberry Pi and Red Pitaya.

Exams

Both UK and US exams may be taken at the Convention. The Foundation and Intermediate exam will take place on Saturday and the Advanced on Sunday. Places must have been pre-booked (exams@rsgb.org.uk) and are not available 'on the day'. The cutoff date for Foundation and Intermediate exams is 23 September (the cutoff for Advanced exams has already passed). Please note the practical element of the Foundation and Intermediate exam must have been completed and signed off before the Convention.

US exams are available on Sunday from 1pm, please reserve your space with Martin, G3ZAY via email to g3zay@btinternet.com.

The RSGB would like to thank the volunteers that are involved with invigilation and facilitating these exams.

The social scene

On Friday evening, the ML&S Buffet takes place. It is a pre-booked ticket-only event with entertainment before and during the early part of the buffet provided by close-up magician Steve Dean – a great favourite of regular Convention delegates. In the bar we have Blacksheep and Charles Wells Bombadier real ale on tap and the bar is open from 5.30pm on both Friday and Saturday evening. During the day there is a bottle bar with light 'tuck shop' snacks available in the social area along with tea and coffee during the breaks between lectures. Lunch tickets are available from Kents Hill on the day (£10 for a two course lunch) and these tickets must be purchased by 11am each day.

On Saturday it is the Gala Dinner where the after dinner speaker will be Libby Jackson, the Astronaut Flight Education Programme Manager at the UK Space Agency. The RSGB and the Amateur Radio on the International Space Station (ARISS) UK team worked closely with Libby and her UK Space Agency colleagues for the ten amateur radio school contacts with Tim Peake when he was on board the ISS. Libby has had a life-long interest in human spaceflight and first dreamt of a career in this when she was 17, following a placement that included shadowing a flight director at NASA's Johnson Space Centre in Houston, Texas. The Gala Dinner is also a pre-booked ticket-only event.

Buildathon

The Convention Buildathon will provide attendees with the opportunity to build a 40m transceiver based on a popular Kanga UK design. The construction is simple and will not pose any difficulties even to the novice kit constructor. The filter contains three toriods that will require winding, but this is not as challenging as people might believe. There will be volunteers available to help with this part of the build. The kit will also include an additional improvement, the K16 Winkeyer IC, that will enable full keyer capability and, when programmed as per the instruction manual, will allow QRSS operation. The basic build should be completed in a half-day session, leaving plenty of time to enjoy the rest of the Convention attractions. Please note that participation in the Buildathon is charged at £29.95, which does not include the cost of admission to the Convention but does include use of all the equipment required and the 40m transceiver kit. You can book this via the RSGB website at www.rsgb.org/convention

Trophy presentations

The main VHF and HF contest trophies will be presented on Sunday the 9th and this is in addition of Contest Forums at the end of the day. The winners of the prestigious G5RP and ROTAB trophies will be announced by the RSGB President, Nick Henwood, G3RWF.

Construction competition

This year the competition is being sponsored by Martin Lynch & Sons with prizes of £50 of vouchers for each category winner and £100 for the winner of the prestigious Pat Hawker, G3VA Trophy that will be awarded to the best overall entry. See the RSGB website for full details of the various categories.

Tickets

Tickets are still available online and those attract a discount over the ones bought on the door (in advance £15 Saturday, £10 Sunday and £20 weekend). On the door these tickets will cost £20 Saturday, £15 Sunday or £25 for the weekend.

This year, those under 21 can attend the Convention free of charge but those under 16 must be accompanied by a responsible adult.

Raffle

We have excellent raffle prizes this year – an IC-7300 (reviewed in the August *RadCom*) from Icom UK, TH-F7E handheld from Kenwood and FT-817 from Yaesu UK. Tickets will be on sale throughout the weekend trom the usual range of enthusiastic sellers! The RSGB would like to thank Icom, Kenwood & Yaesu for their generous donations. The raffle is in aid of the RSGB DX Fund, details of which are on the RSGB website.

The radio... YAESU

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Specifications subject to change without notice. Some accessories and/or options may only be standard in some areas. Check with your local Yaesu Dealer for specific details.

Saturday 8th October

Provisional Programme

Lecture Room 1 (G38, G35 & G34)	Lecture Room 2 (N129 & N130)	Lecture Room 3 (N121a & N123)	Lecture Room 4 (N132 & N134)	Lecture Room 5 (N138 & N141)
Official Opening Nick Henwood G3RWF RSGB President **9.00 - 9.10**				
The VP8SGI & VP8STI DXpeditions Mike McGirr K9AJ **9.10 - 10.00**	Advances in amateur television Noel Matthews G8GTZ **9.30 - 10.15**	The aurora - an introduction Paul Whiting G4YQC **9.15 - 10.00**	Surface mount devices Dave Powis G4HUP **9.45 - 10.30**	This is how oscillators work Paul Brooking G4SHH **9.30 - 10.15**
COFFEE	COFFEE	COFFEE	COFFEE	COFFEE
I have a lizard living in my wardrobe the TX7EU Marquesas Island trip Tom Wylie GM4FDM **10.30-11.15**	The new world of amateur satellites Graham Shirville G3VZV **10.45 - 11.30**	Diagnosing & Reporting RFI problems John Rogers M0JAV **10.30 - 11.15**	Try ARDF Bob Titterington G3ORF **11.00 - 11.45**	From two element beams to quad antennas Mike Parkin G0JMI **10.45 - 11.30**
The IOTA Challenge from Sub-Antarctic Waters to High Arctic Cezar Trifu, VE3LYC **11.30 - 12.15**	Making the most of six metres during the downward cycle Peter Bacon G3ZSS **11.45 - 12.30**	How to get your homebrew project up & running, using test equip. you didn't know you had Simon Lloyd Hughes GW0NVN **11.30 - 12.15**	Try amateur satellites Peter Goodhall 2E0SQL **12.00 - 12.45**	SDR with knobs on! John Linford G3WGV **11.45 - 12.30**
LUNCH	LUNCH	LUNCH	LUNCH	LUNCH
FT4JA Dxpedition of Juan de Nova Island Jacques Saget F6BEE **13.30 - 14.15**	What to look for when choosing a VHF/UHF radio Prof Alwyn Seeds G8DOH **13:45 - 14:30**	The Story of SDR and FlexRadio Gerald Youngblood, K5SDR **13.30 - 14.15**	80th Commonwealth Contest (BERU) celebrations Iain M0PCB & Bob G3PJT **13.45 - 14.30**	HF NVIS propagation: Findings associated with the 5MHz experiment Dr Marcus Walden G0IJZ **13.45 - 14.30**
Contesting from VY2ZM on Prince Edward island Jeff Briggs K1ZM **14.30 - 15.15**	Best practice for VHF UHF DX Ian White GM3SEK **14:45 - 15:30**	Inspiring the next STEM generation 10 amateur radio contacts with Tim Peake Ciaran Morgan M0TXD & Susan Buckle UKSA **14.30 - 15.15**	What If? Controlled receiver bandwidth Dr Paul Darlington M0XPD **14.45 - 15.30**	**14.45 - 15.30**
Tea	Tea	Tea	Tea	Tea
DX fun without spending loads of money! Nick Henwood G3RWF **15.45 - 16.30**	Antennas Justin Johnson G0KSC **16:00 - 16:45**	Making the Tim Peake contacts a reality Graham Shrville & Noel Matthews **15.45 - 16.30**	The secret life of the transverter Sam Jewell G4DDK **16.00 - 16.45**	The Cambridge Remote Station project Michael Wells G7VJR & Bob Whelan G3PJT **16.00 - 16.45**
Raspberry Pi & Red Pitaya Mike Richards G4WNC **16.45 - 17.30**	The rise & rise of 5.7GHz EME Peter Blair G3LTF **17.00 - 17.45**	Developments in IOTA, update on electronic QSLing and the future G3KMA, VE3LYC and PA3EXX **16.45 - 17.30**	Training and Education Open Forum Philip Willis, G4FCL **17.00 - 18.30**	HF directional multiband antennas Justin Johnson G0KSC **17.00 - 17.45**

Other Saturday Activities

RSGB Construction Competition Display ***Lecture Room 6 (N143)*** **9.15 - 15.00**	Prize Presentation RSGB annual construction competition ***Lecture Room 6 (N143)*** **15.00 - 15.15**	All Day surface mount workshop Dave Powis, G4HUP ***Lecture Room 6 (N143)*** **11.00 - 15.00**	Convention Buildathon Steve Hartley G0FUW ***Room N118*** 13.00 - 17.00	UK Examinations ***Room N113*** 13.00- 15.00

Sunday 9th October

Lecture Room 1 (G38, G35 & G34)	Lecture Room 2 (N129 & N130)	Lecture Room 3 (N121a & N123)	Lecture Room 4 (N132 & N134)	Lecture Room 5 (N138 & N141)
	Results of RSGB Amateur Radio Survey John Gould, G3WKL **9.15 - 10.00**	Where shall I put my HF antenna to work DX and contests? David Aslin G3WGN **9.15 - 10.00**	Remote station operation using microwave links John Regnault, G4SWX **9.30 - 10.15**	FT4JA Dxpedition to Juan de Noz Island Jaques Saget F6BEE **9.30 -10.15**
HF Awards Presentation **9.30-10.15**	COFFEE	COFFEE	COFFEE	COFFEE
COFFEE	The VP8SGI & VP8STI DXpeditions Mike McGirr K9AJ **10.30 - 11.15**	Try moving up to 1.3GHz John Worsnop G4BAO **10.30 - 11.15**	Polarisation of 50MHz signals Chris Deacon G4IFX **10.45 - 11.30**	QRP on a shoestring Dave Sergeant G3YMC **10.45 - 11.30**
VHF Awards Presentation **10.45-11.30**	The GB2RS propagation report Steve Nichols G0KYA **11.30-12.15**	World QSL Archive & Club Log Michael Wells G7VJR & Marios 5B4WN **11.30 - 12.15**	Simple 5.7GHz equipment & operating/P in the SHF UK Activity Contests Dave Yorke **11.45 - 12.30**	Being the DX, QRP Dominic Baines M1KTA **11.45 - 12.30**
BYLARA its history and looking ahead Carol Hodges 2E1RBH **11.45 - 12.30**	LUNCH	LUNCH	LUNCH	LUNCH
LUNCH	Raspberry Pi & Red Pitaya Drop in workshop Mike Richards G4WNC **13.00 - 15.15**	Space Weather Prof. Catherine Mitchell **13.30 - 14.15**	VHF DXing (including EME) from an urban location Paul Whatton G4DCV **13.30 - 14.15**	Home design, construction & finishing Bob Burns G3OOU **13.30 - 14.15**
VHF Contest Forum **13.30to 14.15**		Try restoring old radio sets Philip Lawson G4FCL **13.30 - 14.15**	Maritime mobile on VHF Reg Wooley G8VHI **14.30 - 15.15**	The Story of SDR and FlexRadio Gerald Youngblood, K5SDR **14.30 - 15.15**
HF Contest Forum **14.30 to 15.15**				

Raffle
15.30 -16.00

Other Saturday Activities

10am UK Examinations
Room N113
1pm US Examinations
Room N113

Modulation / demodulation

software radio

This detailed article covers making your own IF software defined radio setup from an existing transceiver, an introduction to MDSR V3.1, the Scanning RF-Seismograph V1.4 and plans to monitor the 2017 US total eclipse of the sun. It is based on a White Paper submitted by the author to the TAPR/ARRL digital communications conference, 16-18 September 2016, and the unedited original Paper appears in the Proceedings of that event. Versions of this article are also expected to appear in *QST*, *TCA* and possibly other journals in due course.

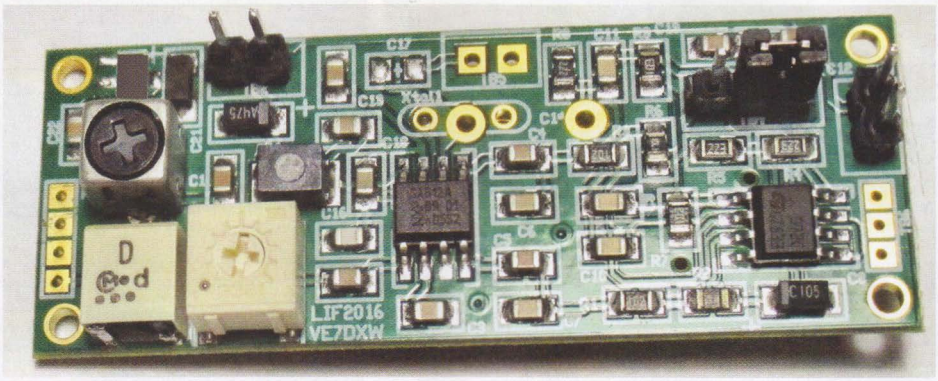

PHOTO 1: The LIF-2016 SMD PCB. The local oscillator crystal is on the solder side of the board.

Why MDSR and the LIF (BiLIF)?

The weakest link on the SDR development front is the unavailability of high speed (RF) analogue to digital converters with 20 or more bits. By only being able to use 16-bit (or lower) converters, the reception is severely limited by the noise floor of the analogue to digital conversion process. In the worst case, the lack of dynamic range masks all the weak signals on a band.

Today's analogue receivers have excellent dynamic range. Even lower-end analogue radios will have a dynamic range of 80dB or more at a very affordable price. Transceivers built before 2000 are very nice to operate; they are great workhorses and get the job done. A lot of hams love their old rigs and would keep them if were it not for all the new modes or the 'bells and whistles' that the new radios offer.

The Modulation Demodulation Software Radio (MDSR) system allows these old, perfectly functional rigs to get a second lease of life as SDR-powered radios. The Low IF (LIF) concept uses the 455kHz IF and down-converts it to 12kHz where it can be processed by a PC sound card. Once it is digitised, the DSP engine of the MDSR software can provide sharp IF filters, notch filters and a whole range of neat SDR-like features that most analogue rigs lack. The MDSR software also adds a real-time spectrum analyser for fast tuning and a remote control feature that is easy to set up and to use. A BiLIF converter PCB is not expensive and even allowing for the time spent to connect the transceiver and the computer together, the MDSR system outperforms any similar price SDR available on the market today. Combined with a 24-bit sound card, which has a dynamic range of about 120dB, the receiver opens up a whole new world of reception.

The BiLIF [1] is a bi directional version of the LIF board that permits SDR transmission as well as reception. It is described in more detail later.

Connectability

The MDSR system can be set up to use two sound cards. One high end 24-bit sound card can be used to do the IF demodulation and a lower quality 16-bit (onboard) sound card can be used for decoding baseband digital systems such as WSPR, JT-65 and JT-9.

The MDSR setup is a free program. It also includes fldigi with its extensive choice of digital modes. Programs in the MDSR suite include

- *MDSR*, which provides the graphic user interface that controls the transceiver via the OmniRig CAT translator and the DSP engine for audio processing
- *MDSR-SA*, which provides a fast spectrum analyser, the OmniRig setup utility and preset frequency banks
- *PM Manager*, the Profile Manger, a backup utility that also stores profiles for different setups such as digital setup or analogue setup. It can also be used to store profiles to control different transceivers. Once a profile is established it can easily be recalled.
- *OmniRig*, which translates the CAT protocols of over 100 different radio makes and models so that MDSR can remote control them
- *fldigi*: developed by Dave, W1HKJ for modulating and de-modulating a vast variety of digital baseband audio modes.
- *Videolan VLC*, for recording and playing audio, and streaming audio during remote operations
- *Dream V1.1*: DRM demodulator for digital DRM shortwave radio reception
- *Java SA*, an amplitude-correcting real time spectrum analyser that uses band noise to calibrate the filter response curve for a flat spectral display without filter flanks
- *Scanning RF-Seismograph*, for RX long term monitoring up to six bands. It can be engaged to monitor passively while the user is not at the station.

Documentation and user help

The MDSR development is well documented and accessible to everybody. All the documentation on our website [2] is free and can be used for any amateur radio purpose. Each program has its own easy to follow PDF help file for reference.

For issues that cannot be resolved by the user, MDSR has a Yahoo user group [3] and online knowledge base that can be searched for answers.

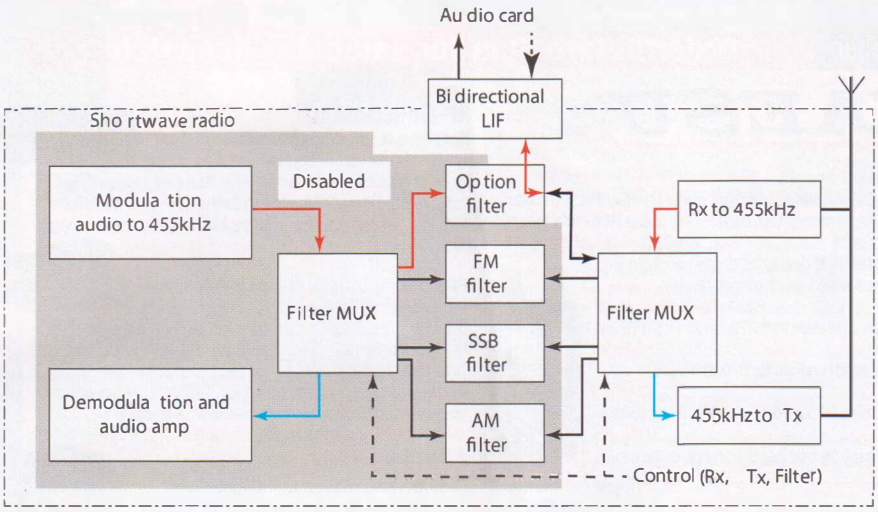

FIGURE 1: Block diagram of the Bidirectional Low IF SDR system.

LIF (BiLIF) and MDSR overview

The LIF concept utilises an existing transceiver and extends the option filter port via a converter so that its signal can be processed by a sound card. Figure 1 shows a block diagram of the system.

By processing the 12kHz IF and not baseband audio, the MDSR software can perform a lot of the functions that most transceivers lack. As a second connection, a computer control (CAT) cable is required to allow control of all functions of the host transceiver via the MDSR software. Thus, MDSR so completely controls the transceiver that it can be out of reach while operating.

The MDSR software puts any analogue RIG on 'steroids' without changing the way the connected radio works. The modifications to the transceiver are minimally invasive – in most cases even reversible – allowing it to change from MDSR to stand-alone operation in minutes.

The most important tools for tuning in weak signals are a real-time spectrum analyser and on-screen IF-DSP filters that eliminate even severe interference. The MDSR offers both – and 2 notch filters in addition.

The LIF-2016 SMD PCB (RX only)

The original LIF used through-hole components but is now available as a (mostly) SMD preassembled board as this was the next step in making the MDSR development appeal to more amateur radio operators.

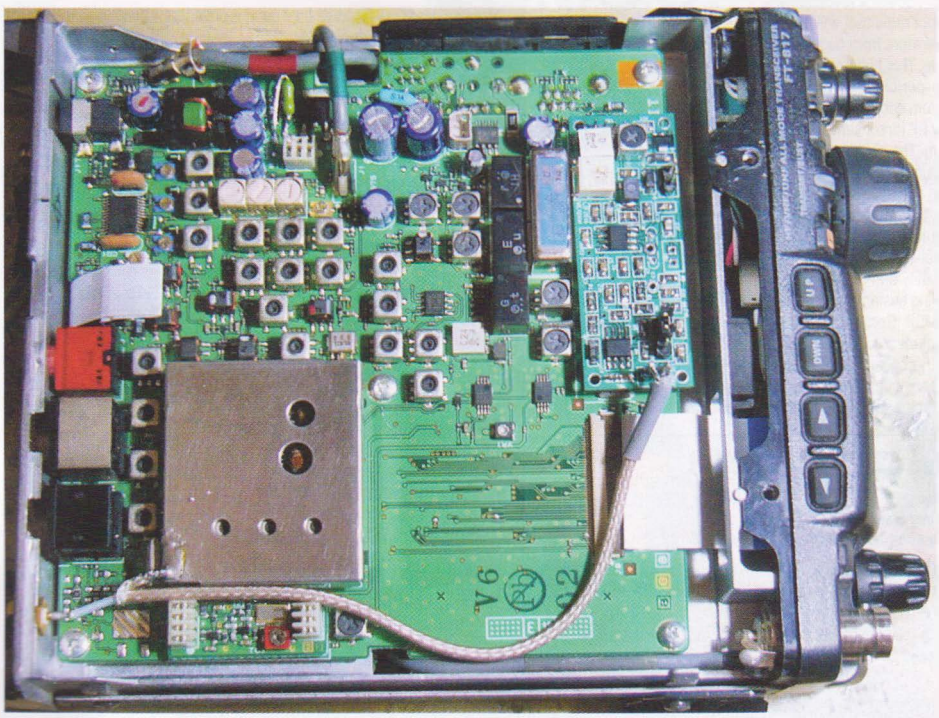

PHOTO 2: LIF-2016 SMD installed in a Yaesu FT-817 in place of a YF-122 option filter. The coax connects the 12kHz IF output to a socket added to the rear panel.

The LIF-2016 PCB is shown in **Photo 1**. The design consists of two layers, and has over 95% ground plane coverage. The down-converter hardware is small enough to fit into most transceivers internally. It is actually pin-compatible with the YF-122 crystal filter that fits into the option filter space of many Yaesu transceivers. Modifying the radios for MDSR becomes now a very neat and fast endeavour.

LIF-2016 block diagram and pinout

The schematics of the LIF have not changed from its earlier versions because it has proven, excellent performance. Details can be found at [2]. Its frequency stability and signal purity make receiving JT-65 and JT-9 signals a breeze. **Figure 2** shows the pinout and adjustment points.

If the unit is placed in a transceiver designed to take a YF-122 option filter, the pin header of the radio fits easily into the left and right PCB holes and slides down for a snug fit. For other receivers, the IF connection has to be made with a jumper. The +12V supply has to be picked off from a suitable spot inside the enclosure. **Photo 2** and **Photo 3** show typical installations.

The LIF-2016 has all the components to allow for a line level input of a 16- or 24-bit soundcard. There is also an additional 7kHz high-pass filter that can be selected. It is set on by default. Its purpose is to protect the soundcard from low frequency rumble that can overload the ADC circuit (and <7kHz is generally not that useful in a 12kHz IF).

Detailed documentation on the MDSR website presently covers installation into eight transceivers: Icom IC-703, IC-7000, IC-756, Yaesu FT-817, FT-857, FT-897, TF-950 and the Kenwood TS-2000. There are also instructions for a couple of receivers. There is further information in the support group for the IC-753, IC-746, IC-706 mk II, FT-736 and TS-870. Many of the principles described are broadly applicable to other radios, and versions of the LIF are available to support 450/455kHz and 9MHz radios.

The LIF2016 makes the conversion of an analogue radio very simple. All that is required is the installation of a LIF port as per instructions. The additional CAT control cable is controlled by OmniRig. OmniRig translates each CAT control command so they can be read by over 100 different transceivers, scanners and receivers. This makes MDSR very versatile and flexible as a as a computer controlled radio interface, with the additional benefits of digital signal processing via the LIF interface.

Using this method, radios can be upgraded

Alex Schwarz, VE7DXW
alexschwarz@telus.net

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HF Transceivers

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FT-817ND The world's first self-contained, battery-powered, Multi-mode Portable Transceiver covering the HF, VHF, and UHF bands. Providing up to five watts of power output, the FT-817 is designed for operation on the 160-10 meter HF bands, plus the 6 metre, 2 metre, and 70 cm bands. Whether your preferred operating mode is SSB, CW, AM, FM, Packet, or SSB-based Digital modes like PSK31, the FT-817 is ready to join you on your next hiking, camping, or search-and-rescue adventure! **Now just £439.00** Plus an extra **£40 Cash Back** from Yaesu making this rig **just £399.00!**

FT-8570 is the world's smallest HF/VHF/UHF mobile transceiver and provides base station-type performance from an ultra-compact package that's ideal for mobile or external battery portable a work **Now just £629.00**

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Handhelds

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Mobiles

IC-2730E VHF/UHF Dual Band Mobile Transceiver **£269.00**

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. An independent tuning knob, separate controller and large display makes it ideal for easy, intuitive mobile operation

ID-5100 Dual Band D-Star Mobile Transceiver **Great value at £499.00!**

Icom's new ID-5100E VHF/UHF dual band D-STAR digital mobile transceiver enhances core features found in the celebrated IC-2820H mobile and incorporates the user-friendly technology found in the IC-7100. The radio features a large responsive touch screen and also integrated GPS, optional Bluetooth connectivity and support for Android devices.

ICOM

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The ICOM IC-7300 has landed HF/ 6 & 4m Transceiver **at just £1049.95**

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. The IC-7300's real-time spectrum scope provides top-level performance in resolution, sweep speed and dynamic range. While listening to received audio, the operator can check the real-time spectrum scope and quickly move to the intended signal. The combination of the real-time spectrum scope and waterfall function improves the quality and efficiency of HF operation. The new RF direct sampling system employed by the IC-7300 realises class leading RMDR (Reciprocal Mixing Dynamic Range) and Phase Noise characteristics. In addition, the IC-7300 features the 70MHz band (European versions only), a large touch screen colour TFT LCD, convenient multi-function dial knob, automatic antenna tuner, voice recorder function and more.

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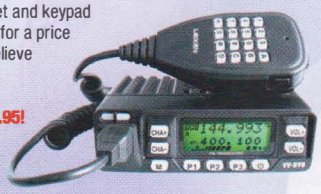

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to SDR at quite low cost. The MDSR software is free and the LIF-2016 is US$50 [4]. The LIF and the BiLiF are also available online.

The RF-Seismograph

The origin of this idea has several starting points. I used to have a weather station that was connected to Weather Underground [5]. This is a brilliant concept that uses private weather stations linked via the internet to display the weather readings all over the world. This concept is efficient and very cost effective. It shares the information and makes it accessible to everyone. Everyone benefits from it and it is free. In a future release of the Seismograph the user will be able to upload an image of the propagation display to our or their own website and share their data with others.

The solar flux graph that is shared over the internet is also a neat way to determine how good propagation will be. Unfortunately there is not a lot of variation throughout the world when we correct the intensity depending on radiation angle. It is a bit like taking the average temperature of the Earth and then stating: "It is 4°C in Miami, Florida". As matter of fact, it is 4°C everywhere else on the planet, too.

Another interesting model is the D-Region Absorption prediction. It takes the amount of the solar flux and the angle of radiation into account. It is a negative indicator that shows which areas and bands cannot be reached during high solar activity. This model makes the assumption that the D-Layer is uniform. It also neglects the fact that when solar radiation hits the D-Layer at a shallow angle (sunrise and sunset) the energy exchange into the D-Layer is stronger.

There are a large number of indices that can help to determine where an HF signal is supposed to end up and why it goes there. Most of them are based on solar activity. But where does the propagation come from in the absence of the Sun, low solar flux or during a solar eclipse? What other phenomena can poke holes in the D-Layer and provide impressive DX coverage for short wave bands?

There is always propagation, but it changes. If someone says: "The conditions are terrible!" they should perhaps instead say, "The bands have shifted – I wonder which ones are open now?" In a moment we will explore that question, but there is something else to address beforehand.

Eliminating local noise sources

Measuring noise in the environment that surrounds the station is the first task of setting up an RF propagation monitor. One of the biggest contributors of RF noise is the flat-screen TV, particularly plasma sets.

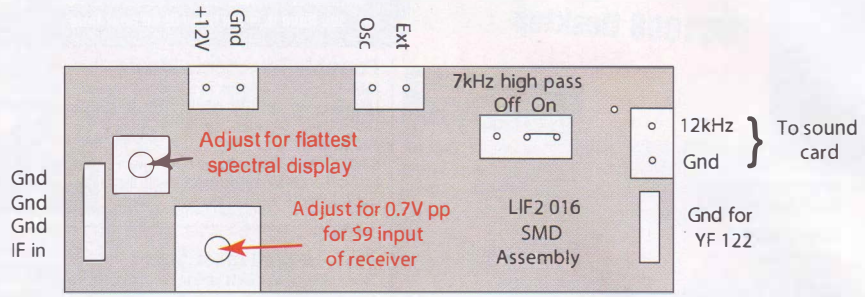


FIGURE 2: Pinout and adjustment points of the LIF-2016 SMD PCB (compare with Photo 1).

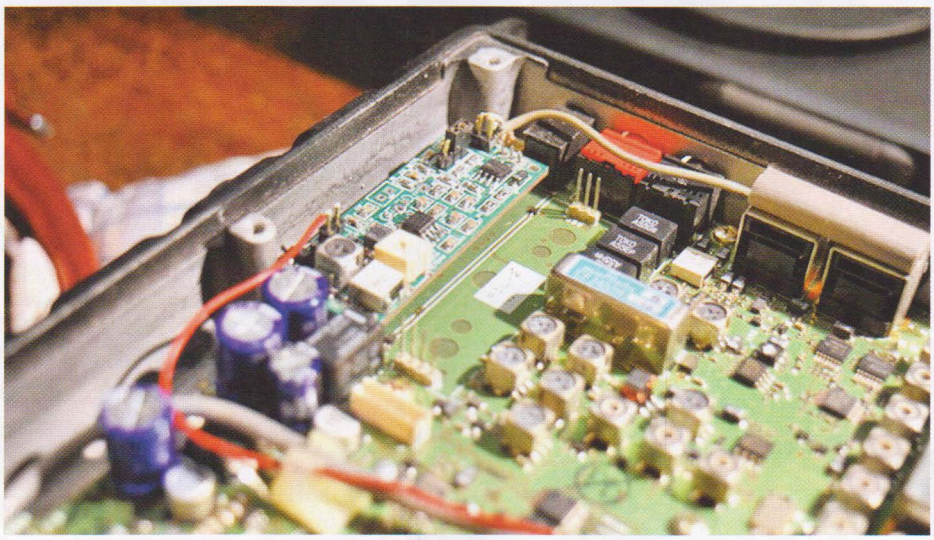


PHOTO 3: Installation of a LIF-2016 SMD PCB in a Yaesu FT-897D.

[Other general advice about interference can be found at [6] – Ed]. By monitoring the time noise occurs and vanishes one can often pinpoint the location of offending units. **Figure 3** shows the interference caused by a particular TV at the author's location. Remedies include an AC RF-line filter and choke cores on the antenna input.

Other noise sources can include fluorescent lighting, poorly-designed LED lamps with insufficient suppression, switch mode PSUs in general (particularly, cheap phone chargers) and electric motors. Electric motors can be cleaned up by putting an RF line filter in series with the AC power cord. But there are many man-made noise sources that are very hard to get rid of. However, by doing this initial work, one can improve DX reception dramatically. Lowering the noise floor is the best antenna upgrade, because noise hides all the weak signals.

The single-channel RF-Seismograph confirms the standard model

X-Ray solar flux hits the ionosphere and causes vibrations in the D-Layer. These changes can be measured and monitored with the single channel RF-Seismograph. In matter of fact the Solar Flux graph on the NOAA website even corroborates the measurement and the time.

But here the similarities end. Whereas the solar flux indicates a sharp spike, the local measurement is quite different. For example, at 7am local time on 14 April the sun is very low in the sky. The solar radiation hits the D-Layer at a very shallow angle. This lengthens the path and the time the radiation energy has to excite the local D-Layer. More energy is transferred into the ionosphere. In the graph of **Figure 4**, at 6.50am the noise level goes up, spikes, and, after 20 minutes, drops to a level still higher than the noise level before. It stays there for about an hour, drops abruptly again just above the regular noise level and then sits there for another hour. Another short spike and then the noise level returns to normal.

Follow the grey line

A good strategy for finding propagation is following the grey line between day and night. It means to operate DX during the morning and the early evening hours. This works especially well on 40 and 20m; making worldwide contacts is not unusual.

Figure 5 shows exactly that behaviour. At about 4.30am local time on that day the band started to open and stations from the Far East and Australia started to come in. At 6.30am the JT65 frequency is packed with DX stations. At 7.15am the rest of the

continent wakes up and the frequency is jammed with North American stations.

The opening at 3.30am is also interesting; is it a sleepless local Ham?

What happens to propagation when the Sun 'flatlines'?

This present solar cycle has been very unusual. Even before the peak in 2014/15 we saw a long period of very low solar flux. When the Sun finally took off, it only lasted for about one year and now it has basically flat-lined again! These are frustrating times for an amateur operator – or are they? If X-Ray flux is the only contributor to propagation, right now, the bands should be dead. But they are not, so what is happening?

Bands still open up but at different times and in unexpected ways. We have to re-learn how propagation redistributes RF energy, and change our operating times and methods.

In order to do this we need a receiver that monitors the local RF conditions 24/7, like a weather station that monitors air pressure and temperature, or a seismograph that records RF signals instead of tremors. It needs to do this over a very long time (≥ 6h), and it must scan all frequencies of interest. This is where the 'Scanning RF-Seismograph' comes in.

Changing old habits

To be more successful in finding RF propagation, our operating procedures and setup have to change. The antenna system needs to be hardened against lightning and static discharges, and the operator has to be comfortable leaving the station running and connected to the antenna at all times, even when he is not present. It is too late to turn on a seismograph after the earthquake, and since we cannot predict the time when an event will occur, it has to be on at all times.

The Scanning RF-Seismograph – spectrum analyser V1.4

Why use a Scanning RF-Seismograph? Noise sources do not create noise that is evenly distributed through the radio spectrum. Neither do radio operators stick to only one frequency or band. With the 6-channel scanner and RF level recorder it is possible to record six different frequencies of interest. This is almost like having six radios receiving at one time. It will do that even while the operator is busy with other chores.

Java spectrum analyser and Scanning RF-Seismograph V1.4

The scanning RF-Seismograph is the latest release in the development program of the MDSR group. The main screen is shown in **Figure 6**.

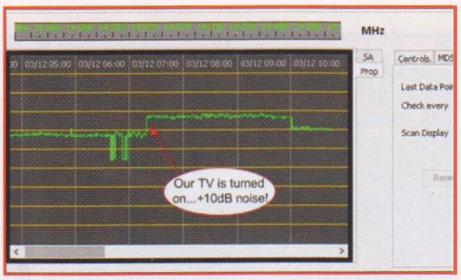


FIGURE 3: Even turning on your own TV can lead to a significant increase in local noise.

The computer interface separates the scanner setup from the display. All the functionality of the amplitude-correcting spectrum analyser is still there, but hidden in this window display. Full details of how to install and set up this program are on the MDSR website [2], where you will also find a PDF help document. You may also find it useful to join the MDSRadio Yahoo user group [3].

Using the Scanning RF-Seismograph – or, 'how to find propagation'

The setup of the is very simple, because it offers easy to use presets for the frequencies most amateurs will want to monitor, especially if the operator is using digital modes or merely wishes to observe standard transmissions such as WWV. Once the frequencies are set, pressing 'Start Scan' launches the scanner and the recorder. The scanner is designed to run indefinitely, but also has a 'Pause/Res' button so that the scan can be stopped and later resumed if the operator decides to use the transceiver for TX/RX operations.

Interesting finds during the operation of the Scanning RF-Seismograph

All the events recorded for this article were recorded during the standard operation of the station. The installation used here employed a Hy-Gain 18HTjr omnidirectional multiband antenna, however any antenna can be used to monitor RF conditions.

Warning: leaving a station connected to an aerial during a thunderstorm without proper lightning protection can be hazardous to life and property. It is not safe to operate any equipment connected to an aerial while a thunderstorm is within about 10 miles (16km).

Thunderstorms affecting the D-layer?

There are several explanations on how this is possible. My favourite theory is that the sprite discharge on top of the storm changes the ionosphere.

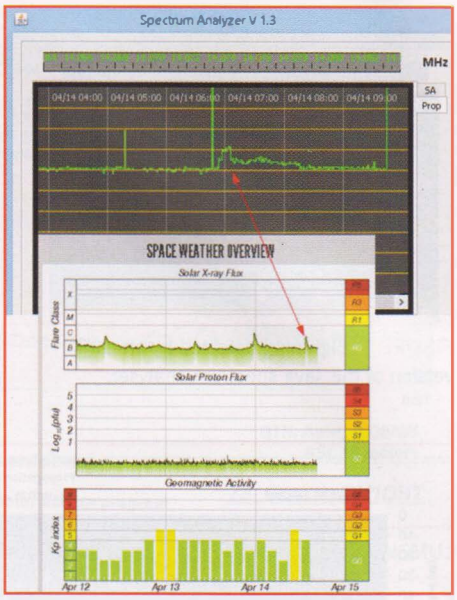


FIGURE 4: A dropout on 20m caused by a coronal mass ejection.

FIGURE 5: Grey line propagation (see text).

FIGURE 6: Main window of the Java spectrum analyser V1.4.

Measuring the effects of a passing thunderstorm

Early in the evening of 26 May 2016 the Greater Vancouver area was treated to a rare thunderstorm (Vancouver only gets about two or three thunderstorms a year). The MDSR team got lucky, because the RF-Seismograph was running automatically while nobody was there to operate the station. **Figure 7** shows the results, with lightning spikes clearly detected on several bands.

The buildup of energy in the troposphere

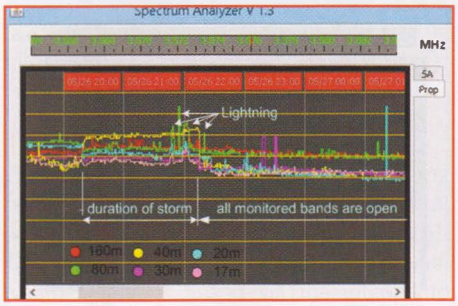


FIGURE 7: Lightning detected by an earlier version of the Java spectrum analyser.

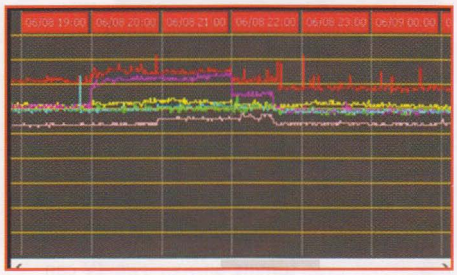


FIGURE 8: 10m propagation caused by airglow.

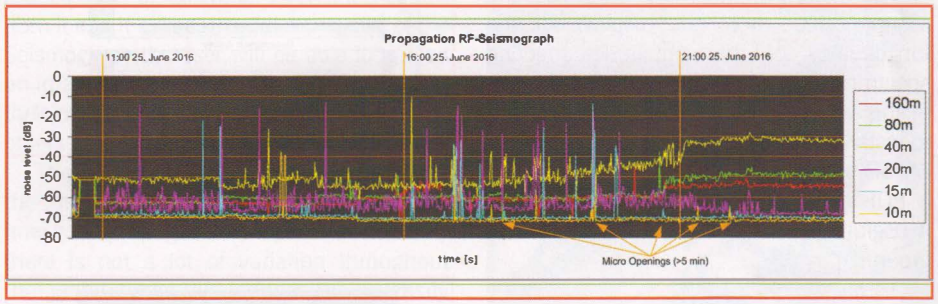


FIGURE 9: Propagation measurement on field day.

was visible at least two hours before the storm hit (left of the 'duration of the storm' marker). During the two hour storm the noise level of the 40m band jumped way up. In this particular storm the lightning passed last, mostly seen in the green spikes (80m). Just after 22:00 a big lightning strike makes even the 17m band jump. At 22:15 the noise of the 40m band drops almost immediately even though the storm was only a few miles away. And then something happened that was rather unexpected; stations from all over the world were heard on all the monitored bands!

10m propagation caused by 'nightglow'

Nightglow (airglow) is a phenomenon that causes a green glow in a dark cloudless sky. It looks similar to soft green aurora borealis, but is more uniform and lacks the streaming nature of auroras. Also, according to Wikipedia, nightglow is caused by atoms that recombine after being photo-ionised by UV radiation from the sun during the day [6]. Nightglow is mostly visible during the summer months around the solstice.

The pink (bottom) graph line in **Figure 8** represents the 10m noise level; just before 21:00 the band noise increases slightly. After 22:00 the band opens to allow for 30 minutes of band activity. Also interesting is the effect on the noise level on 80m (red, top) and 20m (purple, 2nd from top). During the time of the 10m opening there were reports of strong nightglow sightings in Texas. The solar flux reading for this particular day was 92 and the geomagnetic activity very low.

We also have run the RF-Seismograph on 6m but due to the lack of a good antenna we have abandoned the attempt. With the right antenna though, the RF-Seismograph would be ideal to monitor the 6m band.

Cloud to cloud discharge

Cloud to Cloud discharge is created when clouds rise due to atmospheric conditions or are pushed upwards on the slope of mountains. Cloud to cloud discharge creates a lot of local RF noise. It wipes out the reception of signals by covering them up with strong wideband noise. This is similar to the way in which fog reduces visibility.

Figure 9 is a recreation of the data collected at the Field Day site of our local club, the North Shore ARC. The site is situated at 2500ft (800m) elevation on the steep south facing slope of the North Shore mountains. The data was collected on 25 June 2016; day #1 of Field Day operations.

Mainly the 40, 20 and 15m bands were open during the day. It was clear in the morning, and in the afternoon the clouds started to move in. The yellow graph representing the 40m band noise starts rising at around 5pm. At 9pm the noise on 40m tops out at + 20dB above the starting level in the morning. 80 and 160m stay constant for most of the day and rise sharply just before 9pm. After 10pm all bands are dead due to cloud to cloud discharge noise.

When we first looked at this data it was a mystery, especially as the main RF-Seismograph, which was also running at a location with 400ft (140m) elevation 10 miles (15km) away did not record the noise increase. So we posted it on the MDSRadio Yahoo user group [3] and asked if anyone could explain the high noise level. Donn, VA7DH came back with the answer: taking the geographic location of the Field Day site and the weather conditions into account, this is the only logical solution. There was never a drop of rain and the wind was not overly strong on that day. There was never any sign of a thunderhead or lightning; just clouds rising gently over the North Shore mountains.

Propagation caused by meteor scatter

Most meteors are usual very small, and their ion trails get lost in all the other events during the day. At night time, when the bands are quiet a meteorite trail can cause quite some propagation.

The event shown in **Figure 10** happened at 2.40am local time. It starts out by increasing propagation on 40 and 30m. As the propagation drops after about 5 minutes, the noise level of the remaining bands also spikes for another 5 minutes.

Now that we know what a meteorite looks like on the RF-Seismograph we will spot more, even during the day.

Monitoring an eclipse

This story begins in Belgium on 11 August 1999 when Guy Roels, ON6MU (ON1DHT at that time) was watching and recording the total solar eclipse on his computer using an audio card and a converter on his FRG-100 receiver, very similar to the SDR system described earlier. **Figure 11** shows some of his results. The big difference today is that we can use the LIF-2016 and a universal CAT interface to connect the receiver to the computer. The MDSR software, together with the Scanning RF-Seismograph, can monitor the changes on six different bands. The data can be saved in a data format that is compatible with Excel. The implementation of a file upload utility will make it easy to share the collected data with scientific organisations such as NASA, NOAA and DRAO.

Coverage of the forthcoming total solar eclipse in North America on 21 August 2017

Figure 12 shows the totality map of the event shows the line of totality (complete eclipse) that will go across North America on 21 August 2017 [7]. The eclipse will not be visible in Europe but the effects of the eclipse on propagation could be world wide.

The event will start at the east coast of

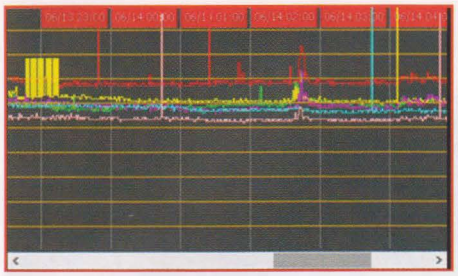


FIGURE 10: Meteor scatter propagation seen on several bands.

America at 1700UTC (1pm local time) and then work its way across the continent in a north western direction. It will exit the US on the west coast of Oregon north of Newport at around 2000UTC (12am local time). Totality will last up to around 2¾ minutes and the total time of the eclipse from start to finish is about 2h30m. Adding the time it takes the Sun to pass North America the time of the total event could be more than 6h for RF propagation effects.

Monitoring the solar eclipse with the Scanning RF-Seismograph

The current version of the software is fully capable of monitoring such an event and to record it. There will be additional functionality in the version planned for this event.

The bands being monitored will have to be synchronised with all the users; in addition, local information such as the grid square and the callsign will have to be entered.

If there are new scientific discoveries, the person(s) who submits the data of the event will be credited with the discovery!

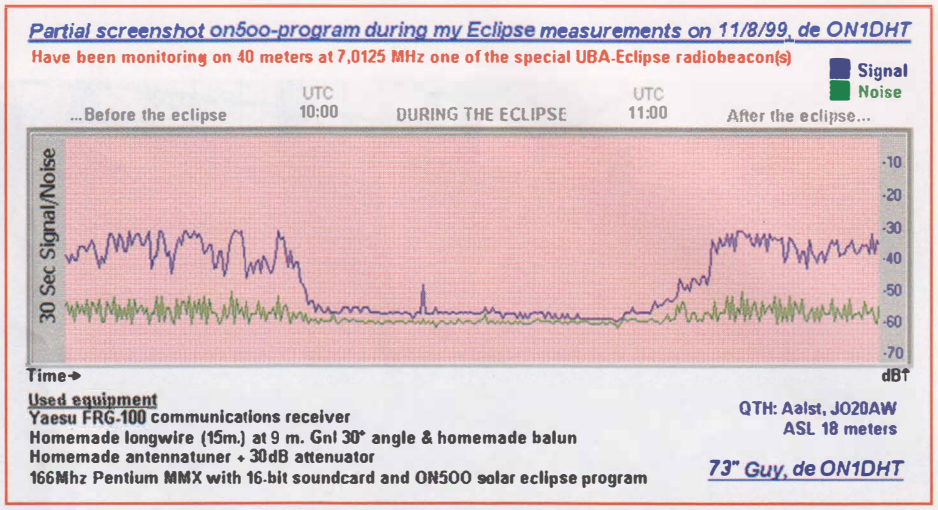


FIGURE 11: 1999 eclipse measurements by Guy, ON6MU (then ON1DHT). Image courtesy ON6MU.

FIGURE 12: Path of the centre of the 21 August 2017 eclipse across the USA. Image generated from e*Eclipser* courtesy of Xavier Jubier (http://tinyurl.com/2uvuud).

Summary

The development of the RF-Seismograph and then the scanning RF-Seismograph was a very worthwhile undertaking. It gives us the opportunity to share propagation reports among many uses and makes use of the transceivers that sit idle in an unoccupied shack.

We were already developing the RF-Seismograph when we found out that there will be a solar eclipse in 2017 in North America. At this time Guy, ON6MU also sent us the link and described what he and the amateurs in Europe (Belgium) were doing in 1999, which prompted us to enhance our work.

During the development we were able to observe and confirm the standard model of propagation and the role the sun plays in it. But we were also able to extend the propagation model by showing how different phenomena can create workable propagation even when the solar flux is low.

With the outreach program and our Yahoo user group we like to invite all amateurs to participate in the Solar Eclipse 2017 experiment and then to forward the recorded data to solar scientists.

Acknowledgements

Guy Roels, ON6MU for the great solar eclipse experiment in 1999 and the documentation of it and the usage of the noise level recording image of the event, for the continued support of the MDSR-SA, maintenance of the website and the creation of MDSR setup files.

Special thanks to Phil Burk for providing the Jsyn FFT sound interface free of charge for this project.

We also want to thank Alex Shovkoplyas (VE3NEA) for the use of the OmniRig CAT interface.

Thanks to Adam Farson (VA7OJ) for the continued support of his test lab and of a sounding-board for ideas.

Thanks to Dr Ken Tapping (currently working for DRAO), responsible for the solar flux monitor station in Penticton, BC, and NOAA for their great website and the solar monitoring tools.

Finally, thanks to Wikipedia for being such a great repository of information and easy explanations of even the most abstruse subjects.

Websearch

[1] www.tapr.org/pdf/DCC2010-BidirectionalLowFrequencyTransverter-VE7DXW.pdf
[2] http://users.skynet.be/myspace/mdsr
[3] https://groups.yahoo.com/neo/groups/mdsradio/info
[4] http://users.skynet.be/myspace/mdsr/order.htm
[5] https://www.wunderground.com/
[5] http://rsgb.org/main/files/2012/11/EMC04-Final.pdf
[6] https://en.wikipedia.org/wiki/Airglow
[7] https://en.wikipedia.org/wiki/Solar_eclipse_of_August_21,_2017

EME 2016

EME2016 was held in Treviso, Italy over the weekend of 19 to 21 August.

The organising committee chaired by IW3HVB did an excellent job, with a well packaged programme of talks and a collateral program of trips to nearby Venice, Treviso, Trieste and Padua. The hosting Best Western BHR Hotel was comfortable and well suited to such an event, with plenty of space for socialising and EME talk. Many of the leading European EME stations were in attendance, with visitors from North and South America, Russia, Japan and Australia making it a multi-cultural event. One sad absentee, noted by IW3HVB in his conference introduction, was Doug, VK3UM, who became SK earlier this year.

The conference was streamed live via www.eme2016.org. UK speakers Sam, G4DDK, Charlie, G3WDG and Dave, G4HUP presented papers on the first day covering a wide range of topics. Sam covered failure methods in LNAs in a QRO environment, presenting results of his 'destructive testing' of preamplifiers. Charlie covered circular polarisation at 10GHz and Dave spoke on the mechanics of an azimuth drive for small dishes.

There were some deeply technical presentations on modulation, codes and information theory for digital modes including a newly proposed QAM11 mode by DJ5HG. This mode claims to get the closest yet to the theoretical Shannon limit for information transmission. We look forward to a practical implementation of this is the near future, bringing digital EME to even smaller systems.

As you can see from the Proceedings files [1], the papers covered the widest range of topics. VK5MC described his 'heavy metal', steel-hubbed 9.8 metre dish project, built on his farm in South Australia. It was designed to give easy ground-level access to the feed point. This can be a real safety issue with a standard prime focus dish of this size which, even if mounted at ground level, requires you to be 5 metres above ground to access the feed for adjustments. On the final day, Jan, PA3FXB and Andreas, DJ5AR presented the results of their 'satellite bounce' experiments, including reflecting signals from the ISS and much smaller objects. Nobel Laureate and inventor of WSJT, Joe Taylor, K1JT updated us on WSJT-X [2], the latest development in his game-changing software for weak signal digital communications. This new code is built with Qt [3], allowing it to be easily implemented over a wide range of operating system platforms. It introduces two new modes, MSK144 for fast fading modes such as MS and QRA 64 for tropo scatter and EME and allows rig control for most modern radios. There is a completely new, high performance decoder for JT65 and this is covered in detail in the June 2016 *QEX*. Finally, to close the day, the vote was taken on the location of EME2018. The result was again in Europe, with the Netherlands hosting.

The chairman of the organising committee Giulio, IW3HVB, introducing the conference.

My thanks to IK3YBX for the photos.

Websearch

[1] www.eme2016.org/index.php/file-repository/
[2] http://bit.ly/2b9mcSe
[3] https://www.qt.io/

Dr John Worsnop, G4BAO
john@g4bao.com

Data

Back in April we touched on the complete rebuild of the WSJT suite of weak signal software, designated WSJT-X.

Development of that is going on at a fast pace and although the public release available on the WSJT website is still version 1.6 and has not changed, development versions of 1.7 are available for those prepared to experiment, test out and report their findings. The WSJT Yahoo Group is very active with their experiences and anyone wishing to participate in tests and moving forward with these developments should look there and consider joining. Full details of Version 1.7 are summarised in [1].

Main enhancements so far include full implementation of all JT65 variants. The new decoder for this mode no longer relies on the patented and licensed KV version, but has a new and considerably improved home-developed one. The result is better and faster decoding of JT65 messages. JT9 now has several sub modes with increased tone spacing for use on the higher frequencies. The highest JT9H has a tone spacing around 222Hz, so while still not as wide as that of JT4G, it ought to be useable on the higher microwave bands when anything other than heavy rain scatter comes into play. ISCAT is also included.

An experimental high speed meteor scatter mode, MSK144 has been added using Minimum Shift Keying, and LPDC coding, and there's a completely new mode, QRA64.

QRA64 or EME with a 5/8λ whip?

An exciting new development, this Low Density Parity Check (LDPC) mode first appears in version 1.7 The Q-ary Repeat Accumulate code is a departure from the convolutional or Reed-Solomon error correction used for all the other WSJT modes. It was designed by Nico Palermo, IV3NMV. The full details are described in a quite heavy paper that can be found at [2], which I'm still trying hard to make sense of. Essentially, the LDPC code appears to work as follows. The message consists of 12 six-bit symbols (72 message bits in total, identical to that at the input of JT65, JT4 and JT9). These 12 symbols are repeated by some irregular factors, so some of them are repeated three times, others up to 6 times. The net result is that the 12 symbols are expanded to 63 symbols but at this stage they still only have the same content as the original source – just repeated.

As an aside, repetition alone is a very simple although not very efficient means of error correction. We do it all the time, in speech and CW, and RTTY and PSK31. Just repeating information so the recipient always 'gets it'. But mathematics can do an awful lot better than simply repeating things.

Returning to QRA codes, the 63 symbols are reordered, or permuted, or scrambled, which simply changes their order but still doesn't add anything else. Each symbol is then multiplied by a weighting to give another six-bit value – and this is where it gets complicated. 'Multiplication' doesn't have its normal mathematical meaning but means multiplication of polynomials. I'll leave that here – barely understanding it myself – but an email to Nico confirmed my feeling that it really is just mapping, done in practice using lookup tables. (All this complicated error correction stuff usually comes down to lookup tables and simple implementations, designed by people who understand the maths!)

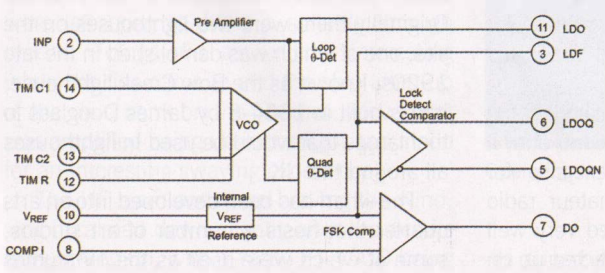
The new 63 weighted values are then successively added together, with the result of the addition at each stage forming a new, still six-bit (64 valued) symbol. Again, addition does not mean normal mathematical 'add' as it involves polynomials, but this time is easier to visualise as it just means the exclusive-OR of each new weighted symbol with the previous one. Now we have 63 new symbols, which are the original repeated ones jumbled and mathematically manipulated. These are concatenated with the original 12 starting symbols from the raw input, merged with a sync-vector based on a 7x7 Costas Array and the final symbols sent as a 64 tone modulation; very similar to JT65.

This all sounds very convoluted and complicated, and it is, but apparently the error correction potential when used with recursive, predictive and highly processor intensive decoding yields phenomenal results. According to Nico's paper and Joe Taylor's notes, tests so far suggest 1.3dB advantage over JT65 from the coding alone, and another 1.9dB from the improved synchronisation, suggesting a scheme 3dB more sensitive than JT65. Such a performance puts it just 0.6dB from the Shannon channel capacity limit for this modulation. That is impressive! Perhaps not really EME with a mobile whip, but it does make moonbounce rather easier for anyone with only a small antenna.

The XR2211 is still alive

Back to earthly matters. An old favourite, the XR2211 FSK modem chip is alive and kicking. This basic chip allows you to build an FSK demodulator for arbitrary symbol rate and frequency shift merely by selecting capacitor and resistor values. It's useful if you want a simple standalone FSK receiver and don't want to tie up a sound card or what have you. A lot of other modem chips appear to have died – try getting hold of the TCM3150 device – and that only ever offered two 1200 baud versions.

Although the last batch was manufactured in October 2015, the XR2211 is still available from RS (although not Farnell) and it passes the all-important 'JNT test – it can be found in a surface mount package. I only ever build in SMT. If a device is available in SOIC package it suggests it may yet be around for a while to come, unlike those devices that are *only* available in DIP and are clearly just obsolete stock left over from the last century.



Block diagram of the XR2211 (image courtesy of Exar).

Websearch

[1] WSJT-X Version 1.7 Features – http://physics.princeton.edu/pulsar/k1jt/v1.7_Features.txt

[2] QRA Codes for Weak Signal Communications, Nico Palermo, IV3NWV – http://microtelecom.it/qracodes/QRACodes-Rev10.pdf

Andy Talbot, G4JNT
andy.g4jnt@gmail.com

International lighthouses and lightships on the air

The International Lighthouses and Lightships Weekend takes place on the 3rd full weekend in August each year and attracts more than 500 lighthouse entries located in over 40 countries.

It all started in 1993 when two members of the AYR Amateur Radio Group, GM4OOU and GM4SUC (SK), were talking about creating an event in the summer when club members could get out on a sunny weekend and play radio. Various themes were considered, but it was decided that lighthouses of Scotland would be ideal.

Lighthouses of Scotland were controlled by the Northern Lighthouse Board in Edinburgh. Approval was sought and obtained to establish amateur radio stations adjacent to their property. In February 1993 an invitation was sent to all Scottish clubs and the Isle of Man club to join in the fun of a weekend, to be called the Northern Lighthouse Activity Weekend, by establishing an amateur radio station at a lighthouse during the third weekend in August. This first year's event saw 11 stations established at lighthouses, operating primarily on the HF bands, with each station making approximately 750 QSOs over the weekend. Two years elapsed before the next Northern Lighthouse Activity Weekend.

International Lighthouse Lightship Weekend, ILLW, came into being in 1998 as the Scottish Northern Lights Award run by the Ayr Amateur Radio Group. In 1999 there were 204 lighthouse/lightship stations in 36 countries

Now firmly in the amateur radio calendar, ILLW takes place on the 3rd full weekend in August each year and attracts over 500 lighthouse entries located in over 40 countries. There are very few rules and it is not the usual contest type event. It is also free and there are no prizes for contacting large numbers of other stations, which may be why it is such a popular event..

Christchurch Amateur Radio Society operated from Hurst Point lighthouse near Hurst Castle.

Christchurch ARS

Christchurch Amateur Radio Society put on a station at the Hurst Point lighthouse (sited to the south west of Hurst Castle) to celebrate ILLW. The event proved to be very successful with plenty of UK and international lighthouses being contacted. As well as lighthouses, a good number of amateur stations were also contacted during the event. We set up the station at Hurst Castle on the Friday and ran the station from 10am on Saturday morning until 5.30pm on the Sunday evening. We were using a G5RV antenna on the roof of the building and this was fed with open feeder and then into an ATU. The main rig was a Kenwood TS-570 and then into a 400W linear for extra power when it was needed. It was well supported by club members.

We had plenty of interested visitors come through the door during the event and it was a good public relations exercise for both Christchurch ARS and amateur radio in general. One thing that worked very well was putting the lighthouses contacted up on a large whiteboard – a lot of visitors found this really interesting.

Martin Clack

Hilderstone AR&EC

Hilderstone Amateur Radio and Electronics Club had to cancel their ILLW event due to gale force winds. The club tweeted 'Rather windy on the cliff top at Joss Bay for GB2NFL therefore cancelled!'.

Loughton & Epping Forest ARC

Loughton and Epping Forrest Amateur Radio Club activated two lights for ILLW. The club has enjoyed a relationship with the owners of Trinity Buoy Wharf on the Thames, opposite the O2 Dome at Greenwich. The wharf was a storage and maintenance depot for buoys that aided navigation in the Thames. Originally there were two lighthouses on the site, one of which was demolished in the late 1920s. Known as the Bow Creek lighthouse, it was built in 1864-6 by James Douglass to trial lamps that would be used in lighthouses all around the UK.

The wharf has been developed into an arts quarter that hosts a number of art studios, some of which were used as the TV studios at the 2012 Olympics. Michael Faraday also had a base there and performed many experiments. A wooden shack still stands on

the wharf to this day with a bunch of exhibits inside commemorating his time there and his scientific exploits.

LEFARS has activated GB2TBW on a number of occasions, this year the opportunity became available to operate not only for the lighthouse, but also from a lightship that is moored at the Wharf, *LV95*.

LV95, now renamed *Lightship 95*, used to guard shipping from the South Goodwin Sands, but has since its retirement been converted to a recording studio, which has hosted many well-known popular artists, like the Noisettes and Ed Sheeran.

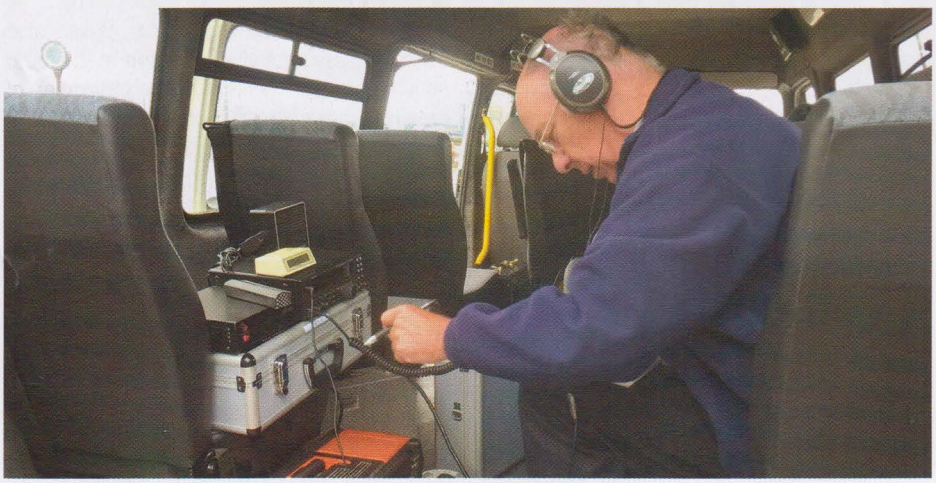
The club decided to set up two HF stations at the lighthouse and a VHF station on the lightship. Half a dozen club members turned up on the Saturday morning to be confronted by squally winds. Attempts at putting up one for the club's tents outside the lighthouse were abandoned after the tent almost took off, taking five club members with it! Just as we started to consider alternative operating positions, perhaps inside the base of the lighthouse, outside in Michael Faradays shed or even in a minibus, it tipped it down with rain, whereupon all the gear was packed back into the minibus and we retreated to the café located next to the lightship. The team then discussed what to do next, whilst drying out and enjoying a hearty breakfast washed down with nice hot tea and coffee. Once the rain rescinded, the weather did indeed look like it was clearing up, but we were still hampered by the high winds. Two aerials were strung up, both starting at the top of the lighthouse, the first being a dipole cut for 40m and the second cut for 20m. The 20m aerial was sloping so steeply it could almost have been a vertical. Extending the rope on the end allowed it to be strung at a less acute angle and made it more usable.

Meanwhile on the lightship, it was originally planned to operate on the deck, but the high wind scuppered that idea. In the end the VHF station, an Icom ID-E880, for the first day was set up in the lamp housing itself at the top of the mounting gantry. A triband collinear was mounted on a 12ft telescopic pole and bungeed to the handrail of the walkway that circumnavigates the lamp house. It was pretty warm in the lamp house, so both the floor and side access hatches were left open to allow a suitable through breeze. Things did get a little interesting when the tide came in and the ship lifted up of the mud bank on the Thames. Movement was amplified being up in the light and made for an interesting swaying experience!

The HF team ended up braving the wind, which calmed down slightly after the aerials were strung up, with a Yaesu FT-450D being used for 40m while Richard, G4DDP brought his new Icom IC-7300 along for a bash on 20m. One noticeable feature of the Icom was its superb filtering. Even though the aerials were strung from the same point, the receiver was not affected at all from the Yaesu sticking out 100W of SSB on 40m, allowing operation

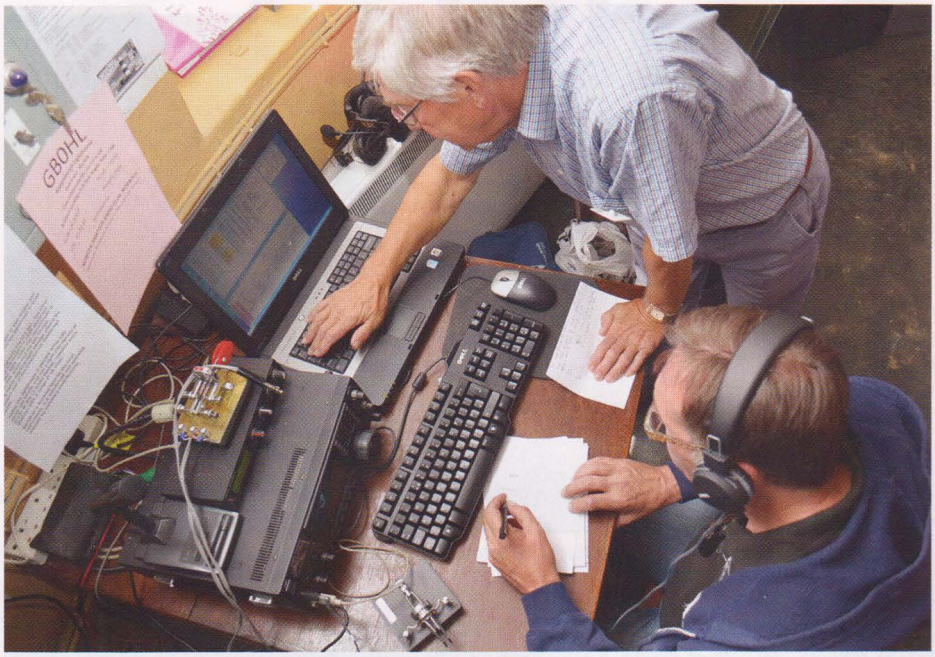
HF aerials strung from the Bow Creek Light. Photo courtesy John, G8DZH.

The second day operating on *LV95*. Photo courtesy John, G8DZH.

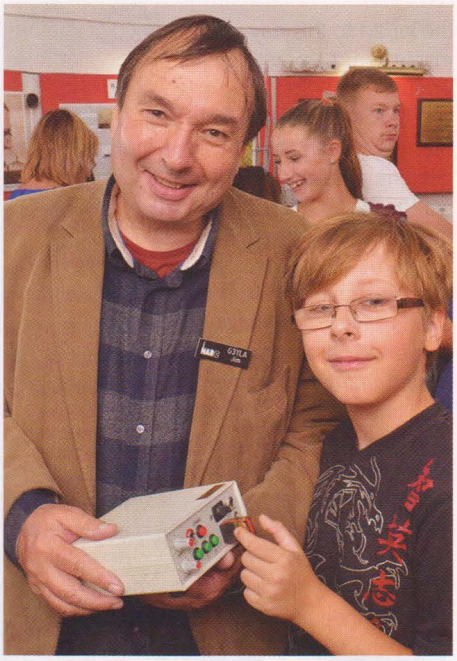


Operating in the bus when the rain came. Photo courtesy John, G8DZH.

Elaine Richards, G4LFM
radcom@rsgb.org.uk



Stuart, M0JKB and Malcom, G3PDH at Happisburgh Lighthouse in Norfolk during International Lighthouse and Lightship Weekend.



Jim Bacon, G3YLA demonstrating Morse code to nine year-old Elliot Brooke from Martham.

without external bandpass filters.

With all three stations working well and the weather overcome, the only other issue was the working conditions. Very few UK stations were heard, with most other lighthouses being copied from Europe, with a few from Scotland, Shetland and Ireland making up the majority of lighthouse contacts in the British Isles. For once the VHF station did particularly well, with people trying to get the lightship in the log as it was issued a separate number (UK0209) from the lighthouse (UK0030) for the weekend's event. Attempts were made to use SSB on 2m on Sunday afternoon, when the ID-E880 radio was swapped for an Icom IC-7000, but sadly the audio broke through into the mic channels of the mixing desk in the recording studio, so the mode was switched back to FM pretty quickly!

It was certainly a challenging weekend to operate due to weather as well as propagation. The end results were 146 QSOs, the majority on 40m and 2m with a handful of QSOs on 20m and 17m, 20 of which were lighthouses. The support from club members was good with well over a dozen people turned up to help set up, support and operate the stations.

Dave De La Haye, M0MBD

Norfolk ARC

Norfolk Amateur Radio Club made nearly 200 contacts with other radio hams from Happisburgh Lighthouse using the callsign GB0HL as part of the International Lighthouse and Lightship Weekend. The event coincided with the International Lighthouse Heritage Weekend when many lighthouses across the world are open to the public.

The lighthouse was extremely busy on the Sunday with many visitors climbing up to the light, enjoying the location and views.

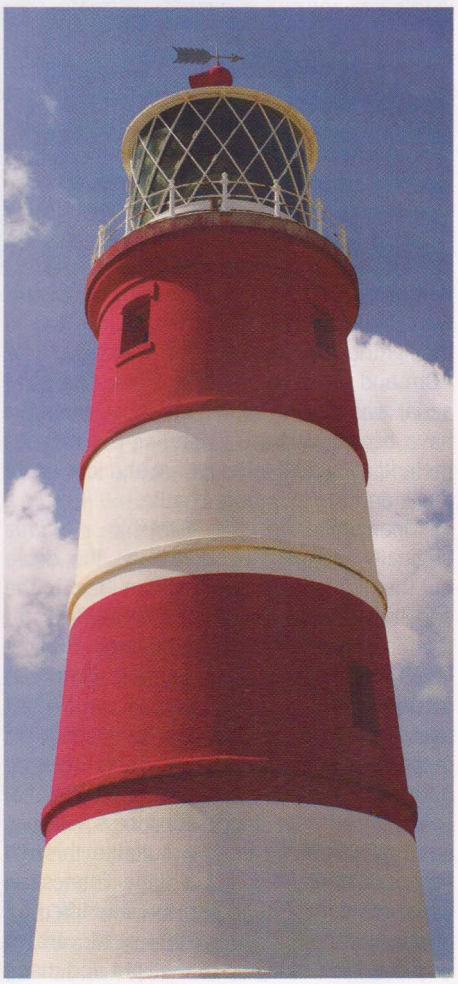
The amateurs made 193 contacts around Europe using CW and SSB on the HF bands. The main activity was on 40m with a few contacts also made on 80 and 20m. Of the 193 contacts, 135 were on CW and only 58 on SSB, partly because of the noise within the lighthouse created by the public queuing to go to the top and the poor acoustics.

Other lighthouses were also contacted within the UK as well as Germany, Holland, Eire and Sweden. These contacts were mainly made using CW, reflecting the traditions and history of maritime communications, although voice transmissions were also used. A lot of interest was shown in the radio activities by visitors to the lighthouse with many youngsters trying their hand at sending their name via Morse code.

Happisburgh Lighthouse is the oldest working light in East Anglia and the only independently-run lighthouse in Great Britain. Built in 1790, and originally one of a pair, the tower is 85ft tall with the lantern 134ft above sea level. The 'low light', which was discontinued in 1883, was 20ft lower and the pair formed leading lights marking safe passage around the southern end of the treacherous Haisborogh Sands. Today the lighthouse is painted white with three red bands and has a light characteristic of three white flashes, repeated every 30 secondss, with a range of 18 miles.

Saved as a working light by the local community, it is maintained and operated entirely by voluntary contributions. NARC wishes to thank the Happisburgh Lighthouse Trust for allowing us to operate from the site and to members of the Lighthouse staff for their assistance.

Steve Nichols, G0KYA



Happisburgh lighthouse activated by Norfolk ARC.

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hupRF DG8 preamplifier and DCI-V Bias injector

Serious operation on the higher bands has many interesting challenges, a large proportion of which focus on preserving as much signal as possible. Antenna height is critical to success on these bands and, of course, higher antennas mean longer feeders that, as the frequency increases, have ever increasing losses.

One of the most common solutions for improving a VHF station's capabilities is to add a preamplifier. There are some excellent, very low-noise, high performance designs around including the DG-8 preamplifier by GM3SEK that forms part of this review. However, for best effect, it is essential that the preamplifier is mounted on the masthead, as close to the antenna as possible. For a detailed explanation of why masthead mounting is so important see GM3SEK's *RadCom Plus* article [1].

Now, with the preamp at the masthead, we need to get a power supply up the mast. The common solution is to use the coax feeder to carry the DC supply using a simple electronic circuit known as a bias-tee, see **Figure 1**. In this circuit, an RF choke and a capacitor are used at each end of the feeder to separate the RF and DC paths. Although the example circuit shown in Figure 1 is very simple, practical bias-tees usually need to be able to handle a high power transmit signal as well as up to 200mA of DC current to supply the preamplifier. As a result, great care has to be taken in the PCB design and the signal decoupling. The hupRF DCI-V VHF Bias-Tee kit reviewed here has been designed specifically to meet the needs of the DG8 preamp.

hupRF DCI-V Bias-Tee Kit

As you can see from **Photo 1**, the DCI-V is supplied with all the components and connectors including the case and a self-adhesive label. The extruded aluminium case

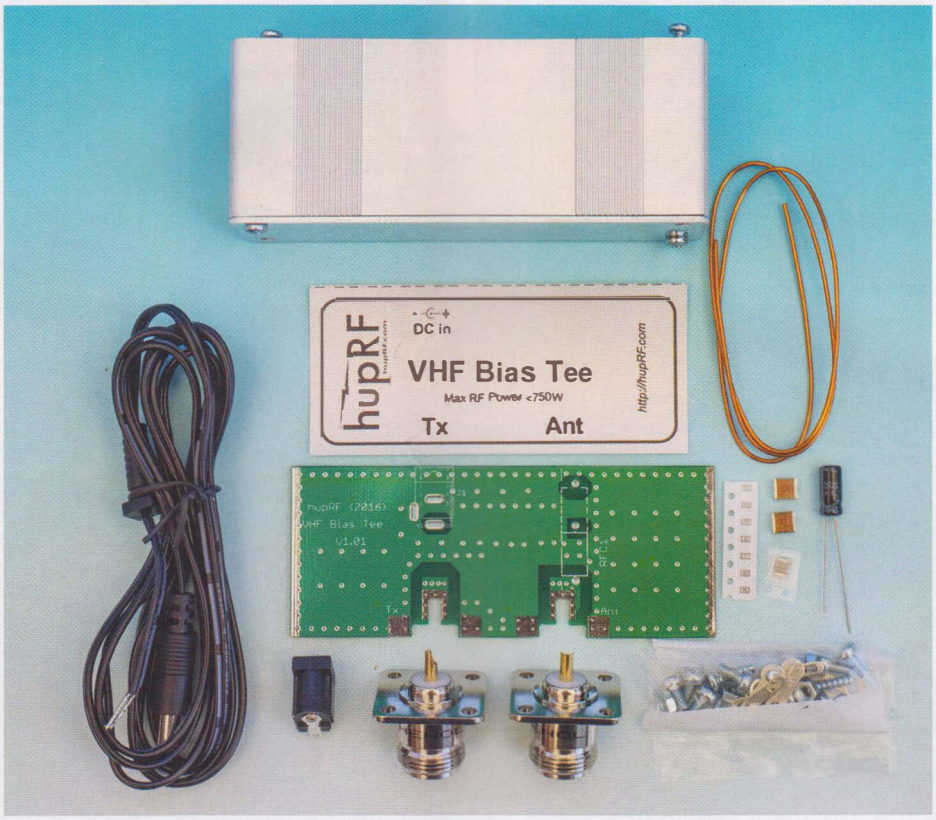


PHOTO 1: hupRF DCI-V bias-tee components.

completes the project but it does require some care with assembly. Full instructions for the DCI-V kit can be downloaded as a PDF from the hupRF site [2]. I suggest you download and print the 10-page instruction manual so you can tick off your progress.

The first task was to get the front and rear panels drilled to accept the connectors. To aid this, the final page of the PDF has 1:1 drilling templates. To ensure the size of the printed template is correct there was a 50mm long line printed at the top of the template. After printing, I checked that this line measured 50mm; this would mean the rest of the template would also be correct. I noticed that my line was only 45mm so I went through the print settings for the PDF and found that my Epson printer was set to shrink oversize pages. Turning this off fixed the problem.

To make the drilling easier, I cut out the front and rear panel paper templates and glued them to the aluminium panels using a paper glue-stick. With the templates fixed in place, I started by drilling small pilot holes for each of the cut-outs. I find this technique helps to get a more accurate end result and gives you some scope for correction if anything goes wrong. For cutting the larger holes in the aluminium panels, a set of chassis punches is the ideal but I often abuse a cheap set of Forstner bits! Providing you drill a pilot hole first, the Forstner bits work surprisingly well for aluminium sheet, diecast alloy and plastic boxes.

With the panel drilled, I used a small flat file to slightly open out the PCB slots for the centre pins of the N connectors. The slots are made deliberately small so you can

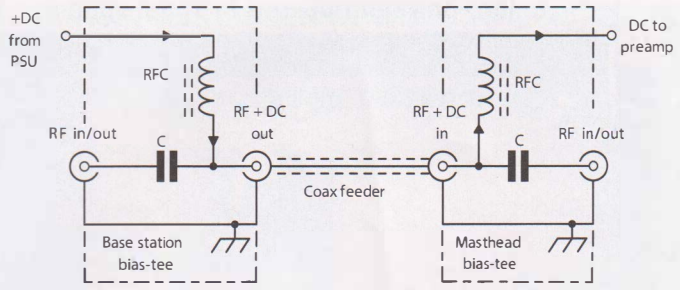


FIGURE 1: Simple bias-tee circuit.

trim them to produce a secure fit for your connectors. I also had to put 90° bends in all the earth tags as these are used to bond the PCB to the chassis and provide additional mechanical support.

Next was the supplied surface mount device (SMD) components to the main PCB. Most of the components were 0805 size, which is not too bad for hand soldering. For this type of soldering I use 0.46mm diameter tin/lead multi-core solder and a small 1mm tip on my temperature controlled iron. I use either a magnifying light or one of those magnifying headsets to see what I'm doing. I soldered the components, one at a time, by placing each one using tweezers and then I used my fingernail to press down and keep it steady whilst delivering a dab of solder to one end using a pre-loaded iron tip. I then soldered the other end of the component and returned to the first end to tidy up the soldering. In cases where I applied a bit too much solder, I used solder wick braiding to remove the surplus. The circuit diagram and PCB for the DCI-V shows lots of 1n decoupling capacitors all connected in parallel but at different points on the PCB to decouple the DC lines. The instructions explain that you don't need to use all the capacitors if you're only using the DCI-V for 144MHz and higher. However, for 6m and 4m they suggest using all the capacitor positions and increasing some of the values. To finish off the PCB construction I used some flux cleaner to tidy up the board and remove excess flux.

With all the SMD components fitted, it was time to mate the PCB with the front panel and the box to make sure everything aligned. Whilst the extruded aluminium case with PCB slots is very neat, it is important to take care at this stage to make sure everything mates properly. In my case, everything aligned OK so I was able to go ahead and solder the earth tags and N connector centre pins to the PCB. The next task was to wind the RF choke, which required between 10 and 20 turns (dependent on the bands being covered) at 5.5mm diameter. I used a 5mm drill as the former for my RF choke. The final steps were to fit the choke and the power connector then screw the case together. The end result is both very smart and sturdy as you can see from the **Photo 2**, which shows the completed board being slid into the housing. The connectors have not been fully bonded to the PCB, which is OK for a standard 100W transceiver but hupRF recommends that the braid supplied is used to fully cover the area around the pins on both sides of the PCB for higher power.

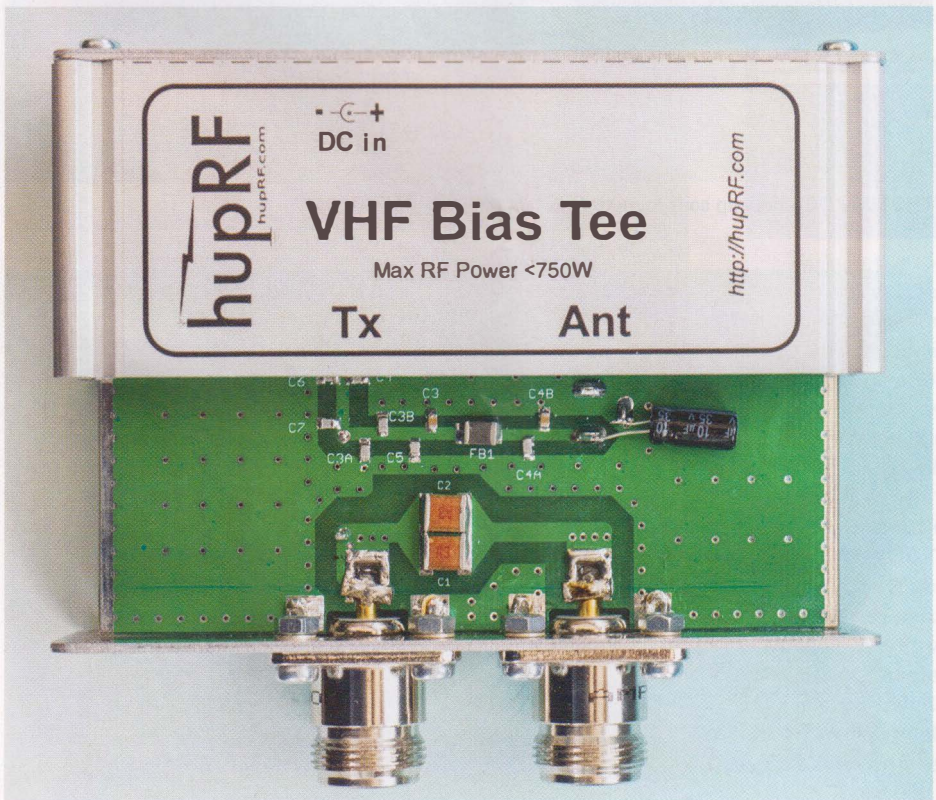


PHOTO 2: View of the completed DCI-V prior to fitting in the enclosure.

DG8 masthead preamp

The DG8 preamp for 2m was designed by Ian White, GM3SEK and featured in *RadCom Plus* [1]. It based on Sam, G4DDK's Nacton transverter Rx front end. The developments for 4 and 6m of the DG8 are down to G4HUP.

The preamp was specifically designed for masthead operation and provides an optimised gain of approximately 16dB with an excellent noise figure of better than 1.6dB. In addition to the basic preamp, the design includes an internal bias-tee circuit to extract the DC power from the coax, along with transmit/receive switching that can handle up to 750W of RF. As part of the masthead oriented design, the preamp is intended to be directly wired into the feeder cable at the antenna end. This is done to avoid the use of additional plugs and sockets, all of which are lossy and potential ingress points for moisture. For the same reason, there are no mounting bolts for the preamp case as these would also penetrate the case. Instead, the case is taped to the mast. Power for the preamp is fed via the coax feeder using a bias-tee, and the DCI-V described earlier is ideal. In addition to providing power for the preamp, the bias-tee supply triggers the transmit/receive switching. When the bias-tee power is removed, the preamp input and output relays automatically drop back to pass-through mode for the transmit signal. The DG8 and the DCI-V are both rated for 750W (JT65 1 minute periods) at 144MHz. The rating goes up to 1kW at 50MHz.

The hupRF DG8 kit comprised a fully assembled, aligned and tested DG8 preamp

Mike Richards, G4WNC
mike@photobyte.org

for the 6m band complete with individual test results. The review model showed a Tx loss of better than 0.2dB with an Rx gain of 16.59dB and a noise figure of 1.3dB. The entire PCB is coated with a protective layer but there were removable tapes over the cable connection points to allow for easy soldering. In addition to the main PCB, the kits comprised a waterproof enclosure complete with sealing gasket, two cable glands, a permeable vent and the brass mounting lugs for the coax feeder. This is all shown in **Photo 3**.

DG8 Construction

As the main PCB was fully assembled, the main activity was to prepare the enclosure and mount the cables to the PCB. The first task was to drill 16mm holes in the rear panel to accept the cable entry glands. The location of the holes was clearly described in the kit instructions. I used (abused) my Forstner bits to cut the holes. It's important to get these holes in the right place so that the incoming cable can pass straight to the PCB connections. In addition to the two cable glands, a 12mm hole is required in the side panel to mount the permeable vent.

The next step was to solder the brass cable lugs onto the underside of the DG8 preamp PCB. These are used for the connection to the outer of the coax feeders as shown in **Photo 4**. To do this I first had to peel away the protective tape to lift the permeable coating. Using the spade terminal lugs to mount the feeders was a novel but very effective way to secure the cables to the PCB. In addition to making the RF connection the incoming feeders are also used to support the preamp thus avoiding any fixing holes that would penetrate the enclosure. The completed unit is shown in **Photo 5**.

Summary

The DCI-V and DG8 preamp make a great combination with excellent performance and are likely to provide a very useful improvement to any VHF/UHF station. The kits were easy to build, with the DCI-V requiring rather more work than the DG8. For the review, the DCI-V bias-tee took me an afternoon to build whilst the simpler DG8 took just a couple of hours.

The DG8 preamplifier kit as reviewed here costs £120, whilst the DCI-V kits costs £37.50. Those buying both together benefit from a special price of £150. Both kits are available from hupRF [2]. My thanks to hupRF for the supply of the review kits.

Websearch

[1] *RadCom Plus* May 2015 (Vol 1 No 1), available to Members via http://rsgb.org/radcom-plus/
[2] http://huprf.com/huprf/

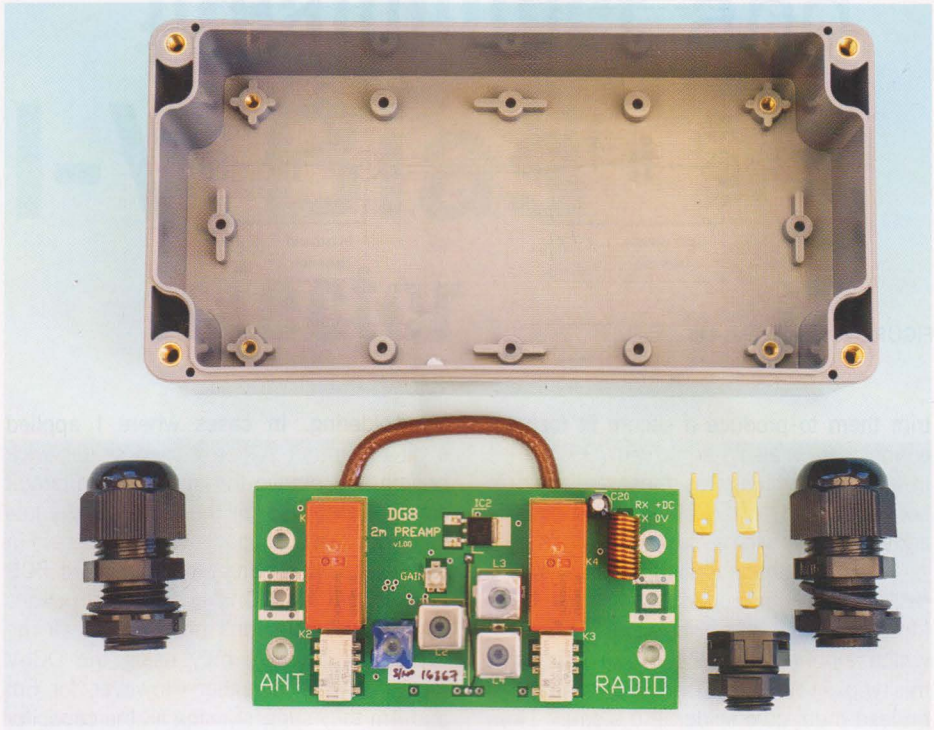


PHOTO 3: hupRF DG8 preamp kit components.

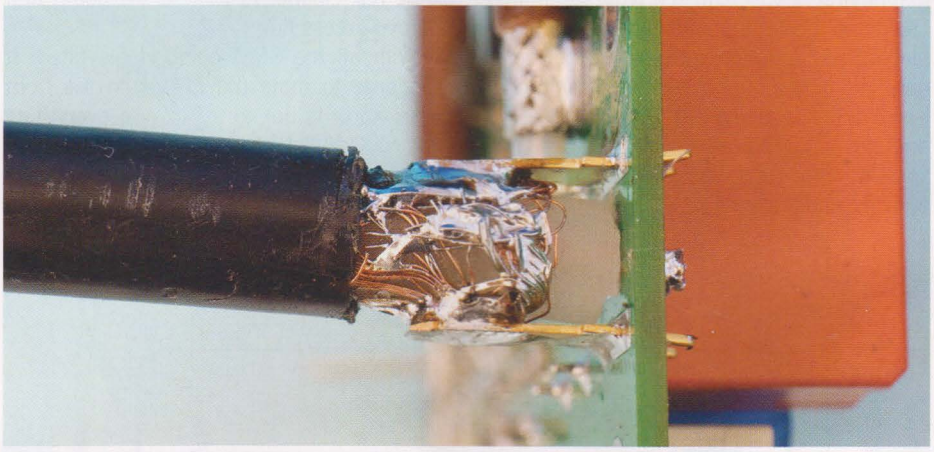


PHOTO 4: DG8 preamp coax mounting system.

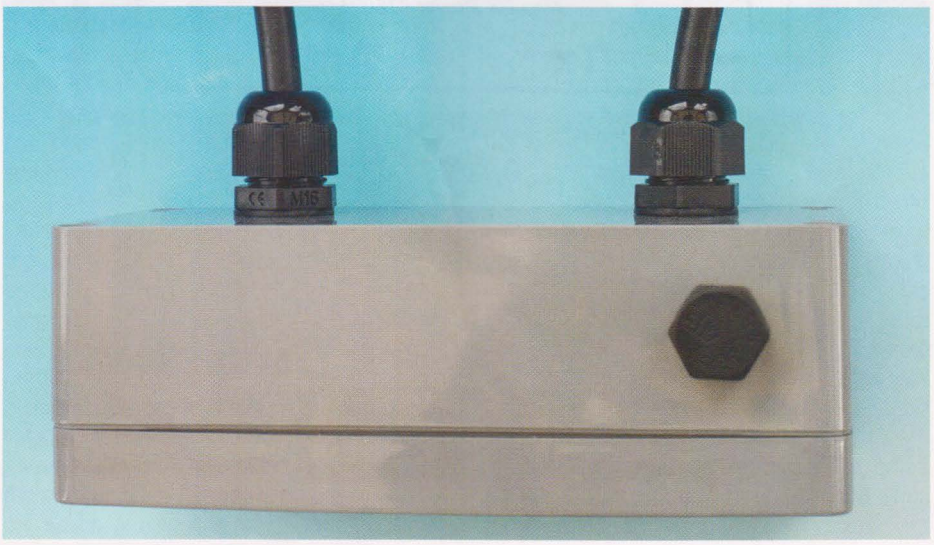
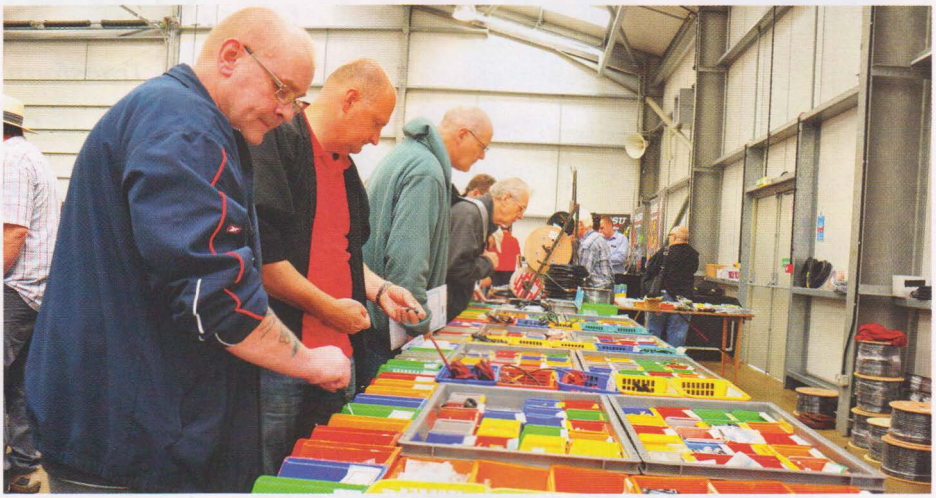


PHOTO 5: Completed DG8 preamp enclosure.

The National Hamfest 2016

The National Hamfest is now only a few weeks away – on 30 September and 1 October at the Newark & Nottinghamshire Showground.



Whether it's components, plugs or a complete station, you are sure to find it at the National Hamfest.

Gates open at 9.30am each day, with the main hall opening at 10am. This gives visitors that chance to look around the flea market area at the start of the day to track down all the bargains! The outside selling area – or flea market – will comprise rows of joined tables with a maximum of 3 tables per seller.

The main hall

The major manufacturers are represented again this year and many familiar traders are returning. We also have several traders from Europe and elsewhere overseas, making it a truly international event.

SDRplay will be exhibiting their SDR – the Radio Spectrum Processor (RSP) – for the first time. This will be an opportunity to see this truly British product in action. SDRplay will also be demonstrating their newly announced SDRuno software (see August 2016 *RadCom* New Products, page 14) and visitors will have an opportunity to try it out for themselves. Members of the SDRplay technical team will be on hand to answer detailed technical questions about SDRs.

Mastrant is one of those European companies returning to the National Hamfest. They will be bringing their synthetic rope and if you want to do a bit of research before the Hamfest into these ropes, check out their new website at www.mastrant.com. They also have a new leaflet to help customers choose which rope best fits their needs.

MOCVO Antennas will showcase the new Duo-Band Mini magnetic mount mobile antenna for 145 and 433MHz. They are also able to supply custom patch leads with various connectors.

The American Radio Relay League (ARRL) will have a stand. We are also pleased to say that for the first time there will be DXCC card checking available on the UK 6m group's stand. Ofcom are returning this year and will have staff on hand to answer all your licensing queries.

The outside fleamarket is open at 9.30am.

Outside events

A number of outside demonstration areas are planned. These include a display of military radio equipment kindly organised by the Vintage Military Radio Amateur Radio society (VMARS). Camb-Hams will again be in attendance with their mobile station (Flossie Mk2) vehicle and will be operating the Hamfest Special Event Station, GB16NH, on most bands. Hamfest attendees are invited to have a go operating GB16NH, there is no need to see a licence as you'll be operating under supervision. If you want to operate under your own callsign then a copy of your licence, in electronic format is fine, will need to be presented. The GB16NH log will be uploaded to Logbook Of The World and Club Log for OQRS.

National Club of the Year

In a change from previous years, the RSGB will be announcing the National Club of the Year winners at the Hamfest on Friday 30 September. The winners, and runners up, will be presented with their trophies, certificates and cheques by RSGB Board Member Len Paget, GM0ONX and Jeff Stanton, G6XYU from the competition sponsors Waters & Stanton.

An RSGB rucksack

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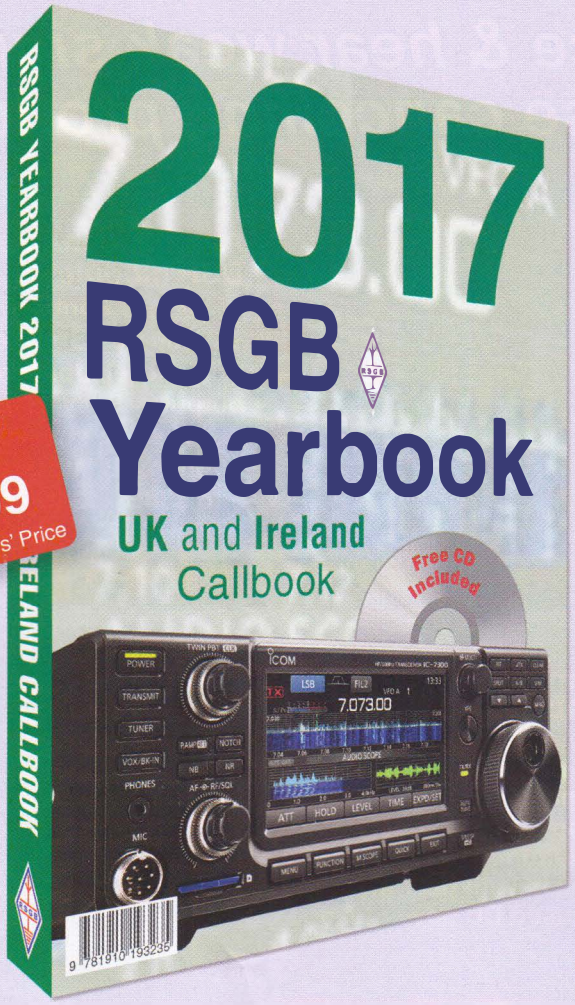
The RSGB stand is bound to be busy each day as they are offering a free RSGB rucksack with every purchase of £16.99 or over. Simply by buying the equivalent of an *RSGB Yearbook 2017* the first 100 customers each day will get their hands on one of these handsome rucksacks. There will be a number of new books available to purchase including the new *RSGB Yearbook 2017*, *Callseeker 2017*, *Deluxe Logbook 2017* and even the latest edition of the *RSGB Radio Communications Handbook*, which is featured in this issue. There will also be special price deals for visitors to the show and anyone joining the RSGB at the show will also be entitled to some special offers for doing so.

NEW



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Edited by Mike Browne, G3DIH

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- Amateur radio - a world of possibilities
- RSGB volunteers video

These videos are produced in the popular MP4 format that will play in most computers and some DVD players. There is even more included and you will also find extended information from RSGB clubs and even samples of the latest RSGB books.

The *RSGB Yearbook 2017* is as always much more than a simple list of callsigns. Fully updated information, great RSGB videos and the very latest licensing data for the UK & Ireland, go to produce the essential publication for every well-equipped shack.

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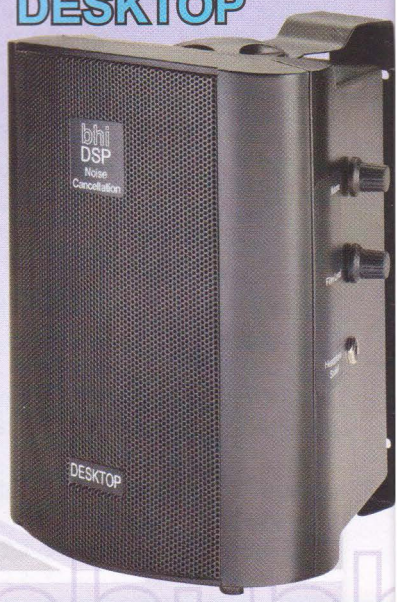

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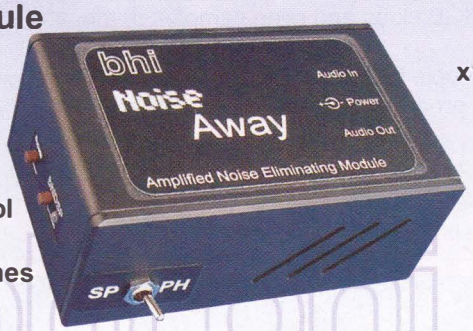

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There will be a number of RSGB Committees in attendance as well as services such as the QSL Bureau and an RSGB Membership stand.

Refreshments

Refreshments are available all day at the National Hamfest in the restaurant area within the hall. There are tables and chairs so you can enjoy a cup of tea or a pint of beer with hot and cold food available. Outside the main hall, there is a picnic area and a burger van.

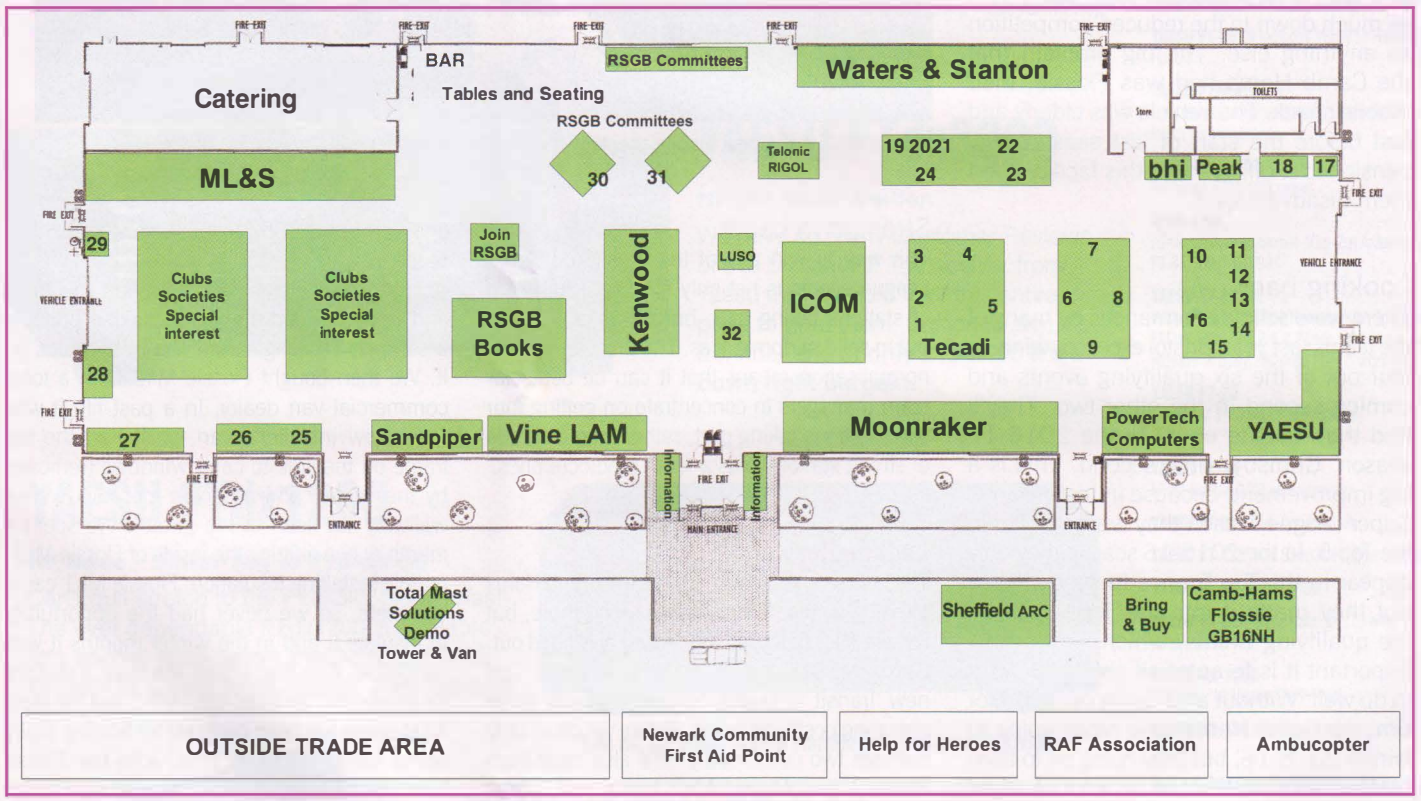
Travel and tickets

If you haven't already bought your tickets, then they are priced at £5 on the gate.

The National Hamfest takes place in and around the George Stephenson Exhibition Hall at the Newark Showground, Lincoln Road, Newark-on-Trent, Nottinghamshire NG24 2NY. The showground is approximately 2 miles from the nearest A1 junction and there is ample free parking on site. Parking for those with blue badges is located near the exhibition hall this year within a central dedicated area of the main car park.

Queues outside the main hall for the 10am start.

NATIONAL HAMFEST 2016



Exhibitors

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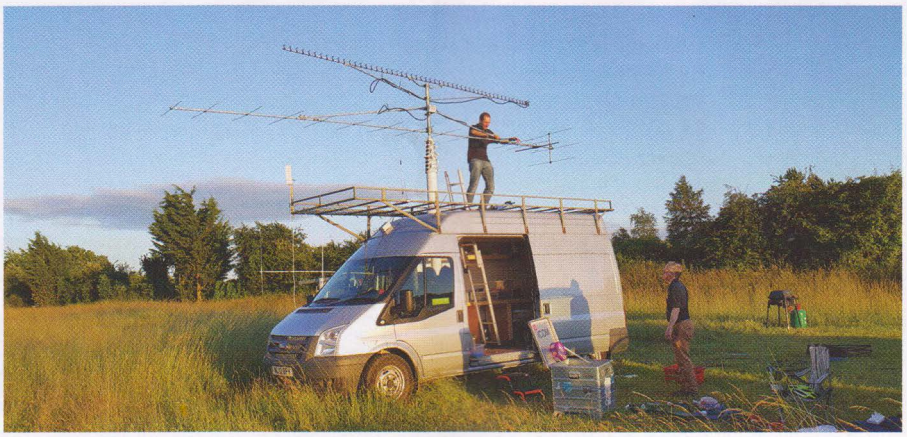
Super League Review/Preview

The new series of the Affiliated Societies Super League starts this month. It will be the seventh season of the competition.

By way of a change, the 2015-16 season wasn't a clash between Bristol and the Camb Hams. Bristol certainly came out on top, and with a new record score, but it was as much down to the reduced competition as anything else. The big problem that the Camb Hams had was Flossie, their mobile shack. The vehicle was elderly and just before the start of last season they pensioned it off. Without this facility it left them disadvantaged.



Flossie Mk2 is the new mobile shack owned by the Camb Hams.

Looking back

There were solid performances by many of the teams last year. Bristol excelled, winning four out of the six qualifying events and coming second in the other two. They'll find that hard to equal in the 2016-17 season. Grimsby came second. This is a big improvement, because in the previous Super League season they weren't even in the Top 5. In the 2015-16 season they only appear in the Top 5 once in six contests, but they made it into the Top 10 in all the qualifying events, which shows how important it is to enter all six if you want to do well. Without a full team on 160m or 6m, the Camb Hams were never going to win in 2015-16, but they hung on to third place – and there must be a lot of clubs who would like to do as well as that. They appeared in the Top 5. Pembroke are another club who are moving up in the world. They came fourth, having appeared twice in the Top 5 of three events. Tall Trees round out the Top 5. The number of points between the teams in third fourth and fifth place is small and the order in which they appear could so easily have been different.

Strength in depth

The way to win any of the individual Super League events is not only to have a full team of stations taking part, but for all of them to put in solid performances. The process of score normalisation means that it can be better for team managers to concentrate on getting four solid stations taking part, rather then a couple of strong stations plus a lot of mediocre ones.

Looking forward

The last thing you could accuse the Camb Hams of being is idle. Flossie might be no more, but Flossie Mk2 has been purchased and fitted out. Gavin, M1BXF of the Camb Hams said; "The new Transit is slightly longer, allowing three operating positions inside. Before we could only manage two comfortably." It's also clear from **Photo 1** that Flossie Mk2 has a roof hatch, to make assembling/disassembling antennas easier. As regards the forthcoming season, he said; "you'll definitely hear the Camb Hams on".

As some background, a number of those in the Camb-Hams donated to the rebuild fund. "We were very lucky in that the rebuild fund totalled £12,000, where some people donated as little a £10 and others £1000 (individuals), Cambridge RAYNET, the CRG and Cambridge105 probably made up £6000 of the amount.

"We sold Flossie Mk1, minus the mast and radio bits, on eBay to someone building a camper. The engine only had 65k miles on it. We then bought Flossie Mk2 from a local commercial van dealer. In a past life it was a window installer's van, so it had the big frame on the side to carry windows (removed by the dealer) and a decent roof rack with a walkway (as seen in the photo). We spent a month or two refitting the inside of Flossie Mk2, mainly installing insulation. Flossie Mk1 came complete, so we never had the opportunity to insulate it and in the winter months it was noticeable. After that in went the mast, a skylight for access and the radio bits (APRS and the like). All shelving has been designed for holding 'really useful boxes' and this time, with the Transit being 80cm longer inside, we managed to get an additional operating position on the desk, meaning that in VHF NFD we got 2m, 6/4m and 70cm all on the desk, and 23cm on the shelf above the cab, so all four stations in the van."

"I tell you this as this time we built it from scratch, with donations. With Flossie Mk1 we used to get lots of 'we would love a van like but we'll never get one donated to us'. Now we've shown that with generosity and elbow grease anyone can have a Flossie. I really want to get that message out. We've used Flossie Mk2 a few times already. It had two stations in it for our DXpedition to Arran in May and in August she was at the Cambridge Rock Festival as the outdoor broadcast vehicle."

TABLE 1: The top five teams in the 2015-2016 Super League series.

	1st	2nd	3rd	4th	5th
6m AFS	Bristol A	Spalding	Bristol B	Travelling Wave	Pembroke
160m Club Calls	Bristol	Wythall	Cambridge Uni	Pembroke	Black Sheep
2m AFS	Black Sheep	Bristol	Camb Hams	Trowbridge	Travelling Wave
80m CW AFS	Brimham	Bristol	Grimsby	De Montfort Uni	Aberdeen
80m SSB AFS	Bristol	Cray Valley	Camb Hams	Norfolk	De Montfort Uni
70cm AFS	Bristol	Black Sheep	Camb Hams	Spalding	Travelling Wave
Overall	**Bristol**	**Grimsby**	**Camb Hams**	**Pembroke**	**Tall Trees**
Points (% of max)	5968 (99.4%)	5340 (89%)	5087 (84.8%)	5070 (84.5%)	5015 (83.5%)

Steve White, G3ZVW
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YAESU FTM-3200E Latest 2/70 Mobile with new digital C4FM (Fusion). Buy the HRI-200 Wires 11 Interface for only £99.99.

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YAESU FTM-400DXE
Four modes of transmission. Large colour touch screen display.

NIFTY DESK-TOP STAND
For Yaesu FTM-400 series.

ATAS-120A
ATAS-120A Auto Mobile 40m-2m Antenna for FT-857/897/450/991.

YAESU FT-8900E
With FREE YSK-8900 Remote Kit. High-power FM on 10m, 6m, 2m & 70cm. When your local repeater is busy, slip onto 10m & work DX!

YAESU FT-2D
C4FM/FM 2/70 Dual band Handie.
FREE NH-85a11u Snapshot Camera.

YAESU VX-3E
Micro Handie 2/70 with scanner.

YAESU FT-60E Twin band Handie.

YAESU FT-1XE Dual Band Full Digital Handie.

YAESU VX-6E 2/70 handie

YAESU VX-8DE Triple Band 6/2/70 with enhanced APRS.

YAESU VR-120D
100kHz - 1300MHz FM/WFM/A.

YAESU VR-160 Miniature communications receiver.

MD-100A8X Base Station Microphone.

MD-200A8X Elite Deluxe base Station Microphone.

YAESU DR-1XE 2/70 C4FM + advanced mixed-mode repeater.

YAESU FTdx3000

HF/6m Base Station

We have so many Customer Reviews of this brilliant HF Transceiver from Yaesu that it would take this entire page to print them. Suffice to say, it's a winner and at **only £1649.95 it's a down right bargain.**

Looking for a Base Station sized radio at a VERY LOW PRICE?

YAESU FTdx1200

HF/Base - Sister Rig to FTdx3000

Can't quit stretch to the FTdx3k? No worries! The ever dependable FTdx1200 is available at a special price before the October PRICE INCREASES from Yaesu Japan. **Just £899.95.**

See ML&S video review HamRadio.co.uk/ftdx1200video

NEW YAESU FT-891

HF/6m Base/Mobile

A modern day FT-857 without 2&70. Bang up to date in looks and smaller than a 2m only FM rig of 25 years ago! **Available end of September Only £599.95.**

FT-450D WITH MYDEL MP-30SW FOR ONLY £549.95!

What a winning bundle! A brand new 3-year **warranty FT-450D HF/6 with Auto ATU & a MyDEL PSU for just £549.95? Martin must be losing it.**

YAESU FTdx5000MP LTD

The FT DX 5000MP HF/50MHz 200W Transceiver is a Premium Class Yaesu radio with 2 independent receivers plus many unique options and accessories designed to meet the performance requirements of even the most demanding serious Amateur Radio operator.

In stock and on demo.

YAESU ROTATORS

G-450C	ONLY £299.95
G-1000DXC	ONLY £449.95
G-5500	ONLY £549.95
G-2800DXC	ONLY £799.95
GS-065 Mast bearing	ONLY £49.95
GC-038 Lower clamps	ONLY £29.95
Rotator cable 25m	£69.95
Rotator cable 40m	£123.95
Rotator connector plugs	£25.95

ML&S CARRY THE LARGEST STOCK OF YAESU ROTATORS IN THE UK AND AT THE BEST PRICES. CABLE & PLUGS ARE EXTRA.

NEW! MYDEL RADIO DUST COVERS
See **Hamradio.uk/covers**

Beautifully crafted and hand stitched. Soft liner to deter from scratching radio. Most types in stock, only £29.95.

Looking for Something to sell? Use our LynchLine.com It's FREE to buy & sell! Looking for the best USED EQUIPMENT? See HamRadio.co.uk/used

NEW PRODUCT

SHACK-CAMS

ML&S introduce a new range of Shack-Cams. Protect the contents of your Shack with these simple easy to install "Shack-Cams".

From only £129.95
See Hamradio.co.uk/shackcams

Works straight out of the box, connect to your WiFi, activate your FREE on-line account and that's it. If your camera is stolen you've still got the recording – it's all stored FREE for 7 days on the cloud.

NEW MyDEL HAMFONE

Ever wished you didn't have to carry two devices around with you? Your Smart phone for every day and your Handie for communication? Finally, ML&S have found a one-stop solution. Not only have we got a device that offers a cell phone and a 70cm Handie in one package but it's water and drop proof!

MLS PRICE IS ONLY £149.99

See www.MLandS.uk/hamfone for full specifications

NEW! ADMS SOFTWARE FROM RT SYSTEMS

Rather than fiddle about programming your rig with the small buttons on the front panel, a far easier method is to use specifically written software & programming lead from RT Systems .

ML&S now stock the most popular range in stock for Yaesu, Icom & Kenwood products.

See:
www.hamradio.co.uk/rtsystems

See
HamRadio.uk/magnum
To view the video see:
www.MLandS.tv

NEW MYDEL MAGNUM Pi

A standard Raspberry Pi kit, fully assembled and flashed with the relevant firmware when connected to a DV5Mini for DMR operation when connected to your DMR Handie or Mobile. You no longer have to tie your main PC or laptop to the DV5Mini dongle to use it, instead a very compact and lightweight Magnum + DV4. Gary Spiers M0TIG has even produced a video at ML&S showing users how simple it is to set up. The Magnum-Pi is just £79.95 alone or you can buy both ready configured for £169.95.

MyDEL

Two-year warranty on all MyDEL PSUs

NEW! MyDEL-DYNA 1D MICRO-HANDIES

Sold as a twin pack, these micro-sized light-weight & licence free communication "walkie-talkies" can be used for many commercial & leisure applications. Super small & lightweight, integral antenna & very loud crisp audio. Can also be programmed to cover 70cm at up to 1W output.

SOLD IN PAIRS, RRP £99.99,

INTRO OFFER ONLY £79.99 OR INDIVIDUALLY AT £44.99

See HamRadio.uk/1D

MyDEL MP-30SW1V £89.95

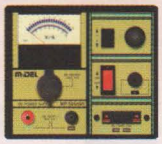
25Amps, 9-15V DC, super light with digital metering for Volts & Amps.

MyDEL MP-50SW111

50 Amp DC power supply **£125.00**

Probably one of the lightest 50Amp DC power supplies available today, the new MP-50SW111 weighs in at only 2.2Kilos (4.85lbs). Unbelievably compact, measuring a mere 195mm wide, including chunky rear terminals and front panel knobs.

MyDEL MP-304MKII £99.95 Heavy Duty LINEAR 30Amp



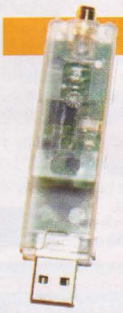
For those of you that prefer old style non-switching technology in your power supply we think this new 30 Amper from MyDEL is the one. Switchable Volts/Amps with large precise metering (analogue of course!) variable Voltage. Cigar socket output for all your accessories, twin front panel outlets for up to 6Amps and two large binding post terminals for up to 30Amps. Remember, all MyDEL PSU's come with a two year no quibble guarantee.

MyDEL CG-3000R ANTENNA TUNER

NOW ONLY £249.95

The best value remote wire antenna tuner now with remote control included.

HELITRON DV4MINI USB STICK FOR D-STAR AND DMR



DV4mini 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.

AVAILABLE FROM THE SOLE UK DISTRIBUTOR, ML&S LTD. ONLY £109.95.

see www.MLandS.uk/dv4mini

NOW AVAILABLE IN 2M

TX Factor is a TV Show dedicated to Ham Radio. See Hamradio.co.uk/txfactor

LOOKING FOR COMMERCIAL GRADE DMR FROM YOUR FAVOURITE STORE?

X1P Ultimate DMR Handie, GPS & Bluetooth.
Price from £599.95

NEW PRODUCT

PD-685G 70cm, Small, lightweight & slim this version has GPS fitted. **£399.95**

Hytera

PD-785 Rugged version, Large TFT Display etc. **£399.95**

MD-785G Base or mobile with GPS. **£395.95**

MD-390 DMR HANDIE FROM TyT NEW MODEL

An updated version of the UK's best-selling DMR Handie, the NEW MD-390. Better ergonomics, better water resilience, improved menu system, option GPS. Free programming lead & software.

AVAILABLE NOW FROM ONLY £149.95.
See web for full details.

NEW ALINCO DM-330FX

NEW PRODUCT

Superb 30Amp PSU with twin 5V 2Amp outputs, Twin 5Amp 13.8V. 10Amp Cigar (for Handies). Variable Voltage & Noise Offset control. V&A Metering.

ONLY £119.95

DIAMOND GSV-3000

RRP £209.95
ML&S £209.95

* Output voltage 1 - 15V DC & 13.8V Fixed * Output current 25A continuous (CE protocol)
* Built-in cooling fan * Supply 230V AC 50Hz * Size 250 x 150 x 240mm * Weight9.5kg

RADIOSPORT HEADSETS

Whether for DXing, contesting, field day, or casual everyday use we think you'll agree Radiosport headsets have the features you want. ML&S are proud to have been appointed their distributor and have stock today.

All headsets are supplied with GEL Cushions giving extra comfort and FREE cloth covers.

RS60CF Deluxe Dream Edition Stereo Headset with boom (as featured) **£189.95**
RS20S Deluxe Dream Edition Stereo Headset only no boom **£119.95**
Mini-XLR lead set for any radio (Yaesu/Kenwood/Icom/Flex/Elecraft) **£59.95**
PTT-FS-RCA Foot switch with 7ft cable with phono plug **£44.95**
PPT-HS-RCA Hand PTT Switch, 7 foot cable with phono plug **£44.95**

How about an additional 3.5mm socket on the opposite ear cup to allow "tethering" of another headset for a logger or maybe just an additional pair of ears?

AIRSPY & SPYVERTER COMBO

Low cost, high performance SDR receiver. Covering DC-1.8GHz with 20MSPS sampling anywhere in the range. Only 3.5dB NF between 42MHz-1GHz.

ONLY £229.95 See **Hamradio.uk/Airspy**

Touch Paddles by BASICOMM

For more information, prices & technical information email Array@HamRadio.co.uk

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All of our videos on one TV channel.

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Call in to our new SUPERSTORE any Saturday for that EXTRA SPECIAL deal!

ML&S Tel: 0345 2300 599 Web: HamRadio.uk

SEE THE ML&S CREW AT NEWARK HAMFEST. 30th SEPT - 1ST OCT

E&OE

ACCESSORIES AND ANTENNAS ON SHOW AT THE NEW SUPERSTORE!

Wonderwand Wonderloop Antennas

WonderWand Widebander
1.8-460MHz with 1.3M Whip! £129.95
Wonder-TCP
40-10m Tuneable Counterpoise....£59.95
or buy both together for only £169.95!

Wonderwand Antennas U.K.

The UK's favourite rig-mounted antenna system!

New! WonderLoop 4010. 40m -10m

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

ML&S PRICE ONLY £99.95

For full info & video see: www.HamRadio.uk/wonderloop

HighEndFed Antennas

A professional range of End Fed Wire antennas from the Netherlands. Each antenna is hand made, individually tested for resonance and SWR. All you have to do is take it out of the box and string the antenna up in the air, add a coax feed back to you radio.

HEF/3Band	40/20/10m 200W, 11.85m Long	£134.95
HEF/5Band	80/40/20/15/10m 200W, 23m Long	£149.95
HEF/40m-QRO	40m Mono Bander, 2kW Only 20m Long.	£219.95
HEF/20m-QRO	20m Mono Bander, 2kW, Only 10m Long.	£199.95

For the full range see www.HamRadio.uk/hyendfed

Super Antenna MP1DLR Package

A complete portable antenna packaged based around the world's best selling SuperStick

MP1DLR Package includes:

- MP1B antenna (SuperSlider Coil, SW1 SuperWhip, 2 extension rods and nut)
- MR1C Counterpoise
- TM2 SuperPod Tripod
- UM2 SuperMount
- GB1 Go Bag
- FG1 Frequency Guide
- MC80 80-meter coil

Super Antenna Features:

- Ham bands: 40m-30m-20m-17m-15m-12m-10m-6m-4m-2m-70cm
- Frequency Range: HF 7MHz~30MHz continuous
- Frequency Range: VHF 48 to 144MHz continuous
- SWR: 1.5 : 1 or better
- RatedPower: 500W SSB; 300W CW / DIGITAL
- Antenna Weight: < 2 pounds (1kg)
- Also configurable for up to 450MHz
- Standard 3/8"-24 male thread for mounting
- TM2 SuperPod tripod included with carry bag
- MC80 80m coil included for 80m band
- Optional MR series radial sets available
- Optional MC60 60m coil for 60m band

NEW IMPROVED VERSION

All for only £259.95

Plus £10.95 post & packing

For the complete range of Super Antenna products see www.HamRadio.uk/Superantenna

Fed up with paying over the odds for Diamond Antennas? So were we. Even lower prices for 2016! Huge selection always available,

DIAMOND

Base Antennas

CP-VU8	80m-70cm 200W Compact HF Base, only 2.7m Long!
X-30	2/70, 3/5.5dB, 1.3m Long
X-50N	2/70, 4.5/7.2dB, 1.7m Long
X-300N	2/70, 6.5/9dB, 3.1m Long
VX-1000	6/2/70 2.15/6.2/8.4DB 1.42M Long
X-510N	2/70 Fibre glass 8.3/11.7dB gain 5.2m long "N"
V-2000	6/2/70, 2.15/6.2/8.4dB, 2.5m Long
X-7000	144/430/1200MHz (2m/70cm/23cm) 8.3dBi (144MHz), 11.7dBi (430MHz), 13.7dBi (1200MHz) 5M Long.

Mobile Antennas

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

See Web for prices

Duplexers/Triplexers

MX-72N	16-150/400-460MHz Duplexer
MX-62M	16-56/140-470MHz Duplexer
MX-610	HF/6+2+70 (for FT-8900)
MX-2000	6/2/70 Triplexer
MX-3000N	2/70/23 Triplexer

See Web for prices

Switches

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

See Web for prices

Hustler Antennas

HUSTLER

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

See web for full listing!

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

4-BTV	40/20/15/10m	£189.95
5-BTV	80/40/20/15/10m	£229.95
6-BTV	80/40/30/20/15/10m	£269.95

The full mobile and base range and accessories available from stock, including the high power 1kW mobile range.

COAX CABLE STRIPPERS

DXE-UT-8213
ONLY £44.95!

This tool prepares RG-8, RG-213, 9913F7, LMR-400 (not LMR-400UF) and other similar size coax cable for installation of a PL-259 connector - or DXE-N1001S two-piece Type N connector (requires a slight additional trimming of the cable center conductor length)

DXE-15035 ONLY £23.95

Great for everything from RG-58 up to Ultraflex 10! Designed for stripping RG-8, RG-213, 400MAX, and similar size cable. Simple to operate, they are preset.

Messi & Paoloni

Full range of Messi & Paoloni Low Loss Professional Coaxial Cable in stock now!

NEW PRODUCT!
M&P ULTRAFLEX 13 "MOON INTERCEPTOR" COAX CABLE

Straight from their factory in Italy comes the new very high grade low loss coaxial-cable specifically designed for HF/V/U high power amplifiers and moon-bounce operation. New improved dielectric design with low attenuation even at 10GHz. Full copper 19-wire strand construction means you can use around the rotator without risk offracture. From £169.95 for 50m. Further information see: **www.hamradio.uk/ultraflex13**

M&P ULTRAFLEX 7
7.3 LowLoss cable, 50 Ohm, double shielded. £28.75 for 25m.

M&P ULTRAFLEX 10
10.3mm LowLoss cable, 50 Ohm, "alternative for RG-213" £45.00 for 25m.

M&P BroadPro50 double jacket
12.4mm LowLoss cable, 50 Ohm, double jacket. £49.75 for 25m.

Any of our cables can be ordered in any length you require. There is a 10% discount for 100m+. If you require specific lengths then please call.

mRS MiniVNA Antenna Analysers

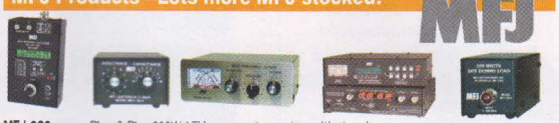
Perfect for checking antennas and RF circuits for hams and commercial users.

MiniVNA Pro with Bluetooth	100kHz-200MHz	£329.95
MiniVNA Extender	For Pro only, extends range to 1500MHz	£299.94
NEW MODEL! MiniVNA Tiny	Huge coverage, 1MHz-3GHz, Android controllable.	ONLY £379.95

MyDel-Sark110 Vector Impedance Antenna

The SARK-110 Antenna Analyser is a pocket size instrument providing fast and accurate measurement of the vector impedance, VSWR, vector reflection coefficient, return loss, and R-L-C (as series or parallel equivalent circuits). Typical applications include checking and tuning antennas, impedance matching, component test, cable fault location, measuring coaxial cable losses, and cutting coaxial cables to precise electrical lengths. The SARK-110 has full vector measurement capability and accurately resolves the resistive, capacitive and inductive components of a load. The measurement reference plane is automatic adjusted via the Open/Short/Load calibration standard to enable the accurate impedance measurements at the end of an intermediate coaxial cable. **ONLY £359.95**

MFJ Products - Lots more MFJ stocked!



MFJ-939	Plug & Play 200W ATU, you won't even know it's there!	
MFJ-974HB	Manual ATU for balanced line antennas, 160-10m	
MFJ-974	as above but without 160m	
MFJ-16010	Random Wire ATU 160-10W	
MFJ-949E	Manual ATU metered, Dummy Load, 1.8-30MHz, 300W	
MFJ-901B	Manual Mini ATU 1.8-30MHz, 200W	
MFJ-971	Manual ATU metered, 1.8-30MHz, 200W	
MFJ-904H	Manual ATU, metered, inc balanced, 1.8-30MHz 150W	
MFJ-969	Manual Roller ATU Metered 1.8-54MHz, 300W	
MFJ-993B	Auto ATU Metered 1.8-30MHz, 300W	
MFJ-1786X	Magnetic Loop 10-30MHz, 150W re-built & re-aligned by ML&S	
MFJ-1788X	Magnetic Loop 7-22MHz, 150W re-built & re-aligned by ML&S	
MFJ-259C	Antenna Analyser 530kHz-230MHz	
MFJ-266	V/U Portable Antenna Analyser 1.5-185MHz + 300-490MHz	
MFJ-269C	530KHz-230MHz, 415-470MHz Analyser	
MFJ-260C	Dummy Load 300W SO-239	

See Web for prices

DX Accessories are available at ML&S

Array Solutions

PowerMaster II

VSWR & RF Power Meters.

AIM 4300DX

Lab & Field Grade Impedance Analyser.

- StackMatch 3/5/10kW Stack Match & Power Splitter Antenna
- SixPack RatPak Range of Remote Antenna Switches
- Vertical Phased Array Controllers
- Baluns & Un-Un Transformers
- K9AY Loop, Beverages, Shared Apex Arrays & Low Band Antenna Products

microHAM

RF Vector Signal Meter Station Master & Station Master Deluxe Network Controller

USB micro KEYER II All-in-one USB Interface

Station Master & Station Master Deluxe Network Controller

For more information, prices & technical information email MicroHam@HamRadio.co.uk

Daiwa Meters

All featuring cross needle display offering unrivalled accuracy for SWR & Power

CN-101L	1.8-200MHz. 15/150/1.5kW	£87.95
CN-102L	1.8-200MHz. 20/200/2kW	£97.95
CN-103LN	140-525MHz. 20/200W. N-Type	£97.95
CN-801HP	1.8-200MHz. 20/200/2kW. PEP Reading. Large display	£119.95
CN-801HP3	1.8-200MHz. 30/300/3kW. PEP Reading. Large display	£139.95
CN-801VN	140-525MHz. 20/200W. N-Type	£104.95

Looking for Something to sell? Use our LynchLine.com It's FREE to buy & sell! Looking for the best USED EQUIPMENT? See HamRadio.uk/used

IN STOCK NOW!

MAESTRO CONTROL CONSOLE FOR THE FLEX-6000 SERIES.

This amazing new innovative product release from Flex changes the way we interface with our SDR transceivers.

ML&S PRICE: £1199.00

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

FLEX 6300

1.8-60MHz, 2 Slice RX
100W SDR TCVR.

ML&S Price: £2199.95
ON DEMO & IN STOCK NOW!

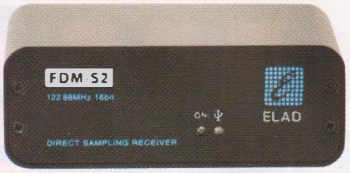
FlexRadio Systems®
FACTORY APPOINTED DEALER

As the largest UK dealer of Flex SDR Products, ML&S always carry stocks of each model and have demonstrators available.

Flex-6300 1.8-60MHz, 2 Slice RX 100W SDR TCVR	£2199.95
Flex-6500 1.8-60MHz, 4 Slice RX SDR 100W Transceiver	£3949.95
Flex-6700 1.8-60MHz, (+RX 135-165MHz) 8 Slice RX SDR 100W Transceiver	£5999.95
Flex-6700R as above, Receiver only	£6599.95
Flex 1500 SDR Low cost SDR Transceiver, connect via USB & you have 5W 160-6m	£699.95

ELAD FDM-S2

Direct sampling receiver based on 122.88MHz 16bit single channel ADC converter covering HF 6m and offering the possibility to exploiting the under-sampling mode. **£449.95**



ELAD FDM-DUO

MULTI-USE 5W SDR TRANSCEIVER

Crafted out of beautiful aluminium, if Ferrari were to ever build a radio, this would be it. Designed using the very latest SDR technology, 10kHz-54MHz, Direct Conversion RX operating at 122.88MHz. The small transceiver employs a fast analog-digital-converter that samples the received HF directly into digital signals and a downstream DSP module provides for filtering and processing. Another ARM processor handles the signals of the control unit. All Mode, in stock.

BLACK ONLY £879.95 RED LIMITED EDITION £919.95

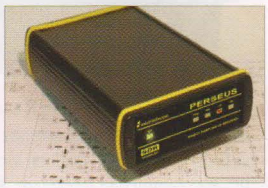
RF EXPLORER 3G COMBO HAND HELD SPECTRUM ANALYSER NOW ONLY £189.95

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

PERSEUS VLF-LF-HF RECEIVER

PERSEUS is a VLF-LF-HF receiver based on an outstanding direct sampling digital architecture.

ONLY £659.95



SUNSDR2PRO TRANSCEIVER

EXPERT ELECTRONICS

- 10KHz-65MHz RX
- 95-148MHz RX
- 1.8-54MHz + 144MHz TX
- Separate independent RX path based on Direct Down Conversion principle (DDC)
- Separate independent TX, based on the Direct Up Conversion principle (DUC)
- 20W output (ideal to drive Amp)
- LAN-cable for connecting to local network
- OS Windows XP/7/8 x32 or x64, OS Linux Ubuntu x64

In stock & on demo.

SPECIAL OFFER: £1189.95
See HamRadio.uk/sunsdr

COLIBRI

ColibriDDC Ethernet controlled SDR receiver.

Latest SDR receiver with Ethernet connectivity allowing remote access via your PC over a LAN. 0.09 to 55MHz and 62.5 to 800MHz (with additional filtering).

ML&S PRICE £569.95
See HamRadio.uk/colibriddc

TIGERTRONICS SL-USB

ONLY £119.95

Tigertronics

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

Cable included - see web.

ELAD FDM-DUO"R"

Receive only version of the popular FDM-Duo 5W SDR Transceiver. Coverage is 9KHz-54MHz, direct sampling. Identical to the TX variant but introduced because of many requests from SWL's and users who wanted RX only. The price is cheaper at only £639.95.

ML&S PRICE: £679.95

NEW EXPERT ELECTRONICS MB-1

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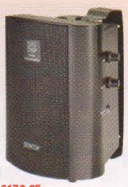

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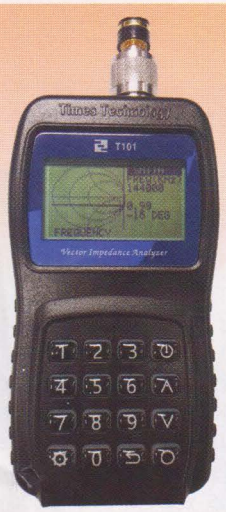

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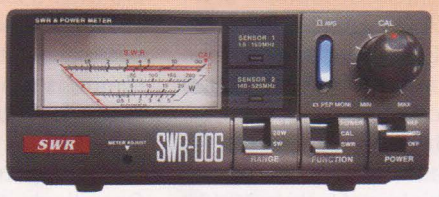

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Design Notes

Remote control of test equipment

Professional test equipment often appears on the surplus market, and can sometimes even be picked up for scrap value if you know where to look. A lot of these items can be very useful in the amateur shack. Power meters, multimeters, signal generators, synthesisers and spectrum analysers are the most useful, but there is a lot of specialised stuff out there too.

One aspect of them that is very rarely taken up in the amateur world is remote control, useful for automating measurements. In the professional arena, whole banks of test equipment form integrated test setups, often dedicated to the testing of just one or a few production items. To make the testing process as simple as possible, all the test equipment is controlled from a computer running a dedicated program for the production engineers to use in a plug and play manner. Ever since the mid 1970s manufacturers have agreed on a remote control interface standard that, at least in hardware terms, they have standardised on so that equipment from different manufacturers can all be controlled over a common bus.

The General Purpose Instrumentation Bus (GPIB, but also known as IEE488 and HPIB) is a rather cumbersome interface by modern standards, being based on an eight bit parallel bus with a multiplicity of handshaking signals. Equipments are interconnected via a 24 way stackable connector that looks a bit like the old Centronics parallel printer interface. **Photo 1** shows two such connectors on an interface box. Bus speed is typically no more than 1MHz, or 1M byte per second, which is enough for most instrumentation and control purposes, even today.

For a PC to be able to control the test equipment on a GPIB bus, to become the *Master*, it needs a suitable interface. In a full scale test setup, a desktop or industrial PC would have a dedicated card with a GPIB connector. Modern laptops don't have this luxury, but instead can make use of a USB to GPIB interface, like the Prologix module shown in Photo 1 **[1]**. Such controllers can be relatively cheap. The one shown here appears to the PC as a COM port and uses the well proven FTDI chipset. Each piece of test equipment on the bus is allocated an unique address from 1 to 32. This is often set on older test equipment by DIP switches or even PCB links; on more modern equipment it is soft-set from the front panel. The controller then addresses each piece of test equipment in turn by issuing first the address then the command string. Unfortunately the command string is not standardised, never was and never will be! Every manufacturer uses their own command set, which is always – fortunately – well documented in user manuals and often is just straightforward plain text. The controller software has to be custom written to support whatever test instruments are in use. For instance, I have a Systron Donner microwave synthesiser that I've set to address 19. The following commands are then used to control it.

First, send the address; this is a command to the Prologix interface, not the synthesiser, and its convention uses lower case specifically, taking the form

addr 19

The front panel LED then shows 'Remote Operation'

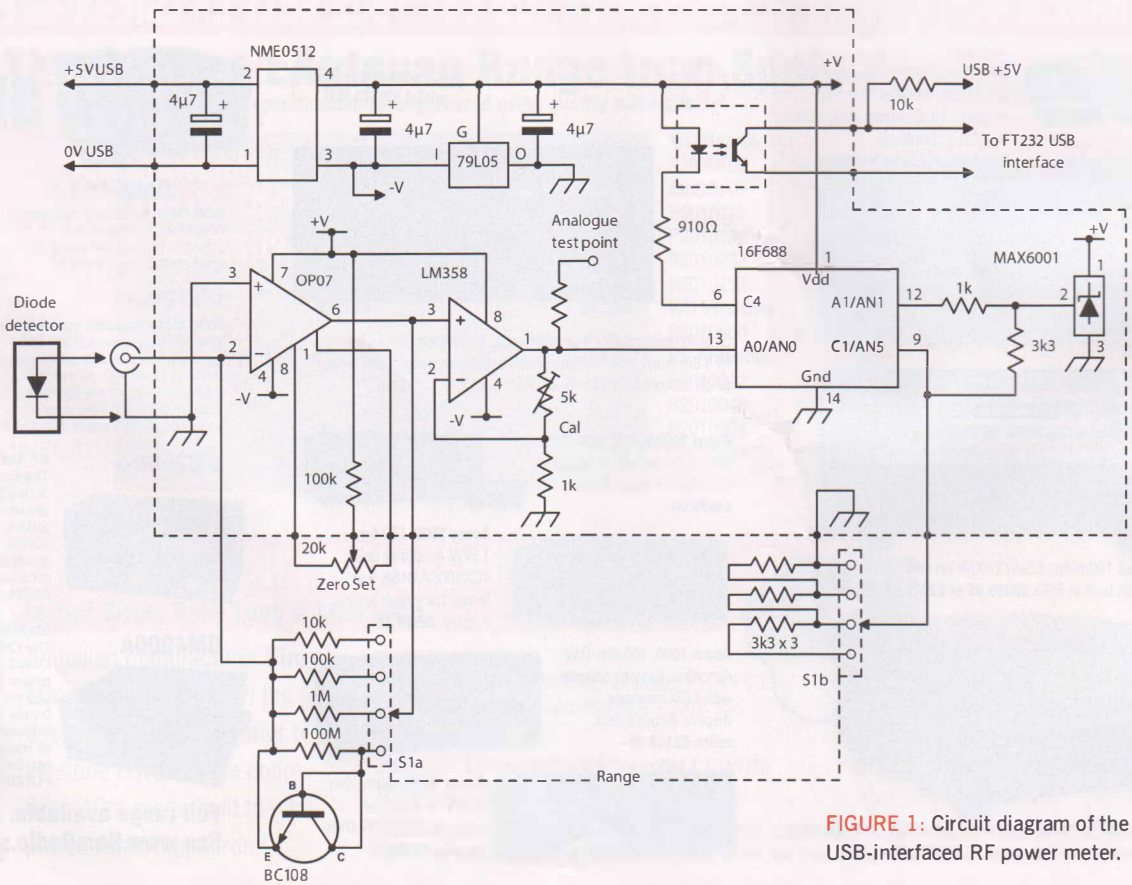

FIGURE 1: Circuit diagram of the USB-interfaced RF power meter.

PHOTO 1: General Purpose Instrumentation Bus (GPIB) connectors and Prologix USB/GPIB interface controller.

PHOTO 2: Three diode detector heads. The two smaller ones, in spite of different type numbers, are near enough identical internally.

Then any commands are sent to the synth until that address is changed by another *addr* command

FREQ 1296350000

Sets the RF frequency in Hz

LEVEL +10

Sets +10dBm output amplitude

RF ON or ***RF OFF***

Switches RF on or off

And it's as simple as that! I send it commands from software via the pseudo serial interface (the COM port where the Prologix box appears) and the equipment responds. Measurement equipment such as DMMs and power meters need to be instructed to send their results, then the data read from the GPIB interface – in this case just as you would from any serial port.

Remote power meter

Unfortunately I don't have a suitable power meter with GPIB interface so for some RF frequency response testing in conjunction with the synthesiser it was necessary to build something the PC could read. Diode detector heads, like those shown on **Photo 2**, frequently appear on the surplus market and they can be used to make an RF power meter that covers a wide dynamic range. The traditional way is to use a milli- or microvolt meter on the diode output to measure the rectified RF. At low signal levels, typically in the range -30dBm to -5dBm, these detectors operate in their square law region where the voltage output is proportional to RF power input [2], and means a relative power meter becomes a straightforward bit of analogue circuitry.

An improvement in dynamic range can, however, be achieved by measuring the current output from the diode into a short circuit. Such a zero-voltage current output is done using a virtual earth opamp input. G3YGF showed, back in the 1980s, how special zero-bias RF detector diodes could manage a true linear square law response (if that isn't an oxymoron) over a dynamic range in excess of 80dB. Those zero bias detector diodes are rare or unobtainable nowadays, but even a simple off the shelf RF detector head with a Schottky diode will give in over 50dB of linear dynamic range using the virtual earth approach.

The circuit shown in **Figure 1** is for a complete virtual earth diode power meter with serial output via a USB interface. The detector input is connected to the virtual earth of a low input-offset opamp. Switched feedback resistors define the voltage output versus current and thus the RF input range. The two smaller detectors of **Photo 2** both provide roughly 450μA per milliwatt of RF; other Schottky detectors can depart from this value by a factor as high as ten, but at least they show a proper square law over a substantial part of their range.

The offset null connections of the opamp are brought out to a multi-turn pot. DC offset become quite noticeable at the lowest power settings so this provides the opportunity to zero things as the meter warms and drifts.

The voltage output from the opamp is amplified in a second opamp, whose function is mainly just to provide a variable gain that can be set for calibration purposes. Should a diode detector of opposite polarity (positive output) be adopted, it also provides an opportunity, with a bit of rewiring, for the necessary polarity inversion. As every diode is different, this calibration stage can become quite important. A simple analogue power meter can be made by connecting its output to a volt meter and with appropriate calibration a remarkably accurate direct reading of RF power is obtained. **Photo 3** shows an earlier analogue version using the same opamp circuitry, but a much wider range of feedback resistors to give 5dB range settings. This offers better than 1dB accuracy over the -40dBm to -5dBm span for the full 10MHz to 12GHz frequency range of the detector head.

I wanted a digital reading meter so the output from the second opamp is adjusted to give a range of 0 to 2.5V full scale and applied to a PIC with internal A/D conversion. The PIC digitises the voltage and sends it as a simple text value of milliwatts expressed in scientific notation on the serial interface. So that the PIC knows the range the power meter is switched to, a second gang of the range switch selects taps on a potential divider and sends a range-select voltage that is also read by the PIC. Thus, the text output can be scaled to indicate the correct value, irrespective of range selected. A typical output from the serial interface looks like *1.2345E-2 mW*.

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PHOTO 3: Analogue version of the diode RF power meter.

The 10-bit A/D converter in the PIC can only offer about 30dB instantaneous dynamic range if results are to be reasonably accurate, so an additional pseudo logarithmic scale is used for the wide dynamic range but less accurate measurements needed for filter response plots. This is generated by using the diode in a transistor's base-emitter junction as a logarithmic generator in the first opamp's feedback path. Vout is proportional to the log of the current though the diode; that generated by the RF detector. Logarithmic detectors were described in more detail in the July 2009 edition of this column. The log detector drifts with temperature, and the 100M resistor has to be used to set some realistic lower power limit. The resulting response is not particularly logarithmic over its full range, and very difficult to calibrate over any extended time period (and it drifts), but appreciably more than 50dB of dynamic range can be obtained on the serial output. When switched to logarithmic operation, the PIC is informed of this by the range switch potential divider, and changes the data output format to a simple number from 0 to 1023 like : '**LOG 0456**' How this is interpreted is now down to automated calibration.

The advantage of GPIB control

And here we now see the big advantage of GPIB control of the sweeper. The uncalibrated wide dynamic range of the diode log detector output can be completely characterised over its full range at the moment it is used. The programmable synthesiser has an accurately controlled output level setting that can be stepped using the GPIB interface, with the resulting power meter output read for each step. That way the controller software can automatically build up a calibration table at the moment it is used, every so often checking itself to allow for temperature and drift. So swept measurements made of any device under test will be corrected and known to be as accurate as the synthesiser's level control.

DC/DC and opto isolation

The circuit of **Figure 1** is USB bus powered and the 5V from such PC interfaces is notoriously 'dirty'. The opamps, since they are operating down to 0V, need negative and positive rails so the best way to cure both issues is to use a 5V to 12V isolated DC/DC converter. Only the +5V rail needs to be stabilised, and that only for the PIC, so a single voltage regulator can be used to give plus 5 and minus (about) 7V supplies. The 79L05 negative regulator operated upside down is a convenient way to get +5V regulated and an incidental unstabilised negative rail from a single +12V floating supply. (Dual ±5V output DC/DC converters do exist, but I just had the single 12V one to hand).

To avoid compromising the noise immunity offered by the converter, opto isolation is used to connect the PIC to the USB interface. This also removes the possibility of ground loops around the test equipment where the galvanic effects of dissimilar metals can introduce a few millivolts of DC that get into the measurement input circuitry and badly upset DC balance when used at low RF power level.

The USB interface is not shown in the circuit diagram, but is an ordinary FT232 USB serial port. I use these in single chip format, but they are readily available built into a cable. See [3] for more details. PIC code for the serial digitiser can be found at [4].

Websearch

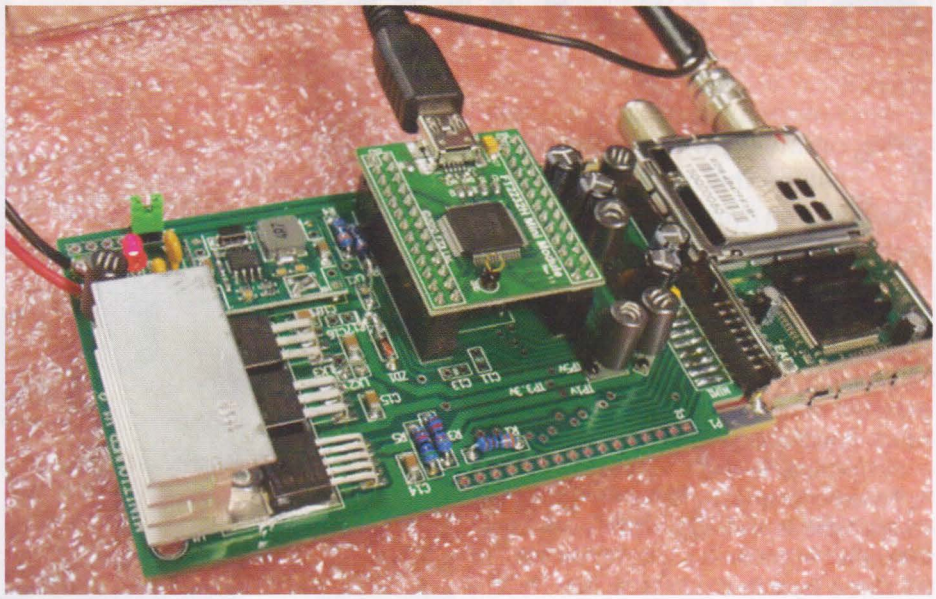
[1] Prologix USB / GPIB interface – www.prologix.biz

[2] Square law operation of RF detectors should not be confused with normal large signal rectification where voltage output is proportional to the square root of power, due to the normal $P = V^2/R$ relationship. The change from square law to rectified operation is a smooth transition and generally lies in the region of -10dBm to 0dBm for most Schottky detector diodes.

[3] FTDIChip USB / serial interfaces – www.ftdichip.com/Products/ICs/FT230X.html

[4] PIC code for the RF power meter digitiser – www.g4jnt.com/RFPowerMeterPIC.zip

146MHz TV Update



G7NSY/P & G8VPG/P at Win Green (left). The USB MiniTiouner Receiver (right).

Two years ago Ofcom gave UK amateurs temporary access to an additional 1MHz between 146 and 147MHz with a power limit of 25 watts ERP and strict conditions of non-interference to other users.

This allocation was intended to be used for experimental modes and as a result the UK band plan was updated to include an allocation for Reduced Bandwidth Digital Amateur Television (RB-TV) [1].

Equipment and information

To enable operation within the 500kHz allocated in the band plan, the ATV community had to develop new equipment based around modified versions of the satellite broadcast DVB-S and MPEG-4 specifications. The initial transmit solution was based on the Raspberry Pi and its camera sending data at 333KSymbols/s; the receiver uses an amateur-designed USB satellite tuner card [2] with the MiniTioune DVB-S reception and analysis software developed by F6DZP [3].

The British Amateur Television Club supported these initiatives including a free download RB-TV special edition [4].

As well as developing equipment to run in 500kHz, early tests showed that even for amplifiers generating only 5W output it would be tough to achieve the required linearity to limit spectral re-growth (which is broadly akin to splatter on HF from an overdriven amplifier). Most stations are now running 80 watt PAs with DC inputs of 60W to produce just 5W of clean RB-TV!

QSOs Using 146MHz RB-TV

Initial on-air tests resulted in the first 2-way QSO between G4CPE and G0WFT in December 2014; G1LPS and M0DTS were the first to achieve a 100km+ QSO, in early 2015.

Since then a number of portable stations have been active on BATC activity days and, on 4 September, G8GTZ/P gained access to Brown Clee (IO82QL). Further south, three other stations went out: G8VPG/P (IO80WX), G7NSY/P (IO80WX) and G8GKQ/P (IO80UU). Despite heavy rain a new record for 146MHz RB-TV was set, first between G8GTZ/P and G8VPG/P at 168km, only to be beaten just 15 minutes later by G8GTZ/P and G8GKQ/P at 182km.

Distances such as 182km might seem trivial for 146MHz. However, RB-TV has a typical bandwidth of over 300kHz and the NoV imposes a limit of 25W ERP. Compare this to a typical 2m SSB station using 3kHz bandwidth and 1kW ERP: RB-TV transmissions are 36dB (4000 times) weaker.

Next steps

The BATC has offered an award for the first 2-way 250km+ RB-TV contact on 146MHz. This remains an elusive target. However the use of even lower bandwidths will help and, as video encoding techniques improve, transmissions using 125KSymbols/s can give acceptable amateur TV pictures and allow for 4dB more path loss.

Noel Matthews, G8GTZ will be presenting a talk on these and other advances in amateur television at the 2016 RSGB Convention on 7-9 October [5].

G8GTZ/P received at 168km by G8VPG/P.

Websearch

[1] www.thersgb.org/services/bandplans/#20
[2] www.batc.org.uk/forum/viewtopic.php?f=15&t=4225
[3] www.vivadatv.org/viewtopic.php?f=81&t=367
[4] https://wiki.batc.tv/images/0/0a/Cqtvrbtv.pdf
[5] www.rsgb.org/convention

Dave Crump, G8GKQ
dave.g8gkq@gmail.com

Antennas

Continuing with the theme of baluns, this month concludes with an overview of some of the techniques used with HF antennas.

Baluns and common mode currents

The majority of HF antennas are inherently *balanced* mechanisms with equal, or near equal, voltages existing to earth either side of the feed-point.

As described last month, when using coaxial cable as the feeder, skin effect causes the outside of the cable's shield to behave as if it were a separate conductor that due to an unbalance allows *common mode* currents to flow (termed I_3 previously). Therefore, when an unbalanced feeder cable is connected to a balanced aerial, it is good practice to use an 'unbalanced to balanced' transition or *balun* to minimise the flow of I_3. This is desirable because the flow of I_3 can affect the antenna's performance.

Detailed HF balun construction guidance is provided in the *Radio Communication Handbook* [1] and the following provides a guide to some of the techniques.

The choke balun

One technique used to minimise I_3 from flowing down the feeder cable shield's 'outer surface' is to add inductance and thus increase the impedance of this path. This is the basis of the choke balun where several turns of the coaxial cable are wound into loops to form an inductor. A typical choke balun is shown in **Photo 1** and comprises several loops of between 300 to 600mm in diameter that are held together using cable ties. Unfortunately, the high frequency performance of this type of balun is affected by the distributed capacitance formed between the balun's loops. This capacitance, along with the balun's inductance, means the arrangement is effectively a high-Q parallel resonant circuit at a specific frequency. This has a tendency of making the choke balun unreliable because its impedance is only high around its resonant frequency, and much lower elsewhere. Therefore, ideally this type of balun is only suitable for single-band antennas or where the spacing between the bands is narrow (eg 10m and 12m). The number of turns to be used depends upon the HF band in use as summarised in **Table 1**.

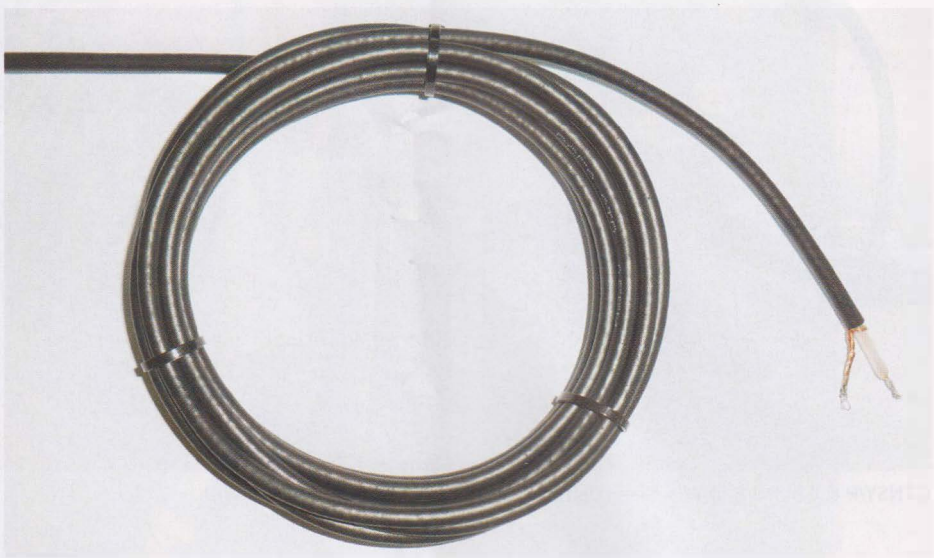


PHOTO 1: Example of a choke balun for the HF bands made from a simple coil of coax.

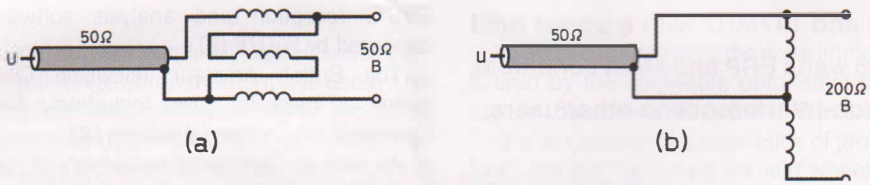


FIGURE 1: Concept of transformer-type baluns. (a) trifilar wire-wound 1:1, (b) bifilar wire-wound 1:4. Note: U denotes unbalanced, B denotes balanced.

Ian White, GM3SEK, described how it is possible to improve the frequency response for this type of balun by adding ferrite cores [2]. This can extend the usable frequency range by about 2:1, enabling the balun to be used for more than one band. Essentially, adding ferrite cores increases the balun's impedance in terms of both its resistive and reactive components ($R \pm jX$). This in turn increases the impedance of the coaxial cable shield's outer surface, enabling common mode current I_3 to be suppressed to a low level.

Ferrite cores also have the effect of increasing the impedance's resistive component, often exceeding 1000Ω. A high resistive component is desirable because this minimises the heat dissipated by the balun due to the common mode current flowing (ie I_3^2R watts). Three examples of the baluns covering the HF bands that used Fair-Rite 2643167851 or Farnell 1463420 ferrite cores are shown in Photo 2, while **Table 2** summarises the construction details for these baluns.

The sleeve choke balun

Another technique is to thread the coaxial cable through a series of ferrite rings to form a sleeve choke balun. Each ferrite ring contributes only a small inductive impedance, therefore to obtain an effective choke requires several rings to be threaded in series. With sufficient ferrite rings, these chokes present a high impedance to common mode currents on the outside of the coaxial cable and some commercially available baluns use this technique. A low band balun using six ferrite rings is shown in **Photo 3**. This balun had an impedance of greater than 2000Ω over a frequency range of 1.5 to 8MHz and greater than 500Ω up to 30MHz.

Transformer/voltage type baluns

Transformer-type (or voltage-type) baluns using iron powder toroid cores can be constructed to cover frequency ranges from 3 to 30MHz. These are auto-transformers that have their origins in the work performed

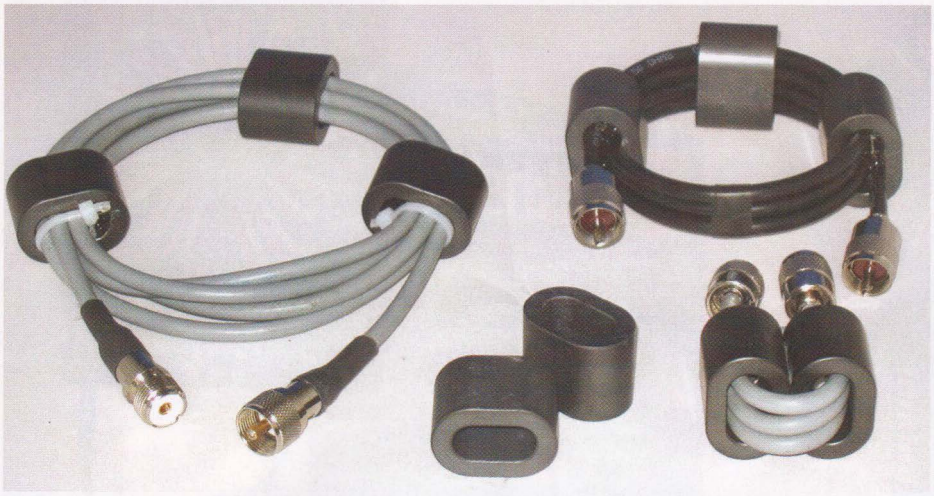


PHOTO 2: Examples of choke baluns. Clockwise from the left: low-bands ferrite choke, mid-bands choke, high-bands choke, and the ferrite cores.

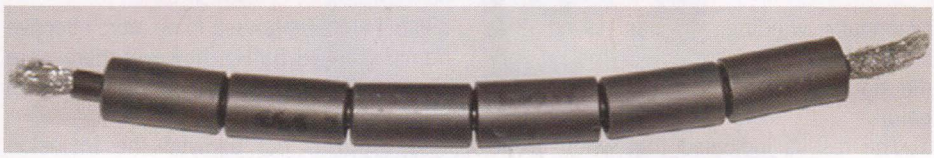


PHOTO 3: Example of a sleeve choke low band balun.

TABLE 1: HF single-band choke balun construction summary.

	RG213/UR67		RG58/UR76	
MHz	Length (m)	Turns	Length (m)	Turns
3.5	6.7	8	6.1	6-8
7	6.7	10	4.6	6
10	3.7	10	3.1	7
14	3.1	4	2.4	8
21	2.4	6-8	1.8	8
28	1.8	6-8	1.22	6-8

TABLE 2: HF Multi-band choke balun construction summary.

Frequency range	Broadband choke details
1.8 to 3.8MHz	2 or 3 ferrite cores threaded onto a 5-turn coaxial cable coil of about 125mm diameter
5, 7 and 10MHz	3 ferrite cores threaded onto a 5-turn coaxial cable coil of about 85mm diameter
14 to 30MHz	2 ferrite cores superglued together side by side and threaded onto a 3-turn coaxial cable coil

TABLE 3: 17 turn trifilar transformer balun measurements with 50Ω dummy load.

	SWR with secondary load of 50Ω		
Frequency (MHz)	*Without capacitor*	*With capacitor connected across primary*	Capacitor value
3.65	1.2:1	1:1	200pF
5.2775	1.2:1	1:1	200pF
7.1	1.2:1	1.3:1	200pF
10.12	1.7:1	1.4:1	200pF
14.25	2.1:1	1.5:1	200pF
18.14	2.5:1	2:1	50pF
21.25, 24.95, 28.5	Over 4:1	-	-

by C L Ruthruff [3]. They function in the same manner as their lower-frequency counterparts, however the low magnetic permeability of the toroid core allows these transformers to operate at much higher frequencies. To enable the transformer to work efficiently, it is important to maintain a high coefficient of coupling between the windings. To achieve this, the wires forming the windings are laid side-by-side to maximise the magnetic field coupling between them. Efficient transformer action requires the primary winding's inductance to be sufficiently large to ensure that the transformer's connection has little effect overall other than that due to the secondary winding's load. However, there will always be some leakage inductance and this is usually considered as being in series with the load. The leakage inductance increases in proportion to the transformer's self-inductance and this is a function of the coupling coefficient between the windings. Essentially, a transformer that works well at 3.5MHz may not work as well at 28.5MHz and this often shows as a worsening SWR as the frequency is increased.

To achieve a high coupling between the windings, bifilar or trifilar winding techniques are used where the turns are effectively wound tightly together with the wires in parallel. The concept of two transformer baluns for impedance ratios of 1:1 and 1:4 are shown as **Figure 1a** and **Figure 1b**. The trifilar 1:1 ratio arrangement tends to increase the leakage inductance and this can limit its upper frequency range compared to the bifilar 1:4 ratio arrangement.

Peter Miles, VK6YSF has published several toroid iron powder core transformer designs. These have included 1:1 and 1:4 impedance transformers and their details are available online [4]. **Photo 4** illustrates a 1:1 impedance ratio transformer balun using a Micrometals iron powder toroid T200-2 core obtained from an online supplier. This balun comprised 17 trifilar wound 3-wire turns with a small gap left between each turn as shown. Plastic insulated 0.7mm diameter copper single core wire was used for the windings. In Photo 4, the stranded blue wires indicate the balanced connection to the transformer with the unbalanced connection shown terminated by coaxial cable.

The 1:1 balun was tested with approximately 10m of RG58 coaxial cable connected to the unbalanced primary winding. This was to simulate the situation

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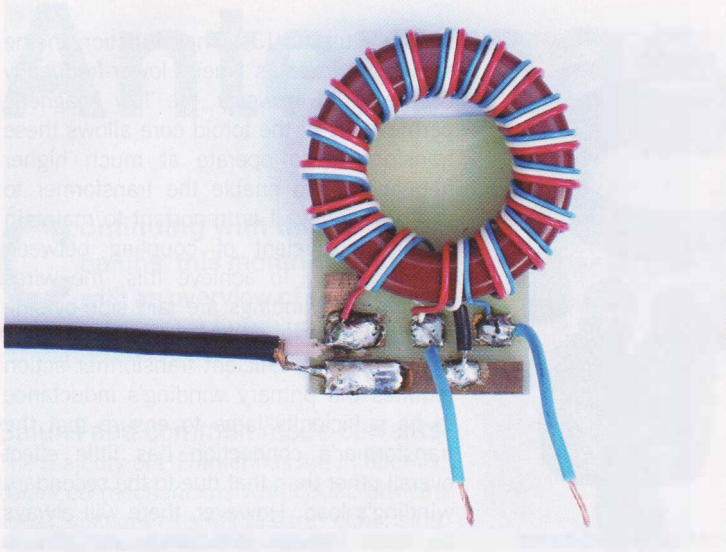


PHOTO 4: Example of 1:1 transformer T200-2 core balun.

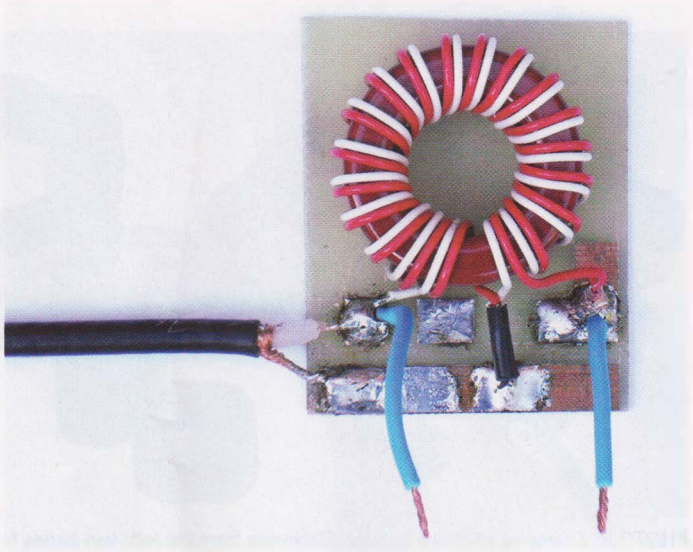


PHOTO 5: Example of 1:4 transformer T130-2 core balun.

where the balun is used remotely from the transmitter (eg at the antenna's feed-point). A 50Ω dummy load was connected to the balanced secondary winding and the coaxial cable was connected to the transmitter via an SWR meter. A 35W signal was applied and the SWR recorded at a range of frequencies, with the results shown in Table 3. To improve the SWR, a capacitor was connected in parallel across the transformer's primary winding where the coaxial cable was terminated [5].

A second series of tests were made for a 1:4 impedance ratio transformer balun using a Micrometals iron powder toroid T130-2 core. This balun comprised 18 bifilar wound 2-wire turns with a small gap left between each turn, as shown in **Photo 5**. Similarly, approximately 10m of RG58 coaxial cable was connected between the transmitter/SWR meter and the transformer's primary winding. The results from this test are shown in **Table 4** for a 200Ω dummy load connected to the secondary winding. It was found that connecting a capacitor across the primary did not improve the performance of this balun.

The results indicated that when tested the trifilar 1:1 balun had a tendency to be more effective between 3.5 and 14MHz provided it was used in associated with a parallel 200pF capacitor (with a rating of at least 500V) across the primary. The bifilar 1:4 balun tended to be more effective from 3.5 to 28.5MHz, however there were specific bands where its performance was inadequate.

Space has not allowed the inclusion of a description of weatherproofing this type of balun. However, the balun could be housed in an ABS box with the cables passing through suitably drilled holes. The arrangement could then be waterproofed using an external grade sealant.

TABLE 4: 17 turn bifilar transformer balun measurements with 200Ω dummy load.

Frequency (MHz)	SWR with 200Ω secondary load
3.65	2.5:1
5.2775	1.4:1
7.1	2.7:1
10.12	4:1
14.25	1.1:1
18.14	2:1
21.25	2.5:1
24.95	1.7:1
28.5	1.7:1

References

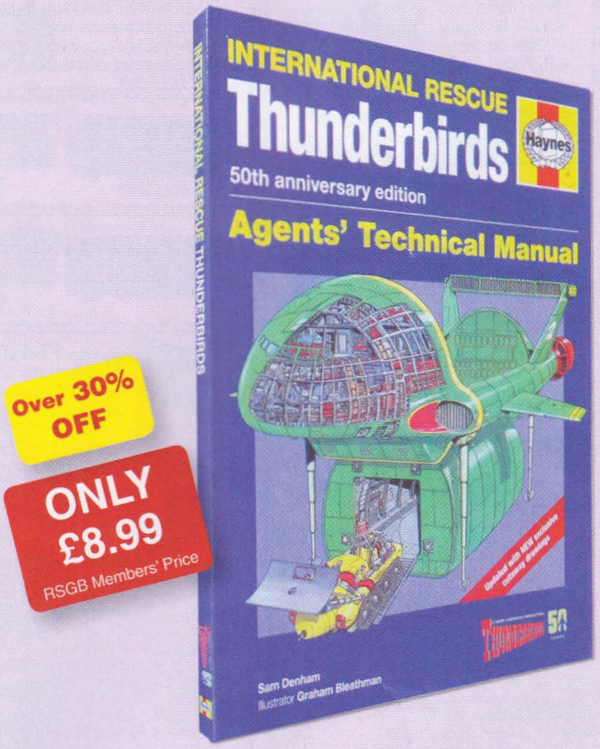
[1] *Radio Communication Handbook 2016*, edited by Mike Browne, G3DIH; Section 14, Transmission Lines, pages 14.11 to 14.15

[2] *RadCom* May 2010, In Practice, pages 38 to 40, Ian White, GM3SEK

[3] Some Broadband Transformers, C L Ruthfoff, MIRE, published by the IRE, 1959

[4] VK6YSF Projects, Peter Miles, July 2012 – http://vk6ysf.com/projects.htm

[5] *Radio Communication Handbook 5th edition*, section 12, HF Aerials, page 12.42



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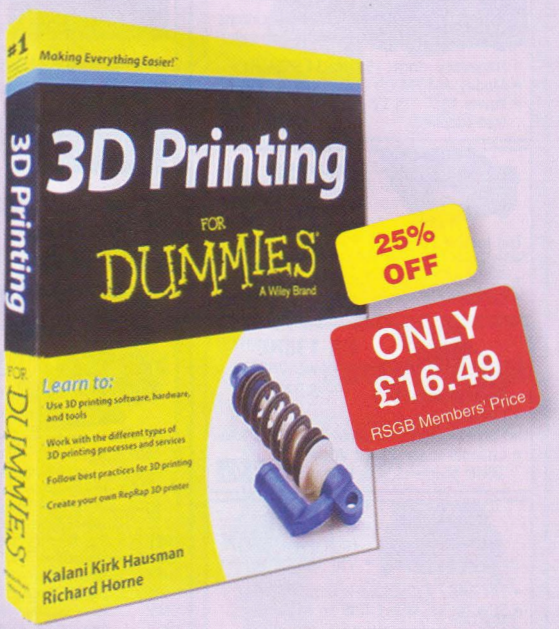

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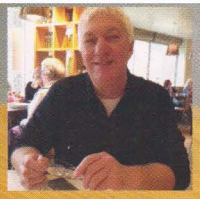

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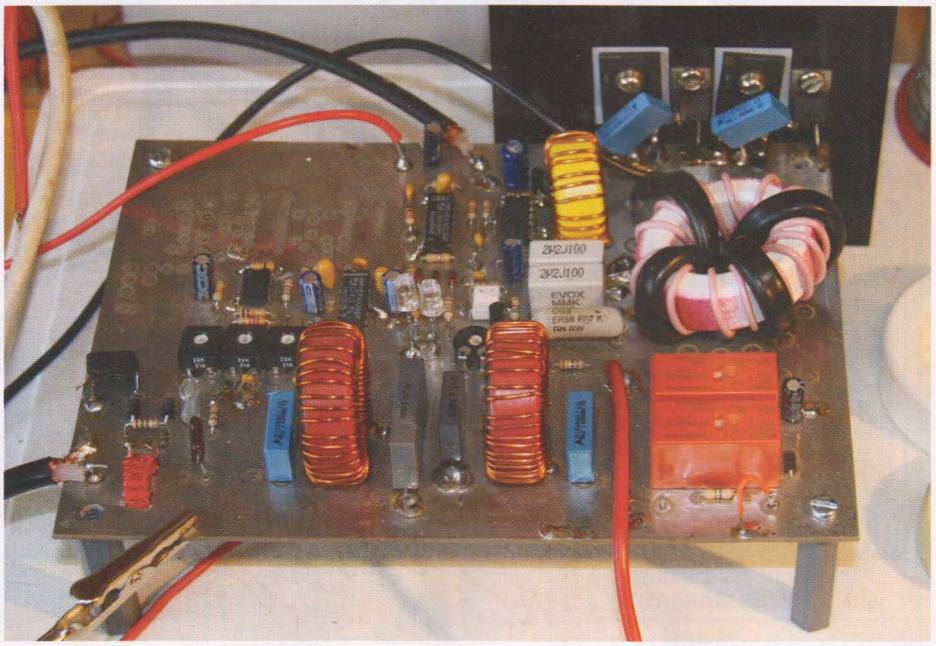
LF

All the latest news from the LF bands from 472 to 2.97kHz.



300W development board under test.

VO1NA has continued to radiate test signals for keen listeners to receive, best reports recently are on 136kHz *OPERA* mode to IZ7SLZ at 5426km. He has been regularly spotted in the UK by Mike, G3XDV and others. Mike's own transmissions on 136 have been received over 2000km away despite high levels of summer static.

OPERA has also been in use on 472kHz with G3KEV reaching SV8RV at 2449km using the 'fast' OP8 mode.

The low down tests continue

DK7FC has been continuing his ULF experiments, attempting to radiate a signal on 2.97kHz. His latest loading coil looks like a giant multi section choke wound on a large pipe. To find out if the signal is propagating into the far field he built a battery powered remote receiving and recording station and left it for a few days at a quiet place 17km away. On returning to the site he was pleased to find that the gear was still there, the batteries had lasted and the Raspberry Pi recorder had kept running, so it was back to base to analyse the received audio stream. After processing 30GB of .WAV files Stefan could see a signal 12dB above noise in a 212nHz bandwidth and 17dB in 47nHz bandwidth. Since this experiment he has been steadily increasing the ERP. The ultimate goal is to get a report from someone like Paul Nicholson in Todmorden, but no luck so far. The next stage is to take the remote receiver 30km away and try again.

Novel receiving system

The space needed to erect an effective receiving aerial for LF is quite considerable unless you use a small loop. Tom, DK1IS has made the best of his urban surroundings to install a multi-mode 'ground dipole' from his garage about 100m away from his house. The total length of the dipole is just over 40m along the back of the row of garages and it is coupled at the 11m point via a ferrite transformer to the remote receiver. Tom has installed relays between each end of the dipole and the earth stakes so that he can have various configurations. He describes them as "earth dipole (both ends grounded), Windom on ground (both ends free) and something like mini-Beverage with special feeding (right side or left side grounded)". There is no mains electricity in the garages, which means there is a lot less interference than at his home station. His setup is solar powered and connected back to the shack by a 5GHz Wi-Fi link.

New PA project

During the summer with its high static levels and short hours of darkness, I thought I might make some progress with a new LF and MF transmitter. It would have to work on any mode that is in use on LF and MF, whilst accommodating any new ones that come along. Some modes, like PSK08, should have a linear PA, whereas others such as JT65 and *OPERA* can quite happily use the more efficient Class D or E designs. Another consideration is duty cycle. Modes like EbNaut require hours of key-down at 100% output, few amateur spec amplifiers are rated for that kind of abuse! Obviously the more efficient switching designs have an advantage here as there is less heat generated for a particular power output.

So is a Class D amplifier the way to go? Chris, 2E0ILY has used one to good effect on 136kHz, but he has had to go to some trouble to generate square-wave drive at twice frequency from his TS-590. The usual divide-by-two push-pull gate drive circuit also raises issues at the start and end of 'key down' periods within the transmission. If the RF drive stops then one FET gate is left biased on and the other off; needless to say, this usually causes the 'on' FET to explode! A protection circuit of some sort is required to protect the FETs – more complication.

In the end I decided to take the conventional route and build an LF/MF version of my 'Throbatron' 160/80/40 FET amplifier. This is a Class AB design using a pair of IXYS switching MOSFETs that I have found to be very reliable in RF service. I have reduced the gain to keep things stable and incorporated a 10W amplifier – again using a pair of MOSFETs – to drive the 500W output stage.

Obviously the Class AB configuration is inefficient and a lot of heat will be generated. I have built it on a heat-sink 'tunnel' with a large fan blowing air through. I hope that will be enough. The power supply has no regulation so as to reduce losses and is built with large components as in the original HF version.

I shall be driving the amplifier from the 1mW output of my Elad transceiver – many sets now have a broadband TX output at low level – and the first stage is an eBay 1W broadband module that I have modified slightly to improve its LF response.

I'm still at the testing stage, but one interesting thing I have found is that the amplifier still works well right up to 80m so I'll still be able to use the same setup on all my favourite bands.

If you don't need a linear and want to generate power more efficiently, then an easy way into Class D is to use one of GOMRF's boards. David has had a 136kHz 300W design for some years and has just released a 472kHz version. It includes SWR and over-current protection and it requires about 2.5V peak to peak drive at twice the desired output frequency. It is ideal for use with the QRP Labs U3S beacon Tx. Details at www.g0mrf.com/630m.htm

A new version of Joe Taylor's WSJT-X (V1.7) has been developed that can generate a "times two" output tone suitable for dividing down when using a transmitter like GOMRF's. To activate the new feature go to "File / Settings / Advanced" and check the box labelled "x 2 Tone Spacing".

Dave Pick, G3YXM
daveyxm@gmail.com

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HF

The sun came back to life during August with up to 5 or 6 sunspot groups showing at one time. The solar flux was a little disappointing but did spend some time in the 90s and briefly hit the 100 mark on 11 August.

Cezar, VE3LYC operating on Cooper Island off the north coast of Alaska.

In September the summer propagation doldrums are generally on the way out so let's hope for some great DX. The CDXC HF Challenge on 15-6m will be well under way by the time you are reading this and you should be able to see what the participants are working by looking at www.cdxc.org.uk

Some good news emerged on the technology front last month when contact was re-established with the lost STEREO satellite. It will be some time before pictures are being received but I am cautiously optimistic that the team will be able to nurse the satellite back to health. Meanwhile the working STEREO satellite is giving us great pictures of any sunspots about to rotate into view.

There is a great deal of HF interest at the RSGB Convention in October so I hope to see many *RadCom* readers there.

DXpedition news

Two operators plan to activate Lesotho in the next few months. Pista, HA5AO will be active as 7P8AO from 15-29 October. The primary purpose of his trip is to deliver humanitarian aid and support to an orphanage so he will be operating in his spare time, mainly CW on 80-6 metres. See www.ha5ao.com for info. Gordon, K7TRB will be active as 7P8VA until 5 November operating SSB, PSK31 and other digital modes on 80-10 metres.

A team from Poland will be active as 8Q7SP from the Maldives (AS-013) from 20 November to 3 December. They will operate CW, SSB and RTTY on 10-160m with several stations. The website is www.8q7sp.dxing.pl

Heinz, DF1YP will again be active as FO/DF1YP from Moorea (OC-046) in French Polynesia from 10 October to 2 November. He will operate holiday style on 20, 17 and 15m, SSB and RTTY.

A big DXpedition team is planning a 15 day operation from Kanton Island (OC-043) in T31 in October 2017 but if you can't wait until then, a smaller team of 3Z9DX, SP3DOI and SP7VC will visit the island in early October and be QRV as T31T. They should be there for 4-6 weeks and will combine amateur radio with voluntary work including the installation of an emergency communication system. The nearby US islands are a separate DXCC (KH1) and a team is working on activating them in 2017 as well – but there is no word yet on the necessary permit from the wildlife people who can be very reluctant to allow any access at all these days.

Team Saint Martin (NA-105) has announced an operation from 1-11 December focusing on the low bands. The operators are K9NU, N9TK, W9ILY and K9EL and will sign FS/home call. QSL to their home calls.

An American team will be QRV from Martinique (NA-107) from 29 October to 4 November. The team will include FM/N7BF, FM/WT4BT, TO40C (AA40C) and TO6ABM (W6ABM).

Peter, S54W, Janko, S57L and Rado, S59ZZ will be active as 9G5AM from Ghana from 19-26 October.

Aki, JA1NLX and Iko, JI1CNA will be active as 3D2YA from Mana Island (OC-121) in Fiji on 21-25 October. They will operate mainly CW, with some SSB and RTTY, on 40-10m.

Masa, JA0RQV will be active as A35JP/P from Niuafo'ou Island (OC-123) from 28 September to 4 October. He will operate CW and SSB on 80-6 metres, running 100 watts into verticals.

After their Pitcairn visit as VP6J, Nob, JF2MBF and Ken, JA2FJP will be active as follows: 20-29 September from Niue (OC-040), 4-10 October from Tuvalu as T2J, 11-13 October from Fiji as 3D2GG. They will operate CW, SSB and RTTY on 160-10m.

Steve, W1SRD, will be VK9LX from Lord Howe Island (OC-004) on 1-8 October. Les, NI1L, will be visiting Lord Howe Island from 20-27 September as VK9LN.

Jean-Philippe, F1TMY should be active from Djibouti as J28PJ for at least 3 years. He has an inverted L for 160, Spiderbeam 5 bands Yagi, 5 ele 50MHz Yagi, G5RV, ATAS 120 for mobile and /MM activity.

Dom, M1KTA will be active from Rarotonga in the South Cooks as E51KTA from 10-19 March 2017 including the Commonwealth Contest.

IOTA

Craig, VK5CE will be active as VK5CE/P from Granite Island (OC-228) many times over the next 6-12 months until demand is satisfied. The operations will be from local dawn to dusk only, as visitors are not allowed to stay overnight on the island. Check OC228.

blogspot.com.au for more information. This is an easy island to access over a long wooden bridge and I was briefly QRV from there about 20 years ago. Fairy penguins live in burrows on the land and the noises emanating from the ground at night are very strange. Craig will also be activating Gabo Island (OC-196) on 31 January to 1 February 2017. The last organised IOTA DXpedition there was back in 2001. See http://oc196.blogspot.com.au/ for more info.

K9AJ and KD6WW successfully activated the King George Islands in Hudson Bay (NA-159) and were briefly QRV from Sanikiluaq in the Belcher Islands afterwards. Not too far away, Cezar, VE3LYC, was very active from Cooper Island (NA-172) off the north coast of Alaska, making 1890 QSOs with 1651 different stations. Cezar was the guest of a scientist studying global warming and used solar power plus batteries in deference to his host's concerns. Cezar will be talking about some of his DXpeditions at the RSGB Convention in October so book your place now to hear about his adventures.

RZ3FW and R4WAA will be active from Zanzibar (AF-032) as 5H1WW from 19-28 November.

Operators from the Dominican Republic will be active from Beata Island (NA-122) as HI1UD from 25 January to 1 February 2017.

Correspondence

Fred, G3SVK found the best time for DX was on 20m during the evening when there was a lot of Far East activity. He was looking hard for T2COW but without success – the signal was never strong enough to hear on a dipole. CY9C produced further DX chasing opportunities. Fred found: on 17m - D2EB, 4S7VG, 7Z1HL, JAs, OJ0B, A45WG, VC2Q (Zone 2), A45XR, YB71RI/1, TZ4AM, 9Q6AL, E21EJC, T6EU, 7Y9LI; 20m - 9M2ROL,SO1WS, 4J29RA, 5Z4/JM1CAX, OA1F. HH2/HB9AMO, T88GA, ZP6CW, FM5FJ, HP1RN, 6Y5/AC4BT, FM5WD, XV9NPS, HS3NBR, OJ0W, KH2LO, OJ0B, E20HHK/P, JW/LB5WB, HS3XVP, YB71IR/4, YB71IR/3, JA1KIH, ZR8I, 9M2ZAK, 3W4XX, V85TL, TR8CA, YB71IR/8, 3B8CF, VP8LP (SSB), 5H1XX, P4/DK4YD; 30m - 4K9W, 5B4AMM, D2EB, HK1MW, OH0/OH2IS, 4S7AB, 5A1AL, OJ0DX, CE3CT, NP3CW, CY9C; 40m - 6Y5/AC4BT, A61Q, DU7ET, OA1F, KP4CPC, OJ0W, HL4RBR, OH0/OH2IS, CO2LI, 6Y5N, FY5KE, 3V8SS, CO8ZZ, TI5W, 3W4XX, OJ0DX, NP3A, OY9JD, VU2GSM, CY9C, CO8CY, KP4/KB7Q, VK2GR, VK8HW, YB71RI/1, YB71RI/6, 7X4AN; 80m - OJ0DX.

Dom, M1KTA and Andy, E51AND discussing expeditions at a Camb Hams meeting.

Chris, G8APB worked CY9C on a range of bands and modes including 15m CW and RTTY, 17m CW RTTY and SSB, 20m CW SSB and RTTY. He was also chasing the Indonesian YB71RI/n stations celebrating the 71st anniversary of independence and managed to get all 10 stations to qualify for the Gold award. Finally he made a start on the Algerian lighthouse award with 7Y9LI on 20m RTTY.

Peter, G3HQT found conditions were improving and reported: 17m – 5H1XX; 20m – OA1F; 30m – RI1FJ, CY9C; 40m – FY5KE.

Ken, CT7AGZ (G4RWD) found CY9C for an ATNO. His report included: 12m – VP6J; 15m - OH0TA, TI5/N4YDU, 5H1XX, CY9C; 17m - OJ0B, HH2AA, TR8CA, 5H1XX, TY2AC, CY9C; 20m - A93JA, JW/LB5WB, OH0TA, 9J2BO, P4/DK3YD, V44KAI, VK2AOH; 30m - YV5LAY, CY9C; 40m - VK3IO, YV5LAY, CY9C.

Gordon, G3PXT reported in on 20m only with: many JAs, RI1FJ, UP2L, 9M2PUL, JW/LB5WB, 4J3J, A45XR, HZ1SX, YB71RI/6, YB71IR/1, VU2AE, YC1MR, EA9BO, J69DS, YC2MDU, EP3SMH, ER3MM, HI8CSS, TA3MHA, FG1JS, YV4AAX, 5C5W, SU9VB, HL4RBR, FG5LA, ZA3/IU7GSN, OJ0DX, WP4U, CY9C, OX5T, HS0ZHC, HS0ZIN, 4S6NCH, OH0M, RI1C, OJ0B.

Peter, G4XEX had technical problems last month so his Cobweb antenna was down at 5ft ("a leaky dummy load on a stick") and his linear was in for repair. With 100W to a barely functioning antenna he worked: on 15m - 7Y9LI, VP8LP, YB71RI/1; 17m - OD5PY, TR8CA, CY9C, E21EJ, 5E3A, 7Y9LI; 20m - JY5HX, V85TL, OD5PY, BG4GOV, SO1WS, RI0FS, 3B8CF, 7Y9LI, TZ4AM, 9V1YC, AT2L, 9M4LHN.

Richard, GI4DOH managed CY9C on 6 bands 80-17m and updated his score to 195 DXCCs this year.

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

TABLE 1: 2016 Worked DXCC Entities (ranked by All). Showing Top 3 from RSGB members table in Club Log plus submitted scores or Club Log scores of recent correspondents where available.

Call	CW	SSB	Data	All
G4PTJ	196	131		258
M0NKR	149	226	69	257
G5LP	244	24	181	251
G1XOW		230		231
G3SVK	198			198
GI4DOH	190	22	46	195
G4IDL	192			192
G0RPM	124	52	123	189
CT7AGZ	178	1	2	178
G3HQT	172		70	174
G4XEX	85	98	89	151
G3PXT	65	95	123	135
G4CCZ	102	56	42	127
G3YMC (QRP)	100			100

TABLE 2: Forthcoming activity.

Until Feb	TZ5XR
Until 5 Nov	7P8VA
Until 25 Nov	VP6AH (OC-044)
Until 24 Sept	JT by OK ops
Until 30 Sept	D66D
Until 25 Nov	VP6AH (OC-044)
20-27 Sept	VK9LN
20-29 Sept	Niue by JA ops
23 Sept – 4 Oct	MD by DL ops
24 Sept – 24 Oct	T30COW by KC0W
25 Sept – 8 Oct	VK9NZ
27 Sept – 4 Oct	T2R
28 Sept – 4 Oct	A35JP/P
Early Oct - Nov	T31T
1-8 Oct	VK9LX
4-10 Oct	T2J
8-23 Oct	S9YY
10 Oct – 2 Nov	FO/DF1YP
11-13 Oct	3D2GG
15-29 Oct	7P8AO
18-21 Oct	H44GC
19-26 Oct	9G5AM
21-25 Oct	3D2YA
25 Oct – 26 Nov	H44COW by KC0W
27 Oct – 10 Nov	ZL7 by 6Gs
29 Oct – 4 Nov	FM by US ops
4-14 Nov	XU7MDC
6-16 Nov	V63AJ
7-19 Nov	6V1IS
10-22 Nov	TL8AO
17-20 Nov	KH2/DF8AN
mid Nov	AF-020 by Is
19-28 Nov	5H1WW
20 Nov – 3 Dec	8Q7SP
1-11 Dec	FS by US ops
16-18 Dec	6V1A
Jan-Feb 2017	E51MAF Nth Cooks
25 Jan – 1 Feb	HI1UD (NA-122)
31 Jan – 1 Feb	VK5CE Gabo I.
10-19 March	E51KTA
April ??	San Felix CE0X
28-30 July	VA2NDX/VY0 (NA-173)

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VHF/UHF

The big highlight of the VHF DXers August calendar is the Persieds meteor shower and, in 2016, it really didn't disappoint.

The jury is out at the moment as to whether the 2016 Persieds could be classed as an 'outburst'. However the predicted ZHR (Zenithal Hourly Rate) of up to 200 could well have been achieved. Peaking from the evening of 11/12 August visual displays have been well documented for those in parts of the UK who were lucky enough to have no cloud or urban light pollution.

Radio wise this period is a magnet for DXpeditions as the high meteor rate gives the chance to make long distance contacts on 50/70 and 144MHz and, in exceptional cases, 432MHz. This year was no exception with some very well located, high power, quality operators making the effort to put rare DXCCs and locator squares on the bands. During this period there also a Meteor Scatter Sprint Contest organised by the Make More Miles On VHF team (MMMonVHF) [1] in cooperation with *DUBUS* magazine [2] and *Funk-Telegramm* [3].

Expeditions

From a UK point of view we were spoilt for choice with all of the major expeditions within the 2000km range on central UK.

SF3NR aka SK3MF, JP92fw. Well known Finnish operator Lasse, OH6KTL and his father Ben, OH6PA activated the rare locater square JP92 during the Persieds meteor shower. The hilltop contest station, SK3MF, is located on private land owned by Hans-Erik, SM3LIC in Nordingra, Sweden to whom the team express their thanks for the opportunity to use the station. Taking over a year to organise, the station was on the air 24/7 for three days. Jussi, OH6ZZ who has been QRV as OH8K and OJ0B plus many other top quality expeditions also joined the team – SM3LIC, and SM3UZS, Magnus, SM3VAC, Stefan SM3RIU and Ulf, SM3RAB who also visited. The SF3NR station comprised a Yaesu FT-736R, homebrew MGF 1302 pre-amplifier, a parallel 2 x 3cx1000a7 2m power amplifier and 6 x 15 element Cue Dee Yagis located at 200m ASL pretty much on the water front. The team made almost 250 ms QSOs with the odd duplicate and 9 EME initials were also worked. A fantastic expedition with many stations throughout Europe reporting 30 second ++ bursts as the Persieds rolled on through its peak.

EI9E expedition to another rare square expedition – IO44.

EI9E from rare Irish locator IO44. John, EI2FG reports on another rare square expedition by the EI9E team to IO44. "This was our sixth rare square activation during the Persieds and the event has grown bigger and better for us as we've progressed. Basically we now use almost the same setup as for VHF NFD in early July but this year we decided to leave to leave some of the 70cm and 23cm gear at home. We took the 2m EME antenna again this year where the mini tower for the antennas bolts onto the sheep trailer that was new for last year's outing to IO43. We expected this site to be very quiet: how wrong we were! All previous Persieds expeditions were sited close to coastal VHF & UHF transmitting stations belonging to the national broadcaster, where we suffered a certain amount of interference.

"Tuesday morning saw work starting on the antennas, with the 2m EME array being first, to try and catch the good conditions at the beginning of the week. Bit by bit the system came together and once we had a system working on 2m we put out a CQ on 144.357 and the band came alive!

"By evening all three bands were operating and the propagation was interesting. There was something of everything. We often had very good Es on 6m and even Es plus MS giving pings and bursts at over 2700km. On Wednesday evening we shifted to JT65 for EME and worked until the noise level swamped receive signals.

"We didn't notice the noise level rising as the antenna followed the moon as the receiver AGC fooled us. We got good reports on EME and these reports continued while our receive signals disappeared, proving our transmit chain including relays, splitter and antennas were still good. The preamp still amplified so we were left scratching our heads. We were looking for faults while there were none and later discovered the noise in certain directions. We ended up with 273 QSOs on 2m, 80 on 4m and over 520 on 6m. Of these, 64 were EME using JT65 and some of the first few were strong enough that we could probably have made CW QSOs if we had tried harder. The totals sound low for six days of operation but bear in mind that many MS QSOs took an hour or more. The equipment worked reasonably well. The 2m amplifier ran from Tuesday afternoon until Sunday afternoon with maybe a 4 hour break overnight and running mostly at 30 seconds on, 30 seconds off. In fact JT65 was easier on it than FSK as it was only on for 48 seconds in 120! Our biggest battle was with software configurations of interfaces and the logging program. Probably the most rewarding contact on 2m was during the short window on EME was with VK5APN at moonrise. Some very nice QSOs on 6m were with OH3DP, ES2MA and another with an SV1 who had been trying for days on MS and they just popped up 59 on SSB on Sunday morning! We missed out on a First between EI and the other active DXPedition C37MS on 4m although we did work them on all

three bands. This First went instead to Pat, EI8IQ who has been with us before but couldn't travel this year. We have completed the most wanted squares request from the west coast of EI. We took our input from the eMWS list on MMMonVHF [1] and we would encourage users to vote there before we decide on where to go next year. We may just start from the beginning again – we'll decide later once eMWS has been updated. One Land Rover made the ultimate sacrifice in bringing you IO44 square. Billy's 1997 Discovery blew a head gasket on a long pull up a hill on the way home and on first inspection it's probably terminal."

The EI9E team members were John, EI2FG, Billy, EI7FJ, Jim, EI8GS, Declan, EI9HQ, Pete, G4CLA and Billy's partner Janet.

More expeditions

From Iceland there were two high power stations active located on opposite north/south parts of the island. They gave square chasers the chance to work two locators, HP and IP, rare in themselves. Olafur, TF3ML/p in HP93 is a well known HF/VHF operator who produces a fantastic signal from his mega station truck, mast trailer and serious QRO combination. Benedikt, TF3CY/P was QRV from locator IP24 but whilst working many stations it was possibly not as good a location as Olafur from HP93. Much further south and possibly warmer C37MS (JN02) was activated from Andorra by Hans, ON5AEN and Jean Jacques, ON7EQ. On location they teamed up with local members Gerardo, EA3HCJ, Beli, C31KC, Joan, C31US (President of URA) and Jose, C31JS who gave invaluable support to the expedition. 9A/OK2ZAW (JN83) and 9A/OK1MU (JN73) was an interesting dual location expedition where the operation was moved from JN83 to JN73 [4].

G8VHI/MM

Reg, G8VHI combined a family cruise holiday with operating from some very rare 'wet' locator squares aboard the P&O flagship *Britannia*. Travelling from Southampton up to the Norwegian Fjords, the disadvantage was the orientation of the ship and the cabin position. Basically Reg was able to work into EU on the outward leg and over to the UK/EI on the return. For anyone going to the RSGB Convention, Reg will be giving a lecture on his experiences and the amazing amount of planning that went into this expedition. The station was not equipped for meteor scatter but general tropo propagation where results were excellent.

Band reports

Lynn, GW8JLY (IO81) said, "I found the Persieds meteor shower to be very good this year and I completed around 40 ms QSOs. New locators worked were IO44 in a back scatter MS QSO with EI9E and JP92 in a MS QSO with SF3NR. I also worked C37MS (JN02) in Andorra for a new country. Other highlights include working TF3ML/P (South West Iceland) again operating from locator HP93 in a very quick QSO with many long bursts and a QSO with OH1ND that started as a MS FSK441 QSO but ended in SSB as some of the bursts in our QSO were very long indeed. My only regret was failing to work TF3CY/P in IP24 as this would have been a new square. One thing I did notice about this year's Persieds as compared to last year's was that there weren't as many very long bursts. The longest burst I saw was just under 2 minutes duration. On 19 August Reg, G8VHI operating as G8VHI/MM gave me the opportunity to work the rare 'wet' locators JO15, JO14, JO13 and JO12 on the 2m band – all these were new locators for me.

John, G4SWX (JO02) reports, "June, July and August are usually the best time to operate on VHF and this year has been no exception with some excellent meteor scatter. Although only 48 QSOs completed, some excellent distances were achieved over 2000km: R3ICQ (KO77) 2199km, 9H1CG (JM75) 2083km, R3YA (KO73) 2202km, RO3X (KO73) 2195km and R1AN (KO78) at 2167km. Back to 14 July and EA8TX (IL18) at 3050km was the best of about 20 tests up to that date this year and our first 2 way QSO in 2016. On 10 August a new DXCC in C37MS was worked with most of the major expeditions worked. Moonbounce was again pretty good, 110 QSOs in this couple of months, the highlight being tests with Joe Taylor, K1JT of his new, much talked about QRA64 mode that will be included in a future release of WSJT-X. Two new DXCCs were worked on 28 June 6Y5AZ (FK18) Jamaica and 22 July JT0YTX (NN58) Mongolia that took four nights chasing until 2am to work for DXCC #128."

Mike, GM3PPE (IO85) says that "on the last day of June there was a great opening to Svalbard and, like many other UK stations, I got JW7QIA (JQ68) in the log. July here in IO85 was characterised by numerous openings throughout Europe but no big multi-hop propagation. I was pleased to put C31CT(JN02) in the log for DXCC #60 this year on Six, all worked with a small 3 element Yagi at 16ft off the ground.

"August started with a bang! At breakfast on 5 August the band was wide open to Israel and the eastern Med. I worked 4X4DZ, 4X6FR both in KM72, and 4Z5SW, 4Z5IW both in KM71. Mid-morning there were strong signals coming through from Cyprus and 5B4AGN and 'AHJ (KM64) went into the log. By midday Ukrainian stations were coming in strongly, with UB7K (KN58), classed as Russia, the best of the bunch. The following day, the band opened in the evening (1800UTC), again to Ukraine with R6KA (KN75) and special event EM25KRR (KO30) the most notable worked.

"On 10 August there was excellent propagation to North Africa and SO1WS(IL46) was worked for a new country. EI9E in rare IO44 was a good signal on the 12th. More big excitement was OJ0DX (JP90), a new country for me and many others. With the Olympics on television I missed the big transatlantic opening but was pleased to work multi-hop Es to SV5BYR/5 (KM36) for yet another new DXCC. After the rather poor July, August has performed like a star, three new DXCCs in one week – could it be the Olympic effect?"

Martin, GM8IEM (IO78) tells me that "quite a few new squares were worked on 2m MS during the Persieds using FSK441. The highlights being RK1AS (KP40) on 12 August at 1992km, taking 2 hours and 12 minutes to complete for a new country, IZ4AIK (JN63) 2019km on the same day, and TF3CY/P (IP24) 852km on the 13th. Thanks also to the guys on the EI9E (IO44) expedition for the new square on 6m and 2m, and to GM6VXB/P (JO07) on the Buzzard platform for a new square on 6m."

Bob G4BAH/ES2BB (G0KPW) SK

I met Bob many years ago at the Friedrichshafen Ham Radio exhibition before it moved to its new location. Somehow we ended up spending the afternoon chatting about VHF and looking at the high power amplifiers, valves, tuning units and other bits and pieces and how he could get them back to UK. As we had flown by Ryanair from Stansted, Bob was trying to find out how he could transport the gear back to the UK, trying to get the RSGB van to take the heavy pieces back with them! He also helped to find my son – who while we were talking about all things VHF got himself lost! Bob's enthusiasm to improve and push the possibilities of VHF was an inspiration and in this vein the G0KPW station was born. JO02rf was a perfect location to work deep into Europe with fantastic results in many contests. Bob's operating was a no messing about, get stuck in, call CQ style and this produced numerous contest win, with the KPW station being operated by many guest operators as well knowing how good it was [5]. The array of antennas developed by Bob was something most of us could only dream of and certainly delivered outstanding the results. Rest In Peace Bob, your enthusiasm will be sadly missed.

Sign off

A really busy month on the bands throughout August with a big thanks to all the expeditioners who spend their time, effort and considerable cash in venturing out to many remote locations. Please send in reports by the 2nd weekend in the month particularly with the potential for early autumn tropo. I'm looking forward to the RSGB Convention in October so see you there.

Websearch

[1] www.mmmonvhf.de
[2] www.dubus.org
[3] http://funk-telegramm.de
[4] http://ok2zaw.blogspot.co.uk
[5] www.mrsap.org/page.php?10

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GHz Bands

In addition to the latest mm-band activity, this month we look at a novel portable microwave beacon.

PHOTO 2: Inside G4JNT's PortaBeacon. Photo: G4JNT.

PHOTO 1: The multiband setup used by G8CUB and G0FDZ at Hackpen. Photo: G0FDZ.

Millimetre band activity

Rob, MODTS reported in July that he's now active on 24GHz. We really need more activity above 10GHz to avoid the understandable frustrations reported by Martyn, G3UKV in the late July event, after just one 24GHz QSO in return for a day's outing. The band's normal range is short; I have no local activity on that band and contests never seem to coincide with good conditions or anomalous propagation. Perhaps a rapid deployment to a local hill when conditions are good might be a better approach.

For the millimetre contest in July, Roger, G8CUB travelled to Hackpen (IO91cl) with a multiband station. He was rewarded with a 47GHz QSO with Keith, GW3TKH/P at 93km but signal levels were down, 55 each way on SSB. They then moved to 76GHz but struggled until they completed a 1-way QSO, exchanging S1 reports, well down on results on the same path last September. Keith could not hear Roger's 50mW signal. However a 2-way 76GHz contact with G4LDR was very easy, 59+ each way. They then worked on 47GHz with big signals. Roger then moved to Clyppe Pypard (IO91bl) to try and work back to G0FDZ at Hackpen. On 134GHz signals were again down on what was expected; they just managed a 1-way contact at 5.3km. They then tried 122GHz, but only a weak signal was received from Chris, G0FDZ, too weak to identify, or peak. From Hackpen, Chris completed contacts with G4LDR on 24/47/76GHz, and 1-way with GW3TKH/P on 47GHz. **Photo 1** shows G8CUB and G0FDZ at Hackpen.

A novel beacon idea

Andy, G4JNT sent me details of his 'PortaBeacon': a self-contained, portable 10GHz test source / beacon that can be taken to a site and rapidly deployed with a minimum of setting up. The design uses an integral GPS receiver to generate lat/long and Maidenhead locator data, which is transmitted via WSJT. **Photo 2** shows the internals. An LMX2541 fractional-N synthesiser [1] generates RF at 3.4GHz, which deliberately overdrives an old 2-4GHz commercial amplifier to generate a strong third harmonic on 10368MHz. This is selected by a 2-element evanescent filter [2] built in WG20, which drives an ex-EW 8-12GHz 100mW amplifier. The system reference is a Morion ovened oscillator. A PIC uses GPS time and calculated location data plus a stored callsign to generate two WSJT JT4G messages sent alternately: the first, on even minutes, contains callsign and a fixed string to pad out the space; on the odd minutes it contains the full resolution locator and a repeat of the minutes unit digit.

GHz bands at the RSGB Convention

GHz bands will again be well represented at the RSGB Convention with the usual UK Microwave group stand showing off GHz bands technology and a chance to meet some GHz enthusiasts. I'll be doing an introduction to 1296MHz DX operation for VHFers looking to try something new. I'm pleased to see that Peter Blair, G3LTF will be giving a talk on 'the rise and rise of 5.7GHz EME'. Peter is a true legend in the world of EME, having made many ground-breaking QSOs over the years (as well as being active terrestrially).

Finally

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

Websearch

[1] www.g4jnt.com/LMX2541_Synth_Module.pdf
[2] www.g4jnt.com/EVANFILT.pdf

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IOTA from Arranmore Island

Stockport Radio Society's (SRS) Peak Contest Group entered the Islands On The Air contest from Arranmore Island in Southern Ireland using EJ0SR.

This year, 8.1 million points were claimed from 2282 QSOs, up from 5.4 million and 1731 QSOs last year. While numerically a significant improvement, it must be noted that the contest rules changed and we entered the MULT2 section. MULT2 permitted the transmission of two signals at any time contacting any station.

Planning for the event started 12 months ago when we discovered last year's venue, a lighthouse on Rathlin Island, was going to be unavailable. Searching around, we found another lighthouse off the northwest coast of Donegal where adjacent cottages could be rented to accommodate the operating team and station.

L-R: Pete Ridley, M1PTR, Kieron Murphy, M5KJM, Carsten Steinhoefel, G0SYP, Tom Spence, M0DCG, Evan Duffield, M0TJU and Bernard Naylor, G3SHF.

Arranmore island

Within the lighthouse compound was a large field we could use to erect our antennas, including TH5 and Hexbeam antennas mounted on 30ft masts fashioned with the aid of many hours of lathe work from Phil, 2E0XYA to fit in the club's new trailer.

While the lighthouse was on top of 150ft high cliffs, the ground rose sharply to the top of the compound, requiring 100m of coax to reach each mast peering over the headland to the east where the majority of our QSOs were destined. The pathway from North through West to South was, for most of our stay, just blue skies and blue sea.

Our team of six (Tom, M0DCG, Pete, M1PTR, Kieron, M5KJM, Evan, M0TJU, Carsten, G0SYP and Bernard G3SHF) travelled across from Holyhead to Dublin by ferry, then drove to catch an evening ferry from Burtonport to Arranmore Island.

There was then a three-mile, potholed, drive across to the lighthouse located on the treeless and turf-covered west side of the island. Plenty of sheep covered the hillsides while lots of seabirds were visible from the site though surprisingly, only one boat was seen to pass by in the week we were there! Clearly traffic has changed since it was built!

COMREG, the Irish licensing authority, issued us with a temporary licence EJ0SR for the week we were there. The EJ prefix is used for any station located on a Southern Ireland island, while EI is used on the mainland. Though the licence conditions in Ireland are very similar to the UK with a 400 watt maximum power output, interestingly, amateurs entering contests are permitted to run up to 1500 watts. Unfortunately our amplifiers could not attain that level of output!

Antennas

Clear weather simplified the erection of our two masts supporting our beams for 10, 15 and 20m; dipoles for 80 and 40m were cut for both CW and SSB band sections. Evan's Spiderpole was pressed into action along with 6 radials making an excellent 80m ground plane.

A multiband Hustler vertical was erected as far as possible away from the transmitting masts and enabled spotting receivers to be used without too much interference or blocking. Mobile phone access was very limited, as was internet access to gain RBN or DX Cluster spots. Carsten's Windom antenna used with Skimmer equipment did provide us with CW spots to assist operation.

Our station was set up in the 18' by 12' lounge of one of the cottages after all the furniture had been carefully removed.

Operating

On Saturday morning we were pleased to see sked contacts with Tony and Al at Walthew House (SRS HQ) and Christine, LA9CSA on 40m – thank you. Last year's propagation was such that we were unable to make any contacts with club members. Conditions in the contest were far from ideal with 10 and 15m not showing the volumes we have enjoyed in the past. 20m kept us busy though the early morning traffic did allow some of the team members to get some sleep.

All too quickly the contest ended at 1pm on Sunday and the antennas and station disassembled by late afternoon in time for us to re-cross the island to yet again retest the quality of the local Guinness. Here it is important to stress that increasing the sample size is to be recommended and will always increase the accuracy of tests if only someone can remember the number in the first place!

We travelled with Irish Ferries on the *Epsilon* going out to Dublin and back on the *Jonathon Swift* and used the Arranmore Blue ferry *Morven* to cross to the island.

My thanks to everyone involved with the contest, for me and I'm sure the other team members, it was a thoroughly enjoyable adventure.

Bernard Naylor, G3SHF
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EMC

The *RadCom* EMC Column was initiated by Hilary Claytonsmith, G4JKS, in April 1989. Over the next seven years I undertook various pieces of technical work that were published in the column and took over writing it in October 1996, so this edition marks my 20th anniversary. This month's extended edition contains the regular look at contemporary EMC items, plus a look back at some of the items from 1996 to compare EMC issues then and now.

PHOTO 1: A typical modern street light with an antenna (top) for remote control and monitoring.

Street lights

Several members have reported that the street lights in their street have been upgraded. In some cases these are LED street lights but other types are also being fitted. We have not had any reports of RFI from LED street lights so far but we have had reports of RFI from other types of street lights that use conventional discharge lamps such as high pressure sodium lamps and metal halide lamps. This type of lamp requires a 'ballast' choke, which can either be iron cored or a switching-type electronic ballast.

Conventional (non-LED) street lights that have recently been installed or upgraded may be fitted with an electronic ballast that may be connected to a wireless control and monitoring system. This allows the street lights to be turned on or off or dimmed remotely via a network of low power radio links. These radio links are quite common and small antennas can be seen on top of many street lights. Photo 1 shows a typical street light with an antenna, although the light is a different type from those in Blackpool mentioned later.

We haven't received any reports of EMC issues in amateur bands due to the radio equipment on top of street lights although we did have had one report of a low level pulsating noise from street lights on 156.000MHz, at the bottom end of the VHF marine band. There was also a report several years ago of RFI on 3.5MHz from street lights in Coventry with remote control switching systems.

Recently, we had a report of RFI on 28MHz from newly replaced conventional street lights in the Blackpool area. This appears to be caused by a particular configuration of street light that uses an electronic ballast with a data cable connected. The electronic ballast by itself may comply with the appropriate EMC standard for conducted emissions up to 30MHz but it appears that if a data cable is connected to the electronic ballast to control it remotely, this can increase radiated emissions from the street light in the 28MHz amateur band. This may depend on the routing of the data cable relative to the electronic ballast.

Although there is no requirement to test radiated emissions below 30MHz, one company that operates street lights fitted clip-on ferrite suppression cores to the data cables on street lights near a radio amateur, in order to reduce the radiated emissions in the 28MHz amateur band.

If street lights in your street have been replaced or upgraded, it would be worth checking to see if there is any increase in noise on any amateur bands such as 28MHz, 50MHz or 70MHz when the street lights switch on. A cheap (£10) TV SDR dongle and associated free spectrum display software may help reveal any emissions in other bands.

Electric vehicles

It has been noted that two popular energy-efficient cars, including the BMW i3 electric car, have no AM radio. The i3 has a body shell made of carbon fibre reinforced plastic on an aluminium platform that contains the lithium-ion battery and the electric motor. Some drivers have noted that some AM stations that they want to listen to are not available on other bands and the only way to receive them would be to stream them via the internet on a mobile phone. That might not be an attractive alternative if you have a limited data allowance, and can be difficult in areas where 3G/4G coverage is patchy.

According to the Green Car Reports website [1], a spokesperson for BMW North America is reported to have said that "AM is not offered due to negative performance influences of the electromagnetic interference of the electric drivetrain. Electric motors cause interference on AM, which is why BMW decided to remove this option. While it could be offered, BMW's performance standards are very high and we don't offer a product that meets less than those high standards."

This does raise the question of what mobile operation on HF amateur bands would be like in an electric car. Brendan reports he has a 2015 Nissan Leaf that does have an AM band on the car radio and he can listen to BBC Radio 5 (693kHz, 909kHz) just fine in the west of Ireland, which is well outside the intended service area.

Brendan also reports that the car radio does not have a long wave band so he can't comment on that but the Nissan Leaf seems good from an EMC perspective. He gets a little interference from the home charge point on the 1.8MHz amateur band when it's connected to the car but in standby mode (ie before the charging timer begins the charging process). He can only hear this on the doublet that runs directly over the house, which has one 'leg' about 10m directly above the car and the charge point. What he hears are harmonics of the 1kHz square wave charging pilot tone (SAE J1772) – and this is coming from the charge point, not the car. He reports that there is nothing on the inverted L antenna that he actually uses for 1.8MHz, which is about 50m away from the house.

Although Brendan hasn't reported using an HF mobile transceiver in the car, he has listened on all HF bands on his base station antenna whilst the car is driving slowly in the vicinity of the house and hasn't observed any problems from 1.8 – 50MHz. Brendan concludes that electric vehicles clearly don't *have* to be EMC nightmares.

Emergency lighting

Fluorescent lights installed in locations such as communal hallways and stairs in blocks of flats often have a battery backup that can

keep the light on for one hour or more if mains power is lost, for example due to a fire. Lights with a battery backup normally have a green LED to indicate that the battery is charged.

These emergency lights may use 2D type low energy fluorescent tubes, but these are different from compact fluorescent lamps that go into a normal lamp holder. 2D tubes do not have any built-in electronics and, like a conventional straight fluorescent tube, they need a separate 'ballast'. This could be a conventional iron cored type or an electronic switching type.

Although a worn out fluorescent tube or an electronic ballast are possible sources of RFI, this would be present continuously whenever the light is on. We had a case recently where multiple emergency lights with battery backup were producing RFI when they were lit and running on mains. Each one produced regular bursts of RFI every 13 seconds. It appears that this was caused by the built-in switching power supply for charging the backup battery. Normally the charger would only operate occasionally to 'top up' the battery or to recharge it after a lighting test had discharged the battery. In this case, it appears that the emergency lights had not been maintained properly so that the batteries had reached the end of their life and needed replacing. This came to light (!) because that the lights were trying to charge their batteries continuously and caused interference to a nearby radio amateur.

Jodrell Bank

According to BBC News Manchester [2] a public inquiry has begun into whether a planned new housing development would pose "a significant risk" to the operation of the Lovell Radio Telescope at Jodrell Bank in Cheshire. It has been reported elsewhere that the Lovell Telescope dish has had a £16m upgrade and a £100m grant from the government towards the Square Kilometre Array project.

Radio astronomy uses preferred frequency bands that are listed in ITU-R Recommendation RA.314-10 [3]. These include a band at 1400 – 1427MHz for Hydrogen Line [4] measurements and a band at 4813.6 – 4834.5MHz for Formaldehyde Line [5] measurements. The latter is on the second harmonic of 2.4GHz Wi-Fi transmitters, microwave ovens and part of the 13cm amateur band.

Nearby man-made sources capable of causing radio interference are said to include mobile phones, microwave ovens, wireless LAN transmitters, televisions and hi-fi equipment, computers and appliances with motors – washing machines, lawnmowers, hedge trimmers, power tools etc.

In 2015, the local Council rejected the plans to build 119 homes on the grounds that the development would cause an "unacceptable impairment" to the observatory. It has been reported that the developer claimed that there was "no evidence" that their plans would cause a significant increase in radio interference. "Reasonable mitigation measures" were also mentioned but it is not clear what these might be. One could speculate that covering the whole housing estate with a mesh dome or building all the houses underground could be quite effective – but might not be considered reasonable!

Clip-on RF current probe

A clip-on RF current probe such as the one in **Photo 2** can be useful for measuring RF currents in wires and cables, in conjunction with a receiver whose S-meter has a known response. For example, is there any noise from VDSL networks coming into your house from outside via the phone line and, if so, how much is there? How much RF interference is coming out of a USB charger or laptop power supply unit via the DC output cable and how much would you expect?

The ferrite core is a type that is intended for RF interference suppression. It consists of a split ferrite bead 28mm long with a 13mm diameter hole. In practice it has been found that any type of clip-on ferrite core that is designed for EMC purposes also makes a good broad band low power RF current transformer up to 30MHz and beyond.

These clip-on cores normally have a plastic housing with a hinge and a clip that is intended to be clipped onto a cable *once* and left. Although some types can be used repeatedly, it is useful to make something more robust for repeated use. The current clamp shown in Photo 2 was made using a plastic spring clamp from a DIY store. These are available in various sizes and, for this application, the jaws should open at least 40mm. The clamp shown is a 6" (150mm) Spring Clamp from Screwfix (product code 1964C), sold as a pack of two. Similar spring clamp sets are available from Wickes (product code 143225 or 142226) and several other DIY suppliers.

Wind five turns of 7-strand 0.1mm PVC insulated wire tightly onto one side of the split ferrite core, as shown. Drill a 3mm diameter hole through the jaws to suit small plastic cable ties. Roughen the plastic jaws of the clamp with coarse sandpaper to improve adhesion, then fit two cable ties 'in series' each side and glue the ferrite cores onto the jaws of the clamp using epoxy resin adhesive such as Araldite, etc, folowing the manufacturer's safety recommendations.

PHOTO 2: Construction of a clip-on RF current probe using a spring clamp. (The cable tie on the handles is just there to keep the jaws open for the photo).

Ensure that all the cavities in the jaws are filled and, for the half of the core with the winding, apply glue above, below and in between the turns of wire to make a good strong joint. Close the clamp gently, leave the glue to set, then apply a fillet of flexible bath sealant or decorator's caulk around the jaws of the clamp (this can just be seen in the photo as the white areas either side of the red jaws). This filler stops the jaws from swivelling, while still allowing some flexibility, which helps to ensure that the two halves of the core close together precisely without the slightest air gap.

Finally, connect the five-turn winding to a panel mounting BNC socket as shown. This particular type of spring clamp has useful holes that can be used for fixing screws to mount a BNC socket.

Most of these clamps have a *very* strong spring, so great care is required not to let the jaws snap shut because this will break the brittle ferrite core. It is advisable to *carefully* drill out the rivet, remove the spring, and then use a strong rubber band to pull the jaws shut. Replace the rivet with a 50mm long M6 bolt with lock nuts.

By adding a suitable test jig, which could be the subject of a future item, a current probe could also be used to make an approximate measurement of the conducted emission from something like a switching power supply or an LED light.

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

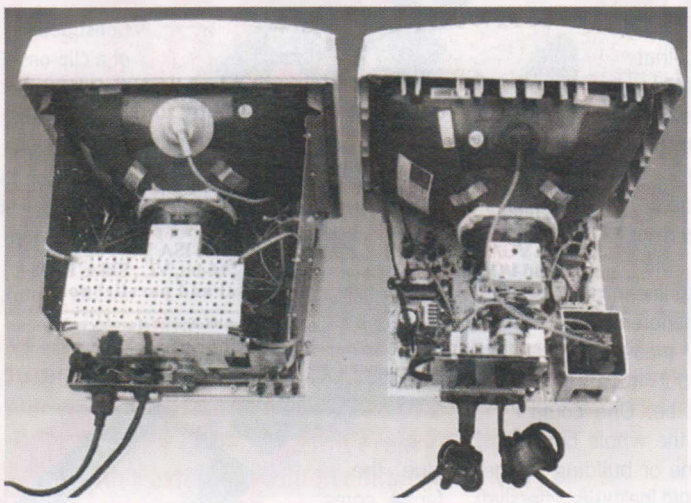


PHOTO 3: Two CRT computer monitors tested for RF emissions in 1996.

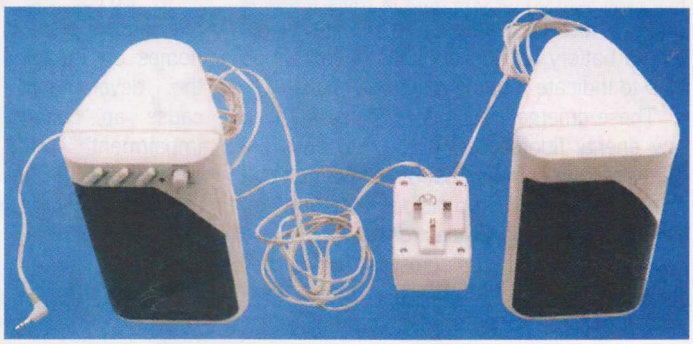


PHOTO 4: A typical pair of amplified speakers for a 1996 multimedia PC.

EMC 1996 – 2016

Over the twenty years that I have been writing this column we have looked at many EMC issues. Although the technologies change, many of the core concerns remain. I thought it might be informative to look at some of the EMC matters that were highlighted in 1996 and consider their relevance today.

ADSL/VDSL. The first item in October 1996 EMC was 'Video via Telephone' – a piece about the then-new ADSL technology, which was undergoing trials, plus comment on a future development, VDSL, using fibre-optic connections to street cabinets and frequencies up to 10MHz (or so we thought) for up to 26MBps connections. This has become a very topical subject again recently and further coverage is planned in future EMC columns.

CAR RADIO KEYS. Another significant item in 1996 was radio keys for cars. These had recently started to use 433.92MHz instead of a previous UK-only frequency of 418MHz. There had been cases where drivers were unable to unlock their cars due to blocking of the radio key receivers in the car due to transmitters on nearby frequencies. This sort of compatibility issue with other radio services is not really EMC but is classed as 'spectrum utilisation parameters'. We published test results showing the selectivity of receivers in various cars. For one car, we commented that reducing the receiver bandwidth from a massive 1.5MHz would be a good idea and that using this unprotected short range device frequency allocation as the only way of disarming the immobiliser seemed to be a non-starter in more ways than one!

CAR ALARMS. We reported on sensors for car alarms in convertible cars. The normal ultrasonic type of sensor is not suitable for such vehicles as it is sensitive to moving air currents. A new type of microwave sensor called a 'field disturbance proximity sensor' worked on 2.45GHz and was primarily for use in convertible cars. It was found that it was also rather sensitive to RF on other bands: 5-10W on 433MHz at a distance of 30m would set it off.

Automotive EMC of various kinds remains one of the most commonly mentioned subjects in this column.

COMPUTER RFI. The EMC Directive 89/336/EEC was originally intended to take effect from 1992 but it was postponed until 1996. It was implemented in the UK by EMC Regulations that came into force on 1 January 1996. These required that products should carry a CE mark. This was a major step forward in many ways, particularly in the case of computers. Before 1996, an EMC standard existed for radiated emissions from computers but manufacturers and importers did not need to comply with this standard in the UK.

A two-part EMC item that started in 1996 was how to reduce RFI from PC base units and monitors. There were large variations in the amount of RFI emitted by different models of CRT monitor (see **Photo 3**, from 1996). Nowadays, most flat screen computer monitors produce much less RFI than the CRT monitors of 20 years ago.

Amplified multimedia speakers for PCs (**Photo 4**) had just started to become popular. Despite the RF immunity requirements of the 1996 EMC Regulations, some PC speakers were rather lacking in RF immunity and were susceptible to RF breakthrough of HF and VHF amateur transmissions.

LOW ENERGY LAMPS. Energy saving compact fluorescent lamps (CFL) were just starting to become popular and we tested five types of CFL to find out which types produced the least RFI in amateur bands. Some were much noisier than others but they all appeared to comply with the EN55015 standard, at least from 1.8 – 30MHz. This is in stark contrast to LED lights today, where some types appear to be far in excess of the EN55015 limits.

TVI/BCI. For radio amateurs, one of the most important consequences of the EMC Directive was that for the first time, radio, TV and audio equipment was required to comply with the BS/EN 55020: 1995 standard for RF immunity. Previously there had been no requirement to meet this standard in UK. As the new and more immune TV sets came into use, this reduced the number of cases of amateur radio transmissions breaking through into TVs. Video recorders were another matter, however.

Emissions *from* TV sets or 'Reverse TVI' were also covered by EMC standards. Flat screen plasma TVs hadn't yet become available.

Another related issue was 'midi' hi-fi systems that used an air-cored AM loop antennas for LW/MW radio reception. We showed how replacing this with a ferrite rod antenna could improve immunity to amateur HF transmissions.

49MHz DEVICES. In 1996 the use of 49.86MHz had recently been authorised for licence-exempt short range devices such as baby monitors and cordless headphones. This is right next to the 50 – 52MHz amateur band and our tests showed that some of these devices had rather limited immunity to 50MHz amateur transmissions.

Websearch

[1] /www.greencarreports.com
[2] www.bbc.co.uk/news/uk-england-manchester-36308125
[3] www.itu.int/rec/R-REC-RA/en
[4] https://en.wikipedia.org/wiki/Hydrogen_line
[5] https://en.wikipedia.org/wiki/Interstellar_formaldehyde

Book Review

It's the biggie – the 2016 RSGB Handbook

RSGB Radio Communication Handbook 2016

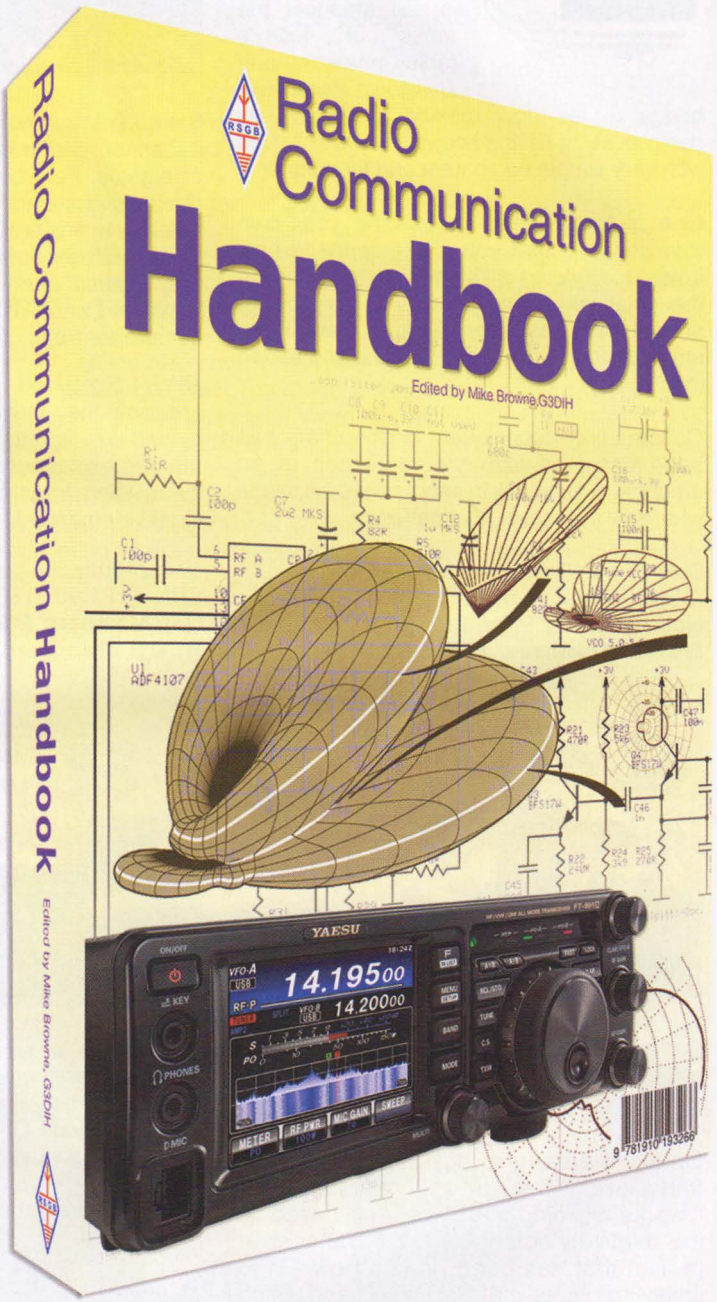
Edited by Mike Browne, G3DIH

The *RSGB Radio Communication Handbook* is one of those heavyweight references that starts from first principles and ends with the latest technology. It's an unbeatable source of information and training for any amateur at any level, with masses of practical information backed up by good solid theory. This edition has been updated by a new editing team and is surely one of the most up-to-date and comprehensive amateur radio reference works on the planet. It describe itself as "the one book you need if you have any interest at all in the technical side of amateur radio ... there is plenty for you here", and I can't fault that claim.

The great thing about an organisation like the RSGB is that its Membership includes top-flight amateurs who really know their subject. And, more to the point, they are prepared to share their knowledge. So that is how the *RSGB Radio Communication Handbook* is built: experts in their field have contributed chapters on a wide range of topics ranging from basic principles to the most recent technology. The advertising describes it as "written *by* thinking amateurs *for* thinking amateurs" and I'd definitely agree with that sentiment.

The *Handbook* contains twenty-five chapters and two Appendices, totalling 864 pages (and comprising, as the Preface notes, over 600,000 words and 2,000 illustrations). Most of the chapters have different authors – 17 are credited in total – and I believe there are many snippets from other sources. Many of the authors will be familiar to regular readers of *RadCom*, and include names such as Alan Betts (of exams fame), Peter Hart (equipment reviews), Eamon Skelton (Homebrew), Mike Parkin (Antennas), Andy Talbot (Design Notes / Data), to name just a few. As you'll appreciate, these are all people who know their stuff and, just as importantly, can communicate it clearly on the written page.

The cover shows the very latest Yaesu radio – an FT-991A – and as I initially flipped through the book I was pleasantly surprised to spot an Icom IC-7300 showcased as the state of the art. That transceiver was only reviewed in *RadCom* in August this year, so it's really up-to-the-minute stuff. But that's not to say everything in the book is whizzy-bang at the expense of history: elsewhere, alongside descriptions of SMD parts, you'll also find information on components you're only likely to encounter if you enjoy the challenge of salvaging parts from the more, shall we say, 'venerable' equipment. It's perhaps sad, but true, that today's latest high-tech is tomorrow's old board that we rob for bits.



I have worked on a few projects in my time and, truth to tell, many of them were designed by adapting standard configurations, eg from data sheets. I'm pleased to see there are two whole chapters devoted to amateur radio building blocks – one on oscillators, the other on amplifiers, mixers etc – and there are many useful little circuits that perform a multitude of functions. But in fact much of the rest of the book also contains similar material, ranging from simple things like a microphone amplifier to a full-blown home-made transceiver (although the latter is not a beginners' project). Of the 2,000+ diagrams mentioned earlier, a goodly proportion are circuit diagrams.

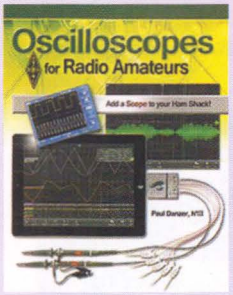
But it's not all soldering iron stuff. The *RSGB Radio Communication Handbook* contains a vast array of background, theory, and practical material, coving a wide range of amateur radio subjects and interests. In fact, no matter what your particular interest, be it construction, Morse, propagation, antennas or a whole host of other matters, the *Handbook* is like having access to your own panel of experts.

Whether you are new to amateur radio or have been around for a good few years, you will find a huge amount of interest in the *RSGB Radio Communication Handbook* and I have no hesitation in recommending it as an essential part of any self-respecting amateur's private library.

ISBN 9781 9101 9326 6
864 pages, 210 x 297mm
Non-Members' Price £29.99
Members' Price £24.99

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

Technical books, C



Building a Transceiver

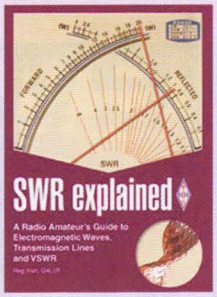
By Eamon Skelton, EI9GQ & Elaine Richards, G4LFM

Home construction is still amongst the ranks of today's radio amateurs and *Building a Transceiver* brings to life how making something as complex as an HF transceiver can be achieved with very simple equipment and techniques.

One of the benefits of building your own transceiver is that you will understand how it works. *Building a Transceiver* is based on the relatively complicated HF transceiver project that has been broken down in to smaller modules that can be built and tested individually.

Construction techniques and testing has been designed with the resources of an amateur radio shack in mind, so will be useful whatever your level of experience.

Size 174x240mm, 176pages,
ISBN: 9781 9101 9301 3
Non Members' Price £12.99
RSGB Members' Price £11.04



SWR Explained

A Radio Amateur's Guide to Electromagnetic Waves, Transmission Lines and VSWR

by Reg Irish, G4LUF

Many radio amateurs are familiar with the concept of the Standing Wave Ratio (SWR) and the effect it has on the transmission and reception of signals. Few however understand much about it beyond the adjustment of an antenna tuning unit to the reduce SWR. *SWR Explained* sets out to fill that gap and provide the context that makes electromagnetic Waves, transmission Lines and VSWR comprehensible.

SWR Explained explaines what waves are, how they move in free space and how guided waves react. How transmission lines react is explained along with matching and even using transmission lines as resonant circuit elements.

174x240mm, 64 pages I
SBN: 9781 9050 8699 3
Non Members' Price £7.99
RSGB Members' Price £6.79

Hart Reviews

By Peter Hart, G3SJX

For 35 years Peter has been writing amateur radio equipment reviews for *RadCom*. These have simply been some of the best equipment reviews published anywhere. These reviews are not theoretical testing or publishing of claimed data but real world testing of performance and analytical reporting of how amateur radio antennas, radios, amplifiers, etc. really work.

Hart Reviews -The Best of RadCom Equipment Reviews builds on Peter's first book that covered his first 25 years of his reviews and collects together reviews that have been published in *RadCom* since 2004. Readers will find an array of equipment and manufacturers represented with all the major radios launched in the last 10 years.

Hart Reviews -The Best of RadCom Equipment Reviews is a great book for everyone interested in amateur radio equipment.

Size: 210x297, 192 pages,
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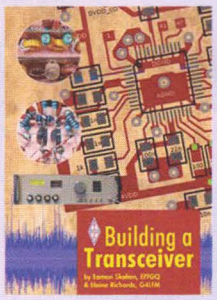

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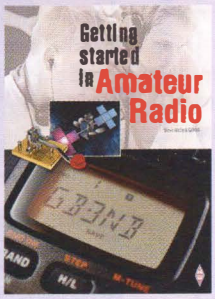

Getting Started in Amateur Radio

By Steve Nichols G0KYA

If you want to know something about the hobby or are newly licensed, or are even just looking for something different, *Getting Started in Amateur Radio* provides the answers. Receiving digital images from the International Space Station? Or talking to friends around the world via satellite? All of these things are possible with amateur radio and *Getting Started in Amateur Radio* details these and many other possibilities.

Getting Started in Amateur Radio provides information on the activities to explore when using your first VHF/UHF or HF station and what other equipment you might need.

Getting Started in Amateur Radio provides the ideal book for those interested in amateur radio.

Size 174x240mm, 96 pages
ISBN: 9781 9101 9311 2
Non Members' Price £8.99
RSGB Members' Price £7.64

RTTY/PSK31 for Radio Amateurs

By Roger Cooke, G3LDI

This book is a practical guide to the two most popular data modes, RTTY and PSK31.

An expanded and fully updated 2nd edition of the popular RTTY and PSK31 for Radio Amateurs. At 50% bigger that the 1st edition, there is no better guide to these data modes. Readers will find details of where to find data modes on the amateur bands, through getting started, to making the most from both these modes. DXpeditions and contests use these modes and there is lots of information on getting the best from these too.

Free CD

The free CD that accompanies this book has also been fully updated to provide a wealth of amateur radio data mode programs to get you started. You will also find reviews of equipment, lots of reference material, videos, web links and essential reading for anybody interested in Data.

Size 174x240mm 48pages,
ISBN: 9781 9050 8688 7
Non Members' Price £7.99
RSGB Members' Price £6.79

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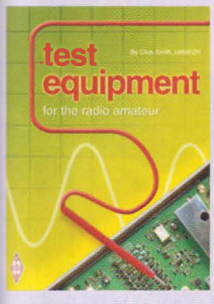


Test Equipment for the Radio Amateur

4th Edition

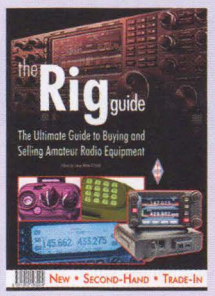
By Clive Smith, GM4FZH

Many of us would like to analyse the performance of our stations but find that professional test equipment such as spectrum analysers prohibitively expensive. Yet it is can be easy to make many pieces of very useful test equipment yourself at home. *Test Equipment for the Radio Amateur* is a book that provides the definitive guide to the equipment that can be made or used to measure the various parameters of an amateur radio station.

This fourth edition of *Test Equipment for the Radio Amateur* has been fully updated a revised to show what can be achieved today with the simple, inexpensive and easily obtainable. Test equipment for measuring current, voltage, the value of components, frequencies, receiver performance, RF power, modulation, antennas and transmission lines, noise, transmitter linearity and much more is all covered. For the home builder there are numerous projects, from a simple fuse tester to a high quality 1.3GHz signal source and much more. One chapter even covers software based test equipment that runs on a PC and includes specialist calculators, oscilloscope and spectrum analyser programs, signal generators, SINAD analysis and even design tools for RF filters. Surplus equipment often appears on the amateur market and the use of this equipment such as frequency counters and oscilloscopes, is well documented in this book.

If you are at all interested in what makes your radio tick as either keen 'home-brewer' or a 'black box' operator *Test Equipment for the Radio Amateur* is the must have for your book shelf!

Size 174x240mm, 256 pages,
ISBN: 9781 9050 8672 6
Price: £9.99



Rig Guide

Edited by Steve White, G3ZVW

The Rig Guide is a unique publication that sets out to answer the question 'what is the right price for this radio?'. What will you get for a radio if you trade it in or try to buy or sell it on an online auction site? - *The Rig Guide* provides the answer.

Buy New • Second Hand • Trade-in

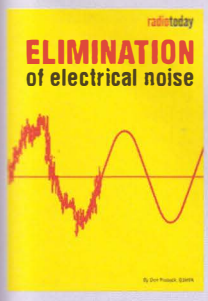
The Rig Guide continues to define the prices of amateur radio equipment in the UK, fully updated and covering more than ever before.

The book begins with tips for buyers and a guide to selling and trading. There is a guide to selling on ebay and even tips on how to avoid getting lumbered with stolen gear. *The Rig Guide* contains a list of the abbreviations used in the descriptions and an explanation of them all. Amateurs trust RSGB reviews and a full list of *RadCom* reviews since 1990 is included.

The Rig Guide also covers receivers, scanners and linear amplifiers. You'll find extensive lists of past models from Acom to Yaesu, with over 20 manufacturers listed in-between. We're not just talking about current models either and you will even find details on the many Chinese manufacturers. DSP isn't forgotten either with a dedicated section on the equipment available. Overall *The Rig Guide* contains details of around 400 of pieces of amateur radio equipment covering HF, VHF & UHF. Each item is described in an easy to understand listing that covers its main features, band coverage etc. with a photograph of the equipment.

Selling or Buying, you need a copy of *The Rig Guide*, don't be at a disadvantage - buy a copy today!

Size: 210x297mm, 96 pages
ISBN: 9781 9101 9320 4
Price: £5.99



Elimination of Electrical Noise

2nd Edition

By Don Pinnock, G3HVA

Electrical Noise is a problem for most radio amateurs today and many are forced off the radio bands because of it. Don Pinnock, G3HVA, is a firm believer that radio amateurs not be forced from the air but should deal with these problems instead. This new second edition of *Elimination of Electrical Noise* tells of Don's personal experiences in doing this, and provides solutions to noise problems that will help many.

Elimination of Electrical Noise details the various types of noise 30kHz to 30MHz, from computers to electrical light fittings and much besides.

Elimination of Electrical Noise provides the help you may need to take charge, tackle that noise problem and get the most from your hobby.

Non Members' Price £6.99
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Sport Radio

There are two new RSGB HF contests taking place this month.

Last October I operated the HQ bonus station MX0HDG on SSB as part of the 21/28MHz Contest. With propagation as it was then I wasn't expecting great things, but the contest just happened to coincide with a magnetic storm. It resulted in propagation being worse than bad; indeed one entrant described conditions as being the worst for 40 years. In twelve hours I made seventeen QSOs on 15m and none on 10m! Conditions that day, the solar forecast going forward and the Presidential Review on Contesting that had taken place a few months before all came together to result in the 21/28MHz Contest being replaced by the new International DX Contest on Sunday 2nd. There are Open, Restricted and QRP categories, plus you can enter single mode or mixed mode. Countries (UK excepted) and Call Areas act as multipliers, and QSO points are loaded to encourage operating on higher frequencies. Then it's back to the 80m Club Sprints, with CW on Wednesday 12th. Next, another new one. RoLo CW takes place on Sunday 16th. It's the replacement contest for RoPoCo, the SSB leg having taken place in April. The SSB leg of the 80m Club Sprint is on the 27th.

The first weekend of October is microwave weekend, with the 1.2/2.3GHz Trophy Contest on Saturday 1st. Starting at the same time but running for 24 hours, the 432MHz-248GHz contest is where the most serious microwave contesters get their kicks. We then move into the UKACs, with 2m on Tuesday 4th and 70cm on Tuesday 11th. The first of this season's Super League events, 6m AFS, takes place on Sunday 16th. Then it's back to the UKACs, with 23cm on Tuesday 18th and 6m + SHF on Tuesday 25th.

October is the month of the Oceania contests, the first of them being SSB that takes place for 24 hours over the weekend of 1st-2nd. There are sections for single-op and multi-op stations. To encourage LF activity the points for QSOs are different on each band. Work Oceania – that's VK, ZL and Pacific islands – only. The IARU 432MHz-248GHz Contest takes place simultaneously with the RSGB UHF/microwave contests this weekend, so if you enter either RSGB event your entry will be forwarded for you by the Contest Committee (unless you ask for it not to be). The Worked All Britain HF Phone Contest runs for 24 hours on 20m to 10m. Next, the 80m SSB leg of the ON Contest. It takes place on Sunday 2nd. Work Belgian stations only, exchanging a signal report and serial number. ON stations also send club codes (eg MCL), which count as multipliers. In each of the four legs of the contest (the first was last month) the winners from each country receive an award, as long as they make 25 or more valid QSO. The UKEICC 80m series continues, with an SSB session on Wednesday 5th. The CW leg of the Oceania Contest takes place for 24 hours over the weekend of 8th-9th and the 80m CW leg of the ON Contest is on Sunday 9th. The Worked All Germany Contest takes place for 24 hours over the weekend of 15th-16th. Work Germany only. The final leg of the ON Contest takes place on 2m on Sunday 16th. The UKEICC DX Contest runs for 24 hours on the weekend of 22nd-23rd and a CW leg of the UKEICC 80m series takes place on Wednesday 26th. And finally... the big one, the CQ WorldWide DX SSB Contest. It runs for the whole 48 hours of the weekend 29th-30th.

Steve White, G3ZVW
steve.g3zvw@gmail.com

RSGB HF Events

Date	Event	Times (UTC)	Mode(s)	Band(s)	Exchange
Oct 2	International DX Contest *	0700-1900	CW, SSB	14-28	RS(T) + SN
Oct 12	80m Club Sprint	1900-2000	CW	3.5	SN + name
Oct 16	RoLo CW *	1900-2030	CW	3.5	RST + Locator received
Oct 27	80m Club Sprint	1900-2000	SSB	3.5	SN + name

RSGB VHF Events

Date	Event	Times (UTC)	Mode(s)	Band(s)	Exchange
Oct 1	1.2/2.3GHz Trophy +	1400-2200	All	1.2/2.3G	RS(T) + SN + Locator
Oct 1-2	432MHz-248GHz	1400-1400	All	432-248G	RS(T) + SN + Locator
Oct 4	144MHz UKAC	1900-2130	All	144	RS(T) + SN + Locator
Oct 11	432MHz UKAC	1900-2130	All	432	RS(T) + SN + Locator
Oct 16	50MHz AFS §	0900-1300	All	50	RS(T) + SN + Locator
Oct 18	1.3GHz UKAC	1900-2130	All	1.3G	RS(T) + SN + Locator
Oct 25	50MHz UKAC	1900-2130	All	50	RS(T) + SN + Locator
Oct 25	SHF UKAC	1900-2130 ~	All	2.3-10G	RS(T) + SN + Locator

Best of the Rest Events

Date	Event	Times (UTC)	Mode(s)	Band(s)	Exchange/info
Oct 1-2	Oceania DX SSB	0800-0800	SSB	1.8-28	RS + SN
Oct 1-2	IARU 432MHz-248GHz	1400-1400	All	432-248G	RS(T) + SN + Locator
Oct 1-2	WAB HF Phone	1900-1900	Phone	14-28	RS(T) + SN + WAB area
Oct 2	ON Contest	0600-1000	SSB	3.5	RS(T) + SN (ONs give club code)
Oct 5	UKEICC 80m	2000-2100	SSB	3.5	4-character Locator (eg IO93)
Oct 8-9	Oceania DX CW	0800-0800	CW	1.8-28	RST + SN
Oct 9	ON Contest	0600-0900	CW	3.5	RS(T) + SN (ONs give club code)
Oct 15-16	Worked All Germany	1500-1500	CW, SSB	3.5-28	RS(T) + SN (DLs send DOK)
Oct 16	ON Contest	0600-1000	Fone, CW	144	RS(T) + SN (ONs give club code)
Oct 22-23	UKEICC DX	1200-1200	CW, SSB	3.5-28	RS(T) (optional) + SN + District Code
Oct 26	UKEICC 80m	2000-2100	CW	3.5	4-character Locator (eg IO93)
Oct 29-30	CQWW DX SSB	0000-2359	SSB	1.8-28	RST + Zone (UK=14)

In the case of differences between this calendar and the Contest Committee web site, the website takes precedence. * HF Championship event. + VHF Championship event. § Super League event. ~ Different bands at different times. For all the latest RSGB contest information and results, visit www.rsgbcc.org

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HF F-Layer Propagation Predictions for October 2016

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	664....14666	665322246666	116444455422	..45555541..	..2555551...	..135552....	...22321....	...1221.....
*** Asia								
Yakutsk	21......2333	1......13333	...111......	...22.......	.....	.....	.....	.....
Tokyo	.......222..	.....134432.	....223332..	...12111....	....1.......	.....	.....	.....
Singapore	.......1222.	244331	......34421.	.....2332...	.....222....	.....12.....	.....	.....
Hyderabad	1.......3333	3.....134433	233311	..1..133....	...1123.....	...1122.....	.....	.....
Tel Aviv	551.....3555	554....25555	225311245522	..5433453...	..244445....	...33232....	...11.1.....	.....
*** Oceania								
Wellington	.......22...	...323345...	...344434...	...2333.3...	....221.....	....11......	.....	.....
Well (ZL) (LP)	.....	.....	..2.....	..1.....1..	.....	.....	.....	.....
Perth	........211.	......13433.	......23321.	.....1221...	.....11.....	.....1......	.....	.....
Sydney	.......111..	......3443..	.....24432..	....12321...	....111.....	....1.......	.....	.....
Melbourne (LP)	.....	..13.....	...4.....	...31.....	...1.....	.....	.....	.....
Honolulu	..12.....	..1311.....	...211.1....	.....	.....	.....	.....	.....
Honolulu (LP)	.....	.....	.....	.....	.....1...	.....1...	.....	.....
W. Samoa	...1.....	..132112....	...23332....	....232.....	.....21.....	.....1......	.....	.....
*** Africa								
Mauritius	2.......1222	3......24433	1......44321	......133...	......131...	......11....	.....	.....
Johanesburg	33.......133	33......3444	22.....14432	.......342..	.....1133...	....11132...	....1112....	.......1....
Ibadan	554.....2455	5552...13555	525321124553	..24322355..	...443345...	...443343...	...242231...	....2111....
Nairobi	33......2333	442.....4444	2.3....24422	..31..1341..	...312232...	...31233....	......11....	.....
Canary Isles	6663....1566	66652..14666	656643335664	212654455621	...6555553..	...6255552..	...2154531..	...1.3232...
*** S. America								
Buenos Aires	222........2	3332......23	2113.....121	...2.....1..	...11...1...	....1.......	.....	.....
Rio de Janeiro	333........3	433......233	3222.....322	...2....12..	...111.121..	....11.11...	....1..1....	.....
Lima	2221.......1	3223......12	1..2......1.	.....	.....	.....	.....	.....
Caracas	3332......13	33331.....33	1..22....23.	....21..12..	.....2212...	.....2221...	.....	.....
*** N. America								
Guatemala	2222.......1	3214......13	1..3......11	.....1...1..	......1.1...	......1.....	.....	.....
New Orleans	3332.......2	31131.....13	.....	.....11.1...	......211...	......1.....	.....	.....
Washington	44432.....23	442231...134	1...12111231	.....32223..	.....3333...	......331...	......1.....	.....
Quebec	3443......23	321.1...1233	.....111221.	.....22231..	......333...	......11....	.....	.....
Anchorage	.131........	1.3.......11	........21..	.....	.....	.....	.....	.....
Vancouver	1232........	1.11.......1	.........1..	........1...	.....	.....	.....	.....
San Francisco	2222........	31131......2	.....	........1...	.....	.....	.....	.....
San Fran (LP)	.....	.....	.....	.......1....	.......2....	.......2....	.......1....	.......1....

Key: The figures represent approximate S-meter readings, whilst the colours represent expected circuit reliability. **Black** equals low to very low probability, **Blue** equals good probability and **Red** equals a strong probability. No signal is expected when a '.' is shown. The RSGB Propagation Studies Committee provides propagation predictions on the internet at **www.rsgb.org.uk/propagation/index.php**. An input power of 100W and a dipole aerial has been used in the preparation of these predictions; therefore a better equipped station should expect better results. The predicted smoothed sunspot numbers for October, November & December 2016 are respectively (SIDC classical method – Waldmeier's standard) 28, 29 & 26 and (combined method) 47, 48 & 48. The provisional mean sunspot number for August was 50.7. The daily maximum / minimum numbers were 81 on 8 & 16 August and 0 on 3 August.

Please send news reports to radcom@rsgb.org.uk. To get future events listed here and put on GB2RS, email details of your meetings as early as possible to radcom@RSGB.org.uk Include your club name, RSGB Region number, contact name, callsign & phone number, date and details of meeting. Example: Fraser Road Radio Club, Region 9, Steve, M1ACB, 01234 832 700, 29 Oct, On the Air. We normally acknowledge all submissions within 3 working days; if you don't hear from us, please phone. We don't normally print 'closed', 'TBA' or 'every Tuesday'-type entries. The deadline for November edition is 22 September and for December issue it's 20 October. For GB2RS, the deadline is 10am on the Thursday of the week of broadcast.

CLUB EVENTS CALENDAR

INTERNATIONAL

Pafos Radio Club, Cyprus
Richard, 5B4AJG, 00 357 97 857 891, 5b4ajg@gmail.com www.cyhams.org
Meets third Thursday of the month at DTs Bar Pafos. Visitors are always welcome.

International federation of Railway Radio Amateurs (FIRAC) www.firac.org.uk

The Radio Officers Association www.radioofficers.com
For former British Merchant Navy Radio Officers. The Radio Officers ARS is a subsidiary of the ROA that operates a CW net on Thursdays at 7.30pm on 7017kHz ± Summer.

NATIONAL

Amateur Radio Caravan and Camping Club
membership@arcc.org.uk, www.arcc.org.uk
Caravan rallies this month: Market Harborough, Leicestershire

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

British Amateur Radio Teledata Group
bartg@bartg.org.uk, www.bartg.org.uk
Membership open to those interested in datacoms. Contests and awards organised.

British Railways Amateur Radio Society
m0zaa@brars.info, www.brars.info
2016 is Golden Jubilee. Membership open to those interested in amateur radio and railways.

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

Radio Amateur Old Timers' Association
MemSec@RAOTA.org, www.RAOTA.org
Membership is open to anyone active in amateur radio. Nets on Wed 3.763 at 1000, 1.963 at 2100, Thurs 7.163 at 1100, 3.763 at 1930 and Sun 3.763MHz at 1000.

Travelling Wave Contest Group
secretary@twcg.org.uk, www.twcg.org.uk
Friendly contest group for those who want to be involved with contesting, but who don't have a local club or whose club isn't active in contesting, from anywhere in the UK.

REGION 1: SCOTLAND SOUTH & WESTERN ISLES

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

Ayr ARG
Charlie, MM0GNS, 01563 551 704
14 USA travelogue, Dave, GM3WIL
28 Bring & Buy Sale

Cockenzie & Port Seton ARC
Bob, GM4UYZ, 01875 811 723
7 Normal club night
9 On-air activity day
29-30 CQWW SSB Contest

Livingston & District ARS
Cathie, 2M0DIB, 01506 433 846
4, 18, 25 Training and operating
11 Handhelds and their operation

West of Scotland (Glasgow) ARS
wosars@gmail.com
7, 14, 21, 28 Club night, 8pm

REGION 2: SCOTLAND NORTH & NORTHERN ISLES

Regional Manager: RM2@rsgb.org.uk

Aberdeen ARS
Fred, GM3ALZ, 01975 651 365
6 Junk sale
13 Surprise talk
20 AGM
27 Construction and on the air

Glenrothes & District RC
Tam, MM0TGB, 0775 3526 498
5 AGM
12 Practical, operating, talk
19 Radio round table discussion
26 After Galashields/update

REGION 3: NORTH WEST

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

Chester & District RS
Bruce, M0CVP, 01244 343 825
4 Grand surplus sale
11 Committee meeting
25 Bring and tell

Furness ARS
Chris, M0KPW, info@fars.org.uk
3, 17, 31 Social meeting, Farmers Arms, Newton
12 Widebanding transceivers, MOTEB
15-16 JOTA, St Perrans, Barrow
24 Committee meeting
26 Building a two element 6m Yagi by M0KPW & G0HIK

Macclesfield & DRS
info@gx4mws.com
3 Shack on the air
10 Number stations, MOTXX
17 CW training
24 Film: Ham Radio-Second World War
31 AGM

Stockport Radio Society
Heather, M6HNS, 07506 904 422
4 Society meeting
13 Net 145.375MHz, 7.30pm
15-16 JOTA, Linnets Clough
18 Radio night
25 Skills night
29-30 Peak Contest Group entering CQ WW SSB

Thornton Cleveleys ARS
John, G4FRK, 01253 862 810
10 AGM
17 New chairman introduction
19 Committee meeting
24 Planning for CQ WW
31 CQ WW

REGION 4: NORTH EAST

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

Angel of the North ARC
Nancy, G7UUR, 01914 770 036
1 E Day, Gateshead Public Library
3 Prep for JOTA, David Stansfield
10, 17, 24, 31 On the air
15 JOTA, The House on the Hill, West Denton
17 Intermediate mock exam
24 Intermediate exam

Bishop Auckland RAC
Gail, M3GBB, 0191 372 0473
6 Normal club night, training

Blyth Radio Club
John, 2E0DCV, 0191 237 1729
5, 26 Club night
12, 19 Foundation training

Colburn & Richmondshire District ARS
Colin, 01748 876 391
6, 19 Club net, GB3IR, 7.30pm
13 Repeater technology, Chris, G4FZN
27 Training, operating, social

Denby Dale RC
Darran, G0BWB, 07974 423 227
1-2 WAB HF contest
5 Surplus sale
15-16 JOTA
19 AGM
29-30 CQ WW, Farnley Tyres

Ripon & District ARS
David, G3UNA, 01423 860 778
6, 13, 20, 27 Club night

Scarborough ARS
Jerry, G6LBL, 01751 476 601
14-16 GB2YMR (TBC), Pickering War Weekend
24 Astronomical photography, Steve Bowden

Sheffield & District Wireless Society
Krystyna, 2E0KSH, 07884 065 375
5 mcHF opensource SDR, Bob Harris
12 Training and social night
19 CERN, Richard French
26 Technical evening

Sheffield ARC
David, G6DCT, littlewood20@btinternet.com
3, 24 Shack night operating, MORCU
10 Basic electronics part 2, Jess, MOZEL
17 Club night

REGION 5: WEST MIDLANDS

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

Bromsgrove & District ARC
Dave, M6DKT, 07584 025 156
7 HF night
14, 28 Data night
21 VHF night

The next deadlines are 22 September, 20 October and 17 November

Central Radio Amateur Circle
Martin, G1TYV, 07948 027 994
1, 8, 15, 22, 29 Group meeting, shack OTA
6 Group meeting

Coventry ARS
John, G8SEQ, 07958 777 363
3, 10, 17, 24, 31 Open net, 8pm, 145.375MHz and or 7.16MHz ± QRM
6, 13, 20, 27 Open net, 8pm, 50.175MHz SSB
7 Inordinatus
14 AGM
21 Video night
28 Radio workshop

Gloucester AR&ES
Anne, 2E1GKY, 01242 699 595 daytime
3 History of hi-fi, David Briggs
5, 12, 19, 26 Net, 7.30pm, 145.500MHz then 145.550MHz
6, 13, 20, 27 Net, meet 7.30pm on 145.550MHz then QSY
10, 17, 31 Informal evening and general operating
24 No meeting, net instead

Malvern Hills RAC
Dave, G4IDF, 01905 351 568
11 The Cairo System, Peter, G8CQH

Mid-Warwickshire ARS
Don, G4CYG, 01926 424 465
11 Homebrew and construction
25 Programme planning for 2017

Nuneaton & District ARC
Neil, MONKE, info@ndarc.co.uk
4 2m UKAC
6, 13, 20, 27 Club net 145.475MHz, 9.30pm
7 Social pint & chat at the Harvester, Nuneaton
11 70cm UKAC
21 Using an audio mixer with amateur radio video
25 6m UKAC

Rugby ATS
Steve, G8LYB, 01788 578 940
1, 22, 29 HF shack on air and project activities
4 UKAC 144MHz, radio operation
8 HF shack on air
11 UKAC 432MHz, radio operation
15 HF shack on air and Clansman demo
18 UKAC 1296MHz, radio operation
25 UKAC 50MHz, radio operation

Salop ARS
salopamateurradio@gmail.com
4, 11, 18, 25 Club CW net, 4.30pm, 144.070MHz
5, 12, 19, 26 Club net, 8.30pm, GB3LH
6 Natter night / committee meeting
13 Pre-AGM discussion
20 AGM
27 Natter night

Solihull ARS
P T Gaskin, G8AYY, 0121 628 7383
6 Net, 145.575MHz or GB3UI, 8pm

Sutton Coldfield ARS
Robert Bird, spirit.guide@hotmail.co.uk
3, 31 Open net, 145.250MHz, 7.30pm
10, 24 Club meeting
11 Open net, 70.475MHz FM, 7.30pm
17 Open net, 50.135MHz SSB, 8.30pm
25 DMR open net gb7fw slot/local2 from 7.30pm

Telford & District ARS
John, MOJZH, 07824 737 716
5 Committee meeting plus GX3ZME OTA
12 15-minute talks, Richard, G0VXG'
19 Suggestions for winter projects
26 Halloween social – soup and a roll

REGION 6: NORTH WALES

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

Dragon ARC
Stewart, GW0ETF, 07833 620 733
3 Surplus sale
17 Titanic, David Roberts, GW8NZN

North Wales Radio Society
Liz Cabban, GW0ETU, 0776 019 0355
6 General meeting
13 Technical topic
20 Visiting speaker
27 Club project planning

REGION 7: SOUTH WALES

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

Aberystwyth & District ARS
Ray, GW7AGG, 01970 611 853,
13 AGM

Llanelli ARS
Craig, MW0MXT, 01269 845 773
3 Social evening
10 On air night & club raffle
17 DVD night
24 On air night
31 Junk sale & club raffle

Newport ARS
Margaret, GW4SUE, 01633 665 289
2, 9, 16, 23, 30 Club net, 10am 3.705MHz
4, 11, 18, 25 Club net, 8pm, 145.425MHz
14 Coal fired power stations, Ross, GW3NWS
28 AGM

REGION 8: NORTHERN IRELAND

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

Bangor & District ARS
Norman, GI3YMY, norman.newell@yahoo.com
6 RSGB archives show, Richard, GI4DOH

Carrickfergus ARG
Elizabeth Forde, elizabethforde64@yahoo.com
11 Colossus machine talk with refreshments

REGION 9: LONDON & THAMES VALLEY

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

Aylesbury Vale RS
avrs@rakewell.com
12 Discussion evening

Burnham Beeches RC
Charles, G0SKA, 01753 647 101
3 Bring a photo of your shack
17 Construction meeting – antennas
29-30 Foundation course and exam session – contact us for availability

Harwell ARS
Malcolm, G8NRP, 01235 524 844,
13 BYLARA, Carol, 2E1RBH

Newbury & District ARS
Rob, G4LMW, 01635 862 737
26 Dealing with EMC and QRN, Pete, G3LWT

Radio Society of Harrow
Linda, G7RJL, lcasey@imperial.ac.uk
3, 10, 17, 24, 31 Club net, 8.15pm, 145.500MHz then QSY
7 Club night
21 Standing waves, Brian, G3YKB

Southgate ARC
Mr K Mendum, G8RPA, g8rpa@arrl.net
8 Jamboree on the Air setup
15-16 JOTA

Verulam ARC
Greg, MOPPG, 01582 413 345
13 Social with GB3VH repeater group, 7.30pm, Rose and Crown
18 Radar, Roger, MORBK

REGION 10: SOUTH & SOUTH EAST

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

Basingstoke ARC
Peter, G0KQA, 01256 414 454
17 AGM

Brede Steam ARS
Dan, MOHOW, 01424 882 008
1, 4, 11, 18, 25 Operating at the shack
15-16 JOTA with 1st Brede Scouts

Bromley & District ARS
Andy, G4WGZ, 01689 878 089
2 Foundation course
5, 12, 19 Net, 145.500MHz, 9pm
18 Setting up your station

Cray Valley RS
Richard, G7GLW, 07831 715 797
6, 20 Club meeting

Crystal Palace R&EC
Bob, G3OOU, 01737 552 170
7 How to use SDR, Damien, 2E0EUI

Darenth Valley Radio Society
Mike, G8AXA, 01689 856 935
12 On the air & natter night
26 Antenna analysers, Mike, G8AXA

Dorking & District RS
David, M6DJB, djb.abraxas@btinternet.com
25 Who's watching what on TV? Peter, G4GNU

Dover RC
Aaron, 2E0FQR, 0771 465 4267
26 Table top sale night

Eastbourne Electronics & Radio Club
Events@ereclub.org.uk
10 Project/demo
31 Talk/meeting

Farnborough & District RS
sec@farnboroughradio.org.uk
26 Hernia Cup quiz

Hastings E&RC
Gordon, 01424 431 909
29 Autumn auction, Holy Redeemer Church Hall, 1.30pm

Horndean & District ARC
Stuart, G0FYX, 02392 472 846
7 Natter night/social evening
21 AGM

Horsham ARC
Alistair, G3ZBU, 07855 268 666
6 Club meeting, junk sale
20 Social, The Selsey Arms

Itchen Valley ARC
Quintin, M1ENU, 023 8078 7799
7, 21 Club net, 145.525MHz, 8pm
14 Ordnance Survey in the 21st century
28 Members' short presentations

Mid-Sussex ARS
Stella, M6ZRJ, 01273 844 511
1-2 Foundation course, admittance £60
7, 21 Radio night & table top sale
14 AGM
28 Radio night

Surrey Radio Contact Club
John, G3MCX, 020 8688 3322
2, 9, 16, 23, 30 Net, 1905kHz, 9.30am
3 Surplus equipment sale
6, 13, 20, 27 Net, 70.300MHz, 8pm
7, 14, 21, 28 Net, 145.350MHz, 8pm
17 Chat and fix-it, John, G8MNY

Swindon & District ARC
Jonathan, M0ZGB, m0zgb@btinternet.com
6 Simple satellite operating, Tim, G4VXE
13, 20 Activity Night
27 CQWW prep night

Worthing & District ARC
Al, M0OAL, information@wadarc.org.uk
2 Sunday breakfast, 9am
18 G3WOR on the air

REGION 11: SOUTH WEST & CHANNEL ISLES

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

Appledore & District ARC
Alan, M6CCH, 01237 422 833
17 Demo of Flex 9300, John, G3JKL

Bristol RSGB Group
Robin, G3TKF, robin@g3tkf.co.uk
31 Beagle to Mars via Kazakstan and Filton, Terry Ransome

Burnham on Sea ARC
Brian, G4RGY, 01278 683 645
5, 19 Club night

Cornish Radio Amateur Club
Steve, G7VOH, 01209 844 939
5 Committee meeting
6 Main meeting
15-16 JOTA
20 Club evening

Exeter ARS
Nick, M0NRJ, 01363 775 756
4 GB3EX net, 7.45pm
11, 18, 25 GB3EW net, 7.45pm
12 Simple test equipment
26 Digital audio modes

Exmouth ARC
Mike, G1GZG, 01395 274 172
5 Auction night, everyone welcome
19 Operating night

North Bristol ARC
Mat, G7FBD, g7fbd@gb3bs.com
1, 8, 22, 29 South-west DMR net, 7pm, Slot2 Talk Group 950
2, 9, 16, 23, 30 Open net on GB3BS, 7pm
7 Cruising Around, part 2
14 Operating, training, relax & chat
21 Video evening, relax & chat
28 Bring and Buy

Plymouth Radio Club
David, 2E0DTC, d.beck123@btinternet.com
11 Rally prep plus natter night

Riviera ARC
rivieraarc@gmail.com
6 AGM
15, 17, 20 Club night

Saltash & District ARC
Mark, M0WMB, 01752 215 546
10 Churches on the Air event

South Bristol ARC
Andrew, G7KNA, 07838 695 471
6 Committee meeting
13 2017 calendar discussion
20 AGM
27 Open house and on the air

Torbay ARS
Dave, G6FSP, g6fsp@tars.org.uk
7, 21 Club night
14 Club night & business meeting
28 London's underground postal service DVD

Weston Super Mare RS
Martin, G7UWI, 01934 613 094
3, 4, 10, 31 Construction, operating & natter night
17 Main meeting

REGION 12: EAST & EAST ANGLIA

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

Braintree & District ARS
John, M5AJB, 01787 460 947
3 Jota planning, DRM radio check over

Cambridge & District ARC
Ian, M0HTA, publicity@cdarc.co.uk
2, 9, 16, 23, 30 Club nets: 8.30am, 144.180MHz USB; 10.30am, 7.0875MHz LSB or 3.620MHz LSB; 11.30am, 145.550MHz FM
5, 12, 19, 26 Club net, 8pm, 145.550MHz FM
14 Meteor scatter, Gavin, M1BXF
20 Constructors evening

Colchester Radio Amateurs
Stefan, M0XLB, 07771 616 676
20 AGM

Felixstowe & District ARS
Paul, G4YQC, pjw@btinternet.com
11 Supper, Saigon, Felixstowe
24 Worked All FDARS contest

Leiston ARC
m0iah2008@gmail.com, 01473 738 593
11 CW evening, Les Cropley
25 2m+70cm contest

Loughton & Epping Forest ARS
Dave, M0MBD, 0798 016 5172, pro@lefars.org.uk
1 National Hamfest, Newark
6, 13, 20, 27 Net, 144.725MHz, 8pm
14 Fish and chips night
26 Advanced exam
28 Club meeting
29 Intermediate practical & exam

South Essex ARS
Terry, G1FBW, 07986 070 040
11 Antennas and propagation, Carl, G3PEM
15 JOTA, GB2CIS, 1st Canvey Is Scouts

Thames ARG
targradio@outlook.com
7 Club night
14, 28 Club net, GB3DA
21 Members only construction tutoring
28 TARG Nets: On GB3DA

Thurrock Acorns ARC
Gordon, 2E0ELI, acorns@taarc.co.uk
6, 13, 20, 27 Open net, 2m FM simplex, 7.30pm

REGION 13: EAST MIDLANDS

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

Lincoln Short-Wave Club
Pam, G4STO, 01427 788 356
4 144MHz UK Club Contest
5, 15, 29 Shack activities and G5FZ on the air
6 Club net via GB3LM, 8pm
8, 22 Saturday Surgery & G6COL on the air
11 430MHz UK Club Contest
12 Nibbles and natter night
13, 20, 27 Club net, 145.375MHz
17 Committee meeting
18 23cm UK Club Contest
19 Formal meeting
25 50MHz UK Club Contest
26 Used equipment sale

Loughborough & District ARC
Chris, G1ETZ, 01509 504 319
4 AGM
11 Forensics talk, Tim, M0ZRR
18 2m club net
25 Practical evening

RAF Waddington ARC
Bob, G3VCA, 07971 166 250
3, 10, 17, 24, 31 Club net, 145.325MHz, 8pm

South Normanton Alfreton & District ARC
A Lawrence, 2E0BQS, 0115 930 7322
3 Talk
10, 24, 31 Natter night
17 Junk sale

Spalding & District ARS
Graham, G8NWC, 01775 760 832
21 Construction contest

Welland Valley ARS
Peter, G4XEX, 01858 432 105
3 Club net, 433.475MHz FM
17 Listening for satellites, Andy, G0SFJ

Worksop ARS
Paul, M0PJA, 07890 626 684
2, 16, 23, 30 Intermediate course
4, 11, 18, 25 Club night & UKAC
6, 13, 20, 27 Construction, CW tuition, on the air
7-9 Club visit to RSGB Convention
14-16 GB1BDS for JOTA

Next deadlines are 22 September, 20 October & 17 November

REGION 4: NORTH EAST

David, M0ZXW took just under a year to pass all three exams. The two invigilators from Wearside Electronic ARS David, M1FIF and Ray, 2E0ERD, were there to see his certificate presented. David is going on to be a registered assessor for the club. Congratulations.

Tyneside ARS has relocated to its new QTH at Broadacre House in Newcastle city centre. To increase local activity on the air, every new member joining will receive a free handheld transceiver with accessories. The new facilities include free Wi-Fi, disabled entrance, tea/coffee, a manned reception with CCTV and a spacious talk area. www.gx3zqm.org.uk/join-us

Garry, 2E0AAC passed his Intermediate exam and Ron, M6WHE passed his foundation with Wearside Electronics ARS. The Senior Instructor was Bill, M0XGR. Congratulations from all the members.

Ben Straker recently passed the Intermediate exam at York Radio Club and Colin Seymour and Susan Halewood passed their Foundation exam. Congratulations to all.

Pontefract & District ARS operated GB0PLF in Pontefract Town Centre (Pontefract Liquorice Festival), then from a 1974 Thomson Glen Caravan with GB1AVR at Ackworth Vintage Steam Rally. The number of contacts was larger than usual with some excellent contacts on 2m FM. They celebrated Yorkshire Day from Garraby Hill, to the east of York, 245m above sea level, and one of the highest spots in the area. Colin, G0NQE brought his IC-718 and half wave vertical with ATU at its base and operated on the HF bands. Keith, G0RLN and Nigel, G0BPK operated 2m FM with a FT-7800 with the DX V 2000 antenna. Contacts included a SOTA station on Blencathra in the Lake District and the Scilly Isles.

REGION 5: WEST MIDLANDS

The youngest member of Nuneaton & District ARC, Niamh aged 9, successfully passed her Foundation exam. Congratulations to Niamh on her success, to dad Matt, M1CID for his support, encouragement and at home training and to the training team. 2016 has certainly been a family affair, as the club was also proud to welcome father and son Mike and Andy Whattling as two new M6s. Congratulations to everyone.

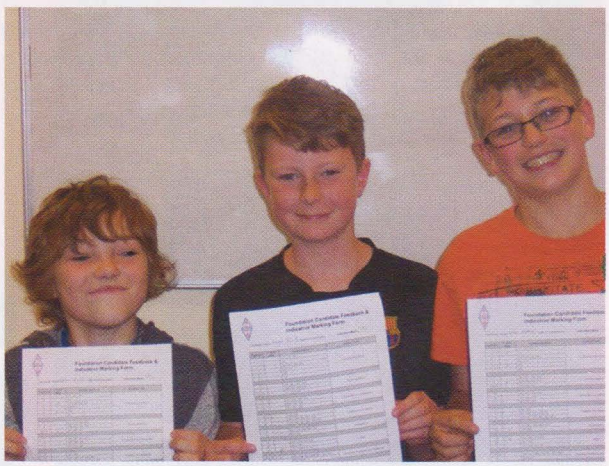
REGION 6: NORTH WALES

North Wales RS will soon be moving to new premises at the Blind Veterans' Centre in Llandudno. The club has been associated with the Charity for some while, helping set up radio stations and will be continuing this after the move. www.nwrs.org.uk

At **Wrexham ARS**, 10yr old Ethan Gordon and his father Simon have recently passed their Foundation exam. Congratulations to them and to Rob who became MW0IAV.

REGION 7: SOUTH WALES

Congratulations to Paul, MW0YBZ on passing his Advanced exam at **Risca & District ARS**. Steven, M0SVR was the instructor and has helped the club achieve many exam successes having gained distinctions in all his own exams at the club. Paul intends to become an Advanced instructor at the club. Kevin, MW0KEQ passed his Advanced exam some time ago. Some of the members were aided by the distance learning available from Bath.



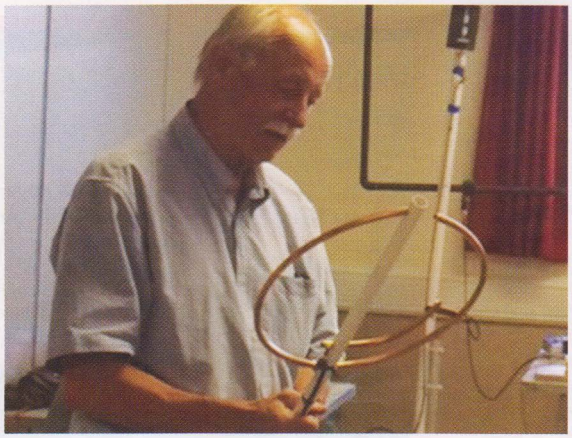
Cwmbran & District ARS send congratulations to (Left to Right) Dewi aged 9, Evan aged 10 and Rhys aged 12. All three passed their Foundation exam at their first attempt with good marks. If you hear them on the air they would love you to give them a call.

REGION 8: NORTHERN IRELAND

Over the summer, NFD Field Day for Bangor & District ARS went well and the annual rally was very well attended. Ian White delivered a fascinating talk on weatherproofing aerial arrays at its conclusion.

REGION 9: LONDON & THAMES VALLEY

Reading & District ARC held on evening of 10 minutes talks about projects being worked on. The meeting received great support from the membership and topics ranged from an Eamon Skelton 23cm project to QRP pocket 40m transceivers, the *RadCom* 2m loop aerial (see photo) to a Raspberry Pi based satellite tracking system amongst many others. It showed the innovation amongst the membership and the diversity of the projects being worked on. Innovation is very much alive and very well within the amateur radio community. What started as an unknown turned out to be a great evening with lots of fun on the way.



REGION 10: SOUTH & SOUTH EAST

Chertsey Radio Club operated GB9LIZ and all QSL cards have now been dispatched. The club is able to offer on demand USA ham radio Tech, General and Extra licence exams as well as both Foundation and Intermediate practical assessments. Offering the full UK Foundation, Intermediate and Advanced exams is also on the cards. The successful Trilogy DMR radio project can be seen at http://tinyurl.com/j3k8deu and the radio is still just £85 fully programmed.

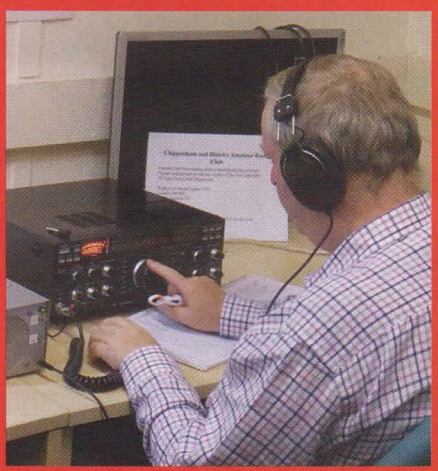
Congratulations to Patrick Bean, Philip Challans, Morgan Flynn and Steve Brett on passing their Intermediate exam with Hilderstone Radio Club. Recently, John, G7OHO gave a fascinating talk on Relativity and Amateur Radio. He explained how the search for aether led to Einstein's theories.

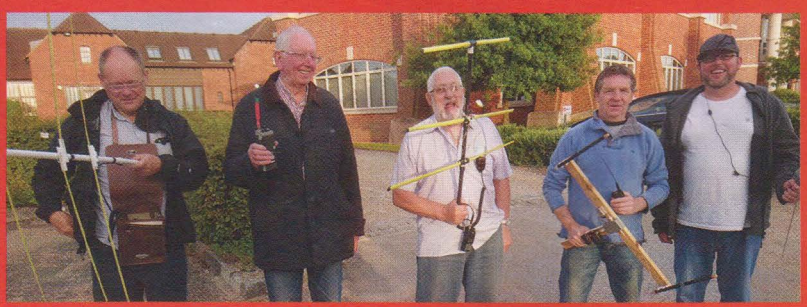
The Hernia Cup Inter Club Challenge Quiz will take place on 26 October from 7.30pm at Farnborough Community Centre, Meudon Avenue, Farnborough, Hants GU14 7LE. Talk in will be on GB3FN (433.375MHz).

This year, Fareham and District ARC had a try at entering VHF NFD. With the help of the more experienced members of the club, they entered the Restricted 25W section from a hill top location near Winchester. A hard core crew of about half a dozen camped out over night and somehow managed a 3rd place. They lost points for what they think was probably poor log keeping, so they plan to practice this. There is a time lapse of the antenna erection at https://youtu.be/P2qPHiKmtsQ.

Itchen Valley ARC received a very interesting talk by M0XGT on Third Method SSB Generation using Software, which provoked a lively discussion. Then, in June, they supported the Otterbourne Village Fete and participated in CW FD. For the first time in VHF FD the Club ran four simultaneous stations, on 6, 2, 70cm and 23cm. Activity was less than usual but all enjoyed the cut and thrust of competing. Operating on VHF was a different world for the die-hard HF members. Operators included Paul, G6MCX, Quentin, M1ENU, Richard, G3OTK and Ray, G3HRH.

Chippenham & District ARC 50th anniversary operations have been focusing on 40, 20 and 10m as well as some DMR activities on the Phoenix Network. Over 250 QSOs so far with a third of members operating and there is still more time to operate. The club was formed in 1966 at the Chippenham Boy's School and moved to its current premises at the Chippenham Sea Cadets HQ (TS Tiger) in 1981. The club callsign G3VRE was granted in November 1966 and founder member Tim, G0RYR has been asked to provide information for an article in the local paper.





Fareham & District ARC held a 2nd VHD DF hunt of the year and a more challenging environment. The event was held on a promontory of land that juts out into Portsmouth harbour. One of the popular tactics was to hug the shoreline and triangulate the 'fox' who was found hiding under an electricity pylon in the middle of the golf course. Derek, G4JLP (second from the left) was the winner with his ingenious technique of holding the radio against his chest and turning around to find the direction of the fox, his body giving a null.

REGION 11: SOUTH WEST & CHANNEL ISLES

Riviera ARC ran a weekend training course where Steph, G4XKH and Steve, G7AHP taught two candiates Andy Robeson and Sebastian Kozlowki. Both passed, including one with a 100% pass mark. The club is currently offering Intermediate training but on evenings only.

REGION 12: EAST & EAST ANGLIA

Thurrock Acorns ARC enjoyed a presentation on radio fox hunting. Members of the club were joined by Dave and Frank from the North Kent RS who explained how they went about running a fox hunt and some of the issues they had to address. The objective is to find a station (Fox) that is transmitting a signal located five/six miles away. Using directional antennas and a map and compass, teams will be expected to listen to the signal take bearings and eventually locate the station. The picture shows Frank, G3WMR and Dave, G4YIB showing the difference types of antennas that can be used.

Murray Niman from the **Essex Repeater Group** explained to members of Thurrock Acorns ARC how the group started and the service it provides to amateurs. Today both mobile and amateur radio enthusiasts operating from their home make use of the repeaters. The ERG is manned by volunteers and at the end of the presentation TAARC presented ERG with a donation.

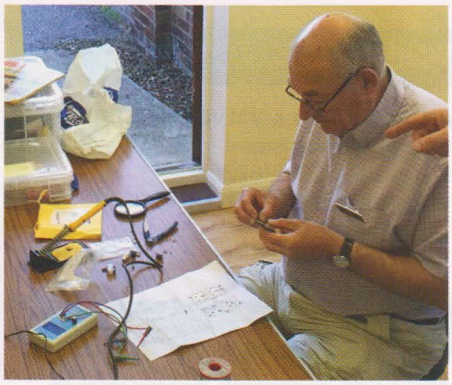
In July, **Harlow & District ARS** held its first field weekend from its new location in Lower Sheering. Some members camped over night and operated till late in the night and early the next morning. There was a surprise visit from Bob and Janet McLeod (VP8LP & VP8AIB) who even helped with setting up. They hand delivered a QSL card for a QSO in 2007. Band conditions were poor but 100 or so contacts were made on HF and 2m. The picture shows Bob, VP8LP, Sid, G1SDK and Janet, VP8AIB.

Essex Ham held two amateur radio sessions for staff and pupils at Estuary High School, near Southend-on-Sea. The sessions included discussion of the Tim Peake ARISS contacts, use of the RSGB's A 21st Century Hobby video, setting up a 70cm station to allow the youngsters and staff to send greetings messages and setting up a Raspberry Pi. The educational sessions concluded with sending of a live packet to the ISS with a greeting from the pupils, and it's hoped that further STEM activities can take place next term.

Mark Haynes, M0DXR from Kenwood gave a fascinating illustrated talk to **Braintree & District ARS** about the company's foundation and early evolution in Japan, through to its 2015 merger with JVC and beyond including the diversity of his role in the communications division. In the second part of his talk, Mark shared his passion for DXpeditions giving as an example the CQ World Wide 2015 contest where he operated 'single operator all band' from Costa Rica as TI5W from the impressive 1500W station of N3KS.

Members of Essex Ham operated two special event stations celebrating this year's Summer Solstice. GB1JSS was active at the /P location of Galleywood Common, near Chelmsford, making contacts on multiple bands and helping newer members to get their first taste of working a busy special event station.

South Essex ARS operated GB1HB at the Island Yacht Club to commemorate the 70th anniversary of Heavenly Body II, the American B17 aircraft that crashed at Canvey Point in 1944. 91 contacts in 24 countries were made overall, 45 on CW, 5 on PSK, 25 on 2m, and the rest on SSB.



At the July Essex Skills Night, hosted by the Chelmsford ARS, David, M0HBV demonstrated the construction of the low-cost Pixie QPR transceiver (see photo), whilst Mike, G4NVT performed various tests for visitors using his spectrum analyser. Also on display, a selection of portable equipment including an Elecraft KX3, as well as some homebrew projects.

REGION 13: EAST MIDLANDS

East Lincolnshire Repeater Group attended the Horncastle Radio Rally and had an exceptional time there. Thanks to the members of the **Eagle Radio group** who recently donated equipment to the repeater fund, they raised £500. Special thanks go to John, M3ERG and Trevor, 2E0JSJ for their help at the rally.

Peter, M0EJL and Pam, G4STO had pleasure in presenting Gerry, G6KGG with his Honorary Life Membership Certificate on behalf of the **Lincoln Short Wave Club**. For many years Gerry has been a loyal and hard-working member. He helped set up GB2CWP at the Lincolnshire Aviation Heritage Centre at East Kirkby and fitting out the club's shack at Aisthorpe.

Region 13 Regional Manager, Jim, G0EJQ visited **Kettering ARS**. They were joined by some of **Northampton ARS** for a DF Hunt, along with Richard, G6TVB DRM 134.

Next deadlines are 22 Sep, 20 Oct & 17 Nov. Email club news to radcom@rsgb.org.uk

At Worksop ARS, Martin, M0ZMF has been experimenting with Delta Beams for 6m. The photo (right) shows two club members out portable for the 6m. The UKACs and in particular 6m is becoming increasingly popular at Worksop Amateur Radio Society.

Classified Ads

For Sale

FIBREGLASS TUBE
High strength tube, square box, rod, and other sections stocked in 6m lengths, can be cut. Engineered Compositions, Chester. Tel: 01244 676000 e. info@engineered-composites.co.uk www.engineered-composites.co.uk

SINOTEL UK - AUTHORISED UK
importers of Baofeng & TYT handhelds, Xiegu X108G HF transceivers. Accessories, antennas and more. www.sinotel.co.uk, 01926-460203, sales@sinotel.co.uk

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Wanted

VINTAGE RADIO & VALVES WANTED
national cash settlement for silent key, shack clearouts 07552 678725, vintageradio@btinternet.com

Equipment

REPAIRS TO RECEIVERS, TRANSMITTERS
New/Old, valve/transistor. Call 07903 023437 for details: www.kent-rigs.co.uk

Aerials

M0CVO ANTENNAS
For all your amateur radio antenna needs. Full details at: www.m0cvoantennas.com

WESTERN HF 10
67ft wire dipole 160-6m, full details lookup m0bzi at: www.qrz.com buy direct: m0bzi@outlook.com or 07748331458 reviews at: http://g0kya.blogspot.com/2010_08_01_archive.html **or** http://www.eham.net/reviews/detail/9424

G4TPH MAGLOOPS BACK IN PRODUCTION.
Remote tune and manual tune models for 40m through 10m. Details at www.g4tph.com

QUAD BAND COLINEARS.
10/6/2/70 Quad band 2.5/2.5/3.5/5.5 dbi gain only 1.2m length £59.95 ea 6/4/2/70 Quad band yes Includes 4m, 2.5/2.5/3.5/5.5 dbi gain 1.2m length £59.95 ea 2/70 Dual band 3.5/5.5 dbi gain 1.1m length only £35.00 ea. UK post £7.95. Now stocking TYT, digital MD380 radio, battery, mains charger, belt clip Only £99.95 programme lead and software £9.95 post £5.00
Website: mirfield-electronics.co.uk Email: martin.stokes@hotmail.com or Tel: 07825549430

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WACRAL welcomes all amateurs to our Sunday morning 'GOOD NEWS' NETS, now at 0730-0830AM on 3747Khz and, again, at 2pm on 3747or 7147Khz. Our 2m SSB net at 3pm is held on144.205. Or, do join us on Wednesday evenings at 9.30pm, 3747Khz , for nationwide Christian fellowship and relaxed chat. See www.wacral.org for more net info and WACRAL details or just call G4OPP on 01622 746650 or g4opp@wacral.org

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Payment to: RSGB, 3 Abbey Court, Priory Business Park, Bedford, MK44 3WH

Advertising. All display and classified advertising enquiries (except Members' Ads, which go to memads@rsgb.org.uk) should be sent to: Chris Danby, G0DWV, Danby Advertising, Fir Trees, Hall Rd, Hainford, Norwich, Norfolk NR10 3LX
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e-mail adsales@rsgb.org.uk

Business Cards

Advertisers Index

FREE MEMBERS' ADS OF UP TO 40 WORDS

Email your Members' Ad to memads@rsgb.org.uk. You must include your name, callsign, phone number, email address and location (not counted in the 40 word limit). Optionally, attach your own photo of the item (min res 800 x 600, must be in focus and well lit). Max 1 ad per Member per month; other terms & conditions also apply (see tinyurl.com/MemAdsInfo).

FOR SALE

AMP RANGER 811H, condition as new. Revalved with reliable RCA valves. Manual. £750. Yaesu 2000 (little used) cable to PC. Manual, Yaesu World QSL map and original accessories. £1,200. Both in original boxes. Includes delivery or collect UK. Gordon, G3MDM, 01980 862 215, g3mdm21a98@yahoo.co.uk (Salisbury area).

ANTENNAS FOR SALE due to ill health. All new, and boxed, include postage. Cushcraft ARX2B 2m vertical, £70. Cushcraft AR6 6m vertical, £80. GM3VLB MiniDelta Loop, £145. Diamond GH62 6m vertical, £80. D Snape, G4GWG, 01257 424 469 (9-5 Mon-Fri) (Wigan).

ANTENNAS FOR SALE due to ill health. All new, boxed, include postage. Hy-Gain AV640 HF 40-30-20-17-15-12-10-6m vertical, £420. Hy-Gain AV18 VS HF vertical 80-40-30-20-15-10m, £110. MFJ-1775 rotatable mini dipole 40-20-15-10-6m (1500W), 2m (300W), £230. INNOV LFA-9 9-element 2m beam, £165. Colin Waterworth, G6AHF, 01257 424 469 (9-5 Mon-Fri) (Warrington).

BRAND NEW. Yaesu G-450 rotator, with Yaesu 40MWP plug kit (normally sold separately), £270. Yaesu GS-050 thrust bearing, £35. Both purchased in October 2015, stored in original packaging inside shack but now surplus to requirements. Will post at buyers cost. Nigel, G0BNR, 0786 683 9751, druzhba100@hotmail.com (Ramsey, Cambs).

DOWNSIZING. Yaesu VR-5000 receiver, £280. LDG Z100Plus auto-tuner, £80. Vibroplex grey No 69925, £100. Picoscope 2203 USB oscilloscope, £40. MFJ-418 Morse tutor, £25. X1M HF xcvr, £90. All plus P&P or collect. John, G1AWJ, 07836 244 584, drjmoyle@gmail.com (Shipston-on-Stour).

DUAL BEAM PRO HF Multiband antenna. 10m-20m+6m, works well and in good condx apart from slight bend in 1 element. Several rpts of +5S points on 17m over a dipole. £100, buyer collects. Peter, G4EOW, 01794 516 326 (Romsey).

FREE RADIO EQUIPMENT. Clearance of stock of radio equipment due to due to death of RSGB Member. Includes receivers, amplifiers, aerials and QSL card collection. No money wanted but must be collected. Keith Brewster, 0771 108 6167, kwbrewster@btinternet.com (Keswick, Cumbria).

FREE TO COLLECTOR, Oldham 2V 30Ah accumulator. Glass jar OK, Bakelite top chipped, no acid, some sediment, suit vintage radio restoration project. Mike, G1MDS, 01483 569 440, g1mds@btinternet.com (Guildford).

FT-450D. Good condition, comes with manual and mic, £400 ONO. Also G5RV, used twice, any sensible offer. Chris Meltham, 2E1BNF, 0779 099 3226 (please ask for me by name), cmdonaldson112@outlook.com (Huddersfield).

FT-817ND, LDG Z817 autotuner, CAT cable, Heil headset interface cable, Wonderwand antenna c/w tuneable counterpoise. All boxed in mint condition c/w documentation (a few turned corners!) etc. Non smoker. May separate. £offers + insured postage or collect. Noel, G6ENY, 01983 755 683, g6enyng@gmail.com (Freshwater, Isle of Wight).

FT-901DM FV-901DM, FC-902 SP-901+ YD148 B/M (Yaesu complete line up) immaculate condition. All manuals and leads included. £650 ono. Must collect, or arrange transport. M J Tovey, GW4XSX. 01545 570 758, m.tovey244@btinternet.com (Aberaeron, Dyfed West Wales).

GAP EAGLE 6 bands height 21ft, wt 11lb. 3 rigid counterpoint rods, power 300V, VSWR less than 2:1, no tuner required. Never erected, mint condition, £150. LDG 200 Pro auto tuner, nice condition, £130. David, 2E1CIK, 01904 863 239, Davidgillatt41@ gmail.com (York).

KENWOOD PADDLE KEY, £53. Kenwood headphones (not used), £25. MFJ audio tuner extender, £35. Peak classic star pack (DCA LCR in case) measures inductance, resistance, capacitance and semiconductors, £53. Wide range power meter, £40. John, M0IIE, 0780 628 5261 (Barton upon Humber).

KENWOOD TS-2000e in excellent condition and perfect working order. I have owned this radio since new and was bought in 2013. I prefer inspection and pick up in Cardiff but will arrange delivery at cost. Offers around £850. Lyn, GW8JLY, 07806 733 334 (Cardiff).

KENWOOD TS-990s, purchased 2016, perfect in every way as having had little use. Complete with SP990, boom mic, foot switch, stored message control box, cables, manual & boxes, £4000. G3TA, 01285 821 571 (Cirencester).

MFJ 941E ATU, only used for QRP, non smoker, immaculate, £90 ono. Also DX394, immaculate, still in box, £70. JIM M75 preamp, £70. Unwanted gift Uniden UBC 355CLT, still in box, guaranteed, 1 month old, £70. Geoff, M1EDF, 01827 830 644 (evenings), geoffrey.m3uxb@gmail.com (Tamworth).

PIONEER 1kW LINEAR AMP. Two years old, in good working order. Covers 1.8 to 28MHz bands. Original box and handbook included along with one spare valve. Prefer buyer inspect and collect. £1200 ONO. John, G4LRG, 01388 606 396, g4lrg@yahoo.co.uk (Bishop Auckland).

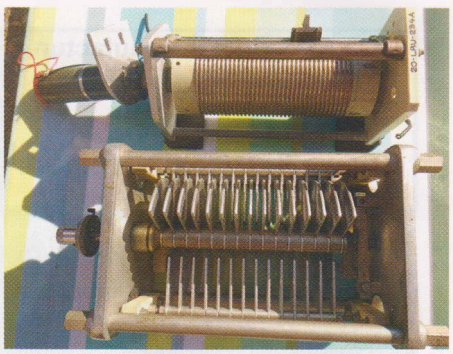
PASOKON TV slow scan TV system original printed instruction manuals. 1 x first version 1993 (blue cover) plus 1 x V2 1994 (orange cover). £10 for the two inc postage. David, G5HY, 07912 619 001, david@g5hy.com (East Dorset).

PRO-SIS-TEL 2051 heavy duty rotator as new in box (cost £699), now £500. Heil Elite Pro-Set 6 headset, as new in box (cost £184), now £100. Ivor, G4YIT, 01733 840 268, g4yit@yahoo.co.uk (March, Cambs).

RANGER 811H linear amplifier. GWO with manual. (Not kit). £600. G4AKG, 01444 239 371, Peterandpat@burgess-hill.co.uk (Burgess Hill, West Sussex).

REBUILT HROs, 1 with octal valves, 1 with UX5. PSU, selection of coils plus extra HRO for restoration, £250. Heathkit SB100, PSU/SPKR, rebuilt some years ago, good condition, £200. SB200, £225. HW101, OK, £85. HE30 for restoration, £25. Buyer collects. Bruce, G3WCE, 01692 538 794, g3wce@grimblepoos.co.uk (North Walsham).

SILENT KEY SALE. Air spaced variable capacitor, 20 x 10 x 9cm, 276pF, £25. Roller coaster inductor, 19 x 8 x 9cm, 20μH, £20. Postage £4. Robert, G0WHO, 01723 352 879, g0who@operamail.com (Scarborough).



SILENT KEY SALE from the estate of G3KKT. Seeking sensible offers from Members who will make good use of the equipment. Yaesu FRG-7 GC Rx. KW2000 transceiver with matching speaker. Yaesu FLDx400 transmitter with matching FRDx400 receiver, with manuals. Eddystone 730/4 receiver, s/n 0128. British Thomson-Houston Co Ltd, Bijou crystal receiver Type B, Form B, number 72 (dated 1924). MFJ-696 Deluxe Versa Tuner II. Farnell ET30/2 30V 2A PSU. AVO Valve Test Set CT 160 with valve data book. Telequipment D67A 25MHz solid state oscilloscope. RS 611-133 LSG-17 Signal Generator. All appear to be serviceable and are available for inspection, located in Somerset. Photos available on request. Contact family via tim.thorogood@e-homescaribbean.com.

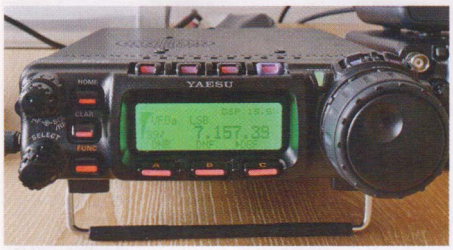
STRUMECH 60ft HD BP60 3 section Versatower 16M20 series, complete, in excellent condition. Upgraded head unit to take Prosistel rotator, £1100. DX Engineering Thunderbolt 60m band 43ft tiltover vertical antenna DXE-60VA-1P, c/w radial plate, excellent condition, £160. Email for photographs. Phil Catterall, G4OBK, 01751 476 380, cq@yorkshirewalker.co.uk (Pickering, near York).

W2IHY EQPlus audio processor. As new, cost £360. Collection welcome. Asking £195. Scott, M6GCO, 07971 863849 (Cambridge).

YAESU 450D transceiver, little used, as new. Also Wouxun FM quad band transceiver, also as new. Free to buyer, 2m70cm handheld. £400. Prefer buyer collects. Peter, M3PST, 01295 730 094, m3pst@btinternet.com. (Oxfordshire).

YAESU FT DX 5000 200W model with built in PSU and Station Monitor. One owner, supplied by ML&S and recently been back there for OLED upgrade and latest software. Mint condition, £2700, can accept card payment. Kris, M0KOO, 07974 94 9792, italianonico@hotmail.com (York).

YAESU FT-857 fitted with Collins 10 pole SSB plug in filter, nearly new, mint condition, non smoking home, £510 including next day insured postage. Adonis AM508e desk compressor microphone with Yaesu lead (other leads available), £55. Mick, M5AED 01536 763 637, mickphotos@btinternet.com (Kettering area).



WANTED

CIRCUIT DIAGRAM for Eton/Grundig Satellit 750. Cost will be paid. Frank, G8FPW, 01406 330 883, Frank.brown24@btinternet.com (Spalding, Lincs).

EDDYSTONE 888A RECEIVER. Brendan, E4BB, 00 353 87 250 8651, ei4bb@yahoo.ie (Dublin).

I AM LOOKING for an experienced person to repair and align my FT-101B. Please email me for more information. No chancers please. John Randall, M0ELS, 0788 189 2136, m0els@yahoo.co.uk (Basildon).

TRIO R-1000 MHz band switch (think this is same as used in R600 as well). Also circuit / manual for PYE Solent PTC984 marine receiver. Allan, M5ALU, allan.horsfield@btinternet.com (Peterborough).

VARIABLE CAPACITORS. Two x split-stator capacitors around 38pF+38pF each for September's PW Aerial Matching Unit. I will pay for the capacitors plus postage and packing costs. Brian, G8NHN, 0779 285 9886 (Manchester).

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. Operating details are provided in an abbreviated form as follows: T = 160m; L = 80 or 40m; H = HF bands (30 - 10m); V = 6 and/or 4m; 2 = 2m; 7 = 70cm; S = satellite and P = packet. Details published here were kindly provided by Ofcom on 02/09/2016.

Date	Callsign	Phonetics	Location	Bands	Keeper
01/10/16	GB5NCS	Norton Canes Scouts	Staffordshire	G1XYO	
01/10/16	GB1NNS	Nuneaton North Scouts	Nuneaton	G8VHI	
01/10/16	GB2VQJ	Victor Quebec Juliette	Holmpton	M0UTX	
01/10/16	GB100LCS	Long Eaton Cub Scouts	Long Eaton	G8XAN	
01/10/16	GB40CV	Cray Valley	London	M0MCV	
01/10/16	GB70CV	Cray Valley	London	M0MCV	
01/10/16	GB4DUK	Great Britain 4 Dementia UK	Angus	G0BKC	
07/10/16	GB6BBS	Barnet Borough Scouts	Barnet	G8RPA	
09/10/16	GB100WYS	West Yorkshire Scouting	Huddersfield	G0BWB	
10/10/16	GB2COS	Chester Oldfield Scouts	Chester	G7BQY	
12/10/16	GB2HWC	Hampshire Winter Camp	Shedfield	G4GBP	
12/10/16	GB100CDC	Chesterfield District Cubs	Chesterfield	G0THF	
12/10/16	GB2BCS	GB2 Bristol Cabot Scouts	Bristol	G4WBV	
13/10/16	GB2BG	Gold Bravo Two Bravo Golf	Macclesfield	G6TDJ	
14/10/16	GB0TDS	Thurrock District Scouts	Grays	M1DPE	
14/10/16	GB5FRR	First Roughton Rural	Roughton, Norfolk	G7VRK	
14/10/16	GB4CSG	Copmanthorpe Scout Group	Copmanthorpe	G1DRG	
14/10/16	GB2TS	Tyneside Scouts	West Denton	G0EVV	
14/10/16	GB1BDS	Bassetlaw District Scouts	Worksop	M0PJA	
14/10/16	GB0KWS	Ketton Wittering Scouts	Ketton	M0ZAV	
14/10/16	GB2YMR	York Moors Railway	Pickering	G4DAX	
14/10/16	GB4FBS	First Bispham Scouts	Blackpool	G3WGU	
14/10/16	GB1BNB	Brinscall Nuclear Bunker	Lancashire	M0WSW	
14/10/16	GB1CUB	Cub Scouts	Worcestershire	G6NYG	
14/10/16	GB1BEL	Belchamps	Essex	M0SCE	
14/10/16	GB1PS	1st Pontefract Scouts	Carleton, Pontefract	G0BPK	
14/10/16	GB2TWH	Taunton West Hatch	Taunton	G0EYR	
15/10/16	GB8CS	Clevedon Scouts	Kenn	M1EPX	
15/10/16	GB4SSG	4th Sevenoaks Scout Group	Sevenoaks	G4JED	
15/10/16	GB2CIS	Jota For Scouting	Essex	G7IIO	
16/10/16	GB1BSG	Belton Scout Group	Great Yarmouth	G0GGB	
20/10/16	GB2HSG	Herrington Scout Group	Sunderland	G7MFN	
21/10/16	GB2SAC	Scout Activity Centre	Sheffield	G6VUE	
21/10/16	GB0MKS	Milton Keynes Scouts	Milton Keynes	M0MMZ	
21/10/16	GB0ROM	Romsey	Romsey	G7VZY	
22/10/16	GB1MAC	Merseyside Air Cadets	Shropshire	M0NVJ	
30/10/16	GB1RUN	Romeo Uniform November	Scarborough	G4SSH	

VIBROPLEX SEMI AUTOMATIC bug key parts or complete keys. WHY? John, G4LGX, 01423 567 390 (Harrogate).

WINDOWS 7 OR 8 OR 8.1 OR VISTA disc, Professional, 32 bit, to upgrade from XP. This is NOT a new installation. Godfrey, G4GLM, 020 8958 5113, cgmm2@btinternet.com (Edgware, Middx).

RALLIES & EVENTS

Members of the RSGB Regional Team will be present with a bookstall at the rallies this month marked with an RSGB diamond.

30 SEPTEMBER & 1 OCTOBER
NATIONAL HAMFEST
Newark & Nottinghamshire Showground, Lincoln Road, Winthorpe, Newark, Nottinghamshire NG24 2NY.
Brought to you by the RSGB in association with the Lincoln Short Wave Club. The venue has free car parking and has disabled facilities. There will be trade stands, a Bring & Buy, car boot area, flea market, special interest groups and RSGB bookstall. There will also be representatives from the RSGB Services and committees. Morse proficiency test will be available. The venue has catering outlets and a seating area. [www.nationalhamfest.org.uk].

2 OCTOBER
BRITISH VINTAGE WIRELESS SOCIETY AUTO JUMBLE
The Angel Leisure Centre, Tonbridge, Kent TN9 1SF. Doors open from 10.30am to 4.30pm. Stalls £30, admission £5, early admission from 9.30am £10. 01892 540 022 (8pm to 9pm only). [www.audiojumble.co.uk].

2 OCTOBER
BLACKWOOD ARS RALLY
Rougemount School, Llantarnham Hall, Malpas Road, Newport NP20 8QB.
The venue has free car parking. A talk-in station will be on 145.550MHz. Doors open at 10am to 4pm with disabled access 15 minutes earlier. There will be trade stands a car boot sale, a Bring & Buy, special interest groups and a lecture programme. There is catering available on site. Mike Rackham, GW4JKV, 01495 226 149, rackhamone@aol.com.

7-9 OCTOBER
RSGB CONVENTION
Kent's Hill Park Training and Conference Centre, Swallow House, Timbold Drive, Kent's Hill Park, Milton Keynes, Buckinghamshire MK7 6BZ.
The Convention programme of lectures for all interests is available on the website and can be seen on page 25 of this issue. Principal sponsor Martin Lynch & Sons. [www.rsgbevents.org].

9 OCTOBER
HORNSEA AMATEUR RADIO RALLY
Floral Hall, 7 The Esplanade, Hornsea, East Riding of Yorkshire HU18 1NQ.
The venue has car parking on site and the doors open at 10am. There will be trade stands, a Bring & Buy, special interest groups and an RSGB bookstall. A raffle will be held on the day. There will be catering on site. Rick, MOCZR, 01964 533 712, R106221@aol.com.

9 OCTOBER
HACK GREEN BUNKER RALLY
Hack Green Secret Nuclear Bunker, Nantwich, Cheshire, CW5 8AL.
Sale of electronic equipment, amateur gear, components, military radio sets and vehicle spares. Doors open 10am, there will trade stand and catering is available on site. Lucy, 01270 623 353, Lucy@hackgreen.co.uk. [www.hackgreen.co.uk].

16 OCTOBER
HOLSWORTHY RADIO RALLY
Holsworthy Community College, Victoria Hill, Holsworthy, Devon EX22 6JD.
Doors open at 10am. There will be traders, a Bring & Buy and catering. The venue has disabled access. Howard, MOMYB, MOOMC@yahoo.co.uk.

22 OCTOBER
CARRICKFERGUS AMATEUR RADIO GROUP RADIO RALLY
Downshire Community School, Carrickfergus, BT38 7DA. Doors open at 11.30pm and admission is £3. There will be trade stands, a Bring & Buy, special interest groups and an RSGB bookstall. The venue has disabled facilities. Refreshments will be available. Tim, MI0TBL, carg@hotmail.co.uk. [www.radioclubs.net/carg].

23 OCTOBER
GALASHIELS RALLY
Volunteer Hall, St Johns Street, Galashiels TD1 3JX Doors open 11.15am, £2.50. Bring and Buy, traders, refreshments. Jim, GM7LUN, 01896 850 245, gm7lun@qsl.net.

23 OCTOBER – **NORTH WALES RALLY - CANCELLED**

6 NOVEMBER – **56th VERON Ham Radio Convention, Americahal, Apeldoorn, The Netherlands**

6 NOVEMBER – **WEST LONDON RADIO & ELECTRONICS SHOW (Kempton Rally)**

6 NOVEMBER – **BUSHVALLEY ARC ANNUAL RALLY**

19 NOVEMBER – **ROCHDALE & DARS TRADITIONAL RADIO RALLY**

20 NOVEMBER – **39th CATS RADIO & ELECTRONICS BAZAAR**

20 NOVEMBER – **PLYMOUTH RADIO RALLY**

3 DECEMBER – **SOUTH LANCS WINTER RALLY**

4 DECEMBER – **BISHOP AUCKLAND RAC RALLY**

2017

5 FEBRUARY 2017 – **CANVEY RADIO AND ELECTRONICS RALLY**

19 FEBRUARY 2017 – **RADIOACTIVE FAIR AT NANTWICH**

26 FEBRUARY 2017 – **CENTRAL COAST ARC RALLY (Australia)**

4 MARCH 2017 – **LAGAN VALLEY ARS RALLY & HAMFEST**

SILENT KEYS

We regret to record the passing of the following Members:

Mr E W Coleman, G1LGO	13/08/16
The Lord Rix, CBE, DL, G2DQU	20/08/16
Mr K G Perkins, G3EDS	10/07/16
Mr J R Davey, G3FPN	
Mr N E A Rush, G3HBZ	28/07/16
Mr D W Aird, G3MFE02/15	
Mr J Harrison, G4AGW	13/08/16
Mr R B P Carpenter, G4BAH	06/08/16
Mr D E Eden, G7TLT 7/2016	
Mr P Buttery, G8PFP 8/2015	
Mr T Heasman, GM4LMH	2016
Prof P Beckley, GW0WQX	10/06/16
Mr C Seear, M6KJF 31/05/16	
Mr F L Cooper, MI0BWK	1/2016
Mr R Hyslop, MM0PFR	15/08/16
Mr P Goodwin, 2E1CPQ	09/08/16
Mr J Barrett, RS305591	16/02/16
Mr T S Cooper, ZS1PS	12/07/16

6 MAY 2017 – **SERF 2017 (Eastbourne Rally)**

19-21 MAY 2017 – **DAYTON HAMVENTION® (Note new venue, see www.hamvention.org)**

11 JUNE 2017 – **JUNCTION 28 AMATEUR RADIO RALLY**

25 JUNE 2017 – **WEST OF ENGLAND RADIO RALLY**

14-16 JULY 2017 – **HAM RADIO SHOW, FRIEDRICHSHAFEN**

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Patron: HRH Prince Philip, The Duke of Edinburgh, KG, KT

Membership is open to all those with an active interest in radio experimentation and communication as a hobby. Applications for Membership should be made to the Sales Department from which full details of Society services may also be obtained.

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Student (21-25). . . . . Free
Under 21. . . . . Free

Subscriptions include VAT where applicable.
Special arrangements exist for visually impaired persons.
Details and Membership application forms are available from RSGB HQ (3 Abbey Court, Fraser Road, Priory Business Park, Bedford MK44 3WH)
or see www.rsgb.org/join

SPECIALIST AREAS

Abuse and Poor Operating
Amateur Radio Observation Service (AROS), Mark Jones, GOMGX, AROS coordinator, email: aros@rsgb.org.uk, www.rsgb.org/aros/

Amateur Radio Direction Finding
Bob Titterington, G3ORY, Chair, ARDF Committee, email: ardf.chairman@rsgb.org.uk, www.rsgb.org/ardf/

Awards
Marcus Hazel-McGown, MM0ZIF, Awards Manager, email: awards@rsgb.org.uk, www.rsgb.org/awards/

Contests
Ian Pawson, G0FCT, Chair, Contest Support, email: csc.chair@rsgb.org.uk, www.rsgb.org/radiosport/
Nick Totterdell, G4FAL, HF Contest Committee email: hfcc.chair@rsgb.org.uk
Andy Cook, G4PIQ, VHF Contest Committee email: vhfcc.chair@rsgb.org.uk

EMC
John Rogers, M0JAV, Chair, EMC Committee, e-mail: emc.chairman@rsgb.org.uk, www.rsgb.org/emc/

General Technical Matters
Andy Talbot, G4JNT, Chair, Technical Forum, email: tech.chair@rsgb.org.uk, www.rsgb.org/technicalmatters/

General Spectrum & Regulatory Matters
Murray Niman, G6JYB, Chair, Spectrum Forum, email: spectrum.chairman@rsgb.org.uk www.rsgb.org/spectrumforum/

GB2RS News Service Management
Ken Hatton, G3VBA, GB2RS Manager, email: gb2rs.manager@rsgb.org.uk
(GB2RS news items should be sent to radcom@rsgb.org.uk)

HF Matters
Ian Greenshields, G4FSU, HF Manager, email: hf.manager@rsgb.org.uk

Intruders to the Amateur Bands
Mark Jones, GOMGX
email: iw@rsgb.org.uk www.rsgb.org/intruders/

IOTA Activity Programme
Roger Balister, G3KMA, IOTA Manager, email: iota.manager@rsgb.org.uk, www.rsgbiota.org/

Microwave Matters
Barry Lewis, G4SJH
email: microwave.manager@rsgb.org.uk

Planning Advice
John Mattocks, G4TEQ
email: pac.chairman@rsgb.org.uk, www.rsgb.org/planning/

Propagation Studies
Steve Nichols, GOKYA, Chair, Propagation Studies Committee, email: psc.chairman@rsgb.org.uk, www.rsgb.org/psc/

Repeater and Data Communications
John McCullagh, GI4BWM, Chair, ETCC, email: etcc.chairman@rsgb.org.uk, www.ukrepeater.net

Training & Education
Philip Willis, M0PHI, Chair, Training & Education Committee, email: tec.chair@rsgb.org.uk, www.rsgb.org/clubsandtraining/

VHF Matters
John Regnault, G4SWX, VHF Manager
email: vhf.manager@rsgb.org.uk

Youth Committee
Mike Jones, 2E0MLJ, Chair, Youth Committee
email: youth.chairman@rsgb.org.uk
www.rsgb.org/youth-committee

Details of the Society's volunteer officers can be found in the RSGB Yearbook and on the RSGB website, www.rsgb.org

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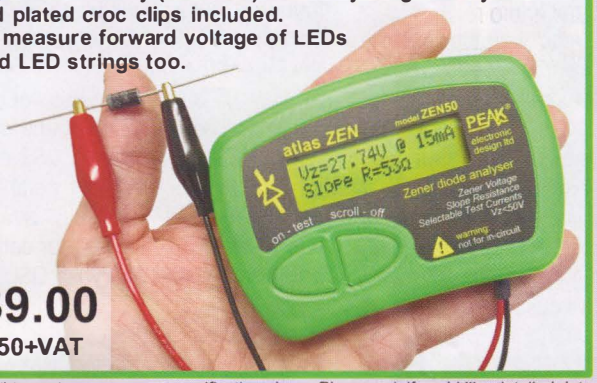

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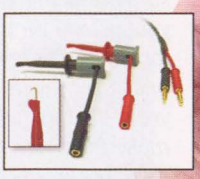

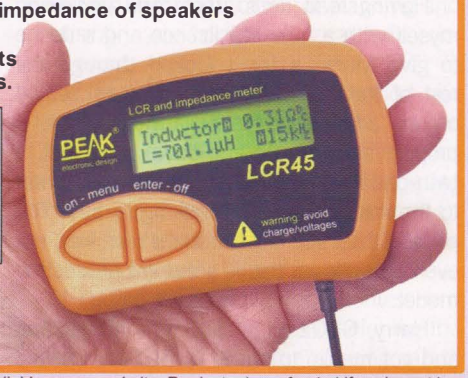

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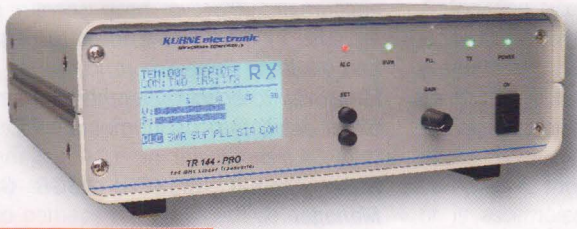

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MORSE... WHAT IS THE POINT?

John Fletcher, G4EDX

I enjoyed reading Ian Simpson, GM0SIM's very well-written article, Morse... What is the point? in the September 2016 issue of *RadCom*, but I admit to being 'one of the converted' already. Morse has been my favoured mode for over forty years on the air. As a newly-licenced G4 in 1975, my first transmitter was a home-built transistor CW rig from a design in *Short Wave Magazine*. Every contact with this brought me great satisfaction. Today's Foundation licensees are denied this opportunity to get on the air for very little outlay.

Having read Ian's article and imagining myself with a new M6 licence and a desire to give Morse a try, I looked through the rest of the magazine and my eyes settled on an advertisement for a Morse key; a proper, straight, up-and-down key, not a twin-paddle affair. Just what a newcomer to the mode should be looking to buy. The price? £239.95. Not Samuel's own key, nor even an antique: this is a current production model.

Harry, G8QZ (now SK) who trained me and got me up to speed in 1974 once told me that a Morse key is just a switch, and you can send Morse on a clock spring and a cork. I saw a row of second-hand keys with an asking price of £50 each at a rally this year and hoped the row would be just as long at the end of the day. Can someone produce a basic, solid Morse key that can be bought for a reasonable price? Not something destined to be put on a shelf, looked at and polished occasionally but used daily to develop skill and bring pleasure.

At a time when radio transceivers are cheaper in real terms than ever before, the over-inflated price of a switch should not deter newcomers from taking up Morse.

RADIO HOUNDS

Donald Radley, 5B4AGQ

Referring to Christopher 2E1BNF letter in the September issue on the misunderstanding of the hobby, it reminded when a few years ago as a committee member of the Pafos Radio Club, 5B4PRC, I received a phone call from one of the local dog charities enquiring if we could arrange to play some music at one of their Dog Fun Days. Regretfully we had to decline, woof woof!

LISTENING TO OUR IDEAS

Morris Smith, G1PIB.

I would like to thank Heather Parsons and Steve Hartley, G0FUW for their visit to Weston super Mare Radio Society on 15 August. The presentation was wonderful and extremely informative and they listened to our comments and took notes. The RSGB seems now have the right people to move itself forward and into 2017 with emphasis on bringing the hobby to a younger generation.

I am an SDR convert and youngsters can, I think, relate to this far better than conventional equipment, with the advent of cheap computers in most homes they can be more involved in the control and limitless capabilities that can be had using this technology. Innovation is the key to their interest, we hope for future young radio amateurs with software talents to prove this. The ISS contacts were a milestone for the RSGB and schools bolstered the interest.

I think the RSGB are key to this, especially after hearing the last at the radio club. I think the way forward is on track too.

Thank you for the kind words about the presentation and our people. The RSGB has supported the use of computers to attract youngsters; we provided PSK31 receiver kits for the Centenary celebrations and attendees built SDR kits at the RSGB Convention last year. We are also looking at new ways to make the best use of the resources we have. If anyone has any thoughts on how we might do more of that, and would like to help us be more innovative, please contact me via g0fuw@rsgb.org.uk

Steve Hartley, G0FUW, RSGB Chair

A HELPFUL FELLOW AMATEUR

Bernard Van Nuil, M6WXG

At the back end of June this year, 'she who must be obeyed' decided she would like a few days away. So we duly trundled off to Lincolnshire. On arrival at the lovely 32ft caravan we unloaded all the usual stuff including the IC-7400 + antenna + power supply, etc.

Everything sorted or so I thought, until I came to fire up the Icom 7400. You guessed it! No power lead. That's it then says I until I remembered that on a previous visit I had seen a multitude of wire antennas above a certain residence.

I went to the QTH and made myself known to the gentleman who answered the door, on the off chance he might be able to help. Sure enough, after much scraffling in various areas of his shack he came up with a spare 706 power lead that fitted the 7400 perfectly.

That kind gentleman was Peter, G0JMZ.

Thanks very much Peter for your kindness and help. It only demonstrates that there are still many decent and courteous people within the hobby.

JARGON

Phil Cragg, G3UGK

With reference to the letter from 2E0HQO about jargon in amateur radio, there's a wonderful example as the caption to a photograph in September's *RadCom*. It reads: "M1GEO & G7UVW QRV from HB0". Of course I know what it means, but I read it out to the XYL – who has had to put up with amateur radio for the best part of 40 years – and her comment was, "It might as well have been written in Klingon". Very true.

Colin Hall, GM4JPZ

I was interested to read 2E0HQO's plea for enlightenment concerning the bewildering number of acronyms, etc. in today's hobby. I have been working on an idea along these lines. If Robert (or anyone else in a similar predicament) would like to contact me at my email address in QRZ.com, I'll be happy to supply him with the information I've gathered so far. I will now continue working on this project and will publish it online by the end of the year.

May I also take this opportunity to suggest to newly-licensed amateurs that they register their calls on the QRZ.com site and include as much contact detail as they are comfortable with. It really is a convenient way to let people know your call is licensed, and also whether you wish QSLs or not.

Bob, G4PVB

In response to Robert Clive, 2E0HQO in September's *RadCom* on jargon. There is a comprehensive list of Abbreviations & Codes on page 153 of the *RSGB's 2017 Yearbook* that I've found useful.

WHY WE SHOULD BE MEMBERS

Brian Wallace, G7MVN

I realise there must be freedom of choice but I firmly believe that every licensed radio amateur and short wave listener should be a member of Radio Society of Great Britain. I am positive, in my own mind, that Ofcom would take our frequencies away if there was not a powerful body to protect us such as the RSGB.

Please bear in mind that the more Members there are in RSGB the stronger they are to stave off any likelihood of taking our privileges away by Ofcom.

As with any representative body, without subscriptions we would not be able to do our work and the more members we have, the stronger voice we have. It is most encouraging that we have seen a steady increase in membership over the last year and we hope to see more joining in 2017. Please try to encourage others to join; with direct debit, the cost of membership is less than £4 a month.

Steve Thomas, M1ACB, RSGB General Manager

DO YOU RECOGNISE THIS?

Lee Taylor, G2ALN

I found the photo in one of my father's old log books and wondered if you can throw any light on it. My Dad was licenced as G2ALN

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and I would like to know where the photo was taken and who the operator was.

GB3RS has been a permanent special event callsign for the RSGB for a long time. It was used as many of the Conventions and exhibitions held mainly in London. These days it's the permanent special event callsign for the station at the RSGB's National Radio Centre at Bletchley Park. If you can help with details for Lee, drop an email to radcom@rsgb.org.uk

CONVERTING RADIOS

Maurice Hall, G0AWA

Re letter in August *RadCom*, page 96

I belong to an earlier generation than the writer, but also used to convert ex military equipment after the war.

At the end of the letter I read your comments with reference to looking at Clause 7 of the Foundation Licence. I was wondering what is in this Clause, as your wording seemed to indicate that it was not allowed-perhaps you could advise me of the reason for your caution.

Basically, Clause 7 reads "Where this Licence is a Foundation Licence, the Licensee shall only use commercially available Radio Equipment which satisfies IR 2028. Foundation Licence holders may also use Radio Equipment constructed using commercially available kits which satisfy IR 2028". Ofcom guidance expands this as follows "With the exception of Foundation licensees, Amateur Radio licensees may use whatever equipment they wish, if its use complies with the terms and conditions of the Licence. There is no general requirement for Amateur Radio apparatus to conform to the essential requirements of the Radio and Telecommunication Terminal Equipment Directive (R&TTED). However, the R&TTED does cover Amateur Radio apparatus that is available commercially ('plug-and-play' equipment or kits designed to be assembled into 'plug-and-play' equipment).

Clause 7 goes on to say, "Holders of the Foundation Licence have demonstrated only limited technical competence and so pose a greater risk of causing harmful interference (even if inadvertently) if they construct their own apparatus. We therefore restrict holders of the Foundation Licence to apparatus that conforms to Interface Requirement IR 2028 or is assembled from kits, which conform to IR 2028. We believe that if apparatus conforms to IR2028 it should be possible to demonstrate its conformity with the essential requirements of the R&TTED. Through IR 2028, we therefore manage the risk of inadvertent harmful interference."

BEING PART OF SOMETHING MORE

Mike Davis, G0ROT

Prior to the start of the 2m Trophy Contest on 3 and 4 September, a station was heard asking why amateurs would buy top of the range equipment in order to have a brief QSO with other stations?

If we had had time to talk to this fellow amateur before the contest, I would have explained I was part of a team setting up a station in a field. We had planned for this event, collected together the best equipment we felt we could lay our hands on, and worked together to assemble the station. We also had the pleasure of working with each other, of planning and socialising in our homes and local pubs prior to the event.

We then worked together to support one another while we entered the contest.

It is not just the contest, of trying to amass not only the number of QSOs but also amassing points which, in this contest, is dependent on the distance the stations are apart, but also the social aspect of being part of a team.

Of course doing well in the contest is a bonus; winning it would be like winning the Lottery. Above all is the sense of being part of a team working together to achieve something.

So please, understand, we are not individuals setting up a station but a group of people that enjoy working together.

RESPONSE TO BUYER COLLECTS.

Howard Murray, G3NBY

Following my original letter and the letters that followed on the subject of 'Buyer Collects' I have a few final thoughts.

I still believe that 'buyer collects' reduces the market for the seller. But, as ever, all advice is only a recommendation and it's not compulsory! Just because my reaction is to dismiss those adverts, there will be others that don't. Graham talks about travelling around the country, enjoying the trip in pursuit of a deal – I'd love to go with him! But that option is unlikely to suit everyone searching for those pieces of equipment. If, from Stockport, I see an ad for a much-sought after item in Bude, Isle of Sheppey or Inverness marked 'Buyer Inspects and Collects', I will continue to pass on that one.

I may not be alone.

NOISE REDUCTION

Russell Tribe, G4SAQ

I must write to congratulate G3XLP on his "STAR noise reduction" article in May *RadCom*. His profound insight to the problem is truly impressive and he wrote the article in such a clear manner that I, as a non-technical person, could readily understand most of it. This is a great achievement! I can't wait to hear details of a full construction project – I'm longing to build it.

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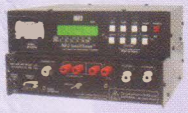

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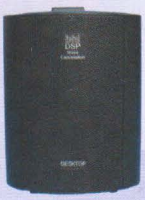

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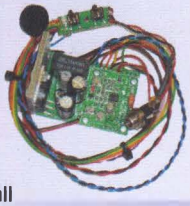

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