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KX2 £859.95

ELECRAFT K3S

Options available:

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- 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.
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- KXV3A board now replaced with KXV3B board which will now be included as standard.
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K3S/100-F £2999.95 **K3S/100-K £2849.95**
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Buddipole

40-2m portable antenna kit with Balun.

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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

DR-X1E

Digital and conventional FM dual mode repeater that covers the VHF and UHF amateur radio band. It was developed for use with System Fusion and conventional FM in mind.

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FT-1XDE

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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.

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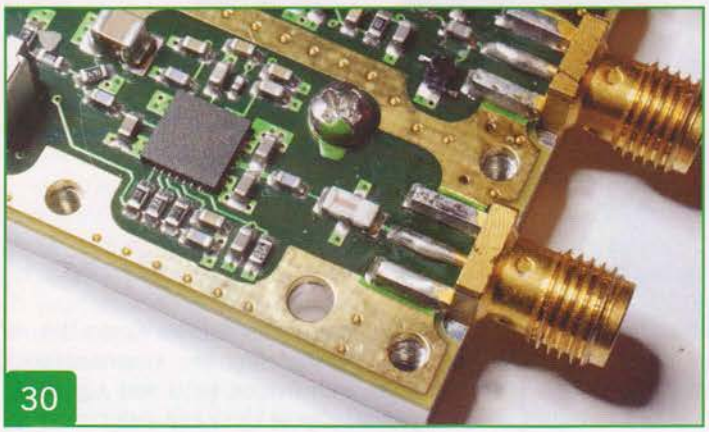

Technical Features

Features

Cover image: FlexRadio Systems visit the NRC with a FLEX-6500 and FLEX Maestro for the NRC. Photos courtesy Mike, G4WNC.

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 October edition of *RadCom* is expected to arrive with most Members by 23 September, 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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Club of the Year presentations

Denby Dale & District ARS is seen on the right receiving the large Club of the Year 2015 award for Region 4. Presented by Region 4 Manager Ian Douglas, G7MFN the trophy was received by Adrian, G1BRB, Brian, G0BFJ, Oliver M6EUB and James, 2E0JTH amongst others.

Mick Senior, G4EFO, the Region 10 Manager presented Hilderstone Radio Club with the Club of the Year 2015 shield for the second year running in that Region (lower right). The club have continued their good work this year supporting Wellesley House school with astronaut Tim Peake's amateur radio contact and coached two pupils, Ethan and Benny, through their amateur radio Foundation licence. The boys recently gave a presentation to the club members about their experience.

The national winner and runners-up of the Club of the Year 2015 competition will be announced at the National Hamfest in September. Presentations of the trophy, certificates and prize cheques will take place at that time.

The RSGB would like to thank Waters and Stanton for their continued support of the award.

Towards one RAYNET

Wherever you sit in the RAYNET community, one thing has always been abundantly clear – we need one organisation, and the sooner the better.

The shape and status of the likely new, unified RAYNET has been defined. Considerable progress towards this goal has been made by the RSGB/RAEN joint working group over recent months without much outward fuss. Now we want to share the proposals more widely. There is a proposed memorandum of agreement between the RSGB and the unified RAYNET that sets out their new complementary roles and co-operative relationship. A joint statement on the detail and how amalgamation will be achieved has been drawn up by the RSGB and the RAE.

The relevant documents can be found at www.rsgb.org/main/operating/emergency-communications along with a fuller version of this article. If you are at all interested in the future of RAYNET please go to the webpage and read the documents.

Very briefly, the new unified organisation will become an affiliated Special Interest Group of the Society. In turn, only the unified RAYNET will have the task of providing the special support that groups need, such as specific insurance and photo ID. Only groups in the unified organisation will be able to use the title RAYNET.

To put these changes in place decisions have to be made by both the RSGB and the Network but the processes are different. If agreement is reached on both sides, RSGB groups will be invited to transfer to the unified RAYNET on or before their RSGB affiliation comes up for renewal. It's important to note that the unified RAYNET will be a membership organisation like its predecessor. So not only will the group transfer, its members will become members of the unified RAYNET. During transition the unified RAYNET will have an interim management committee until new elections can be held which will include its new groups and members. RAYNET groups will be able to have RSGB affiliation like any other RSGB club for payment of the club fee.

Peter R Thomson, GM1XEA
Chairman of the RSGB Emergency Communications Committee

Computer programmer required for HF propagation prediction project

The RSGB's Propagation Studies Committee (PSC) is looking for an experienced programmer with Python skills and a good working knowledge of Linux and web servers to develop the next phase of its online HF propagation prediction software on a voluntary basis.

The first stage can be seen working at www.predtest.uk/

Unfortunately, the initial developer can no longer devote any more time to the project and PSC is keen to develop a point-to-point propagation solution and also maintain and develop what has already been completed. If interested please contact Gwyn, G4FKH via email to g4fkh@sky.com.

Can you help keep up the standards?

Most readers of *RadCom* will have experienced interference problems of one sort or another over the last few years. Many will have noticed that the incidence and intensity has increased. In this world of advanced technology and radio-controlled gadgetry, the probability of interference is high.

The list of interfering equipment grows by the month, from switch mode PSUs, plasma TVs, solar panels, wind turbines, robotic lawnmowers, LED illumination, electric car chargers, floodlights, ventilation systems to Christmas lights. It is difficult to see how the problem will improve as more equipment uses the radio spectrum.

The EMC Committee has four main functions. The first is to give Members personal advice when EMC issues arise. The second is to keep an eye on emerging technologies and to investigate any potential threat to the amateur bands. Once a problem is identified, tests can be carried out to ascertain the severity of the problem. Third, is the production of advice in the form of Leaflets (15 in all), 'EMC Matters' and the EMC Matters Forum online, all of which contain help, which should deal with nearly all Members' problems. The fourth is less visible but is extremely important – lobbying & Standards.

Lobbying and active involvement in Standardisation forums may appear dull but it is far from it. Such involvement is vital in ensuring that the views of radio spectrum users are factored into the formulation of standards at an early stage.

In the past RSGB has been represented on National and International standardisation bodies, BSI, CISPR and ETSI and has raised the profile of the Amateur Radio Service in forums where other members (mainly from industry) had no knowledge of our existence or, in many cases of the requirements of *any* weak signal radio services.

As with every other aspect of EMC work the Standardisation load is increasing and the EMC Committee is looking for Members who feel they would like to join the EMC team to help in this particular area of Standardisation.

We are now looking for someone to represent the RSGB on the BSI GEL210/11 Committee, which provides input into British, European and International Standards and Codes of Practice. Training is available from BSI and support will also be given by members of the EMC Committee. The role will involve reading documentation and attending meetings (typically three times a year), for which expenses will be reimbursed.

Ideally the person should have a good understanding of radio and EMC technology and be willing to join the EMC Committee as a member or corresponding member.

If you would like to help please contact emc.chairman@rsgb.org.uk

G5RP trophy

The G5RP Trophy is an annual award to encourage newcomers to HF DXing. The award is not limited to youngsters or the newly-licensed; it is open to anyone who has recently discovered and made significant progress in HF DXing.

If you are an established HF DXer and want to recommend someone to be awarded the G5RP Trophy for 2016, now is the time to send in your nomination. Your nominee should be an up-and-coming HF DXer who has made rapid progress in the last year and has some real achievements to show, for example, a good total of new countries worked or some serious HF DXpedition activity.

This prestigious award will be presented this year at the RSGB Convention on 7 to 9 October. Last year the winner was Jamie, 2E0SDV and he received the trophy from RSGB Chair Graham Murchie, G4FSG at the RSGB Convention in 2015.

Please send your nominations to Ian Greenshields, G4FSU, QTHR, or by email to ian.greenshields@gmail.com to arrive no later than 16 September 2016.

New GB2RS News reading

Since the first Sunday in June there has been an addition to the GB2RS Schedule. G8VHI, located in Nuneaton, now reads the news at 2030UTC on 145.525MHz. Reg has a very good location and should be audible over a large area of the West and East Midlands. His best report to date is near Hamburg in Germany!

RadCom plus

RadCom Plus July 2016

RadCom Plus is the RSGB's digital technical supplement. The latest version is available to RSGB Members via the RSGB website. This edition has articles on a narrowband direct upconverter for the LF/ME bands, the issues and solutions for making a direct SSB upconverter that is suitable for audio or digital modes, a relatively inexpensive way to start transmitting on 10GHz, using the Arduino microcontroller, the ganging and tracking of superhet receivers and a 70cm handheld using the DRA818U module. Go to www.rsgb.org and click on the Publications button.

Seeking new Examination Standards Committee Chair

An opportunity has arisen to take an important role in the development and management of the RSGB Amateur Radio Examinations. The Examinations Standards Committee (ESC) oversees all aspects of the examinations and it current Chair, Professor Simon Watts, will retire at the end of this year, having completed 10 years in this role. The RSGB is seeking applications from suitably qualified and experienced persons to fulfil this exciting role. The appointment will be for an initial term of three years.

The role is pivotal in steering the Amateur Radio Examinations forward as new technologies and opportunities for change and improvement are developed. The ESC Chair is appointed by, and reports to, the RSGB Board. The ESC Chair is responsible for the appointment of the Examinations Standards Manager, Examination Quality Assurance Manager and the Chair of the Examination Group.

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

Applications which should include how you believe you could fulfil this role and a brief CV should be sent to Ian Shepherd, G4EVK c/o RSGB Headquarters or by email (see below).

There is much information about the examinations system provided on the RSGB web pages but if you require further information or an informal chat about the role or whether to apply then you can contact the RSGB Director responsible for exams by emailing Ian via g4evk@rsgb.org.uk. The closing date for applications is 31 October 2016.

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 A G Stacey	G3BXS
Mr K I Procter	G3EPO
60 years	
Mr R J Cooke	G3LDI
Mr G Dale	G3MFH
Mr A Kettlety	G8HTN
Mr H R Mesny	GJ3LFJ
50 years	
Mr P A Kalas	G3VCN
Mr G H S Jones	G3VKV
Mr J D Peters	G3VMJ
Mr E Searle	G3VMY
Mr S Cammies	ZS1XG
Mr D A Lane	G3VOM
Mr H S Pinchin	G3VPE
Mr I R Cutler	G3XFV
Mr C J Marsden	G3XSO
Mr D M Kirkwood	G3YQO
Mr C G Clark	G8BKQ
Mr R T Payne	GM4AWA
Mr A A C Richmond	GU30NJ

QSL Matters

The easiest part of the Bureau's job is sorting cards, but that's far from the whole story. It tries to ensure the system is being used fairly and for the benefit of all Members. This involves significant and, often, time consuming work, made all the harder if users don't follow the guidelines in the *RSGB Yearbook* and on the website. We especially need Members to include a current *RadCom* label showing their Membership number. Please make sure the callsign on the label matches the one you are using by updating your details if you change callsign. Including an original, in-date, *RadCom* label and notifying RSGB of all calls held (not prefixes) saves a lot extra work.

For clubs and special events, *RadCom* labels don't apply, but details of the club's affiliation is still needed. A copy of the NoV for GB activities must be included with every batch of cards as confirmation that the holder or club is a Member or affiliated.

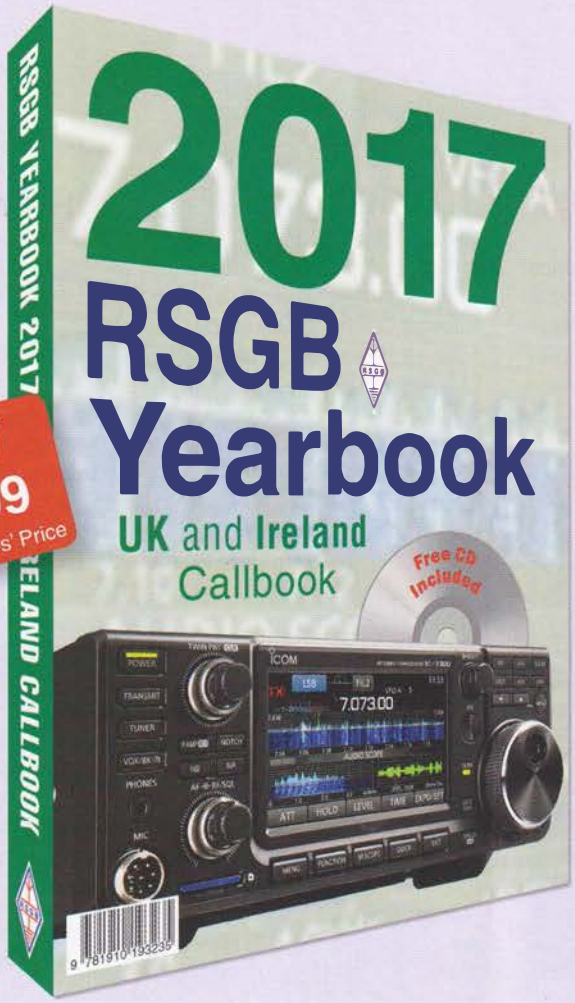
Receiving approximately 130kg of W1AW centenary cards for the ARRL's Centenary (that occurred in 2014) came as more than a surprise (see right). That's around 40,000 cards! Unlike the GB100RSGB celebrations, the ARRL has opted for a traditional, QSL 100% outgoing, worldwide, rather than OQRS or card on receipt. Sadly, many won't be delivered as the recipients don't have envelopes with their QSL sub managers. If you don't want to miss your card, now's the time to send your sub manager a C5 envelope with your Membership number and callsign on it.

It is with sadness that we advise that two QSL sub groups have been temporarily suspended, due to the sudden death of John Fogden, G4WSX. These are the G3I-L and G4W-X groups. John was a stalwart of the RSGB, a long time volunteer that will be missed by many, especially by his friends in the two sub groups that he handled with diligence for many years.

A replacement volunteer is needed for the very busy G3I-L group. At this time it is intended that John's G4W-X group will be absorbed into a larger group as part of an ongoing G4 series review.

We are still seeking a replacement volunteer to support the busy Contest Calls group. Contesters generate significant numbers of QSL requests and we urgently need a replacement volunteer. If you have an interest in contesting, or taking on the G3I-L group, all you need is a little time, space and basic spreadsheet skills. Please email qsl@rsgb.org.uk and we'll tell you more.

NEW



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Water Bottle Not Included

RSGB Yearbook 2017

Edited by Mike Browne, G3DIH

There is nothing quite like the *RSGB Yearbook 2017*. Not only does it contain the latest details of over 86,000 UK and Irish Republic callsigns in its massive 544 pages but it remains the most comprehensive guide to amateur radio in the UK and worldwide.

The *RSGB Yearbook 2017* remains the very latest and most accurate callsign information available for the UK. Added to the callsign data there are 176 pages of invaluable reference material for just about everything you are ever likely to want to know about amateur radio. There is all the latest information on every aspect of the RSGB from how the Society is organised, the services it offers, committees, who to contact for assistance, etc. Regional information provides details of the RSGB Regional Manager Team, local clubs, contest, repeater and emergency groups alongside examination details. There is a huge range of information sections included from Repeaters, Beacons, Band Plans, RSGB Awards, RSGB Contests and HF Propagation Predictions for 2017. There are also listings of special contest callsigns, permanent special event callsigns and much, much more.

FREE CD with RSGB Videos
This year the Yearbook bonus CD contains not only contains all the 176 information pages of the *RSGB Yearbook 2017* in a searchable PDF format but also 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. 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.

210x297mm 544 pages, ISBN: 9781 9101 9323 5
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Louis Varney G5RV Cup

The Louis Varney Cup is awarded for advances in space communication. It was won by Wouter Weggerlaar, PA3WEG for outstanding technical contributions to several amateur satellites and associated outreach. It was presented to him at the AMSAT-UK Colloquium by RSGB Chair Steve Hartley, GOFUW.

Ofcom new licensing system

The Society has been discussing with Ofcom what many licensees see as problems with the new licensing system. Licensees have been issued with callsigns that appear in callsign lists such as QRZ.com.

Ofcom have reaffirmed that none of the callsigns issued by the new system is a duplicate. Although some of these callsigns have been used in the past (which is why they could be found on QRZ.com or Hamcall.net), none has been authorised under a valid licence for at least two years. In fact, Ofcom made changes to the system on 3 August, which were intended to ensure that callsigns that were last used more than two years ago were also not recycled.

The Society challenged Ofcom on this, as they were receiving reports that some applicants were still getting recycled callsigns, even after the 3 August changes. Ofcom says that it has now loaded the past ten years'-worth of licensing records into its new licensing system. That means that if a callsign was last used more than ten years ago, the system may recycle it but that callsigns used in the last ten years should not be recycled. We are urgently discussing with Ofcom how we might help develop a fuller and more comprehensive list, to reduce further the likelihood of recycling.

Although they don't usually allow a callsign to be changed, Ofcom have said that, in the circumstances, if you find that the new system has issued you with a recycled callsign, you may request a replacement if you wish.

Ofcom have also confirmed that the requirement to revalidate licences at least every five years remains. At present the system does not provide an obvious way of doing this but this is also being urgently addressed.

RadCom basics

The October/November edition of *RadCom Basics* will be published on 4 October. This edition will contain the 2nd part of the article on using the DX Cluster as well as an explanation of how and why the HF bands come alive in autumn. There is also an article to help you understand that the sunspot number and the Solar Flux Index mean and how those details can help on the air. Finally, there's an article on taking part in the CQWW contest – the SSB leg is at the end of October. Go to the RSGB website at www.rgb.org and click on the Publications button.

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 D Rugen, 2E0OLG
Mr A Eid, A9001SWL
Mr W Fenech, AI6JZ
Mr B Schweikert, DL3SCY
Mr P Smit, G0LIY
Mr T Neale, G0WAB
Mr D Wormald, G3GGL
Mr A Grieve, G4ATI
Mr M Moseley, G6UAN
Mr P Higginson, G7EZH
Mr D Culver, K3YB
Mr K Clowes, KG5LQL
Mr D Dobbert, KW4UY
Mr C Mellor, M0HTS
Mr E Smart, M0RFR
Mr A Rowley, M0UKR
Mr L Redgwell, M6GYX
Mr B Holgate, M6HGM
Mr M Seabrook, M6HHE
Mr J Hewlett, M6JTY
Mr J Harrison, M6LOX
Mr N Coady, M6NCX
Mr S Shaw, M6PHF
Mr L Pawson, M6XLP
Mr T Talbot-Humphries, M6ZGY
Mr H Kernaghan, MI0KOA
Mr S Morrow, MI0ULK
Mr D Mulligan, MI6MQF
Mr L Hambleton, MI6VAI
Mr A Barclay, MM0WXE
Mr R Clow, MM6FZT
Mr J Hodson, MW6HDV
Mr B C Potter, RS208756
Mr W Barmby, RS308989
Mr D Flood, RS309092
Mr D A Brown, RS309102
Mr P Neal, RS309120
Mr H R Bennet, RS309156
Mr P Gostelow, RS309158
Mr P Wedgbury, RS309184
Mr S Gibb, RS309186
Mrs N Neal, RS309199
Mr G Rothery, RS309209
Mr N Capstick, RS309234
Mr J Willis, RS309244
Mr D Price, RS309252
Mr G Price, RS309253
Mr S Jones, RS309255
Master T Scott, RS309275
Mr G Arnold, RS309323
Mr J Kelly, RS309328
Mr S Thirlwall, RS309329
Mr E Parker, RS309330
Mr E Parsons, RS309364
Ms J McCorkell, RS309373
Mr A.A Brown, RS309403
Mrs E Reisch, RS309404
Mr R Doughty, RS309434
Mr J Walker, RS309436
Mr B Kenway, RS309442
Mr C Harris, RS309467
Mr H I Hultqvist, SM5FLT
Mr R Hellberg, SM5RVH
Mr J Siitari, SV9RMU
Mr M Kelly, VE3FFK
Mr R Jacob, VK2BJP
Dr I B Egerton, VK2IBE
Mr B Walker, VK4YS
Mr R Stegemeyer, W7HR
Mr D Wright, W9RIT
Mr D Wilson, WE4X
Mr R Morgan, ZB2TT

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

Mr P Roberts, 2E0BBP
Mr D S Millard, 2E0MRD
Mr L L L Lyman, 9M2AA
Mr A Linton, EI2HH
Mr A V Nicholls, G0LUB
Mr R F Greaves, G0MOH
Mr D G Inston, G0MZT
Mr J Easton, G1ILB
Mr R J L Stenning, G1LIW
Mr J G Moggeridge, G1YHB
Mr T H Merrills, G3VBS
Mr C Turner, G4HKP
Mr F H Goddard, G4OVS
Mr A Williams, G4PQY
Mr T M Bevan, G4TWW
Mr R L Cook, G4XHE
Mr P N Raynor, G6EUF
Mr M Kulin, G6PGQ
Mr C F Hosegood, G7IRU
Mr B M Blight, G8AAD
Mr I Hill, G8MWK
Mr C O'Connell, GI1RXL
Mr S C J McAdams, GJ7DNI
Mr P Crockford, GM8IOA
Mr D Bower, K4PZT
Mr N Heft, KC2KY
Mr M Bywater, M0DFF
Rev L Clark, M0LAE
Ms L V Milford, M0LAS
Mr N Parker, M0NKL
Mr S Vickers, M0SSV
Mr C P Hayes, M3HSM
Mr J Mirfield, M6XNO
Mr J Dow, MM0SNK
Chorley & DARS, MX0ISN
Mr G L Heron, N2APB
Mr O S Alonso, N6PAZ
Mr M Hartley, RS184441
Mr S Rattley, RS184447
Dr C Nadin, VK6ACF
Mr J A Jaminet, W3HMS
Mr A Mason Jr, WA9KPZ

NEW

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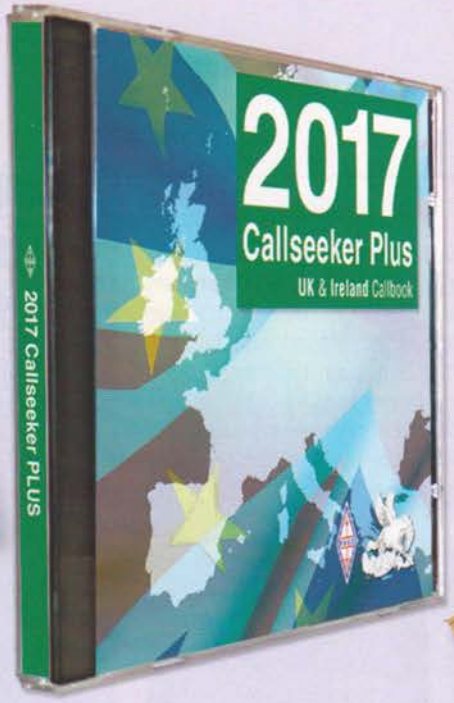

NH National Hamfest
30th Sept & 1st Oct
FREE RSGB Rucksack
IF YOU SPEND £16.99 OR OVER
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Water Bottle Not Included

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 and with more callsigns – Callseeker Plus 2017 what a bargain!

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

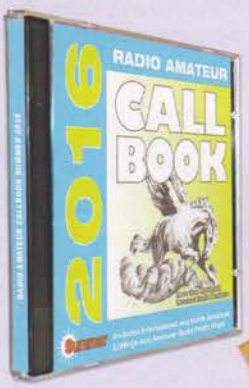
Pegasus Flying Horse World Callbook CD - Summer 2016 CD & USB Stick

New Edition

This is the very latest version of the popular *Pegasus Flying Horse World Callbook - Summer 2016*. Supplied as both a CD and USB memory stick, it contains the very latest Europe and US call data making it the most up-to-date and very best World Callsign Directory available. With more than 1.6million callsigns included and 60,000 email addresses, 60,000 QSL Manager listings and much more. *Pegasus Flying Horse World Callbook CD* requires no hard disk space as it runs straight from the CD. The easy to use interface is available in four languages and provides instant access to label printing, CSV export functions, etc.

Easy to use and comprehensive, the *Pegasus Flying Horse World Callbook* is a highly useful tool for every radio amateur's shack

Non Members' Price £44.99
RSGB Members" Price £38.24



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First UK QSO on 122GHz

UK mmWave enthusiasts have often not favoured the 122GHz band due to the oxygen resonance and water losses, but the first UK QSO took place on 17 July at 1345UTC between G8CUB/P and G0FDZ/P. Both stations were located at Hackpen (IO91CL). The distance was 120m and CW reports were 599 both ways. An earlier attempt at 5km failed with just the merest hint of a signal. A 134GHz QSO took place over the same 5km path but signals were weak. It is hoped that an attempt will be made soon over 1.5km. Power levels were 70μW for Chris, G0FDZ and 300μW for Roger, G8CUB. One feature of G0FDZ's system was the use of a slab type mixer that has been recently developed to make millimetre wave mixers easier to construct. With this QSO, every allocated UK band has now has had at least one QSO.

Spanning the Atlantic on 144MHz

Many people know that Marconi famously first sent radio signals across the Atlantic in 1901 from Cornwall to Newfoundland. It is thought the frequency was around 850kHz (this was a bit before calibrated VFOs!). Now amateurs are trying to make this leap on 144MHz using only tropospheric or ionospheric means.

A transAtlantic 2m QSO has long been sought. The first such verified QSO will be rewarded with the Brendan Award sponsored by the Irish Radio Transmitting Society.

Thanks to an assist from Justin, G0KSC and InnovAntennas, a group of amateurs is closing in on this elusive goal. Frank, VO1HP made his Conception Bay North, Newfoundland summer QTH available for a receive site to listen for transAtlantic VHF beacons using a stacked pair of InnovAntennas LFA-Q Yagis and a two-port InnovAntennas power splitter feeding an SDR receiver.

Boscombe Down Balloon Challenge

Radio amateurs in the south of England are asked to look out for schools and youth groups taking part in the Boscombe Down Balloon Challenge – and to provide any help and encouragement that they can.

The Challenge invites teams of budding engineers and scientists to compete for three £1000 prizes. Entrants will launch their own high-altitude balloon, which will carry a radio telemetry payload operating in the licence-free portion of the 434MHz band. This is a great opportunity to promote STEM (Science, Technology, Engineering and Maths), but many would-be competitors will lack the radio communications know-how that most licensed amateurs take for granted; and any offers of help in this area are likely to be most welcome. This is also a very good opportunity to show off amateur radio to young people.

Full details of the Bocombe Down Balloon Challenge can be found at www.bdballoonchallenge.org/

Competition flights can take place at any time up to and including 31 December 2016 – but leading competitors are already planning their high-altitude missions.

D-STAR QSO Party 2016

Icom Inc will be holding a D-Star QSO party from 0000UTC on 23 September to 2359UTC on 25 September. The format of the party will be the same as in previous years with the goal of encouraging D-Star operators to communicate with as many other operators across the world via D-Star repeaters. For more information visit the D-Star QSO Party 2016 website www.icom.co.jp/world/dqp

Young Ham of the Year

Skyler Fennell, KDOWHB, of Denver has been selected as the 2016 Bill Pasternak, WA6ITF Memorial Young Ham of the Year by the Amateur Radio Newsline. Skyler, 17 was first licensed in July 2013 as a Technician and upgraded to General by September 2013. He took and passed his Extra class licence exam in January 2014. His interest in basic electronics was sparked when he was in the fourth grade and continued into middle school and high school. Among his early building projects were a laser Spirograph, audio amplifiers, and high voltage transformer drivers. He began working with the ABOBX STEM School Amateur Radio Club in nearby Littleton, Colerado and got involved in the group's Edge of Space Sciences missions (balloon launches with amateur equipment). He became project manager for its 440MHz repeater and helped put together an AllStar and EchoLink repeater for students, serving as a mentor for construction of the project. Skyler has chronicled several of his amateur radio and technical achievements on his YouTube channel – Skyler FM.

CF31CER

2016 is a year of historical significance for the Canadian Forces 31st Combat Engineer Regiment in St Thomas, Ontario, Canada. It is the 100th anniversary of the 91st Battalion's deployment in June 1916 to France during the First World War and the 150th anniversary of the formation in September 1866 of the Elgin Regiment and its continued operation as the 31st Combat Engineer Regiment. A Special Event Station, CF31CER, will be operating from 1200UTC on 10 September until 1200UTC on the 11th from the Regimental HQ. To obtain a certificate via email, you must send an email to CF31CER@gmail.com with the contact number provided to you and a return email address.

Sponsor a brick

Construction of the Codebreakers' Wall surrounding Hut 8 at Bletchley Park has been finished. The wall is a re-creation of the original wartime blast wall. You can sponsor a brick to be engraved with the name of a veteran, with your name or in memory of a loved one. The Codebreakers' Wall will be a memorial that will last for generations at Bletchley Park and the money raised will help to complete the transformation of this historic place. Go to www.bletchleypark.org.uk/ and click on 'support us'.

UKFM (Group Western) AGM

The UKFM (Group Western) repeater group is holding its 41st Annual General Meeting at 8pm on Monday 5 September. The meeting will be held at the Warrington ARC HQ, Bellhouse Lane, Grappenhall, Warrington WA4 2SG.

Friedrichshafen lectures

The keynote lectures and presentations from Friedrichshafen Ham Radio 2016 are available from the Documentary Archive Radio Communications. Go to www.dokufunk.org and click on the Lecture Room icon.

Telford HamFest

Telford & District ARS are holding their annual HamFest on Sunday 4 September. This event is held at Enginuity (see Rallies on page 94). As in previous years, there will be numerous traders and exhibitors that people enjoy browsing and from whom they make those 'essential' purchases, as well as an RSGB Information and Book stand. A special feature this year will be a presentation by Noel Matthews, G8GTZ, who is not only Chairman of the BATC (British Amateur Television Club), but was also ARISS TV Team Leader for the recent Principia project. His presentation is entitled Amateur Radio on the ISS. More information at www.telfordhamfest.org.uk

Orkney Wireless Museum

It is planned that the Museum amateur radio station will be in operation from its premises at Kiln Corner, Kirkwall (www.gb2owm.org.uk) from 1 to 7 September during the 26th Orkney International Science Festival (www.oisf.org). Probable operating periods will be weekdays and Sunday afternoons between 2 and 4.30pm and Saturday between 10am and 12.30pm. Operation will be primarily on HF SSB.

E day

Angel of the North ARC is taking part in E day on 1 October at the Gateshead Public Library. They will be running workshops suitable for all ages such as building a crystal radio, HF radio demonstrations and an oscilloscope experiment. More details from Jacqui Thompson on 0191 433 8406 or email jacquithompson@gateshead.gov.uk

Interference Committee

The German National Society, DARC, has reported that Thilo Kootz, DL9KCE has been elected as Chair of the CISPR/H committee. CISPR is International Special Committee on Radio Interference.

Radio commemoration

On 24 August 1916 Ernest Shackleton completed his epic journey to rescue the crew of the *Endurance*, which had been crushed by ice in the Weddell Sea in November 1915. Remarkably, all lives were saved. The rescue will be commemorated during Endurance Week from 24 to 31 August with a number of special radio activities from the UK and around the world. Modern-day scientific researchers and institutions are invited to participate. More details are available on www.RedKiteRadio.org.uk

New Polish radio club

A new radio club has been formed in Poland, located in one of the schools in Rzeszow. It has all been made possible by a number of radio amateurs from nearby clubs in Debica and Lancut who have given up their time to start this ball rolling. Thanks also go to the school Director as well as the City President, Mr Ferenc, who has taken an interest in this project. The club call is SQ8POP, which is held by Piotr, SP8MRD, so keep your ears open for this call – the school looks forward to working you.

G3KMA inducted into CQ DX Hall of Fame

At the CDXC AGM held recently in Rutland, Roger Balister, G3KMA was presented with the prestigious CQ DX Hall of Fame award by the RSGB President, Nick Henwood, G3RWF.

Roger, who has driven the Islands on the Air (IOTA) programme as IOTA manager, received the award from *CQ* magazine who said in their citation: "As manager of the Islands on the Air program since 1985, Balister has seen IOTA grow from a few hundred early participants to more than 10,000 today, making it one of the most popular award programs in Amateur Radio."

CDXC is a major supporter of IOTA, both sponsoring individual IOTA expeditions, and also has recently given a major donation to the newly formed IOTA Ltd for its IT upgrade.

Special events

Riviera ARC from Devon will be activating Babbacombe Cliff Railway for Railways on the Air on 24 and 25 September. They will be covering the HF bands and 2m / 70cm, and expect to be busy on 40 / 20 metres. They have requested the usual callsign of *GB4BCR* from Ofcom.

On 8 September GB4SBB will be operated by Thornbury and South Gloucestershire ARS from approximately 9.30am until dusk. Transmitting on 7 and 14MHz as well as 2m and 70cm the station will commemorate the 50th anniversary of the Severn Bridge.

Happy 100th birthday

Allan Ogden, G5OD was first licensed in 1934 at the age of 18. He celebrated his 100th birthday in Guildford on 4 August. His interest in radio dates back to his days at Manchester Grammar school, where he developed a keen interest in anything and everything electrical. In the lifetime that followed, his prime radio interests were always construction and CW. He devised homebrew kit of all kinds, from simple receivers and QRP rigs to complex transceivers and high power amplifiers. In his early days of radio, like many amateurs of the day, he did, of course, cut and grind his own crystals. Shortly after receiving his licence, Allan moved home to high ground in Colwyn Bay where, with plenty of space for antennas, he met and formed a lasting friendship with David Mitchell, G6AA. The two had many QSOs and did a great deal of experimentation on the bands – including Top Band. Another great friend of those days was John Clarricoats, G6CL, then editor of the *T&R Bulletin*.

Allan Ogden, G5OD operating HF CW at the age of 95.

In WWII he enlisted and went to work with a group of 'boffins' within the RAF, where he helped to develop very high voltage, high power, beam systems to interfere with enemy airborne guidance devices. After his demob Allan took up radio again, with a special interest in worldwide HF CW operation, and was invited into the FOC (First Class CW Operators' Club), where he held Membership Number 88 for more than 50 years. David, G6AA emigrated to New Zealand and Allan decided to do the same with his whole family. Eventually, Allan built his own house and created a cattle farming business that he ran for some 15 years. He returned to the UK in 1960 and settled in Guildford, and joined the local Guildford and District ARS.

In 2005 Allan became a founder member and treasurer of a new local club with a particular focus on CW: The Wey Valley Amateur Radio Group. He was appointed an Honorary Life Member of the club in 2015. Participating in field days and other contests (of which BERU was always his favourite), he remained active on the bands until the age of 95, when, with severe arthritis setting in, he felt his CW was not up to the standard he would like and regrettably closed down his station. He is now resident in a care home, where, with failing sight, he is still able to read Morse and, on the occasion of his birthday, enjoyed the greetings of fellow club members recorded in Morse code.

New Belarus 5MHz allocation

From July 2016, amateurs in Belarus have had access to the new WRC15 allocation from 5351.5 to 5366.5kHz with a maximum power of 50 watts. SSB, CW and digital modes are permitted to Class A (top level) licensees.

Rally details

The new organisers of the Weston Super Mare Rally on 18 September would like to ask all those traders and clubs who had planned to attend the rally, including those with bookings already in place to please contact Dave, G4CXQ on 07871 034 206 or by email to g4cxq@btinternet.com to confirm their details. The original organiser was taken ill abroad and the relevant files are presently unavailable.

2016 FIRAC Congress

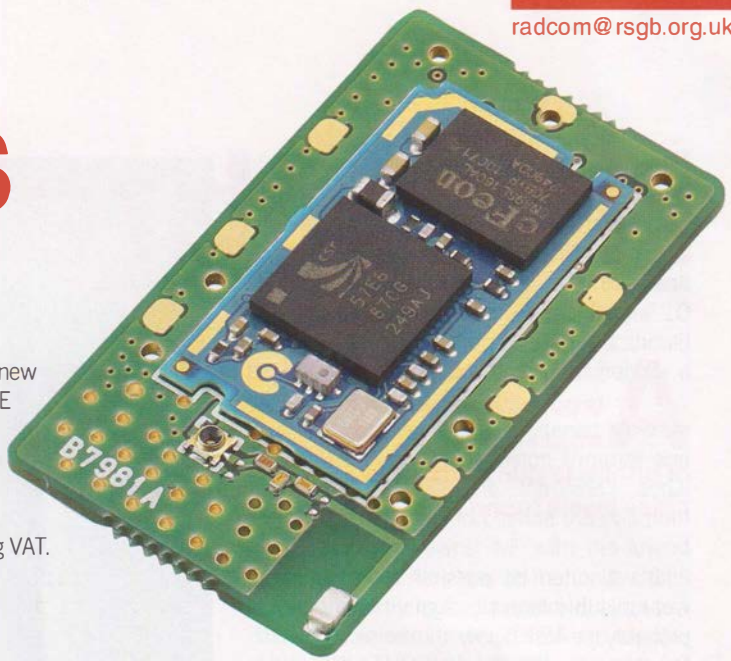
Membership of British Railways Amateur Radio Society (BRARS) is open to anyone with an interest in amateur radio and railways. BRARS is a member of FIRAC (Fédération Internationale des RadioAmateurs Cheminots, which in English is International Federation of Railway Radio Amateurs).

This year, BRARS is celebrating its Golden Anniversary and is delighted to announce that it is hosting this year's FIRAC Congress in Derby from 15 to 19 September. This will be the 55th FIRAC Congress and will attract amateur radio & railway enthusiasts from FIRAC member societies around Europe.

For more information please see www.BRARS.info

radcom@rsgb.org.uk

New Products



Bluetooth unit for Icom mobile radios

The current Icom UT-133 Bluetooth unit is being replaced with a new version that is compatible with not only the ID-5100E and IC-2730E mobile transceivers but also with Icom's new IC-A120E ground support aviation mobile. The new UT-133A is basically identical to the UT-133 but has the added capability of handling PTT function of Bluetooth-enabled headsets.

The UT-133A is now available to purchase for a RRP of £40 excluding VAT. More details available at www.icomuk.co.uk

Masthead mounted preamplifiers

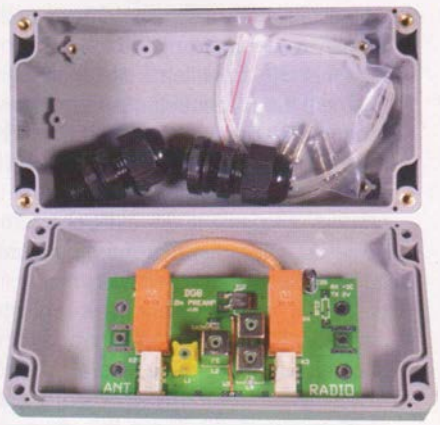
Following the success of the DG8-2 Assembly Kits for 144MHz, hupRF is pleased to announce the introduction of models for the 50MHz and 70MHz bands (DG8-6 and DG8-4).

The DG8-x preamplifiers are delivered as a pre-assembled PCB with the filters ready aligned and the noise figure optimised. All remaining parts needed to complete the project are included, leaving you to drill the weatherproof box and complete the mechanical assembly of the preamp. All Assembly Kits also include a breathable membrane vent for the housing, so no clear holes are needed to the outside.

The new models both have noise figures of better than 1.5dB, and their prime advantage is the ability to eliminate feeder loss – for most stations, external noise is the limiting factor at these frequencies.

As with the DG8-2, the design is highly corrosion resistant, as there are no exposed metal parts, making them especially suitable for exposed and coastal locations.

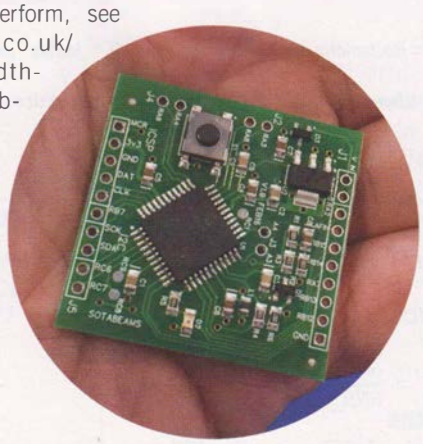
DG-6 and DG-4 preamplifier Assembly Kits are now available from stock. Short kits for all versions of the DG8 preamp are available for those who prefer to build for themselves. For further information and ordering, visit the website at http://hupRF.com



Variable SSB/CW audio filter modules

SOTABEAMS has added a new continuously variable audio filter module to their filter line-up. The LASERBEAM-VARI produces near-perfect filters from as narrow as 200Hz up to 3500Hz. The LASERBEAM-VARI is ideal for SSB, CW and data use. The modules are ready built and just require a few external components (supplied) for use. They can either be used as an external filter or built into existing radios.

SOTABEAMS has a short video on their website showing how the filters perform, see www.sotabeams.co.uk/variable-bandwidth-filter-modules-ssb-cw/



New rotator controller

The RA-S1, from Array Solutions, is a digital controller for azimuthal rotators. Its main features include soft-start and soft-stop with the Pulse Width Modulation speed control, which means the controller softly ramps up and ramps down the rotator's speed on every operation mode. It has offset definition that quickly corrects the azimuth your antenna is pointing at, without the need of a new calibration. Point and Shoot (POS) means you can choose an azimuth with the POS potentiometer, press GO and let the controller softly guide the rotator to the chosen bearing. It is possible to upgrade the firmware of the controller easily with the USB port so your controller will never be out of date. The RA-S1 was developed to work with most of the available rotators in the marked, being able to control AC rotators (24 or 36V AC) and DC (12, 24 or 36V DC), that have positioning feedback by pulses or internal potentiometer. Full details at www.arraysolutions.com/ra-s1?filter_name=AS-RA-S1

New factory for Verotec

After only five years in its previous factory, Verotec has moved its UK operation some 10 miles to new premises in Botley, Southampton. The new facility gives twice as much space for the design department, enabling extra CAD seats to be introduced; manufacturing and assembly space on the shop floor for application-specific modified standard products has also been increased. www.verotec.co.uk

Homebrew

At frequencies above 144MHz it is possible to receive extremely weak signals. This happy state of affairs is due to the relatively low noise levels found at VHF and above.

It will often be possible to receive very weak, sub-microvolt signals that would probably be lost below the noise at MF/HF. Receivers for the amateur VHF/UHF bands will usually be designed to have excellent sensitivity, achieved by the use of high gain, low noise RF amplifiers.

There are practical limits to the sensitivity of any receiving system. All materials at a temperature above absolute zero (OK or around -273°C) generate noise due to the random movement of electrons. Thermal noise is proportional to temperature and bandwidth, with available noise power of k*T*B watts, where k is Boltzmann's constant, T is absolute temperature (K) and B is bandwidth in Hz. See **Figure 1** for details.

There are several methods of evaluating receiver sensitivity. There is some potential for confusion because of the many different parameters used in receiver specifications. These include terms like noise factor (F), noise figure (NF), noise temperature, MDS (minimum discernible signal, or sometimes minimum detectable signal) and so on.

As a general rule, a signal can only be heard when it is above the receiver noise floor, so signal-to-noise ratio will be a positive value. MDS is specified as a specific value above the receiver noise floor, sometimes +1dB.

Thermal noise from a resistor is proportional to temperature and the measuring bandwidth. At room temperature (17°C) it's -174dBm + 10log(B). For an SSB bandwidth of 2.7kHz, this is around -140dBm.

The ideal RF amplifier would be perfectly linear and produce no noise, so that its output SNR (signal-to-noise ratio) will be the same as its input SNR. In the real world, even the best amplifiers will not achieve this ideal performance. Any practical receiver will produce some internally-generated noise. There will also be noise from other sources like the power supply and any nearby circuits like digital control systems etc. Non-linearity may produce noise in the form of unwanted distortion products. Poor selectivity, poor image rejection or any other source of spurious signals will further degrade receiver performance.

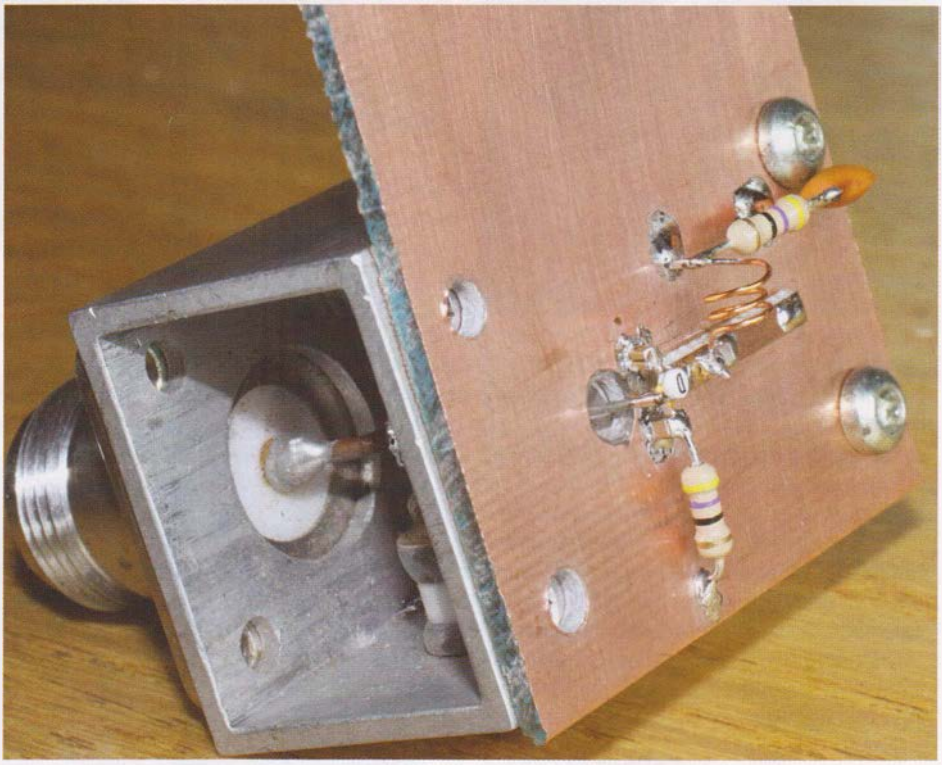


PHOTO 1: Key construction information for the 23cm preamplifier.

Noise

Receivers for amateur bands from VHF to microwaves are normally designed for low noise and high sensitivity. The goal for the designer is to achieve the lowest possible MDS. There are a few concepts and receiver parameters that are particularly important for VHF/UHF design. Amplifier or receiver sensitivity is often specified in terms of noise figure (NF). This is a measure of the amount of noise added by the device. Noise factor (F) is simply the ratio of input SNR to output SNR. NF is the same ratio expressed in dB. Our perfect noiseless amplifier above would have F = 1 or NF = 0dB. Any practical device will produce some noise and have a NF greater than 0dB. For reference: a NF of 20dB or more would be adequate for a MF receiver, a typical HF transistor RF amplifier will have NF around 6dB and the best low noise amplifiers for VHF/UHF have values below 0.5dB. A professional, state of the art, cryogenically

$k = Boltzmann\,constant = 1.38065 \times 10^{-23}\ joules\ per\ kelvin$

$B = bandwidth\,(Hz) \quad T = absolute\ temperature\ (K)$

$P_n = k \cdot T \cdot B \quad watts$

$V_n = \sqrt{4 \cdot k \cdot T \cdot B \cdot R}$

$At\ T = 290K\,(17C):\ P_n = 10LOG(k \cdot 290 \cdot 1 \cdot 1000) = -174dBm/Hz$

$MDS = -174dBm + NF + 10LOG(B)$

$F = \frac{SNR_{in}}{SNR_{out}} \quad NF_{dB} = 10LOG(F)$

$NF_{dB} = 10LOG\left(1 + \frac{T}{290}\right)$

$Cascaded\ stages:\ F = F_1 + \frac{F_2 - 1}{G_1} + \frac{F_3 - 1}{G_1 G_2} + ...$

FIGURE 1: Relationships governing noise power.

cooled microwave preamplifier in a radio telescope might have a NF of 0.03dB.

Passive devices at standard room temperature (290K) will have a NF value equal to their loss. This is important when evaluating the performance of very low noise amplifiers. For example, a coax feeder with a loss of 1-2dB will have a very significant impact on the performance of an amplifier with a 0.5dB NF. This is why low noise preamps are often located at the masthead instead of the shack end of the feedline.

In a cascaded chain of high gain amplifiers, the NF for the entire system will tend to be dominated by the performance of the first stage. Figure 1 shows how to calculate F for multiple cascaded stages. Even in a single stage, high gain amplifier, input matching tends to be more critical than output matching. It is quite common to see designs for low noise RF amplifiers where the input is carefully matched for lowest noise and the output (drain) is terminated by a simple load resistor.

Very low noise amplifiers are sometimes specified in terms of equivalent noise temperature, where $T_E = 290\times(10\text{^}(NF\div10)-1)$ K (kelvin). **Table 1** shows a few values as a quick reference.

Modern MMIC devices make it trivially easy to build low noise amplifiers for any frequency from VHF well into the microwave region. The MMIC is basically a 'black-box' solution for an amplifier with 50Ω input and output impedance. Just choose a device that meets your requirements for gain, frequency, NF, power level, etc. **Figure 3** shows a practical circuit for a small MMIC. Only a few external components are required to make a working amplifier. As the I/O circuits are matched for 50Ω, it is very easy to cascade several stages. The PCB layout for MMICs is almost universal, so that many alternative types of MMIC can be used on the same PCB design. Typical MMIC packages are also very well suited to homebrew methods like glued stripline as used in our recent projects.

MMIC amplifiers are inherently broad-banded and will often require some form of filter at the input or output. MMIC amplifiers also generally have a higher NF than single FETs. For multi-stage RF amplifiers, it is common practice to use a discrete FET with tuned input as the first stage and an MMIC as the second stage. The FET provides some selectivity and determines the overall NF, the MMIC provides additional gain.

PHOTO 2: **General view of the completed 23cm preamplifier. The adjustment screw for C2 is on the left side.**

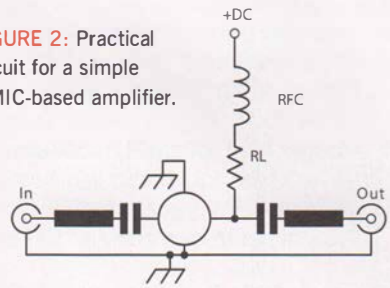


FIGURE 2: **Practical circuit for a simple MMIC-based amplifier.**

23cm amplifier

The schematic for a 1296MHz amplifier is shown in **Figure 3**. I used an NEC NE32584C HJ FET **[1]** in this circuit. The design allows some flexibility in the choice of FET. An earlier version of this amplifier used a Mitsubishi MGF1302 GaAsFET with excellent results. Although technically discontinued, the NE32584C is currently available at very low cost on eBay and other internet sources at around £5 for 10 devices. If stocks dry up in future, it should be a simple matter to adapt the circuit for a different device.

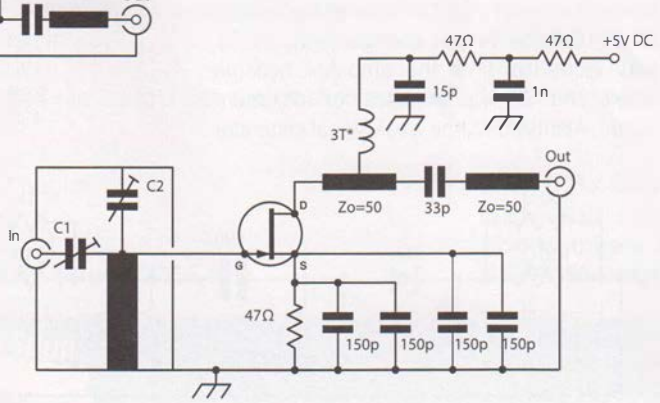


FIGURE 3: **Practical circuit of a low noise NE32584-based preamplifier for 23cm.**

The input circuit is a shortened ¼ wave line, tuned by a small piston trimmer and capacitively coupled to the 50Ω aerial feedline. The goal is to provide the optimum input match for lowest NF with the lowest possible losses. Any loss in the input circuit will add directly to the overall NF. Ultra-low noise devices like the NE32584 are capable of NF below 0.5dB at 12GHz and as low as 0.25dB at 1.2GHz, although these figures will be difficult to realise in practice. A pair of plugs and sockets and a short length of coaxial cable at the input will degrade the NF by a good fraction of a dB. I used a high quality N socket at the input and a short length of 23x28x45mm box-section aluminium as the input transmission line (TL) 'cavity'. The centre conductor is a 10mm diameter x 25mm long copper rod.

Construction

The basic construction method is shown in **Figure 4**. All input circuit components are inside the cavity. This arrangement is mechanically stable and inherently well screened. The FET amplifier is mounted on a strip of PCB laminate that is screwed to the side wall of the cavity. Connection to the FET gate is via a short length of stiff, straight copper wire that passes through small holes in the cavity and PCB. **Photo 1** and **Photo 2** show details of the arrangement. C1 (not seen in the photos) is a miniature piston ceramic type with a minimum capacitance well below 1pF. Mine measures 0.25-2.5pF over the adjustment range. For such low capacitance, it is possible to use a home-made capacitive probe. Some designs use a metal disc on the back of the input connector, although this would be difficult to adjust when using N type sockets. C2 is a 10pF air-spaced metal ceramic type that also measures well below 1pF at minimum capacitance. The inductor in the drain circuit is 3T of approximately 0.375mm enamelled copper wire, wide spaced, 4mm diameter. The 50Ω output line is a short length of nominal 50Ω glued line, 2.8mm wide. The copper trace on the line was cut

Eamon Skelton, EI9GQ
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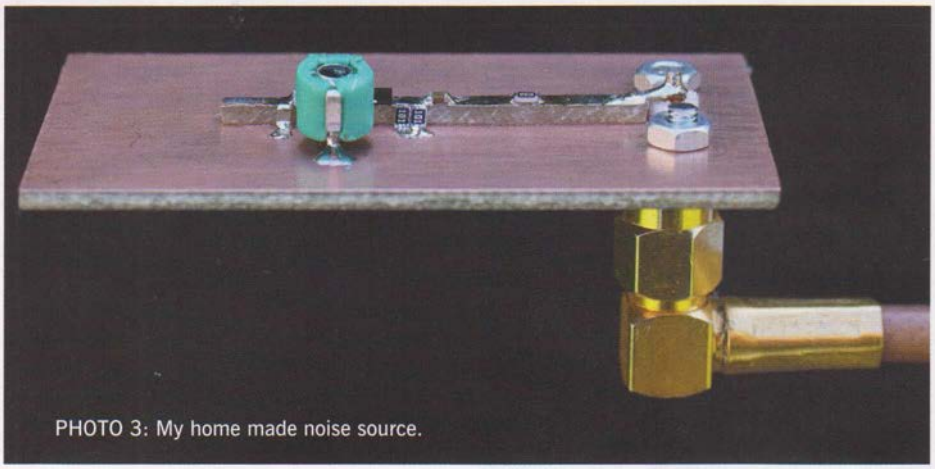

PHOTO 3: My home made noise source.

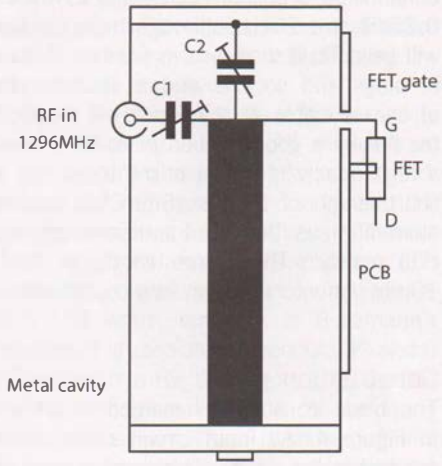

FIGURE 4: Details of 23cm preamplifier input cavity. See also Photo 1 and Photo 2.

with a hacksaw and the gap bridged by the 33pF output coupling capacitor. The source capacitors are four identical surface mount types, as seen in the photo and in last month's Homebrew.

As with most UHF and microwave projects, the electrical design is extremely simple. Most of the construction effort goes into the mechanical details. For the skilled mechanical engineer, the ultimate solution is to mill the input cavity from a solid block of metal. The cavity and tuned line can then be silver plated to keep resistive losses to an absolute minimum. As advanced metal working and silver plating are beyond my current capabilities, I have opted for the simple aluminium box. The end caps are cut from ~5mm thick aluminium, which are drilled and tapped with an M3 tap. The cap mounting screws are also used to secure the PCB laminate and one side of the N socket. The copper rod was also drilled and tapped for end-mounting. It would also be possible to use hollow copper tubing, but this would require a different mounting arrangement, perhaps a brass nut soldered into one end of the tube.

Testing and alignment

The unit is powered from a 5VDC supply. I used a standard 7805 regulator from the main 13.8V supply. Make sure you don't accidentally apply more than 5V while testing. The absolute maximum rating for the device is 4V. The bias and supply line resistors keep the FET voltage to around 3V in both of my prototypes. FET current is around 13mA as indicated by a 620mV drop across the source resistor.

For the initial tests, I set C1 to around 40% engaged. C2 was also set towards the low capacitance end (around 1-2pF). The amplifier was placed before the 1296-144MHz mixer (June 2016) and my 144MHz receiver was used as the IF. If you live near a beacon or other reliable signal source, it will be a simple matter to do the initial tuning. I had to use my 23cm weak signal source for these adjustments. Setting C1 to its minimum value gave very high gain, well in excess of 20dB. The amplifier tended to be unstable in this configuration, so C1 was increased until the amplifier became stable and C2 was adjusted for maximum signal. At this point, the weak signal generator was connected to a 12V motorcycle battery and moved to the end of the garden. This provided a relatively weak signal for more accurate adjustment. The final adjustment for best NF was done with a noise source as shown in **Figure 5** and **Photo 3**.

I used the reverse-biased base-emitter junction of a surface mount transistor in place of the Zener diode. Excess noise output is quite high. I don't have the means to measure it accurately, but it is probably above +30dB. The source includes a 20dB attenuator, which reduces the noise to a more suitable level. I will attempt to calibrate this source against my valve noise source (August 2011) so that it can be used to estimate absolute NF. This calibration will have to be done at 144MHz because the thermionic noise source is only accurate up to 200MHz. The noise source should be toggled on/off and the amplifier input circuit adjusted for the maximum *difference* with noise on/off rather than peaking for maximum noise. Remember that the input match for best NF will not be the same as for maximum gain.

System progress

The 23cm receiver seems stable and well behaved. The only signal I have heard was a very strong local amateur. I can occasionally hear, or at least see faint traces of GB3MHZ at 600km+ on the WSJT spectrum scope, but recently tropo conditions have been too poor for good copy. I heard this beacon several times under its old callsign GB3MHL using my previous 23cm receiver.

Next month: test instruments and calibration.

Websearch

[1] NEC NE32584C pseudomorphic heterojunction FET datasheet, downloadable from several sources eg www.cel.com/pdf/datasheets/ne32584.pdf

TABLE 1: Cross reference between some noise figures and equivalent noise temperatures in kelvin (K).

NF	T(K)
0.25	18
0.5	35
1	75
2	170
3	288
4	438

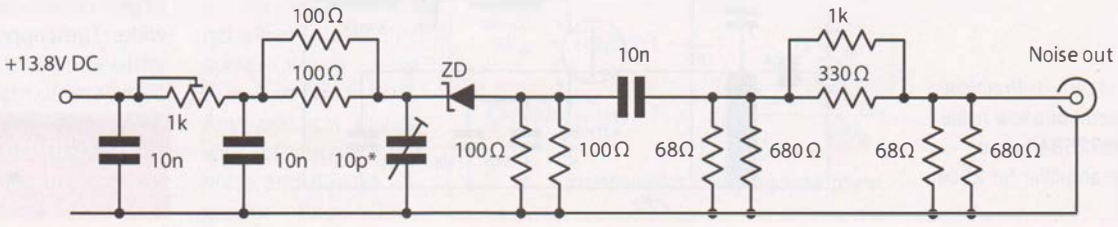

FIGURE 5: Home made noise source – I used a reverse-biased B-E junction of a surface mount transistor in place of the Zener diode (see text).

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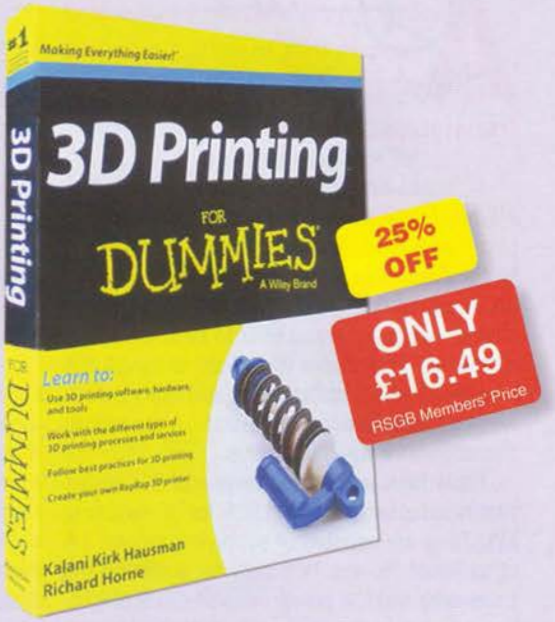

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Design Notes

A bit of a mixed bag of bits and pieces this month, covering PTT switching, upside down transistors and more.

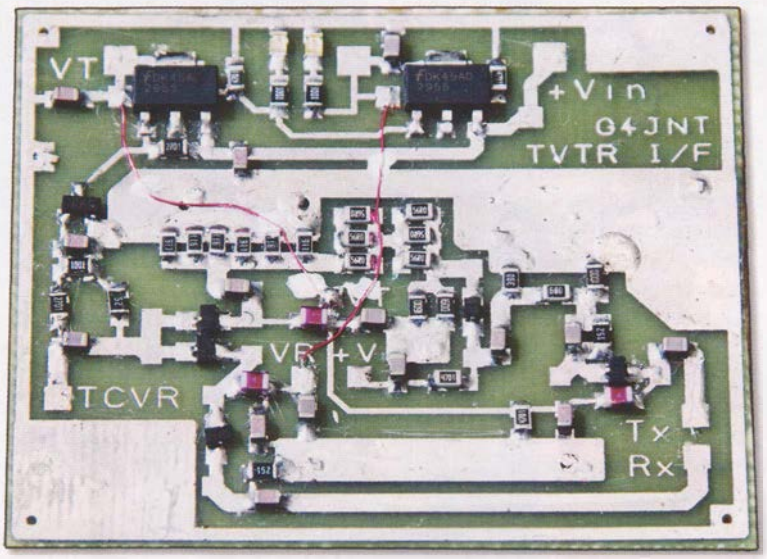

PHOTO 1: Complete FT-817 transverter interface module originally described in December 2013, making use of PIN diodes for the RF switches and the adjustable attenuator. The latest version now has Tx/Rx switched DC supplies.

FT-817 transverter interface updated

In the December 2013 Design Notes we saw an interface designed to allow an FT-817 or similar low power transceiver to be used with a transverter. PIN diodes were used to switch the Tx path via an adjustable power attenuator (which was also based around a PIN diode), or to bypass this attenuator when in receive.

I now have an updated version of this design that includes two P-channel FETs for DC switching [1]. They are capable of supplying around 1A of switched Rx and Tx supply for powering the transverter and low power transmit driver stages. Apart from this, the RF design is identical to that published previously. Photo 1 shows a picture of the new PCB.

PTT interfacing

John, GOAPI recently put together a 1296MHz transverter based around the SG-Lab transverter module [2] and a surplus power amplifier. The transmit/receive switching control came from the driver transceiver via the usual ground to transmit interface provided. In order to switch both transverter and RF changeover relay he simply used two diodes to activate both together when the line was pulled low. This sort of simple arrangement, often referred to as diode-OR, is shown in Figure 1 showing how a transverter, PA bias and antenna changeover relay can all be individually controlled with one switch to ground. In normal circumstances this idea works well, with the diodes providing mutual isolation from arbitrary pull-up voltages within each controlled item of equipment. However, John found that with the series diode, the SG-Lab transverter did not switch over to Tx mode. He discovered that its input voltage needed to drop below 0.6V before it would reliably go into Tx.

The circuit diagram for the SG-Lab unit is not provided, but it is straightforward to infer (read that as *'inspired guess based on observation'*) what the PTT control input must look like to have such a low switching threshold. It is probably not totally unlike that shown in Figure 2, where the threshold is defined by the base-emitter switching voltage of the transistor. This is not good. Such a low voltage switching threshold allows poor margin for noise and, as we have seen, does not allow diode-OR paralleling since the forward voltage of the isolation diode is more or less equal to the switching threshold.

Much better PTT input circuits really ought to be included, like those shown in Figure 3, which include an isolation diode and forces the switching threshold voltage to be a lot higher – at some properly controlled value. In the NPN bipolar version, the threshold is defined by the potential divider formed with the two lower resistors dropping the input voltage down to the V_{BE} threshold. With the values shown, this threshold sits at roughly 4V. A third resistor pulls up to Vcc, where an indicator LED can conveniently be included, as shown, without compromising any voltage thresholds. The second version, using a P-channel FET, has a switching threshold a few volts (the FET gate turn-on value) below the positive rail.

As for GOAPI's problem, John just connected his transverter without any isolating diode and trusted it to cope with the voltage imposed on the connection from the 12V relay used in parallel. It appears to have survived. To be fair to the SG-Lab transverter, they do provide a jumper-selectable option on the module to allow Tx switching to be done with +V to Tx and RF sensing instead of just pulling to ground.

Art film for homebrew PCBs

In the October 2015 issue we looked in some detail at making your own PCBs at home using the UV exposure technique with pre-sensitised PCB material. There, I recommended acetate transparency material, or possibly tracing paper, printed from a laser printer for the positive film

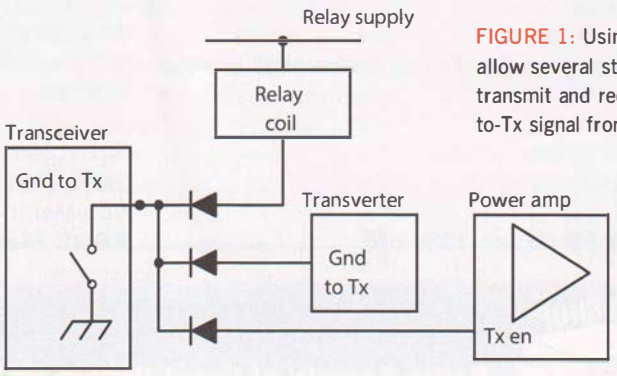

FIGURE 1: Using diodes (diode ORing) to allow several stages to be switched between transmit and receive from a single ground-to-Tx signal from the driving transceiver.

artwork for making the exposure. Neither material is perfect. If the acetate is shiny – and most is – the laser toner does always not adhere too well, resulting in pinholes or lack of density. It is often necessary to use a double layer, which gives its own problems when trying to align the two. Tracing paper gives a better and denser result but is a bit flimsy and requires longer exposure time because it is not terribly transparent to UV. At a recent local radio club talk Ray, 2E0DHG mentioned that he uses a product called 'Art Film', available from RS [3] to make his transparencies. One side has a rough surface ideally suited to take laser toner properly, providing a dense print pattern. It is a tough plastic material and more transparent to UV than tracing paper. I tried the product and it really does work well. Used the same way as described in the October issue, it needs just slightly longer exposure time than clear acetate. A much neater and cleaner track edge is produced than either of the two products used previously can provide. The PCB in Photo 1 was produced using Art Film as the photo resist.

DCA Pro software / firmware upgrade

The DCA-Pro component analyser was reviewed in *RadCom* in March 2013. This test box, as well as identifying component types, allows connection to a computer for plotting out characteristic curves of semiconductors. After a request from John, G3ZTY, to allow a greater range of base currents for testing 'backwards' bipolar transistors (see later) the manufacturers have upgraded the software and device firmware. They state [to John] "Further to your feedback, I'm writing to let you know that the DCA Pro companion software now allows you to adjust base currents over a much wider range so that you can test the performance of backwards transistors more effectively."

John then commented "I've just tried it here and the results look great. Although I end up with a very low gain (of around 3), the saturation voltage is excellent. We're no longer working at tiny currents (that were previously limited to the auto-detected maximums). So displayed resolution is much better as a result."

To measure a backwards bipolar device, the transistor's true connections are first identified with the DCA-Pro in 'identify' mode, then the two probes connected to collector and emitter are manually swapped before starting the curve plotting process.

To obtain your software update, simply start your DCA Pro software and allow the update to be detected. Alternatively you can upgrade by going to [4].

Bipolar transistors upside down

So what *are* these backwards, or upside down, transistors? In the circuit of the Third Method audio downconverter in May's column (see also *RadCom Plus*, July 2016) [5] I mentioned there was something 'a bit odd', and invited readers to spot it. G3ZTY was one of the three readers to write in and comment on the connection of the two NPN switching transistors that control the +1/-1 gain of the opamp stage. But they all knew why it had been done...

When a bipolar transistor is used as a saturating switch, the collector-emitter voltage usually ends up at a lowish but significant value. For a small signal NPN device with a milliamp or so of base current, it is typically in the region of 100mV when fully saturated and passing a few milliamps. For shunt switching low level signals like audio this is unsatisfactory – it would be nice if this $V_{CE(SAT)}$ could be no more than a few millivolts at most and nicer still if it would accept a very low negative voltage there – making shunting of AC signals even more effective.

It turns out this is possible if the transistor is operated with collector and emitter swapped.

The important thing to note is that although an NPN structure looks as if it ought to be symmetrical, it certainly isn't. The doping profile in the base-emitter region is very different from that in the base-collector region. If a bipolar transistor is forced to work with collector emitter reversed, two things happen: 1) its current gain (collector current divided by base current, or H_{FE}) falls to a very low value – it can easily go to as low as 3 to 6, whereas in normal operation an H_{FE} of several hundred is typical. It is even possible for forward current gain in some devices used this way to be less than unity when operated reversed. 2) Of much more significance, the saturation voltage, $V_{CE(SAT)}$ is considerably reduced – often as low as millivolt or even hundreds of microvolts. So now we have our shunt switch and providing a few milliamps of base current to compensate for the low gain is no problem.

Which is why, in Figure 2 of May's Design Notes, the two BC846 transistors appear to be connected upside down. On the virtual earth point of the opamp as they are, any significant saturation voltage across the transistors, when switched on to give the -1 gain setting, would compromise the balance of the mixer and result in a net DC level on the output. Testing transistors for this application is the reason G3ZTR contacted Peak Instruments with a request for the now upgraded software and firmware capability that can now measure such devices.

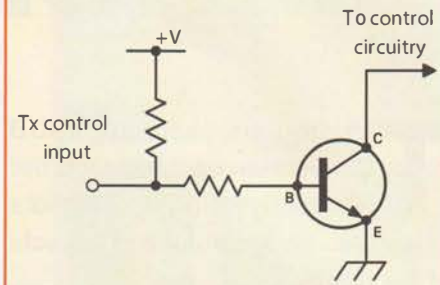

FIGURE 2: Inspired guess of the Tx/Rx input circuitry used for the SG-Lab 1296MHz transverter based on measured switching threshold voltages.

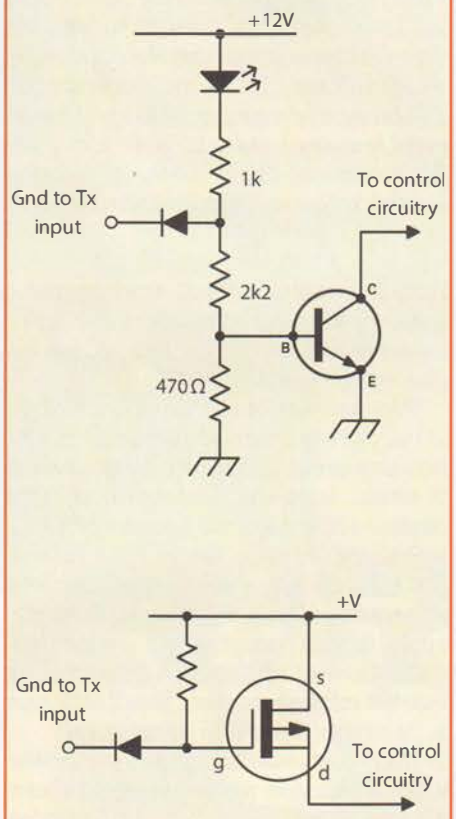

FIGURE 3: Two ways to interface a ground-to-Tx signal to DC control circuitry within, for example, a transverter. The input can be paralleled with other control signals working with arbitrary (positive) supply voltages. This arrangement ensures a safe switching threshold of several volts that the line has to be pulled down to for correct changeover operation.

Websearch

[1] FT-817 transverter driver – www.g4jnt.com/TvtrIntFace.pdf

[2] SG-Lab 1296MHz Transverter – www.sg-lab.com/TR1300/tr1300.html

[3] RS Components, Art Film – search for stock No 286-6773 at http://uk.rs-online.com/web/

[4] Peak Atlas DCA-Pro software / firmware upgrade – www.peakelec.co.uk/downloads/dcaprosetup.exe

[5] http://rsgb.org/main/publications-archives/radcom-plus/

Andy Talbot, G4JNT
andy.g4jnt@gmail.com

RSGB Convention 2016

The programme for the RSGB Convention on 7 to 9 October is already filling up with lots of lectures on a multitude of aspects of the hobby.

Martin Lynch & Sons, sponsors of the event, always has a large range of products on display.

The Convention is sponsored by Martin Lynch & Sons, to whom the RSGB offer its thanks for their continued support. It will be held at Kents Hill Conference Centre, Kents Hill Park, Timbold Drive, Milton Keynes MK7 6BZ. Friday evening is the ML&S sponsored buffet (tickets are £34.50 or part of a package) and Saturday evening is the Gala Dinner with Libby Jackson, the Astronaut Flight Education Programme Manager for the UK Space Agency, as the after-dinner speaker (£39.50 or part of a package). Day tickets can be bought in advance, saving £5 on the door prices (£15 for Saturday, £10 for Sunday or £20 for the weekend, only when bought in advance).

More to interest visitors

To give you some idea of the wide range of topics that will be available over the weekend, here are a few examples.

The Aurora – an introduction by Paul Whiting, G4YQC. Not only is the aurora a magnificent sight and a strange propagation mode it is also a major RF radiator. Learn what this phenomenon is, its causes and how to look and listen out for it

Restoring Old Radio Sets by Philip Lawson, G4FCL. A taster as to what is involved in restoring an old radio set. From electrical and mechanical repairs through to testing and restoring the cabinet. Delivered with useful tips and humour, yet important messages on safety, he will encourage you to consider restoring an old set yourself.

The VP8SGI and VP8STI DXpeditions by Mike McGirr, K9AJ. Mike was an operator and 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.

What IF? By Dr Paul Darlington, MOXPD. Amateurs are familiar with the requirement that receiver bandwidth should be sufficiently wide to recover the entire signal but sufficiently narrow to avoid admitting unwanted noise. Achieving such an appropriately balanced bandwidth in any mode is important both for objective performance and for what might br termed 'functional' aspects of operator comfort and enjoyment. This presentation considers practical methods for introducing controlled receiving bandwidth in a range of simple receivers, covering direct conversion, superhet and software-defined radios.

SDR with knobs on! by John Linford, G3WGV. Traditional radios are being overtaken by SDR technology and it is said that the mouse and keyboard are the front panel of the future. John will look at the opportunities, issues and alternatives, using a home brew SDR controller project as a case study.

Diagnosing and Reporting RFI problems by John Rogers MOJAV. This will outline the new EMC assisted diagnosis / reporting process and provide a summary of statistics on some of the recent investigations into solar PV, VDSL and LED Lighting. John will also explain what is needed for Ofcom to consider investigating RFI cases.

Best Practice for VHF/UHF DX by Ian White, GM3SEK. Optimum performance at VHF/UHF depends very much on the way the entire station is configured and operated – and there is always room for improvement. With his usual blend of practical advice and solid technical background, GM3SEK distils over 50 years of experience in trying to get everything right, from the antennas down to (literally) the operating chair.

QRP on a shoestring by Dave Sergeant, G3YMC. A keen QRP operator for many years, Dave will describe how to operate QRP from a typical suburban QTH using simple wire antennas and how he has managed to work lots of DX and perform well in international contests with just 5W of power.

Construction Competition

The annual Construction Competition will take place and if you have entered any projects in your local radio club's competition, think about an entry in the RSGB's annual event. The overall winner will be awarded the G3VA trophy. There are a number of categories that you can enter whether you have built and designed a project from scratch or put together a kit. Just enter construction competition into the search box on the RSGB website (www.rsgb.org) and click on the first entry for the rules and entry form.

Exams

We will again be offering the opportunity to sit the Foundation and Intermediate exams on Saturday (8 October) and the Advanced exam on Sunday (9 October). To enrol as a candidate please contact the RSGB via exams@rsgb.org.uk or on 01234 832 717. Candidates for the Foundation and Intermediate will need to complete the practical element before the Convention. There is also the opportunity to take the FCC exams starting at 1pm on the Sunday. Candidates should email Martin Atherton, G3ZAY (g3zay@btinternet.com) to indicate which exams they want to do and discuss the paperwork requirements. If there are enough spare exam papers it may be possible to sit the exam on the day as a 'walk-in', although you must bring the correct documentation. Please note that UK citizens with a Full UK licence do not need to take the FCC exams to operate in the USA on holiday – reciprocal arrangements cover that.

www.rsgb.org/convention

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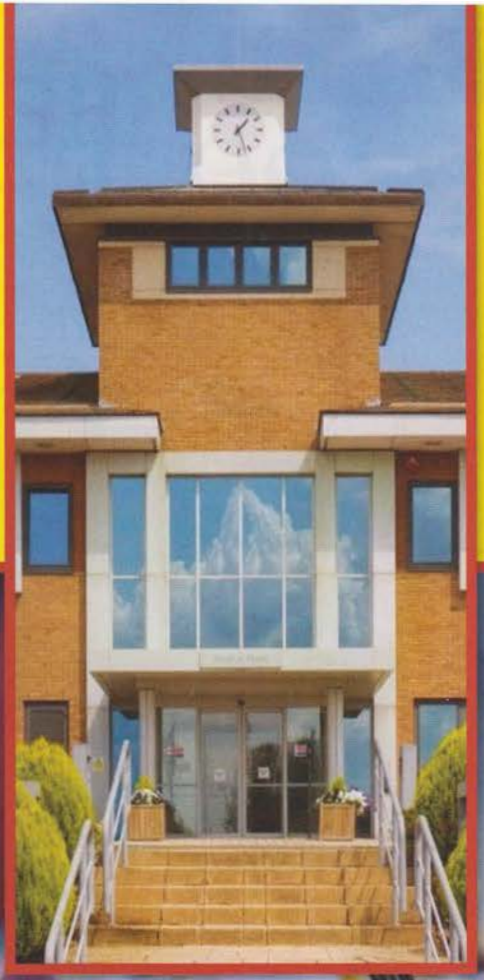

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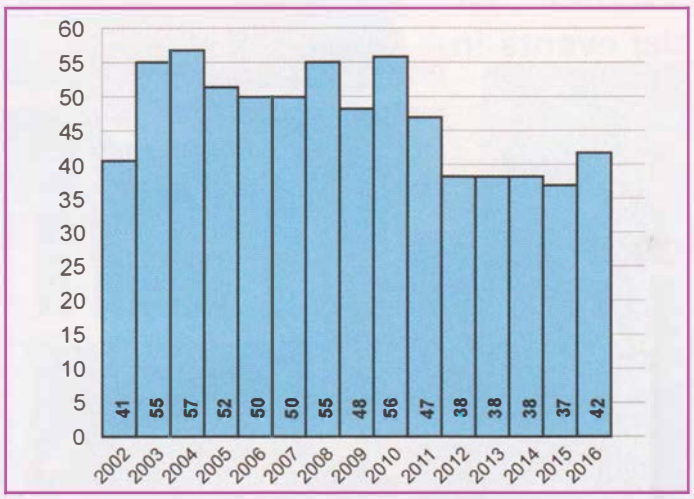

FIGURE 1: CW NFD participation from 2002 to 2016.

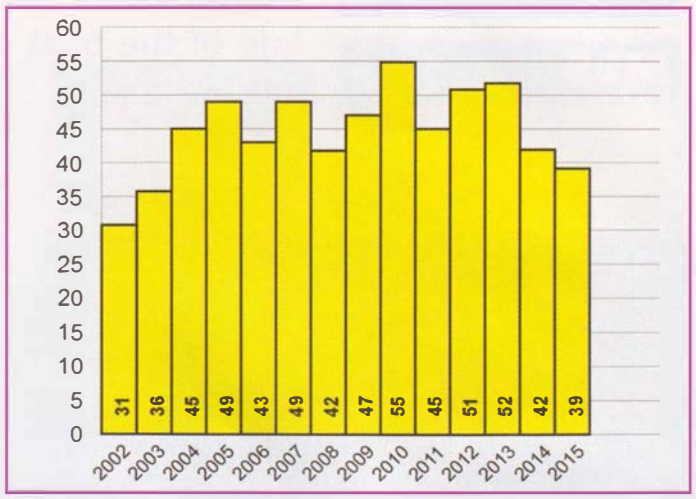

FIGURE 2: SSB FD participation from 2002 to 2015.

2017 will see changes to the format of CW National Field Day and SSB Field Day, but why has the HF Contest Committee decided to revamp them?

CW NFD

This is a contest that has been going for a *long* time. It didn't take place during WWII, indeed all UK amateur radio activity was stopped, but it resumed soon after. In recent times there has been a steady decline in participation. In the three years of the 1970s that I was able to obtain figures for there were about 96 stations taking part each year. **Figure 1** shows the participation for the past 15 years. Although there was a modest increase this year it shows a general decline, and if you consider what participation was like in the 1970s it's a major decline. An average entry of 40-something stations over the recent period isn't exactly an exciting number.

The Contest Committee has taken steps in the past to introduce entry categories that make it easy for small clubs to compete on an even footing. As popular as Morse operation still is (witness the fact that an average of 171 individuals entered the 80m Club Championship CW sessions earlier this year), I'd now like to play with the numbers a bit. Divide 171 by five (that's my estimate of the average number of *operators* in a CW NFD team) and you get 34. I know that not everyone who enters Club Championships operates in CW NFD (and *vice versa*), but the fact that about 40 teams currently enter CW NFD suggests to me that the Contest Committee might be fishing in an empty pool.

SSB Field Day

The first SSB Field Day was held in the 1970s. **Figure 2** shows that in the years since 2002 the participation has fluctuated, with the average number of entries being in the 40s. There was no apparent drop in activity to coincide with the bad years of propagation between Sunspot cycles 23 and 24, and no spike to coincide with the peak of Sunspot Cycle 24 (such as it was). Maybe it was just the prospect of a wet weekend that deterred some groups from entering in some years. Once again, 40-something participating stations isn't an exciting number.

Not everybody is Morse proficient, so on the face of it SSB contests ought to attract bigger numbers of entries. Indeed this is so in the case of the 80m Club Championships. This year an average of 190 stations entered each SSB session. Assume once again that the average number of *operators* in a SSB FD team is five and you get 38 teams. Now consider the fact that SSB Field Day coincides with the 144MHz Trophy Contest and it seems to me that getting 40 team entries in SSB FD might be about as good as it's going to get, unless new contesters can be attracted. The 144MHz Trophy Contest coincides with an IARU contest, so that's not going to move. Moving SSB Field Day to a different weekend might help, but combining CW NFD and SSB FD would be against IARU guidelines, so that's unlikely.

The HFCC View

The HF Contest Committee has been looking at the situation and have come up with a plan. G4FAL says; "The HF Contest Committee (HFCC) are updating the contest rules for 2017 in line with the outcomes of the Presidential Review of Contesting held in 2015. The new rules will be made available on the www.rsgbcc.org website as they are completed and there will be an opportunity to discuss them at the RSGB Convention in October." This will be during the Contesting Forum on Sunday 9th.

"The HFCC have been concerned about the National Field Day (CW) and the SSB Field Day and have been working on revising the rules to encourage participation. A survey was run by the committee around the period of CW NFD in June. This was notified where possible by email to all the operators who were listed as having participated in either contest in 2015. There were 115 responses. Five of the committee took part in NFD this year – so our thoughts about the future are based on the combination of the responses to the survey and our personal experience.

"The likely rule changes for next year (with percentage survey responses) include:

- CW NFD and SSB Field Day will be made more similar to each other. (70%)
- A Fixed Station category will be added, with QSO points coming from working portable stations. This is to increase activity and not to encourage potential portable operators to stay at home. (62%)
- One transmitter will be allowed in all portable categories. (63%)
- There will be a 100W maximum power limit in CW NFD and SSB FD. (50% for this one of three options)
- DXCC multipliers will be used in both contests. (53% for this one of three options)

"We see the Low Power Unassisted category, which allows 100W to a single aerial as being the primary category for each contest. Typically this is a doublet with removable links.

"From comments made in the survey responses it is clear that the current rules are not a significant reason why fewer groups are entering NFD. However, we want the rules to encourage groups or individuals to take part and are changing them to facilitate this."

Steve White, G3ZVW
steve.g3zvw@gmail.com

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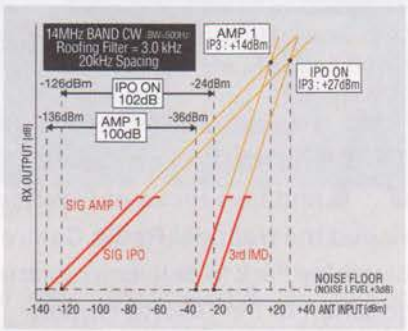

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Flex Radio donation to the National Radio Centre

RSGB General Manager, Steve Thomas, M1ACB and RSGB President Nick Henwood, G3RWF greet the FlexRadio Systems team, Gerald Youngblood, K5SDR, Lori Hicks and Matt Youngblood, KD5FGE.

At the end of July, Gerald, K5SDR and MattYoundblood, KD5FGE and Lori Hicks of FlexRadio visited the National Radio Centre at Bletchley Park to deliver a generous donation to the GB3RS station.

The fixed special event station, GB3RS, now has a FlexRadio FLEX-6500 and a FLEX Maestro added to the equipment used by both the volunteers and visitors to the National Radio Centre (NRC). The trio from FlexRadio were met by the RSGB President, Nick Henwood, G3RWF and RSGB General Manager Steve Thomas, M1ACB as well as several of the NRC's regular volunteers.

FlexRadio background

Gerald, K5SDR is the founder of FlexRadio and the story of how the company – and its products – started is interesting. He got his first level of licence in 1967 when he was a teenager in high school around the age of 15 or 16. That got him interested in the technical side of radio and he built amplifiers and other similar projects. He went on to get an electrical engineering degree but only stayed active in amateur radio until his sophomore year. At that point studies took over and he didn't do much with it, although he kept the licence.

When he was studying electrical engineering he took the communications path and in his senior year took the theory of communications engineering, which included how you modulate signals, demodulators, fast Fourier transforms and all the basic maths and things that are in digital signal processing.

Some years ago, his son Matt, who was 14 at the time, got interested in amateur radio. So they worked together to study for his licence, which got Gerald re-interested. He found that technology had changed since he was last involved with amateur radio. One of the things that had happened was PSK 31 had come along. You could plug your radio into your sound card of your computer and work someone on the other side of the world that you couldn't really hear!

Remembering the theory from his senior year at college about in phase and quadrature signals, he set about designing some hardware to create the I and Q inputs needed for the computer soundcard. This enabled him to build a radio around the PC.

Gerald admits that meant he had to go and learn digital signal processing, and the first unit wasn't fully working until 2003.

He wrote a four article series called Software Defined Radio for the Masses over 2002/2003 for the ARRL's magazine *QEX*. This, unexpectedly, brought emails from other amateurs who started asking for kits so that they could experiment too! He thought about it and decided that he would build 50 units and ship them to some of the 500 or so who had emailed. He sold 500 units in the first year building them on the kitchen table and really it wasn't until he'd sold a few hundred that he thought about turning it into a business.

It started out as a little three-board set that you plugged in with wires to a soundcard in a computer and a parallel port, no box, it just dangled on the table. The project continued to improve with board additions, an enclosure and so on. Those using the project continued to have an input in the changes and improvements that were made.

The FLEX Maestro & FLEX-6500 now installed for you to try out at the National Radio Centre.

So that was the beginning. The product range has since grown in number and complexity – many have been reviewed in *RadCom* over the years too.

To this day, customers still have input into the FlexRadio products. Customers have approached them and said that they really need to do this, this and this and, many times, they are *able* to do this, this and this with the next software release.

Matt, KD5FGE demonstrates the Flex system to NRC volunteers.

FlexSystems Maestro

The Maestro was reviewed in the August 2016 edition of *RadCom* and was quickly connected up at the NRC, sitting with the two main radios – the Yaesu FTDX-5000 and Kenwood TS-2000. The volunteers (Martin, G3ZAY, Graham, G7OSR, Andy, M0GYK and John, G8JKR) then had a brief 'driving lesson' so they will be able to help visiting amateurs in the forthcoming months, so come along and have a go. The RSGB hopes that visiting amateurs will bring along their licence so they can have the opportunity to use the state of the art station there – including the new Maestro and FLEX-6500. Send *RadCom* an email with your experiences if you get to operate at GB3RS (radcom@rsgb.org.uk). The volunteers were all very interested as none have the new equipment in their home shacks. Initial thoughts included comments on the 'rightness' of the control knobs and how easy the touch screen was to use.

This is the second display of Software Defined Radio ensuring that the NRC looks at the past and towards the future of amateur radio.

The RSGB would like to thank FlexRadio, particularly the founder Gerald Youngblood, for the generous donation to the station at the NRC.

New power supply

When the FLEX-6500 and the Maestro were initially connected, the power supply from the Kenwood TS-2000 was used. Obviously this wasn't a situation that could continue on a permantent basis and the RSGB would like to thanks Martin Lynch & Sons for their donation of a Diamond GSV-3000 power supply that provides 30A continuous rating at 100% duty cycle, the DC output range is adjustable from 1 to 15 volt with a maximum of 3mVpp ripple.

Martin brought the power supply to the NRC and is shown with the new PSU and Flex Maestro and FLEX-6500.

Elaine Richards, G4LFM
elaine.richards@rsgb.org.uk

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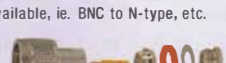

PL259-6mm Standard plug for RG58 ..... £0.99p
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Kuhne MKU23 G4

13cm band (2300–2450MHz) transverter

I enjoy operating on the microwave bands and my favourite is probably the 13cm band. However, it is also one of the most frustrating bands to access.

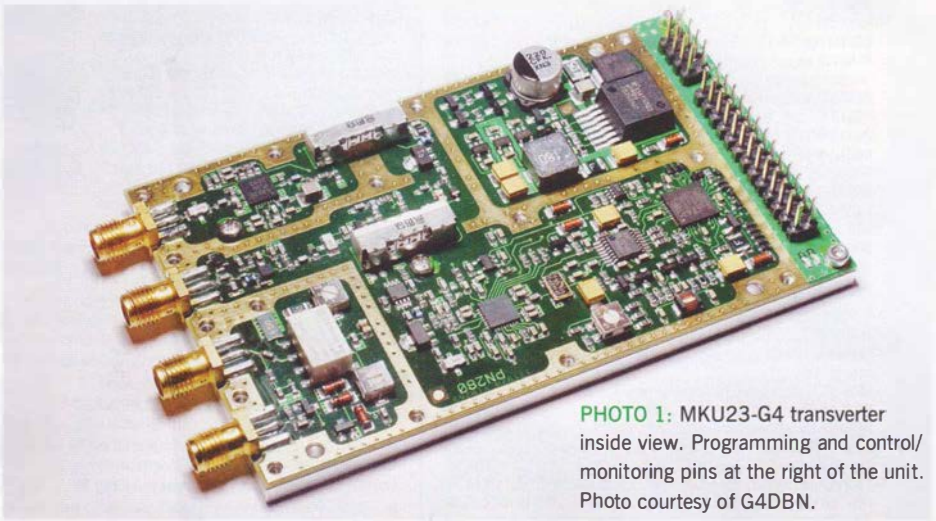

PHOTO 1: MKU23-G4 transverter inside view. Programming and control/monitoring pins at the right of the unit. Photo courtesy of G4DBN.

Currently, in the UK, we are allowed to use a number of sub bands in the 2300 to 2450MHz frequency range. These amateur radio allocations are shown in Table 1. Note that access to 2300 to 2302MHz is by NoV only and has some geographical restrictions. The range 2400 to 2450MHz is shared access with Wi-Fi and other services. The RSGB frequency allocation table should be consulted for the latest allocations in case of any further changes.

The large frequency gap between 2350 to 2390MHz has occurred following a recent mobile radio frequency auction. 2304 to 2310MHz was lost some years ago. We should thank Ofcom for recently agreeing access to the frequency range 2300 to 2302MHz, following lobbying by the RSGB. Access to this range is, however, for a limited time and by NoV only. There is no guarantee that this allocation will continue to be available after 2018. In much of the rest of the world the frequency range 2304 to 2306MHz is still available and used. Collectively, these sub bands are part of what is known as S band.

Whilst the 2400 to 2402MHz sub band is part of the 2400 to 2483.5MHz ISM/Wi-Fi allocation, the lower 2MHz is reasonably clear of Wi-Fi signals, but may suffer some interference from sidebands of the lower, high data rate, Wi-Fi channels in some locations. Radio amateurs have designated this sub band as the 2400MHz Space Allocation to be used for satellites and, in some countries such as Japan, for EME. Several amateur satellites are due for launch in the near future. The uplink for the geostationary satellite Es'Hail-2 will use the 2400MHz sub band for the uplink to the satellite. Demand for 2400MHz, narrowband transverters or complete transceivers is therefore likely to increase.

Amateur microwave radio amateurs often use the 144MHz amateur band as the IF (Intermediate Frequency) for driving microwave transverters. In Europe this band is only 2MHz wide (146 to 147MHz is available in parts of the UK by NoV only). Covering the total frequency range of the amateur 13cm sub band allocations, in 2MHz wide 'chunks', would require a number of different transverter local oscillators. Whilst this can be achieved with conventional crystal oscillator/multiplier chains, covering the four common allocations would require a complicated arrangement of oscillators and filtering. A more practical approach is to use a wide range frequency synthesiser that can switch its VCO (voltage controlled oscillator) to the required local oscillator frequency.

Because of the disparate frequency allocations in different countries 13cm EME often takes place with transmission in one sub band and then listening to the reply in another sub band. This is known as cross band operating, familiar to those who have used 28.885MHz and 50MHz before we obtained our 50MHz allocation in the UK. A synthesised LO can make this much easier to arrange with relatively simple logic switching of the LO frequency.

13cm transverter

It is with this demanding requirement for access to the various 13cm amateur sub bands that Kuhne Electronic have launched the MKU23 G4, a fourth generation 13cm transverter from the stable of DB6NT.

This has to be one of the most compact UHF transverters currently available. Packaged in a 100mm x 60mm x 13mm milled box, the transverter provides a claimed transmit power output of 1W with a receiver noise figure of 1.5dB.

How good is this transverter? Does it meet the claimed specification? Many microwave operators have a natural distrust of synthesiser controlled local oscillators due to poor noise performance. How does the synthesiser phase noise perform in the presence of strong local signals and does it cause problems for other band users when transmitting?

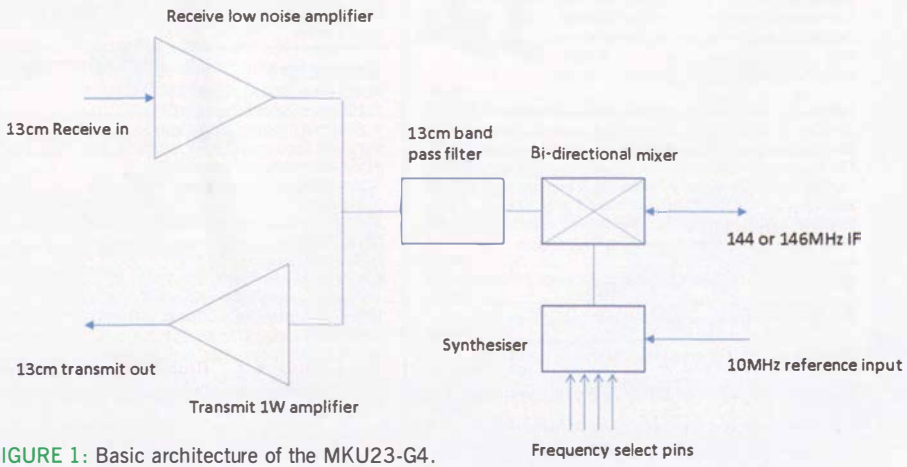

FIGURE 1: Basic architecture of the MKU23-G4.

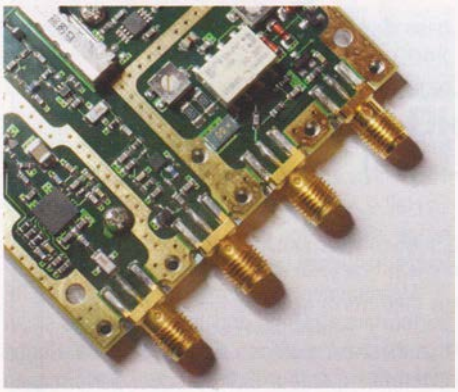

PHOTO 2: MKU23-G4 transverter inside view close up of the output amplifier and low pass filter lower left, receiver input second from the left, IF input/output third connector from the left and external 10MHz reference input top SMA connector. Photo courtesy G4DBN.

PHOTO 3: Nicely milled aluminium cover for the transverter. Photo courtesy G4DBN.

On test

A range of test equipments were used to test the transverter and it was used, on-air, to listen to a number of beacons during a recent period of enhanced propagation over the North Sea. The nearby GB3MHZ S Band beacon provided a useful test of the ability of the transverter receive converter to function in the presence of a nearby strong signal. Phase noise from the synthesiser controlled oscillator could potentially mix with the beacon signal to produce significant levels of noise to mask weak signals many kilohertz from the beacon. This is known as reciprocal mixing.

For these on-air tests the transverter was connected, via a coaxial relay, to a 67 element Yagi on my mast. An Elecraft K3 transceiver, with either its internal KV144 2m transverter or my Anglian 144MHz 2m transverter, was used.

The comprehensive user manual, provided with the MKU23 G4, made setting up very easy.

All sub band selection, PTT, computer interface, monitor and power supply input are accessible via a multi-pin connector (0.1 inch pitch, dual row) along one edge of the transverter, whilst four SMA connectors provide for RF transmit and receive, 10MHz reference frequency input and the 144MHz IF (common connector). This last connector also carries the over-coax PTT voltage transmit/receive switching that some of us prefer over separate PTT input. The transverter does not need the external reference 10MHz input to function. The free-running internal 10MHz reference may be stable enough for most users.

Adjustment of both transmit drive level and receiver gain are by miniature potentiometer accessible through the top of the milled aluminium case. Local oscillator frequency trim (when not using the external 10MHz reference) is also by means of a small surface mount potentiometer accessible through the top of the milled case.

A nice touch is that the LO frequencies can be changed by means of the user-accessible links to enable the use of 146 to 148MHz as an alternative IF. This can be invaluable to prevent IF breakthrough and to avoid unwanted image reception, especially at 2400 to 2402MHz as the image band, with 2m band IF, is in the middle of the 3G base station range and there are quite a lot of these base stations in use. Switching the IF by 2MHz does not eliminate the image, but it allows some scope to avoid a local problem base station. The extra filtering in the transmit amplifier chain reduces transmit image to extremely low level and should not be a problem.

MKU23 G4 architecture

I am indebted to Neil, G4DBN for his permission to use his photographs of the inside of the transverter. I make no apologies for showing the inside of the MKU23 G4. I know from correspondence that many *RadCom* readers appreciate seeing the inside of reviewed radio equipment as well as the front panel. Photographs of the inside of the transverter, together with the supplied schematic diagrams, mean that it is possible to describe the basic architecture of the MKU23 G4. Unfortunately the schematic diagrams supplied with the transverter are of very low resolution and therefore hard to read, although in conjunction with the photos prove very informative.

The inside photographs show that the transverter is constructed using surface mount components on an etched PCB. The milled case lid has compartments that provide screening between critical transverter stages, with the corresponding PCB ground areas adequately grounded with through-hole vias.

The basic architecture (**Figure 1**) is that of separate transmit and receive amplifier chains, a common RF bandpass filter, common bilateral mixer, synthesised local oscillator and relay switched IF path. Internal voltage regulators ensure that the correct voltage is supplied to separate circuits within the transverter.

An external coaxial antenna changeover relay is required if a single antenna is to be used, although two separate antennas could be used if preferred. An internal event sequencer ensures correct antenna relay, masthead preamplifier and, if used, power amplifier switching to protect against damage due to different switching and enabling speeds of the external circuits.

In more detail, the 13cm receive input signal passes through two stages of low noise amplification with high pass filtering between stages. It is then diode switched to a ceramic bandpass filter to remove the image band before passing to the bilateral mixer.

The IF output of the mixer at 144MHz to 146MHz (or 146MHz to 148MHz, depending on which has been selected) passes though a diplexer to the IF changeover relay used to switch between receive and transmit on the 2m IF radio. An SMD relay usually provides better isolation than the more usual diode IF switch. Receiver gain adjustment is provided by a variable IF attenuator with the receive gain potentiometer.

On transmit, the incoming 144 – 146MHz or 146 – 148MHz from the IF radio is switched by a second pair of SMD relay contacts to the transverter's transmit power attenuator. The attenuator can be adjusted to accept between 0.5W and 5W input at IF. From the relay output the IF passes through the diplexer to the same mixer used for receive and then through the common ceramic bandpass filter. Diode switching routes the filter output to a two stage transmit amplifier chain with a second bandpass filter between stages. A small SMD low pass filter then ensures excellent low harmonic output levels.

Obviously the mixer requires a local oscillator input and this comes from the amplified output from an integrated synthesiser chip. The synthesiser used in the MKU23 G4 cannot be determined from the photo or schematic. An ATMEL microprocessor controls the synthesiser output frequency from the input from the programming pins at one end of the transverter. The processor also performs a number of other functions including the built-in sequencer to control transmit and receive switch timing.

Sam Jewell, G4DDK
jewell@btinternet.com

A high stability 20MHz temperature controlled crystal oscillator (TCXO) is included on the PCB. This drives a reference clock generator chip. When 'free running' the TCXO controls the synthesiser output frequency. When a high stability external reference is connected to the 10MHz input socket, the reference clock generator automatically locks to this input rather than the internal reference.

Power for the transverter can be between 12 and 14 volts. An internal voltage regulator reduces this to some lower voltage to power all sections of the transverter. Separate linear voltage regulators are used to supply the synthesiser, reference generator and processor. These appear to be sourced from the main voltage regulator.

Results summary

Table 2 shows the results of my measurements as well as the manufacturer's performance claims.

Clearly the MKU23-G4 meets or exceeds the manufacturer's specification.

The transverter shows a good level of sensitivity, at below 1dB, across the entire frequency range. Transmit power output was measured at nearly twice the manufacturer's typical output value. Harmonic output and transmitter intermodulation are well controlled.

Frequency accuracy was measured using the internal reference. The manufacturer's figure of ±3ppm stability from 0 to 40°C is possibly taken from the specification for the miniature surface mount TCXO (Temperature controlled crystal oscillator). My measurement of +205Hz at 20°C is well within this specification, but obviously may vary considerably from this figure at the extremes of the temperature range. The TCXO frequency can be trimmed by means of the externally accessible trimmer, if required.

I found the MKU23 G4 easy to set up and use. You do not need to connect it to a PC in order to program it for the different sub bands. You will need to add a suitable switch to the 'boxed' 13cm transverter in order to select the required sub bands for transmit and receive, rather than rely on moving links in the header.

The synthesiser circuit that controls the LO frequency seems to have been well-implemented with very good phase noise performance. Phase noise is not as low as can be achieved with many good crystal oscillator/multiplier local oscillator chains, but is probably adequate for most applications.

Observation of reciprocal mixing effects on weak beacon signals in the beacon sub band from mixing with the nearby (<5km) GB3MHZ 13cm beacon suggests that this should not be a concern to either the owner of the transverter or to other stations located nearby (from radiated wideband noise and transmitter composite noise).

The figure of 42dB for receive converter image rejection may necessitate using the higher IF if you are unfortunate enough to have a 3G mobile base station close to you on the lowest base station channel. Alternatively, an external 2400 – 2402MHz bandpass filter may be required in the receive path. The transmitter path has two bandpass filters so that image frequency transmission should not be a problem. This will be an interesting area to watch when the Es'Hail-2 satellite launches and this frequency range is used for the uplink. Make sure your image frequency transmission is clean.

Measurements confirm the manufacturers RF performance claims and in many cases show that these are exceeded. From experience, Kuhne Electronic amateur radio product performance figures are often quite conservative.

Thanks

My thanks to Kuhne Electronic for the loan of the transverter. The MKU23 G4 transverter is available direct from Kuhne Electronic for €447. See www.kuhne-electronic.de/en/home.html

TABLE 1: The UK 13cm usage plan.

2.3GHz (13cm)	UK Usage	
2,300.000-2302.000MHz 2,310.000-2,320.000	By NoV only	
	2,310.000-2,310.500MHz	Repeater links
	2,311.000-2,315.000MHz	High speed data
	Preferred Narrowband Segment	
2,320.000-2,320.150	2,320.000-2,320.100MHz	Moonbounce
2,320.150-2,320.800	2,320.200MHz	SSB centre of activity
	2,320.750-2,320.800MHz	Local Beacons, 10W ERP max
2,320.800-2,321.000 Beacons exclusive	2,320.800-2,320.990MHz	Propagation Beacons only
2,321.000-2,322.000	FM/DV	
2,322.000-2,350.000	Wideband Modes, including data, ATV	
2,390.000-2,400.000	All modes	
2,400.000-2,450.000	2,435.000MHz	ATV repeater outputs
Satellites	2,440.000MHz	ATV repeater outputs

Operation in 2310-2350MHz and 2390-2400MHz are subject to specific conditions and guidance.

TABLE 2: MKU23-G4 performance summary.

Parameter	Manufacturers claim	Measured performance	Comments
Receive converter gain	25dB max	25.4dB at 2320MHz	Max receiver gain
Noise figure	1.5dB	0.95dB at 2320MHz 1dB at 2400MHz	Measured at Ta = 20°C
Receive converter P1dB	Not stated	-30dBm	Only measured at 2320MHz
Image rejection	Not stated	42dB	Only measured at 2400MHz *
Frequency accuracy and stability	±3ppm from 0 to 40°C (without external reference input)	205Hz at 20°C	10MHz external reference not connected
Input match (return loss)	not stated	>14dB	across the band 2300 to 2500MHz
Transmit converter			
Power output	1W	>1.8W	Max transmitter gain and 0.5W IF drive source
Harmonics	Not stated	<-60dBc	
Transmit IMD	Not stated	<-40dB at 1W	Limited by my measurement system
Image and LO suppression	Not stated	<60dBc	
Non harmonically related output	Not stated	<-60dBc	
Local oscillator phase noise	At below 1dB noise figure	-91dBc/Hz at 10kHz offset	

* Image is in the 3G mobile base station frequency range.

Antennas

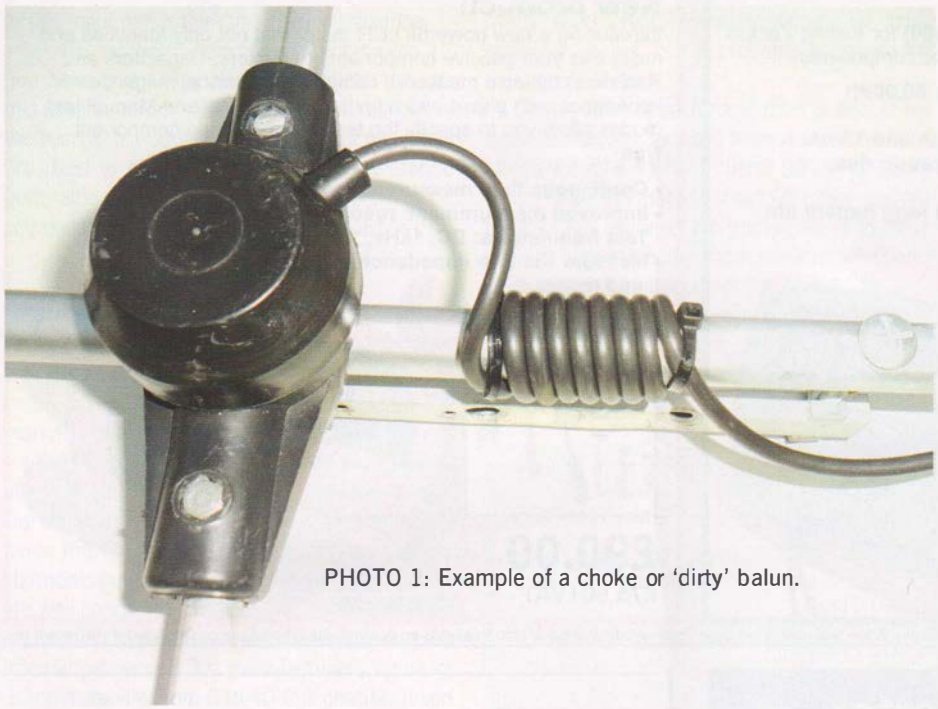

PHOTO 1: Example of a choke or 'dirty' balun.

With antennas it's often a question of balance.

Coaxial cables and antennas

Using coaxial cable to feed an antenna usually results in *common mode* currents flowing on the outside of the cable's shield. These currents are undesirable because they can affect the antenna's performance. This month, several techniques are examined and summarised to reduce the effects of common mode currents.

Unbalance and common mode currents

Twin line feeder cables, eg ladder lines, are symmetrically constructed and the currents flowing in each conductor are equal but opposite (under ideal conditions). Therefore, little radiation from the feeder takes place and the feeder tends not to be susceptible to picking up RF signals when on receive. This balanced mode of transmission is often referred to as the *differential mode*.

Taking a horizontal HF dipole as an example, the antenna's radiated RF field connects with the feeder, the ground, buildings and other objects nearby. The effect of these is to distort the RF field around the antenna, as shown in **Figure 1**. This distorted field induces RF currents into the twin line feeder and this causes the currents flowing in the feeder's conductors to become unbalanced. This can result in undesirable feeder RF radiation (a potential cause of interference), modification of the antenna's radiation pattern and problems from RF in the 'shack'. When on receive, any imbalance to the currents flowing in the twin line feeder can allow RF noise to picked up and impair the signal being received [1].

As a result, actual antennas can be very susceptible to the way they are installed, and are rarely well balanced. To minimise this unbalanced effect, an antenna should be installed as high and as clear of local objects as possible. This maximises the electromagnetic coupling between the antenna's opposite halves, improving its balance and reducing these undesirable effects.

It seems reasonable that using coaxial cable should overcome these problems because the outer conductive shield screens the inner conductor throughout the cable's length. The two concentric conductors are closely coupled along their entire length, so the currents flowing in the central conductor (I_1) and on the inside of the shield (I_2) are equal but opposite (ie differential mode).

Coaxial cable's construction, although concentric, is not symmetrical and it is inherently unbalanced. Skin effect causes the inner and outer surfaces of the coaxial cable's shield to behave as if they were two entirely independent conductors. The outside of the shield is, in effect, not coupled to the antenna in the same way as its inner surface and central conductor. This results in a situation where there can be a difference between the currents flowing in the antenna at either side of the feed-point. Skin effect means that current I_2 flows along the inside of the screen. When reaching the feed-point, I_2 now has two paths it can flow into: either

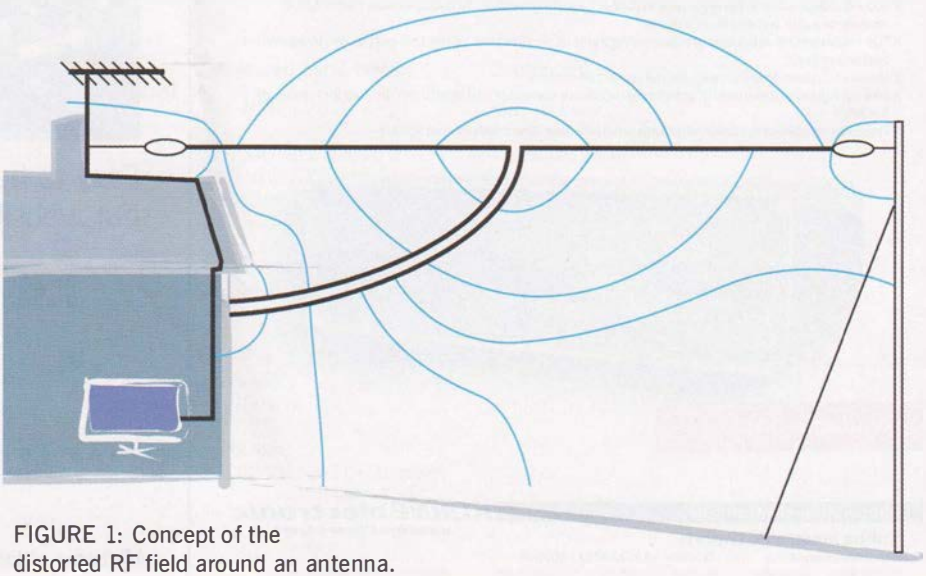

FIGURE 1: Concept of the distorted RF field around an antenna.

the antenna, or the outside of the shield. If the shield's outside impedance is low enough, then the current flowing down the shield can be significant. This is termed a common mode current and shown as I_3 in **Figure 2**.

With current I_3 flowing down the outside of the coaxial cable's shield, the feeder cable becomes part of the radiating antenna. This results in the problems previously described in terms of the distortion of the antenna's radiation pattern, RF currents on metal masts/booms and possible problems with 'RF in the shack' associated with running high power.

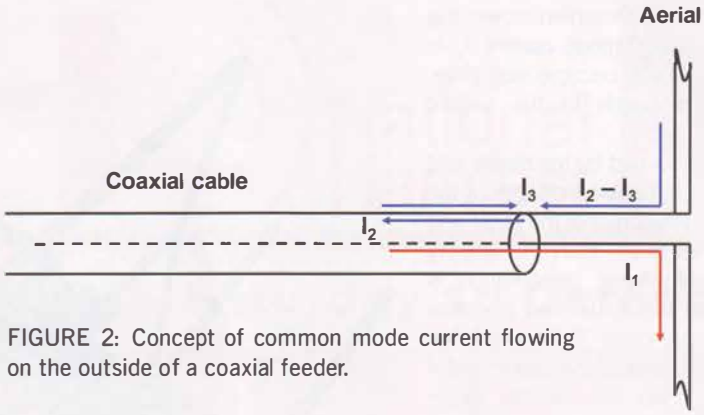

FIGURE 2: Concept of common mode current flowing on the outside of a coaxial feeder.

Reducing common mode currents

To minimise the undesirable effects associated with common mode currents, the primary technique is to reduce common mode current I_3 to a level where its effects become negligible. Essentially, when an unbalanced feeder cable is to be connected to a balanced aerial's feed-point, then an 'unbalanced to balanced' transition is used. This is called a *balun* [2].

The choke balun

The outside of the coaxial cable's shield can be thought of as a separate conductor that allows I_3 to flow. If impedance of this conductor is high, then I_3 can be minimised. A method to do this is to add inductance increasing the impedance of the shield's 'outer surface' conductor. Taking a Yagi beam as an example, this can be done by winding several turns of the feeder coaxial cable around the antenna's boom as close to the feed-point as possible. The windings can be held in place using cable ties, as shown in **Photo 1**. This technique works well from about 28MHz to 440MHz and has become known as the *choke balun* or *dirty balun*. At 28MHz the choke balun is made from about 15 to 20 turns of coaxial cable wound onto a 25mm round former, while at 440MHz it comprises around 4 turns wound onto a 20mm diameter former.

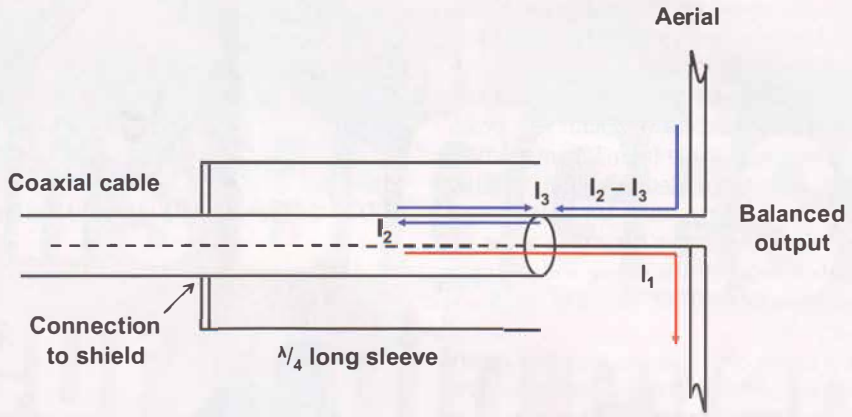

FIGURE 3: Concept of the sleeve choke balun. Note: the high impedance of the λ/4 sleeve section makes I_3 negligible, therefore $(I_2\text{-}I_3)$ tends towards I_2.

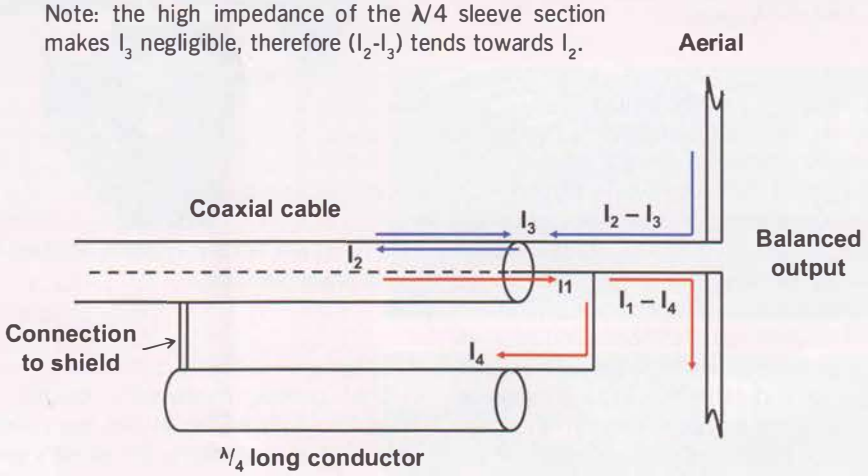

FIGURE 4: Concept of the λ/4 or Pawsey balun. Note: the high impedance of the λ/4 line causes I_3 and I_4 to cancel, so $(I_1\text{-}I_4)$ and $(I_2\text{-}I_3)$ tend towards I_1 and I_2.

The sleeve choke balun

A transmission line short-circuited at one end presents a very high impedance at its open end when the line is λ/4 in length. This property can be used to reduce common mode currents and forms the basis for the *sleeve choke balun*.

A conductive sleeve is slid over the outside of the coaxial cable feeder and concentrically connected to the coaxial cable's shield at a distance of λ/4 from the end of the cable, as illustrated in **Figure 3**. The combination of the sleeve and coaxial cable's outer shield form a shorted λ/4 transmission line at the frequency of operation and so presents a very high impedance at the feed-point between the outer of the coaxial cable's shield and the sleeve. The characteristic impedance of the transmission formed between the sleeve and the cable is not important because it is the length of this line that is the basis of the balun.

When the current I_2, flowing on the inside surface of the shield, encounters the feed-point, then the high impedance presented by the λ/4 sleeve/shield combination forces

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most of current I_2 to flow into the aerial. The high impedance path presented down the cable reduces common mode current I_3 to a level where its effects become negligible, giving a balanced match to the aerial's connection.

The coaxial line formed by the sleeve and the cable is an electrical λ/4 in length. If the insulation between the outer of the cable and inner of the sleeve is air, then the velocity factor of the cable/sleeve combination is close to unity and the actual and electrical lengths become very close. If the insulation between the sleeve/cable is the cable's outer plastic covering, then the velocity factor becomes more of an issue and the physical length becomes smaller than λ/4. This may require the sleeve choke balun to be initially made long and then trimmed to tune it to the operational frequency.

Photo 2 shows an example of a sleeve choke balun used for a 23cm Yagi beam. The sleeve was made from 12mm diameter copper pipe terminated 57.5mm from the feed-point forming the λ/4 cable/sleeve line. This sleeve choke balun had air as the insulation between the sleeve and the cable allowing its actual and electrical lengths to be very close.

λ/4 sleeve choke baluns provide a means to reduce common mode currents for VHF, UHF and SHF antennas, however their length for HF antennas makes them become very long and impractical.

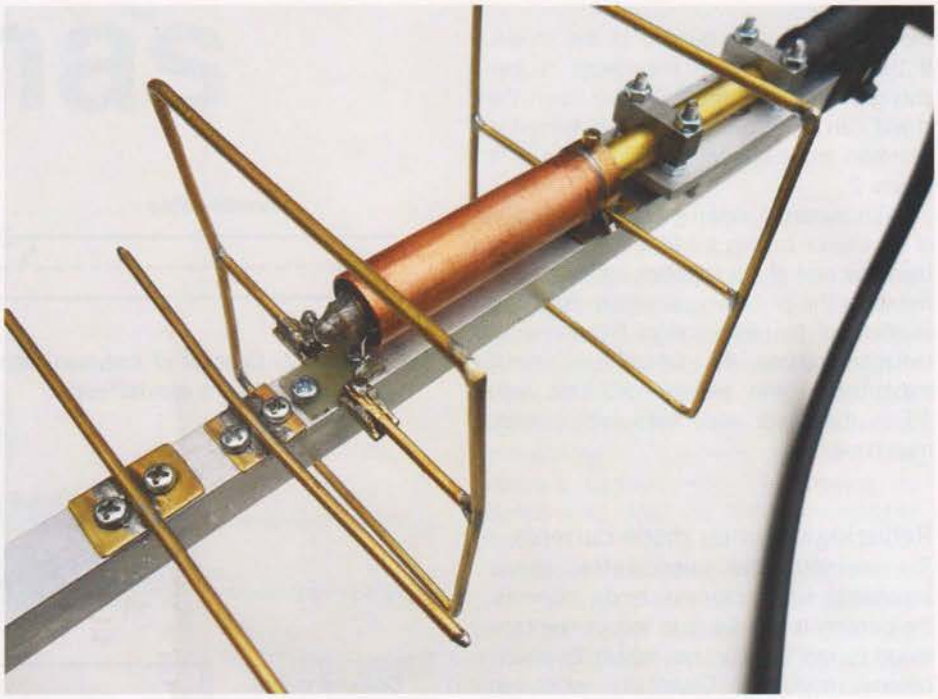

PHOTO 2: Example of a sleeve choke balun.

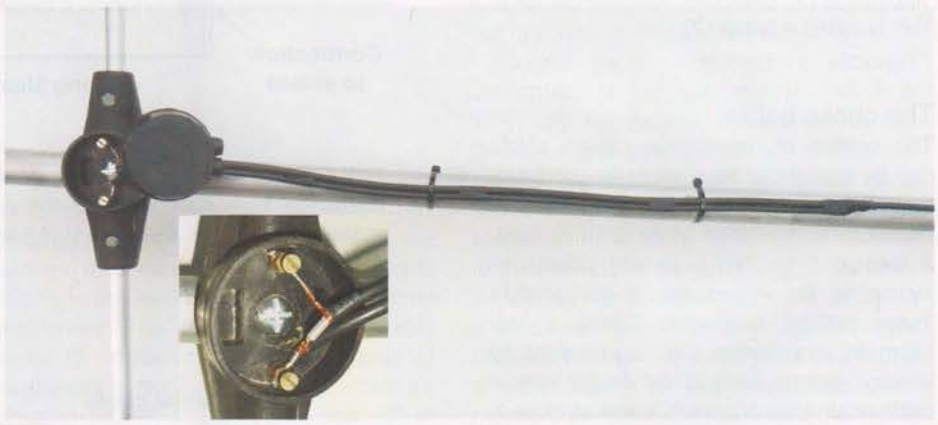

PHOTO 3: λ/4 or Pawsey balun used for a 2m antenna and (inset) detail of the connection to the driven element.

The λ/4 or Pawsey balun

Another balun based on a λ/4 transmission line is the *Pawsey* or *λ/4 balun*. This consists of a conductor run in parallel with the coaxial feeder cable of an equal diameter to the coaxial cable's shield. This conductor is connected to the feeder's shield at an electrical λ/4 with the other end connected to the coaxial cable's inner conductor as illustrated in **Figure 4**. The gap between the conductor and cable should be air, making the actual and electrical lengths very close. The usual practice is to use a length of the same coaxial cable, with its shield forming the parallel conductor.

In a similar manner to the sleeve balun, if the insulation between the cable and conductor is the cable's plastic covering, then the velocity factor can have an affect. This may require the balun's length to be initially cut long and then trimmed until the best match is found.

The shorted λ/4 long line is connected between the coaxial cable's inner conductor and shield and presents a high impedance at the frequency of operation. This is in parallel with the aerial's feed-point impedance (or radiation resistance) and has very little effect upon the aerial's feed-point because its impedance is low by comparison.

The central conductor's current I_1 flows into both the aerial and the parallel conductor as I_4. Similarly, the shield's inner current I_2 flows into both the aerial and the shield's outer as I_3. However, I_1 and I_2 are equal but opposite, so I_3 and the parallel conductor's current I_4 are opposite in phase. The transmission line formed by the parallel conductor with the coaxial cable's outer shield has its own characteristic impedance. This forces I_3 to be equal but opposite in phase to I_4 and they cancel, giving a balanced match to the aerial's connection.

Photo 3 shows an example of the construction of a λ/4 balun for a 2m Yagi beam. The balun's length was 510mm and it was made from RG58 coaxial cable. The parallel conductor was soldered to the coaxial feeder cable's screen (through a small access hole); plumbers' PTFE tape was used to protect the joint and self-amalgamating tape was then wrapped around the outside to weatherproof it. This technique works well from about 50MHz to 440MHz, however for HF frequencies the balun becomes physically rather long, tending to make it impractical.

Next month we'll look at HF balun techniques.

References

[1] *Radio Communication Handbook*, 14th edition, edited by Mike Dennison, G3XDV and Mike Browne, G3DIH: Section 14, Transmission Lines, Pages 14.11 to 14.15; Figures 14.20, 14.21

[2] *VHF/UHF Handbook*, second edition, edited by Andy Barter, G8ATD: Section 5, Antennas and transmission lines, page 139-140

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Refurbishing a Butternut HF9V vertical

Although the methods described here relate to the aerial in my back garden, the basic techniques are applicable to a wide range of different circumstances – not just aerials.

I've been using a salvaged Butternut HF9V vertical for the past six years but a recent storm managed to snap the top section, so it was time for a repair and general service. In this article I'm sharing my experiences in the hope that others might find some of the tools and techniques useful.

Although what I'm describing is necessarily specific to my situation, the methods are applicable to a wide range of different circumstances – not just aerials.

My Butternut history

A few years ago I was looking for an inconspicuous antenna for the garden that would still allow me coverage of all the WARC bands and be useful for DXing. After much searching and review reading, I settled on the Butternut HF9V (**Photo 1**) as this 8.5m (28ft) tall vertical antenna met most of the requirements and also had an impressive reputation. At the time, I spotted a secondhand HF9V for sale so decided to take the plunge. Unfortunately, the secondhand antenna proved to be in a pretty sorry state.

The HF9V uses a series of decreasing diameter alloy tubes, where each smaller rod is a sliding fit inside its adjoining tube. If these joints are not well protected from the weather they tend to fuse together. That is exactly what happened in my case so several joints had to be cut and replacement tubes found. At the time I had a very helpful alloy tube supplier locally that was able to match the sizes for me, so it wasn't long before the antenna was back in one piece. This time I made sure that all the tube joints and other electrical contacts were protected from corrosion with a liberal application of Contralube 770 contact grease.

One of the many problems I encountered whilst rebuilding the HF9V was the missing wire and brackets for the two ¼ wave stubs that are used on 15m and 6m. Whilst searching the web for solutions, I spotted a modification from an American amateur that replaced the ¼ wave wire stubs with 450Ω ribbon cable stubs. This seemed like a good solution so that's what I used for my rebuild.

Contact grease

Modern contact greases are a real lifesaver when working with antennas as they provide quite remarkable protection from corrosion. When I first restored the HF9V, I packed all the tube joints and electrical connections with Contralube 770. This provided excellent protection for all the sliding joints and when I recently repaired the antenna, all the telescoping aluminum tubes were still removable and none had fused together, despite six years exposed to the weather. I was particularly impressed with the protection of the electrical joints. In one example, I was joining the bright copper conductor of a 450Ω ribbon cable to the alloy antenna tube, all held in place by a galvanized steel Jubilee clip. Without any protection this joint would have very quickly degraded. However, when I took the antenna down for repair, I tested the connection with an ohmmeter and the contact resistance was showing a short circuit. When I released the Jubilee clip and cleaned away the grease and dirt from the ribbon cable conductor, I was amazed to see the wire was still showing bright copper!

Contralube works slightly differently from a conventional lubricating grease as it's designed to move away from the actual

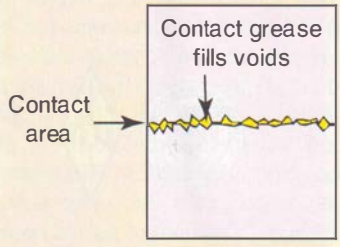

FIGURE 1: A typical contact surface between two conductors is rough and the spaces can usefully be filled by a conductive waterproofing agent such as Contralube contact grease.

PHOTO 1: The Butternut HF9V antenna.

PHOTO 2: Leica DISTO D2 laser rangefinder.

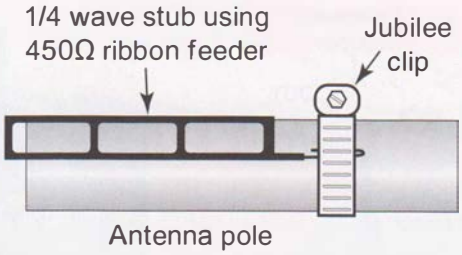

FIGURE 2: Clamping a wire to the antenna pole using a Jubilee clip (see text).

PHOTO 3: White card attached to the aerial to provide a target for the laser rangefinder.

contact points. You are probably aware that all electrical joints are pretty rough if you were to examine them with a microscope, see **Figure 1**. The actual electrical contact is made through the surface peaks. When a contact grease such as Contralube is used, it moves away from the peaks to allow a good contact but fills all the micro-gaps. That way, it prevents water, oxygen and any harmful acids in the environment from reaching the critical contact area. This type of grease is used extensively in harsh environments such as car engines, marine electricals, etc. The grease is suitable for all types of electrical connection and can stand up to 10kV. It is also safe to use on small signal and RF connections. Contralube 770 is mainly available through vehicle and marine suppliers. An alternative contact grease is Electrolube that's available from many electronic places such as RS Components and Farnell. I haven't personally tried Electrolube but it would appear to be a potential substitute.

Measuring up

Multiband antennas such as the HF9V can be quite time consuming to set up as many interactive adjustments are required. As my now-snapped antenna was previously working extremely well, I wanted to preserve the setup, which meant I needed to accurately record the position of all the key antenna components. As I was doing the repair on my own, a standard tape measure was not going to be very practical. The solution was to use a laser tape measure (or rangefinder). I had bought one of these at a tool show a couple of years ago and had been amazed at its accuracy, which was ideal for antenna measurements. The rangefinder works by emitting a pulsed laser onto a target and using the return time to calculate the distance. The Leica DISTO D2 that I used (**Photo 2**) provides a range of up to 60m (indoors) and an accuracy of ±1.5mm. At the time of writing the D2 is available for around £65 and other types are available from around £25 upwards. You do tend to get what you pay for in this market and the cheaper models tend to have a shorter range and lower accuracy.

When making the antenna measurements, I needed a target for the laser. With the HF9V the measurements are all relative to the feed point so I needed to make a simple target to mark the feed point. The solution I used was to fold a 100mm x 200mm piece of white card in half and then cut out a tab from both sides of the open end, see **Photo 3**. I then used gaffer tape to hold the two tabs to the antenna at the feed point. This provided a stable reference for all the antenna measurements. I used a similar target when measuring the length of the ¼ wave stubs for 15m and 6m.

With all the measurements noted, I could start rebuilding the antenna. I decided to stick with the use of 450Ω ribbon cable for the stubs but cut these slightly long so I had some room for fine tuning.

Rebuilding

Since the original restoration, my friendly local alloy tube supplier has moved away but I managed to find all I needed online at the Aluminium Warehouse. I only ordered two 2.4m lengths of 13mm alloy tubing and a few Jubilee clips but it arrived undamaged and extremely well packaged in a sturdy cardboard tube. With all the measurements to hand, rebuilding was straightforward and I made sure that every alloy tube joint had a good coating of Contralube. When connecting the ribbon cable to the antenna tubing I doubled-over the wire but made sure it was flat before clamping with a Jubilee clip, as seen in **Figure 2**. These joints, along with all the other joints, were protected with contact grease. Whilst on the subject of Jubilee or pipe clips, watch out for the cheap imitations. I bought a mixed set from Amazon and they were very poor quality, much thinner than the real thing and with poor quality plating. The trick is to either buy branded Jubilee clips or clips from other manufacturers that comply with BS 5315. The metal used is either mild steel with a bright zinc finish or stainless steel. As you can probably guess by now, the Jubilee clips and contact areas were liberally coated with contact grease to provide plenty of protection. This had worked well for the last six years as all the Jublee clips on the rebuilt antenna operated freely but I replaced the clips as it was an easy job with the antenna disassembled.

Red Pitaya tune-up

To complete the Butternut setup, I needed to measure the antenna matching across all 9 bands to make sure all was well. For this operation I decided to make use of my Red Pitaya development board. These boards have lots of potential as they include a pair of 14-bit, 125MSPS (mega sample per second) analogue to digital converters

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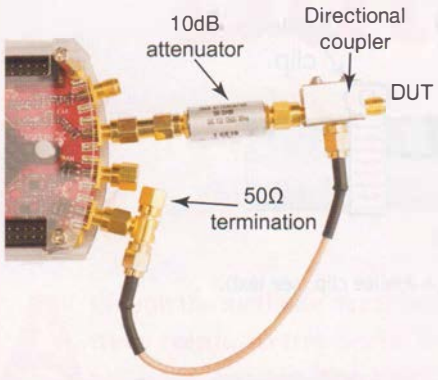

FIGURE 3: Using the Red Pitaya with a directional coupler.

(ADC) along with matching digital to analogue converters (DAC) with a Field Programmable Gate Array (FPGA) and a usefully fast ARM processor. In fact, it has all the basics for a decent direct sampling SDR receiver. Up until recently, the supporting software for this board has been a bit lacking, but electronics engineer Pavel Denim has recently started producing some excellent software. You can see details of his software range at [1].

For the HF9V antenna I used Pavel's vector network analyser (VNA) application. To convert the Red Pitaya VNA into an effective antenna analyser, I needed to add a measurement fixture. There are a number of ways to do this, ranging from the use of a directional coupler, **Figure 3**, resistive bridge and balun, **Figure 4** or a simple resistive shunt fixture, **Figure 5**. I experimented with all three options and compared the results with my DG8SAQ VNWA. The simplest solution turned out to be the shunt fixture, (Figure 5) as described in Sam Wetterling's excellent *VNA-Guide* that's available to download from [2].

In **Figure 6** I've shown a comparison between a VSWR sweep of my HF9V using the Red Pitaya/shunt fixture combination and the DG8SAQ VNWA. As you can see, the plots of the complex HF9V antenna were very nearly identical. Of course, the DG8SAQ VNWA can run a very wide range of accurate measurements but, as a simple antenna analyser, the Red Pitaya fares very well. You will note that in Figure 4 and Figure 5 I've included 10-12dB of attenuation between the RF output of the Red Pitaya and the measurement fixture. This is because the Red Pitaya outputs show some odd resonances and the additional attenuation provides a degree of masking. The sweep shown in Figure 6 shows the HF9V after the initial re-build but before I'd completed the final trimming.

My shunt fixture was built into a diecast box measuring approximately 50mm x 50mm (**Photo 4**) with SMA connectors for the Red Pitaya input and output and an

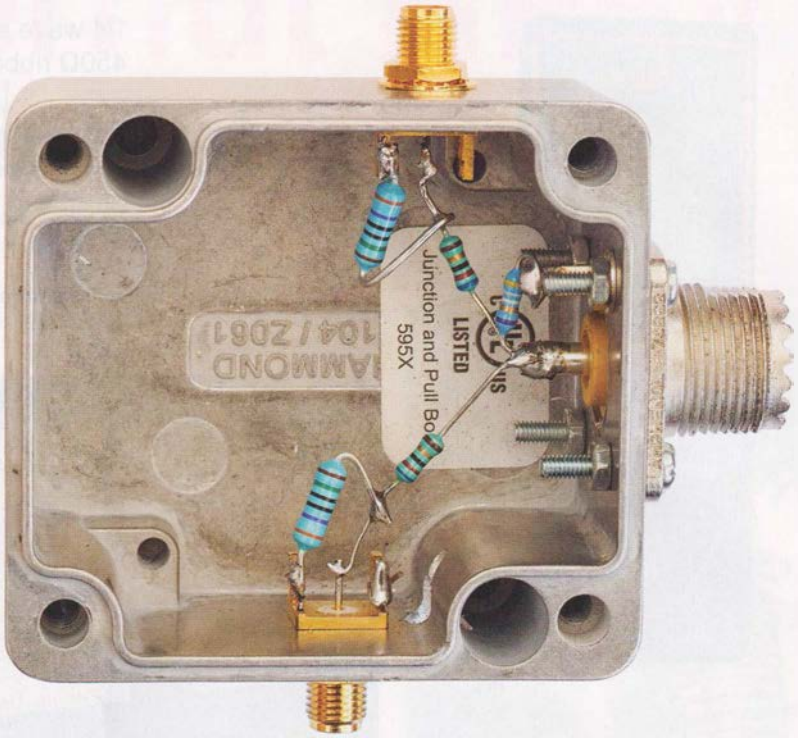

PHOTO 4: My homebrew shunt fixture (see also Figure 5).

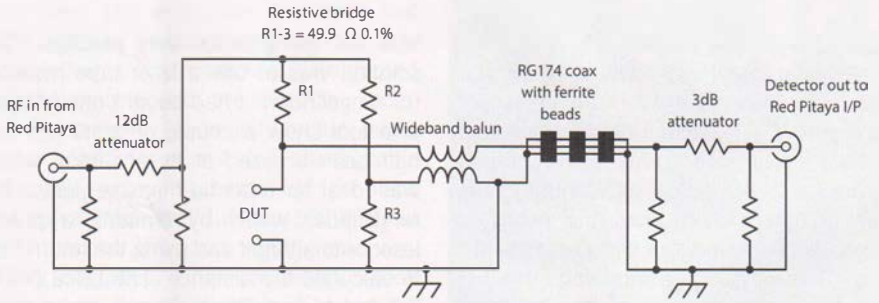

FIGURE 4: Resistive bridge arrangement.

SO239 socket for the antenna. This latter connector can be substituted for whatever antenna connector you prefer to use in your shack.

Before you can obtain meaningful measurements, you need to calibrate the VNA and that is a very simple process. You need to construct or purchase a set of calibration loads that comprise a short circuit, open circuit and a 50Ω load. For my DIY setup I used three Amphenol PL-259 plugs, each fitted with a short length of the same cable as my antenna feed. I then used a sharp knife and cutters to cut the cable on all three connectors flush with the back of the plug. For the open circuit, the cut was simply tidied up to make sure there were no strands of braid bridging the gap. For the short circuit, some copper cable braid was placed across the back of the connector and flooded with solder to make a good short circuit, as seen in **Photo 5**. Finally, the 50Ω load comprised four parallel 200Ω 0805 style SMD thick film resistors mounted in a cross formation on the back of the connector, as seen in **Photo 6**. The power rating is only a fraction of a watt but that's plenty for use with a VNA, for which an accurate load is far more important than the power handling.

For my antenna measurements, I set the VNA to span 3MHz to 30MHz with 3000 points and a bandwidth of 500Hz. To calibrate you just connect the open circuit connector and press the Open button, then do the same with the short circuit and 50Ω loads. As a double check, I left the 50Ω load connected and pressed the DUT (Device Under Test) button. If, on completion of the sweep, you select the Smith chart you should see a small red dot on the central 50Ω point. If you want to eliminate your antenna feeder from the analysis, you can carry out the short/open/load (SOL) calibration at the antenna end of the feeder. By doing this the feeder becomes part of the measuring instrument so it doesn't influence the results.

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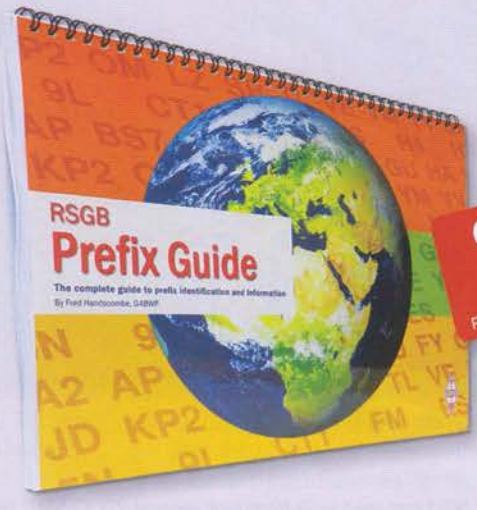

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PHOTO 5: 'Short circuit' test load.

PHOTO 6: 50Ω test load built from four parallel 200Ω SMD resistors.

With the Red Pitaya VNA calibrated, I set about fine tuning the HF9V. As the Red Pitaya is an Ethernet connected device, I could leave it connected to my antenna in the shack whilst I controlled it remotely using my laptop down by the antenna, connected back to my home network via Wi-Fi. This was very useful when adjusting the Butternut's coils for the best band coverage.

However, the first task for the VNA was to help me cut the 450Ω ribbon feeder for the ¼ wave stubs. For this measurement, I took my Red Pitaya and laptop out to the antenna and measured each stub using the shunt fixture. I did this with the feeder strapped to the antenna, as it would be when completed. The two wires of the feeder were connected to the centre and outer of the PL-259 on the shunt fixture. By zooming in to the stub frequency I could accurately measure the ¼ wave resonance and so cut the ribbon to the correct length. The purpose of the ¼ wave stubs is to effectively change the length of the antenna by isolating the upper section. To work properly, the stub needs to be an exact electrical ¼ wave at the centre of the required band, and the bottom end of the stub needs to attach to the antenna at the right point on the antenna. By measuring the stub in situ, I was able to cut this very precisely. That just left the position of the stub to be adjusted as part of the tuning process, so I was down to one variable instead of two.

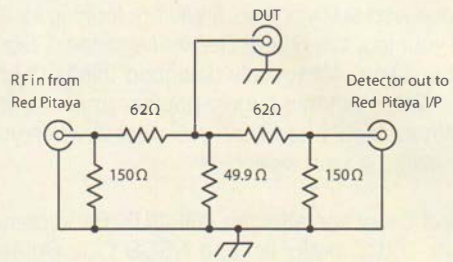

FIGURE 5: Resistive shunt fixture (see Photo 4).

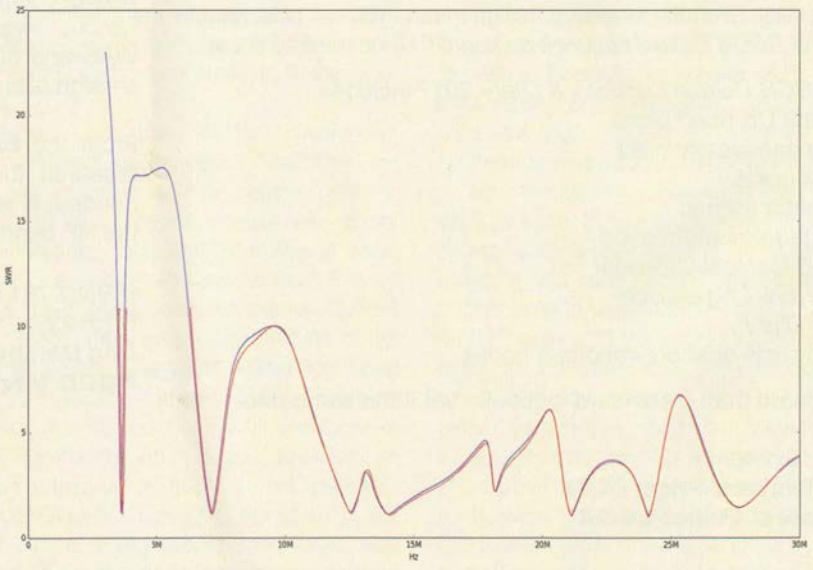

FIGURE 6: Comparison VSWR sweep of my HF9V using the Red Pitaya/shunt fixture combination and the DG8SAQ VNWA.

Capacitor issue

One of the weak areas of the Butternut antenna seems to be the 67pF capacitor that's attached to the 30m coil. I've had a couple of these break due to the antenna

flexing. My simple solution was to replace one of the aluminium connecting strips with a length of copper braiding from a coax cable. This provided a low impedance, flexible link, thus relieving the strain on the capacitor. As you can probably guess, the copper braid was liberally coated with Contralube to protect it from the elements!

Radials

One of the most important considerations for the HF9V and many other vertical antennas is a good ground plane. In my case, I buried around 20 radials just below the surface of my lawn. The antenna was mounted towards one side of the garden so I couldn't create a perfect, symmetrical ground plane but I just made each radial as long as I could manage. I found the simplest way to bury the radials under the lawn was the so-called 'slit trench' method. Wait until the soil is moist and use a flat garden spade or edger to cut a narrow slot, just the thickness of the blade. Once the spade or edger is in the soil you then ease it towards you to open up a vee shaped slot and then push the radial wire into the slot and tread down the earth, **Figure 13**. It's a bit of a laborious process but it will pay dividends with increased antenna efficiency and a low take-off angle.

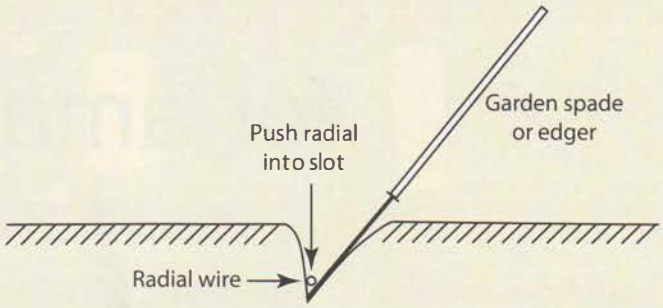

FIGURE 7: Illustration of how to bury radials.

Summary

For the rest of the tune-up I followed the Butternut instructions and the rebuilt antenna is now working as well as ever. It should be good for another few years out in the elements. The rebuild has been an interesting exercise and shown me that the Red Pitaya can be an extremely useful development board thanks to the excellent work of Pavel Denim.

Websearch

[1] http://pavel-demin.github.io/red-pitaya-notes/
[2] www.wetterlin.org/sam/SA/Operation/VNA_Guide.pdf

Report

Amateur TV Contest

The IARU Region 1 AmateurTV Contest on 11 and 12 June was a great success [1].

The contest took place on all bands from 432MHz to 24GHz and each contact had to be confirmed by the receipt of a four digit numeric code that was only sent by TV (ie 'in vision'). Points were awarded based on the distance of the contact, with multipliers for the higher bands. There were 12 entries from the UK.

The best DX worked was 512km for a TV contact between F6ANO and F1AHR on the 70cm band. G8GTZ/P (near Hastings, Kent) achieved a 288km with PA3WEG on 70cm and a 266km contact with F3YX on 23cm.

On 70cm, stations used digital ATV (2MHz bandwidth), RB-TV (Reduced Bandwidth Digital TV, <800kHz), and AM. On 23cm and above the predominant modes were digital ATV and FM. Reduced bandwidth digital TV proved to be a very good DX mode. A number of stations used the popular RTL-SDR dongle and the *TVSharp* program to easily receive the AM transmissions on 70cm.

There were at least 33 stations active on 70cm with 46 stations on 23cm. The higher bands saw a lot of activity as well: 23 stations on 13cm, 9 on 9cm, 12 on 6cm, 15 on 3cm and 6 on 1.2cm. Two UK stations, MODTS/P and G1LPS, were active on all bands – a great achievement!

G8GKQ Portsdown

The British Amateur Television Club (BATC) ran a UK-only section of the contest on the 146MHz NoV band. There were 6 entrants using RB-TV with a maximum ERP of 25W. Despite the low power, the best DX achieved was 119km for a contact between G8GKQ/P and GW8VPG/P.

You don't need much equipment to receive amateur TV. A converted analogue or digital satellite TV receiver with a preamp and/or frequency converter is a good start. You can find more information at [2] and [3]. Although the next IARU contest is not until June 2017, the BATC promote a number of activity weekends during the year. Dates are on [2].

Talkback during ATV operation tends to be on 144.75MHz FM, or occasionally on 144.170MHz SSB. Some of the activity is also coordinated through plotted on and the DXSpot. TV website.

Lastly, don't forget that there is an extensive network of amateur TV repeaters around the country – useful for finding other locals involved in amateur TV, and as an initial signal source. The full list is at [3].

Websearch

[1] https://vhf-uhf.veron.nl/wp-content/uploads/2015/08/IARU-ATV-results-2016.pdf
[2] www.batc.org.uk/forum/
[3] https://wiki.batc.tv/BATC_Wiki

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Modifying the Philips FM1100 for amateur service

Many amateurs originally started on VHF or UHF with a radio that was first used in the private mobile radio world. In the early days these used separate crystals for transmit and receive, one each per channel. If you were fortunate your radio had a selection of up to ten channels, but crystalling ten channels would cost a small fortune.

PHOTO 1: The Philips FM1100 discussed in this article. Note the eight pushbuttons.

As time moved on PMR radio designs were upgraded to use a synthesiser to generate the channel frequencies. In the first designs the settings were usually stored in a one-time programmable fusible link programmable read only memory (PROM). If the channels stored in it were not the ones you needed, there was no way to alter them apart from ordering a new PROM to your specification. This is now a rare situation as most firms who provided this service no longer offer it. If you needed the continuous tone controlled squelch system (CTCSS) you would need to find a set that had a CTCSS module fitted.

Time moved on and now most radios are programmed with the aid of a computer – and there are many more facilities available as standard in each radio.

Scope

This article concentrates on the Philips / Simoco FM1100 transceiver, a fairly common 25W-class FM mobile. Some of the general principles are probably applicable to other radios, but the details (and especially the data) will be different.

In the FM1100 the information for channel frequencies and all other facilities is stored in an 8-pin 24C16 electrically erasable (E^2) PROM. In its commercial service years this would normally have been programmed by a 286 to 486-class desktop computer with a dedicated interface card. Unfortunately, modern machines aren't really compatible. Another programming method was to use a portable data programmer that connected to the microphone socket. A keypad on the device allowed the various parameters to be entered. These are, now, rare and expensive beasts: they occasionally come up on eBay for £150 or so.

So what I explain here is how to modify the contents of the 24C16 with a general purpose multiple E^2PROM programmer and a hexadecimal file editor. Suitable programmers with USB interfaces cost about £5 or so straight from China via eBay and other sales sites.

Suitable radios

I must tell you first that when you visit a rally or other buying venue and see this type of radio there are variations. This article deals with the version with eight buttons below the display, as seen in **Photo 1**. Ask the seller whether it is high band or low band and whether it is already programmed on amateur channels.

High band will give you the ability of operating on 2m; low band will get you onto 4m. Look at the information label above the power connector. If you see the version Sa911 it is high band with 12.5kHz channel spacing – ideal for 2m. Va911 is high band with 25kHz channel spacing. Se011 is low band 12.5kHz and Ve011 is low band with 25kHz spacing.

The next thing to look for is whether or not the 24C16 chip is removable. In the more modern radios the 24C16 is a surface mounted device and as such would not be suitable for this project. The chip is located below the top cover (which is secured by a single large screw) and to the right of the flexistrip behind the microphone socket. See **Photo 2**.

Back home

So you've bought the radio and now you are back home. What do you do now?

First make sure that the radio is working with the channels programmed. You will see the display show a number in the right hand corner: this is the switch-on channel and it might not be a channel in use in your area. Connect a suitable dummy load and transmit. Use a frequency counter (or a scanner, at a pinch) to find out what frequency each channel is tuned to. Take a note of the results for reference.

You will need to extract the 24C16 IC from the radio and read its contents into a file using your programmer. I use a Willem programmer but any reputable E^2PROM programmer will serve the purpose. Remove the 24C16 from the (powered-down!) radio and read its contents.

Note: before you do anything else, save the contents of the chip in a file so that you can return to the original data if something goes wrong. You might also want to consider buying a spare 24C16 IC or two so that you can keep the original to one side.

Programming

Once you have read the data from the chip you will see that the chip contents look quite like a spreadsheet when viewed with a hex editor. The channel information starts at address $00026. The first two bytes are for the receive frequency code and the next two are the transmit frequency code.

The Tx and Rx frequencies are stored in hexadecimal as multiples of 6.25kHz. So, to work out the required code, divide the frequency by 6.25kHz and convert the result to hexadecimal. For example,
145.000MHz/0.00625=23200=5AA0 (hex)
145.025MHz/0.00625=23204=5AA4 (hex)
145.600MHz is 5B00 (hex)
...and so on.

A spreadsheet may make this easier if you are calculating a lot of channel frequencies.

There is no 'repeater offset' function – you simply calculate the receive and transmit frequencies separately, as you do for all the channels.

The next address stores the Rx CTCSS code: if it is 00 there is no CTCSS on this channel. The next address stores the CTCSS code for transmit, or 00 if none.

There are 38 tones in all but we only use nine of them. **Table 1** shows the codes and their associated frequencies.

There will be another 2 bytes, usually E828 or E829, which set up the transmit power, scan group value, squelch level and sellcall on or off and microprocessor clock offset on or off. These are shown in **Table 2**.

In addresses you allocate to repeater channels you can put in E82A or E82B, which sets the selective call so that you can use the button in the front of the microphone to send a tone burst. There is the facility of switching on a clock offset to clear interference on some receive channels, this is why the E82B code is offered.

From address $000575 you can put in channel numbers you may wish to insert into a scan group. Each of these groups can store 10 channels, at the end of a group of channels put FF. This indicates the end of the group. Of course the channels are entered in hex so channel 10 would be 0A and so on. To set up a scan group you need to have a group of channels without Rx or Tx frequencies, so for instance channel 81 can be set up as the first scan group of how many channels you wish. The two bytes after the CTCSS location in the channel string for 81 are 0129, which indicates that channel 81 will scan the first group of channels.

Channel 82 will scan the next group of channels with the code 0229 and so on until you have completed the scan groups the way you want them. There are only 6 scan groups but that will give you 6 blocks of 10 channels. So to scan the first block of channels you would select channel 81 or to select the second block of channels select channel 82. Of course you may wish to use another group of channels as scan channels such as 31 to 36.

Another function that is useful is the ability to have the radio switch on to either a fixed channel (your local repeater perhaps) or the last channel that was used when the radio was switched off. The address for this function is $0006D7. A channel number in this address will cause the radio to switch on to that specific channel, while FF will cause it to switch on at the channel it was on when last switched off.

$000729 is the starting address to select the button functions. The first button is the grey one on the microphone and the next is the first one on the console below the display. I usually set the console buttons as follows:
1 – Low power
2 – Squelch open
3 – lamp off / on.

The next button is 7, which decrements the channels, and then 8, which increments the channels. If the channel select buttons are held for a second the channels shift in tens.

The hex codes are as follows: 01 19 0C 36 00 00 00 31 30.

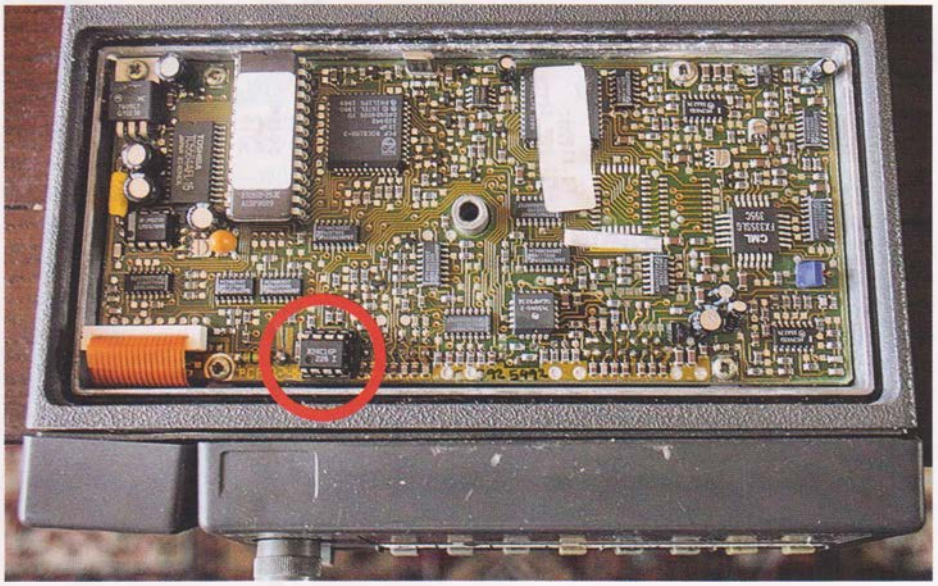

PHOTO 2: Location of the 24C16 memory IC that holds the frequency information.

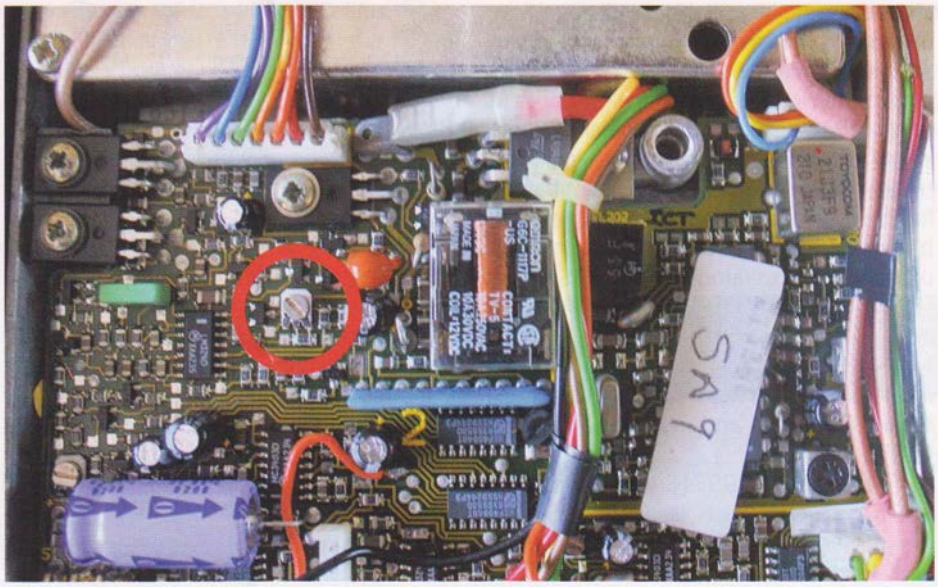

PHOTO 3: The output power adjustment pot.

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TABLE 1: CTCSS hex codes.

Code	CTCSS frequency
00	None
01	67Hz
02	71.9Hz
04	77Hz
06	82.5Hz
08	88.5Hz
0A	94.8Hz
0D	103.5Hz
0F	110.9Hz
11	118.8Hz

TABLE 2: Data for entering offset, power, squelch, sellcall and scan group codes.

Offset	Power	Squelch	Sellcall	Scan group	Hex code
OFF	25W	12dB	OFF	NO	E828
ON	25W	12dB	OFF	NO	E829
OFF	15W	12dB	OFF	NO	E028
ON	15W	12dB	OFF	NO	E029
OFF	10W	12dB	OFF	NO	D828
ON	10W	12dB	OFF	NO	D829
OFF	6W	12dB	OFF	NO	D028
ON	6W	12dB	OFF	NO	D029
OFF	1W	12dB	OFF	NO	C828
ON	1W	12dB	OFF	NO	C829
OFF	Prohibited	12dB	OFF	NO	C028
ON	Prohibited	12dB	OFF	NO	C029
OFF	25W	12dB	ON	NO	E82A
ON	25W	12dB	ON	NO	E82B
OFF	15W	12dB	ON	NO	E02A
ON	15W	12dB	ON	NO	E02B
OFF	10W	12dB	ON	NO	D82A
ON	10W	12dB	ON	NO	D82B
OFF	6W	12dB	ON	NO	D02A
ON	6W	12dB	ON	NO	D02B
OFF	1W	12dB	ON	NO	C82A
ON	1W	12dB	ON	NO	C82B
OFF	Prohibited	12dB	ON	NO	C02A
ON	Prohibited	12dB	ON	NO	C02B
				YES	0129
				YES	0229
				YES	0329
				YES	0429
				YES	0529
				YES	0629

If you wish you can have user-selected CTCSS by putting 35 in the address $00072D for button 4 and 34 in address $00072E for button 5. This will give you the ability to select the appropriate tone for the repeater local to where you are, eg your local repeater may use tone 15 but when you are on holiday the local repeater may use tone 4. When you press button 4 you will see an additional number come on the display: this is the CTCSS code number. It is altered by the channel change buttons. When you have the code you require, press button 4 again to revert to the channel function. If you use this function you will have CTCSS on receive so you will need to press button 5 to remove the CTCSS before you can hear any transmissions when you are using simplex channels. You will need to put 19 into address $000746 to give an indicator for the CTCSS status, indicator on means CTCSS on and indicator off means CTCSS is off.

The address $00071E stores the value for low power, which is selected by the low power button. The values of 1, 2, 3 and 4 relate to 1W, 6W, 10W and 15W respectively.

You may see a lot of values in addresses I have not mentioned. These are not required for our purposes. Some are used as calibration codes and are best left alone.

The selective call system can be used to generate a 1747Hz tone, which is close enough to 1750Hz to open repeaters. In normal selective calling there can be 8 different systems. One system used in one country and another used in a neighbouring country, as you can see this makes sure that radios used in country A do not trigger radios used in country B. We use the sellcall system 1 to give the correct tone frequency. Usually there are five tones sent but for our purposes we only need one. At address $000640 put in 28, that gives tone 8 and the next address put in FF. To set the tone time to 500 miliseconds, put in 32 at address $0006F8 and put in 32 at address $000708 to give 500 milliseconds of carrier before the tone is sent. This is known as Link Establishment Time where the receiver in the distant repeater receives the carrier then a short pause before the tone comes in to start the repeater access timer.

Timeout timer

These radios were never designed for long transmissions, particularly if using high power, so it is perhaps best to have a transmission time out timer set for about 2 or 3 minutes. Address $000719 holds the value for this, in seconds, so decide on how long you want the timer to run for, convert this to hex and put that value in this position. Another advantage of this is that if your microphone PTT switch jams on, the transmitter only jams the channel for the duration of the timer setting.

Setting the power output

Power output can be adjusted by the software setting, but the actual level is dependant on the setting of a preset on the board. If a non-standard power output is required, you should set the software codes for 25 watts and then set the actual power by adjusting the preset control on the analogue board. Inside the radio, under the large cover you will see a metal screen. Remove this and you will see the circuit board as seen in **Photo 3**. The power adjust pot is indicated in the photo by a red circle and adjusting it will enable you to set the transmit power.

Whatever extra power you might be able to squeeze out of the radio using this technique it is not a good idea to try to exceed the design maximum of 25W.

Help from the internet

There is a lot of useful information and access to expertise on the internet. The Yahoo group https://groups.yahoo.com/neo/groups/FM1000series/info is particularly helpful, especially for troubleshooting.

It's also worth knowing that you may also find newer Philips equipment referred to as Simoco, as there was a buyout a few years ago that resulted in a name change.

Thanks

I would like to thank Norman, GI3YMY, Stewart, GI4OCK and Bertie, GI4POC who all gave assistance in in the preparation of this article.

Sport Radio

SSB Field Day takes place for 24 hours over the weekend of 3rd-4th September.

After that the 80m Club Sprint series continues, with SSB on the 14th. Next, a new RSGB contest – the International Autumn Sprint CW. This contest runs for four hours on the 24th and is modelled on the former EU Sprints, the first of the RSGB International Sprints having taken place in the spring. The 80m Club Sprint CW session is on the 29th. In any of the sprint contests, if you initiate a call (by sending CQ, QRZ, up 2kHz etc), you are permitted to work only one station on that frequency. You must then move at least 2kHz before you call another station or before you initiate a call again (CQ, QRZ, up 2kHz? etc). The use of UK Contest Callsigns is permitted in all the International Sprints, but not in the 80m Club Sprints.

The first VHF contest is the 144MHz Trophy, which takes place for 24 hours on 3rd-4th. This one is hotly contested in the Open category, but there are four other categories and three of them are for single ops, so there are opportunities for all to strive to do well. Overlapping the last three hours (and then continuing for one hour on its own), the fifth and final 144MHz Backpacker Contest takes place. In the Backpackers there are two permitted power levels, 3W and 10W. Finally its the UKACs, with 2m on the 6th. After the 70cm UKAC on the 13th there's the Second 70MHz Contest on the morning of the 18th. Then it's back to the UKACs for the remainder of the month, with 23cm on the 20th and 6m plus SHF on the 27th.

The All Asian DX Contest takes place for the whole 48 hours of the weekend of 3rd-4th. UK stations taking part in SSB Field Day will find it helpful to have a suitable number to give them, because All Asian stations want to be sent the operators' age, not a serial number. For 24 hours over the same weekend the IARU 144MHz Contest takes place. It coincides exactly with the RSGB 144MHz Trophy contest. For four hours on the 4th the Worked All Britain 144MHz QRO Phone Contest takes place. The WAB contest overlaps the RSGB and IARU events, so please remember that participants in this one will ask for your WAB square. The new series of UKEICC 80m contest starts this month, with an SSB session on the 7th. In addition to individual entries, last year a team competition was also introduced. This year the maximum team size is increased from three to four. The second leg of the Worked All Europe (WAE) DX Contest takes place for 24 hours over the the 10-11th. This month it's SSB. Europe works non-Europe only. The UK Microwave Group is running another of their cumulative contests on the 11th, on 24-47GHz. The BARTG Sprint 75 Contest runs for four hours on the 18th. All activity is on 75 baud RTTY. The first of this autumn's series of CQWW DX contests is RTTY, which takes place for the whole 48 hours of the 24-25th. There are three contests on the 25th. First there's a UKuG contest on 5.7 and 10GHz. Next, the first leg of the ON Contest takes place on 6m. Work Belgian stations only, exchanging a signal report and serial number. ON stations also send club codes (eg MCL), which count as multipliers. There are four legs to the contest (most of them on other bands, next month) and in each of them the winners from each country receive an award, so long as they make 25 or more valid QSO. Also on the 25th the *Practical Wireless* 4m Contest runs for four hours. The final contest of the month is the UKEICC 80m CW on the 28th.

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RSGB HF Events

Date	Event	Times (UTC)	Mode(s)	Band(s)	Exchange
Sep 3-4	SSB Field Day	1300-1300	SSB	3.5-28	RS + SN
Sep 14	80m Club Sprint	1900-2000	SSB	3.5	Both calls + SN + name
Sep 24	International Autumn Sprint CW	1700-2100	CW	3.5-14	Both calls + SN + name
Sep 29	80m Club Sprint	1900-2000	CW	3.5	Both calls + SN + name

RSGB VHF Events

Date	Event	Times (UTC)	Mode(s)	Band(s)	Exchange
Sep 3-4	144MHz Trophy +	1400-1400	All	144	RS(T) + SN + Locator
Sep 4	5th 144MHz Backpacker	1100-1500	All	144	RS(T) + SN + Locator
Sep 6	144MHz UKAC	1900-2130	All	144	RS(T) + SN + Locator
Sep 13	432MHz UKAC	1900-2130	All	432	RS(T) + SN + Locator
Sep 18	2nd 70MHz	0900-1200	All	70	RS(T) + SN + Locator
Sep 20	1.3GHz UKAC	1900-2130	All	1.3G	RS(T) + SN + Locator
Sep 27	50MHz UKAC	1900-2130	All	50	RS(T) + SN + Locator
Sep 27	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
Sep 3-4	All Asian DX	0000-2359	SSB	1.8-28	RS + age (YLs send 00)
Sep 3-4	IARU 144MHz	1400-1400	All	144	RS(T) + SN + Locator
Sep 4	WAB 2m QRO Phone	1000-1400	SSB/FM	144	RS + SN + WAB square
Sep 7	UKEICC 80m	2000-2100	SSB	3.5	4-character Locator (Grid) square
Sep 10-11	WAE DX SSB	0000-2359	SSB	3.5-28	RST + SN (EU works non-EU only)
Sep 11	UKuG	0900-1700	All	24, 47G	RS(T) + SN + Locator
Sep 18	BARTG Sprint 75	1700-2100	RTTY	3.5-28	SN
Sep 24-25	CQWW RTTY DX	0000-2359	RTTY	3.5-28	RST + Zone (UK=14)
Sep 25	UKuG	0600-1800	All	5.7, 10G	RS(T) + SN + Locator
Sep 25	ON Contest	0700-1000	Fone/CW	50	RS(T) + SN (ONs give club code)
Sep 25	PW 70MHz	1200-1600	All	70	RS(T) + SN + Locator
Sep 28	UKEICC 80m	2000-2100	CW	3.5	4-character Locator (Grid) square

In case of differences between this calendar and the Contest Committee website, the website takes precedence. + VHF Championship event ~ Different bands at different times

A new trailer for Sussex RAYNET

Sussex RAYNET is to get new mobile emergency communications thanks to a donation from the local electricity distributor, Southern Electric Power Distribution (SEPD).

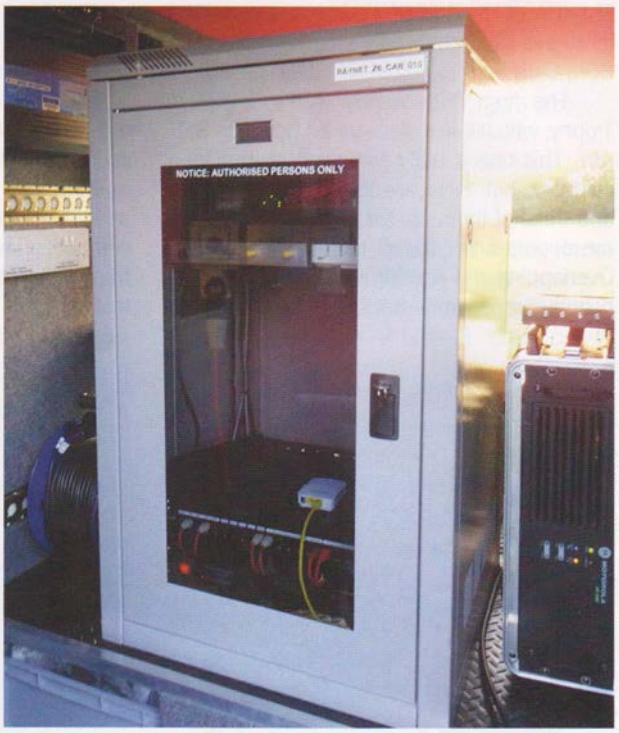
A one-of-a-kind mobile resilience trailer built to bring emergency comms to areas affected by major incidents.

A South Coast group from The Radio Amateurs' Emergency Network RAYNET is using their donation from SEPD to build a one-of-a-kind mobile resilience trailer that will transport communications equipment into areas badly affected by severe storms and major incidents. This cash injection is being made as part of SEPD's Resilient Communities Fund, designed to help local groups and not-for-profit organisations, like RAYNET, improve the ability of their towns and villages to withstand extreme weather events.

Phill, G7JRV and Paul, 2E0VCU have been working evenings and weekends for the last few months to build the trailer.

For RAYNET, this new trailer means that user services such as the blue and orange light agencies will be able to send and receive data in areas where traditional communications links may be down for some time, making a massive difference to residents across the county during storms and other emergencies that might adversely affect power supplies, phone and broadband. From this trailer, RAYNET is able to offer wired and wireless internet access pulled in via a number of bonded sources such as 3G, 4G and KA satellite broadband. User Services can be offered separate additional bandwidth to bolster their own connections, equipment hosting with UPS backup, private Mesh Wireless services, Video over IP streaming, and live environmental data. When needed the trailer can be deployed complete with tables, chairs, LED lighting and an outdoor area for times when an additional breakout space is needed.

The User Services have been asking RAYNET for some time to be more focused on data, this donation is going to make a huge difference to RAYNET's capabilities and the communities across not only the home base in Sussex but also the neighbouring counties. If the fixed communications networks get disrupted during an emergency, the new resilience trailer will be able to provide a greater level of support to the county's emergency services and the council, contributing towards the safety of residents and the protection of the environment. During extreme weather events, particularly flooding, it's quite possible that people will have to leave their homes and the new trailer can also be used to help them keep in touch with friends and family, and provide a secure area where they can recharge their devices. Being mobile means that the group are not tied to one location and so they can travel as and when they are needed, which is great news for local communities across Sussex, Surrey and Hampshire.



Emergency comms equipment inside the new trailer.

RAYNET will be able to manage the trailer and its local supporting volunteers via secure digital radio regardless of the trailers location and completely independent of fixed ground based infrastructure networks. The trailer is the first of its kind and hopefully, with future funding, it will be possible to build more units like this one across the whole country.

For more details about RAYNET, please visit www.raynet-uk.net/

The Resilient Communities Fund is open to non-profit making, community organisations throughout SEPD's operating region of central southern England. For more details on the fund, please visit www.ssepd.co.uk/Resiliencefund/

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See
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ATV

Operating news

Shaun, G8VPG (Bristol) reports that he and the local group have been experimenting with reduced bandwidth TV (RBTV) on the 146–147MHz band using the DATV Express board with Windows operating system. They use several amplifiers and filters to transmit and used the Minitioune receiver. They have been on the South Wales hilltops during the May and June activity weekends. Their latest QSO was 121km and was listed as no 3 in the best known DX list compiled by W6HHC. They have also been working with the GB3ZZ repeater, see later.

Dave, G8GKQ and Noel, G8GTZ have been working RBTV on the 10GHz band to extend the range of these microwaves using 333ks 7/8 and H264. The first proof of concept test was from Lane End to Hannington, 32km over a slightly obstructed path and on 3 July they worked over a 93km path. Noel was on Walbury Hill near Newbury with a 3W transmitter and Dave was on Povington Hill near Lulworth with a 250mW transmitter. Received MERs were in the range 6–12dB with fading over the almost-line-of-sight path. This is the first time that I have heard of RBTV on the 10GHz band. More tests are planned over greater distances.

Henry, F4WBG (JN26AO) is testing RBTV on the 6m band. So far 200km has been worked over an obstructed path using an SR of 333kHz. These distances were not possible on other bands. More tests are planned during the summer to extend the range. With the right conditions, worldwide coverage may even be possible. In most countries the 6m band is from 50.0 to 52.0MHz. The lower part of the band can be quite busy with CW and SSB but the top 1½ MHz is often barely used so it can be very suitable for RB-TV.

ATV repeaters

GB3NQ in Cornwall has had an improvement to its 70cm digital receiver input. It had been suffering from interference from the local 70cm beacon. By adding a new 5 pole interdigital filter on the input the interference has been eliminated. The 70cm antenna is omnidirectional, horizontally polarised and at 1000ft ASL, so we should now see some real DX stations getting in. GB3NQ transmits on 1316MHz analogue and it can also be monitored via the BATC streaming service.

Shaun, G8VPG reports that they have been experimenting with adding a RB-DATV 2m input to the GB3ZZ repeater near Bristol. Send a horizontally polarised signal on 146.5MHz, 333ks/s, FEC7/8, video PID 256, audio disabled, but you must use an audio PID of 4095 to get the picture to lock. Work is still going on to optimise the antenna and feeder. The output can be seen on GB3ZZ channel 2 [1].

Gilwell Park attendees in the green screen studio.

Scouts 24 hour activity weekend

Over the weekend of 9/10 July, Gilwell Park Scout Activity Centre, Chingford, London was host to 5,000 fourteen to eighteen year old Explorer Scouts for their annual 24 hour non-stop activity weekend. One of the activity zones for this event includes the GB2GP permanent amateur radio station, and this year for the first time it also included a TV studio. The studio had a green screen set up with autoprompt on the camera for the Explorer Scouts to try their hand at presenting the weather forecast. In addition, three remote controlled cameras demonstrated the principles of vision mixing, whilst allowing the volunteer staff to keep tabs on several of the technology areas.

The studio proved to be exceptionally popular, with many of the Explorers visiting the activity right through the day and night to demonstrate their presentation skills. Some proved to be very creative, substituting their own scripts and backdrops in place of the standard weather forecast! The video output was also streamed on the internet via the BATC streaming service for worldwide viewing.

One of the highlights in the main arena was a launch of a high altitude balloon by Phil, MODNY. The balloon also transmitted pictures. With a steady wind blowing to the east it was predicted to get the balloon to the continent, but in the end it fell short, landing in the English Channel just off the Netherlands. Some excellent images were received from the balloon during its flight and these were shown to the visitors. Thanks go to Dave, G8GKQ; Phil, MODNY; Tim, MOTHM; Steve, MOBPQ; Tim, 2E0CTQ; Sian, M6ZSA; John, 2E0XLX; Dave, MOMBD; Ross, Graham and Peter for working the long hours to provide a youth experience of amateur radio and amateur television to the visiting Explorer Scouts. Let's hope we get a continuing interest in ATV from this younger community.

BATC Convention, CAT16

The 2016 BATC Convention for Amateur Television and the club's Biennial General Meeting will be held in the Conference Room of the Royal Air Force Museum at Cosford, near Telford, Shropshire on 24 and 25 September. This includes a very interesting BATC lecture programme, equipment demonstrations and equipment testing facility. Kevin, G3AAF will be exhibiting his very useful range of RF products. More details in the BATC Forum [2].

The charge to attend the convention is £10 per day, payable at the door. For more information and to register your intention to attend, see [3]. Visitors to CAT 16 will also have free access to the RAF Museum. Parking is also free.

The Biennial General Meeting of the BATC will take place on the Sunday afternoon. There is no charge if you only attend the BGM.

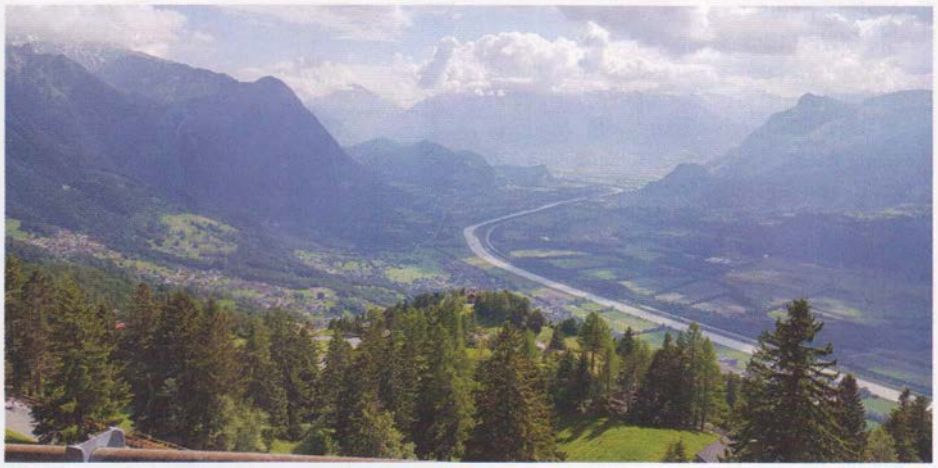
Websearch

[1] www.stvg.co.uk
[2] http://batc.org.uk/forum/
[3] https://batc.org.uk/shop/cat16

Dave Mann, G8ADM
g8adm@gb3bh.com

HF

Conditions continued to be poor during July though there was a small burst of sunspot activity around the middle of the month. Sporadic-E livened things up with some extra European signals but in general the higher bands were very quiet.



HB0 QTH, a location at Gaglei in the mountatins for some /P operating.

20 and 17m delivered the goods for better equipped operators and several mid-Pacific stations like T2COW were worked on 17m. Conditions should start to improve a bit now as the summer doldrums begin to dissipate – and there is still some magnetic life left in the Sun so we will get occasional crops of spots.

Contest conditions

The IARU Contest provided a snapshot of conditions at the start of July. Bob, MDOCCE was transmitting for 24 hours with 100 watts to a 4-ele SteppIR at 60ft. He checked 10m regularly and watched the spots, but never heard a single station on the band. 15m was open to near-Asia, Africa, South America and the East Coast of North America, but no West Coast or JA signals were heard. The big stations in NA had big 15m signals, as usual. Early on Sunday morning, there was an opening over the North Pole on 20m, and even with low power he worked a KL7 and a KH6. 20m was open in some direction all night. There were good signals from W6 on 40m for several hours during the early morning hours and VK was heard, although he could not raise either W6 or VK with 100W to an inverted V. He found 80m tough with low power and a vertical, but made more than 20 NA QSOs plus a couple of SA, one Zone 18 Asia, and one AF QSO. 160m was EU-only.

In contrast to Bob's experience, Jim, MOJWB in Portishead found a lot of South American and Caribbean stations on 10m during the evening. Phil, 2E0DSQ, in Leicester also found some South American and Caribbean stations on 10m – with rather more on 15. Dave, G3UEG worked two all time new slots on 10m with QSOs with Palestine and Vatican City, plus French Guiana and Venezuela. Ray, W2RS in Arizona heard no UK stations other than G3BJ at 559 on 20m. Steve, PJ4DX heard some DX but said conditions were the worst he could remember since moving to Bonaire in 2013. Dave, G3YMC agreed conditions were poor and only worked one station outside Europe with his QRP setup. Mike, G7TWC operating as GR2HQ found an anomalous ZL4AS who was very strong on 15m around midnight – so it pays to keep checking! Steve, G1XOW almost doubled his 2015 score with a lot of DX on 20m and 40m. His best DX on 15m was Namibia and on 40m VK (around 0540) with North America about an hour earlier.

The IOTA Contest suffered from even worse conditions than the IARU event. There was again some Sporadic-E and 20m performed reasonably well but little DX was worked on 15 and 10. Charles, M0OXO found that 20m was the only good band; 15 and 10 were almost dead apart from some Sporadic-E on 10 on the Saturday. Steve, G1XOW stayed on 20m for almost the whole of his 12 hour entry. Steve, PJ4DX heard nothing on 10m and agreed that 20 was the only good band. His best QSO was with YJ8RN/P around 0400UTC. David, G3UEG found VP8LP and an HR1 station on 15m, plus CE and HS on 40. David, M0BWY, using a vertical, heard only one US station during the contest. Brian, 5B4AIZ said conditions were diabolical as he only managed about 14 QSOs on 15 and 10 despite calling CQ frequently.

M1GEO & G7UVW QRV from HB0.

DXpeditions

I have already mentioned the VP6AH trip to Pitcairn (OC-044) in the autumn. Now it seems there will be a shorter visit before that by JF2MBF and JA2FJP from 25 August to 3 September when they will be QRV as VP6J. I suspect the best bands will be 30/40/20 but keep an ear on 17/15 as well since this can be a good path to the UK. After Pitcairn the guys will be E51Q for 8-19 September before moving to Niue (OC-040) for 20-29 September, Tuvalu (OC-015) as T2J on 4-10 October and, finally, Fiji from 11-13 October.

Tom, KC0W, recently operating as T2COW from Tuvalu, has received the H44COW callsign for his Solomon Islands DXpedition, expected to take place between 25 October and 26 November. But his next stop is Vanuatu (YJ) from 20 August to 21 September. After that he will be in West Kiribati to operate T30COW from 24 September to 24 October. After the Solomon Islands he will return to Samoa (5W) then hopefully go on to Tokelau (ZK3), Temotu Province (H40), Bangladesh, Nepal and Bhutan.

The dates of LA7GIA's TL8AO DXpedition to Bangui are 10-22 November. He plans to have

a beam for 20, 15 and 10m and a rotatable dipole on 17m.

F5MXH is back in Mali and operating as TZ5XR until February next year. He has an IC-7300 and should be QRV from 160 to 6m.

To celebrate their Silver Jubilee, the Japan Amateur Radio Development Association (JARD) plans to activate JD1YBV from Ogasawara (AS-031) to commemorate the 1991 establishment of JARD. Activity will take place on 40m to 6m from 23-28 August.

Mike, DF8AN will be QRV from Yap Island (OC-012) from 6-16 November as V63AJ. Listen for him on CW, with some PSK and RTTY. After Micronesia, Mike will be heading to Guam where he'll be operating as KH2/DF8AN until 20 November.

A German team is heading for the Isle of Man (EU-116) in late September and early October. They will be operating as MD/home calls from 23 September to 4 October. Activity will be on 1.8 through to 28MHz on digital modes, SSB and CW. They have a website at http://md.mydx.de/

Andy, IK7YTT will be QRV as XX9TYT for a few days from 29 August including the All Asian SSB Contest.

Koji, JM1CAX is QRV as 5Z4/JM1CAX until the end of August.

The next San Felix (SA-013) expedition has grown from a one man operation to a major 10 man DXpedition now scheduled for April 2017. The last DXpedition to San Felix was in March of 2002 by XR0X. See http://www.dxmaps.com/dxcalendard.php?Lan=&Cod=335.

A quick visit to HB0

Five members (George, M1GEO, Chris, G8OCV, David, G7UVW, Dave, M0TAZ and Peter, G0IAP) of the Secret Nuclear Bunker Contest Group attended the Friedrichshafen hamfest weekend and with help from the Liechtenstein radio club chose a location at Gaflei in the mountains for a /P operation after the hamfest. Equipment used was a 40m doublet in a tree and 50W from an Icom IC-7100 and car battery. Conditions were difficult with rapid QSB and at times seemingly one-way propagation. They worked 59 stations and 14 DXCCs.

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	190	126		252
G5LP	242	24	180	249
M0NKR	131	212	64	249
G1XOW		225		225
G4IDL	191			191
GI4DOH	186	22	46	191
G3SVK	189			189
G0RPM	117	48	120	183
CT7AGZ	173	1	2	173
G3HQT	162		68	166
G4XEX	75	97	87	145
G3PXT	56	89	116	126
G4CCZ	99	55	41	124
G3YMC (QRP)	100			100

IOTA

Out of the blue, VE3KTB who was working on Ellesmere Island (NA-008) as VY0ERC announced that he had a chance for a very short excursion to the super-rare Axel Heiberg Island (NA-043) on 28/29 July. I checked his favourite NA-008 20m SSB frequencies on the cluster, tuned around and found him CQing with no takers during the afternoon of the 29th. It just serves to emphasise that the DX is not always on the cluster.

Andy, VK5MAV has announced he will be active from Viney Island (OC-266) from 9-13 September.

VE2DVG will be QRV from La Madeleine Islands (NA-038) from 21 August to 2 September. While you are waiting for him you might like to read the novel *Entry Island* by Peter May that is set in the area.

Alain, F8FUA will be active from Lifou Island (OC-033) as FK/F8FUA from 5-12 September.

TABLE 2: Forthcoming activity.

Until Feb	TZ5XR
14-27 Aug (part of)	OC-206
17-28 Aug	TX2AH (OC-063)
19-29 Aug	CY9 – St Paul Island
20 Aug – 21 Sept	Vanuatu by KC0W
21 Aug – 2 Sept	Madeleine Is (NA-038)
23-28 Aug	JD1YBV
25 Aug – 3 Sept	VP6J
29 Aug – ?	XX9TYT
3 Sept – 25 Nov	VP6AH (OC-044)
6-24 Sept	JT by OK ops
8-19 Sept	E51Q
11-19 Sept	TO5FP St Pierre/ Miquelon
15-30 Sept	D66D
20-29 Sept	Niue by JA ops
3 Sept – 25 Nov	VP6AH (OC-044)
5-12 Sept	FK/F8FUA (OC-033)
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
3 Sept – 25 Nov	VP6AH (OC-044)
4-10 Oct	T2J
8-23 Oct	S9YY
18-21 Oct	H44GC
19-26 Oct	9G5AM
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
1-11 Dec	FS by US ops
Jan-Feb 2017	E51MAF Nth Cooks
April	San Felix CE0X

Correspondence

Peter, G4XEX found life on HF – even on 10m where he heard a US station on RTTY. But his band of the month was 20m where he found: JW/G4PVM, VU2CPL, JO1WXO, ET3AA, YB1AR, ZS8BH, V55DX, HS5SRH, HS0ZHC, HS3XVP, 8N8HQ, 9V1XX, ZS6WM, VU2TMP, JF1OPL, and E21YDP. His best DX on 17m was S79V.

Peter, G3HQT concluded that his antennas ran out of electrons during July as there was so little to be heard. He reported: 17m RTTY D44TWO; 30m HH2AA and RI1FJ. RI1FJ mentioned that he was about to go QRT and had no news about a replacement amateur radio op in Franz Josef Land.

Gordon, G3PXT managed to get his linear working properly on all the HF bands and found: on 10m – CR6K, YT0HQ, LY0HQ, EM5HQ, EF4HQ, HV6SP, 9A0HQ, S50HQ, LY0HQ, CN8KD; 15m – VR2XMT; 17m – JAs, TF5B; 20m – A41PP, A61EK, A61ZX, KP4RS, A71AE, 7Z1HL, JF8EPR, RD0A, PX2A, JE4CIL, E21YDP, YB1BLE, YB5BOY, VE2FK, 7Z1TT, XW4XR, ZD7VC, SU9VB, OH0HQ, VK5GR, JA2XYO, FR1GV, V51WH, FG5LA, YV5AAX, 4J3J, HZ1HN, andVU2VID; 40m – FR4NT, YC3DR. Gordon was busy contesting earlier in the year and came 1st in the PACC contest for single-op 40m.

Fred, G3SVK heard very little on 15m and above but was kept busy on the other bands. He reports: 17m – D44TW0, A61Q, HH2/HB9AM0, FM5FJ, D2EB, 4S7VG, JH1MDJ, OJ0B; 20m – 6Y5/AC4BT, HR5/F2JD, XE1XR, FS/K9EL, 3B9FR, YV5LAY, 9V1VV, 5Z4/JM1CAX, JM1TUY, V44KAI, XX9TGM, 9K2MU, J6/NY3B, HP1RN, FM/F6BCW, VU2TS, 9M2ZQK, VU2CPL, JA7AKH, LU5FF, HS0ZEE, OX3XR, 9J2HN, T88GA, 9V1YC, YI3WHR (SSB), J79IX, ZY8M, SU1SK, VP5/W5RF, DU1ET, J79WI, FM5FJ, 6Y1LZ, LU7HN, 9M2PUL, RI1FJ, XV9NPS, VU2PHD, JT5FW, 9V1YC, TF3JB, 4J29RA, JR4GPA, HK3CZE, OA1F, NP4R, S01WS, HH2/HB9AMO, HS3NBR, OJ0W, KH2L, OJ0B, HL4RBR; 30m – D44TW0, ER3CW, A61Q, LX/DL5NUA/P, VK3CWB, JT5FW, A45XR, S01WS, HH2AA, DU1AST, D2EB, 4J1926HR, HK1MW; 40m – D44TWO, C31US, V55DX, J6/NY3B, J75KG, J79WI, RI1AND, 6Y1LZ, PJ2/K3NK, S79V, HH2/HB9AMO, HK1X, D2EB, JT5FW, CP4BT, ZL2IFB, ZY8M, TR8CA, 5R8SV, DU1ET, ZS6CCY, HH2AA, 6Y5/AC4BT, A61Q, OA1F, OA4DX, KP4CPC, OJ0W.

Finally

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

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VHF/UHF

From the end of June and throughout July, conditions were a little lacklustre in the higher VHF bands with fairly limited Sporadic-E openings. Lower bands like 6 and 4m fared better with decent European openings.

Drone cam over the 4m Trophy station MOSNB.

G7RAU at The Lizard again

Dave is a regular visitor to The Lizard in Cornwall with his motor home and has always based his trips on holiday first and radio second... The 10 day expedition had variable radio conditions, weak tropo every day to EA1 (ED1ZAG/b was there most days, albeit weak) with good propagation enhancement over a few evenings enabling locators IN82 and IN52 to be worked. Dave managed to catch two Sporadic-E openings with prefixes CN8, EA7 and EA4 completed. As Dave packs a multi band station he had great fun on 4m and gave the IN79 locator square as a new one to many European and UK stations. Dave was keen to try tropo QSOs on the band as well and was rewarded with QSOs into PA and ON. GM was worked for the first time with help from aircraft scatter. On the last evening and into the morning of the holiday (expedition) the fog was so thick that it drenched everything in the tent and motor home but, ever the DXer, Dave checked the ED1ZAG beacon and it was 599++. Generally all was not plain sailing – with five duff patch leads that were perfectly OK when leaving home and a cheap imported USB hub that caused all kinds of problems in the IT area! A trip into Truro was called for and some ferrite clip on modules and a quality USB hub and the problems were solved with a drastic reduction in noise. Clearly the CE marked imported hub lacked any kind of filtering. 4m suffered from significant noise even from this rural location, however the best direction was west with only 2 S-points of noise but the worst by far was 300 and 210° with S8 and S9 noise. Inverters on the camp site were the culprits and Dave had no noise at all when the inverters were off.

Arriving home (Isle of Wight IO90) and recovering from an awful bug, Dave almost lost his voice (not great for SSB operation) but he managed to crawl into the shack. On the morning of 8 July ED1ZAG/b was quite strong and Dave worked EA1YV (IN52), very rare to cross the hills on the north coast of Spain. On the evening of the same day again the ED1 beacon was 599+ and EA8CSB in IL18 was copied very weakly, but Dave's croaking voice wasn't enough to raise him. Consolation was working EA1NL in IN52PJ in CW. The following day, 9 July, the ED1ZAG beacon was still there and slightly stronger along with other beacons in the same direction, the jewel being ED8ZAA in IL18 (Canary Islands). Tropo to EA8 is rare for Dave from IO90 probably due to obstructive land mass. Despite a continuing bad throat he worked stations in locators IN52, 53, 72, 73, 83, 91, 93. A got-away was a caller from very rare IN71 sadly lost in QRM. Dave also tried tropo testing with Mario, I3MEK and surprisingly was copied by IKOSMG in JN61 Rome area. Possibly this was ionospheric (IONO) scatter however it could have been true tropo. This shows the value of testing paths and spending time to try where there can be possible DX to be worked. Then at 9am EA8TL in IL18RJ was worked on CW and then SSB. About 1pm tail ending a French station a QSO was completed with EA8TX in IL18QI but this could well have been weak Sporadic-E as Dave went on to work EA8BPX (IL18) and EA8TJ for a second time in the day. A superb Sporadic-E opening to SV8 and I7/I8 occurred on 10 July but activity, sadly, was very low.

Lyn, GW8JLY (IO81) continues his 2m operations almost on a daily basis and reports: "On 12 June I returned home just in time to catch a 2m Es opening to LY and EW. I worked just three stations and heard a few more – LY2CH (KO15), EW6FS (KO35) and EW6DX (KO45). KO35 and KO45 were new locators. Also copied was EW6AA in KO55 but his signal faded before a complete a QSO could be made. On 29 June there was another opening, this time it was to Morocco. There was only 1 station QRV there, CN8LI in IM63NX. Unfortunately IM63 was not a new locator but it was nice to work CN again as it's not often that I see openings to that country. On 10 July at 1306UTC, IZ8YBS (JM89) returned to my CQ DX call and after a short period of silence, Gilberto, IK7LMX (JN80XP) was also worked with 59 plus plus both ways. Sporadic-E signals on 2m can be very, very strong. JM89 was a new locator for me and was a locator I had been waiting to work for many years.

"During June and July there have been several DXpeditions to rare locators and these enabled me to work new locators KO07, KO18, JO29, JP42 and JP44. The station worked in KO07 and KP18 was ES0UG operated by a group of German hams who started their expedition in KO18 before moving on to KO07. In JP42 I worked Stefan, LA0BY operating as LA0BY/P and Lars, SM4IVE operating as LA/SM4IVE activated JO29 and JP44 for another 2 new ones."

Chris, M0KPW in South Cumbria (IO84) comments on generally poor HF conditions

so decided to try his hand on 6m where he has 'dabbled' previously tried to press his 20m delta loop and ATU into 6m service. This produced just a handful of QSOs, so this year he decided to put a 6m dipole on the roof. It wasn't very high, in fact only just above gutter level on a very short mast but with 100 watts into his FT-950, Chris has had some good results.

This set up has netted QSOs with just under 100 locator squares since the beginning of the year. No great DX was worked, but the locators included JO, IN, IM, IP, JN, JM, KO, KN, IO and much rarer JM60 and JM48 locators. One afternoon's operating generated 14 new squares from 21 QSOs.

Chris also has a 6m Ampro Whip that is kept on the car for use during lunch breaks at work (when conditions and time are available). Just over half an hour of operating with 70W into an FT-857D and the whip on the 10 June saw 11 QSOs into squares JN49, JN99, JO40, JO50, JN58, JO70, KN84. Currently under construction is a 2 element Yagi that will be finished this year. Although too late for this year's E season it will be tested and mounted on the roof ready for next year's season. The antenna has a 40cm boom that will allow it to be fitted on the side of the house without overhanging the neighbours bungalow.

Gordon, G3PXT (JO02) has almost perfected the art of the 'invisible antenna'. Gordon has been QRV throughout the Sporadic-E season on 6m with a novel antenna installation solution. He runs a 2 element Innov Antennas Quad mounted in the centre of his willow tree initially installed when the tree wasn't in leaf. At a fixed direction beaming south east amazingly the SWR on the antenna didn't change even as the tree came into leaf. It has been used to good effect even with a 120ft run of RG213 cable to the feed point. Gordon has worked 50 DXCCs in 28 locator squares out 600+ QSOs on 6m so far to middle of July 2016. An impressive list of prefixes include 4X4,UX, SV9, TF, EA8, T77, 4O, C31, 5B4, HVO, EA9 and CN8 all from an antenna not visible from the ground. Two rigs, a TS-2000X and TS-590SG, enable constant monitoring and a good eye on the DX Cluster is of great benefit.

4m RSGB Trophy contest

On 17 July, George, M1GEO and Dave, MOTAZ headed out to their usual portable location at the Kelvedon Hatch Secret Nuclear Bunker to take part in the RSGB 70MHz Trophy Contest. The weather was warm, ideal for *al fresco* operating. Using an Icom IC-7100 and a homebrew 6 element Yagi atop a Racal PU12 mast, with 50W and a leisure battery, they operated from 11am until 4 pm. They managed to make 59 QSOs at MOSNB/P, with best DX being Scotland at 518km. They were joined by Geoff, GODDX and Rob, MOVFC who operated in the RSGB HF QRP CW Contest. The photo, taken by drone, shows both the 70MHz station and the HF QRP station.

G7RAU expedition wiring up two rigs for FSK441.

Tropospheric propagation forecasting

Thanks for the comments from last month's column where some stations were asking for more information on the Tropospheric Propagation mapping and how to use it to try and forecast some openings.

It has been clear that over the 'summer?' months so far, coastal stations have fared considerably better in working DX than the rest of us inland. This isn't to say that westerly and northern stations don't have their moments but low level ducting across a sea path can provide superb conditions as opposed to much higher level ducts required for propagation overland. Over the past few years interest in Connected Propagation (ie Tropo – Meteor Scatter and Tropo – Aurora) require the key 700–800km tropo component to try and establish the link. There have also been reports of cross-Atlantic tropo from African islands to the Caribbean last year.

For some years now I have regularly watched the forecasts produced by Pascal, F5LEN that give a relative forecast of potential paths by processing global weather data into a graphical form. Pascal's website has developed a lot over the years to include forecasts for these extreme paths ie from Cape Verde to Southern Ireland and South West England and also Cape Verde to French Guyana and Bonaire that were reported as potential QSOs last year [1].

August and September have the potential for super high pressure systems coming to the UK from the South West. Pascal's prediction software will be very much worth monitoring. I have always considered this time of the year good for late summer super tropo and indeed propagation from Western UK, GD, GI, GM and EI have proved this with DX contacts down to The Canary Islands (EA8) on frequencies as high as 70cm and potentially up to 23cm. A highlight lecture at the RSGB Convention 2014 was given by Chris Waldron, GOIJZ with excellent information on Tropospheric Ducting. This was followed up by a two part series on the subject starting in the October 2014 edition of *RadCom* that is well worth a read.

Andorra on 4m

A DXCC entity on many stations wanted list is Andorra, prefix C31. During June, the 4m band was made available to amateurs on a non interference basis. The allocation from 70.000 – 70.200MHz allows all modes to be used with a maximum output power of 10W. It is hoped that an expedition organised by Jean-Jacques, ON7EQ and Hans, ON5AEN will be active on the band during the Persieds meteor shower with 2m also being activated so clearly some pile ups will ensue here.

Sign Off

Thanks once again to all contributors this month again with new reports from Chris, MOKPW, Gordon, G3PXT and George, M1GEO. Let's hope for good conditions during late August and September.

Websearch

[1] http://tropo.f5len.org/forecasts-for-europe/

Richard Staples, G4HGI
g4hgi@live.com

GHz Bands

Progress on both 134 and 241GHz, a new 13cm transverter and some beacon news.

The mmWave bands feature strongly this month with a few small groups doing some very exciting things above 24GHz including a first ever UK QSO at 122GHz (see page 12). As I said in my 47GHz article a while back, this is not an area where you can 'go it alone' as the QSO numbers are not large. Why not follow the likes of the Essex, Sheffield and Hampshire groups and form a mmWave cell in your area? I also urge the active groups to publish their results more widely and produce details of their equipment so other people know where to start. These bands are a real technical challenge for just a few QSOs and are rapidly becoming the last bastion of microwave homebrew. Inexpensive RF sources such as the ADF4350 4.4GHz signal source development board make a good start for multiplying to these bands and are available from ebay [1]. They just require the addition of an Arduino [2], PIC or similar board for programming.

134GHz

G8BKE reports that he "has made it out of his driveway on 134GHz". He exchanged signals from a site east of Winchester with John, G8ACE over a 3.9km path. G8BKE used 58GHz 130mm Flann horns for Tx and Rx and G8ACE the 30cm Nurad dishes.

241GHz

Higher up, Ian, G8KQW was able to receive the 241GHz signals from John, G8ACE over a 3.9km LOS path across Winchester. Signals were stronger than John's previous test distance of 6.75km [3] when they were marginal.

Beacon news

The latest Scottish attended beacon is at the QTH of GM6BIG. It is running on test on 10368.500MHz. Located near Salsburgh, between Glasgow and Edinburgh, it has a fairly good 360° horizon. Apparently it's not quite "ready for the big time" yet, and needs some more work. I hope it can become a GB3xxx NoV beacon soon. Reports please via beaconspot.eu or direct to gm6big@gmail.com. John, G8AKF emailed me to tell me that he very kindly helped finance the ONOTB 1296.950MHz beacon built by Pedro, ON7WP and installed at Botrange (JO30bm), the highest point in Belgium. The callsign is in memory of John's late father Thomas Ballantyne. ODX for the beacon so far is GM3UAG (IO87jx) at 931km. John himself is now QRV on 1.3GHz with a 'pedestrian mobile' setup comprising an FT-817 SG Lab transverter [4] and Wimo panel antenna. On the higher bands, Chris, G8BKE reports that his NoV has been granted for the replacement 47GHz Bell Hill beacon, so we look forward to seeing that on the air soon.

PHOTO 1: The Telford DARS on Guernsey, GP3ZME/P, courtesy of Telford DARS.

New North American 47GHz record

On 30 June, KT1J and N1JEZ on Whiteface Mountain in NY (FN34bi) made a QSO with VE2UG and VE3FN on Mont Tremblant QC (FN26rf) over a 215km path. The US end used a 0.25m Procom dish and about 35mW and the Canadians 1 foot dishes and DB6NT transverters with 500 and 150mW respectively. Dewpoint was in the mid 40s (Fahrenheit, I assume) and signals peaked on 47GHz about 15-20dB out of the noise.

Telford & DARS DXpedition

During the DXpedition to Guernsey, GP3ZME/P, while the VHF activity went well, the group reported poor results above 1GHz. Last minute equipment failures meant that 1.3GHz activity was low. On 2.3GHz they worked just six English stations, despite the South Coast and Shropshire beacons being audible much of the time. On 3.4GHz no QSOs were made and just 6 stations on 5.7GHz, ODX being G3XDY (JO02ob) at 397km during the 26 June contest period. By contrast 10GHz was the most rewarding band, with 14 different stations worked, ODX being G3XDY. In general, conditions were poor for tropo, but they were let down by not having the facilities for doing CW aircraft scatter skeds and JT modes, as both these can make QSOs up to 10GHz even in bad conditions.

New SG-Lab 13cm transverter

News has just reached me of a 13cm version of the highly successful and inexpensive transverter from SG-Lab. From a 432MHz IF it produces around 1W and has around 10dB of Rx gain. It has a choice of 4 LO frequencies so is ready for EsHail Sat. As well as the built in TCXO it supports an external 10MHz input. At the time of writing there is no information on the website [4], so for more information email info@sg-lab.com.

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] ADF4350 4.4GHz development board – http://ebay.eu/2aoaCaF
[2] Arduino ADF4350 controller – http://bit.ly/2arnb4R
[3] G8ACE 241GHz tests – http://bit.ly/2a0bMEW
[4] SG lab transverters – www.sg-lab.com/index.html

Dr John Worsnop, G4BAO
john@g4bao.com

ACO Radio Exercise Blue Ham

To celebrate the 75th anniversary of the formation of the Air Training Corps (ATC), Exercise Blue Ham was run from noon on 18 June to noon on the 19th using the 5MHz (60m) band with the agreed nominated channels.

Around the UK, ATC Squadrons, Wings and Regions set up and operated radio stations on 5MHz for the purpose of making contact with radio amateurs. With HF working conditions as they are at the moment, it was going to be a challenge for all taking part. From the data gathered during the Exercise, the logsheets show quite a variety of different and diverse antenna and radio setups with quite a few amateurs operating out in the field.

Special callsigns for this activity were issued out to stations two days before the start and were only usable during the period of operation; this provided some interesting callsigns in everyone's logbooks!

The ATC setup 12 stations with an additional 1 Army Cadet Force (ACF/CCF) station making 13 in total. Between the cadet stations they managed to log some 715 calls during the period of operation.

Cadets and Staff who operated and logged details exchanged their callsign, Maidenhead locator, power, signal report, type of antenna and orientation promptly as at times pile ups started to occur. Both amateurs and the cadets struggled at times exchanging information due to the use of some non-military phonetic alphabet, which cadets were not used to. Examples like Radio instead of Romeo and Italy instead of India were used, however I feel sure that both sides enjoyed the phonetic exchanges and got everyone thinking.

Feedback from the ACO/ACF stations that took part in the Exercise is that they "enjoyed the time contacting the callsigns and being able to hop around the band using different channels to the ones they normally operate on and to be able, at times to have a constant rally of traffic which is not their normal radio operation." Looking at the logsheets we pretty well covered most parts of the UK with some European stations calling in.

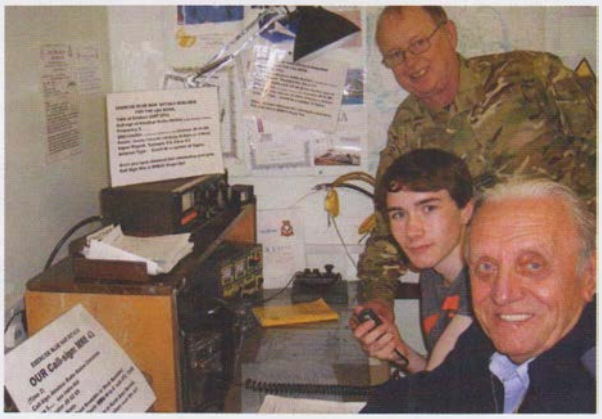
Feedback from the cadets

"We would like to operate again using the same scenario as before, it has added interest to the overall operating experience."

"We gained more knowledge and understanding of working antennas and with other groups of operators and their procedures, albeit slightly different to ours".

"Following the initial buzz from the Exercise I feel sure that more Units will now want to provide a station next time around even if local amateurs volunteer to help us out with setting up and running of it. Cadets can put into practice their radio training they have received."

"Some interesting contacts, PA5V, G5FM, PI4FL/P, GD3YUM. GB100NWA, G3ATC" – MRE46 & MRE40.



(Top to bottom) Flying Officer Phil Barber RAFVR(T) – Squadron Officer, Leading Cadet Sam Brooker and CI Terry Owen – Squadron Radio Officer taking part in the Exercise.

Feedback from amateurs

"The exercise was very useful, both as a training aid for cadets and as an interoperability experiment with the Amateur Community.

"Many cadets obviously having their first experience at radio operating, a few of them really needed a little more briefing before being let loose, but also many very good operators.

"Some of the amateurs participating didn't seem to quite understand what was going on and confused the cadets by waffling a bit, that's amateur radio!" – Colin, G8TMV

"Great fun it was and from my location I heard a great many stations and it sounded as if everyone on both sides was making the effort to make it a cordial and worthwhile event. Some amateur stations who can't normally operate on 60m put in a lot of effort to establish portable stations!" – Michael, GOTNF

"Since I typed feedback I have heard several amateurs on 80m nets saying how impressed they were by the cadets' operating skills and interest in the stations they worked. I hope that similar events can happen again to the benefit of both groups." – Frank, G3WMR

"I heard an amateur calling CQ over the top of an MRE station already using the frequency – presumably regarding it as interference rather than the Primary User." – Richard, G4DYA

Worth a note is that websites overseas published the details of Exercise Blue Ham, in America, Germany, and Holland so there was a wide audience of listeners as well as operators.

Planning another Exercise

A special mention goes to Cdt Sam Brooker for the amount of contacts he made during his period of radio operating in the station (1000hrs to 1800hrs on the Saturday and 1000hrs to 1200hrs on the Sunday). Cdt Brooker is a holder of a ACO Silver Communications Award so was able to put his radio training to good use by talking to amateurs and other Cadet Force stations.

On the following Monday No 1132 (Stalham) Squadron HQ were pleased to receive a visit by the Central & East Regional Radio Communications Officer – Flt Lt David Webb, RAFVR(T) in which he discussed how the Exercise went and how successful it was for the Team involved and listened to the feedback and comments which could be valuable for the future planning of another Exercise.

Finally the Organisers would like to thank the effort and time put in by all callsigns to participate in this unique Exercise to celebrate the ATC's 75th Anniversary year.

Flt Lt David Webb, RAFVR(T), 2E0DIP
radio.ce@aircadets.org

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Barnaby Festival Launch

I think it's fair to say that you don't get many days in work like this – sending a weather balloon into space!

I work for an IT consultancy called Hi-Impact, based on the Wirral. Part of what we do is run workshops for primary school children on various aspects of computing, animation, programming, robotics, photography, electronics and much, much more. One of our flagship projects involves a high altitude balloon (HAB) launch. We also use this as an opportunity to teach the children about space travel, the physics of space, payload design, and weather – we even get the children to run the predictions on where their craft will land. We attach some small 'experiments' to the craft, usually involving foods and other such objects, to see how they would survive the conditions.

Holding onto the craft before lift off.

The HABDuino

I was aware of the HABDuino prior to starting at Hi-Impact and we made it a plan to add it to a future HAB launch [1].

An email landed in my inbox on my first day from Georgia in our Media Team (and who also runs our Arduino workshops) "Hope day one is going great! The HABDuino is here, do you want to come and have a look at it?" I went over and picked it up off her desk, along with all the other attachments that came with it. Luckily I had read up on the HABDuino, so I knew what I was in for.

For the uninitiated, the HABDuino is an Arduino shield. It attaches to an Arduino UNO and provides a frequency-locked (434.650MHz) temperature compensated Tx, outputting 10mW. As we're not allowed to run Packet from an unmanned craft, RTTY is the data mode of necessity here.

I took the HABDuino home and got it going on the bench. Georgia had already loaded the necessary code into it and I said I'd report back once I'd got it going and understood it all. A few days later, I sat down with Georgia, the HABDuino, my FT-817 and a laptop to explain how it all worked. Speaking to her now, she admits that she was impressed even if she didn't understand it all!

We had a fair few launches planned, but due to schedule clashes we couldn't get the HABDuino on board. One Friday afternoon some months later, Alan (our MD) asked if I could get the word out that we would be putting HABDuino on a launch that was linked to the Barnaby Festival in Macclesfield in a few weeks. I gladly accepted the challenge, and set to work.

Having had some marketing experience as well as having been a club chairman, I figured I was skilled enough to take care of the promotional side (I'd written plenty of press releases over the years!). Firstly GB2RS, I asked the editor if I could have our news item placed in the National News section – yes. Next was Southgate and then the UKHAS Mailing list and Facebook/Twitter.

I also put the word out in my district (61) and emailed Ceri, our Regional Manager, so that word could go out as far and wide as possible. In hindsight, I should have also emailed Region 5, but in the end, it probably wasn't necessary.

Over the final week I watched the news story pop up on the various news sources, on Twitter, Facebook, and more – I was quite surprised to hear our story as the lead item on GB2RS the Sunday before.

Given that some amateur radio news sites take their feeds from RSGB and Southgate, it was quite surprising to see the story pop up for an amateur radio club in Eerie, Indiana, during a check of how well the promotional side had gone a few days before.

The two weeks before were just as much of a technical blur – changes to code, flight documentation, payload configuration. It all had to be written and tested before it could be approved for adding to HABHUB's flight database. A final check a few days later and I was confident everything was ready. I handed everything over to Alan and Simon (who handle the logistics for our flights) for them to build the HABDuino into the payload.

Launch day

Alan, Simon, and Georgia were on site before me. The HABDuino was ready, I had my FT-817, laptop, 2/70 magmount, UHF Yagi and a handheld with me, and an additional battery pack for the FT-817, so I was well prepared. The plan was to use the handheld in the event we had tracking issues by (hopefully) enlisting other amateurs to help.

I helped the team run through the various

pre-launch stages and tick off the parts on our checklists. The schoolchildren arrived about 30 minutes later and we were busy right up until the launch. We'd done this many times before and the process was, by now, very slick and well-rehearsed – we had everything ready in plenty of time.

I set up my monitoring station and got *FL-DIGI* ready to decode.

We fired up the HABDuino, which was now encased in an iPad box, along with our other tracking equipment and experiments on the payload. It got lock within about 90 seconds and, despite a poor phone signal, I managed to get the data uploaded into the Tracker. I would later discover that I probably only uploaded data for about the 10 minutes or so prior to launch, but luckily by then other people were already listening for us.

We had to delay our launch slightly, due to the RAF needing the airspace (we were near Welshpool Airport) but not by much.

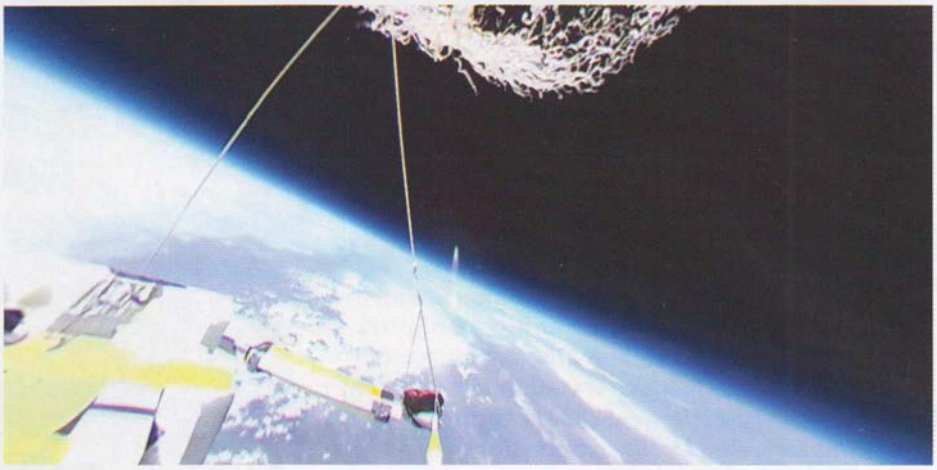
Much like NASA, non-essential staff cleared the launchpad, Alan did the final countdown with the children and everyone let go on cue. The craft drifted off into the clear blue skies. He had purposefully under-filled the balloon in order to reach a record altitude for us (usually we over-fill to get the craft up and down relatively quickly, but this means less altitude). With low wind and a nearby landing destination predicted, we wanted more altitude this time to see how the video footage compared. The FT-817 continued to decode the signal for some time, I left site about an hour after the launch, but I still had a decodable signal the entire time.

Oxygene in space

2016 marks the 40th anniversary of Jean-Michel Jarre's debut album *Oxygene*. For this anniversary, his team are putting a book together of artwork, photos and anything else *Oxygene* related, they have asked the fans to contribute. I got wind of this via one of the fan forums and thought I'd take a chance and emailed JMJ's management to ask "what if we could send a copy of *Oxygene* up into space and photograph it?" The reply came back a few days later, "That's a great idea!" We even had a similarly enthusiastic reply from Jean-Michel himself!

I called Alan and explained it all to him. He thought that this was an amazing opportunity given that JMJ is performing at Jodrell Bank as part of the Bluedot festival in July (which isn't all that far from the schools we were working with for the Barnaby Festival).

I donated an *Oxygene* CD and this was attached to one side of the payload with a GoPro duly positioned to show the CD and the skies below. We would later discover that we'd got the shots required and we were even asked if we could send the video over. We look forward to seeing our imagery in the book and perhaps in some other creative guise during a concert...



The balloon bursts...

The chase

We also had another Alan working on the project on the day back at the office, monitoring the SPOT and phone GPS trackers, the HABDuino and watching the Tweets and Facebook messages from the team and everyone else on site. Fifteen minutes or so later, everyone except me left the site and the chase got underway as we'd had the first reports in.

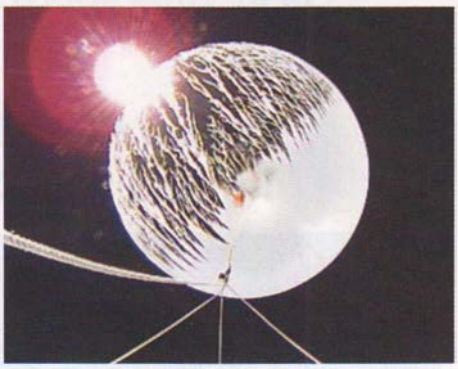
I left site, but almost immediately hit a problem – sketchy mobile phone coverage! I had to drive until I had a signal. I headed to one site, but it looks like the team had left by the time I got there. I actually missed the whole thing! On previous launches I had been part of the chase team and we'd travelled as one, so it wasn't a problem. Alan in the office luckily had phone contact with the chase team and guided them to the landing site almost in time to witness it landing after a lengthy flight to over 30,000m (100,000ft) above the Earth. The craft was picked up very quickly in a field near Lydbury North. I had driven through there but the team were in a side lane, so I didn't see them!

The data

I found a spot to get a mobile signal and called in, eventually arranging to head back to Chester to dissect some of the data and check footage. Turns out the HABDuino worked far better than we'd ever hoped for. Looking through the logs we'd had people logging it in Holland and, speaking to Simon, he'd heard that the HABDuino had provided the most accurate data of all, even showing when the balloon had burst by animating the balloon dropping from the sky. The team were on site minutes after the balloon had landed: it is probably the quickest retrieval we've ever had. Everyone was very impressed with how well the HABDuino worked and it's fair to say we'll be using it again.

The future

There are so many ideas - where do we go next?



The moment the balloon burst.

I'd really like to try SSDV, we may even go with the PITS (Pi In the Sky) Board and make it do a lot more. I've even discussed sending it up with some SETI data, so we crunch SETI data at the edge of space. We might also try WSPR.

Thanks

Finally a big thank you to the following: the editor, who kindly let us hijack the national GB2RS news for our first HABDuino launch, everyone at Southgate ARC and every other news page that featured us (too many to list!), everyone on the UKHAS Google Group, Dave Akerman, all the schools involved and, finally, the team at Hi-Impact: Alan Thompson (who looked after the balloon and payload), Simon Sloan (additional Balloon/Payload Support), Georgia Flynn (photography and additional support) and Alan Crist who was watching the screens and directing the chase back from the Wirral.

Websearch

[1] http://www.habduino.org/

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Radioworld

sales@radioworld.co.uk
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"Awesome rig to look at, but it is even more impressive "under the hood"

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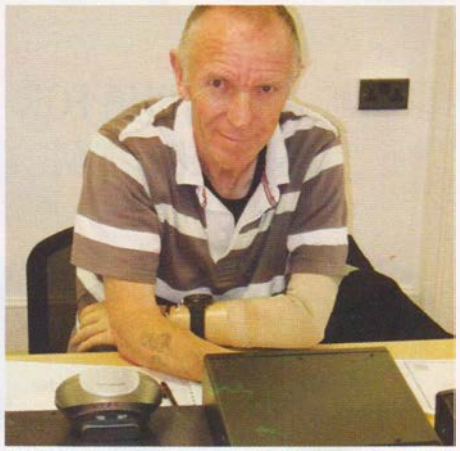
Museums on the air

Many clubs take the opportunity in June each year to set up special event stations at local museums.

The second activation of GB100NWA by Loughton & Epping Forest ARS.

The first weekend activating GB100NWA.



Chris, M0KTT with Horndean & District ARC.

Horndean & District ARC

For the first museum weekend activity, Horndean & District ARC operated GB2WRM from the World War One Remembrance Museum at Fort Widley, which is located on Portsdown Hill, near Portsmouth. Like last year, they were fortunate to be offered space within the museum by the owner/curator Charles Haskell, who they thank very much.

HF was operated from the museum and as they also had a club site up on the parade ground at the Fort, they operated 2m from a gazebo set up outside the club caravan, using a collinear on top of a 30 foot mast. Portsdown Hill is about 400 feet above sea level. Radio conditions on HF on the Saturday were poor with weak stations and heavy QSB, but 2m did slightly better with the best distance contact being GB0SNB in Essex. Sunday was a bit better on HF, but overall only 47 UK and near Europe QSOs were made over the two days, of which 12 were with other UK museums. It was hard going.

For the second weekend they operated GB0RMM from the Royal Marines Museum at Eastney, Portsmouth, very close to the sea-front. Again radio conditions were very poor, and they had some HF antenna problems initially, which were solved by the station manager bringing into use a Windom antenna he had just bought. The HF station made only 43 QSOs over the two days, including 7 museums, and the VHF station made 22 QSOs. The museum is moving in 2019, so next year might be the club's last time with GB0RMM from that site.

QSL cards for GB2WRM and GB0RMM can be requested via the bureau, or via G0FYX.

Loughton & Epping Forest ARS

Loughton and Epping Forest ARS activated North Weald Airfield with GB100NWA. The call is in recognition of this historic airfield's 100th anniversary. Currently a civil aerodrome, it enjoys lots of activity with a mix of private and commercial aviation and hosting a range of other events including the Wings and Wheels model event, regular Saturday markets and Driving Experiences. The airfield's claim to fame includes being the base of No 39 Squadron in 1916. This Home Defence squadron was formed to defend London against the German Zeppelin airships. The first success for the Squadron since moving from Sutton's Farm to North Weald was on the night of 1/2 October 1916 when 2nd Lieutenant Wulstan Tempest shot down Zeppelin L31, commanded by Kapitänleutnant Heinrich Mathy. The Zeppelin flagship was brought down at Oakmere Park, Potters Bar, killing all twenty crew. Tempest was awarded the DSO.

The first activation of this special commemorative callsign was during both International Museums Weekends. The first Museum's weekend coincided with the Air-Britain annual Fly-In at North Weald, which meant that if the bands were dead there would at least be some aircraft to see and a number of traders and exhibitors to visit under canvas. Over 30 club members attended during the course of the weekend, making it the best attended event in recent history. It included some of the more recently licensed club members. Serious damage was avoided on the Sunday as a neighbouring tent that was not pegged or stayed took off in the keen wind, and was only stopped when it hit the club's antenna mast. It showed how sturdy the self-supporting tower was as it stopped the progress of the 16ft marquee and prevented it causing damage to a large number of vehicles that were parked nearby.

The second activation took place on 25 and 26 June. The first day was virtually abandoned due to heavy electrical storms in the area. The second day was much better with a stiff breeze but sunny conditions allowing 'al fresco' operations to take place. Due to the bad weather the previous day, it was decided to operate in the open, but to be prepared for a quick retreat to the shelter of the minibus should they get caught with a shower. With many club members away this weekend, there was many fewer helpers (only 10), but the QSO rate was much better with 40m becoming very busy.

In total over the two weekends they added 191 QSOs on HF and 56 QSOs on VHF, with 25 registered museums worked. Not many of the contacts were '5/9 73' QSOs, as the club likes to talk to the stations that call in.

Elaine Richards, G4LFM
radcom@rsgb.org.uk

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Morse...

What is the point?

Just what is the point with an archaic old mode like Morse in today's modern communications?

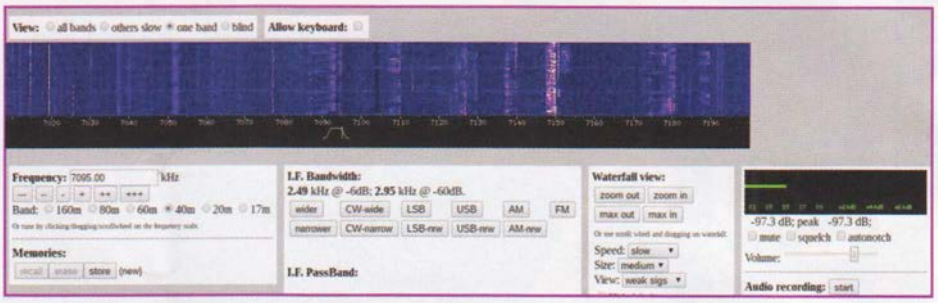

FIGURE 1: A screenshot of 40m (see text for details).

We all now get a basic introduction to Morse in the licence training courses but it is just that, a basic introduction, yet all the new modes coming along like D-Star, C4FM etc also get lovely explanation articles in the technical press to help us understand the new modes and the manufacturers promote their powerful new technology.

No wonder new is generally seen as better than old. What I'm going to do here is treat Morse as if it was a spangly new mode and give it the equivalent big sell.

This is meant as an interactive article... don't just take my word for things. Investigate for yourself as your read.

Using SDR

First have a look at a band – take 40m as an example. Do a web search for 'web SDR' to find the online Software Defined Receivers you can play with that allow you to experiment with the filters to see their effects. One of my favourites is Web-SDR.org [1] and on it I tend to choose to listen to the Hack Green SDR at the Cheshire nuclear bunker museum [2].

Figure 1 is a screenshot of 40m. The fuzzy vertical bands, centre and right, are the individual SSB signals and the narrow dotted lines on the left are the Morse (you can interactively tune a webSDR by mouse dragging the yellow filter cursor on the black ribbon to under whatever you want to listen to).

Spectral efficiency

Look at the width of the vertical lines. Generally, SSB is around 2500Hz wide, hence you can get a certain number of them into a band before they start to overlap and cause problems to each other. Now look at the dotted Morse lines on the left. You can happily get Morse through in just 250Hz of bandwidth so you can get significantly more Morse users in a band compared to SSB.

Signal to noise ratio

For understanding a communication, a good signal to noise ratio is more important than just signal level alone. View this another way, for a fixed signal level you can improve its reception by reducing the noise received. The amount of noise received depends on how wide your filter is (but you cannot reduce your filter to narrower than your signal's bandwidth).

Let's have a play with this idea online using the software defined Rx mentioned previously [2].

First check that the mode is set to USB or LSB as appropriate for the band and have a listen to a sideband signal. Next, leave the mode as LSB or USB but listen to a Morse signal on the left hand side (LHS) of the display by pulling the yellow filter marker across to the LHS Morse signals. Remember how noisy this is (it is worth doing this for both a Morse signal 'out by itself' with no other close signals and one with close-by users).

Now leave the frequency cursor where it is and mouse click from LSB to CW to CW-narrow in the IF bandwidth menu and listen to the noise drop as you reduce to the CW bandwidths (you might have to slightly move the frequency cursor to optimise the Morse signal within the new filter bandwidth as with being set initially in a wideband (SSB) position it may not have been perfectly peaked for Morse use).

You will also notice closeby Morse signals that were in the original SSB bandwidth dropping down too.

As you drop from sideband to Morse bandwidths you will also see the SDR yellow filter cursor get narrower to match the bandwidth covered. It will go from a wide square wave to a much narrower trapezoidal shape.

The noise picked up in 250Hz of Morse bandwidth is obviously significantly below that received in 2500Hz of SSB filter bandwidth.

Intelligibility

For example in SSB say the letter C (or could that have been B or V or G or E or D?... try saying them all keeping your teeth clamped together and just using your lips to voice

PHOTO 1: An entire station – aerial, power, rig, key and phones – that can easily be carried in your pocket.

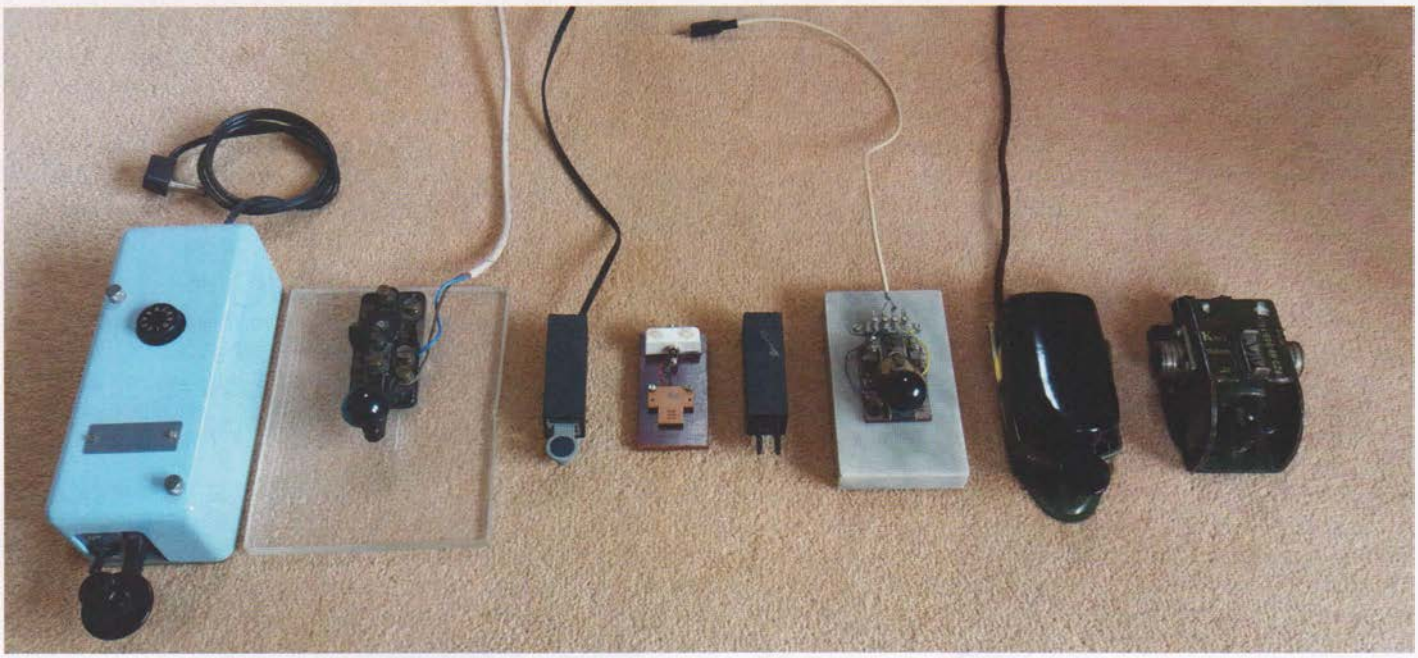

PHOTO 2: Collecting more CW keys than I can reasonably justify... guilty as charged, M'lud.

them... even this slight distortion leaves them all sound incredibly similar and easy to mis-hear when receiving). This often leads to needing to resort to phonetics 'Charlie' in the speech modes.

Here you are listening for the speech's Level (up to a peak hence the average is less) and its frequency and its intonation. All pretty complex.

Morse is much easier to understand as it is simply keying for a full on or full off carrier, be that a crisp Dah de dah dit or a distorted Bah be bah bip or a buried-in-the noise Haaaash quieter Hash quieter Haaaash quieter Hash.

Your brain's inbuilt signal processing can still dig it out and understand it as a C. Resorting to phonetics is simply not needed in Morse.

Combining effects of all the above (reduced noise and improved intelligibility) can give Morse about a 10:1 advantage over SSB.

There are two ways to look at this.... If you have an existing 100W radio then simply switching from sideband to Morse will give you a performance boost equivalent to switching on a 1kW amp for your sideband signal. Alternatively if you want go portable to the top of a hill then for equivalent of 100W SSB performance you can drop to 10W of CW power.

Battery duration

Given that Power $=I^2R$ and battery capacity is measured in ampere hours, dropping from 100W of SSB to 10W of Morse for portable roughly reduces to a third your Tx current draw. You then have the option for lugging significantly lighter 'CW batteries' to the top of the hill compared to 'SSB batteries' or, conversely, if you already have the battery then as you back your power off it can last much longer for you on CW compared to sideband.

There is another effect that can come into play here... the efficiency of CW only rigs compared to multimode or sideband rigs.

A quick question and aside here... you will be fully aware of linear amplifiers, which are equally good for sideband and Morse, but have you ever heard of non-linear amplifiers?

Linear means straight line. You put 10 watts and get, say, 100 watts out. If you put in 20W you will get 200W out. Similarly 11W in would give 110W out. This straight line relationship is essential to sideband (or AM) where the amplitude distribution across the modulation cycle is critical. Even a bit of non-linearity say with 'flat topping' a bit on your speech peaks will be catastrophic on SSB with your signal starting to splatter over the band and making you very unpopular with other users. Output filtering will reduce the problems on the harmonic bands but it doesn't help the splattering around you on the same band. For SSB you *must* be linear for a clean signal.

Morse on the other hand is simply on or off of the full carrier and linearity doesn't really matter. Non-linear output stages can be used for CW and the output slugged with big filters to clean up any harmonics and they don't have same splatter problems when used for Morse compared to SSB.

Non-linear amplifiers can be made to be more efficient than linear amps (they are good for FM too, which is also amplitude independent and this immunity to splatter was one of the one of the reasons why Ofcom went for FM CB rather than AM CB in this country).

Take a relay for instance with a 5V coil (say 50Ω coil impedance) and say 500V DC on its output contacts feeding a 50Ω load. If I switch the coil on and off once per second I'll get 500V doing the same on/off rate on the output. This looks just like an amplifier... 5V square wave in, 500V square wave out. If I put 4.5V in I'll probably still have enough oomph to switch the coil but I'll still get 500V out. Similarly if I put 5.5V in I'll switch the coil without burning it out but still only get 500V out. Amplification but totally non-linear. The thing is that the whole process is very efficient as the only power lost in this 'amplifier' is the half watt in the coil (remember that $P = V^2/R$ so $(5x5)/50 = 0.5W$ 'in' compared to the $500x500/50 = 5kW$ 'out', so this is over 99% efficient.

Unfortunately relays will not switch fast enough for say 14MHz operation but FETs will. They do take a bit of power each time they switch on and off and their drain to source resistance isn't totally zero when on, but they can still be made into much more efficient non linear amps than 'linears' can ever be.

The upshot of this is that dedicated CW only rigs (like MTR5 from LNR (Kanga in this country)) can be even more power efficient than equivalent power multimode or SSB-only rigs, so portable batteries last longer.

Ian Simpson, GM0SIM
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Even down to practically running from just a PP3 9V battery.

Cost of getting on this new mode

Fortunately most modern rigs already have this 'new' Morse mode provisioned so there should be zero cost there. On SSB if you want to aim for professional quality audio then something like a Heil mic can cost you over £100. If you want similar professional quality for Morse keys the sky is still the limit for beautiful keys that are as much works of art as they are keys (just look at the likes of Begalli or Vibroplex) but for a simple, no nonsense key you can happily start around £25 for an unused 'new old stock' Czech Army Morse key.

If you have a newer rig with DSP then these can generally 'dial in' any narrow CW audio bandwidth that you want to minimise the noise. If you have an older rig needing crystal filters to optimise Morse Rx bandwidth then these can, unfortunately, be quite expensive (£120 for an CW IF filter for a FT-817), however a cheaper initial option that gets you 'most of the way there' is just to stick a narrow band audio filter in line with your headphones (for example the likes of a hy-per-mite 200Hz bandwidth audio filter ($35 from 4 States QRP club **[3]** and **[4]**). In some ways this can even give nicer audio out than an IF crystal filter because it has no 'ringing' effects because of the lower Q.

More bands for you

10MHz, is a civilised, contest-free band. It's open more often than 20m and combines the best points of 20m and 40m. I think it's a peach of a band, it's closed for SSB but open for Morse.

Full QSK

We have all 'doubled' at some time using SSB or FM accidentally talking at the same time as your target station. On AM, FM & SSB when you are transmitting you are deaf and not receiving. Some Morse equipment has 'full break in' mode whereby fast Tx switching means you can actually still hear the band during the spaces between your Tx dits and dahs so doubling is easily avoided. Effectively you are still listening while you transmit.

Training

OK, I won't deny it. SSB is much easier to learn compared to Morse, which has a pain of a learning curve but I think it is worth it. Check out **[5]**, a 10 year old American girl on YouTube demonstrating Morse and keys. Morse is nothing to be feared.

Alternatively... many new rigs, like the Elecraft KX3 or KX3, will read the Morse for you and display it on their screen plus computers can send/receive Morse too. Traditionalists will be turning in their graves here and going apoplectic with rage but hey I said Morse was a new *datamode* and keyboard sending is OK for that to give you access to the advantages of power and spectral efficiency etc. If you start using it this way I also guarantee you will also soon get lazy for reading the screen and start to recognise the sound of the characters instead for yourself. How do I know this? Back in the 1970s a friend got into RTTY with on old Creed 7b teleprinter (sounding like a diesel cement mixer when running). He was tuning along the band and heard the characteristic sound of RTTY transmission and said "oh that's RY's" (teleprinters used to idle transmitting RYRYRYRYRY to keep themselves in sync and 'reserve' the frequency from others jumping in). He turned on the Creed and sure enough the RY idle sequence was displayed. He certainly couldn't read all RTTY by ear but had started to recognise certain sounds by ear. You will quickly start to do the same hence even if you are going to upset the purists it is worth giving Morse a go this way to help move you on the traditional approach later.

A full station

Morse equipment can be as complicated as you like (as per any other mode), but one of the nice things about is that because of its effectiveness, efficiency and simplicity it can be pared down to an absolute minimum and still work.

Photo 1 shows an entire station including aerial, power, rig, key and phones that can easily be carried in your pocket.

Warning

I do have one word of warning. Morse keys tend to be beautiful pieces of mechanical engineering and good talking points. It is all too easy to find that collecting Morse keys can become addictive, **Photo 2**. *Mea Culpa*!

Summary

There is an interesting parallel here. Back in the late 70s and early 80s when old piston-engined RAF Avro Shackleton maritime patrol aircraft were being replaced with the new jet engined Nimrods, the old squadron had a motto that beautifully captures the Morse/SSB debate... 'Old age and treachery will triumph over youth and skill'.

Based on all the previous points CW can up-stage traditional SSB more often than not. Just consider it to be an elegantly simple datamode. I am convinced that if Morse had just been invented today that it would be released with great fanfare to rave reviews. It may be old but it certainly isn't antiquated or archaic and I would heartily recommend that you give it a try. It isn't as daunting as you may think and is certainly worth the effort.

Dah de dah (...K... an invitation to transmit... and you probably recognise this already from FM repeater hand-overs, so you have used Morse already without realising).

Websearch

[1] http://websdr.org/
[2] http://hackgreensdr.org:8901/
[3] www.4sqrp.com/HiPerMite.php
[4] www.youtube.com/watch?v=pk184CB6RgE
[5] www.youtube.com/watch?v=0DQyLMkSk5I

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By Philip Lawson, G4FCL

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TM3NOI Noirmoutier Island expedition

Noirmoutier Island is located in the Atlantic Ocean, part of south Brittany in the French region of Pays de la Loire, in French department 85: la Vendée.

I live in northern France and got my novice licence in 2008 with the callsign F0FVI, which allowed me to transmit on VHF. I studied for the French technician HAREC licence with my radio club and got my technician licence with the callsign F4FVI in 2009. My main interests are varied but includes DXing on HF, antennas, IOTA and ATV on 23cm.

DXpeditions

I have activated Noirmoutier Island several times (as TM0NOI, TM1NOI, TM2NOI and TM3NOI). This island has many advantages; it is possible to join the island by a bridge or by a path in the sea at low tide; furthermore, Noirmoutier Island is part of the IOTA group referenced as EU-064. Of course, it is not a 'most wanted' DXCC, but experience has shown each activation was a success and logbooks were well filled up.

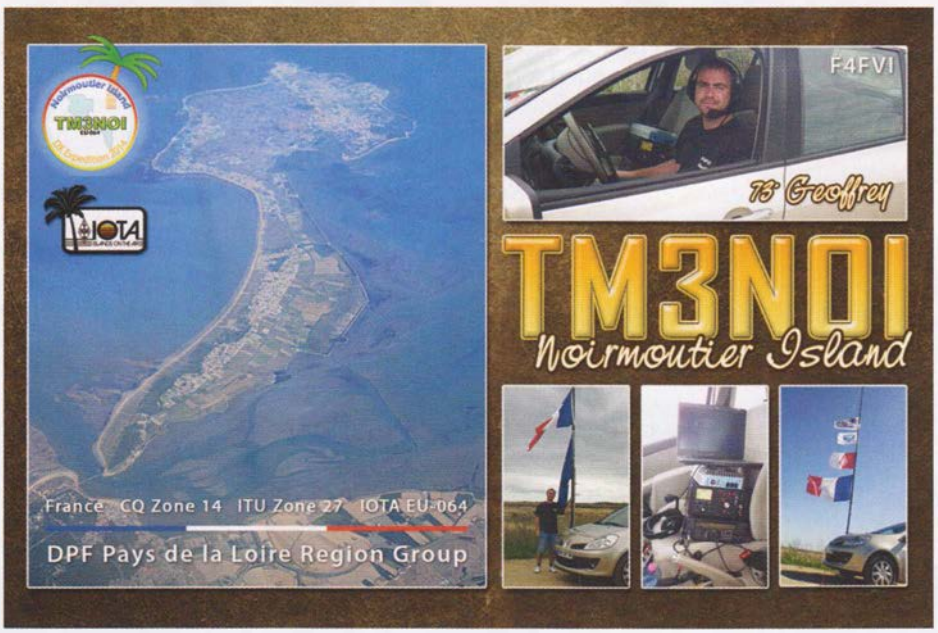
Noirmoutier Island is an ideal DXpedition spot for beginners and especially for young operators for a number of reasons. You don't need a boat to get to the island, it's easy to transport your station and with all the salt pans and salt water, it's ideal for vertical antennas. The island has about 10,000 inhabitants and measures 49km², so it is big enough to find a place to set up a portable station without much of a problem.

Planning

Planning your first DXpedition to Noirmoutier Island means sorting out the equipment you will need because you don't want to have to get back to the mainland to pick up something you have forgotten. The fact that you *can* go back makes it an ideal first timer DXpedition spot. You have to think about the antenna system, mast, transceivers, power supply (battery or generator) as well as food, accommodation, local authorities...

Calling from this IOTA reference is quite different than calling from your home QTH.

The bridge between Noirmoutier Island and the Continent.



QSL card for TM3NOI.

Now you are a searched-for station and it will be necessary to deal with different kinds of pile up. This kind of expedition is instructive because it teaches you how to manage a pile-up – but not too *large* a pile-up – and demonstrates the importance of listening on the radio for calling stations.

Different solutions can be applied depending on the nature of the pile-up; for a little pile-up, getting one or two letter of a callsign is enough to catch a station, for a bigger pile-up, it is possible to divide it by zone or country. I found it very efficient when I got a Spanish pile-up on 40m during one hour as TM2NOI to work them by the number in the callsign, for example 'QRZ callsign with number 2 only'. For very big pile-up the split system can be used; transmitting on one frequency and listening on a precise frequency range 'QRZ listening 5 to 10kHz up/down".

On Noirmoutier Island, I often divided the pile-up by number quite successfully, which gives everyone chance to work you. I was working through a huge pile-up from Europe when I heard a weak station calling "please listen South America". So I said: "Please Europe stand by, QRZ outside Europe" and I worked a QRP station from Brazil S4 and a few Northern American and Japanese stations that were a bit too weak to break the European pile-up that was coming in sometimes at 20 or 30dB over S9.

This kind of small scale DXpedition also allows you to see and learn how the propagation works on HF. All my activations of Noirmoutier Island, whether on my own or with others, have been in the summer months. Choosing the right frequencies at the right moment is important. I found that the 10m band required good openings to be much use, the 15 and 17m bands were mainly open during the daylight and gave good opportunities of DX with Asia and Middle East (15m) and Eastern Europe (17m) from Europe. The 20m band was open nearly all the time; during the day it was mostly Europe whereas during the first part of the night US stations were heard more easily. So it was very interesting to jump on 20m a few times during the day to get the best of the propagation on this band. The 40m band allowed me to work local HF (350km – 1500km) depending the time. But the 80m band was quite different for several reasons, first of all, on a technical note, because the antenna starts to be very big, and for /P, often very close from the ground (but that can be balanced by the good salt water reflection near the sea coast), and the hours of darkness are few during the summer. Activating for a minimum of a complete day and night on the island will show to beginners the evolution of radio waves propagation – at least it did for me.

When planning a DXpedition, albeit a small one, further preparation beyond equipment is needed. In order to be chased, you will need to publish the information about your activity in enough time before the expedition and on the most diversified network possible. One or two months before the activity is usually enough. You can use a variety of methods; national society, local clubs, weekly or monthly magazines or via the internet on blogs, DX website etc. What is really important is to create a dedicated webpage for the activity and use websites like QRZ.com so people can find all the information needed. Make sure you include location of the island, locator, equipment used, operator name, QSL information (bureau, direct, electronic, online logbook...).

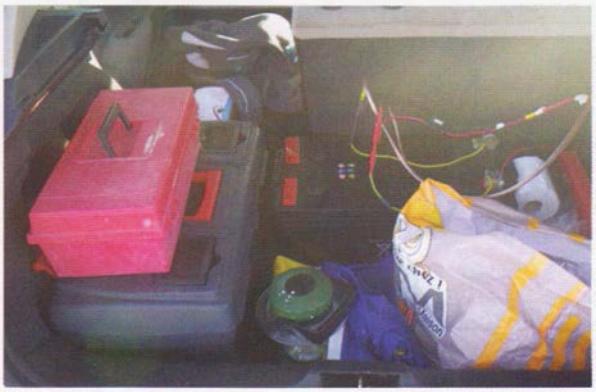
Learning to QSL

All that bring us to talk about the post-expedition period with the management of QSL cards coming by bureau, direct or internet. The electronic QSLs are the fastest and easiest way to answer like with eQSL, or Logbook of the World (LoTW) because they are free and operators receive them nearly immediately. Club Log can be useful allowing contacts to request a QSL card without sending one to you. Be careful if you say QSLs via the bureau or direct because you *will* receive cards. If you don't want them, just to send cards, say so in your publicity. If someone wants a card posted directly, you will need them to cover the direct postage with a self addressed envelope with a contribution of €1 or $2, especially for world wide delivery.

Having clear instructions on the website will save you a lot of time and will allow you an easier management of the QSL cards. QSL card management also requires you to decide are you filling them in by hand or using software to produce stickers.

My main mistake was to think that I would have received all the QSL cards very quickly, but that was far from true. Today, I still receive QSLs from 2008! So you need to work that fact into your planning. Make sure you have QSLs from previous years available.

Radio station used for TM3NOI in the car.



All the material packed in the back of the car with the battery.

Try for yourself

Crossing the bridge that connects Noirmoutier Island to the continent allows you to jump into a new dimension of amateur radio for beginners or young operators. It is really an educational bridge for self-improvement in the hobby. I'm sure it's not the only easy-to-reach DXpedition location but I hope you think about it.

Geoffrey, F4FVI
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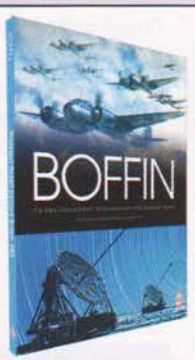

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3 Abbey Court, Priory Business Park, Bedford, MK44 3WH. Tel: 01234 832 700 Fax: 01234 831 496

HF F-Layer Propagation Predictions for September 2016

Compiled by Gwyn Williams, G4FKH

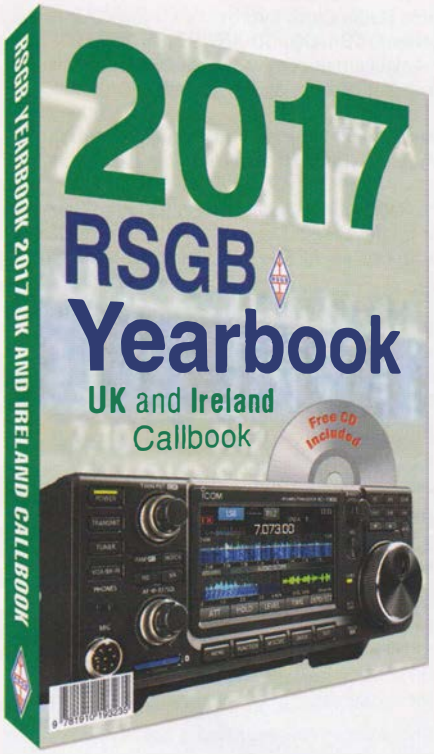
	3.5MHz	7.0MHz	10.1MHz	14.0MHz	18.1MHz	21.0MHz	24.9MHz	28.0MHz
Time	000011111220	000011111220	000011111220	000011111220	000011111220	000011111220	000011111220	000011111220
(UTC)	246802468020	246802468020	246802468020	246802468020	246802468020	246802468020	246802468020	246802468020
*** Europe								
Moscow	651.....1566	45421.124666	125333345632	..35444552..	..12333221..	...122211...	.....11.....	.....
*** Asia								
Yakutsk	221	.21.....1333	..1......1..	....1.....	.....	.....	.....	.....
Tokyo	........22..	.......2331.	.....11222..	....11.....	.....	.....	.....	.....
Singapore	........222.	34421	......2343..	......2331..	......111...	.....	.....	.....
Hyderabad	1.......2333	2......23443	.......3342.	......12....	.....11.....	.....	.....	.....
Tel Aviv	53......1555	553....14555	13521.135552	..53333452..	..1222222...	.....	.....	.....
*** Oceania								
Wellington	.....	.......23...	...122213...	...1111.....	.....	.....	.....	.....
Well (ZL) (LP)	..1.....	.24.....	124......211	..2......21.	.....	.....	.....	.....
Perth	........111.	.......2332.	......12321.	......11....	.....	.....	.....	.....
Sydney	........11..	.......333..	......2322..	.....111....	.....	.....	.....	.....
Melbourne (LP)	.....	..12.....	..13.....	...2.....	.....	.....	.....	.....
Honolulu	.....	..21.....	...11.....	.....	.....	.....	.....	.....
Honolulu (LP)	.....	.....	.....	.....1...	.....2...	.....1...	.....	.....
W. Samoa	.....	...1.....	...1211.....	....121.....	.....	.....	.....	.....
*** Africa								
Mauritius	2........322	3......14543	1......34421	.......332..	.......12...	.....	.....	.....
Johanesburg	23.......333	23......4543	.2......5531	.......2441.	.......232..	.......12...	........1...	.....
Ibadan	545......445	5552....2555	52531..13555	..342123452.	...4323343..	...2111241..	........1...	.....
Nairobi	33......1333	441.....3444	112....14442	..21...244..	...111234...	.....1...	.....	.....
Canary Isles	6651.....466	66641...2566	636532234666	212544445632	...65555561.	...3433353..	...1222232..	...1111121..
*** S. America								
Buenos Aires	222........1	333.......23	2111.....132	.........21.	.........1..	.....	.....	.....
Rio de Janeiro	333.......23	434......344	322......432	.........42.	........13..	........11..	.....	.....
Lima	222.....	3222......12	1..2......21	.....	.....	.....	.....	.....
Caracas	3331.......3	3333......24	1..11.....31	....21...2..	.....1...	.....	.....	.....
*** N. America								
Guatemala	222.....	3223.......2	1..2......11	.....	.....	.....	.....	.....
New Orleans	3331.......1	3132.......2	.....	.....	.....	.....	.....	.....
Washington	4443.......3	44422.....23	....21..1122	.....21112..	.....1...	.....	.....	.....
Quebec	3442.......3	322.......23	....1...112.	.....11112..	.....	.....	.....	.....
Anchorage	.....	..2.....	.....	.....	.....	.....	.....	.....
Vancouver	.13.....	..2.....	.....	.....	.....	.....	.....	.....
San Francisco	.22.....	1121.....	.....	.....	.....	.....	.....	.....
San Fran (LP)	.....	.....	.....	.....	.....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 September, October and November 2016 are respectively (SIDC classical method – Waldmeier's standard) 30, 28 & 27 and (combined method) 47, 48 & 49. The provisional mean sunspot number for July was 32.5. The daily maximum / minimum numbers were 69 on 15 July and 0 on 1, 4, 25-27 July.

RadCom

Book Review

September means only one thing – Yearbook!



For many years the *RSGB Yearbook* has been an indispensable operating aid for the well-equipped shack. The updated 2017 edition continues that fine tradition and includes an updated CD of additional bonus material. My sole disappointment is that a few typos have crept in here and there, along with some uneven typesetting that is quite uncharacteristic of other RSGB publications.

The *Yearbook* is packed with useful information, and it contains something for pretty much everyone. Many people find the complete UK & Ireland call book indispensable, making it easy (among other things) to QSL direct.

There are 176 pages of useful operating and Society information ranging from a description of what the RSGB actually *is* and a quick trip round the Society's headquarters building, through to descriptions of the services and benefits the Society offers its Members including the QSL Bureau, planning advice, EMC matters, and licensing. A large proportion of these pages are devoted to operating matters, with sections on contests, propagation, satellites, data communications and repeaters, to name but a few.

Let's take a look at some sections at random. The RSGB QSL Bureau part describes what Members can expect from the Bureau, how to use it, tips and tricks, and – most importantly – includes a list of the Sub-Managers. The RSGB Online section will probably be a bit of an eye-opener to some, too: there's a good list of some of the RSGB's many online services, ranging from our social media / YouTube details through FAQs, contacts, the club, course and events finders, technical help, forums, archives and much more. Repeaters, datacomms, weak signal work, CW, satellites – it's all there.

Every year all Affiliated clubs are invited to submit information for the *Yearbook*. Around two dozen are featured in the book itself, and all submissions are included on the accompanying CD. Speaking of which, the CD also contains four newly-released RSGB videos:

- GB1SS Schools Calling Tim Peake
- 21st Century Hobby – Youth Video
- Amateur Radio – A World Of Possibilities
- The RSGB Volunteers video

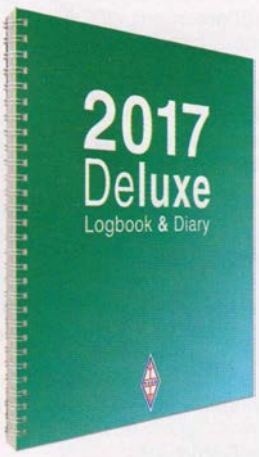
It also contains sample chapters of several RSGB books and (perhaps most importantly) all of the Information pages I've been discussing.

The second, and largest, part of the *Yearbook* is the all-important Callbook information. Generated directly from the information in Ofcom's callsign database, it lists all UK amateur radio callsigns that were valid at the time of preparation. Most include name and address details, but there are a few 'details withheld' in a separate section. There is also a postcode-based reverse callsign lookup so you can find out who's in a given area. There's also a listing by surname. Permanent Special Event and Special Contest Callsigns are also listed.

The *RSGB Yearbook 2017* is an excellent reference work that fully a deserves a place on any discerning amateur's bookshelf.

ISBN 9781 9101 9323 5, 544 pages, 210 x 297mm
Non-Members' price £19.99, Members' price £16.99

Deluxe Logbook & Diary 2017



The Deluxe Logbook & Diary includes a DXCC prefix list, locator map, QSL bureau information (with a list of QSL managers), UK band plans, details of Ofcom, GB2RS, repeaters, the RSGB Contest list – and more. And of course it has an extensive amateur radio station log section as well so you can record all your contacts. A nice feature is that it is spiral bound so it lies completely flat on the table, which makes it that bit easier to record your contacts. At the same price as the regular RSGB logbook, the Deluxe Logbook & Diary represents excellent value.

Non Members' price £4.99
Members' price £4.24

Callseeker Plus 2017

Supplied on CD or memory stick, this is the perfect way of looking up European callsigns, or to search on name or location. It requires no internet connection or even installation space on your PC yet coverage includes 9A, DL, EA, ES, F, HA, HB9, I, LX, LY, OE, OH, ON, OZ, SM, SP, SV and Z3. Navigating through the search results is intuitive and several print options are available, including straight to an address label.

In addition to the call information there is a PDF of all 176 *RSGB Yearbook 2017* Information pages, four RSGB videos and a host of other 'extras' from across Europe.

Non Members' price £16.99
Members' price £14.44

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

Please send all news reports and future events to radcom@rsgb.org.uk. For future events, 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 the October edition is 25 August and for November it's 22 September. For GB2RS, the deadline is 10am on the Thursday of the week of broadcast.

CLUB EVENTS CALENDAR

INTERNATIONAL

Pafos Radio Club, Cyprus
Richard, 5B4AJG, 00 357 97 857 891,
5b4ajg@gmail.com www.cyhams.org
Meets 3rd Thursday at DTs Bar, Pafos. Visitors 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. Radio Officers ARS is a subsidiary of the ROA.

NATIONAL

Amateur Radio Caravan and Camping Club
membership@arcc.org.uk, www.arcc.org.uk
Caravan rallies: Upper Quinton (Stratford)

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 open to those active in amateur radio. Nets: 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
2 80th anniversary planning
16 Demo, John, 2M0JCG
30 Holey Smoke, Marcus,GM4LVW

Cockenzie & Port Seton ARC
Bob, GM4UYZ, 01875 811 723
2 Normal club night
23 2m DF hunt. Meet Co-op car park (East) 6.30pm

Livingston & District ARS
Cathie, 2M0DIB, 01506 433 846
6, 20, 27 Training and operating
13 Introduction to contests

Lothians RS
Mike, MM0MLB, secretary@lothiansradiosociety.com
14 LRS President's address
28 Club night

REGION 2: SCOTLAND NORTH & NORTHERN ISLES

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

Aberdeen ARS
Fred, GM3ALZ, 01975 651 365
1 Junk sale
8 70th anniversary dinner
15, 22 Surprise talk/quiz night
29 Construction and on the air

REGION 3: NORTH WEST

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

Bolton Wireless Club
boltonwireless@gmail.com
12 Social evening
26 More verticals inland and by the sea, M0UFC

Chester & District RS
Bruce, M0CVP, 01244 343 825
6 Modern day CW QSOing, Keith, GW4OKT
20 Transceiver project update, G4FVZ & GW4OKT
27 Social media and us, Graham, G7NEH

Furness ARS
Chris, M0KPW, furnessamateurradio@outlook.com
5, 19 Social meeting, Farmers, Newton
11 Tour de Furness
14, 28 Presentations – HPSSC, Barrow
24, 25 GB2LHR Railways on the Air, Haverthwaite

Macclesfield & District RS
info@gx4mws.com
5, 19 Shack on the air/ Construction
12 A G5RV mod, M0GWF
26 Secret wireless wars

South Manchester R&CC
Ron, G3SVW, 0161 969 3999
1 Aerial erections of the past, Ron, G3SVW
8 Worldwide Radio Prefixes, Ron, G3SVW
15 Radio etiquette, Dave, G0BJK
22 Surplus equipment sale
29 Mini-lectures by all members

Stockport Radio Society
Heather, M6HNS, 07506 904 422
6 Society meeting
15 2m net, 145.375 ± 7.30pm
20, 27 Radio/Skills night

Thornton Cleveleys ARS
John, G4FRK, 01253 862 810
5, 26 Practical evening/construction
12, 19 Natter night / BVWS video

REGION 4: NORTH EAST

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

Angel of the North ARC
Nancy, G7UUR, 0191 477 0036
5, 12, 19, 26 On the air
24, 25 Railways on the air (ROTA) weekend

Colburn & Richmondshire District ARS
Colin, 01748 876 391
8 Contacting the ISS, Paul Hunt, G8PYX
15, 29 Club net, via GB3IR, 7.30pm
22 Training, operating, social

Denby Dale RC
Darran, G0BWB, 07974 423227
3, 4 RSGB SSB Field Day from Farnley Tyres
4 WAB 144MHz QRO Contest
7 Working satellites, David, M0ODM
21 Huddersfield Repeater Group update, G3SDY

Hambleton (Northallerton) ARS
Tony, G3MAE, 01609 881 530
14 Operating night
28 Club program discussion

Newsham ARTC
John, 2E0DCV, 01912 371 729
7, 14 Foundation training
21, 28 Club night

Ripon & District ARS
David, G3UNA, 01423 860 778
1, 8, 15, 22, 29 Club night

Sheffield & District Wireless Society
Krystyna, 2E0KSH, 07884 065 375
7 Vintage, valve & Army gear, G8EQD & 2E0ERA
14, 28 Training and social night / technical
21 Home construction, M6SLO

Sheffield ARC
David, G6DCT, littlewood20@btinternet.com
12 Shack night operating M0RCU
19 Space exploration part 2, Ian Hole, G0OUG
26 Club night

REGION 5: WEST MIDLANDS

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

Central Radio Amateur Circle
Martin, G1TYV, 07948 027 994
1 Group meeting
3, 10, 17, 24 Shack on the air, group meeting
4 UKAC 144MHz

Coventry ARS
John, G8SEQ, 07958 777 363
1, 8, 15, 22, 29 Open net 8pm 50.175MHz SSB
5, 12, 19, 26 Open net 8pm 145.375 or 7.16MHz

Gloucester AR&ES
Anne, 2E1GKY, 01242 699 595 daytime
1, 8, 15, 22, 29 Net 7.30pm, 145.550 then QSY
5 Annual general meeting
7, 14, 21, 28 Net, 7.30pm, 145.500 then 145.550MHz
10 GB4GC from Gloucester Cathedral
12 Chassis bashing in the 21st Century, G8CQZ
19, 26 Informal evening and general operating

Malvern Hills RAC
Dave, G4IDF, 01905 351 568
13 AGM

Midland ARS
Norman, G8BHE, 07808 078 003
7 Open meeting, shack on the air & training
14 Committee meeting & training classes
21 Shack on the air, DMR review & training
28 AGM review, open meeting & training classes

Mid-Warwickshire ARS
Don, G4CYG, 01926 424 465
13 Bring in an interesting item to discuss
27 Simple QRP transceivers & receivers, 2E0DQG

Rugby ATS
Steve, G8LYB, 01788 578 940
3 Shack on air, 144MHz Trophy contest
6, 13, 20, 27 UKAC, radio operation
10 HF lecture
17, 24 HF shack on the air

Salop ARS
salopamateurradio@gmail.com
1, 15 Natter night / committee meeting
6, 13, 20, 27 CW net, 4.30pm, 144.070MHz
7, 14, 21, 28 Club net 8.30pm GB3LH
8 Shack night with G3SRT on the air
22 Construction contest
29 Quiz night with Powys ARC

South Birmingham RS
Gemma, M6GKG, gemmagordon.m6gkg@gmail.com
1, 8, 15, 22, 29 Training classes, Dave, G8OWL
2, 3 Preparing for Telford Hamfest
4 Club stand at Telford Hamfest, helpers needed
5, 12, 25 Work in the shack
6, 13, 20, 27 Coffee morning, 11am-1pm
9, 23 Unload/ work on the trailer

Stratford Upon Avon & District RS
G0CHO, 01608 664 488
5, 19 Club net, 145.275MHz FM, 8pm
12 Open meeting, programme & project planning
26 Reverse engineering, John, G1AWJ

Sutton Coldfield ARS
Robert Bird, spirit.guide@hotmail.co.uk
5, 19 Open net, ±145.250MHz, 7.30pm
12, 26 Club meeting
13 Open net, 70.475 FM, 7.30pm
27 DMR open net GB7FW slot/local2, 7.30pm

Telford & District ARS
John, M0JZH, 07824 737 716
7 Committee meeting & GX3ZME OTA
14 Hamfest debrief / talk of the Guernsey trip
21 Rig Expert antenna analyser
28 Digital filters, Richard, G0VXG

Wythall Radio Club
Chris, G0EYO, 07710 412 819
2, 9, 16, 23, 30 Nibbles night in the shack
4, 11, 18, 25 Club net 145.225 or GB3WL, 8pm
6, 20 Morse class, 7.30pm, club meeting, 8pm
13 Morse, 7.30pm, meeting, 8pm, committee 8.30pm
26 Curry night
27 Morse class, 7.30pm, 3x15 minute talks, 8pm

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

Dragon ARC
Stewart, GW0ETF, 07833 620 733
5 Club business/construction comp planning
19 Talk by John Shorney from National Grid

North Wales Radio Society.
Liz, GW0ETU, 0776 019 0355
1 General meeting
8 Technical topic, John, GW4GRW
15 DF hunts, Simon Taylor
22 Pedestrian DF hunt
29 Discussion night & update on DF hunt

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

Aberystwyth & District ARS
Ray, GW7AGG, 01970 611 853
3 Across Wales walk
8 HF on the air night with refreshments
29 Net on 145.500 then 145.550MHz

Llanelli ARS
Craig, MW0MXT, 01269 845 773
3 GB1PCA on the air
5, 19 Social evening/DVD night
12, 26 On air night/junk sale & club raffle

Newport ARS
Margaret, GW4SUE, 01633 665 289
2 Nostalgia night
4, 11, 18, 25 Club net, 10am, 3.705MHz
6, 13, 20, 27 Club net, 8pm, 145.425MHz
24 GB4OST, Railways on the Air

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

Bangor & District ARS
Norman, GI3YMY, norman.newell@yahoo.com
1 AGM

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

Aylesbury Vale RS
avrs@rakewell.com
14 Presentation by Vic, G6GDI

Bracknell ARC
Andy, M0HAK, andy@m0hak.co.uk
7, 21, 28 Open net, 8pm, 145.375MHz
14 Visit to National Grid, 6pm

Burnham Beeches RC
Charles, G0SKA, 01753 647 101
5 Junk sale
19 Open evening, all welcome

Edgware & District RS
Mike, G4RNW, 02089 500 658
8 Sorting out club's unwanted stock
22 Bring & show evening

Harwell ARS
Malcolm, G8NRP, 01235 524 844,
info@g3pia.org.uk
8 Natter night

Newbury & District ARS
Rob, G4LMW, 01635 862 737
28 Mini DXpedition to HC8, Geoff G8OFQ

Radio Society of Harrow,
Linda, G7RJL, lcasey@imperial.ac.uk
5, 12, 19, 26 Club net, 8.15pm,145.5 then QSY
2 Surplus equipment sale
16 70th anniversary celebration, by invitation
25 Outdoor event 2-5pm Old Redding car park

Reading & District ARC
Laurence, G2DD, 0758 470 6625
3, 4 SSB Field Day
8 VLF, Georg Wiessala
12, 17 Advanced/Intermediate course

Southgate ARC
Mr K Mendum, G8RPA, g8rpa@arrl.net
14 History of ballooning, Mike Hodgson, M0NOE
22-25 Railways on the Air (ROTA)

Verulam ARC
Greg, M0PPG, 01582 413 345
8 Social with GB3VH Repeater Group, 7.30pm
20 CQ160m experimenting with antennas, M0UKR

Deadlines: 25 Aug, 22 Sep

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

Basingstoke ARC
Peter, G0KQA, 01256 414454
19 Alexanderson VLF Tx at Varberg, M0KER

Bromley & District ARS
Andy, G4WGZ, 01689 878 089
7, 14, 21, 28 Net 145.500MHz (and QSY) 9pm
18 Foundation course
20 Digital mobile radio

Coulsdon ATS
Mike, M1CCF, 020 8654 2582
12 One man and his Guide Dog, Paul Harman

Crawley ARC
John, G3VLH, 01342 714 402
18 Microwave Round Table
28 How your antenna really works, G3JKV

Cray Valley RS
Richard, G7GLW, 07831 715 797
8 PMR/emergency communication, G3ZPS
22 Surplus sale

Crystal Palace R&EC
Bob, G3OOU, 01737 552 170
2 Geographical mapping, Nick Stapley and eutectic points, Jim Lugsden

Dorking & District RS
David, M6DJB, djb.abraxas@btinternet.com
27 Amateur radio in Cyprus, G4PFF/5B4AGX

Dover RC
Aaron, 2E0FQR, 0771 465 4267
7 Winter project planning evening

Eastbourne Electronics & Radio Club
Events@ereclub.org.uk
12 Project/demo
26 Talk/meeting

Echelford ARS
John, G4GSC, 01784 451 898
8 DXpedition to Hondoras, John, G4IRN
22 On air/CW practice/Bring & Buy/natter night

Fareham & District ARC
Chris, G7MFR, chris@jenkins-powell.com
7, 14, 21 Informal meeting
28 Film

Hastings E&RC
Gordon, 01424 431 909
28 Learning the code, Phil, G3MGQ

Hilderstone R&EC
Ian 2E0DUE, hilderstoneclub@gmail.com
3 HF contest at Capel
8 Natter night
22 DRM talk
24 Air Ambulance event

Horndean & District ARC
Stuart, G0FYX, 02392 472 846
2 Natter night/social evening
16 Club members' 15-minute talks

Horsham ARC
Alistair G3ZBU, 07855 268666
1 Life at sea as a Marine RO, Peter Gavin
15 Social, The Royal Oak, Wineham

Mid-Sussex ARS
Stella, M6ZRJ, 01273 844 511
2, 9 Radio night & table top sale

16 Prep for Town Day
17 Haywards Heath Town Day
23 Skittles evening
30 Indian Hospital & the Chatri during WW1, Amanda Jane

Southdown ARS
Andy, M6GND 01323 486 924
3 12.30pm 144.3 SSB/145.5 FM/51.6 FM
5 Auction
7 8.30am 145.275 FM, 10.30am shack open, 12.30pm cafe, 2.30pm various nets
8, 15, 22, 29 9.50am/10am various nets
10, 17 9.50am/10am/12.30pm various nets
10, 11 CHOTA at West Dean
14, 21, 28 8.30am/2.30pm various nets 12.30pm cafe
18 70MHz Contest

Surrey Radio Contact Club
John, G3MCX, 020 8688 3322
1, 8, 15, 22, 29 Net, 70.300MHz, 8pm
2, 9, 16, 23, 30 Net, 145.350MHz, 8pm
4, 11, 18, 25 Net, 1905kHz, 9.30am
5 Test equipment, Bob Burns, G3OOU
19 Chat and fix-it, John, G8MNY

Sutton & Cheam RS
John, G0BWV, 0208 644 9945
15 AROS, Vince Shirley, G0ORC

Worthing & District ARC
Al, M0OAL, information@wadarc.org.uk
4 9am Sunday breakfast
20 G3WOR on the air evening

REGION 11: SOUTH WEST & CHANNEL ISLES

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

Appledore & District ARC
Alan, M6CCH, 01237 422 833
19 Programming your Baofeng radio, Mike, G4KXQ

Bristol RSGB Group
Robin, G3TKF, robin@g3tkf.co.uk
26 Chat night inc G0FUW on the AMSAT/ISS

Burnham on Sea ARC
Brian, G4RGY, 01278 683 645
7, 21 Club night

Callington ARS
John, G4PBN, 01822 835 834
7 Cover off equipment evening

Cornish RAC
Steve, G7VOH, 01209 844 939
1 Committee meeting
7 Main meeting
15 Club evening

Exeter ARS
Nick, M0NRJ, 01363 775 756
6, 13, 20, 27 GB3EX repeater net at 7.45pm
14 Digital modes workshop
28 First Aid training Part 1

Exmouth ARC
Mike, G1GZG, 01395 274 172
7 Public & local club evening
21 Operating night

Mid-Somerset ARC
David, G8BFV, 01749 670 085
13 Recent developments in digital ATV, G8VPG

North Bristol ARC
Mat, G7FBD, g7fbd@gb3bs.com
2 Enigma part 2
3, 10, 17, 24 DMR net, 7pm, Slot2 talk group 950
4, 11, 18, 25 Open net on GB3BS 7-8pm
9, 30 Relax & chat + operating & training
16 Video evening (radio related) + relax and chat
23, 24 Preparation for ROTA (Avon Valley Railway)

Plymouth Radio Club
David, 2E0DTC, d.beck123@btinternet.com
13 Club transmitters on the air

Riviera ARC
rivieraarc@gmail.com
1 Visit to Friedrichshafen 2016 video, G4XKH
15 Club night

Saltash & District ARC
Mark, M0WMB, 01752 215 546
12 CHOTA, GB5IVE, St Ive Methodist Church

South Bristol ARC
Andrew, G7KNA, 07838 695 471
8 DVD night, *The Secret War* episode 4
15 Table top sale
22, 24, 25 ROTA briefing/Railways on the Air
29 Open house and on the air night

Thornbury & South Gloucestershire ARC
tsgarc@gmail.com
2, 9, 16, 23, 30 Club net
7 Arduino, Paul, M0ZMB
8 Severn Bridge 50th special event
14, 28 On the air night
21 Project night

Torbay ARS
Dave, G6FSP, g6fsp@tars.org.uk
2, 9, 16, 23 Club night & business meeting (9th)
11 Mobile Communication Rally, Newton Abbot
30 Aerial construction presentation

Weston Super Mare RS
Martin, G7UWI, 01934 613 094
5, 12, 26 Construction, operating & natter nights
18 Radio rally
19 SDR radio, G1PIB

Yeovil ARC
Rodney, M0RGE, 01935 825791
1 Morse, Rob Mannion, G3XFD
8 GB7YS and TDMA DMR technology by G3ZXX
22 Morse practice by G3MYM
29 Station on the air

REGION 12: EAST & EAST ANGLIA

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

Braintree & District ARS
John, M5AJB, 01787 460 947
5 Railways on the Air planning, natter night
19 Operating evening HF, 2m and 70cm

Cambridge & District ARC
Ian, M0HTA, publicity@cdarc.co.uk
4, 11, 18, 25 Various nets, 8.30, 10.30 & 11.30am
5, 12, 19, 26 Club net, 8pm 145.550MHz FM
9 SDR Play expert demo, Jon, G4ABQ
23 Foundation shack evening + Tx Factor video

Chelmsford ARS
secretary@g0mwt.org.uk
1 Foundation course
6 Millimetric microwaves, Chris, G0FDZ
19 Skills night at Danbury Village Hall

Colchester Radio Amateurs
Stefan, M0XLB, 07771 616 676
1, 8, 22, 29 Club net 3.685MHz LSB 7pm
6, 13, 20, 27 Club net 433.425MHz FM 7pm
7, 14, 21, 28 Club net 145.350MHz FM 7pm
15 Contest tips, Jonathan, G0DVJ

Felixstowe & District ARS
Paul, G4YQC, pjw@btinternet.com
11 Martlesham airfield SES
12 ESWR post mortem
24, 25 Foundation course
26 RSGB update, Keith, G7CIY

Leiston ARC
m0iah2008@gmail.com, 01473 738 593
13 Surplus sale
27 2m+70cm contest

Loughton & Epping Forest ARS
Dave, M0MBD, 0798 016 5172
1, 8, 15, 22, 29 Net, 144.725MHz, 8pm
2, 16, 30 Club meeting
10, 11 GB2ECS (Essex Country Show)
24, 25 GB2RGM (Royal Gunpowder Mills)

Norfolk Coast ARS
Steve, G3PND, info@norfolkcoastamateurs.co.uk
1 Preparing for SSB FD
8 Design & construction of NCARS transceiver
15 Visit to Bletchley Park
22, 29 The next construction project

Thames ARG
targradio@outlook.com
2 Club night
9, 23, 30 TARG nets on GB3DA
16 TARGet Night (Members only)

Thurrock Acorns ARC
Gordon, 2E0ELI, acorns@taarc.co.uk
1, 8, 15, 22, 29 Open net, 2m FM, 7.30pm

REGION 13: EAST MIDLANDS

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

Lincoln Short-Wave Club
Pam, G4STO, 01427 788 356
1, 8 Club repeater net via GB3LM, 8pm
3, 10 Saturday surgery, G6COL on the air
6, 13, 20, 27 UK Club Contest
7, 17 Shack activities and G5FZ on the air
14 Nibbles and natter night
15, 22 8pm Club net 145.375MHz
21 Formal meeting
24, 28, 29 National Hamfest prep and set up

Loughborough & District ARC
Chris, G1ETZ, 01509 504 319
6 Video night via internet
13 Under the hat, Albert & Andrew
20 Vintage radio, bring something along
27 Practical evening

RAF Waddington ARC
Bob, G3VCA, 07971 166 250
5, 12, 19, 26 Club net, 145.325MHz 8pm

Spalding & District ARS
Graham, G8NWC, 01775 760 832
4 BBQ and Fun day at the caravan

Welland Valley ARS
Peter, G4XEX, 01858 432 105
5 On the air sked, 145.275 FM
19 CW and multimode decode night
30, 1 Oct National Hamfest

Worksop ARS
Paul, M0PJA, 07890 626 684
1, 8, 15, 22 Technical, construction, CW and operating
6, 13, 20, 27 Club Night & UKAC
18, 25 Intermediate course 6pm
29 SOTA, a game of two halves, M0PJA & M0ONI
30 Sep, 1 Oct National Hamfest

REGION 2: SCOTLAND NORTH & NORTHERN ISLES

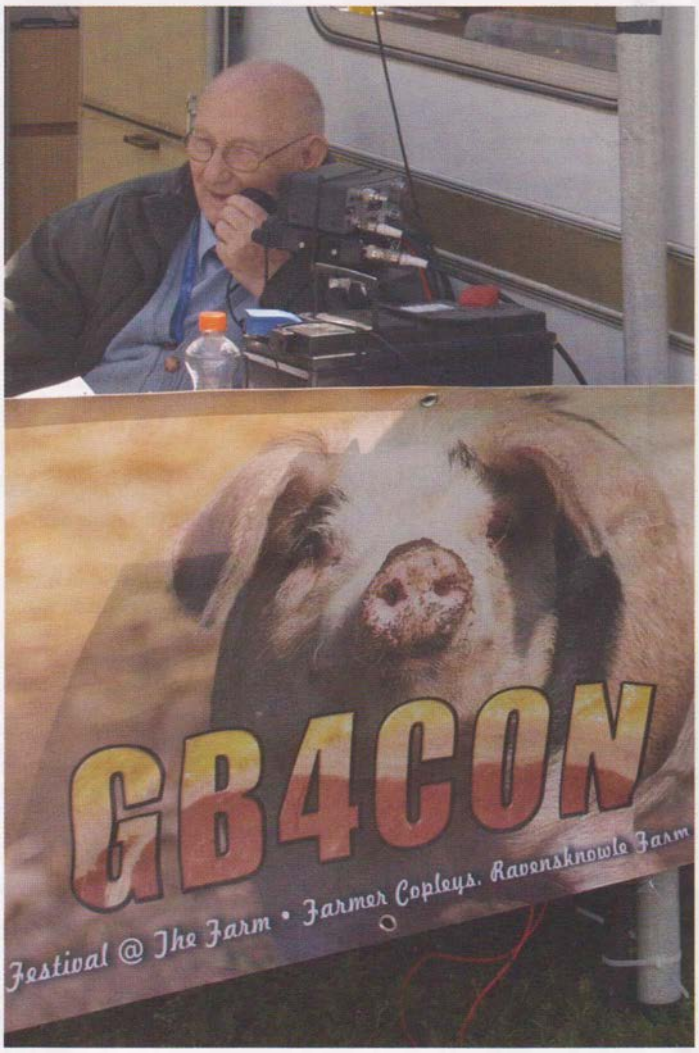
Dundee ARC is continuing to encourage and support both newcomers and those progressing through the ranks of amateur radio. In July, another five candidates sat the Advanced exam and all received positive results. Four of the candidates were from the Dundee club and one was from Renfrew, near Glasgow. Congratulations to Rolfe James, Rab Turpie, George Sinclair, Tony Barclay and Stephen McCallum. Some of the students used the Bath Correspondence Course as part of their training and all have said that they were very pleased with the information and assistance they received. Tom, GM3NHQ ran a Tuesday night course to augment the Bath training.

REGION 4: NORTH EAST

Bishop Auckland RAC meets every Thursday at the Stanley Crook Village Hall at about 7.45pm. Everyone is welcome. The club has a fully operational shack and members can operate radios using all bands. Training is provided by Tim, MOACV and Bob, GOOCB. For training enquiries, please email g4ttf@yahoo.co.uk.

Hambleton (Northallerton) ARS congratulates Mac who recently became M6RYE. From September the club will be moving to a new venue for four months while the current location is being demolished, so the club will meet at Northgate Horticulture, Yaffort Road, Northallerton DL7 OLG.

Paul, M6PQD received his certificate for passing his Foundation exam at Houghton-Le-Spring ARC. Congratulations from all members at the club and they look forward to hearing him on the air.



In June, members of Pontefract & District ARS operated GB4CON (g-BACON!) at Farmer Copley's *Festival @ the Farm*, an annual Fun Day. Operating on 2m only for this occasion, there was a constant run of contacts for most of the day until they all dried up – around the time of the football match! Stations worked included those in the Yorkshire Dales, Bury, Nottinghamshire and Derbyshire, all using 50W FM. The image shows Niall, G4ISU, operating the station from outside the caravan. The banner, a copy of the QSL card, received many comments, with quite a few people asking about amateur radio.

Durham & District ARS running GB13COL, the 13 colonies special event. The event took place from 1 to 6 July, with the final number of contacts made at 3113. The station was running HF and digital modes with many operators staying over night. The photo shows Tom, MOHYE and Jim, G7TFX.

York Radio Club at Snowball Plantation (York) taking part in the Field Radio Event in May, organised by Steve, 2E0YYK. The photo shows Bob Campbell MBE, MOHNL on the radio.

REGION 5: WEST MIDLANDS

Midland ARS sends congratulations to Gary Parr on passing his Foundation exam with a pass rate of 23 out of 26. His instructor was Steve, MOSSV. Brian Potter also passed with 23 from 26.

REGION 7: SOUTH WALES

Risca and District ARS visited Bletchley Park, enjoying a guided tour around the Park. The tour lasted about an hour and was extremely informative and enjoyable including the humorous stories related by the tour guide. The attention to detail at Bletchley is impressive. Sound effects are particularly noteworthy, including very realistic aircraft sounds as you tour the Park. The National Radio Centre has exhibitions from the first inventors in the late 19th century through to future radio developments. Visitors will find films, interactive displays, hands on experiments and even the opportunity to go on air in the state of the art amateur radio station. Visitors who hold an amateur radio licence are welcome to operate the station for a short while if circumstances permit, but remember to bring a copy of your licence with you. The National Museum of Computing houses Colossus and was a very interesting stop.

In July, Newport ARS presented Doug, MW0OPY with a framed photograph in recognition of him successfully completing the Jester Azores Challenge 2016 (www.jesterinfo.org). Doug sailed single-handed to Praia de Vitoria, Terceira in the Azores and back on his boat the Jekeeda II. On board he had a Yaesu FT-847 and inverted L cut for 20m. For the duration of the trip Newport club maintained a regular listening watch for Doug and ran their normal 2m net in parallel with 20m thus enabling Doug to call in if conditions permitted.

REGION 8: NORTHERN IRELAND

Causeway Coast & Glens ARC help fund raise with the Robert Quigg VC Commemoration Society. GB0VC was first used on July 2014 and a special QSL card was designed which tells the story of Quigg VC's bravery. Many stations have been contacted in over 60 countries throughout the world. A field day was held in Bushmills in 2014 to raise funds and it turned out to be a great day. The club also activated the GB0VC callsign in July 2016. Club members were present at the unveiling of the new bronze Statue of Robert Quigg VC by Her Majesty The Queen.

REGION 10: SOUTH & SOUTH EAST

Horndean & District ARC has been running its 16th Foundation course. At the exam, five of the six candidates passed and club members look forward to hearing them on the air very soon. The club is moving to a new venue, and meeting on a different day (1st & 3rd Fridays). From 2 September they will be meeting at Deverell Hall, 84 London Road, Purbrook, Waterlooville PO7 5LU. You can check out details on the website http://hdarc.co.uk/.

REGION 11: SOUTH WEST & CHANNEL ISLES

Plymouth Radio Club took part in Armed Forces Weekend, a larger event than previous years that drew record crowds from all over the West Country. The radio caravan, located on Plymouth Hoe, had the transmitters on display, using GB1AFW throughout the two day event. Members were on hand to offer help and advice to those interested. During the two days, contacts were made with Scandinavia, Spain, Italy, New Zealand and the United States just to name a few.

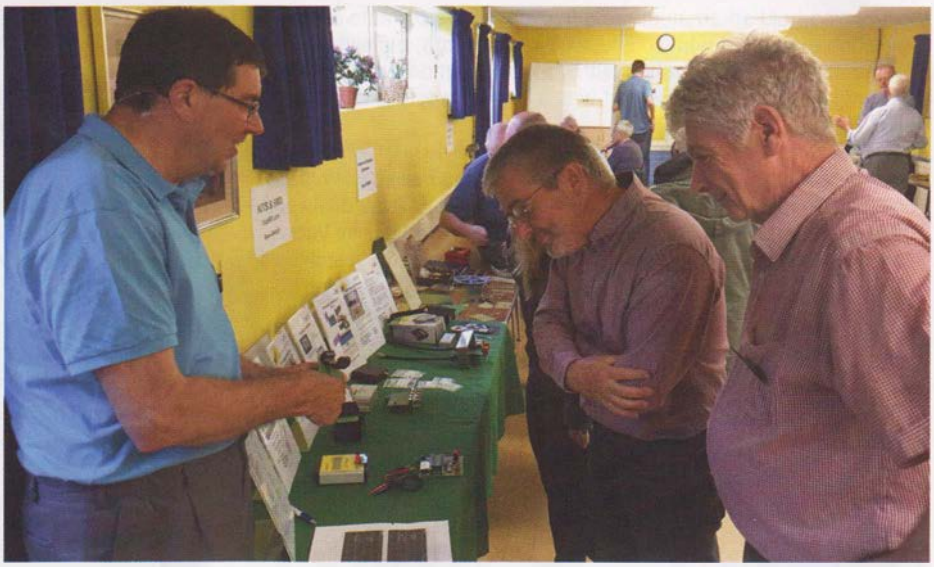
Thornbury and South Gloucestershire ARC took an active part in the annual Thornbury Carnival. It was a hugely successful event where the club gained at least two potential guest speakers and three new members with many more interested in things like SDR that were on display by club members. Those involved included Mark, M6KMJ, Derek, M6DTT, Gary, G7NVZ and Peter, M6KVA. The club plans to attend the sister event in South Gloucestershire during September.

REGION 12: EAST & EAST ANGLIA

Members of **Essex Ham** operated two special event stations celebrating this year's Summer Solstice. GB1JSS was active at the popular /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.

Keen to spread the word about amateur radio, Essex Ham also held an introduction to amateur radio to staff and pupils at Estuary High School. This included discussion of the Tim Peake ARISS contacts, use of the RSGB's *A 21st Century Hobby* video, and setting up a 70cm station to allow the youngsters and staff to send greetings messages.

Thurrock Acorns ARC had a talk from Miles, one of the newest club members, about how he became a radio amateur. He said it all started years ago when his father was in the RAF designing circuits for the various weapons systems. Although he was unable to talk in detail about his work, Miles' interest in electronics grew and his father would sit with him either building electronics kits, or carefully cutting balsa wood to build gliders. Recently, with the club's support, he passed his Foundation licence and is now very active exploring the amateur bands transmitting audio, television and data modes. Thunder and lightning certainly livened up the Horndon Feast and Fair event when the club ran a special event station. There was a steady flow of visitors, including the young lady in the picture (left) who sent a short message via the Morse key on the table. In the middle of the afternoon the sky turned black and the thunder and lightning rolled in so the gazebo changed role, to a wet weather tent.



The June Essex Skills Night saw several new presentations on offer to visitors, including a series of kits from hupRF.com, log-periodic PCB antennas from Sam, G4DDK and a home-made wind speed kit made by Alan, M0IWZ using an Arduino.

As part of the Marconi Hall Street Factory Exhibition, Chelmsford ARS members assisted young people in building AM radios from a kit of parts. Christopher, G0IPU carried out PAT testing on all the equipment the week before, which was a bit tedious, but necessary. Michael, G4NVT was charged with turning the radio educational packs into individual kits. By utilising an A4 sheet he laid out all the components in a manner that was easy to use with each item labelled. Each session was well attended and the youngsters looked the part as each was given a white lab coat to wear; this really set the scene. The radios mostly worked first time, whilst others needed coaxing into life and the 'Chief Engineer' Ed, G8FAX oversaw all construction. All age groups and abilities were catered for, and no-one went home disappointed. Over the two days some 35 radios were built; all worked, and everyone had a great time. Thanks to Chris, Ed, Michael, Andy, Jack and Murray for getting involved in a worth while event. Photo (above) courtesy of G4GHO.

Howard, G6LXK and Mike, G8DJO were the annual Braintree & District ARS DF hunt victors, with first timers Colin, M6NCU and Joe, M6YEL running a close second. A recent meeting saw Neville, G8CDG faultfinding and overhauling an FRDX400 receiver (above). All of the valves were tested on Jim, G0DCR's vintage AVO No 3 tester and a replacement is being sought for one that was found to have a low output.

Four Intermediate licensees have started to construct a transmitter and receiver at Norfolk Coast ARS. The rig is being designed jointly by members, using discrete transistors on a stage by stage basis – each stage is discussed and analysed in detail, with the concept that this will help the Intermediate licensees prepare for their Advanced exams in due course. The first stage is a single transistor regenerative TRF receiver to be followed by RF and audio stages, then the transmitter.

REGION 13: EAST MIDLANDS

Jim, GOEJQ, the RM for Region 13, visited Eagle Radio Group. It was a very interesting evening with three previous members visiting from Australia – Celia, VK4POM, Roger, VK4TV and David, VK3DBD.

RAF Waddington ARC welcomes all, whether licensed or just interested in getting started. A recent and very welcome visitor was Maya, JG1MRG from Japan, who said she enjoyed her visit.

Chefs Pam, G4STO and Steve, M5ZZZ prepared food in the pouring rain for members of Lincoln Short Wave Club at the annual Sausage and Burger Night. The new RSGB DRM Andrew Gilfilan and his family joined them at the event. Although the weather was dreadful members enjoyed a fun-filled evening.

Classified Ads

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DOWNSIZING. IC-718, little used and in mint condition, £400. Yaesu FT-450D, as new, £410 or both for £750. Prefer buyer collects, otherwise carriage £10 each. Phil, M0GQV, 01642 818 475, phil.langabeer@ntlworld.com (Teesside area).

ELECRAFT KX3 radio and PX3 pan-adapter, both in mint condition, little used. The KX3 has the internal autotuner fitted, CW paddle, dual-band roofing filter, internal charger and batteries. All documentation, leads, etc included. £1,400 + insured postage, or collect. David Downer, M0GGJ, 01983 520 795, david@davedowner.co.uk (Newport, Isle of Wight).

ICOM IC-756 PRO 3 complete with leads, microphone, manual and original box. VGC and GWO, £975 ONO, carriage included. Garry, GM3MQO, 01292 738 566, garryolesen@yahoo.co.uk (Ayrshire).

ICOM IC-756 PRO 3, unblemished condition, user manual, mic, original box. Non smoker. Try before you buy. Prefer collection, only £1,500. Also new boxed Ameritron HF-UHF 5 channel remote coax switch, £199. Vincent, GW8RLI, 0797 017 8446 (Pontypridd).

ICOM TRANSCEIVERS, all seldom used. IC-7100 with Z-100 Plus auto ATU, CF-530 Duplexer, HM-151 mic, SP-10 speaker. SD card. Wired ready for all bands, £650. IC-9100 + mic, £1,300. ID-51, £100. Boxes/manuals. The lot £2,000. Could deliver. Alex, G3IAZ, 01323 472 408, alx.wickham@gmail.com (Eastbourne).

K3 – EXCELLENT CONDITION, little used and needs a home where it will be put to good use. Factory built, 100W, 400Hz CW 8 pole filter included. Buyer collects and can test it. £1,950 OVNO. Berni, G0IDA, wberni@gmail.com (Brighton).

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KW EZEE MATCH, £49. Also KW160 ATU, £45. Both good working order. Morse key by Great Northern Telegraph, Bakelite, vintage, £12. David, G3ZPA, 01908 501 310, davidwhite400@hotmail.com (Milton Keynes).

PHILIPS QB3-300 beam tetrodes in used condition, quantity 4. 125W anode dissipation. Equivalent to 4-125A, QY3-125, CV2130. £25 plus £3.95 postage/packing. David Aldridge, G3VGR, 07802 241 365, g3vgr@qsl.net (Buckhurst Hill, Essex).

R1155B RX WITH PSU/AF AMP. Further R1155 (model unknown), built-in PSU/AF amp, modified for Top Band. Additional PSU/AF amp with Jones plug. Both working when tested after several years standing. £350 (no split). Strictly sold as seen, cash on collection. W Watson, G4EHT, 07835 469 149, bill.g4eht@yahoo.co.uk (Lichfield, Staffs).

TEN TEC OMNI VI including TT Model 961 12V PSU. Excellent performer, fully loaded with all filters. Owner's manual included, but no microphone. £450, cash or bank transfer. I much prefer inspect and collect. Cleared funds required before you collect. Peter, G3XJS, 07973 260 022, g3xjs@gqrp.co.uk (West Malling).

WIMO 3 ELEMENT MINI-2000 TRIBAND BEAM. Compact light weight 3 band antenna for 10, 15 and 20m. Nearly new condition – only on the air for 10 days. Cost 428 Euro – I'll take £250 + shipping. Mike, G3WPH, 01189 403 648, g3wph@folly.demon.co.uk (Berkshire).

YAESU FL-2100B linear amplifier in good working order, with manual, £250. Drake MN-2000 antenna tuner, with manual, £100. Buyer to collect. Colin, G7NLA, 01507 533 424, CMil1234@aol.com (Lincs).

YAESU FT-100 with 500Hz CW filter, SEC-1223 PSU, Morse keyer/paddle and headphones. All neatly packaged in a PELI 1600 waterproof case. Total weight is 12kg, £350. Gwyn Williams, G4FKH, 07984 073 007, g4fkh@sky.com (Chelmsford, Essex).

YAESU FT-1000MP Mark V (200W). GWO, boxed, with manuals and fist mic. Full set of factory installed Collins and Inrad filters. Comes with RigExpert Standard USB interface and lead, £850 delivered to UK address. For more info see http://clstr.co.uk/ft1000. Jim Whiteside, M0HPJ, 07775 855 166, jaydublu2002@gmail.com (Norfolk).

YAESU FT-2000 (S/N 7C110020) and matching DMU-2000 (S/N 7C040239). Both in perfect working order. No modifications, software fully up to date, non smoker. Original mic, manuals and shipping boxes. £1,600 plus shipping the lot. Jim, EI4HH, +353 864 071 185, holohaj2@hotmail.com (Dublin).

YAESU FT-450D, mint condition, in original box £350. Buyer collects or postage at cost. Alex, M0HCL, 01438 871 387, alex_a_cunningham@yahoo.co.uk (Herts).

YAESU FT-990 AC with microphone, £495. MFJ-962D, £150. HB ATU with wide spaced capacitors and roller coaster, £40. Photos if required. Buyer collects or carriage extra. Sale OBO GW3FPH. Howarth, GW3TMP, 01352 771 520, jhj43@btinternet.com (Mold, Flintshire).

YAESU QUADRA 1kW HF/6m amplifier. Boxed in excellent condition, £2395. Acom 1000 1kW HF/6m amplifier, boxed, hardly ever had any use, £1,395. Amp UK Ranger 811h, mint cond, £695. 170W 23cm amplifier, superb quality, £450. G0NMP, 0778 546 2445 (Norfolk).

WANTED

CONCENTRIC POTENTIOMETER 500k + 10k with an on/off switch. Will pay a reasonable price. Martins, M0PAM, martins.m0pam@btinternet.com (Kent).

DROP IN CHARGER/POD for the BAOFENG 888 hand held. A Skaife, G4XIV, 01904 330 502 (York).

KW1000 AMPLIFIER. Working or not but must be mechanically sound with front panel in good condition. Bruce, G3WCE, 01692 538 794, g3wce@grimblepoos.co.uk (North Walsham).

LOOKING TO BUY an Annecke balanced (symmetrical) ATU for 80 to 10 metres. Any leads please to David, G4CWB, 01423 504 373 or david@violinman.co.uk (Harrogate).

OCTAL BASED CRYSTAL OVEN for 1 or 2 HC6/u crystals wanted for some projects of the Bergen Broadcasting Museum (bergenkringkaster.no). The old unit is rated at 115V, 75°C. 1 or 2 10XJ and FT243 crystal sockets. Peter, LB0K / G8CKB, +47 5633 8204, lb0k@online.no (Bergen, Norway).

Want to hear weak signals more clearly? Get a bhi DSP noise cancelling product!

bhi

NES10-2 MK3

Amplified DSP speaker:

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Simply plug in the audio and connect the power!

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Amplified in-line DSP module:

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- 3W audio - Speaker & line level inputs and outputs - Easy to use
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Handheld stereo/dual channel in-line DSP module

- Easy to use rotary controls for all functions - New improved DSP noise cancelling - Use with mono, stereo or two separate channel inputs - 8 filter levels 9 to 40dB - Ideal for portable use & DXing - Use with headphones or a small speaker - Over 40 hours battery life - Takes 2 x AA cells or use 12V DC power lead- Size: 121mm x 70mm x 33mm - Suitable for use with Elecraft K3 & KX3 plus FlexRadio

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Dual channel DSP noise eliminating module

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- Supplied with fused DC power lead and 3.5mm mono audio plug lead and operating instructions

ANEM MKII

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- Wide audio bandwidth
- Easy pushbutton control
- Compact inline unit for use with your headphones or extension speaker

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EA&O

SCHEMATIC AND SERVICE INFO for a Marconi Marine MF-HF valve receiver model 288. Also looking for any Marconi Marine Tx or Rx suitable for a museum exhibit in New Jersey, USA, see www.vwoa.org. J Shaw, K2LRE, k2lre@aol.com (New Jersey).

YAESU 650C rotor box indicator wanted. The rotor on the tower is OK but if need be I would buy both. MOCVS, 01629 823 025 (Matlock).

YAESU FT-225RD 2m transceiver. Only the LED display is actually needed, but I am willing to buy a complete rig. Dave, G8WRB, 01621 786 052, drkirkby@kirkbymicrowave.co.uk (Essex).

UP FOR GRABS

DIODE VALVES VR78. Demonstrate thermionics at ohm-meter voltage! Just send me an adequately pre-paid self-addressed mailing container. VR78s are 11mm dia x 48mm long, featherweight, and fragile. 8 are available. Godfrey, G4GLM, 020 8958 5113, cgmm2@btinternet.com (Edgware, Middlesex).

FREE TO COLLECTOR. WS19 chassis, much modified by my attempt to convert to general coverage RX, and some parts since removed. Mike, G1MDS, 01483 569 440, g1mds@btinternet.com (Guildford).

***RADCOM* BINDERS.** Ten old size and five new size. All excellent condition. Carriage cost only. Richard, G8THE, 01424 719 793, richardjhill@hotmail.com (Hastings).

SILENT KEYS

We regret to record the passing of the following Members:

Mr E Emerson	G0DLX	07/06/15
Mr N Millar	G0GBZ	14/07/16
Mr R S Mason	G0VAF	28/06/16
Mr C E Parish	G0VVU	04/06/16
Prof P Beckley	GW0WQX	10/06/16
Mr P J Morrison	G1OKW	07/07/16
Mr R Harding	G3AKU	01/07/16
Mr H Collison	G3FKV	05/2016
Mr J R Davey	G3FPN	17/06/16
Mr A Bird	G3MJX	24/07/16
Mr R Hargreaves	G3XZQ	16/6/16
Mr J McNulty	G4EUY	18/06/16
Mr D B Durance	G4EXX	01/07/16
Mr M D Rogerson	G4FBL	08/07/16
Mr R McAteer	GI4MFM	05/2016
Mr G Kearns	G4MYA	06/2016
W A Harrop	G4VPG / EA6ABM	08/06/16
Mr J R A Fogden	G4WSX	11/07/16
Mr D A Hurr	G6MFH	01/2016
Mr J Butterfield	GW7DWR	06/07/16
Mr D E Eden	G7TLT	07/2016
Mr P Howden	RS305037	01/06/16
K J Slomczynski	SP5HS	01/08/16

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 29/06/2016.

Date	Callsign	Phonetics	Location	Bands	Keeper
01/09/16	GB4SBC	Saint Barnabas Church	Worcs	LHV27	G4ACS
02/09/16	GB6SMD	Golf Bravo Six Saint Matthews Day	West Sussex	H27	G6JVT
03/09/16	GB0MND	Golf Bravo Zero Merchant Navy Day	Liverpool	LH	M0BZZ
04/09/16	GB1MAC	Merseyside Air Cadets	Kirby	LH2	M0NVJ
05/09/16	GB4EVA	Edward Victor Appleton	Otley	LHV27	M0RNS
07/09/16	GB0SXW	Stone Cross Windmill	Pevensey, East Sussex	TLHV2	G1FBH
09/09/16	GB4NGR	Narrow Gauge Railway	Bucks	LH27	M0PJD
	GB0SMF	St Marys Fordingbridge	Fordingbridge	LH27	G4GBP
10/09/16	GB1LIM	Lowton Independent Methodist Church	Warrington	LHV27	G1EFU
	GB2HMC	Haroldswick Methodist Church	Haroldswick	LH2	G0PFH
	GB2ECS	Essex Country Show	Essex	LHV27	G0TOC
	GB2SJB	Saint John the Baptist	Suffolk	LHV2	G0JFM
	GB0TRN	Train	Northampton	LHV27	G6TVB
	GB0CRB	Cottingham Road Baptist Church	Hull	L2	G6LNV
	GB4GC	Gloucester Cathedral	Gloucester	LH2	G4MGW
	GB2DMR	Delta Mike Romeo	County Down	LHV	GI4JTF
12/09/16	GB0WIW	Wireless in Wales	Denbigh	LH27	GW6VEI
20/09/16	GB2WS	Railway on the Air	Derbyshire	LV2	G1VAB
	GB2HSC	Hollycombe Steam Collection	Liphook	LHV27	G4VKC
23/09/16	GB0SDR	Somerset + Dorset Radio	Midsomer Norton	LH27	G7KNA
24/09/16	GB2SDR	South Devon Railway	Devon	LHV	G4VUD
	GB4OST	Old Station Tintern	Chepstow	L	G4SUE
	GB0DR	Dartmoor Railway	Devon	LH27	G7UDX
	GB0CVR	Colne Valley Railway	Essex	LH27	G0EMK
25/09/16	GB1WLR	Railway on the Air	Lancashire	LH2	M0WSW
	GB2EVR	Eden Valley Rail	Cumbria	LH27	G0NRK
29/09/16	GB0SCR	Swindon Crickdale Railway	Swindon	LH27	G4GBP

HELPLINES

ACE-HF PRO propagation software. I went ahead and purchased it. I understood it's a very powerful piece of software. However, can anyone help me with a tutorial, as I am in need of help and guidance? I'm willing to travel. Clive Haddrell, G4OPO, 0117 949 6201, clive@firstresponse.org.uk (Bristol).

Can anyone shed any light on the Dewsbury Electronics FM board for the TS-930S? The business is long gone and the former proprietor no longer has any relevant paperwork. A copy of the operating instructions would be a great help, the circuits and installation instructions would be perfect. John, G3JVC, g3jvc@jcleeve.idps.co.uk (Surbiton).

RALLIES & EVENTS

Members of the RSGB Regional Team will be present with a bookstall at the rallies this month marked with an RSGB diamond.

4 SEPTEMBER
TELFORD HAMFEST
Enginuity Technology Centre, Coalbrookdale, Telford TF8 7DU
Doors open at 10am. More information from Martyn, G3UKV on 01952 255 416.
[www.telfordhamfest.co.uk].

10 SEPTEMBER
CAISTER LIFEBOAT RADIO RALLY
Caister Lifeboat Station, Tan Lane, Caster on Sea, Norfolk NR30 5DJ
Doors open from 9.30am to 3pm, with traders gaining access from 8am. There are indoor tables available at £10 and outside car boot pitches for £5 and booking is advisable. Admission is free and the venue has free parking and disabled access. All proceeds go to Caister Lifeboat. Contact Zane, on 0771 121 4790 or by email to m1bfidx@ntlworld.com. [www.m1bfidx.wix.com/cl-radio-rally].

11 SEPTEMBER
TORBAY ANUAL COMMUNICATION FAIR
Newton Abbot Racecourse, Devon TQ12 3AF
The event is indoors and doors open at 10am with disabled visitors gaining access half an hour earlier. Admission £2. Plenty of car parking on site. There will be a Bring & Buy and an RSGB bookstall. There is catering on site. To book tables call Pete, G4VTO on 01803 864 528 or email rally@tars.org.uk.

11 SEPTEMBER
ANDOVER RADIO AND COMPUTER BOOT SALE
Tangley Village Hall, Wildhern, Andover, Hampshire SP11 0JE
Doors will be open from 9am, with disabled visitors gaining access from 8.30am. Admittance is £2. Tables in the hall are £10 and pitches in the field £8. There will be a Bring & Buy, Car boot area, as well as trade stands. Catering will be available on site and there will be a raffle held on the day. More details from Paul Phillips, G4KZY, 0777 573 8200, paul.g4kzy@gmail.com.

17 SEPTEMBER NEW DATE
FOG ON THE TYNE RALLY
Whitehall Road Methodist Church Hall, Bensham, Gateshead NE8 4LH
Entry is £2 and the doors open at 10.30am. entry is through door at the side of building next to the car park. Bacon butties and cup of tea or coffee will

be £2.50. There will be a Bring & Buy, junk stall, RSGB book stand as well as traders. Car parking is now available and the entrance is on Whitehall Road. Details from Nancy, G7UUR on 0799 076 0920, nancybone2001@yahoo.co.uk. [www.anarc.net].

18 SEPTEMBER
28th GREAT NORTHERN HAMFEST, by South Yorkshire Repeater Group
Barnsley Premier Leisure Complex, Queen's Road, Barnsley, S71 1AN
The venue has easy access for disabled visitors and the Hamfest is in one large hall. Doors open at 10am and traders have access from 7.30am. Admission is £3.50, children under 14 accompanied by an adult are free. There will be trade stands, special interest groups and an RSGB bookstall. There is no Bring & Buy but tables are available at £15 (plus £5 for electric points). Details from Ernie, G4LUE on 07984 191 873. [www.gnhf.co.uk].

18 SEPTEMBER
WESTON SUPER MARE RADIO AND ELECTRONICS RALLY
The CAMPUS Community Centre, Highlands Lane, Weston super Mare BS24 7DX
Free parking, level access, catering. Opens 10am. Admission £3, under 16's free. There will be trade stands, group exhibitors, auction of surplus equipment, home-brew competition, Lectures. Details from Mike, MOVLN,01278 786 684.

18 SEPTEMBER
MICROWAVE ROUND TABLE
Tilgate Forest Rec Centre, Hut 18, Tilgate Forest, Crawley, West Sussex, RH11 9BQ
Crawley ARC hosts a day of demonstrations, presentations, equipment and component sales – all microwave related. This annual event attracts microwave enthusiasts from around the UK and overseas. Refreshments available.

23 – 25 SEPTEMBER
WACRAL FELLOWSHIP WEEKEND
Elim Conference Centre, De Walden Road, West Malvern, Worcestershire WR14 4DG
Guest speaker on Saturday evening Don Field, G3XTT (Editor of *Practical Wireless*). Details from Shirley on 01924 229 630.

24 & 25 SEPTEMBER
BATC CONVENTION
RAF Museum Cosford, near Telford.

25 SEPTEMBER
CHIPPENHAM & DAR MINI-RALLY
NEW VENUE: Kington Langley Village Hall, Church Road, Kington Langley SN15 5NJ
The doors open at 10am, disabled visitors 9.30am. Admission is £2 with under 16s free. There is on site car parking. There will be trade stands, a car boot area and refreshments will be available. The new venue is 1.5 miles south of the M4 J17. Details from Brian, G6HUI on 0772 224 2741. [www.g3vre.org.uk].

25 SEPTEMBER
BELGIUM AMATEUR RADIO & COMPUTER RALLY
Hall 'Louvexpo', 7 rue du Hocquet, La Louvière. Direct access from the motorway (50km south of Brussels). Open from 9am. Talk-in on local FM repeaters 145.600MHz, 438.875MHz and DSTAR 439.4375MHz. Features 4000m², trade stands from United Kingdom, Holland, Germany, France and flea market. Detailos from Michel, ON7FI, +32 475 45 45 78, michel.dewyngaert@skynet.be. [www.on6ll.be].

30 SEPTEMBER & 1 OCTOBER
NATIONAL HAMFEST
Newark & Nottinghamshire Showground, Lincoln Road, Winthorpe, Newark, Notts 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 – **BVWS AUTO JUMBLE**

2 OCTOBER – **BLACKWOOD ARS RALLY**

7-9 OCTOBER – **RSGB CONVENTION**
[www.rsgb.org/convention]

9 OCTOBER – **HORNSEA AMATEUR RADIO RALLY**

9 OCTOBER – **HACK GREEN BUNKER RALLY**

16 OCTOBER – **HOLSWORTHY RADIO RALLY**

22 OCTOBER – **CARRICKFERGUS ARG RALLY**

23 OCTOBER – **GALASHIELS RALLY**

23 OCTOBER – **NORTH WALES RALLY**

6 NOVEMBER – **WEST LONDON RADIO AND ELECTRONICS SHOW**

6 NOVEMBER – **BUSHVALLEY ARC ANNUAL RALLY**

19 NOVEMBER – **ROCHDALE & DISTRICT AMATEUR RADIO SOCIETY TRADITIONAL RADIO RALLY**

20 NOVEMBER – **CATS RADIO & ELEC. BAZAAR**

20 NOVEMBER – **PLYMOUTH RADIO RALLY**

3 DECEMBER – **SOUTH LANCS WINTER RALLY**

4 DECEMBER – **BISHOP AUCKLAND RAC RALLY**

19 FEBRUARY 2017 – **RADIOACTIVE FAIR, NANTWICH**

26 FEBRUARY 2017 – **CENTRAL COAST AMATEUR RADIO CLUB RALLY**

6 MAY 2017 – **SOUTHERN ELECTRONICS & RADIO FAIR (EASTBOURNE RALLY)**

19-21 MAY 2017 – **DAYTON HAMVENTION®**

11 JUNE 2017 – **JUNCTION 28 AMATEUR RADIO RALLY**

25 JUNE 2017 – **WEST OF ENGLAND RADIO RALLY**

14-16 JULY 2017 – **FRIEDRICHSHAFEN**

RADIO SOCIETY OF GREAT BRITAIN
ADVANCING AMATEUR RADIO SINCE 1913

Founded in 1913 incorporated 1926. RSGB is a trading name of Radio Society of Great Britain, a limited company registered in England and Wales with company number 00216431. Member society of the International Amateur Radio Union.

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.

RSGB MEMBERSHIP

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Paying other than by Direct Debit attracts a £4 premium.

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

YOUR RSGB

This page provides names and contact details for Board Members and Regional Managers. Members seeking advice and guidance on any aspect of amateur radio or the Society's work are free to contact the relevant person. Before doing so, please do check the comprehensive FAQs on the RSGB website at www.rsgb.org/faq/ to see if your question is answered there.
Details of RSGB Committees appear on the RSGB website, http://rsgb.org/main/about-us/committees/
Details for contacting the various departments at the RSGB HQ appear on the website at http://rsgb.org/main/contact/

THE RSGB BOARD

Nick Henwood, G3RWF (RSGB President)
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Alan Messenger, GOTLK, email: gOtlk@rsgb.org.uk
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Ian Shepherd, G4EVK, email: g4evk@rsgb.org.uk

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email: gm.dept@rsgb.org.uk

Honorary Treasurer:
Richard Horton, G4AOJ, email: g4aoj@rsgb.org.uk

Company Secretary:
Post vacant

Note: The General Manager, Company Secretary and Honorary Treasurer are not Directors, but are in attendance at Board Meetings.

REGIONAL MANAGERS

Region 1 – M Hazel-McGown, MMOZIF, rm1@rsgb.org.uk
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HEADQUARTERS

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Bedford MK44 3WH
+44 (0)1234 832 700

AMATEUR RADIO FILM

Waldemar Sznajder, 3Z6AEF
President Polish Amateur Radio Union (PZK)

I would like to convey our deepest thanks for the film produced by the Radio Society of Great Britain entitled *21st Century Hobby*, promoting amateur radio as a hobby. Paweł Zakrzewski, SP7TEV, the IARU Liaison Officer of the PZK, received a copy on DVD.

This invaluable material will constitute a fantastic tool for highly efficient and effective promotion of amateur radio as an interesting and versatile activity as widely as possible on the Internet, directly in Poland and also within the Polish speaking communities all over the world.

To sum up, let me express our deepest thanks once again, in the name of all Polish radio amateurs, for your valuable assistance.

ACRONYMS, JARGON AND OTHER TURN-OFFS...

Robert Olive, 2E0HQO

I am prompted by the letter from GM3BST to write with some sympathy and understanding of the points he raises. I am but a spring chicken at 77 compared to his 96 years, but I have only recently 'returned to the fold' in the last two years after an absence of 60 years or more from the world of amateur radio – having passed both Foundation and Intermediate in successive courses, thanks to the great tutors at Newbury and District ARS. I first became aware of ham radio as a teenager in 1955 when I first met my father, G3HQO (SK). This encouraged me to enlist in the Royal Corps of Signals in 1957 as a Radio Technician, which occupation I followed for three years before embarking upon a totally different life in Africa... During my Service I worked continually on the 'usual suspects' – 1940s WS 19, WS 52 and WS 53 – that were well within my compass, training and understanding.

I recently decided to re-examine the possibilities of obtaining a licence having stumbled, literally, across a nice working Eddystone 730 at a car boot sale (for £5, honestly!) a couple of years ago.

As a result. I decided to re-join the RSGB (I was BRS 21343 in 1956), having managed most of the technical issues in the excellent Foundation booklet without any swotting. My main difficulty was, and is, bridging the massive technical gap between 1940s technology (1960 being when I last saw the inside of a radio of any description), and the incredible major advancements that I found in 2014. Whilst quite obviously the basics were pretty much the same, printed circuitry, digitisation and all the other modern developments were tricky to navigate my way through. Also there seems to be so much more now going on in ham radio than there was just running, say a simple 100W homebrew, in the 1950s on 80m through to 10m in the evenings and weekends.

Despite some uncertainty on my part, but having obtained my 2E, my intention is to operate a maximum 50W station on HF 'in the old style' as I remember the 1950s, when such as SSB (if I remember correctly) was only just becoming the then norm, and names like Yaesu were beginning to supplant the traditional, mainly American, brands such as Hallicrafters, RCA, etc.

My point is this; when I receive *RadCom* I am overwhelmed by the amount of jargon, acronyms, abbreviations and other specialist nomenclature quite simply because I do not understand most of it! Are there Members out there somewhere who understand my problem, who might consider putting together a glossary of all these terms together with simple explanations? Am I the only one in this predicament?

It need not be a major publication, but a few simple pages that could be inserted in the magazine, as a supplement, or even published as an official RSGB booklet.

I would be interested in Members' views.

OPEN NIGHTS FOR YOUNG PEOPLE

Christopher Donaldson, 2E1BNF

I have been an amateur for a few years now but when I tell people, especially those of a similar age, that I am a radio amateur they usually think I mean CB or that I'm a DJ and ask about the music I play! Perhaps some local radio clubs could think about open nights where young people in particular could be encouraged to see what amateur radio is all about.

BUYER COLLECTS

Graham Lindsay, G8BZL

I was astonished at comments from G3NBY and G1MFG about 'buyer inspects and collects'. I advertised my FT-1000mp Mk 5 last month with this proviso assuming that no buyer in his right mind would pay that much for an item without seeing it. However it seems I was wrong. Everyone has a different idea of what good or mint condition is. Having many friends who have bought blind and regretted it because 'no returns accepted' was part of the deal, I assumed a buyer would want to test my rig out on air. But if anyone wants to buy my transceiver unseen and pay carriage and accept it with no option to return it if it is not as expected, please give me a call. After all it is an extraordinarily good bargain!

Graham Taylor, 2E0VPT

I feel I must respond to the criticism, leveled at the 'Prefer Buyer Collect' adverts in the August *RadCom*.

In my case, it certainly isn't a case of finding a 'next day, countrywide, delivery courier for £10', or even paying for insurance. What concerns me is that the goods I am selling should be received by the buyer in the same condition it was in when it left my home.

Recently, I sold a tranceiver to a ham in Doncaster. As I live in the West Midlands, we came to an arrangement and met halfway between our two addresses. I had a day out in the Peak District and the deal was completed satisfactory. My latest advertisement appeared in *RadCom* and the item was sold on the first day of the magazine's issue – and was collected by the purchaser. We have all read about, and seen in some cases, the horror stories concerning some parcel delivery companies, hence my concern for property that remains mine until successfully handed over to the buyer.

Finally, in my opinion, surely it is up to the seller, how they want to word the advertisement and how they want to conduct the sale.

Richard Constantine, G3UGF

August's *RadCom* contained sage advice for advertisers regarding 'Buyer Collects' adverts. As an inveterate collector of things, I have a burgeoning collection of real radios that glow in the dark, most acquired through eBay or magazine sales.

All too often I've encountered the dreaded 'buyer collects' epitaph and must confess it has put me off on many an occasion. Nevertheless there are some, simply must have, radio items that have prompted me go the extra mile (or hundred). The strategy originally adopted for online purchases was to contact the seller, ask if they were prepared to pack the goods and for myself to arrange a courier collection. Along the way some have declined and it's perhaps been their loss, but most have agreed. Following a disastrous episode, where one sender put two kW radios in the same flimsy box, without any internal packing, only for them to arrive as a smashed and dented pile of scrap and with no redress, I now have another tack. At the risk of reducing my chances to snap up a bargain ever again, here's what I do.

I always send my own packing to the seller first. It costs a little more but it's certainly worth it. I send out a large, secure box containing bubble wrap, a roll of packaging tape and pre-printed address labels plus 'Fragile Glass' labels. The key ingredient is a large plastic bag full of those little wiggly, polystyrene chips, that look like S shaped popcorn. The step by step instruction sheet tells the sender to open the radio, close all the variable capacitors and stuff the wiggly bits in tightly, especially around the valves (which are best left in their sockets). Then to wrap the radio tightly into the box with bubble wrap, tape, label and email me to arrange collection .

It might sound a little over the top, but I can assure readers that it works and I haven't lost a radio, a crystal, a filter, or a hot transistor yet! .

...and oh yes, I do have a Joystick and an ATU

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(of sorts) in a 'Woolies' sandwich box, somewhere in this large pile of very valuable junk, but haven't seen it for quite some time.

JOYSTICK

Peter Hancock, 7Q7PH/GU3WOW

In 1966-67, whilst teaching physics in the Angoni Highlands of Malawi, I acquired my licence after purchasing a KW2000 from departing colleague Peter Sandiford, G3STF/7Q7PS.

My complete rig, shown in the photo below, in addition to the transceiver, also included a self-built Heathkit GC1A Mohican SW receiver, a homebrew SWR meter – in an Agfa slide box – a 20m dipole slung between two trees and a Joystick. I laboriously trimmed the dipole down an inch at a time until SWR was extremely close to 1:1 at mid-band.

At some point I replaced the 6146 PA valves with 6146Bs to up the power a bit, in effect transforming the transceiver into something resembling a KW2000A.

Our location at 6000' ASL proved ideal since I made contacts pretty well worldwide. Sunspot conditions were moving close to maximum toward the end of my time. The Joystick, shown here in the photo, worked surprisingly well indoors, even though we were under a corrugated iron roof.

Nowadays my rig is still fairly basic: IC-725 plus G5RV. And my Joystick is still in service occasionally.

50 YEARS MEMBERSHIP

Mike George, G3XYG

I was thrilled to get my personalised G3XYG badge this week in celebration of 50 years Membership. I also celebrated my 80th birthday so it has been a memorable week.

My station is all homebrew (PICaSTAR project) and although I'm more interested in building than rag-chewing, I have had many years of pleasure from amateur radio as a hobby.

Congratulations on your birthday and Membership milestones. The badge is just a small token of recognition and appreciation from us for your continued Membership.
Steve Thomas, M1ACB, RSGB General Manager

SLIM JIMS AND VF

Tom Morgan, ZS1AFS/ZT1T/G0CAJ

Down in ZS1 I get my *RadCom* late – but it does arrive. I look forward to reading what goes on 'out there'.

I noted the excellent Slim Jim article with a chuckle. Because I'm the only visible radio ham in Robertson, I get asked to help 'because I know that sort of thing'. And so it was when two young Americans ladies turned up on my doorstep with my friend, Alwyn. One was holding a little bag. Out of it they produced parts of an antenna that fitted together. I looked at it and said, "It's a HB9CV". And my friend said, "There you are, Tom can help you!" And that is how I can to design and assemble a HB9CV for the mountain cat project. It would be attached to a plane.

After the trials Alwyn asked, "Can't you make an antenna for me?" He's a flyer and uses his aeronautical handheld to monitor our airfield (no control tower). It was Sue, ZS1AFR/G0EZN who suggested the versatile Slim Jim for the top of his house. She has made quite a few from 300Ω ribbon and fixed in a piece of electrical conduit. We are still using the one from our station on the top of Dollis Hill, London NW2. We upscaled the measurements in proportion (I think we got our original measurement from PW's *Out of Thin Air*) attached a coaxial lead and adjusted the SWR to 1:1 – easy. Whether 300Ω ribbon would work on HF relying on a suspension point remains to be seen.

ANTENNA BUILD

Chris, M0KPW
Furness Amateur Radio Society

May's edition of *RadCom* featured a very interesting article entitled 'A Simple Halo Antenna For The 2m Band'. This was a design for a low cost 2m antenna that could be built from copper pipe and a few 'odds and sods' and, more importantly, could be built within a time frame of an evening's club meeting. Furness ARS had been looking for a suitable construction project for club members for some time and this seemed the ideal candidate. A prototype was built by Martyn, M0TEB and all the relevant components were sourced and the build night was planned for late June. About 12 club members requested to build the antenna and copper pipe was pre-cut beforehand to allow time for the construction to fit into the desired time of a club meeting. Antennas started to take shape as people used a former to shape the copper, pillar and hand drills, pipe cutters etc. Lengths of RG58 with a PL259 soldered were used to test the SWR of the antennas – with nearly all of them coming in at 1.2:1. Those who didn't construct were on hand to offer assistance and advice during the evening, and the night proved to be very popular.

Two club members, Nick, G0HIK and Chris, M0KPW, decided to up-scale the antenna to make 6m versions – slightly more unwieldy and involving shaping the copper pipe around tractor wheels. But again the completed antennas came in with a low SWR.

Two weeks later, members met on a local hillside in glorious sunshine to put the antennas on the air and put them through their paces. Members tested them on FM and SSB making local contacts with other club members at their home QTHs and out portable in other locations around Furness.

The 6m versions were also tested, but 6m was not in great shape on the evening, so only a couple of local contacts were made. The 6m Halos have since been tried out and QSOs had been made into France, Spain, Italy, Germany and Croatia running around 65W. Club members enjoyed the constructions of these antennas are looking for other suitable projects that can fit in to one or two club nights.

OLD RADIO SETS

Phil Moss, M0PBM

I noted the advert for Philip Lawson's book *Restoring Old Radio Sets* with interest. I have rather a collection now, it is hard not to keep getting them! The advert states these are now rather a rarity: I must disagree. Let me point you in two directions: they are both charities, not commercial. First, the British Vintage Radio & TV Museum, Dulwich, (www.bvwtm.org.uk) usually has a number of sets for sale, from very old to transistor portables, also some televisions at fairly low to very low prices. The place also has about 1500 sets on display, very well worth a visit. Secondly the BVWS, British Vintage Wireless Society (www.bvws.org.uk), has auctions around the country, where hundreds of sets, plus audio, test gear, military and miscellaneous items are sold and I am aware they have just acquired several large collections, requiring extra sales to be laid on. There is also the National Vintage Communications Fair (info@nvcf.org.uk) who hold sales. So you are not limited to car boot sales and 'antique' shops and their inflated prices.

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