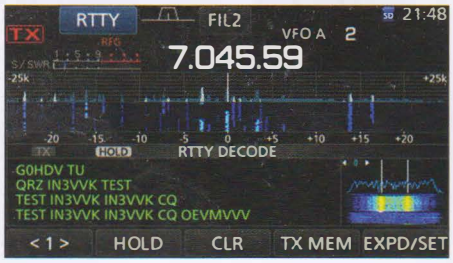
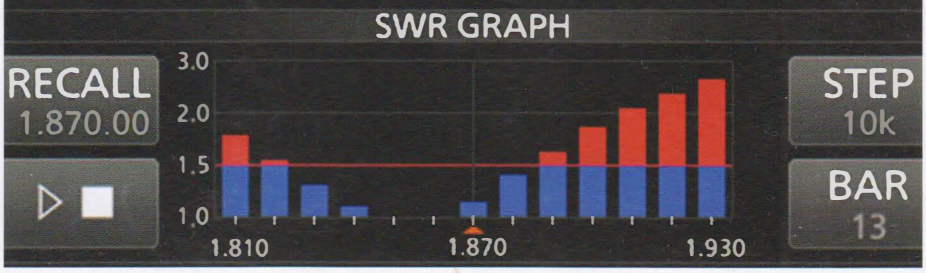
Radio Society of Great Britain
Advancing amateur radio since 1913

RadCom



Icom IC-7300 HF-4m

Peter Hart, G3SJX examines the first mainstream Japanese transceiver to adopt full direct-digital sampling SDR technology while retaining traditional knobs and dials – the revolutionary benefits of SDR with no computer needed



WATERS & STANTON

EUROPE'S HAM STORE

WEEKLY DEALS SIGN UP

- Weekly Discounts
- News on Upcoming Events
- Latest Deals and Offers

Scan QR code with your smartphone or tablet to sign up

1st Annual National Ham BBQ • 23rd July 2016 • Starts 11:30am

National Ham BBQ with live Band

An event for all the family in 5 acres of grounds with children's play area and FREE parking. Large exhibition hall, lecture theatre and licensed bar. Features includes BBQ, Lecture Stream, Family Cream Teas and free hot and soft drinks. Late afternoon join us in the bar for live Smooth Jazz from UK's top artists. The latest details are on:

www.nationalhamradiobbq.co.uk

Starts 11.30am - Live Smooth Jazz Late Afternoon

WHAT'S HAPPENING?

Flea Market & Club Tables
Bring your unwanted gear along to sell in exhibition hall. Radio Clubs and associated organisations are also invited to display their offerings. Don't miss this opportunity to promote yourself.

Raffle Draw
If you're feeling lucky, you can take part in our Raffle Draw, giving you the chance to win some big prizes! All raffle tickets will be £1 each and everyone will have the chance to win!

Free Parking For 100 Cars
The Hockley Community Centre provides spacing for up to 100 cars, so there is no need to worry about where you're going to park. The car park is also free for all visitors!

Lectures
All lectures to be announced.

WHERE IS IT?

Hockley Community Centre
Westminster Drive,
Hockley, Essex
SS5 4XD

WHO'S ATTENDING?

ICOM KENWOOD
ELECRAFT
FlexRadio Systems® Software Defined Radios
innovAntennas™ Performance through Innovation
YAESU

More information is available at www.nationalhamradiobbq.co.uk

FLEX RADIO

CALL ABOUT FLEX TRADE UP PROGRAM

FLEX-6300
The FLEX-6300 provides an entry point into multi-dimensional amateur radio operations from CW to the latest digital modes.
£2099.95

Flex-6500
The FLEX-6500™ is for the advanced operator who desires extended performance across four slice receivers.
£3579.95

Flex Maestro
The FlexRadio Maestro™ is an intuitive, plug-and-play control console that directs operation of any FLEX-6000 Signature Series transceiver without the need of a traditional PC.
£1199.95

Flex-6700
FLEX-6700 for the most demanding amateur needs. Capable of displaying up to six slice receivers and two antennas at any one time on HF and 50MHz.
£5999.95

Flex-6700R
An SDR receiver for the most demanding of Amateur's needs on HF/VHF wideband receiver.
£4899.95

Flex-Control
A FlexControl is the ultimate VFO and radio control accessory for all FlexRadio Systems' software defined radios.
£109.95

Maestro Accessories
Tilt - Stand for Maestro gives variable tilt.
£89.95

Battery - Make the Maestro more portable with this battery.
£26.95

APACHE LABS

SOLE IMPORTER

ANAN-100BE
2 slice Rx 100 watt HF and 6M software defined radio multi-mode transceiver. The receiver is Direct Down Conversion, providing continuous, uninterrupted, receive coverage from 10KHz to 55MHz. Can also support up to two receivers (sharing the same antenna) each at the same time.
£1749.95

Anan-10E
Up to 7 slice Rx 15W All-Mode SDR transceiver covers from 160 - 6m.
£1495.95

Anan-100E
7 slice Rx 100 watt HF and 6M software defined radio multi-mode transceiver.
£2174.95

Anan 200DE
Up to 7 slice RX 100W 160-6m all mode SDR transceiver with 150k logic elements.
£3849.95

EXPERT ELECTRONICS

OFFICIAL IMPORTER

SUNSDR2 PRO
Designed for advanced HF/6m, 20W output, and 2m, 8W output, operation. Even the most experienced operator will be surprised by its capabilities.
£1189.95

MB-1
New generation of amateur radio. Get 100W output on HF/6m and 8W on 2m with this transceiver that combines a classic design and the most advanced DUC/DDC SDR technologies (No ATU).
£4299.95

Waters & Stanton Ltd, Spa House, 22 Main Road, Hockley, Essex SS5 4QS
01702 204965 FAX 01702 205843 sales@wsplc.com
@wsplc blog.hamradiostore.co.uk facebook.com/WatersandStanton YouTube Waters and Stanton

W&S @ Jaycee, 20 Woodside Way, Glenrothes, Fife KY7 5DF
01592 756962
jayceecoms@aol.com

We have free parking, a cafe opposite and a pub nearby 'pay us a visit'

StepplR

All SteppIR available from stock as of July. Call for today's best prices.

In 2000 Mike K7IR, designed an antenna that has adjustable elements inside an ouwwter casing that permits optimum and continuous tuning throughout its range. Guaranteed low VSWR wherever you operate in any band.

BUYING STEPPIR

There has always been a wait for getting your SteppIR antenna from the USA. Things are changing and we now aim to carry stock of the more popular items.

ELECRAFT

SOLE IMPORTER

ELECRAFT KX2

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

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

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

Purchase yours today from Waters and Stanton!

KX2: £789.95

ELECRAFT K3S

Options available:

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

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

Features:

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

K3S/100-F £2749.95
K3S/10-F £2199.95
K3S/100-K £2599.95
K3S/10-K £2049.95

ELECRAFT ACCESSORIES

SOLE IMPORTER

ELECRAFT PX3

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

Features include:

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

PX3-K £499.95
PX3-F £559.95

KXPA100

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

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

KXPA-100-K £799.95
KXPA-100-F £849.95

SP-3

The SP3 is internally modelled to remove resonances. It has dual inputs and can be used with any transceiver.

£199.95

SPID ROTATORS

ALPHA-SPID RAU

A step up from the mainstream rotators and provides excellent support for direct round mast mounting. Weighs 6.5kg and can hold 120kg.

£420.00

ALPHA-SPID RAS

An excellent option for medium sized EME arrays with good reliability and easy setup and interfacing to PC systems. Weighs 14kg and recommended for LFA and OWL arrays up to 14el x 4.

£825.00

BUDDIPOLE

Buddipole Deluxe Long

40-4m portable antenna kit with tripod mast, rotating arm, long carry bag, extra long 18' whip.

£359.95

Buddipole

40-2m portable antenna kit with Balun.

£179.95

Buddistick

7-54 MHz portable antenna kit continuous 250W.

£149.95

BUY NOW PAY LATER FINANCE AVAILABLE! CONTACT US FOR MORE DETAILS

www.hamradiostore.co.uk

Sign up to our Newsletter at hamradiostore.co.uk for exclusive deals and latest news

YAESU DEALS

OFFICIAL RE-SELLER

NEW

FTM-3200DE

Rugged yet compact C4FM/FM 65W mobile transceiver of solid RF power. Loud and Crystal Clear Front Panel Speaker with 3W of Audio Output. Instantly recognises digital or analogue transmission and adjusts automatically for flawless co existence of both digital and analogue users.

£184.95

BEST SELLER

FT-991

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

Call for latest price

£400 Cashback available

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.

Price: £929.95

FT-1DE

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

Call for latest price

NEW

FTM-100DE

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

Call for latest price

FT-DX1200

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

Call for latest price

FT-817ND

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

Call for latest price

FTM-400DE

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

£389.95

FT-450D

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

Call for latest price

PRICE MATCH
We will not be beaten - If we have to match a competitors price, we will give you a free £20.00 MFJ voucher

KENWOOD DEALS

KENWOOD DEALER OF THE YEAR

FREE Heil equipment with Kenwood purchase

TS-480HX/TS-480SAT

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

Call for best prices

NEW IN STOCK

TS-990S

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

Call for best prices

NEW LICENCE DEAL. CALL FOR DETAILS

TS-590SG

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

Call for best prices

TH-F7E

This dual band 2m/70cm transceiver handheld is also a wide band all mode receiver from 0.1MHz to 1300MHz. You can receive two frequencies at once, even from the same band. Comes equipped with a powerful 7.4V, 1550mAh lithium-ion battery for high output and Hi/Low/El settings for extended battery life.

Call for best prices

ICOM DEALS

OFFICIAL RE-SELLER

NEW STOCK ARRIVED

IC-7300

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

£1049.95

NEW

Reviewed this Issue

NOW IN STOCK

IC-7851

The new Icom IC-7851, the flagship transceiver from Icom! It features a new Local Oscillator, an audio scope function, dual scope function, high resolution waterfall display and much more!

Call for latest price

BEST SELLER

IC-7100

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

£999.95

BUY NOW PAY LATER FINANCE AVAILABLE! CONTACT US FOR MORE DETAILS

www.hamradiostore.co.uk

Pay us a visit and check out our amazing demo facility
Sign up to our Newsletter at hamradiostore.co.uk for exclusive deals and latest news

Waters & Stanton Ltd, Spa House, 22 Main Road, Hockley, Essex SS5 4QS

01702 204965 | 01702 205843 | sales@wsplc.com

@wsplc | blog.hamradiostore.co.uk | facebook.com/WatersandStanton | YouTube Waters and Stanton

W&S @ Jaycee, 20 Woodside Way, Glenrothes, Fife KY7 5DF

01592 756962

jayceecoms@aol.com

We have free parking, a cafe opposite and a pub nearby 'pay us a visit'

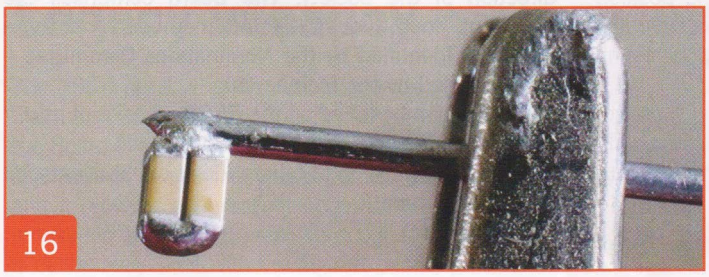
Contents

August 2016

News and Reports

Regulars

Reviews



Technical Features

Features

Cover image:
Icom IC-7300 HF, 50 and 70MHz transceiver

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

Managing Editor: Elaine Richards, G4LFM, elaine.richards@rsgb.org.uk
Technical Editor: Giles Read, G1MFG, giles.read@rsgb.org.uk
Layout and Design: Kevin Williams, M6CYB, kevin.williams@rsgb.org.uk

All contributions and correspondence concerning *RadCom* should be posted to: *RadCom* Editor, 3 Abbey Court, Fraser Road, Priory Business Park, Bedford MK44 3WH Phone 01234 832 700, fax 01234 831 496, radcom@rsgb.org.uk

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 September edition of *RadCom* is expected to arrive with most Members by 25 August, although this can take up to a week longer in some cases; international deliveries can take longer still.**

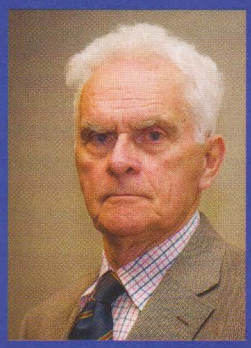
All material in *RadCom* is subject to editing for length, clarity, style, punctuation, grammar, legality & taste. Articles for *RadCom* are accepted on the strict understanding that they are previously unpublished and not currently on offer to any other publication. Unless otherwise indicated the RSGB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

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

The RSGB is on Twitter @theRSGB

Find us on Facebook at www.facebook.com/theRSGB

Rupert Thorogood, G3KKT, SK



It is with great sadness that we announce the passing of Rupert Thorogood, G3KKT, who was the RSGB Company Secretary from 2006 until he passed away on 25 June 2016. His role as Company Secretary meant that he was rarely in the forefront of the Society's activities and many Members only saw him at the AGM. However, Rupert provided considerable knowledge and experience to the Board's activities and had an exceptional eye for detail.

A number of Rupert's colleagues and friends have sent us their memories and stories. The full list of contributions is available on the RSGB website (www.rsgb.org/g3kkt-sk), here are some that we think portray the man behind the role.

"I first met Rupert about 25 years ago, when we were both working on GSM radio standards in the early 1990s; he was working in the DTI. Our paths crossed in many meetings around the world, where he used to turn up in his private aeroplane, throwing the travel claims department into chaos with the mileage claim calculated on a Great Circle route. He was always interesting to talk to, full of anecdotes, and full of a zest for life. I shall miss him." *Charles Brookson, G4GBA.*

"I knew Rupert through my time as Regional Manager, and whilst I was on the Selection Committee. Rupert was very knowledgeable as Company Secretary, knew the Articles and Bylaws and all the relevant company legislation from cover to cover, and could literally quote the relevant lines, word-for-word in some cases. I certainly enjoyed working alongside him, and I'm sure he will be missed by many." *Mark Harper, MW1MDH*

"When he worked with me in the DTI, he was going off to an ETSI meeting that was being held in Zurich. He came to see me (I was notionally his boss) to ask whether he could fly to Zurich. I said "Well, you *can* fly to Zurich, although there are few direct flights from London and as it's a small airport there, so it's a bit of a hairy landing. Most people fly to Geneva and then take a train." He replied "No I mean is it OK if I fly *myself* there in *my* aeroplane?" I must have been mad, but trying not to think of the DTI's liability if he crashed his plane into a Swiss bank, I said he could do so as long as his travel expenses claim was capped by the British Airways fare to Geneva plus the Swiss rail fare on to Zurich. So that's what he did." *David Hendon*

"I first met Rupert when he moved to Cheltenham. He confused admin staff here by claiming motor mileage when flying his Piper Apache/Aztec G-MOLY on business. He took me on a local flight on one occasion, probably the only occasion that I'll ever get my hands on the controls of a twin engine aircraft (very sensibly he didn't let me land it!). 73, Rupert." *Ken, G3LVP*

"It was a privilege to work with Rupert while I was RSGB President and last spoke to him at the AGM in Glasgow. RIP Rupert." *Colin Thomas, G3PSM*

"I very much enjoyed working with Rupert while I was on the Board. I bumped into him just a few weeks ago at Reading station and we had a nice chat – he seemed in fine fettle and this comes as a real shock." *Don Field, G3XTT*

In addition to his role within the Society, Rupert was an active radio amateur and particularly enjoyed operating from far-flung places. He will be missed greatly; our thoughts are with his family at this time.

New microwave manager

The RSGB Board is pleased to announce the appointment of Barry Lewis, G4SJH to the position of Microwave Manager. He brings considerable experience to the role from homebrew and contesting to regulatory affairs.

Barry succeeds the former Microwave Manager Murray Niman, G6JYB, to whom the Board extend their thanks for his efforts on behalf of the amateur community.

RSGB Directors

The RSGB Board plays an important role in the strategic direction of the Society. The Board comprises the President, four directly elected members and three Members identified by the Nominations Committee – and endorsed by the Membership.

Details can be found on the RSGB website at http://rsgb.org/main/about-us/board-of-directors/
They are always keen to talk to Members at events, so look out for them!

Regional COTY winner

In June, Stockport Radio Society were very honoured to be presented with the RSGB Region 3 Club of the Year 2015 (Large Clubs) shield. It was presented to Heather Stanley, M6HNS by Dave Wilson, M0OBW on behalf of Regional Manager Kath Wilson, M1CNY who was unable to attend, but sent her apologies at missing the presentation. This is the second time that Stockport Radio Society has won this shield. The first win was in 2009, the inaugural year of the competition.

Good luck to all the regional finalists from both small and large clubs. The top three places will be announced at the National Hamfest later this year. The Club of the Year competition is sponsored by Waters & Stanton, to whom the RSGB extends its thanks for their continued support.

Youngsters on the Air 2017

The RSGB Youth Committee is delighted to announce that the bid to host the IARU YOTA 2017 summer camp has been successful and we are proud to be hosting this prestigious international event.

Around 100 young people under the age of 26 from all over IARU Region 1 will be coming to the UK to take part. There will be a week-long set of wireless technology activities including a Special Event Station, a buildathon, antenna building, ARDF, a SOTA activation and the opportunity to visit some landmark 'tourist' sites to get the cultural experience.

A project team has been set up and after investigating a range of sites across the UK it has been decided that the event will be hosted at Gilwell Park, the UK Scouting HQ, during the week 5-12 August 2017.

Sara, 2IOSSW, Nick, M6NJR, Arthur, 2E0RTY and Kieran, M6RZR are representing the UK at this year's event in Austria and we will be advertising for the UK team for 2017 in January. Watch this space!

We have already had offers of help for YOTA 2017 from a number of clubs, including Loughton & Epping Forest ARS, Radio Society of Harrow, Camb-Hams and the Radio Scouting leaders from Gilwell Park. If you believe you have any skills to offer during the event please contact yota@rsgb.org.uk We would be particularly interested to hear from young Members or Affiliated Societies who could lead an activity or talk that will educate and/or inspire the YOTA teams.

Running an event such as YOTA 2017 is not without some costs. The IARU makes a significant contribution but we need to find the rest. The RSGB is therefore seeking supporters from the amateur radio community who wish to be associated with this event and help financially. Supporters of all sizes are welcome and if you would like to know more please visit www.rsgb.org/yotasupporter

Legacy vacancy

The RSGB Legacy Fund exists due to the generosity of donors and the Legacy Sub-Committee works with the Board to consider and recommend proposals for its use. The Fund currently stands at about £170,000 and it provides an excellent opportunity to support innovation and development. Its scope for proposals is deliberately wide with the highest priority given to proposals focused on taking our hobby forward. See page 34 for more details on what the Fund does.

There are currently four trustees and we wish to make one further appointment. The term of office for trustees is three years with a two term maximum. Most work is conducted by email and Skype.

We would like to hear from Members who would be interested in serving. RSGB President Nick Henwood, G3RWF is currently Chairman of the sub-committee and would welcome informal discussion, initially via email to president@rsgb.org.uk

Applications by CV should arrive with the General Manager, Steve Thomas, M1ACB, via email to gm@rsgb.org.uk by 31 August 2016.

UK Licence Exams at the RSGB Convention

At the RSGB Convention, 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 Assessment before the Convention.

QSL Bureau sub manager Jack Brazzil, G3WP, SK

John (Jack) Brazzill, G3WP was born in Brightlingsea Essex on 19 February 1918. During WWII he saw service as a radio operator in the Royal Navy. Jack was an RSGB QSL Bureau Sub Manager based in Chelmsford Essex for over 50 years. He was a quiet, unassuming and gentle man who lead a simple life of simple pleasures and always said what he thought, loved by those who knew him for his simplicity and honesty.

New Region 7 manager co-opted

The RSGB Board has co-opted a new Regional Manager for South Wales – Region 7. The post will become due for election at the next AGM in 2017. Glyn Jones, GW0ANA has been appointed as Regional Manager for Region 7.

Schools Link Project

Now that the Tim Peake school contacts have finished, you might be thinking that it is all over. As far as we're concerned, this is just the beginning of another big project, and we wanted to share the latest updates with you.

The RSGB has set up the Schools Link Project (SLP) to work initially with the ten ARISS contact schools to develop wireless-related science and its technologies into activities for use in everyday teaching. Ian Stevenson, G3YNU is leading the project for the Technical & Eduction Committee (TEC). The idea has been welcomed by all the schools.

Schools. Some of these have already set up amateur radio clubs as a result of pupils getting their Foundation licence to lead the ARISS contacts. Others are being very active with their local clubs and are looking for ways in which to include amateur radio activities into their busy schedules, or are running Foundation courses for other pupils. Ian is working closely with Ashfield Primary School and Sandringham Secondary School in particular.

Hilderstone Electronics and Radio Club are working closely with **Wellesley House School**. The school has an amateur radio club, they have applied for a UK Space Agency grant under the Tim Peake grant scheme, and the club put on a number of activities at the school as part of Women in Engineering Day in June. Several more pupils have expressed an interest in finding out more about amateur radio as a result.

Ashfield Primary School is developing a long-term plan for embedding wireless science in the curriculum. They would like to develop a Foundation course for 10-11 year-olds but realise it will take time to plan properly.

Sandringham School has an amateur radio club that is very active under the guidance of headteacher, Alan Grey, who is G4DJX.

Sidmouth ARS has been working with **King's School** to enable them to start an after-school radio club, probably by the Autumn term. The school is applying for a grant to run the club and SARS will help obtain a club callsign and be responsible for the club's on-air operation until they get a Full licence. The club is running a Foundation course starting in late July, and one of the IT Techs from the school will be undertaking the course.

The **Norwich Schools** have submitted a bid for the Tim Peake grant, and **Derby School** is also considering it.

QSL Matters

We always ask Members to 'check before they send'. Printing cards and labels by computer definitely makes life easier for operators, but can increase the volume of non-processable cards for QSL bureaux around the world. Whilst processing cards this month for GI/MI/2I we noted that 20% of all cards in one of the groups were for a single station that clearly states online "QSL: Please only, LOTW." This tells us cards won't be collected and there will be no replies: sadly, those sending cards hadn't looked at the information.

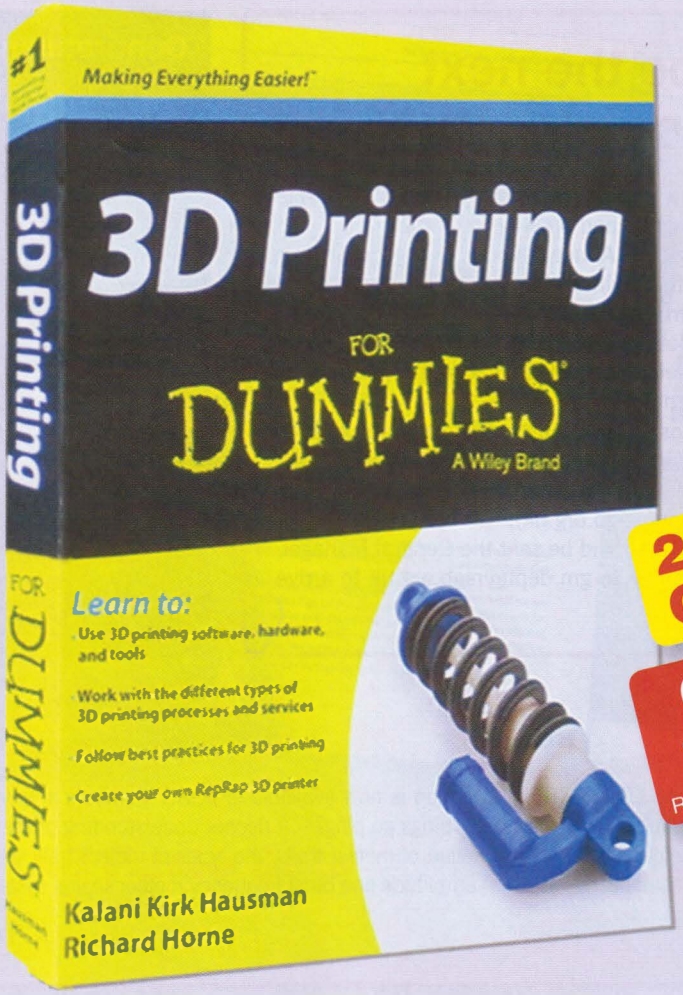
G4 Series changes: Activity in all series waxes and wanes and not just with sunspot activity! Much depends on the age and circumstances of the operators. This means that the bureau activity and workload has to change to reflect this. At the present time there is an overdue need to consolidate the G4 series. Following a period of consultation, the first of these changes will be in place by early August. Jeff Pascoe, G4ELZ will handle all calls, G4A-F and Ian Fugler, G4IIY will handle G4G-L. The bureau will arrange all envelope and card transfers. Our sincere thanks go to Nigel Roberts, G4KZZ and Chris Lennox, G4LXU who have both kindly relinquished their own callsign groups to make this possible. Nigel will continue to handle the very busy GO series complete and we thank Chis for his excellent service and diligence on behalf of G4L members.

Contest calls: Are you interested in contesting or DXing? Current short call contest sub manager Shaun Imms, MOIMM wishes to step down, due to changes in his work pattern. We'd be pleased to hear in from a member of the contesting fraternity, listener or licensed, interested in taking his place. If you have a little time, space and basic spreadsheet knowledge, supporting contest activity in the UK could be of interest to you. Please email qsl@rsgb.org.uk for more information.

Holiday season: Planning a holiday to a different UK prefix this year? Please remember to find details of the QSL manager in your holiday destination before you go (check the RSGB website) and lodge C5 collection envelopes bearing your Membership number as soon as possible. Remember, those visiting places like the Channel Islands or Isle of Man need to buy stamps locally as UK mainland stamps can't be used.

NEW

P&P FROM FREE
(Over £30 See Page 78 For Details)



25% OFF

ONLY £16.49
RSGB Members' Price

3D Printing For Dummies

By Kalani Kirk Hausman & Richard Horne

Done in the usual 'Dummies' style this *3D Printing For Dummies* book explains all that you need to know to get started printing out 3D objects quickly and inexpensively!

3D printing is no longer just the preserve of expensive printers working with incomprehensible and equally expensive software. This remarkable technology has now come to the masses with the growing availability of 3D printers at lower costs than ever before. *3D Printing For Dummies* provides a friendly but straightforward guide that examines the types of 3D printing technology available. You'll discover methods for the creation of 3D printable objects using software, 3D scanners and even photographs. The mysteries of stereolithography, selective sintering, fused deposition and granular binding techniques are all explained. The book even provides a design for making your own 3D printer the 'RepRap' printer and walks you through the process of creating a printer using open source designs, software, and hardware.

3D Printing For Dummies provides a great insight into this fast developing area of technology. It provides the knowledge needed to manufacture specialist parts of unusual design or construction at home. Be you keen constructor or just want to know about the technology this book provides a fascinating guide to the possibilities of 3D printing.

Size: 188 x 234mm, 384 pages
ISBN: 9781 1186 6075 1
Non Members' £21.99
RSGB Members' £16.49 (25% off)

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

Could you be the next Company Secretary?

The RSGB is looking for a new Company Secretary. This is a key role in the Society's governance regime and provides important support in the running of Board meetings and Annual General Meetings. We are keen to appoint a volunteer from within the Membership and would be very pleased to hear from anyone with appropriate knowledge, skills and experience. The Board is very conscious that it currently lacks diversity and would welcome applications from social/ethnic groups who are underrepresented.

The main duties of the post are set out in the Society's Articles of Association (http://thersgb.org/aboutus/articles/articles-of-association.pdf) and detailed Terms of Reference are available from the General Manager (gm.dept@rsgb.org.uk).

Applications, including a CV, should be sent the General Manager, Steve Thomas, M1ACB, by email to gm.dept@rsgb.org.uk to arrive by 31 August 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 S Fenwick	G3AIO
Mr B H Thwaites	G3CVI
Mr G A Errock	G3HCO
60 Years	
Mr F Claytonsmith	GM3JKS
Mr K G Grover	G3KIP
Mr D W Blakeley	G3KZN
Mr D A Shepherd C.Eng. MIEE	G3LCS
Mr G L Adams	G3LEQ
50 Years	
Mr F Turner-Smith	G3VKI
Mr C Linnell	G3VLT
Mr M P Coombs	G3VTO
Mr D W Cannings	G4DWC
Mr P Shield	G8BXM
Mr R T Sherrard	GI3VAW

RSGB Videos

The latest video of a lecture from the 2015 RSGB Convention is now available to RSGB Members at www.rsgb.org/pingtalk This lecture was given as part of the VHF theme and is entitled 'What makes the pings go ping? – A deeper understanding of meteor scatter' by Dr John Worsnop, G4BAO. It looks at the principles behind meteor scatter, the formation of meteor trails, the types of meteor trail, the effect of operating frequency and of path geometry, the system throughput – burst duration, burst amplitude and burst frequency meteor scatter system issues, the antenna and its environment as well as receiver performance.

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 R Ogden, 2E0RYO
Mr C Mcdonald, 2M0FOB
Mr J McDonald, 2M0IOT
Mr N Alward, 2W0NCA
Dr G Hiltl, DK5FJ
Mr L Radlofl, DL5KUA
Galway VHF Group, EI4ALE
Mr A Tilt, G1JMX
Luton VHF Group, G3SVJ
Mr G Train, G4LEX
National Hamfest (Lincoln) Ltd, G4STO
Mr S Daniels, G6UIM
Mr S Duffield, G7CBW
Mr M Wyman, G7JLI
Mr S Kazuhiro, JR2KCW
Mr E Darrah, K7ERD
Mr J H Griffin, KD5ISH
Mr C Blevins, KE5HRS
Mr T Koschmieder, KG5LBS
Mr V Rytikov, KK6YGB
Mr E Luteran, KL7HRN
Mr R Dykes, M0IAZ
Miss A Grace, M0UDP
Mr J Haughie, M1AEB
Mr G Nutsey, M1AQO
Mr A Barber, M1FIM
Mr A White, M3VQF
Mr A Jones, M6ALX
Mr S Powell, M6FHX
Mr H Beavis, M6GQW
Mr T Keep, M6GYY
Mr C Loud, M6HCG
Mr P Ashton, M6HVM
Mr A Wallace, M6IFR
Ms S Jones, M6ISJ
Miss J Adams, M6JJX
Mr D Simmons, M6KND
Mr R Dunnaker, M6KNY
Mr L Brace, M6LGK
Mr J Wood, M6ONS
Mr S Latimer, M6OOL
Mr R Hawkes, M6RQH
Mr V Davies, M6RVA
Ms T Jones, M6TEP
Master G Radulescu, M6UKX
Mrs J Buck, M6YJB
Mr M Housley, M6ZWD
Mr K Gascoyne, MD6KFH
Mr N Smith, MD6NSS
Mr A Glasgow, MI6HGI
Mr R Davison, MW0WML
Mr B Stewart, MW6EEI
Mr G Holcomb, N4CYI
Mr C D Barton, NZ5M
Mr H van Loenhout, ON4MM
Mr J T Saiger, RS 207154
Mr C M Jones, RS206473
Mr M Gosi, RS308353
Mrs J Etherington, RS308831
Mr A Noyce, RS308837
Mr K Davies, RS308840
Mr J Armand, RS308843
Mr D Wells, RS308844
Mr G Bryant, RS308877
Mr A Fitton, RS308895
Mr L Furr, RS308917
Mr V M Pillai, RS308945
Mr P Guthrie, RS308972
Miss C Leach, RS308978
Mr P Dillon, RS308984
Mr R Hutcheon, RS308986
Mr P Ewington, RS309029
Mr P Allen, RS309044
Mr M Bayman, RS309072
Mr M Sherman, RS309094
Mr D Meakin, RS309099
Mr C Locock, RS309110
Mr L Hendry, RS309111
Mr J Webber, RS309112
Mr M Chapman, RS309142
Mr S Edwards, RS309148
Mr J Stigell, SM0WHH
Mr U D Kutlu, TA3UDK
Mr P Burford, VK3ZPQ
Mr M McTaggart, WA4UT
Mr R Smith, WU2S
Mr E J Efchak, WX2R

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

Mr A Rudge, 2E0BBD
Mr G Stockbridge, 2E0BJJ
Mr P Wright, 2E0CKJ
Mr W Dover, 2E0PGP
Mr M Marsh, 2E0RCK
Mr J Hanse, AC8HZ
Mr F Wuelfing, DK6QI
Mr L Radloff, DL5KUA
Mr K Bennett, G0DUK
Mr D Allison, G0JQR
Mr J Edwards, G0MJZ
Mr J L M Mattison, G0PTG
Mr P Maynard, G0TCP
Mr C S Brown, G1FGB
Mr J C Lennard, G1HXP
Mr M Lowe, G1NNU
Mr G M A Barber, G3WQT
Mr F W Barker, G4AUQ
Mr R B P Carpenter, G4BAH
Mr R E Hammond, G4FKR
Mr A R Geering, G4LMS
Mr A Hibberd, G8AQN
Mr D Pedley, G8EMA
Mr R W Trussler, GM0CSN
Mr T W G Menzies, GM1GEQ
Ms Y Benting, GM7DMN
Mr P Schlatter, HB9DQT
Mr K Scodova, KE8UR
Mr V Kjemperud, LA7EJ
Mr N Haigh, M0KKH
Mr D Conway, M0YDC
Mr K Heselton, M1EMC
Mr R E Johnson, M5ROB
Mr A J Morgan, M5ZAP
Mr E Price, M6ETP
Mr I Fraser, M6GBK
Mr P J Laird, MM0AUP
Mr J Stuart, MM3VQA
Mr J Browne, MM6RKT
Mr J Hayhurst, MW0DBB
Mr B Dumitrescu, MW0HCC
Mr R Meal, MW0RGM
Mr J Rowlands, MW1CFN
Mr G Hopkins, MW1DCF
Mr A Rees, MW1LCR
Mr T Arey, N2EI
Tele Klub RY/ABB OY, OH6BI
Mr S G Greenaway, RS210402
Mr G Waldron, RS212952
Mr M Cowell, RS308958
Mr V Christiani, VE7252
Dr G Lemaster, WB5OYP

NEW

P&P FROM FREE
(Over £30 See Page 78 For Details)

ONLY £7.64
RSGB Members' Price

Restoring Old Radio Sets

By Philip Lawson, G4FCL

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

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

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

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

Also available on amazonkindle

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

Special Events Stations

Chippenham and District ARC will be operating GB5CRC for the month of August to celebrate its 50th anniversary. Formed in 1966, its first meeting was held at Hardenhuish Boys School in Chippenham. It now holds regular meetings at the Sea Cadet HQ Chippenham on Tuesday nights. All welcome. A rally at Kington Langley Village Hall will take place on 25 September. See www.g3vre.org.uk for further details.

South Essex ARS will be will be attending Canvey Community Archive at the War Memorial Hall, High Street, Canvey Island, Essex SS8 7RB on 10 September from 10am to 4pm and operating GX4RSE. Their stand will have Morse keys and sounders for people to try and test their skill as well as information on the International Space Station and amateur radio videos and a information on how to get licensed.

GB75ACO will be on the air celebrating 75 years of the Air Training Corps between 3 and 28 September (10am to 8pm on Saturdays and Sunday; 7.45 to 9.15pm Monday and Wednesday, outside this when operators are available). Primary operation will be on 40m using SSB and some CW. A special QSL card is available for those that collect QSLs. Please QSL direct to G4PSH or via the RSGB Bureau. See www.QRZ.com

Churches and Chapels On The Air (CHOTA) will take place on Saturday 10 September. If you intend to put a station on please register your station with John, G3XYF by email to g3xyf@btconnect.com

Amateur radio at EMF 2016

Derek, G7LFC and his daughter Rebecca, M6BUB, will be running an installation entitled 'Communicating around the world without the Internet' at Electromagnetic Field in Guildford from 5 to 7 August.

Using the callsign GB8EMF the pair will demonstrate to the thousands in attendance why wireless radio communication is still relevant to a world that sees the internet as the last word in worldwide communication.

On-site will be an HF station demonstrating communication using voice and digital modes, such as PSK. There will also be a VHF station that will be used to show how wireless communication can continue to operate when other web based communications systems fail.

The camp is to be held at Loseley Park, Guilford and is effectively a temporary village of geeks, crafters and technology enthusiasts that's lit up by night and buzzing with activity during the day. Over a thousand curious people will descend on the camp's friendly open space to learn, share, and talk about what they love.

Further details about EMF 2016 can be found at www.emfcamp.org

W&S Open Day

Waters & Stanton held their 26th Annual Open Day in May at their showroom in Hockley. It was a busy day with good weather so there were gazebos on the forecourt providing refreshments and second-hand sales to the many visitors. Reps from Icom, Kenwood and Yaesu were in attendance and there was a programme of interesting mini-lectures in the showroom. Leiston (Suffolk) and Norfolk Radio Clubs visited to receive their plaques and certificates for winning Region 12 RSGB Club of the Year for 2015. Essex CW Club were on the air using their Elecraft K3 hooked up to the new SteppIR and had a lot of contacts. A charity raffle was held to support British Wireless for the Blind Fund.

Men's shed electronics

Many 'Men's Sheds' have been set up across the UK over the last two years. Most offer woodworking and other activities that appeal to retired men seeking to learn and share new skills. Electronics is often seen as complex and components expensive to obtain, so electronics and related activities may not be offered. However UK radio amateurs, regardless of location, are well placed to help grow and develop this vital community resource. In the future many more men will retire and want to engage in useful community based activities like electronics.

Here's how radio amateurs can help. To kick start or grow an electronics group within a Men's Shed the following are needed:

- new through hole electronic components
- small hand tools, soldering irons, basic multimeters
- unassembled and complete electronic kits
- mentors willing to share their electronics skills in short sessions

The Men's Shed Electronics project is coordinated by David Searle, formerly GM8WNY, ZL3DWS, VK2DWS. In New Zealand, with helpful start up advice from Steve Hartley, David and a group of 45 radio amateurs held Electronic Buildathon events for hundreds of young people. In acknowledgement of that, he was awarded *NZ Amateur of the Year* by NZ amateur radio society NZART. You can contact David via mensshedelectronics@gmail.com

Training initiative

Six radio clubs (Bromley, Cray Valley, Crystal Palace, Darenth Valley, North Kent & West Kent) in South East London and adjacent areas of Kent have formed the South East Tutors (SET) group to support, promote and deliver fully taught courses covering all levels of the amateur radio licence. By improving coordination and promotion between local clubs, SET aims to makes it easier for candidates to see all local courses on offer along with progression options from foundation through to full licence. See http://goo.gl/AEV5GN for further information and links to SET clubs including a timetable of which club has what course running and when.

Martin's 60th birthday party

The attendance was excellent with around 400 customers visiting the ML&S showroom. ML&S even decorated the street to celebrate Her Majesty's 90th birthday. Burgers and hot dogs along with refreshments and even entertainment were available (not forgetting the bacon butties from 7am)! Customers came from literally all over the UK and the special day was filmed by mls.tv as well as the crew from TX-Factor who will make a special feature in a forthcoming episode. Representatives from Yaesu and Icom UK were on site throughout the day. Dave Stockley, G4ELP, the Chairman of Icom UK, even made the four hour round-journey, just to join in the celebrations. A great day was had by all Martin would like to thank all those who turned up.

AMSAT-UK Colloquium 2016

This year's Colloquium is now only a few weeks away. The event takes place at the Holiday Inn in Guildford over the weekend of the 29 to 31 July. A full programme of presentations, covering all aspects of the amateur satellite world, has been developed for the Saturday and Sunday and a Beginners Session is scheduled for the Friday afternoon. Sessions will include updates on the many new satellites that are expected to be launched over the next few months. This includes Eshail-2 that will carry the first ever geostationary amateur radio transponder and provide more than 8MHz of new intercontinental spectrum – it will provide coverage to five continents. Additionally there is a session on how to develop software receivers using GNU radio, reviews of the Tim Peake ARISS contacts and the STEM results achieved, information about a new 76GHz satellite project, a review of how to operate 'in the field' and lots more.

As well as the presentations during the day, Libby Jackson, from the UK Space Agency, with whom the ARISS UK team worked closely during the Tim Peake mission, will be speaking during the Gala Dinner on the Saturday evening. Full details are at https://amsat-uk.org/colloquium

Bill Newman, M0BNN, SK

Bill Newman, M0BNN passed away peacefully in his sleep in May. He was renowned all over the world for the many distinctive QSL cards that he produced to commemorate contacts at out of the way lighthouse sites that he visited and photographed. The cards he made for the Planet Lightship (GB2LBL) and Fort Perch Rock (GB4FPR) together with the ships that called at Liverpool and the personal cards he produced to commemorate people and occasions are second to none. Bill came into the amateur radio world late on in his life but he made a great impression on Wirral ARS.

bhi Summer Sale

DSP noise cancelling specialist bhi Ltd are running a Summer Sale until 31 August. bhi have a range of DSP noise cancelling speakers, in-line modules and a retrofit install modules to suit most applications. Order from any of bhi's authorised dealers or contact bhi on 01444 870 333 and www.bhi-ltd.com, quoting reference SUMMER10 when placing an order.

Raising funds for Cornwall Hospice Care

In the summer of 2017, Dennis, G7AGZ is planning an ascent of Ben Nevis in aid of Cornwall Hospice Care. Once he's made it to the top he plans to operate a special event station on VHF for around two hours, subject to the weather. All sponsorship from local companies and individuals will go to the Cornwall Hospice Care, with any costs borne by Dennis. Check out his QRZ.com page, which carries full details of this event.

Jaycee Open Day

On Saturday 27 August, Jaycee Electronics have their open day at 20 Woodside Way, Glenrothes, Fife KY7 5DF. There will be talks and lectures during the day including Justin Johnson, G0KSC on 4m, Chris Ridley, G8GKC from Icom on the inside story of the IC-7300 and Ian, GM3SEK on reducing noise levels and avoiding RF interference in your shack. There will be refreshments available, free on-street parking and a charity raffle.

International YL Convention

The YL Convention taking place in Milton Keynes in October is a get together like no other and it is for like-minded ladies across the world who enjoys the hobby of amateur radio. It takes place from 5 to 8 October and will include optional visits to Bletchley Park, Woburn Abbey, Milton Keynes and the RSGB Convention. For full details see www.bylara.org.uk

Help wanted for JOTA

A Cub leader in Dronfield, Derbyshire is looking for a radio amateur (or group of amateurs) who are interested in running a JOTA station over the weekend of 14 to 16 October. Drop a line to the Region 13 Manager, Jim Stevenson, via email to rm13@rsgb.org.uk if you can help.

Continued on page 15

radcom@rsgb.org.uk

New Products

More on the KX2 transceiver

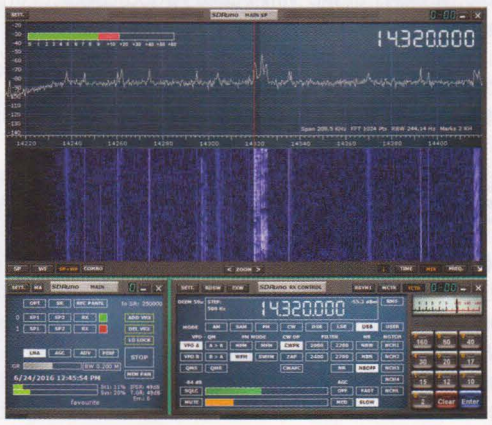
Following the launch at Dayton in May, Elecraft is now in full production on the KX2 transceiver. It has features very similar to the KX3 but is about half the size and weight and can fit in a jacket pocket. It can even be used hand-held, with a built-in microphone to facilitate HT-style operation. Despite its small size (1.5 x 2.8 x 5.8") and light weight (13oz.), the KX2 can be configured as a complete HF station, with options for an internal 2.6Ah Li-ion battery, wide-range automatic antenna tuner, hand held microphone and attached CW keyer paddle. This greatly reduces the amount of gear and cables needed for field outings. For home and mobile use, the KX2 works with the Elecraft KXPA100 100W amplifier. It can transmit in SSB, CW, and data modes at up to 10 watts. True SDR technology, with 32-bit IF DSP, provides features normally found only in desktop rigs: dual watch with stereo audio, noise blanking, noise reduction, auto-notch, 8-band RX/TX EQ, a digital voice recorder with two transmit messages, and PSK31/PSK63/RTTY text decode/display. The operator can use the attached keyer paddle to transmit in data modes without a PC. The KX2 covers 80-10m (9 bands). For further details, visit www.elecraft.com.

Barenco antenna mounting hardware

Barenco produce a huge range of antenna mounting hardware and a new hand-built display was delivered to the ML&S showroom in June. It took Brian Gell (Barenco's owner) and his team two weeks to design and lay out the wall display, showing all the small specialist parts that the company produces from its engineering works in Nottingham. ML&S stock all Barenco parts including the huge bespoke range of wall brackets, mast accessories etc. The photo shows ML&S Sales Manager, Richard Radford & Brian Gell, Managing Director of Barenco Ltd, with the new display board for their showroom. For the full range of Barenco at ML&S see www.HamRadio.uk/Barenco

SDRplay

SDRplay have announced the official release of SDRuno software for their SDRplay RSP (Receive Signal Processor). SDRuno is the new name for the RSP compatible version of the Studio 1 specialist SDR software. The new software is freely available to all current and future users of the RSP and provides native support for the SDRplay RSP. SDRuno provides multiple receivers thus allowing the simultaneous reception of different modulation systems within the same receive bandwidth. The filters offer an ultimate rejection of greater than 140dB and the software has a unique distortion-free double stage AGC with fully adjustable parameters. The software also includes multiple notch filters with bandwidth adjustable down to 1Hz. For full details and to download the new software visit: www.sdrplay.com/windows.html



Miniature USB enclosures

Hammond Manufacturing, well known for their range of die-cast and ABS enclosures, have announced an extension to their popular 1551 series of USB enclosures. The new range has a cut-out for a standard Type A plug and features three sizes that are 35mm, 50mm or 65mm long and 20mm, 25mm or 30mm wide respectively. The height of all version is 15.5mm the two smaller units have two PCB stand-offs whilst the larger model has four stand-offs. Standard colours available are black, grey, translucent clear, translucent smoke and translucent red. Full details and drawings are available from the Hammond Manufacturing website at www.hammondmfg.com/1551USB.htm

RFinder and Lithuania

Lietuvos Radijo Medeju Draugija (LRMD), the National Society of Lithuania, has joined as the twelfth Member Society of RFinder. They will be responsible for maintaining the very latest LT Repeater data for RFinder, the world wide repeater directory. RFinder has over 60,000 repeaters in over 170 countries in the database. The annual subscription provides access to repeater data through its collections of Apps on Android and iPhone, web, RT Systems and CHIRP radio programmers. www.rfinder.net/

New digital controller for azimuthal rotators

US company Array Solutions has launched the RA-S1, a digital controller for azimuthal rotators. Amongst its main features are voltage output regulated with pulse width modulation, software defined limits so that your stacked antennas won't hit the tower and it is very intuitive to configure, it's firmware upgradeable with the USB port so your controller will never be out of date and was developed to work with most of the available rotators in the marked, being able to control AC and DC that have positioning feedback by pulses or internal potentiometer. See www.arraysolutions.com for full details.

News continued from page 13

Endurance 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 18 to 26 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. Details are available on www.RedKiteRadio.org.uk

Changes in Andorra

In an Andorran government resolution dated 16 June 2016, Andorran amateurs received news of two new bands plus an increase in power in an existing one.

60m/5MHz. Andorra returns to 60m/5MHz under the new WRC15 allocation of 5351.5 – 5366.5kHz with a maximum power of 15W EIRP. CW and USB is permitted, with a maximum bandwidth of 5kHz. This is temporary until 31 December 2016 and permanent from 1 January 2017.

4m. A new 4m allocation of 70.0 – 70.2MHz has been granted on a non-interference basis with a maximum power of 10W. All modes are permitted and users must abide by the IARU Region 1 4m/70MHz band plan.

6m. A power increase has been granted up to a maximum of 600W.

Details of these changes can be found on the website of the Andorran national society, URA, which also contains some links to official Andorran government documents. See www.ura.ad/Pla_de_Bandes.html

Homebrew

This month we look at low noise receive amplifiers for VHF, UHF and microwaves.

PHOTO 1: Surface mount capacitors paralleled and prepared for soldering to the PCB (see text).

The radio spectrum from LF to around 70MHz is a rather noisy place. Due to the relatively high level of atmospheric and man-made noise at these frequencies, low noise or high gain RF amplifiers are rarely needed. In most cases, receiver sensitivity will be limited by noise from external sources, rather than noise generated within the receiver. This is easily demonstrated by swapping your HF aerial for a 50Ω dummy load. If you see a large decrease in noise when you switch to the load, your receive sensitivity is probably more than adequate. My main HF receiver has no front end RF amplification and a lossy diode first mixer. Despite this apparent disadvantage, I can easily hear the band noise on 10m, even late at night when the band is closed.

The situation at VHF, UHF and microwaves is quite different. These bands tend to be much quieter because of the lower level of man-made noise (QRM) and the almost total lack of natural atmospheric noise (QRN). If you are lucky, the band noise at your location will be so low that you may enjoy better receive sensitivity by using a low noise preamp.

At VHF and above, it is relatively easy to make high gain directional aerials that will enhance wanted signals, while rejecting signals and noise coming from other directions. This improvement in signal-to-noise ratio will allow reception of weaker signals. For radio amateurs, the ultimate test of receiver sensitivity is EME (moonbounce) operation where a high gain array is pointed at cold sky, well away from earthly noise sources. Under these conditions, a very low noise preamp can give a significant improvement in sensitivity. A very informative paper on noise figure is at [1].

Receiver sensitivity has improved steadily over the years. At one time, the state of the art was driven by the needs of radio astronomers as well as amateur EME enthusiasts. Large radio telescopes had fat budgets for the latest electronics and cryogenic cooling to keep noise to a minimum. Low noise devices developed for astronomy, space communication and military applications would eventually become available to the home constructor. Suitable devices were often difficult to source and quite expensive. At the end of the 1980s, mass produced satellite TV receivers became a cheap consumer item. Complete systems including the receiver, dish and LNB could be bought for around £200. The LNB (low noise block converter) included the complete RF front end and contained several microwave transistors. As there was a need to make the dish as small as possible, there was a strong incentive to develop new ultra-low noise transistors that cost pennies rather than pounds.

The first generation of cheap LNBs had a claimed noise figure (NF) around 1.7dB at 10-12GHz. This improved to below 1dB within a few years. The current generation of LNBs specify even lower NF, although some of the claims are so outlandish that they should probably be regarded with suspicion. Low noise transistors for sat-TV reception are generally some form of single-gate FET (field effect transistor). These devices are inherently broad-banded and will usually achieve significant gain and very low NF at frequencies below the sat-TV bands. There are several different types and designations used for satellite reception. GaAsFETs, HEMT, PHEMT, Hetero-junction FET etc... In general, devices specified for sat-TV downconverters will have excellent performance on several amateur bands, at least up to 10GHz. Some of my old 2m receivers used unmarked microwave FETs that were lifted from scrap LNBs. Part of the fun was getting the devices out of the screened unit without destroying them and then spending hours experimenting

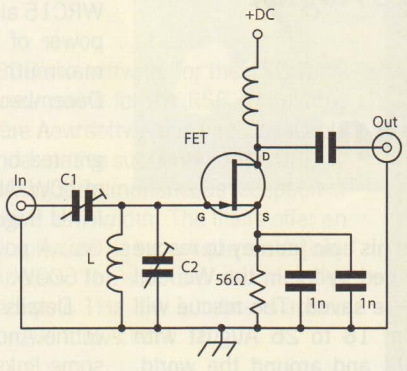


FIGURE 1: Basic layout of a FET RF amplifier.

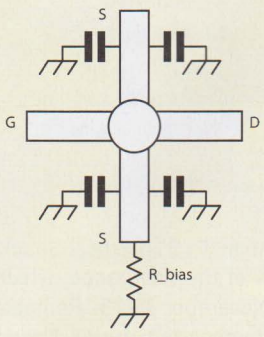


FIGURE 2: General configuration of a microwave FET package, bias and decoupling components.

to establish the optimum bias and input matching conditions for best NF at 144MHz. Now that new marked devices are available for well under £1 each in small quantities, there isn't as much incentive to recycle those old LNBs, although I still have a few in the junkbox.

A junction FET is a three terminal device that is functionally similar to a triode valve. Most microwave FETs are of this type. Four terminal, dual-gate 'tetrode' FETs are also available, but these are usually limited to VHF/UHF. **Figure 1** shows a basic layout for a FET RF amplifier. This is the standard common-source configuration. The layout is much the same as would be used for a HF amplifier.

The gate of a junction FET is a reversed biased diode junction. At low frequencies, this looks like a small capacitance in series with a very high resistance. At UHF and microwave frequencies, the input matching required for lowest NF will not be the same as for greatest gain or lowest return loss. If you have a noise figure meter or a suitable noise source, you can adjust the input matching for best NF. If you are setting up an amplifier using off-air signals, simply tuning for maximum received signal strength is not likely to achieve the best NF.

The more common types of JFET require a negative bias on the gate. In **Figure 1**, this is achieved by placing a resistor in the source circuit. As the gate is at ground potential, the voltage drop across this resistor pulls the source positive with respect to the gate. This resistor is bypassed for RF using one or more bypass capacitors. This simple method works very well at lower frequencies, but it should be applied carefully at VHF/UHF. At shorter cm wavelengths (GHz), it will be difficult if not impossible to achieve effective bypassing because of the inductance and physical size of the capacitors. To allow for easier grounding of the source, UHF/microwave FETs will usually have two source leads, each made from a strip of flat metal. These can be soldered to earthed pads on the PCB or directly to the ground foil. This approach usually calls for a negative bias supply for the gate circuit. This is slightly inconvenient because most amateur gear is designed to work with a single-ended DC supply, with the chassis bonded to the negative supply rail. However, it is not difficult to arrange a negative gate supply using a simple DC-DC converter. I have found that self-biasing works very well at 2m and 70cm. Good results are also possible at 23cm if the constructor is very careful with the physical layout. I usually use two parallel pairs of leadless surface-mount capacitors, one pair on each of the two source leads. **Figure 2** shows the configuration.

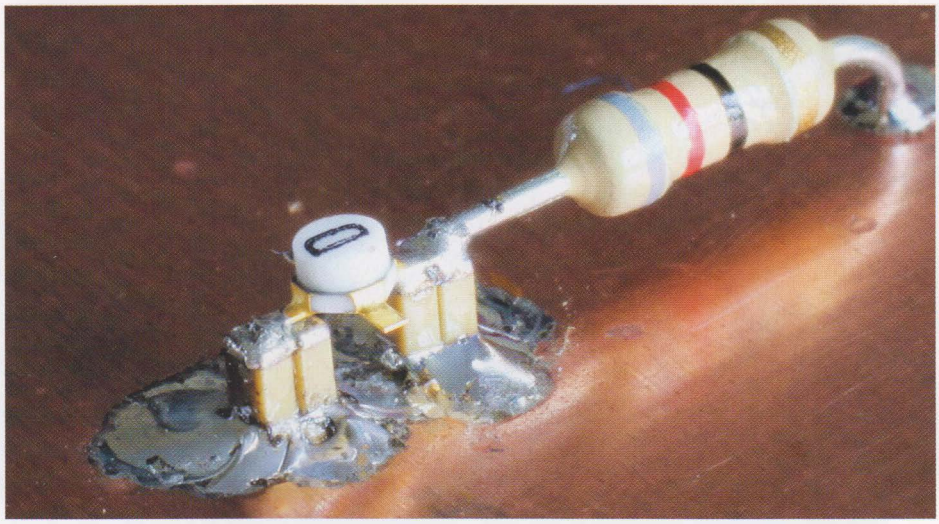


PHOTO 2: A microwave FET atop decoupling capacitors with a bias resistor (compare with Figure 2).

The problem with this approach is that it is quite difficult to solder the components in place. Even the usual tricks like using a wooden cocktail stick / toothpick to hold the components in place won't make the job much easier. To solder chip capacitors so that they are standing on-end above the copper foil, I stack two capacitors and solder the ends while holding them in place with a toothpick. The pair are then soldered to a length of tinned wire. See **Photo 1**. The wire makes it very easy to hold the capacitors in place while they are soldered to the PCB. I use one of the leads on a diode or capacitor as the wire; the component body makes a good 'handle' and also stops the hot wire from burning my fingertips. The capacitor pairs should be spaced to match the source lead positions of the FET. **Photo 2** shows a FET mounted using this method.

Input matching

Any of the usual impedance matching networks (PI, L T-network etc) can be used for FET input matching. The circuit in Figure 1 is very popular because of its great flexibility. Inductor L may be a standard coil or a transmission line (TL). Losses in the input network directly degrade the noise figure, so it is important that any losses here are kept to a minimum. A silver plated copper coil and a pair of air-spaced piston trimmers are a well tried and tested approach. At UHF, it is common practice to use a TL section in place of the coil. 'Cavity' type resonators can be made from copper rod or tube in a metal enclosure. As well as keeping resistive losses to a minimum, this method has the added advantage of keeping the input circuit completely screened from stray noise or interaction with the output circuit. As state-of-the art devices now boast NF of around 0.2-0.5dB, some constructors

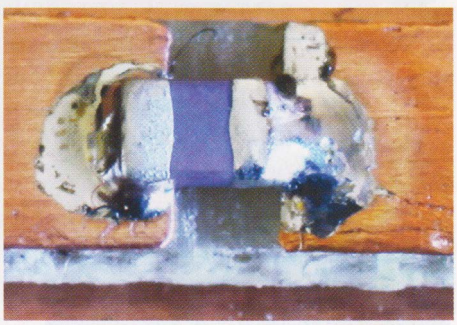


PHOTO 3: Surface mount capacitor on a transmission line.

will go to extraordinary lengths to keep input losses down. I know one amateur who uses coaxially arranged copper water pipe as the input line. How far would you go for that extra 0.1dB?

Devices that have substantial gain at cm wavelengths will have enormous gain at low frequencies. This combination of high gain over a very wide bandwidth is a perfect recipe for instability. You are likely to find that the maximum achievable gain of an amplifier is greater than the maximum *stable* gain. In my own experience, I have found that a high gain FET amplifier is unlikely to be unconditionally stable. In the case of my 2m receiver, the RF amp has gain in excess of 20dB and is always stable when the receive aerial is connected to the input. However, if the input is open-circuit, the RF amplifier takes off into oscillation, making loud 'birdies' across the band. I am happy to live with this conditional stability, because the amplifier is always stable while it is in use (ie the

Eamon Skelton, EI9GQ
hbradio@eircom.net

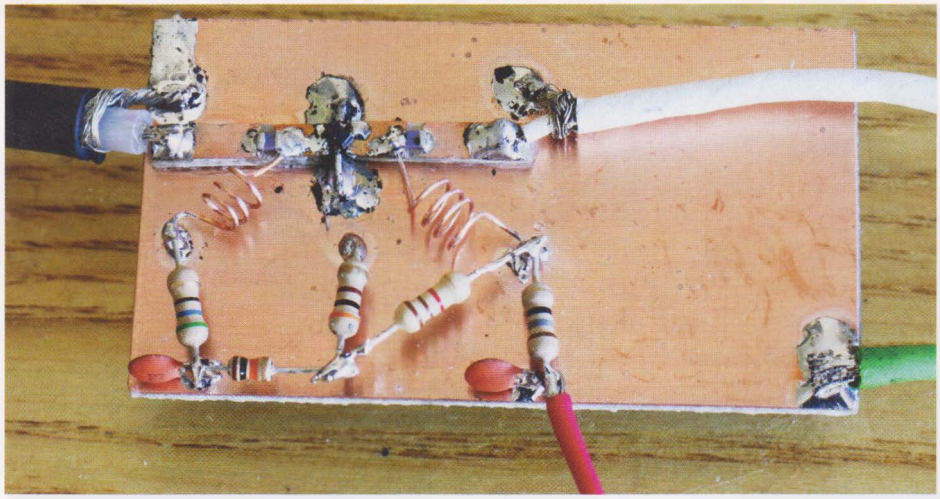


PHOTO 4: The assembled 23cm amplifier.

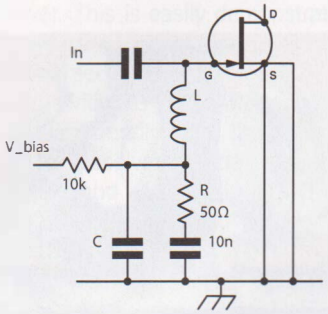


FIGURE 3: Input circuit of a FET amplifier.

aerial is connected). As this amplifier shows excellent NF (around 1dB), I am reluctant to tinker with it. With careful design of the input and output matching networks, it is possible to reduce the risk of instability at little or no cost in terms of gain or NF. **Figure 3** shows the input circuit of a FET amplifier. At the design frequency, inductor L feeds bias voltage to the gate of the FET. At lower frequencies, L and C act as a low pass filter (LPF) that effectively terminates the gate circuit with a 50Ω resistor for frequencies well below the normal operating frequency. This simple diplexer greatly reduces the risk of LF instability.

Enhancement mode FETs

The majority of FETs are N-channel depletion types that require a negative gate bias. There are a few enhancement mode types that require positive gate bias.

This is very convenient for at least two good reasons. It is relatively easy to provide the necessary positive gate bias voltage. In the simplest case, all that is required is a simple resistive divider. The other big advantage is that the designer can attach the source leads directly to ground, without any complications. One notable enhancement type device is the Avago ATF-54143. Excellent performance and very simple biasing requirements have made this one of the most popular choices for amateur preamp projects. The device is described as a "high dynamic range, low noise, E-PHEMT". The specs are just about ideal for a 23cm preamp:

2GHz; 3V, 60mA (typ)
36.2dBm output 3rd order intercept
20.4dBm output power at 1dB
gain compression
0.5dB noise figure
16.6dB associated gain.

Be aware that most microwave FETs are rather static sensitive.

Figure 4 shows a 23cm amplifier that is loosely based on a design from the Avago

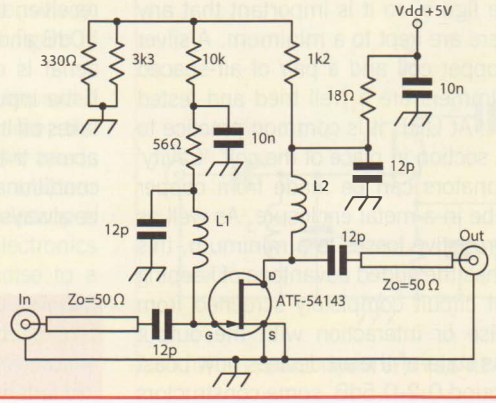


FIGURE 4: 23cm amplifier loosely based on an Avago application note.

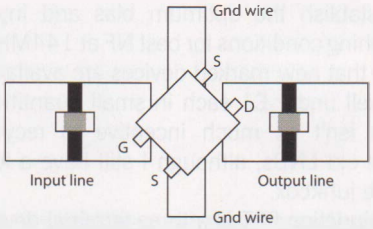


FIGURE 5: How the ATF-54143 is mounted on the transmission lines.

application notes [2]. The datasheet shows a simple passive bias circuit based on a resistive divider and an alternative active bias circuit based on a bipolar transistor. I chose the simpler option, although it would be quite easy to graft on the additional components for the active version.

The circuit is built around two strips of 50Ω line. This is superglued to the copper foil of some PCB laminate in the same manner as our recent projects. Each line is 2.8mm wide and 13mm long.

The two source terminals of the FET are soldered to a short length of 1mm wire that was soldered to the board in the gap between the input and output lines. 1.5mm wire would have made the job easier because it would be a closer match to the height of the PCB lines. The gate and drain connections are soldered directly to the input and output lines respectively. **Figure 5** shows how the transistor package is mounted. The copper track of each line was cut using a hacksaw blade and the gaps were bridged by the 0805 size I/O coupling capacitors. See **Photo 3**. L1 is 3 turns of bare copper wound on a 2.5mm former, L2 is 3.5 turns. The assembled amplifier is shown in **Photo 4**.

The capacitors can be installed on the lines before they are glued to the board. The ground wire should be soldered to the board before the lines are glued down. Don't use too much solder or you won't have enough clearance for the lines. The input line runs out to the edge of the board so that it can be soldered to a coax connector or cable.

As I don't have much in the way of test instruments for 23cm, gain was evaluated by assembling the receive converter as follows. RF amp, 3rd order BPF and 23cm to 2m mixer (June 2016). The 576MHz local oscillator was described in May. Gain of the 23cm amplifier seems very close to the expected value of 16-17dB.

Next month: more on RF amplifiers.

Websearch

[1] Agilent (HP) *Fundamentals of RF and Microwave Noise Figure Measurements* (Application Note 57-1) – http://cp.literature.agilent.com/litweb/pdf/5952-8255E.pdf
[2] Avago Application Note 1222

The radio... YAESU

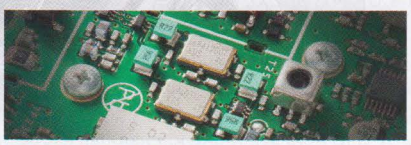
FT-991

HF/VHF/UHF
ALL MODE TRANSCEIVER

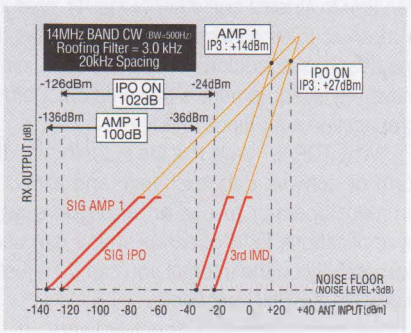
New generation all-band transceiver FT-991 offers full-fledged support for all modes including HF/50/144/430 MHz in a single compact unit

- Triple conversion with 1st IF frequency of 69.450MHz for all bands
- Narrow band 3 kHz roofing filter provided in standard configuration realizes excellent adjacent multi signal characteristics
- Features the highly acclaimed FTDX series quad mixer, along with a dedicated VHF/UHF mixer
- Highly effective interference removal functions are great for stress-free QSOs on the DX and Contest scene
- Final Stage with Ample Power Reserves: 100 W for HF/50 MHz Bands and 50 W for VHF/UHF Bands
- 3.5 inch full color touch panel display for convenient comfortable operating
- Advanced Spectrum Scope Function with Waterfall Display Capability
- Advanced technologies fully utilize the potential of C4FM Digital including high-quality transmit audio, AMS, and Group Monitor functions

* Snapshot image send/receive by C4FM digital is not possible.



3 kHz and 15 kHz Roofing Filter



IDR (IMD Dynamic range) / IP3 (3rd-Order Intercept Point) characteristics

C4FM Digital Communication Clear and Crisp Voice Technology

HF/VHF/UHF 100 W
All Mode Transceiver

FT-991

(144 MHz/ 430 MHz 50 W)

YAESU The radio

YAESU UK Ltd
Unit 12 Sun Valley Business Park, Winnall Close
Winchester, Hampshire SO23 0LB

For latest Yaesu news, visit us on the Internet: http://www.yaesu.co.uk

Data

BroadBand HamNet – BBHN

On 22 May the Crawley Amateur Radio Club hosted a meet-up for all those interested in BroadBand Hamnet. The meeting was organised by Ted, G4ELM, assisted by Andrew, G7UHN. Ted kindly supplied this summary of Hamnet and the meeting.

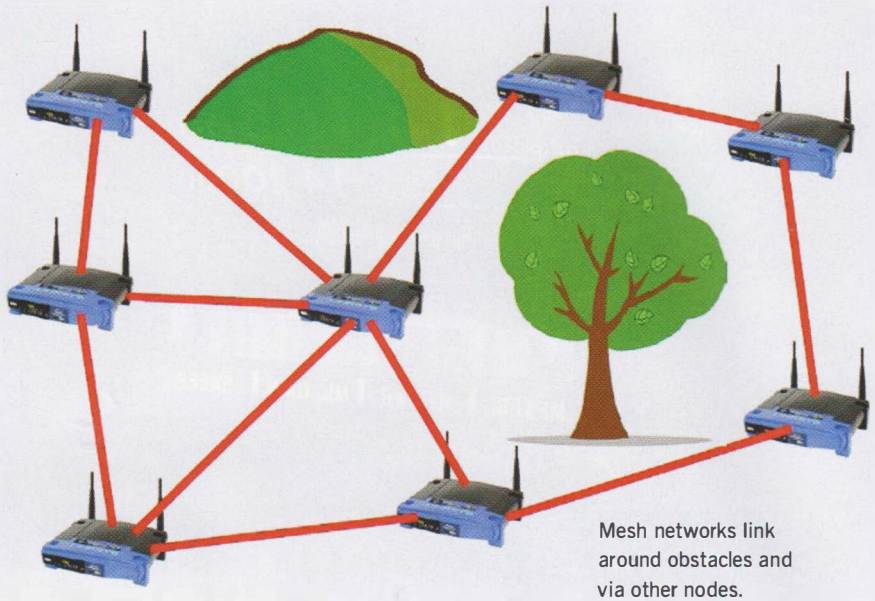
"The use of TCP/IP networking systems at microwave frequencies is a growing part of amateur radio operation in many areas of the USA. The major form is called BroadBand HamNet (BBHN). There are areas of high activity all across the States but the earliest 'hot spot' is centred around Austin, Texas, where the urbanised population supports high-tech activity and industry. Consequently, a large number of competent amateurs are available to develop such digital systems and to link their equipments into a city-wide 'Mesh' network. The amateur bands at 2.4, 3.4 and 5.6GHz are all used for this networking – often over surprisingly long paths. The US 900MHz band – not available in the UK – is also used.

"Why a 'Mesh'? Well, the system has been designed to automatically become a self discovering, self configuring, fault tolerant wireless network offering high speed exchange of TCP/IP data extending between all Nodes that can link to at least one other Node. The result is a mesh of interconnection paths and links that may vary as conditions change, Nodes join or leave (eg as equipment is powered on or off), or propagation conditions change.

"Why TCP/IP? Well, it is the industry standard form of network data exchange and allows an amateur operator to use an impressive range of applications for that data – if you can use it successfully on the internet you can do it just as easily via a BBHN network!

"Almost universally, the hardware in use consists of surplus wireless routers whose firmware (their internal operating system) has been reprogrammed, or 'reflashed', with custom, amateur-written code, freely downloadable from [1]. It is uploaded using the 'update firmware' option available on the hardware. This use of surplus hardware, often available at very low cost, or for free, means getting a basic BBHN node operational can cost next to nothing. Then, once set up, it merely becomes a tool to plug in or connect whatever you want to communicate.

"BBHN activity is growing steadily. An initial UK meeting was called recently to test the level of interest in forming a co-ordinating and development group for this exciting area of amateur work. Amateurs from across the country were invited to attend. A total of 23 turned up at the excellent facilities offered by the Crawley clubhouse (thanks CARC for the splendid hosting!) and many more would have come had travel arrangements allowed. An existing operator from Norwich travelled to the event and was rewarded by some superb assistance in getting more of his system operational. A pair of representatives from RAYNET were keen to see what applications were already available to support their specialist needs and were encouraged by the wide range of facilities offered by BBHN. Even two experienced Dutch BBHN operators took the trouble to fly in especially for the event and to discuss their own experiences – including running 'tunnels' to the USA. Many other UK operators are already active but tend to be spread thinly across the country, so direct RF linking is not yet available between more than a few of them.



Mesh networks link around obstacles and via other nodes.

"A presentation on the current state of BBHN development was given by Ted, G4ELM and a demonstration of all aspects of the technology used was provided by Rob, 2E0RPT. A fully portable Node was displayed by Andy, G7UHN, where his "overgrown lunch-box" was shown exchanging live video of the attendees in the clubhouse (together with their GPS location) via 2E0RPT's Node and onto the projection facility.

"Most significantly for short-term UK BBHN developments, the use of an internet tunnel facility was ably shown by Rob connecting his Node back to his home (some 50 miles away) and then, via his transatlantic tunnel arrangement, displaying a huge number of other stations from the USA, Canada, Australia and New Zealand, all linked together live on the BBHN network.

"Most of these stations were 'advertising' a wide variety of 'services' of direct interest to other radio amateurs including voice over IP (VoIP), web servers, webcams, text chat facilities, BBS's and, a few, remote station control of their HF equipment.

"The recent changes and developments in UK licensing were described and discussed and revealed to be highly favourable to BBHN as well as to remote station and unattended operation. BBHN can provide the necessary control network data linking for all such operations that the UK Amateur Licence allows.

"An appeal was made for volunteers to form a steering committee but no-one felt able to take on that role so the existing instigators will continue for now. The BBHN UK group has a website [2] and an active Facebook page [3] with useful material, plus 'how to' videos on YouTube. Further information is available on the main BBHN USA website [1], which includes a Forum specifically for the UK.

"Several attendees have had further thoughts, become more enthused and offered to get more actively involved in organising activities so there is hope for the future expansion of the BBHN UK group. Anyone interested in BBHN UK can contact BBHNUK@gmail.com for further details."

Websearch

[1] www.broadband-hamnet.org/
[2] http://bbhnuk.onthewifi.com/
[3] www.facebook.com/groups/BBHNUK/

Andy Talbot, G4JNT
ac.talbot@btinternet.com

NEW ICOM IC-7300

100 Watt - HF/50/70MHz TRANSCEIVER with SSB / CW / RTTY / AM / FM

I couldn't think of a better heading for Icom's New IC-7300, so I thought I'd use Peter Hart's conclusion in this month's review:

The IC-7300 is a superb radio with some great features and a good performance. Currently priced at around £1050 it is outstanding value for money and the SDR approach adopted will surely pave the way for the future for this style of radio.

The IC7300 sports HF+6m+4m coverage, its 100W houses an eye-catching touchscreen TFT display and includes an internal antenna tuner.

- High Quality Real-Time Spectrum Scope
- RF Direct Sampling System
- Class Leading Phase Noise Characteristics
- Large Touch Screen Colour TFT LCD
- Built-in Automatic Antenna Tuner
- Easy-to-Hear Sound Quality

Check out our web page HamRadio.uk/ic7300 for more information.

In stock, on demonstration and ready to collect or ship today.

From the UK's largest Icom Ham Radio Dealer.

Want to see Mike Richards G4WNC do a full in depth technical review on the IC-7300? See www.MLandS.tv

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

SAFE ONLINE SHOPPING
Shopping online with ML&S is safe and secure. E&OE

FOLLOW US ON TWITTER AND FACEBOOK HamRadioUK

Martin Lynch & Sons Ltd. Wessex House, Drake Avenue, Staines, Middlesex TW18 2AP. E-mail: **sales@hamradio.uk**
Opening Hours: Mon - Fri: 8.30am to 5pm. Sat: 9.30am to 4.30pm. International Tel: +44(0) 1932 567 333

Icom IC-7300

HF, 50 and 70MHz transceiver

PHOTO 1: IC-7300 front view.

The IC-7300 is the latest HF+ radio from Icom and is quite a revolutionary design. It is the first stand-alone transceiver from the main Japanese suppliers to adopt full direct-digital sampling SDR technology. All processing is on-board, no controlling computer is needed and the radio sports the usual buttons, controls and displays seen on traditional designs. Covering the HF bands plus 50 and 70MHz, the radio is packed with features and functions including a multicolour touch-screen display, a high-resolution real-time spectrum scope and much more.

Basic functions

The IC-7300 is a compact midi-sized radio measuring 240mm (w) x 94mm (h) x 238mm (d) and weighs about 4.2kg. The receiver tunes from 30kHz to 74.8MHz and the transmitter is enabled in the amateur bands at a maximum of 100W output power (1.8 to 50MHz). 4m is enabled (70.0 to 70.5MHz) in the UK and also in Europe where 70MHz is an allocation, and the transmit output on this band is 50W maximum. 60m transmit coverage extends continuously from 5.255MHz to 5.405MHz and includes all operating modes.

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

The radio requires the usual nominal 13.8V supply and draws a maximum current of 21A. CE marked models marketed in the UK and Europe have a separate EMC filter box incorporated into the power supply lead. The full manual is supplied on CD ROM as a PDF file together with a full set of circuit diagrams. Running to around 170 pages it is very detailed, book-marked and full of cross-links, with many pictorial representations. A subset of the full manual is also provided on paper, 72 pages covering the initial set-up and basic operating instructions. The radio is provided with a standard hand electret microphone, the HM-219, but other microphones are, of course, also suitable.

Radio design and architecture

Direct digital sampling is used for both the receive and transmit signal paths. Incoming receive signals pass through a diode-switched bandpass filter unit where one of 15 narrowband filters is selected to cover the tuning range of the receiver. A preamplifier with a switchable high gain or a low gain setting and / or an input attenuator allows the receiver to accommodate differing signal levels. An AGC controlled PIN attenuator is also included in the signal path. The RF signal is then sampled by the A/D converter and passed in parallel digital format to the FPGA, a fast field-programmable gate array. This extracts a slice of input signal at an IF of 36kHz by a process of down-conversion decimation and passes the result to a DSP device for all further processing of the received signal. This is the same DSP chip as is used in the IC-7100 receiver, except in that receiver the down-conversion process to 36kHz is done as an analogue superhet radio. Hence with the same, or at least similar, DSP code the various filtering and processing functions are the same for both radios. A separate down-conversion process in the FPGA simultaneously produces the spectrum scope signal path. Direct sampling tends to produce low-level distortion products, which can be noticeable under certain situations, particularly on quiet bands. Dithering in the A/D converter can reduce or eliminate this and is enabled by the IP+ function.

On transmit the process operates in reverse. The DSP generates the transmit signal, which is up-converted in the FPGA to the desired output frequency and converted to analogue format by the D/A converter. The

PHOTO 2: Rear panel of the IC-7300.

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

Inside

Removing the covers reveals a well-constructed, clean layout with circuit boards mounted on the usual compartmentalised sturdy die-cast frame with an integral heatsink blown by a large fan on the rear panel. The transmitter power amplifier stages together with filters, and the receiver front end and filters are mounted on the top side. The bottom side houses the main signal processing board and the ATU. Improved sound quality has been addressed by mounting the upward facing speaker in its own compartment in the die-cast chassis with rubber mountings. Although only 6cm in diameter, the speaker appears to be a good quality unit.

Front panel

Operation of the radio centres around the touch-screen display and the associated buttons and controls. The multicolour display has a high resolution and is particularly clear and bright and retains readability well under bright lighting. Band, mode, filter selection, meter selection and VFO/memory functions are all selected by touching the appropriate areas on the display which brings up a grid of selectable options. Five hardware buttons along the bottom of the display select top level functions for the display such as spectrum scope, RTTY decoder, keyers (via the MENU key) or the receive parameters such as AGC, preamps, noise reduction (via the FUNCTION key). Dedicated buttons on the front panel also provide a fast alternative way to set the various receive, VFO and memory functions. Clicking the MULTI rotary control sets adjustable functions such as transmit power level and microphone gain.

The display shows a large number and complete set of status indicators and function values. Both frequencies are shown in split frequency operation with a single bargraph style meter for signal strength and various selectable transmit functions. Simultaneous display of multiple transmit functions can also be selected. A very comprehensive set mode allows tailoring of an enormous number of functions. These are all accessed via the touch screen display with nested menu items and many are set using MULTI or the rotary tuning knob. A keyboard is displayed when alphanumeric data needs to be entered. This can be in either a full QWERTY or a 10-key format and makes data entry very straightforward.

Tuning is very smooth and easy using the 50mm diameter rotary control. Tuning is in 10Hz or 1Hz steps at 6kHz or 600Hz per knob revolution with auto speed-up on fast tuning. A quarter rate is also selectable on CW and data modes. A higher rate for faster navigation is also selectable, with a variety of mode-dependant step sizes. AF gain combined with RF squelch and Twin PBT (passband tuning) are given separate rotary controls on the front panel and there is the usual 8-pin DIN microphone connector and a 3.5mm headphone jack.

An SD memory card slot is also provided for storing various items such as received and transmitted audio files, RTTY, CW and voice memory stores, RTTY decode logs, memory contents and set-up data. Screen images can also be captured. The SD card is also the route for transferring firmware updates from a PC to the radio. SD or SDHC cards up to 32GB can be used.

Rear panel

The rear panel contains a single SO239 antenna socket; a pity a second wasn't included for flexibility as the radio covers two VHF bands as well as HF. A 13-pin socket, as used on several other Icom radios, is used for connecting various accessories, including

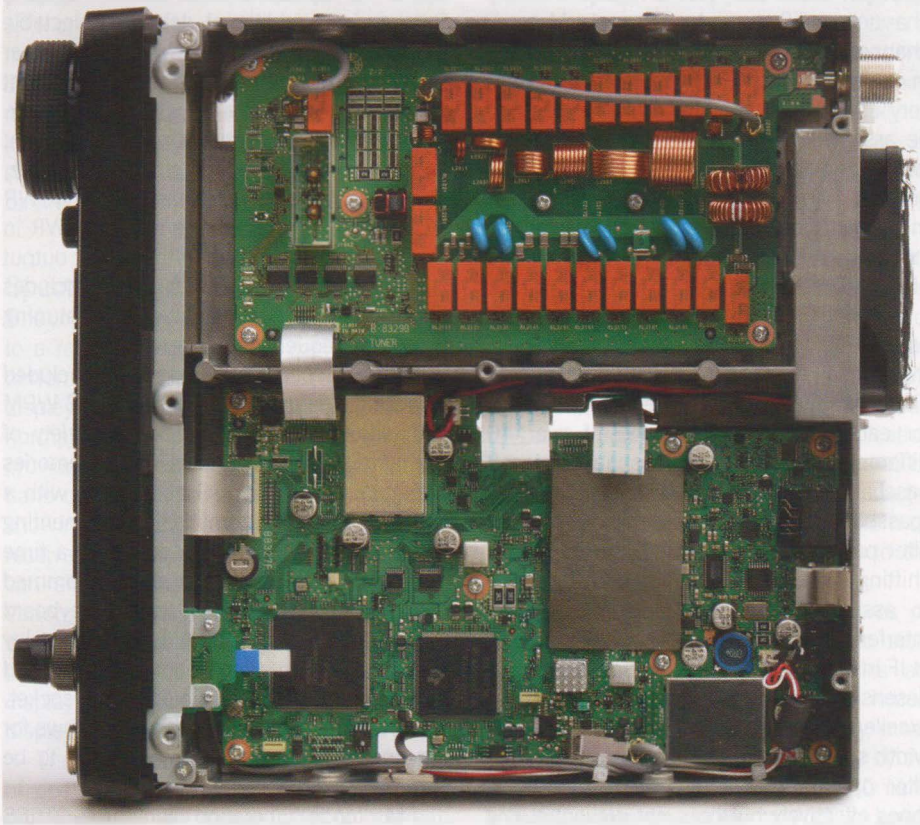


PHOTO 3: Under the bottom cover, showing signal processing and ATU boards.

Peter Hart, G3SJX
peter@g3sjx.freeserve.co.uk

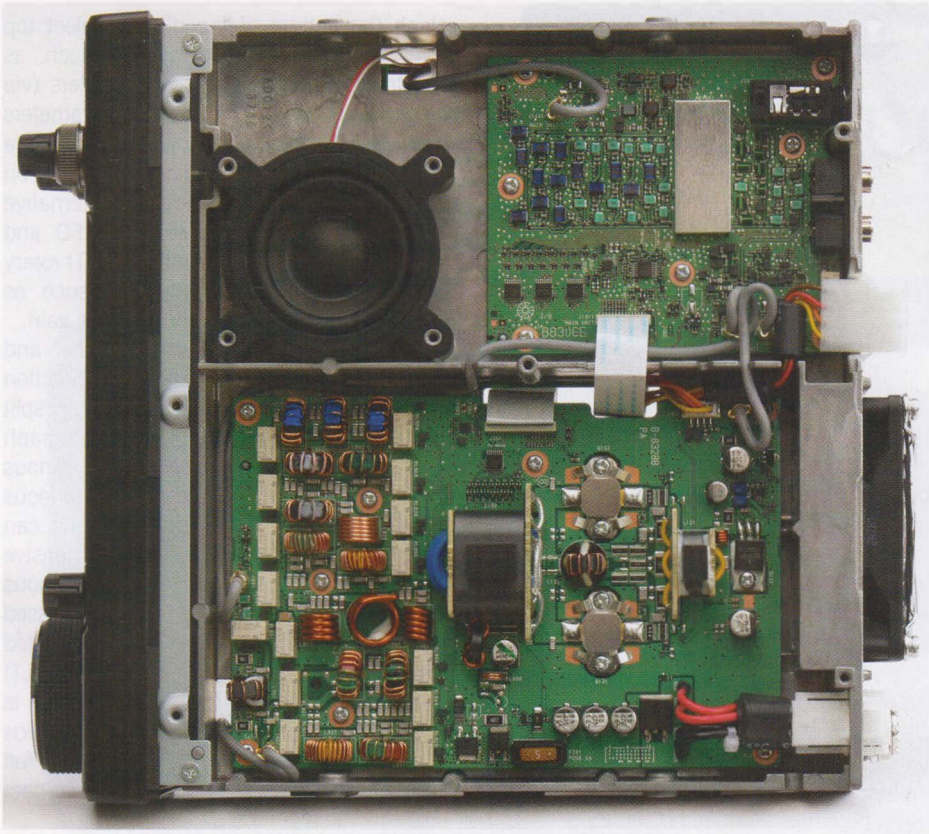


PHOTO 4: Under the top cover, showing TX PA, RX front end and filters.

control of linear amplifiers, audio input and output for data modes, and band data for external control such as for ATUs. A separate socket interfaces to the Icom AH-4 ATU and AH-740 antenna. Phono connectors provide alternative switching and ALC feedback for linear amplifiers. The usual external speaker connection is provided, and a single key jack accommodates CW paddles, straight keys or computer keying. Both the CI-V interface and a USB port are provided for computer interfacing. The USB port can also be used in conjunction with data mode software on the PC to transfer receive and transmit audio, PTT, CW and RTTY keying. A 12kHz IF output may also be enabled for DRM decoding.

Receiver features

The usual receiver functions are provided. Twin VFOs (A/B) allow split operation with the ability to easily check and tune the transmit frequency via XFC. Incremental tuning (RIT, XIT) functioning on both receive and transmit, pitch control and auto-tuning on CW are all provided. Band selection via the touch screen buttons allows three separate frequencies to be stored per band (ie a band stacking register). 5MHz and 70MHz bands do not have dedicated buttons but are included on the GENE general coverage button. It is a good idea to store several 5MHz and 70MHz frequencies into memory as the GENE band stacked frequencies are easily overwritten when tuning outside the amateur bands, eg to broadcast frequencies. Frequencies can also be keyed in directly.

There are a total of 99 regular memory channels and 2 scan edge channels. Memory channels can be selected, saved and copied in several different ways, making access very straightforward. Memory channels can be assigned names up to 10 characters in length and this is quick and easy with the on-screen keyboard. A separate quick access memopad stack for 5 or 10 stores is also included. A host of scanning functions are also provided.

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

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

The receiver audio response can be tailored independently for each mode. The high-pass and low-pass roll-offs can be adjusted separately and the bass and treble responses cut or enhanced, so there is much to play with here. There is no CW audio peak filter but on RTTY a sharp twin peak filter is provided.

Transmit features

Transmit functions for SSB include the usual speech compressor, VOX and a transmission monitor. The audio transmit filter bandwidth may be set to wide, mid or narrow, where the upper and lower bandwidth points are adjustable. By default the wide setting is 100Hz to 2900Hz, mid setting 300Hz to 2700Hz and narrow is 500Hz to 2500Hz. In addition, the bass and treble responses can be cut or enhanced separately for each voice mode in a similar fashion to the receive audio.

On CW there is the usual provision for full and semi break-in with adjustable drop back delay. The keying envelope rise and fall times are adjustable between 2 and 8ms and an additional delay is selectable to accommodate slow-switching linear amplifiers or other accessories. Different delays may be set for HF, 50 and 70MHz. An automatic antenna tuner is built in, covering all bands including 50 and 70MHz. The tuner matches antennas up to a VSWR of 3:1 at full power or to a higher VSWR in an emergency mode when the power output is then limited to 50W. The tuner includes the usual memories to enable rapid retuning when the frequency changes.

A full CW message keyer is included operating over the speed range 6 – 48 WPM with adjustable weighting and a variety of keying paddle arrangements. Eight memories will each store up to 70 characters, with a provision to send automatically incrementing serial numbers and auto-repeat after a time delay. The message stores are programmed in text via the touch screen keyboard display and may be sent either from display buttons or via an external homebrew keypad connected to the microphone socket. However, the external keypad only allows for sending stores 1-4. Stores 5-8 need to be sent from the display buttons.

FM mode operation includes CTCSS access and tone squelch, and repeater split

PHOTO 5: Menu display.

PHOTO 6: Function screen display.

PHOTO 7: Filter bandwidth display.

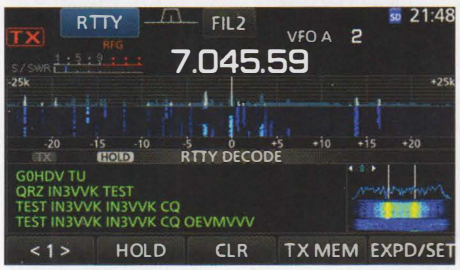


PHOTO 8: RTTY decoder with mini scope display.

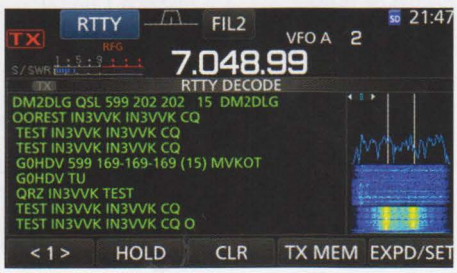


PHOTO 9: RTTY decoder display in expanded mode.

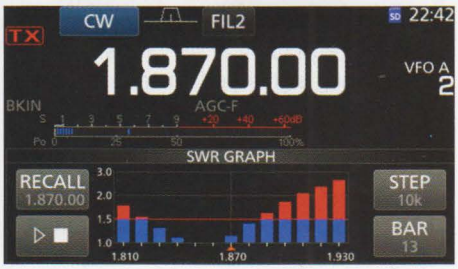


PHOTO 10: Antenna SWR graph display.

frequency operation. Repeater offsets are stored separately for HF and 50MHz and are programmable over wide limits.

RTTY

A built-in Baudot decoder for standard 45-baud RTTY signals displays 4 lines of 35 characters in standard mode or 9 lines of 35 characters in wide mode. An audio spectrum and waterfall display is provided for tuning purposes and there are a host of user setups and options, easy to access. There are 8 message stores, each holding up to 70 characters for pre-programmed transmitted messages and these are accessed and stored in a similar fashion to the CW message stores. Receive and transmit messages can be time stamped and saved to SD card.

Spectrum and scope displays

One of the key features that SDR brings to a radio at relatively low cost is the high performance real-time spectrum scope display. This operates simultaneously with normal receiver operation. Two displays are provided: a spectrum of the signals for the band currently selected and an audio scope showing the waveform and spectrum of the receiver or transmitter audio. Both spectrums can show an associated waterfall display. Various combinations of spectrum and audio display are possible in expanded or in mini-scope mode used in conjunction with other displays such as the RTTY decoder. The displays have excellent resolution.

The spectrum display has two modes of operation. The centre mode will display the spectrum on either side of the on-tune frequency with spans selectable from ±2.5kHz to ±500kHz. The Fixed mode will display the spectrum between two fixed points, and three fixed edge bands can be set for each amateur band. In both modes there are a number of settings that select sweep speed, colours, VFO markers, peak hold, averaging, reference level etc. The displayed vertical range is 80dB.

One of the features of the spectrum display is touch-screen tuning. When the spectrum area or the waterfall area is touched either with a finger or a stylus, the frequency span immediately adjacent to the touched area is zoomed. Then a second touch will precisely tune the radio to the wanted frequency. Zooming greatly improves the accuracy of tuning by this method.

Auxiliary features

The IC-7300 includes a digital voice recorder for transmitting messages such as CQ calls. These are only stored on the SD card, which must be in place. Eight channels are available, each with 90 seconds recording time, and these can be tagged with labels up to 16 characters long for easy identification on the display screen. Messages can also be set to repeat after a time delay. Messages are sent from the display buttons or from an external keypad in a similar fashion to the CW and RTTY stores.

As well as providing message stores on transmit, the voice recorder can also store the receive and transmit audio. Files are automatically named and placed in folders together with time and date, frequency, mode etc. The recording time is limited only by the amount of available memory on the SD card. Individual files are limited to 2GB in length but new files are created automatically if necessary. Stored as .WAV files at a data rate of 128kbps, 2GB corresponds to around 35 hours of recording time. The audio can be transferred to a PC or played back on the radio where the usual CD audio-style navigation buttons (fast forward, pause etc) are provided.

PHOTO 11: Keyboard display.

The antenna SWR can be plotted graphically against frequency, which can be useful to check antenna performance over the band. The measuring step is selectable from 10 to 500kHz and the number of steps from 3 to 13. **Photo 10** shows the match on my 160m dipole across the band.

Other features include a built-in calendar and 24-hour clock, transmit timeout timer, screensaver, and a voice synthesiser for audible readout of frequency, mode and S-meter. Remote control over the internet or home network is possible using the optional RS-BA1 IP remote control software. With an appropriate monitor, this provides the possibility of a much larger spectrum and waterfall display together with mouse driven point and click tuning.

Measurements

The full set of measurements is given in the table. The receiver sensitivity is excellent

and both preamplifiers are effective across the whole tuning range. A 16dB attenuator is inserted at MF band frequencies below 1.6MHz to prevent overload from strong broadcast stations. This can be switched out but even so the sensitivity drops rapidly below 1MHz and is down by 40dB at 100kHz. The S meter is fairly linear and represents 3dB per S-unit. Some small spurious responses were found but these were at least 90dB down, which is a good figure. The AGC attack time was clean, with a slight hole but no overshoot; decay times are broadly according to set values.

The strong signal performance is limited by analogue to digital converter (ADC) overload. With the preamplifier off, this occurs with single input signals at about –10dBm and this sets the blocking limit of the receiver. An overload indicator on the display (OVF) indicates when this point is reached. This limit applies to signals more than 8kHz away. With close-in signals the front end AGC operates, reducing input to the ADC. Where really strong signals are present, turn down the RF gain control, as this lowers the gain by applying AGC to the front end PIN attenuator, or switch in the front end attenuator. When multiple strong signals are present, it is the peak envelope voltage that determines the overload limit. With two signals, as used for intermodulation tests, this occurs at –16dBm per signal but can be much lower when more signals are involved.

Direct sampling receivers respond to multiple strong signals in a totally different way from conventional analogue receivers and this has a significant bearing on the way we should define and measure dynamic range. Even with relatively modest input signals of S9, low-level intermodulation is produced that does not increase significantly until the overload level is approached. Third order input intercept, frequently quoted as a measure of the strong signal performance of analogue receivers, is meaningless for direct sampling receivers.

With the IC-7300, intermodulation products appear out of the noise floor with input signals of around –60dBm (S9+10dB) but do not increase significantly until within 3dB of the overload limit. Measuring / referencing dynamic range to the noise floor, as is normal with analogue receivers, gives a figure around 75dB. This is a rather pessimistic approach considering that on most of the HF bands, with a reasonable antenna, levels at the receiver noise floor are insignificant. Measuring and referencing to a signal to noise ratio of 10dB gives a dynamic range around 100dB or even a little more, which compares well with some of the best analogue designs.

On the quieter bands where low-level intermodulation products may be an issue, enabling the IP+ function removes these low-level products but reduces sensitivity by about 8dB (preamp off). Sensitivity reduction is somewhat less on 50 and 70MHz or with the preamplifiers selected. The overload limit is not affected by IP+. With IP+ enabled, a dynamic range of 96dB to 100dB was measured in 2.4kHz bandwidth even when noise floor referenced. Intermodulation figures are independent of signal spacing down to very close spacing and in-band products are also extremely good. Audio noise and distortion was low.

The reciprocal mixing phase noise figures are extremely good, particularly so for a radio in this price bracket. This allowed the IF filter skirts to be measured down to a level of about –80dB with relative ease and showed similar tight skirts to other recent Icom radios.

On transmit, the results are generally quite good and similar to the IC-7100. The power output was well up to specification. CW rise and fall characteristics are reasonable, distortion negligible on semi break-in but with slightly shortened characters on full break-in. There was no first character shortening or overshoot at lower power levels. The adjustable delay for linear amplifier switching gives expected results on key-down but timing on key-up is very short in full break-in mode and may be a problem with some fast amplifiers. SSB intermodulation products are very reasonable for a 12V radio, tolerant of audio overdrive with an apparent VOGAD action and the compressor does not add significant distortion. On AM the carrier level was correctly set at all power levels and modulation was very clean.

The transmit noise output at full power is significantly better than most radios on the bands, which is a welcome improvement. However, the noise at a reduced output of 20W is some 10 to 14dB higher than at the 100W level, which is rather surprising. I also found that the transmit output power dropped away quite rapidly with lowering the supply voltage, which has implications if you are powering the radio from a battery. I don't normally check this as I have only recently acquired a suitable variable voltage power supply. The figures in the table were obtained with the radio powered from 13.8V. At 12V the power output dropped to around 80W and at 11V to around 33W. The radio stopped functioning below 10.5V.

On-the-air performance

I was very impressed with how well the radio performed and how easy it was to use. Much thought has obviously gone into achieving an excellent ergonomic design; the controls, the display and overall handling is close to ideal. The touchscreen display is very responsive and undemanding even with large fingers and is crisp and clear. Tuning is easy to navigate and memories quick and easy to access. Touch tuning from the spectrum display worked well and the zoom feature generally ensured that the frequency was fairly accurately set.

The performance was excellent. Sensitivity was good but dropped markedly on the lower frequency broadcast and timecode bands although the response was clean. The strong signal performance was generally very good. Signal overload and intermodulation effects were observed with excessive use of preamplifier gain but in all cases could be avoided by correct use of the preamplifier / attenuator / RF gain controls. No low-level intermodulation effects were observed on the quiet bands but the radio was not used when large signals were around such as in the more popular contests on 50 or 70MHz. The channel filters, notches, noise blanker and noise reduction system all performed extremely well. The audio quality and volume from the internal speaker was remarkably good with no rattles, although on CW a distinct resonance was heard. The quality on headphones was excellent.

Transmit operation was very well behaved. The fan operates continuously on transmit even when cold and is fairly quiet except on initial start. It does not operate on receive and keeps the temperature well in check even during long periods of continuous transmission. Audio quality reports were excellent with the supplied HM-219 microphone. CW break-in was clean, with just a hint of clicks on the sidetone. On full break-in the changeover relay was slightly noisy but allowed listening between characters up to about 25 WPM.

The spectrum scope, waterfall and audio screens were very effective with high resolution and no appreciable delay, a great improvement on previous radios. The RTTY decoder was very effective and easy to use for rubber-stamp contacts. RTTY message stores are best to access from an external keypad as two key presses are necessary when using the front panel buttons, which doesn't lend itself to slick operation. It is about time that Icom produced a keypad accessory along the lines of the Yaesu FH-2. During the course of the review a firmware upgrade was released, which I installed without problems.

Conclusions

The IC-7300 is a superb radio with some great features and a good performance. Currently priced at around £1050 it is outstanding value for money and the SDR approach adopted will surely pave the way for the future for this style of radio.

Acknowledgement

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

ICOM IC-7300 MEASURED PERFORMANCE

RECEIVER MEASUREMENTS

	SENSITIVITY SSB 10dBs+n:n			INPUT FOR S9		
Frequency	Preamp Off	Preamp 1	Preamp 2	Preamp Off	Preamp1	Preamp2
1.8MHz	0.35μV (-116dBm)	0.14μV (-124dBm)	0.13μV (-125dBm)	63μV	26μV	16μV
3.5MHz	0.28μV (-118dBm)	0.11μV (-126dBm)	0.1μV (-127dBm)	56μV	23μV	14μV
7MHz	0.28μV (-118dBm)	0.11μV (-126dBm)	0.1μV (-127dBm)	56μV	25μV	15μV
10MHz	0.25μV (-119dBm)	0.1μV (-127dBm)	0.09μV (-128dBm)	50μV	21μV	13μV
14MHz	0.25μV (-119dBm)	0.1μV (-127dBm)	0.09μV (-128dBm)	53μV	22μV	13μV
18MHz	0.28μV (-118dBm)	0.11μV (-126dBm)	0.1μV (-127dBm)	60μV	25μV	16μV
21MHz	0.28μV (-118dBm)	0.1μV (-127dBm)	0.09μV (-128dBm)	60μV	25μV	15μV
24MHz	0.28μV (-118dBm)	0.1μV (-127dBm)	0.09μV (-128dBm)	60μV	25μV	16μV
28MHz	0.32μV (-117dBm)	0.11μV (-126dBm)	0.1μV (-127dBm)	67μV	28μV	18μV
50MHz	0.32μV (-117dBm)	0.11μV (-126dBm)	0.1μV (-127dBm)	63μV	28μV	18μV
70MHz	0.32μV (-117dBm)	0.11μV (-126dBm)	0.1μV (-127dBm)	56μV	25μV	18μV

AM sensitivity (28MHz) Preamp1: 0.56μV for 10dBs+n:n at 30% mod depth
FM sensitivity (28MHz) Preamp 1: 0.14μV for 12dB SINAD 3kHz pk deviation
AGC threshold Preamp1: 1.1μV
100dB above AGC threshold for 2dB audio output increase
AGC attack time: 2ms
AGC decay time: approx as specified
Max audio into 8 ohm: 2.2W at 1% distortion, 2.6W at 10% distortion
Max audio into 4 ohm: 4.0W at 1% distortion, 4.8W at 10% distortion
Inband intermodulation products: better than -60dB

S-Reading	Input Level USB		Filter	IF Bandwidth Sharp				IF Bandwidth Soft			
(7MHz)	Preamp Off	Preamp1		-6dB	-60dB	-70dB	-80dB	-6dB	-60dB	-70dB	-80dB
S1	3.3μV	1.5μV	10kHz FM	11.3kHz	16.3kHz	17.0kHz	17.8kHz	-	-	-	-
S3	6.3μV	2.8μV	6kHz AM	6.4kHz	10.4kHz	11.0kHz	11.4kHz	-	-	-	-
S5	13μV	5.6μV	2.4kHz USB	2525Hz	3459Hz	3661Hz	3873Hz	2314Hz	3456Hz	3667Hz	3885Hz
S7	26μV	11μV	500Hz CW	516Hz	667Hz	705Hz	751Hz	543Hz	779Hz	838Hz	910Hz
S9	56μV	25μV	100Hz CW	109Hz	192Hz	214Hz	246Hz	114Hz	231Hz	252Hz	277Hz
S9+20	500μV	210μV									
S9+40	4mV	1.7mV									
S9+60	38mV	18mV									

Frequency Offset	Reciprocal Mixing Dynamic Range 500Hz BW 7MHz	Reciprocal Mixing Dynamic Range 500Hz BW 21MHz
1kHz	107dB (-134dBC/Hz)	not measured
2kHz	110dB (-137dBC/Hz)	105dB (-132dBC/Hz)
3kHz	113dB (-140dBC/Hz)	107dB (-134dBC/Hz)
5kHz	116dB (-143dBC/Hz)	109dB (-136dBC/Hz)
10kHz	121dB (-148dBC/Hz)	112dB (-139dBC/Hz)
15kHz	122dB (-149dBC/Hz)	114dB (-141dBC/Hz)
20kHz	123dB (-150dBC/Hz)	117dB (-144dBC/Hz)
30kHz	overload limit	121dB (-148dBC/Hz)
50kHz	overload limit	126dB (-153dBC/Hz)
100kHz	overload limit	118dB (-145dBC/Hz)
150kHz	overload limit	overload limit

TRANSMITTER MEASUREMENTS

	CW Power		Intermodulation Products	
Frequency	Output	Harmonics	3rd order	5th order
1.8MHz	103W	-65dB	-38dB	-40dB
3.5MHz	107W	-60dB	-48dB	-37dB
7MHz	104W	-62dB	-50dB	-37dB
10MHz	105W	-62dB	-43dB	-36dB
14MHz	105W	-60dB	-40dB	-37dB
18MHz	104W	-62dB	-46dB	-38dB
21MHz	104W	-62dB	-39dB	-39dB
24MHz	104W	<-70dB	-38dB	-39dB
28MHz	103W	-58dB	-36dB	-38dB
50MHz	106W	-63dB	-26dB	-38dB
70MHz	54W	<-70dB	-27dB	-36dB

Intermodulation product levels are quoted with respect to PEP.

Frequency Offset	Transmit Noise 7MHz 100W O/P	Transmit Noise 7MHz 20W O/P
1kHz	-79dBm/Hz (-129dBC/Hz)	-67dBm/Hz
2kHz	-81dBm/Hz (-131dBC/Hz)	-68dBm/Hz
3kHz	-84dBm/Hz (-134dBC/Hz)	-70dBm/Hz
5kHz	-84dBm/Hz (-134dBC/Hz)	-70dBm/Hz
10kHz	-83dBm/Hz (-133dBC/Hz)	-69dBm/Hz
20kHz	-83dBm/Hz (-133dBC/Hz)	-69dBm/Hz
50kHz	-87dBm/Hz (-137dBC/Hz)	-77dBm/Hz
100kHz	-84dBm/Hz (-134dBC/Hz)	-76dBm/Hz
150kHz	-85dBm/Hz (-135dBC/Hz)	-74dBm/Hz

Transmitter AF distortion: much less than 1%
Microphone input sensitivity: 7mV for full output
FM deviation: 4kHz (wide), 2kHz (narrow)
SSB-data T/R switch speed: mute-TX 30ms, TX-mute 4ms, mute-RX 35ms, RX-mute 2ms

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

MOONRAKER

Radio Communications Manufacturer and Reseller

Moonraker UK Limited
Cranfield Road
Woburn Sands
Bucks MK17 8UR
Open Mon-Fri 9-5:30pm

Sales Line 01908 281705
E-mail: sales@moonraker.eu Web: www.moonraker.eu

PayPal VISA MasterCard

Order before 3pm for same day despatch!

WOUXUN

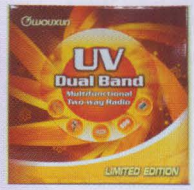
"WOUXUN QUAD BANDERS BACK IN STOCK"

Authorised dealer

KG-UV950P Quad band 10/6/2/70 upto 50W..... **£249.95**

KG-UV950PL Quad band 6/4/2/70 utilising the now popular 4m band..... **£269.95**

KG-UV9D Pro-Pack Complete Radio Kit.
A complete handheld kit with every accessory you could ever need..... **just £149.95**



Wouxun WO/PC0-003
Software lead for mobiles. **£19.94**

KENWOOD

Authorised dealer

TS-990 HF to 6m 200W Flag ship base station radio..... **£5199.95**

TS-590SG HF to 6m (30kHz – 60MHz) 100W HF Transceiver **£1159.95**

TS-480SAT 1.8-52MHz (30kHz-60MHz Receiver) 100W HF Transceiver with built in ATU ..... new lower price **£659.95**

TS-480HX 1.8-52MHz (30kHz-60MHz Receiver) 200W HF Transceiver.....new lower price **£719.95**

FREE Headphones or Earphones with any Kenwood Transceiver purchase - new license holders only

YAESU

Authorised dealer

New & in stock

FT-1XDE C4FM/FDMA dual band digital handheld with 3 digital and 1 analog mode, V/D, Data FR and Voice FR all at a great Moonraker price **£269.00**

Hand-helds

FT-2DE C4FM/FM dual band digital handheld with 1.7" high resolution touch screen display **£329.00**

VX-8DE Triband Handheld for 6/2/70cm with GPS/APRS and wideband RX..... **£209.00**

VX-6E Dual Band Handheld for 2/70cm 5 watts **£149.00**

VX-3E Dual band 2/70cm RX 0.5-999MHz, 3 Watts output **£99.95**

FT-60E Probably the best dual band handie on the market ..... **Just £99.00!**

FT-270E Single band 2m, 144-146MHz, 137-174MHz Rx..... **£99.00**

Mobiles

FTM-100DE Digital Dual Band Mobile Transceiver with C4FM & FM144/430 with 50W out at **£259.00**

FT-8900R Quad band 10/6/2/70cm 28-430MHz, 50 Watts output **£249.00**

FT-8800E Dual band 2/70cm RX 10-999MHz, 50 Watts output ..... **Now Only £249.00**

FT-7900E Dual band 2/70cm 50/40 Watts with wideband RX..... **£199.00**

FT-2900E Single band 2m 75 Watt heavy duty transceiver..... **£129.00**

New & in stock

FTM-400XDE dual band digital mobile with 3 digital and 1 analog mode, V/D, date FR and Voice FR mode all at a great Moonraker price **£409.00**

HF Transceivers

The FT-991 is the next generation in all mode, all band MF/HF/VHF/UHF transceiver with C4FM (System Fusion) Digital capability. The FT-991 includes multi-mode operation on CW, AM, FM, SSB, and Digital Modes (Packet, PSK31, RTTY and C4FM), with 100 Watts of HF/50MHz Capability (50 Watts VHF/UHF).
Now just £949.00

FT-817ND The world's first self-contained, battery-powered, Multi-mode Portable Transceiver covering the HF, VHF, and UHF bands. Providing up to five watts of power output, the FT-817 is designed for operation on the 160-10 meter HF bands, plus the 6 metre, 2 metre, and 70 cm bands. Whether your preferred operating mode is SSB, CW, AM, FM, Packet, or SSB-based Digital modes like PSK31, the FT-817 is ready to join you on your next hiking, camping, or search-and-rescue adventure!
Now just £449.00

FT-857D is the world's smallest HF/VHF/UHF mobile transceiver and provides base station-type performance from an ultra-compact package that's ideal for mobile or external battery portable a work **Now just £629.00**

FT-450D is a compact yet superb HF/50MHz radio with state-of-the-art IF DSP technology configured to provide World Class performance in an easy to operate package. Suitable for all applications; beginners, casual operators, enthusiasts, portable/field users and emergency service providers at all at a new low low price ~~**£699.95**~~ **Back in stock at an amazing £499.00**

FT-DX1200 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. Similar to the high-end "YAESU FT DX" series, it uses 32-bit high speed floating point DSP for renowned proven performance and at an amazing low price of
Now just £949.00

FT-DX3000 is member of the long line of top performing YAESU FT DX Series of transceivers. It inherits the design concepts of the FT DX 9000 and FT DX 5000 transceivers that have received high praise from all over the world by those pursuing the highest ideal of Amateur HF communication equipment
Now just £1599.00

All Yaesu accessories in stock on line at www.moonraker.eu

Handhelds
New ID-51PLUS Dual Band D-Star Digital
In stock at just £379.00!
ID-51E PLUS is an evolution of the popular ID-51E which is popular within the D-STAR Amateur radio community. The new model incorporates popular features found in the original including integrated GPS, an independent AM/FM receiver and V/V, U/U, V/U Dual watch, but also includes enhancements for digital operation and compatibility with the RS-MS1A free Android application

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

This stunning new dual band mobile transceiver features a large high-contrast LCD screen with backlight, V/V and U/U simultaneous receive capability and optional Bluetooth® connectivity for hands-free and remote control communications. An independent tuning knob, separate controller and large display makes it ideal for easy, intuitive mobile operation

ID-5100 Dual Band D-Star Mobile Transceiver
Great value at £499.00!
Icom's new ID-5100E VHF/UHF dual band D-STAR digital mobile transceiver enhances core features found in the celebrated IC-2820H mobile and incorporates the user-friendly technology found in the IC-7100. The radio features a large responsive touch screen and also integrated GPS, optional Bluetooth connectivity and support for Android devices.

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

ICOM

Authorised dealer

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

BAOFENG

"MASSIVE BULK 500pc PURCHASE"

Authorised dealer

The every growing Baofeng family – Quality products at amazing low low prices

UV-5RC PLUS Amazing dual band handie. Full 4.5 Watts, 136-174/400-470MHz plus 65-108MHz RX comes complete with desktop charger, antenna, belt clip, and an amazing 1800mAh battery as standard and that's not the best bit ~~£49.95~~ ..... **Now just £29.99!!**

MOONRAKER

Moonraker MT-270 25W dual band mobile transceiver ..... **at an incredible £79.95**

Now over 600 units sold and counting, amazing radio at an amazing price with all the basic featuers you need to get up and mobile
Frequency: 136-174, 400-480MHz
Channels: 200
Channel Spacing: 25KHz, 20KHz, 12.5KHz
Phase Lock Step: 5KHz, 6.25KHz, 10KHz, 12.5KHz, 15KHz, 25KHz
Working Voltage: 13.8V DC CTCSS, DCS, 5 Tone, 2 Tone, DTMF
Size: 90(W) x 35(H) x 118 (D) mm Weight 408g

LEXION

VV-898 Dual Band Mobile Transceiver
What a great entry level dual band rig, with only 10 Watts it is ideal for the new foundation pass holders. Comes complete with radio bracket and keypad microphone - all for a price you just won't believe
Moonraker Super Special
~~£99.95~~ **Now £59.95!**

Check on-line for all updates, new products and special offers Visit us now at **www.moonraker.eu**

LOOKING TO PART-EX THE EASY WAY?

Come to Moonraker - we will deliver your new radio and collect your old one at the same time.

No Charge, No Stress, No Hassle and it could be done in 24 hrs

Have you ever been frustrated ordering online or driving to local radio emporium to find out that they do not have stock! Then try us – our website is updated daily to show live stock – so next time you need something – give us a go

Want your shiny new rig FAST? Weekend Saturday or Sunday delivery just £10*

*(*per 30kg box length restriction apply please call for details)*

MOONRAKER

Yagi Antennas

All Yagis have high quality gamma match fittings with stainless steel fixings! (excluding YG4-2C)

YG27-35 Dual band 3/5 element 3.5/12.5 dBd gain with one feed! **£79.95**
YG4-2C 2 metre 4 Element (Boom 48") (Gain 7dBd) **£29.95**
YG5-2 2 metre 5 Element (Boom 63") (Gain 10dBd) **£59.95**
YG8-2 2 metre 8 Element (Boom 125") (Gain 12dBd) **£79.95**
YG3-4 4 metre 3 Element (Boom 45") (Gain 8dBd) **£69.95**
YG5-4 4 metre 5 Element (Boom 104") (Gain 10dBd) **£79.95**
YG3-6 6 metre 3 Element (Boom 72") (Gain 7.5dBd) **£79.95**
YG5-6 6 metre 5 Element (Boom 142") (Gain 9.5dBd) **£89.95**

ZL Special Yagi Antennas

The ZL special gives you a massive gain for the smallest boom length ... no wonder they are our best selling Yagis!

ZL5-2 2 Metre 5 Ele, Boom 95cm, Gain 9.5dBd **£59.95**
ZL7-2 2 Metre 7 Ele, Boom 150cm, Gain 11.5dBd **£69.95**
ZL12-2 2 Metre 12 Ele, Boom 315cm, Gain 14dBd **£99.95**
ZL7-70 70cm 7 Ele, Boom 70cm, Gain 11.5dBd **£39.95**
ZL12-70 70cm 12 Ele, Boom 120cm, Gain 14dBd **£49.95**

HB9CV

Brilliant 2 element beams ... ideal for portable use

HB9-70 70cm (Boom 12") **£24.95**
HB9-2 2 metre (Boom 20") **£29.95**
HB9-4 4 metre (Boom 23") **£39.95**
HB9-6 6 metre (Boom 33") **£49.95**

Halo Loops

Our most popular compact antennas, great base, mobile, portable, or wherever!

HLP-2 2 metre (size approx 300mm square) **£24.95**
HLP-4 4 metre (size approx 600mm square) **£34.95**
HLP-6 6 metre (size approx 800mm square) **£39.95**

MOONRAKER

QRP Antennas

The Moonraker Whizz range are great for getting on HF in a neat compact and totally portable way

Whizz Whip HF/VHF/UHF portable antenna with telescopic whip - ideal for any situation where a long wore or vertical antenna is just not an option - get on air today for **just £99.95**

Whizz Loop 20-60m compact loop is ideal for QRP Transceivers when space is limited or using portable with a Yaesu FT-817ND or similar. Can be used indoors with surprising results and handy for travelling due to its "pocket" size antenna ideal for indoor or out and can be packed away and all for just **£69.95**

Whizz Loop V2 same as above but with a frequency range from 40-10m **£79.95**

Back in stock at last

MD-7400 40-70cm Multiband Mobile Antenna at a new lower price !

This is a wideband mobile whip that is manually tuned by sliding the telescoping coil at the base. The telescopic whip may also be adjusted for fine tuning and optimizing the VHF/UHF performance. Maximum length of the antenna is 1.77m and maximum power handling is 130W

One antenna HF/VHF & UHF and one amazing new low price £79.95

Portable Telescopic Masts

LMA-S Length 17.6ft open 4ft closed 2-1" diameter ... **£79.95**
LMA-M Length 26ft open 5.5ft closed 2-1" diameter .. **£89.95**
LMA-L Length 33ft open 7.2ft closed 2-1" diameter **£99.95**
CARPLATE-HDT brilliant drive on plate with tilt – ideal to be used in conjunction with the portable telescopic masts and only ... **£44.95**

20ft Swaged Mast Sets

(5ft Sections)

These heavy duty masts sets have lovely push fit swaged sections to give a strong mast set. Ideal for portable or permanent installations . . . also available singly

MSP-125 4 section 1.25inch OD mast set **£39.95**
MSP-150 4 section 1.50inch OD mast set **£44.95**
MSPX-150 heavy duty 2.65mm 1.50 inch OD mast set **£59.95**
MSP-175 4 section 1.75inch OD mast set **£49.95**
MSP-200 4 section 2.00inch OD mast set **£59.95**
MSPX-200 heavy duty 2.65mm 2.00 inch OD mast set **£79.95**

MOONRAKER

Mobile Antenna Mounts

TRIMAG-S Triple magnetic mount with SO239 antenna fitting with 4m RG58 and PL259 fitted – ideal for those larger antennas ..... **just £34.95**
TURBO-S single 170mm magnetic mount with SO239 antenna fitting with 4m RG58 and PL259 fitted – will suit most antennas upto 5ft **£16.95**
HKITHD-SO Heavy duty hatch back mount with SO239 antenna fitting with 4m RG58 and PL259 fitted **£32.95**
HKITM-S Mini hatch back mount with SO239 antenna fitting with 4m RG58 and PL259 fitted **£32.95**

MOONRAKER

Multiband Mobile

Why buy loads of different antennas when Moonraker has one to cover all! SPX series has a unique fly lead and socket for quick band changing

SPX-100 9 Band plug n' go portable, 6/10/12/15/17/20/30/40/80m, Length 165cm retracted just 0.5m, Power 50W complete with 38th PL259 or BNC fitting to suit all applications, mobile portable or base - brilliant! **£44.95**
SPX-200S 6 Band plug n' go mobile, 6/10/15/20/40/80m, Length 130cm, Power 120W, PL259 fitting **£44.95**
SPX-300S 9 Band plug n' go mobile, 6/10/12/15/17/20/30/40/80m, Length 165cm, High Power 200W,PL259 fitting **£59.95**

MOONRAKER

VHF/UHF Mobiles

GF151 Glass Mount 2/70cm, Gain 2.9/4.3dBd, Length 78cm complete with 4m cable and PL259 ..... **£29.95**
MRM-100 MICRO MAG 2/70cm, Gain 0.5/3.0dBd, Length 55cm, 1" magnetic base with 4m coax and BNC **£19.95**
MR700 2/70cm, Gain 0/3.0dBd, Length 50cm, 3/8 fitting **£9.95**
MR777 2/70cm, Gain 2.8/4.8dBd, Length 150cm, 3/8 fitting **£19.95**
MRQ525 2/70cm, Gain 0.5/3.2dBd, Length 43cm, PL259 fitting (high quality) **£19.95**
MRQ500 2/70cm, Gain 3.2/5.8dBd, Length 95cm, PL259 fitting (high quality) **£26.95**
MRQ750 2/70cm, Gain 5.5/8.0dBd, Length 150cm, PL259 fitting (high quality) **£36.95**
MRQ800 6/2/70cm Gain 3.0dBi/5.0/7.5dBdBd, Length 150cm, PL259 fitting (high quality) **£39.95**
MRQ273 2/70/23cm Gain 3.5/5.5/7.5dBdBd, Length 85cm, PL259 fitting (high quality) **£49.95**
MRQ900 10/6/2/70cm Gain 10m (2.15dB) 6m(2.5dB) 2m (2.8dB) 70cm (5.5dB) **Length:** 125cm PL259 fitting **£49.95**

PAM Kit

A great portable freestanding tripod which can be extended to 4m. Perfect for field days at a perfect price

Just £59.95 complete

Telescopic Masts

TMA-1 Aluminium mast ★ 4 sections 170cm each ★ 45mm to 30mm ★ Approx 20ft erect 6ft collapsed **£149.95**
TMA-2 Aluminium mast ★ 8 sections 170cm each ★ 65mm to 30mm ★ Approx 40ft erect 6ft collapsed **£249.95**
TMF-1 Fibreglass mast ★ 4 sections 160cm each ★ 50mm to 30mm ★ Approx 20ft erect 6ft collapsed **£179.95**
TMF-1.5 Fibreglass mast ★ 5 sections 200cm each ★ 60mm to 30mm ★ Approx 30ft erect 8ft collapsed **£249.95**
TMF-2 Fibreglass mast ★ 5 sections 240cm each ★ 60mm to 30mm ★ Approx 40ft erect 9ft collapsed **£299.95**
TMF-3 Fiberglass mast * 6 sections 240cm each * 65-23mm * Approx 50ft erect 8ft collapsed **£349.95**

MOONRAKER

Dual and Triband Collinear Verticals

Diamond quality – Moonraker prices ! These high gain antennas have been pre-tuned for your convenience, easy to use, easy to install, and a choice of connection ... look no further

SQBM100P 2/70cm 3.00/6.00dBd, RX 25-2000MHz, Length 100cm SO239 ..... ~~£49.95~~ **special offer £39.95**
SQBM200P 2/70cm, Gain 4.5/7.5dBd, RX 25-2000MHz, Length 155cm, SO239 ..... ~~£54.95~~ **special offer £44.95**
SQBM500P 2/70cm, Gain 6.8/9.2dBd, RX 25-2000MHz, Length 250cm, SO239 ..... ~~£74.95~~ **special offer £69.95**
SQBM500M 2/70cm, Gain 6.8/9.2dBd, RX 25-2000MHz, Length 250cm, N-Type ..... ~~£79.95~~ **special offer £74.95**
SQBM800N 2/70cm, Gain 8.5/12.5dBd, RX 25-2000MHz, Length 520cm, N-Type ..... ~~£139.95~~ **special offer £99.95**
SQBM1000P 6/2/70cm, Gain 3.0/6.2/8.4dBd, RX 25-2000MHz, Length 250cm, SO239 ..... **£84.95**
SQBM223N 2/70/23cm, Gain 4.5/7.5/12.5dBd, RX 25-2000MHz, Length 155cm, N-Type **£79.95**
SQBM4040P Quadband 10/4/2/70cm Gain 2.5/3.2/3.6/5.5dBi Length 120cm **£69.95**
SQBM4060P Quadband 10/6/2/70cm Gain 2.5/3.0/3.6/5.5dBi Length 120cm **£69.95**

MOONRAKER

HF Wire Antennas

All our HF wire antennas are made with complete waterproof potted baluns and high quality "original" flexweave antenna wire.

MDHF-80 3.5MHz balun matched mono dipole, length 40m **£59.95**
MDHF-40 7.0MHz balun matched mono dipole, length 20m **£44.95**
MDHF-20 14MHz balun matched mono dipole, length 10m **£39.95**
OSHF-80 3.5-30MHz balun matched off set dipole, length 40m **£59.95**
OSHF-40 7.0-30MHz balun matched off set dipole, length 22m **£44.95**
OSHF-20 14-30MHz balun matched off set dipole, length 11 m **£39.95**
LWHF-160 1.8-50MHz unun match end fed antenna, length 42m **£49.95**
LWHF-80 3.5-50MHz unun match end fed antenna, length 20m **£44.95**
LWHF-40 7.0-50MHz unun match end fed antenna, length 10m **£39.95**

MOONRAKER

HF Mobiles

Get great results with the Moonraker range of HF mobiles! ... from as little as £19.95!

AMPRO-10 Slim line design 28MHz 2m approx. 3/8th fitting **£19.95**
AMPRO-11 Slim line design 27MHz 2m approx. 3/8th fitting **£19.95**
AMPRO-12 Slim line design 24MHz 2m approx. 3/8th fitting **£19.95**
AMPRO-15 Slim line design 21MHz 2m approx. 3/8th fitting **£19.95**
AMPRO-17 Slim line design 18MHz 2m approx. 3/8th fitting **£19.95**
AMPRO-20 Slim line design 14MHz 2m approx. 3/8th fitting **£19.95**
AMPRO-30 Slim line design 10MHz 2m approx. 3/8th fitting **£19.95**
AMPRO-40 Slim line design 7MHz 2m approx. 3/8th fitting **£19.95**
AMPRO-60 Slim line design 5MHz 2m approx. 3/8th fitting **£22.95**
AMPRO-80 Slim line design 3.5MHz 2m approx. 3/8th fitting **£24.95**
AMPRO-160 Slim line design 28MHz 2m approx. 3/8th fitting **£59.95**

Other frequencies available. Call or see online for more details.

- Come and visit us at our retail premises
- We have massive stocks in our large warehouse
- We import direct from all over the world
- See us at many rallies throughout the country

MetroVNA Pro Touch, a Vector Network Analyser

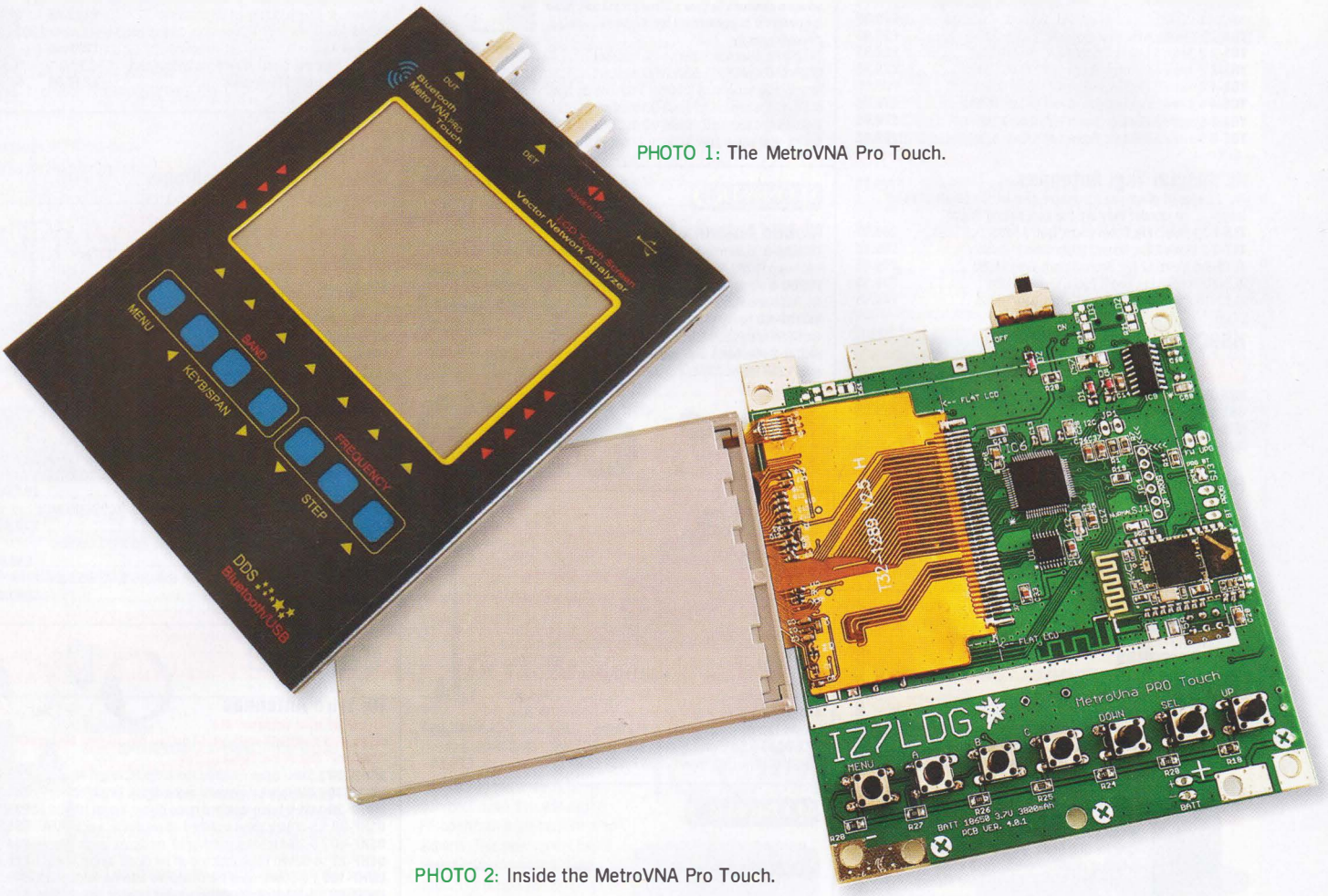


PHOTO 1: The MetroVNA Pro Touch.

PHOTO 2: Inside the MetroVNA Pro Touch.

Antenna analysers for the amateur market have come a long way. Twenty years ago we were buying analysers with analogue meters. They consumed dry cell batteries like they were going out of fashion.

In more recent models the number of batteries has come down, less power is consumed and liquid crystal displays have shown us things like the curves for SWR, impedance and reactance. Now Italian company MetroVNA has introduced a range of small, light VNAs with something extra. They sport all the things that some other modern VNAs do, namely a rechargeable battery, a USB connection and Bluetooth capability; but the 'something extra' is a colour touch screen display. Interestingly this doesn't result in them costing more than the close equivalent VNAs from some other manufacturers. There are three models in the range, covering up to 55MHz, 180MHz and 250MHz. The one provided for this review was the 180MHz model.

What's in the box

The MetroVNA Pro Touch (**Photo 1**) arrived in a fairly small box. On the outside there are QR codes that link to the User Guide in English and Italian on the company's website (German is also available). A QR code for the Wimo website (in Germany) is also on the box.

Inside the box the MetroVNA came with a peel-off screen protector, the unit as a whole being protected by bubble wrap. The only other thing is a 'quick user manual' – a single A4 page. Users have to provide their own USB cable and PC software. There are suggestions in the User Manual of suitable PC software that can be used, but more about that later.

The entire instrument can be managed through convenient virtual screen keys, but to increase the flexibility a series of seven tactile buttons below the screen can be used to enter/change the operating frequencies or band, and activate or deactivate the virtual keys on the display.

Although the MetroVNA is designed for rapid teardown (as the User Guide puts it), it also says not to disassemble or attempt to repair the unit. Consequently I expected to be unable to include any photos of the innards, but I contacted the MetroVNA designer, Antonio Ferrulli, IZ7LDG, who kindly sent **Photo 2**. It shows the PCB, with the display folded over to reveal more of the components.

As a testament to the tightness of the

manufacturing tolerances, the seven tactile buttons on the PCB protrude through cut-outs on the front of the aluminium case to *just* touch the underside of the labelled membrane on the front (which is scratchproof). The colour display fits neatly into a cut-out in the membrane. Along the top edge there are two BNC sockets – one labelled DUT (Device Under Test) and the other labelled DET (DETector) – plus the power switch and a USB socket. The USB socket has a red LED built into it, which glows when the unit is being charged.

PHOTO 3: The MetroVNA main screen.

PHOTO 4. A good SWR at 3620kHz.

Capabilities

The MetroVNA is capable of measuring SWR and a whole lot more. Traps, filters, attenuators, RF lines, coax loss and field strength reading are all within its capability.

It arrived with a fully charged battery, so was ready to use 'out of the box'. When you switch it on the unit runs a diagnostic check, beeps twice, then displays the screen seen in **Photo 3**. There are ten options in the main menu and five in the service menu.

All the tests conducted in this review were 'real world' tests. I plugged in a variety of antennas and tested them. There isn't sufficient space for me to review every last aspect of such a comprehensive instrument, so I hope the following gives you a flavour of its capabilities. There are two main modes of operation; Reflection Mode for measuring antennas and Transmission Mode for measuring filters etc.

Something that needs to be said early on is that the MetroVNA is very responsive. It refreshes the display ten times a second while tests are running, so any changes made to an antenna or a filter are immediately apparent. All button presses (tactile or on the touch screen) are confirmed with a beep.

1. EASY. This menu option displays the SWR and impedance of an antenna numerically and also on a strip. **Photo 4** is of my 80m dipole. In addition to the tactile buttons, there are soft buttons to change band and also to change frequency up and down. Steps are selectable down to as little as 1kHz. You can call up a numeric keypad, to input a frequency directly, jump directly to a graphic curve of the SWR and return to the main menu.
2. METER. Displays antenna resistance, return loss, reactance and impedance, both numerically and on a strip type display. The frequency can be changed by inputting from a numeric keypad that can be called up. Alternatively, use the 'band' buttons to cycle up/down through the amateur bands. **Photo 5** is of my 40m full-wave delta loop.
3. AUTOSWR. Cycle quickly through the amateur bands, to find which one an antenna is resonant on. The numbers tell you the frequency of the lowest SWR, plus the SWR at that frequency. Frequencies can be input directly and the span of the graphic display can be cycled though. **Photo 6** shows it testing a 20m Inverted-V dipole.
4. SMETER. A dual meter type display of SWR and impedance, along with numerical values. In this case (**Photo 7**) it is of a 10m quad loop.
5. MULTI. A six-band SWR meter. You can change each of the frequencies to whatever you want, simply by touching them and then calling-up the virtual keypad. I used a microwave dummy load for this test, to check how close to 1:1 the SWR was across a wide range of frequencies. As **Photo 8** shows, the indicated SWR is very slightly higher at 50MHz. In subsequent tests the indicated SWR gradually increased as the frequency was increased, but the instrument can be calibrated so that it indicates an SWR 1:1 at higher frequencies with the load connected. For me the real benefit of this setting is when testing multiband antennas, such as a fan dipole, because changing the length or position of one will often affect another.
6. SWMETER. **Photo 9** shows the single, large meter-type display of SWR of this menu option. In addition there are numerical values of SWR, resistance, impedance, and reactance. Incidentally, on none of the screens is the value of X given a sign (Xc or Xl).
7. GRAPH. Graphic display of the SWR of an 80m dipole. Readings for resistance, phase, impedance and reactance can all be switched on/off. I returned to measuring the characteristics of my 80m dipole for this test. **Photo 10** shows the result.

PHOTO 5: A full-wave delta loop for 40m, fed with a quarter-wave of 75-ohm coax to match the impedance.

PHOTO 6: The AutoSWR screen for a 20m dipole.

PHOTO 7: 10m quad loop, fed with a quarter-wave of 75-ohm coax to match the impedance.

Steve White, G3ZVW
steve.g3zvw@gmail.com

PHOTO 8: SWR across the HF bands of a 50Ω dummy load.

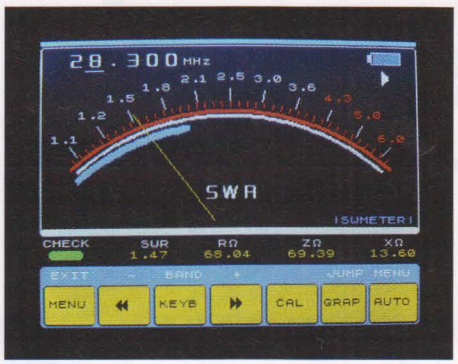


PHOTO 9: 10m quad loop, fed with a quarter-wave of 75Ω coax to match the impedance.

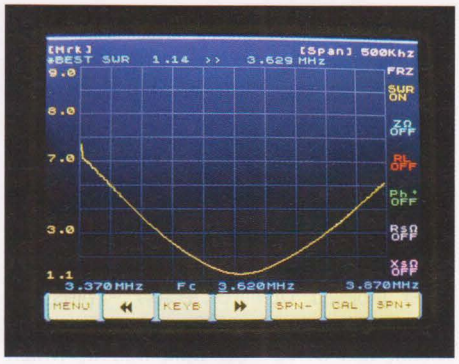


PHOTO 10: A good SWR dip on an 80m dipole.

8. RFMETER. On this setting the MetroVNA can function as a field strength meter (attach a short antenna). The maximum input level is +5dBm.
9. TLGRAPH. Standing for 'Transmission Loss Graphic', this is the setting used for measuring filters and attenuators. **Photo 11** shows the resonance obtained when I connected a quartz crystal between the DET and DUT sockets.
10. RFGEN. Through the RF Generator menu option the DDS frequency synthesiser of the MetroVNA can be used as a signal generator.
11. dBMETER. In this mode, connecting a signal to the DET socket enables the MetroVNA to work as an RF meter. Its uses are for measuring RF noise and antenna gain. It can also be used to measure the gain of an RF amplifier. The input level is -70 to +5dBm and overloading the input could damage the instrument, so care is called for.

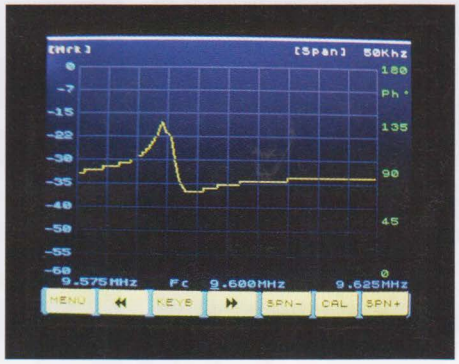


PHOTO 11: Resonance characteristic of a quartz crystal.

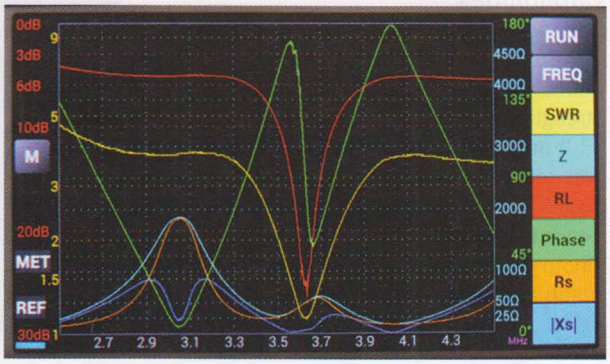


PHOTO 12: Smartphone display of 80m dipole, from 2.5 to 4.5MHz.

Other menus

The MetroVNA also has a number of utility/service menus. In addition to a diagnostic menu, there's a Table of dBm/Voltage/Wattage, screens on which you can calibrate the frequency and reflected power, and info such as hardware and firmware versions, battery state, etc.

So far all the tests in this review been done with the MetroVNA as a standalone instrument, but there are two other options – to link it to your smartphone via Bluetooth or your computer via USB.

Bluetooth operation

Pairing my smartphone to the Metro VNA was straightforward. I then used the phone to access the MetroVNA web site, found the link to the Android app and downloaded it from the Play Store. Upon running the app it linked immediately to the MetroVNA and it was easy to get things running. I was able to pinch and stretch the phone's touchscreen to move the centre frequency and set the limits I wanted, and enable/disable various measurements by pressing the buttons on the right. The characteristics of my 80m dipole are shown in **Photo 12**. The smartphone app does not provide the same functionality as the VNA itself. Nor does it update continually. What it provides is a snapshot of what is being tested, up to 10m from the VNA. Please note that if you are displaying any of the measuring screens on the VNA when you press 'RUN' on the smartphone, the VNA reverts to the main menu.

PC software

Software for a personal computer is not provided with the MetroVNA, but the User Guide points to VNAJ, by DL2SBA. I downloaded it (it's free) and used it in conjunction with the MetroVNA. It is a *very* powerful tool that could easily be the subject of an extensive review in its own right, so here I will only say that it worked.

The MetroVNA is also compatible with BlueVNA, IG/VNA, and other programs.

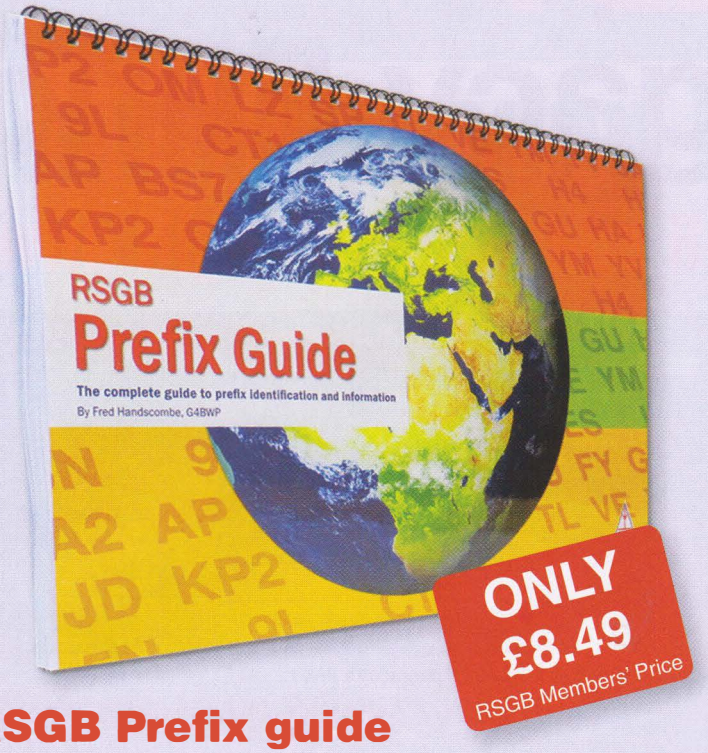
Conclusions

I certainly found the MetroVNA to be a very useful tool. In operation it is responsive and versatile. I got the impression that the English language User Guide was a translation of the original Italian. It wasn't perfect, but it certainly got the point across. There were some differences between the menus of the instrument and the menus in the User Guide, which leads us to something that is important to note. Coming from a fledgling company, the product – and especially the firmware – is still being developed. I received a MetroVNA with firmware version 3.05. I updated it to version 3.10, but by the time this review was finished it was up to 3.22. I did not find updating it a simple process, but with the cooperation of Antonio we got the job done and I think he learned that something he sees as simple (because he does it frequently), isn't simple for everyone else! Clear, step-by-step instructions on the website would make this process a lot easier. My PC runs Windows 7 and I also needed to install the driver for the USB chip used in the MetroVNA. If you're running Windows 10 this may not be necessary. The battery life of the MetroVNA Pro Touch was good and the display is bright enough to see in sunlight.

I would like to thank the designer and producer of the MetroVNA, Antonio Ferrulli, IZ7LDG, for his assistance in this review and of course Nevada for the review sample. The 180MHz MetroVNA is available from them, priced £249.95.

NEW

P&P FROM FREE
(Over £30 See Page 78 For Details)



ONLY £8.49
RSGB Members' Price

RSGB Prefix guide

12th Edition

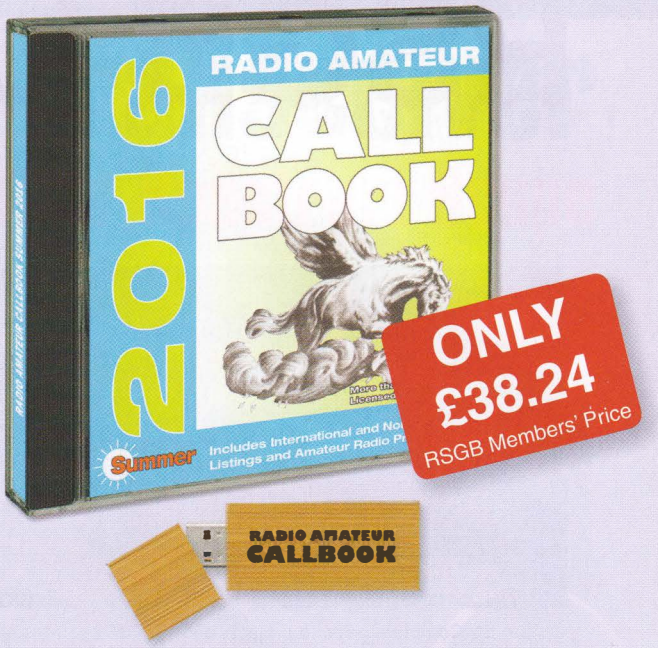
The RSGB Prefix Guide is simply the very latest amateur radio prefix information available and a lot more besides.

Fully updated with all the very latest changes in the amateur radio world, the *RSGB Prefix Guide* is the best guide available for amateur radio prefixes and it is now in a colour format.

This latest edition of the *RSGB Prefix Guide* has had a 'makeover' and now uses colour to make listings clearer and easier to use. Fully updated there are the usual series of changes to prefix listings including many detailed items such as the additional K1N prefix for Navassa Island and United Nations call 4U2U. There is a huge range of additional information covering references for continent, CQ Zone, DXCC, IOTA, ITU Zone, Latitude & Longitude and a whole lot more. Readers will find comprehensive lists of DXCC deleted entities, Russian & CIS entities and even the popular DXCC checklist is here. There is the very latest information on various award programmes including IOTA, CQ WAZ, DXCC, WAS and others. There is also an index of countries and their callsign allocations divided by continent.

From the basic "*what was that callsign*" question through to research for an elusive award, this book provides what is needed. If you are interested in DX, awards or simply operate the HF bands the *RSGB Prefix Guide* is the book for you.

ISBN: 9781 9101 9318 1
Size: 297x210mm (landscape), 80 pages
Non Members' Price: £9.99
RSGB Members' Price: £8.49



ONLY £38.24
RSGB Members' Price

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, CW, 250 maps and hosts of other useful features. There is even a comprehensive help function for the less experienced. *The Pegasus Flying Horse World Callbook CD* is compatible with existing logging software and works on operating systems from DOS, Windows, Linux etc.

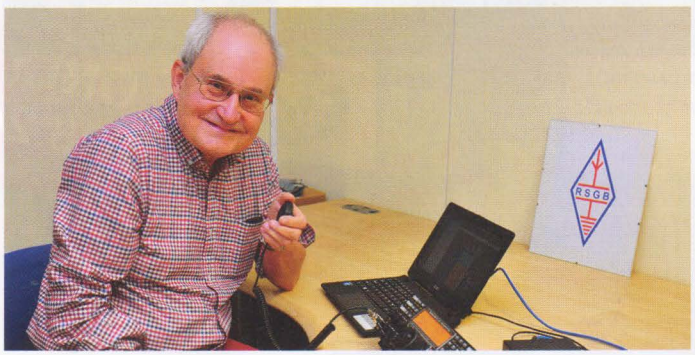
Easy to use and comprehensive, the *Pegasus Flying Horse World Callbook* is a highly useful tool for every radio amateur's shack

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

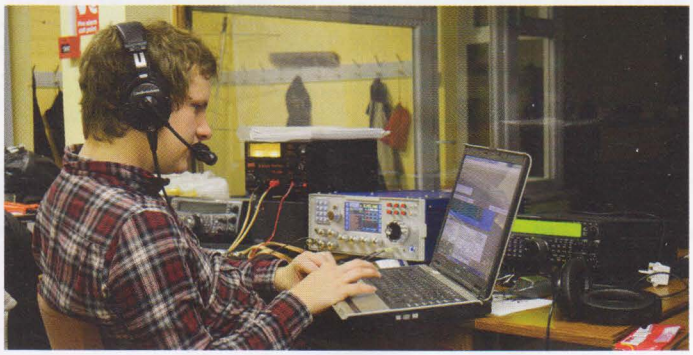
E&OE *(All prices shown plus p&p)*

RSGB SHOP
Radio Society of Great Britain www.rsgbshop.org
3 Abbey Court, Priory Business Park, Bedford, MK44 3WH. Tel: 01234 832 700 Fax: 01234 831 496

Helping good ideas happen – The RSGB Legacy Fund



Cambridge Community Radio project: Bob, G3PJT operates remotely from RSGB HQ to show how it works!



Project DX15 Youth DXpedition to Wales.

Apart from those friendly e-mails from West Africa, how often have you been freely offered money to spend? Well, thanks to the generosity of donors to the RSGB Legacy Fund to benefit the hobby, the RSGB is making that offer.

The fund stands at approximately £160,000 and is available for the encouragement and development of amateur radio. Some excellent projects have already been supported. We can do more and inaction cannot be blamed on lack of resources. What we lack are good proposals.

Of course there are guidelines. We want the fund to help keep the amateur radio flame burning for current and future Members. Its objectives are deliberately wide and projects must make a difference for lots of people. So this isn't your opportunity to fund a brand-new SDR for your own shack – or even that of your club!

To help you with your thinking, here are projects that have received funding in the past.

Spectrum pollution and interference

The increasing pollution of the spectrum affects many of us. While we benefit from the astonishing pace of technological growth, we are also increasingly at the mercy of an increasingly noisy radio spectrum. Some amateurs have given up because of noise; others soldier on but with less satisfaction in their hobby. Many commercial interests are not particularly worried about spectrum pollution unless it directly affects them. Radio amateurs are.

The first project approved for Legacy Fund support was for the measurement of the noise floor – in order to provide scientifically-based evidence to back up our struggle to draw attention to the problem so it can be more effectively tackled. A second project has provided the EMC Committee with top quality equipment to help amateurs in addressing local QRM projects.

These two projects are just a start – we need more to make things better today and help secure the future of our hobby.

Specific activities

To support a thriving activity, the Fund has provided equipment and software for ARDF – Amateur Radio Direction Finding. It brings together our technical hobby and keeping fit – an ideal combination for some folks! Legacy Funding has helped it remain relevant and in tune with technology. The Fund has also supported the further development of the internationally-popular Islands on the Air (IOTA) programme.

Young people

The Youth DXpedition to Wales in 2015 (Project DX15) was also part-supported by the fund. Groups of young people worked together to learn more about the hobby - supported by some very generous volunteers. A good project – learning, having fun and looking to the future.

Not necessarily young!

The Legacy Fund exists to support the whole age profile of the Society. The Cambridge Community Amateur Radio Project was part-funded and gives remote internet access to a top class HF radio station. This enables continued enjoyment of the hobby by those who are restricted in some way – perhaps health problems, challenge of advancing years, disability, limited antenna space.

These examples are to give a feel for the sort of projects which might get support.

Make contact

So how do you or your group make contact? The Legacy Sub-Committee makes recommendations to the RSGB Board. Its current members (trustees) are: Nick, G3RWF (Chair); Ian, G4EVK; Glenn, G6HFF; Lindsay, G8PMA and Alan, G8SSL. If you have an idea that you think might be right for legacy funding, start by looking at the RSGB website (www.rsgb.org/legacy). Then get in touch with the Sub-Committee trustees for a preliminary chat about your thoughts and their potential. Then there is a simple application form to complete that asks for the details of your proposal, the skills of those proposing it and its benefit to the amateur radio community. It also requires a timetable and costings. The Sub-Committee makes recommendations to the RSGB Board that has the final word.

Please get your thinking caps on! It will benefit our hobby and also keep faith with those whose generosity has made such funding available. We look forward to hearing from you.

Nick Henwood, G3RWF
Chairman, Legacy Sub-Committee
president@rsgb.org.uk

ICOM

HF/50/70MHz Transceiver

IC-7300

Revolutionary HF Transceiver

with High Performance Real-Time Spectrum Scope

Available now from authorised Icom UK Amateur Radio Dealers!

- RF direct sampling system
- Class-leading RMDR and phase noise characteristics
- Outstanding real-time spectrum scope
- Audio scope function
- New 'IP+' function
- Large touch-screen colour TFT LCD
- SD memory card slot for saving data
- Built-in automatic antenna tuner
- High-resolution waterfall function
- Multi-dial knob for smooth operation
- And much much more!

ICOM-UK
Blacksole House, Altira Park, Herne Bay, Kent CT6 6GZ. UK. Telephone: +44 (0)1227 741741. Fax: +44 (0)1227 741742.
e-mail: info@icomuk.co.uk website: www.icomuk.co.uk

Count on us!

79th Commonwealth Contest 2016

A well supported and closely fought Commonwealth Contest (also known as BERU) in difficult HF conditions.

This year's entry equalled the previous year's total, despite declining solar activity and disturbed HF conditions. Regardless of conditions, especially poor this year on the 10m band, competition in both the Open and the Restricted sections was keen. A total of 44 Commonwealth call areas submitted logs and a further 18 call areas were active and worked by many, including many of the 100 Restricted stations using only 100 watts and single element antennas. A total of 16 teams again entered the team competition.

The contest attracted an entry of 270 stations, comprising 56 in the Open assisted section, 81 in the Open unassisted section, 76 in the Restricted unassisted section, 24 in the Restricted assisted section, and 3 in the Multi-op section. Six HQ stations (Canada VA3RAC (VE3KI), VE7RAC (VE7JKZ), VE1RAC (VE1RSM) and VO1RAC, the UK GB5CC (G4FNL) and India AT1HQ (VU2PTT)) were kindly active to give away bonus QSOs. Sixteen teams entered the team competition, two from Australia, three from Canada, eight from all over the UK and one each from the Caribbean, Africa and New Zealand. Travellers again spiced up the contest for all by travelling to 5X, A2, C6, ZL, J3, J7, VY2, VO1, VP9 and ZF .

There was plenty of Commonwealth DX on offer. Entries were received from 5X, 9H, 9J2, 9M6, 9V1, A2, C4, C6, G, GI, GM, GW, J3, J7, T32, V5, VE1-7, 9, VK2, 3, 4, 6, 7, VO1, 2,VP9, VY2, VU, ZL1, 2, 3, 4, 5, 6, ZB2, ZF, ZS1 and ZS5. In addition, the following Commonwealth call areas were active but did not submit logs; 3B8, 3B9, 3DA0, 4S7, 5B4, 5Z0, 6Y, 8P6, 8Q7, 9M2, 9V1, A3, V3, V44, V85 and VP8. There were 148 UK entries, 56 VE, 19 VK, 13 ZL, 6 VU, and 18 other areas. This compares extremely well with last year, especially the ZL and VK entry. A number of mail shots went out before the contest to encourage the activity. The BERU website at https://berucontest.wordpress.com was very active with DX information leading up to the contest and with the team information.

The shift towards the lower bands makes the challenge to work the Commonwealth harder, but still the Commonwealth Contest remains a great opportunity for the Restricted station to log DX. This year the great support from ZL, VK, the rarer VE areas and the opening up of the bottom of the 80m band certainly helped.

Mike, VP9/G3VYI operated from Bermuda and was runner up for the Junior Rose Bowl.

Results

Operating from his super station on the shore of Prince Edward Island, the winner of the Senior Rose Bowl is Jeff Briggs, VY2ZM. Jeff managed to keep ahead of Ron Van der Kraats, CJ3T (VE3AT). Dave Goodwin, VE9CB (ex VO1AU) was third. The winner of the Colonel Thomas Rose Bowl is again Don Beattie, G3BJ. Winner of the Junior Rose Bowl is Bob Whelan, J34G (G3PJT) operating from the north shore of Grenada, followed by Mike Franklin, VP9/G3VYI, then Peter Hobbs, VO1LET (G3LET) operating this year in the Restricted section. The winner of the John Dunnington trophy is Bryan Turner, G3RLE. The Ross Carey Rose Bowl was won by Dave Aslin, G3WGN. Roger Parsons, VE3ZI took the VP8GQ trophy

In the QRP section, Mike Smith, VE9AA won the Lilliput Trophy with a comfortable margin over G3YMC. The leading Restricted single operator assisted certificate goes to Frank Davis, VO1HP, followed by G6M (G4BYG) in second and G3PHO in third place.

The Rosebery Shield for the leading single operator assisted station went to John Sluymer, VE3EJ. The leading Multi operator station was G3TBK, followed by VE9ML.

The Travellers award goes to A21MC (Mark Capstick, G4RCD). Mark operated from the Capital Guesthouse, Gaberone. He commented, "I made 104 QSOs in the contest – it was pretty hard work being so far from the centres of activity, and conditions had been much better in the days before the contest".

On the RSGB Contest Committtee website it is possible to see the scoring rates of entrants and compare them. For example showing J34G overtook his rivals only after 0000UTC and how sleep finally claimed him at 0800 or 4am J3 time! You can see how close the Open SOU rates were too from the Restricted score chart.

Commonwealth Medal

The Commonwealth Medal, awarded to long standing entrants, goes this year, to the Quake Contest Team from ZL consisting of ZM2B, ZL3PAH, ZL4PW, ZL3GA, and ZL3AB. This is in recognition of their sterling efforts from the antipodes. Born out of the Canterbury earthquake in 2010, the Quake Contest Team have been regular entrants and handed out many bonuses over the intervening years. Just to wake them up this year they experienced a large tremor right after the contest start! Mark, ZL3AB mailed "On behalf of the Quake Contesters team I'd like to thank the organisers for

the Commonwealth Medal award. It was totally unexpected and the boys were quite chuffed! We have a lot of fun in the BERU and especially enjoy the team aspect. We are looking forward to 2017. 73".

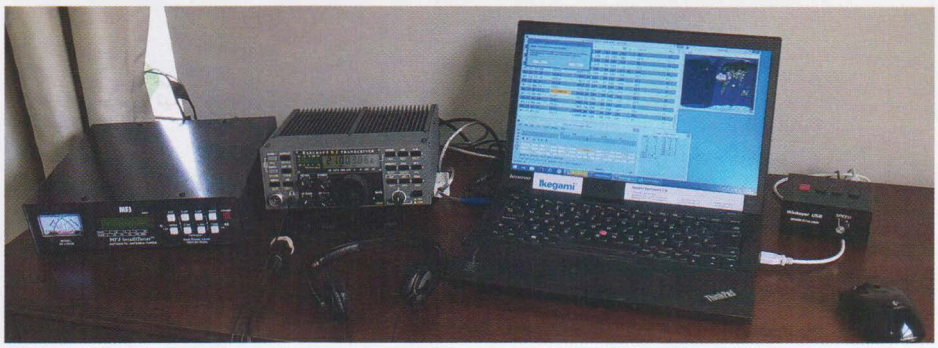
Team competition

It is good to see the keen competition again between the sixteen teams who entered this year. The variable propagation made for big scores from the VE teams, but was much harder on the VK and ZL teams this year despite the increased 'latitude correction factor'. The team competition was again won by Team Canada Eh?, then Team Australia 1, ahead of Team Quake Contesters. This is a fine team effort by the southern teams under challenging HF conditions.

Band analysis and propagation

There was solar disturbance the day before the contest, with a high A index, so average to poor conditions prevailed on 20m and 15m for the whole period, with little on 20m overnight, and 10m was poor to closed for many stations. Overnight conditions on 80m and 40m were reasonable, with fast fading signals at the dawn opening on 80m at 0600 followed by 40m at 0700. The chart shows the 20m activity from the UK to the Commonwealth. This chart and others will be published on the Commonwealth Contest website. The expected 20m Sunday morning opening did not happen for many, or only with a few minutes to run. During the night most of the ZL team were audible at VP9 on 20m but with few other signals. Peter, VO1LET reported good 10m conditions to UK on the day before but poor to non-existent propagation on the Saturday.

VO1LET operated from the Admiralty House Museum station.



The station operated as A25MC in Botswana.

The leading Restricted single operator assisted certificate goes to Frank Davis, VO1HP.

Operating from his super station on the shore of Prince Edward Island, Jeff Briggs, VY2ZM is the winner of the Senior Rose Bowl.

Travellers tales

In the Restricted section some great traveller's stations were set up, using 100W rigs and home made or commercial portable trap verticals or fan dipoles. K3 rigs were popular again. Peter, G3LET travelled this year to the Admiralty House Museum in VO1, with a restricted section entry, but was plagued by intermittent local QRN. Nigel, G3TXF, who travelled to Dominica as J79XF, commented, "Because of local noise at the original location, the entire station as well as the antennas were moved to a different (lower noise) location during the contest. Never had to do that before!" MOPCB travelled to VE3 and operated the VE3MIS club station but also suffered from noise on 80m. Alan, VE3HX travelled to VE2 as VE2AEJ, involving a toboggan, snow shoes and a G5RV in the trees. Mark, G4RCD visited Botswana and used a simple setup of a suitcase doublet/ATU and K2 to make over a 100 contacts despite poor HF conditions in southern Africa, and trouble with non BERU callers. J34G put his vertical too close to the sea and it was nearly washed away overnight! ZF2CA (G4CWF) operated from the ZF1A club station as last year and found conditions variable on HF with 10m openings at times. Colin was caught out by 20m failing to 'happen' on Sunday morning. Iain, ZL/G4SGX took his portable antenna with him and enjoyed his trip to ZL.

Silent key...

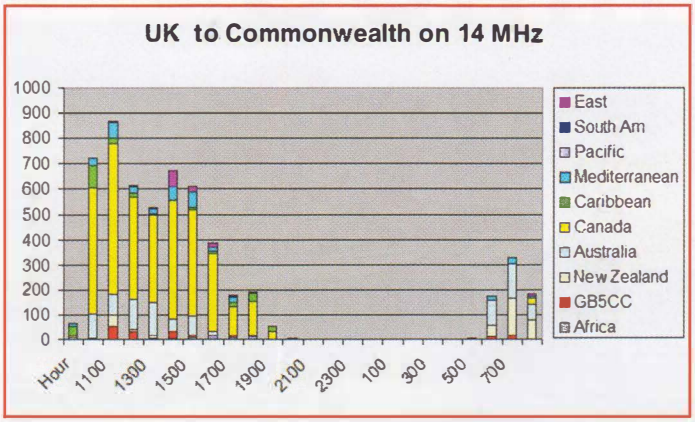
First to be heard and the last to disappear... Sadly, this year, Arthur J Gould, G3JKY, who was a long time BERU entrant, became a silent key. Our thoughts are with his family and friends.

Adjudicator's comments

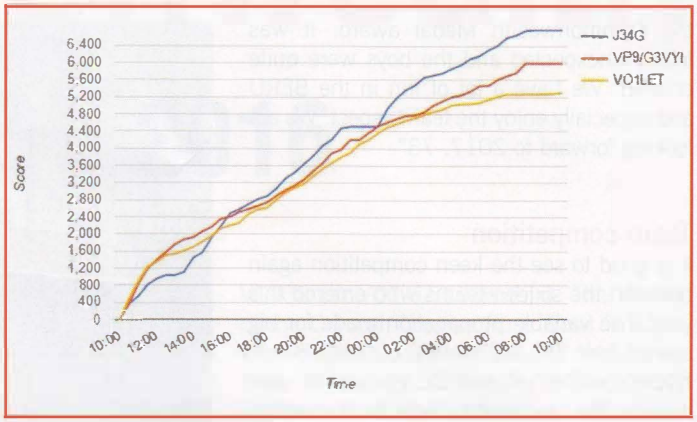
The full results are available at the RSGB Contest Committee website at www.rsgbcc.org/cgi-bin/hfresults.pl?Contest=Commonwealth%20Contest&year=2016 This has a great facility to display the stations' relative scoring rates as a multiple score/time graph, quite revealing for the top stations. A few paper logs were received this year and most logs were to a good standard.

Lots of BERU info, stories and pictures are at the Commonwealth Contest website https://berucontest.wordpress.com/

Mike Franklin, G3VYI
mike.franklin3@btinternet.com



The chart showing the QSOs on 14MHz from the UK to various areas of the Commonwealth.



You can see how close the Restricted Single Op Unassisted rates were.

80th Contest in 2017

The 2017 dates are 11 and 12 March 2017, so book your travel now!

There will be a number of UK HQ stations active from all the different call areas of the UK to increase activity and the bonus points.

Look at the Commonwealth Contest (BERU) website for lots of info on DX locations. Why not organise an expedition to Malta or Gozo or Cyprus, or further afield to Africa, or to the Caribbean?

Iain, ZL/G4SGX took his portable antenna with him and enjoyed his trip to ZL.

Selected Soap Box comments

2E1AYS: 1st time in the contest was a great buzz.

9M6XRO: Mixed condx this year. 10m was open but little activity. 40m CW destroyed in this region by 24/7 YB SSB nets. Many thanks to the contest organisers and 73 to all from Borneo.

A25MC: The bands were pretty noisy and when there was propagation it was hard to keep the non-Commonwealth callers quiet.

C4Z: Great support from the UK / VK /ZL. Enjoyable as always. Special thanks to the travellers who provide so much DX for us to work.

G0HSA: Despite the poor conditions managed to work some VK and ZL stations. Will be back next year.

G3LDI: Propagation was badly affected by a CME two days before and signals were very fluttery and auroral. There were some very loud signals too however.

G3NKS: Interesting conditions! Good path to VK but missed ZL. Much enjoyed.

G3OFA: First time entry to BERU. Hard going against the big stations but enjoyable.

G7TWC: Went to the country to get some fresh air and away from urban noise. Contest lived up to and exceeded my expectations. As always, thanks to the intrepid travellers who add spice.

GB5CC: High A index had huge negative impact on propagation (much poorer than in the previous year.) Really annoying that I lost my HF Yagi at around 0800Z, and had to manage as best I could for the last two hours.

GM3WIJ: Band condx pretty poor especially. 10/15m Thanks again to DX travellers making it work. Nice to work some DX with back garden wire antenna and 100 watts.

GW8Z: My favourite HF contest rather spoilt by the Sun this year and the worst conditions for many years made it really had work for us 'little stations'.

MM0JOM: Enjoyed first time in BERU. Great DX.

T32WW: Great to take time from our holiday style DXpedition to participate in the BERU. Glad to catch VE9CB and other Maritime entries. Best DX were VP9, ZF and J3/7.

VE3/M0PCB: Operated from the VE3MIS club station, towards the end conditions weren't great, the Sunday morning path to G on 80m didn't really open to the extent I had hoped for. Having a 6 ele Yagi on 20m and a 3 ele Yagi on 40m helped for sure!

VE3VHB: Amazing 80m signal from VK6VZ low bands very noisy at start of contest. Found 40/80 very poor after night-fall.

VE5SDH: I'm a blind ham was a little rough getting a signal out of VE5 land was fun hearing some DX though.

VE7BQO/VY1: My thanks to the operators who took the time and effort to copy my weak QRP signal.

VE7RAC: Definitely on the downhill side of the cycle what a pleasure to work so many VKs and ZLs on 15m.

VE9AA: Tried QRP Unassisted this year for a change of pace. UK ops were relatively easy, but VK, ZL etc nearly impossible- hi!

VE9CB: My first BERU from my new location. I worked many UK stations on 40m on an all-daylight path. LP to ZL and VK on 20m was quite good.

VK2BJ: Enjoyable contest as usual but conditions on 10 very poor and poor on 15. Path to Caribbean very patchy

VK2EL: Operated from multi-story retirement village. Antennas magnetic loops on fourth-floor balcony.

VK2IG: Thanks for running another enjoyable contest. PS: my operating time was interrupted by the arrival of a new baby llama!

VK3MI: I was pleased to be able to improve on my 2015 score by a margin of around 20% Thanks to everyone for the fun and QSOs.

VK6AJ: Conditions were better I had hoped. Nice to meet old friends again.

VK6LW: HF condx down compared to last year still a very enjoyable contest and always a challenge.

VO1LET: Apologies to callers I missed or QSOs abandoned due to a persistent static noise source.

VP9/G3VYI: Difficult condx at start then improved. 10m only 1 QSO!

VY2ZM: 10m was not open to Europe from here and even 15m was 'skewed' over Africa for almost all EU QSOs. Thanks for all the QSOs. It was fun.

ZB2CW: The winter storms broke the club's hexbeam. No option but to use a 20m long wire. It can only get better!

ZL3AB: A 4.4 earthquake to start the contest got the heart pumping. Poor propagation made it hard work though. Thanks for all the QSOs.

ZL3PAH: Despite difficult condx and a bit of a slog enjoyed myself as always - BERU is a very special contest.

ZM4G: Could only manage a few hours in the chair this year but I'm glad I did. Long live BERU!

FLEX 6000 SERIES & MAESTRO

True Flex-Ability

FlexRadio Systems® Software Defined Radios

FACTORY APPOINTED DEALER

As Flex Radio USA's Largest European retailer, ML&S pride themselves in having on-site expertise to demonstrate their exclusive range of products and more importantly support them, pre and post-sale. Anyone can shift boxes but the real test is when you need back-up. Our team of engineers and support staff are on site FULL TIME giving you real peace of mind before and after a sale is made.

When you next think of buying a new Flex Radio Product, think ML&S

IN STOCK NOW!

NEW MAESTRO CONTROL CONSOLE FOR THE FLEX-6000 SERIES.

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

ML&S PRICE: £1199.00

See HamRadio.uk/flex

FLEX 6300

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

ML&S PRICE: 2099.95
ON DEMO & IN STOCK NOW

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

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

SAFE ONLINE SHOPPING
Shopping online with ML&S is safe and secure. E&OE

PayPal

FOLLOW US ON TWITTER AND FACEBOOK **HamRadioUK**

Martin Lynch & Sons Ltd, Wessex House, Drake Avenue, Staines, Middlesex TW18 2AP. E-mail: **sales@hamradio.uk**
Opening Hours: Mon - Fri: 8.30am to 5pm. Sat: 9.30am to 4.30pm. International Tel: +44(0) 1932 567 333

FlexRadio Systems Maestro Control Console

The Maestro is a standalone unit that enables full control of any FLEX-6000 series of transceivers.

Whilst SDR technology is setting the standard in new radio designs, many amateurs are reluctant to embrace the fully computerised radio station and prefer the tactile approach provided by traditional, analogue rigs.

This preference has spawned a market of add-on tuning knobs and the like as well as a few new SDR rigs fitted with conventional controls. FlexRadio Systems have been at the forefront of digital radio systems and have recently introduced their own tactile interface to their FLEX-6000 series of transceivers. The Maestro is a standalone unit that enables full control of any FLEX-6000 series rig through a mixture of touch screen and familiar analogue controls. In this review I will be concentrating on the features of the Maestro as the excellent FLEX-6000 series transceivers have been reviewed in previous editions of *RadCom*.

Connections

You can see from **Photo 1** that the Maestro has a very comprehensive set of interconnections on the rear panel. Starting with the power supply, there are a number of options. The most obvious is to use the coaxial power socket and supplied lead to connect the Maestro to the main shack 12V power supply.

An interesting alternative is to use a battery pack. Rather than use a specialist and expensive dedicated battery unit, the Maestro makes use of the popular 5V USB power packs that are used to charge mobile phones. Because there is a mass market for these power packs there's plenty of choice and the prices are very competitive. The maximum size for the Maestro battery is 6" x 3" x 0.75", which is a bit smaller than many of the common power packs so you will need to choose yours with this in mind.

One further point to remember is that the usable capacity of these power units is about 70% of the quoted capacity. Given the Maestro's power demand, a popular

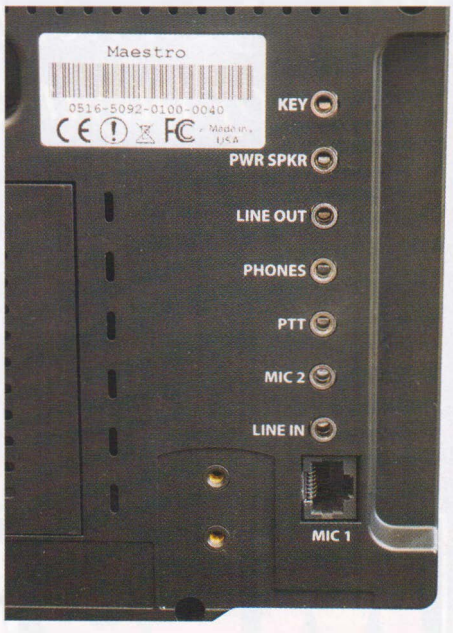


PHOTO 1: The well-connected rear panel of the Maestro.

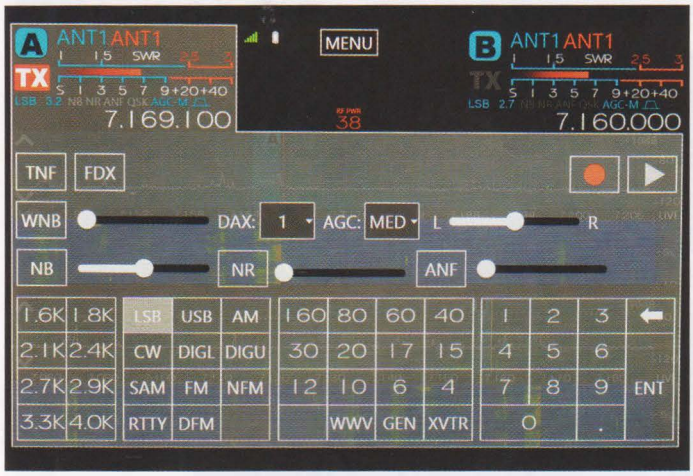


PHOTO 2: The pop-up slice receiver control panel

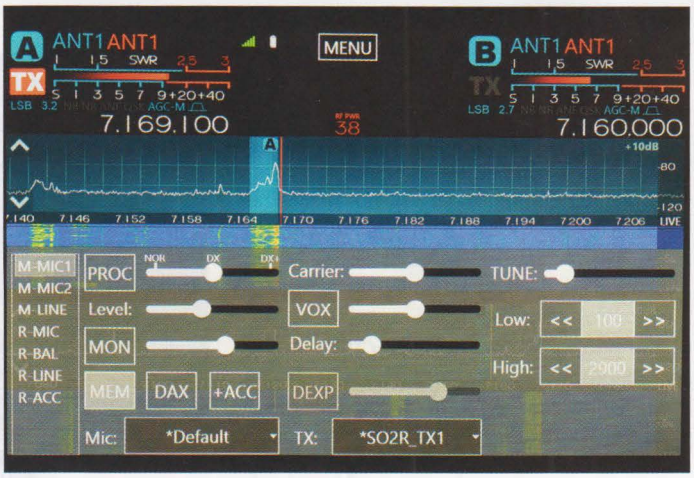


PHOTO 3: The pop-up transmit control panel

10,000mAh size unit should keep the Maestro running for at least 5 hours. The final power option was to use the supplied mains power pack.

Communication between the Maestro and network connected, FLEX-6000 series base units can be handled either via Wi-Fi or a hard-wired Ethernet connection. For the Wi-Fi option, the Maestro has an integrated Wi-Fi modem so there's nothing else to buy. Wi-Fi setup was very simple as it was presented as an option during the normal start-up. When using Wi-Fi, the security password was entered using the on-screen keyboard. As you would expect, the wired Ethernet option was completely automated and the Maestro negotiated its IP address using the DHCP server on my home network.

With the Maestro, you have three options for the microphone connection. If the FLEX-6000 base unit is nearby you can use its multi-pin Foster connector. However, to take full advantage of the Maestro's remote connection, you should use the (Yaesu-wired) RJ-45 microphone socket or the 3.5mm microphone sockets. The inputs are selectable via the Maestro's transmit control panel so you are free to use either option and the 3.5mm jack includes PTT and a DC bias facility for electret mics. The Maestro provides the usual, line-level, fixed audio output that is handy for recording or external audio processing/decoding systems.

There's also a (stereo-wired) powered speaker output where the level is controlled by the receiver volume controls. This was ideal for connecting a good quality external speaker system and worked very well with my Mackie CR4s.

The 3.5mm stereo headphone works as expected and automatically muted the internal speaker.

For CW operators, the key jack employed a 3.5mm stereo socket and had provision for connecting straight or paddle keys.

Power-Up

The Maestro was started by pressing and holding the top-panel power button for about 5 seconds and then, about 40 seconds later, the radio selection appeared. If you're fortunate enough to have multiple FLEX-6000 series rigs on your network, you can use this menu to select the desired rig. The next screen provided a software version option with two choices available in the review model. I opted for the latest version. This screen is also used to advise you of software updates and also to download and install those updates. That completed the power-up sequence and the Maestro burst into life.

Using the Maestro

I found the Maestro interface to be very intuitive and I was soon scooting around the bands without having to plough through the manual. This is always a good sign that the interface has been well designed. Just before I cover the mechanics of the operation, I ought to explain a couple of key operational principles behind the FLEX-6000 series transceivers. This product range does all the RF and digital processing in the main unit, which means, the connected computer, or in this case, the Maestro, simply has to display the results and handle the audio signal routing. Handling all the heavy processing within the main unit greatly reduces the computer loading and also makes it possible to access and control the advanced features of these transceivers via a simple 100Mb/s Ethernet or even a home Wi-Fi link. The second point to appreciate is that the Maestro operates with a maximum of two slice receivers. In this case, a slice receiver is a virtual receiver that can be up to 20kHz wide and can be placed anywhere in the spectrum. It is individually controllable and the mode, frequency and filter settings, etc can all be changed independent of other slices. Think of it as a VFO or an independent, full-function, receiver. The net result is that you can manually tune either slice receiver over the entire spectrum without any gaps or settings to change. The beauty of the two slice receivers is that each one can be tuned anywhere in the digitised spectrum from around 10kHz to 72MHz! When it comes to transmitting you can link the transmit section to either one of the receivers but not both.

Hopefully, you can see from the photos that the Maestro is a good sized control panel with a very crisp 8" (diagonal) display. The main tuning knob (slice receiver A) is probably the most used control and the Maestro uses a 55mm diameter knob with a good weight. This makes the knob highly spinnable, which is a feature missing from many digital systems! I was also delighted to see that there are no detents on any of the Maestro's rotary controls. Of course, the controls still operate using discrete steps but the removal of detents makes operation feel so much smoother. The main tuning knob uses a 64 steps per turn device and produces a very smooth tuning effect. Tuning step selection for the main tuning could be very easily adjusted using the Step button right next to the tuning knob. The second slice receiver employs a slightly smaller knob at 40mm diameter but it is also spinnable. In addition to the excellent manual tuning system, the Maestro's touch-screen control is very powerful. The screen reacts to all the usual touch-screen gestures so a double-tap on a signal will cause the receiver to instantly re-tune. I could also swipe across the display to move the central tuning ribbon plus both the horizontal

Mike Richards, G4WNC
mike@photobyte.org

(frequency) and vertical (signal level) axis could be zoomed, either by pinching or spreading two fingers.

Immediately above the two main tuning knobs is a row of buttons that were used to enable each slice receiver and to toggle the transmit option between the two receivers. These buttons were also used to active the Tx and Rx incremental tuning. Moving up the control panel revealed a set of three, dual-mode, function buttons that could be customised via the main menu. These buttons had a wide range of potential uses, eg to switch-in your favourite noise reduction or maybe to activate split working. It's easy to overlook the function buttons but with a bit of planning, they can be a real time saver.

Each of the slice receivers has a carefully chosen pair of dual concentric controls at the top of the main panel. The left-hand control gives direct access to volume and the AGC threshold or squelch. The latter two are dependent on the mode selected. The central knob can also be depressed to activate a Solo mode that mutes the other slice receiver. The right-hand concentric pair provide full control of the receive bandwidth using an ingeniously simple system. The inner knob is used to adjust the LF cut-off frequency whilst the outer knob adjusts the overall filter width. In practice, this was a wonderfully simple way to adjust the excellent filtering and far easier than trying to drag the side of the passband with a computer mouse! By clicking and turning the central knob, the receiver would also alternate between two or more pre-settable bandwidth values. A duplicate set of controls were provided for the B slice receiver.

Accessing the mode selection and the wide range of receive controls for each slice receiver could be done ether by tapping the frequency readout or by depressing the appropriate tuning knob. This activated the on-screen control panel shown in **Photo 2**. As you can see, this provides quick band selection, direct frequency entry, bandwidth, mode selection, noise reduction and more. I found the touch screen very responsive and easy to use.

Moving on to the transmit controls, there was a pair of concentric controls to the right of the panel that provided quick adjustment of the mic gain and drive level. However, when operating CW, the Mic control changes to adjust the internal keyer speed. Pressing the Tx power indicator in the centre of the display activated the main transmit control panel, **Photo 3**. This gave quick access to all the vital transmit controls including speech processing, VOX, tune power, delay, bandwidth, mic selection and more. To help with optimising the transmit controls, the Maestro includes a handy audio recorder that can be used to record and play back the processed audio. I found this a great aid for getting the speech processing just right for your voice/mic combination.

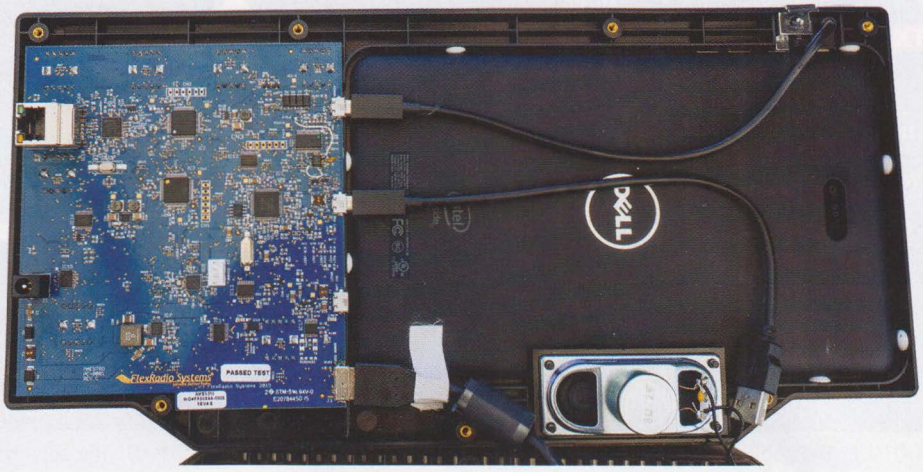


PHOTO 4: A look inside the Maestro with the Dell tablet on the right and the custom control board on the left.

Persistence

To help speed general operation, the Maestro conveniently remembers the settings you last used on any given band. FlexSystems call this feature 'persistence' and I found it to be a great time-saver. In addition to automatically saving the last used settings for each band, you can also save global profiles which, as the names suggests, captures and saves the settings for all bands. I'm sure most operators will find this very useful, especially if you have a range of operating interests. I find that I alternate between different operating interests, ie Data Modes, Phone, Contests, etc and the Maestro's global profiles let me create a separate profile for each operating mode that I could easily recall. This likely to be a real bonus for contest stations as each operator could have their own profile.

A peek inside

As I mentioned earlier, the Maestro is simply an interface to the FLEX-6000 series transceivers so it provides a dedicated computing platform for those rigs. As a result, there is no RF circuitry in the Maestro as all the RF interconnections take place on the FLEX-6000 main unit. At the heart of the Maestro is a Dell Venue 8 Pro tablet that is mounted inside the Maestro's case, see **Photo 4**. This is a clever idea and a very convenient and cost-effective way to achieve a high quality display combined with good touch-screen controls. The LCD type used in the Dell Venue 8 is an IPS (In-Plane Switching) panel that is known to produce good colour with excellent viewing angles. Processing power for the tablet comes from an Intel Atom Z3740 processor, which is a quad-core unit that runs at up to 1.8GHz. Although not quoted, the underlying operating system appears to be Windows 8.

Whilst the tablet runs the rig management software and the display interaction, a custom board looks after the physical controls. This board used standard devices for managing communications with the Ethernet port and the USB link to the tablet based software. All the rotary and push-button controls on the Maestro employed digital rotary encoders and the LED control was managed by a pair of PIC 8-bit microcontrollers coupled with a number of logic latches.

Summary

The new FlexSystems Maestro is extremely easy to use and provides a very effective control system for the FLEX-6000 series transceivers. I particularly liked the feel and interaction of the tuning knobs and touch screen. The Maestro's display was impressive with just the right amount of touch sensitivity, a very crisp display and a wide viewing angle. I felt the range of manual controls was very well thought through with all the key controls to hand and backed up with rapid access to the more advanced features through the simple menu system. Although many will buy the Maestro for its traditional rotary controls, the touch-screen interface is well implemented and should not be overlooked. Combining a FLEX-6000 series transceiver with the FlexSystems Maestro creates a wonderfully simple to operate but powerful station with the flexibility to take the Maestro wherever your home Wi-Fi permits. This added flexibility could be particularly attractive to radio clubs or demonstration stations.

The Maestro costs £1199.95 and is available from all FlexSystems dealers. My thanks to FlexSystems for the loan of the review model.

Hamfest 2016

Keep the dates of Friday 30 September and Saturday 1 October free for the biggest rally in the UK.

Organised by the Lincoln Short Wave Club in association with the RSGB, the National Hamfest takes place at the Newark & Nottingham Showground, Newark, Nottinghamshire NG24 2NY.

Tickets on sale

The Online Ticket Office is now open for business and buying you tickets in advance means you can use the EXPRESS gate and avoid the queues. There is a 20% discount on bulk purchases of 10 tickets or more. See the website www.nationalhamfest.org.uk for full details.

Car boot/flea market

As well as the indoor trading area where you will find all of the main manufacturers represented as well as traders large and small from both the UK and Europe, there is a car boot/flea market outside. This will see some changes on 2016.

Tables will be set out end to end in a long row and you can have 1, 2 or 3 tables (costing £20 per table per day). There won't be space for your vehicle to be parked alongside the table for extra selling space. These tables may be pre-booked using the tickets menu on the National Hamfest website (www.nationalhamfest.org.uk).

Pre-booking and paying for your tables in advance will secure you the best tables nearest to the centre of the event. This part of the outside area is available for individuals who wish to dispose of unwanted items and is not for regular traders. All pitches must be cleared by 6pm each day, and those with tables should note that there is no overnight security outside (tables inside the main hall will have a security presence overnight).

The car boot area will be a little different in 2016 but, no doubt, still popular with visitors.

On both the Friday and Saturday of the event, gates will open at 7.30am for access to set up the Car boot/Flea market area and this must be finished by 9.15am. Anyone arriving after 9.15am will have to wait until an escort is available (to comply with the Health & Safety regulations of the site).

RSGB Convention 2016

The programme for the RSGB Convention on 7 to 9 October is already filling up with more than 30 different lectures booked on a multitude of aspects of the hobby. From ARDF (Amateur Radio Direction Finding) to transverters and Arduino to SDR with knobs on, there is something for everyone.

It's not only lectures. This year there will be a Buildathon and a workshop on soldering surface mount devices.

Buildathon

The Convention Buildathon will provide attendees with the opportunity to build a 40m transceiver based on a popular Kanga UK design. The construction is simple and easy and will not pose any difficulties even to the novice kit constructor. The filter contains three toriods that will require winding, but this is not as challenging as people believe. There will be volunteers available to help with this part of the build.

The basic build should be completed in a half-day session, leaving plenty of time to enjoy the rest of the Convention attractions. Please note that participation at the Buildathon is charged at £29.95; that does not include the cost of admission to the Convention but does include use of all the equipment required and the 40m transceiver kit.

Something for everyone amongst the talks planned for this year.

Soldering workshop

Dave Powis, G4HUP will be presenting a new surface mount device (SMD) project aimed at beginners in this technology, and potentially with applications across all radio users. The presentation will introduce and explain the project, as well as the techniques and tools needed to construct it. This will be followed during the day by a number of workshop sessions with full construction support. Registration details for the workshop sessions will be provided closer to the event.

Design Notes

Last month we looked at two low cost transceiver modules made by DORJI. These modules have no harmonic filtering on the output and if used straight into an antenna could, and probably would, radiate on non-amateur frequencies, making their use illegal if left as-is. No mention of this lack of filtering, or indeed any indication of harmonic levels is indicated in the data sheet.

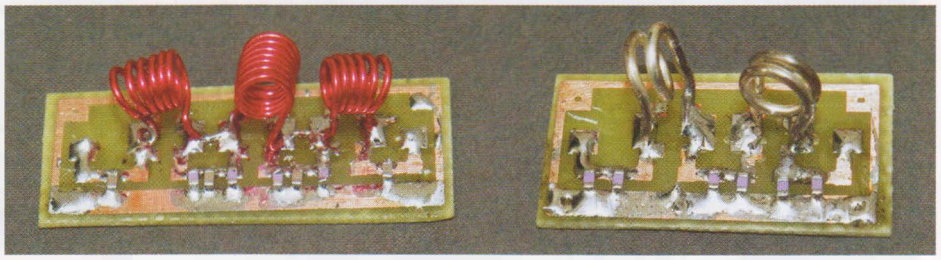


PHOTO 1: The two breadboard filters, constructed using SMT capacitors on a generic filter PCB.

Transmitter output filtering

So... we need external low pass output filtering to attenuate these harmonics. But what is an acceptable level? The CEPT requirements for commercial equipment define spurious outputs (not just harmonics) to some extent based on the output power and the frequency band. The specification is that all unwanted spurious outputs outside the necessary bandwidth are below the carrier (ie dBc) by 43 + 10.LOG(P) dB, where P is the power in watts.

The equation holds up to a maximum of -50dBc for frequency products below 30MHz and -70dBc for all products above 30MHz. The lower value of -50dBc only really holds for HF equipment operated at the bottom end of the band, so we will only consider the -70dBc case for frequencies over 30MHz.

In practice this means that a low power VHF transmitter of 1 watt needs to have its harmonics attenuated by at least 43dB, but a 100 watt VHF transmitter requires 63dB. The limiting case is at 500 watts, where suppression fixes at -70dBc Of course, as amateurs we are not *obliged* to meet these requirements in any home built kit – but there is no excuse whatsoever for not doing so; and if it subsequently does cause interference – enough said.

The harmonic levels I measured on the VHF and UHF DORJI modules are shown in **Table 1**. From this we can see the main problem with the VHF unit is going to be attenuating its second harmonic by at least 33dB to get it from -10dBc to below -43dBc.

TABLE 1: Measured harmonic levels on the DORJI modules at 1W output.

Module	2nd	3rd	4th harmonic
VHF	-10dBc	-22dBc	-28dBc
UHF	-19dBc	-57dBc	(all others <-70dBc)

Low pass filter design

Design of simple inductor capacitor low pass filters is, nowadays, almost a plug-and-play process using filter design software such as *AADE Filter Designer* [1]. All designs presented here use the diagrams from *AADE* but many other filter design packages are available. Search on the web for 'RF filter design software' to find them.

Filters for the output from a transmitter come with one or two special requirements, and some relaxations that can make for neat short cuts. All low pass filters allow the designer to specify a certain amount of passband ripple. Higher ripple generally means a sharper cut off but also means that the input impedance, at the points of peak ripple, may be quite poor. To show what this means, consider two theoretical designs for a 5th order, low pass filter with a cutoff of 150MHz. **Figure 1** shows the ideal Chebyshev values and response for a 0.05dB ripple design. **Figure 2** shows the changes that happen when a ripple of 0.5dB is specified. In each case the red curve shows the input return loss **[2]** and you can see that for the latter case is goes to a rather poor 10dB at the points of maximum ripple (VSWR = 2:1). BUT, see how at other frequency values its return loss is still acceptable. Contrast with the 0.05dB ripple case where return loss is acceptable at better than -20dB over the whole of the passband – but a slower roll-off, giving less attenuation of the second harmonic. High ripple filters are often used in low level stages where match is not critical; transmitter output filters call for low ripple designs, or careful placing of the point of maximum ripple.

Neither of the two designs is suitable as it stands as the output filter for the DORJII module. In the 0.05dB ripple version, the attenuation at 290MHz is just 28dB and not sufficient for our needs. In the other, the match at 145MHz is too poor at just 9dB return loss. Also, the component values are the 'ideal' ones generated by the design software. We will have tolerances and unknown inductors to contend with, any departure from the ideal will alter the response. Fortunately the *AADE* software allows users to change components at will and see what happens to the response as things are varied (as do all the other packages). This works to our advantage as it allows 'odd' and custom designs to be modelled and shows how they can be adjusted for a final version.

Other filter responses could be used, but offer little advantage in this application. The Butterworth, or zero ripple, response has a slower roll off and offers nothing over a low ripple Chebyshev. An

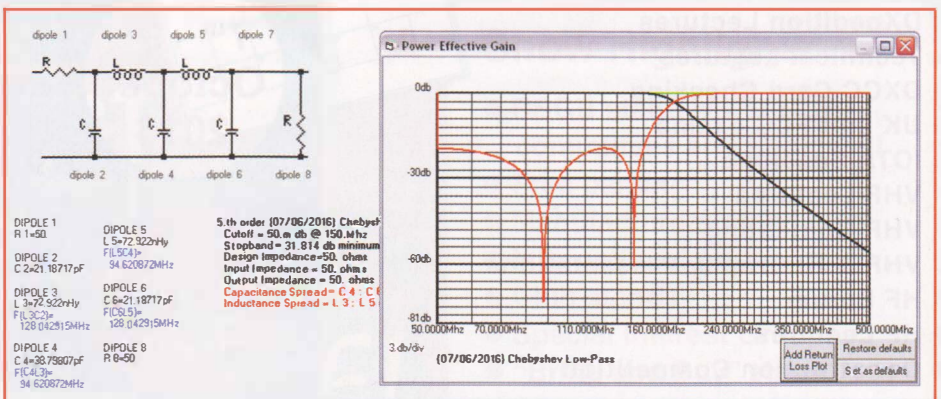


FIGURE 1: Idealised *AADE* filter for 150MHz LPF with 0.05dB passband ripple, with a good match over all the passband.

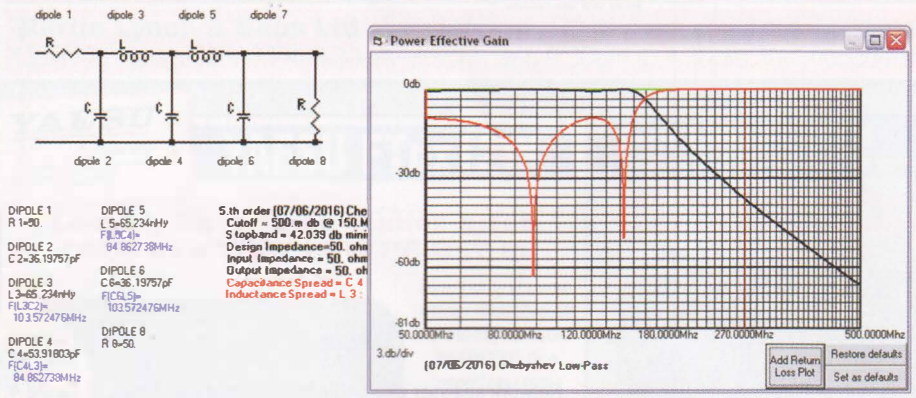


FIGURE 2: Idealised *AADE* filter for 150MHz LPF with 0.5dB passband ripple, showing the poor match at certain frequencies in the passband.

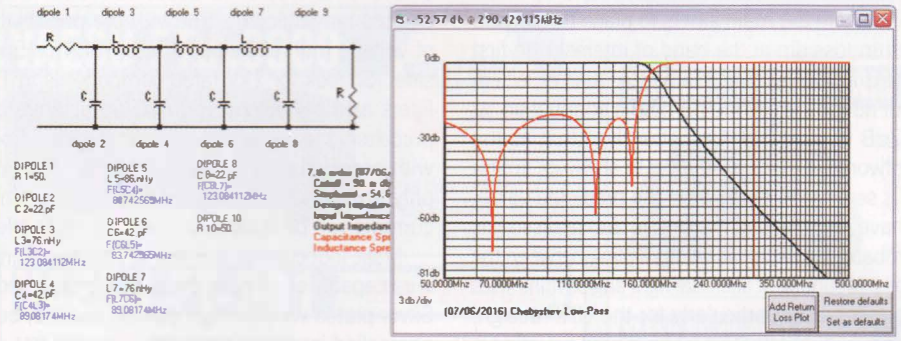


FIGURE 3: *AADE* design for 7th order low ripple filter with components adjusted to 'convenient' values.

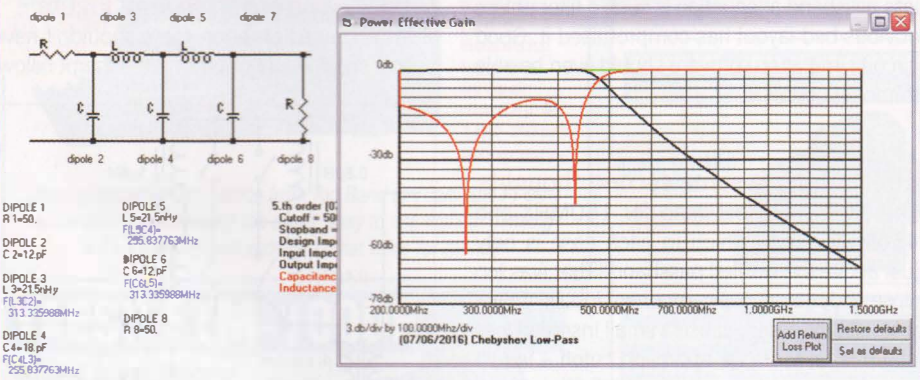


FIGURE 4: 450MHz high ripple filter adjusted to place an optimum match region at the frequency of interest.

elliptic design, using capacitors across the top Tee inductors to give notches of near infinite attenuation at certain stopband frequencies can be very helpful in cases where a wider passband and sharp cutoff is desired. Tuning the inductors by setting the correct notch frequency can also make for very easy adjustment. But in this application modelling showed no advantage to an elliptic over the 7th order Chebyshev in terms of the total number of components.

Some practical designs

The easy way is just to increase the filter complexity and use a 7th order low ripple design. **Figure 3** shows such a filter, that more than meets the requirements for passband return loss of 20dB and second harmonic attenuation of 52dB. The component values have been adjusted to the nearest pF and nH and this filter can be built and tuned as described later.

Now, what about the UHF module? The second harmonic level is already at -19dBc so we only need an extra 24dB to meet the requirements. If the design of **Figure 1** were scaled in frequency it would just about do the job with a few dB in hand, but let's have a play and see what can be done with a higher ripple 5th order design, adjusting component values to optimise the position of the ripple minimum.

If we start out with a 450MHz low pass Chebyshev design specifying 0.5B ripple, worst case return loss is around 10dB (as before). Now look back at **Figure 2**, which is just a frequency scaled version of this one. See how the second passband dip lies at 140MHz. On the 0.5dB UHF design, this dip scales to 429MHz – tantalisingly close to where we want it! Can we play with component values and cutoff frequency to move this dip to 433MHz? One way is to scale the design cutoff frequency, to move it higher in the ratio of 433/428 so the ripple peak moves in sympathy. Modelling for a cutoff of 454MHz, the result of **Figure 4** is generated. Again the ideal component values have been adjusted to the nearest pF and (this time) 0.5nH resolution. The return loss at 433MHz is a satisfactory 20dB and, more importantly, the attenuation at the second harmonic is 40dB. Perfect.

Building them

L/C filters really lend themselves to just about any construction technique suited to RF circuitry. Rats nest layout over a copper ground plane works well, but for a more robust solution a PCB is preferable. The physical layout can follow the electrical schematic remarkably closely, and for designs up to UHF a single sided PCB can suffice if size is kept down. I already had some small PCBs made up for filters and use SMT components for everything. **Photo 1** shows my breadboard for the two filters – the 7th order VHF low ripple design and the optimised 5th order UHF one.

To get the calculated response, component values really need to be close to the design values – getting to within 5% should be good enough, assuming you haven't asked for too critical a filter cutoff or tried to be too clever! Capacitors of this accuracy are readily available: my stock of SMT devices are all 5% tolerance, and devices are available to this tolerance down to less than 1pF. The required values for the filter are made up of several in parallel. Doing this also helps reduce stray inductance and shares out current flow and heating effects at high power. Try to get really close to the calculated values of capacitance, as that makes the next stage easier.

Inductors

These can be a real pain at VHF and UHF. One solution is to use ready moulded ones with adjustable cores, but unless you happen to have good junk box stocks these are a bit expensive nowadays. Air wound ones work well, and can be adjusted by squeezing the turns, but getting the right value from the start is near impossible.

Andy Talbot, G4JNT
andy.g4jnt@gmail.com

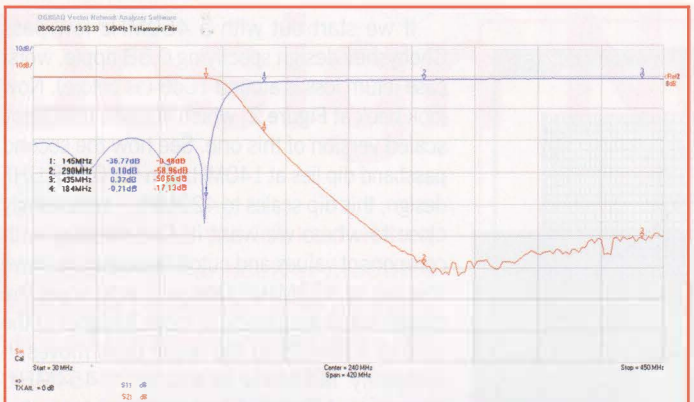


FIGURE 5: Network analyser plot of first breadboard version of Figure 3.

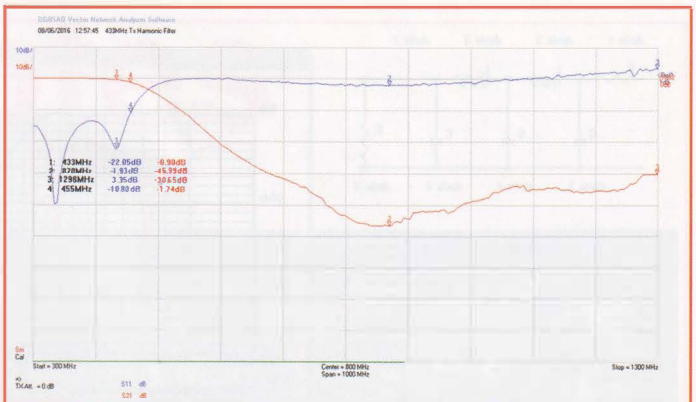


FIGURE 6: Network analyser plot of the first breadboard version of Figure 4.

Wheeler's equation [3] provides a starting point; expect something like 20% accuracy and, for two turns coils at UHF, even worse. But all is not lost: the coils can be adjusted at test. Even if not spot on, the fact that all the capacitors are correct means that over half the components are already at the right value. The VHF coils in Photo 1 were wound using 0.5mm enamelled wire on a 3.1mm drill and the UHF coils with 0.6mm silver plated wire on a 4mm drill.

Tuning up and testing

Rule one about tuning up filters: never, ever, just try to do it based on 'maximum smoke', otherwise known as just tuning for a peak. You'll go down an infinity of wrong ways and never get the right response. Instead, adjust while looking at the return loss of the filter with the output port terminated in a good load. This means only a single port measurement, meaning lower cost, simpler antenna analysers or even a SWR bridge and tuneable transmitter can be used. Of course, a two port network analyser means you can simultaneously monitor transmission loss, but this really doesn't show much extra value. Return loss tells you everything!

Look at Figures 1 to 4 again; see the red return loss curves. Those sharp dips depend on the component values. Since we already know the capacitors are correct, all that remains is to adjust the inductors to get the sharp dips more or less into the right place.

Results

Figures 5 shows the measured results for my breadboard 150MHz 7th order Chebyshev 0.05dB ripple filter. Compare with **Figure 3**. The dips are smoothed out a bit as I used averaging on the network analyser, but they are not too far off the predicted ones after a bit of coil squeezing. The attenuation at 290MHz measures 58dB, remarkably close to the predicted value of ~56dB.

Similarly, **Figure 6** shows the measured results of the 5th order Chebyshev with optimised passband. The plot doesn't look so nice because my DG8SAQ network analyser is reaching the limit of its capability (it is only properly useful up to 500MHz, with degraded performance above that). But it is good enough to tune up with. Since here the main aim is to place the second return loss dip at the band of interest, the first one is further away from predicted than expected. But notice the second harmonic attenuation, at 47dB (it may even be better than that as the network analyser is starting to show its limits) it is several dB better than the predicted value. I have encountered this before and realised it is probably due to unwanted coupling between the coils. Mounting at alternate right angles minimises coupling but, particularly for the UHF design, some will remain. While unwanted coupling is never desirable, in cases like this it *can* work to our advantage. I have rarely seen significantly less passband attenuation is such a filter unless obvious bad layout has compromised it. Good circuit simulation software should even be able to model coupling.

Conclusions & some second thoughts

The filters were designed for 150MHz and 454MHz cutoff, which in each case is only just above the wanted passband. That was too close and means that component losses, which were not modelled, cause a small insertion loss that increases as we approach cutoff – ie just where we want to use it. The VHF filter shows 0.7dB insertion loss and the UHF one 0.9dB. Had they been designed for a slightly higher cutoff, the stopband attenuation at the second harmonic would be degraded, but insertion loss would also be reduced. Some more time should have been spent trying designs for, say 160 or 165MHz cutoff and 470 to 480MHz.

For a low power transmitter such as these, an extra 0.5dB is hardly important, but at the 400 watt level, every fraction of a dB matters. Which brings us onto the final point...

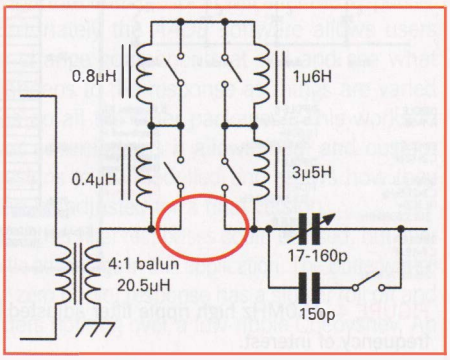
Voltage and current ratings

All filters show slight resonances internal to their operation, which multiples applied voltage. To get an idea of capacitor ratings, first calculate the applied peak voltage at maximum power. $V_{PEAK} = \sqrt{(2 \times \text{power (W)} \times 50\Omega)}$, which is 200V for 400W. In normal usage, a safety factor of 1.5 or 2 would be used, so 400V rated devices are sufficient. But with the possibility of voltage multiplication, a factor of 4 or 5 is safer. So look for 1kV rated components in Tx filters at the 400W level. ATC do a range of porcelain capacitors suited to this application with associated high current ratings. For 1W only about a 20V rating is necessary and the currents will be fairly low – but not negligible.

Make inductors as low loss as possible, using wire capable of carrying the currents expected. Silver plated wire for high powers is good, but enamelled is often adequate.

Errata – correction to July Figure 1

G8ACA spotted an error: there shouldn't have been a short where ringed in the excerpt below.



Websearch

[1] *AADE Filter Design* Download – www.dxzone.com/dx17873/aade-filter-design.html

[2] Return loss is simply the reflection coefficient expressed in positive dB terms, and is related to VSWR (V) by the equation RL (dB) = 20.LOG[(V – 1) / (V + 1)] Filter ripple is also related via the equation Ripple (dB) = 10.LOG [2 * (V2 + 1) / (V + 1)2]

[3] Wheeler's equation for inductance: L (µH) = (D.N)2 / (0.46 * D + G), where D = diameter of the coil, G = length (both in mm) & N = number of turns. For large coils with many turns, expect around 10% accuracy. For small coils of only a few turns treat the result as just a starting point and expect an accuracy of 20 – 50% from the calculation.

YAESU FIELD GEAR 2016 CASHBACK/FREE GIFT REBATE OFFER

Runs 1st July- 30th Sept 2016

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

SAFE ONLINE SHOPPING
Shopping online with ML&S is safe and secure. E&OE

PayPal

FOLLOW US ON TWITTER AND FACEBOOK HamRadioUK

Martin Lynch & Sons Ltd. Wessex House, Drake Avenue, Staines, Middlesex TW18 2AP. E-mail: **sales@hamradio.uk**
Opening Hours: Mon - Fri: 8.30am to 5pm. Sat: 9.30am to 4.30pm. International Tel: +44 1932 567 333

YAESU 60th Anniversary Since 1956

YAESU FTdx1200

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

SUPER SUMMER SAVING SEE WEB

Bored looking at a mono display? Yaesu obviously were so they introduced the FTdx1200. It's a "proper" base station size too for those that don't want fiddly little controls.

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

YAESU FTdx3000

SUPER SUMMER SAVING SEE WEB

A cut down version of the famous FTdx5000. 100 Watts on HF-6m.

YAESU FT-991 NEW PRODUCT!

HF-70cm with ATU Built-In

SUPER SUMMER SAVING £80 CASH BACK

We love this compact base station radio. Beautiful touch-screen display & 160-70cm coverage.

Offering superb performance from Top Band to 70cm, the FT-991 is compact without being too small, easy to use without missing out on features and above all great value for money.

YAESU FTM-100DE

Latest 2/70 Mobile

The latest 2/70 Mobile from Yaesu with the new digital C4FM (Fusion).

IN STOCK AT ONLY £299.95
£40 CASH BACK
HRI-200 Wires 11 Interface Only £99.99

YAESU FTM-3200E NEW PRODUCT

C4FM 2m Transceiver

65Watt 144MHz with AMS.

ONLY £159.95
see *Hamradio.uk/ftm3200*

Yaesu FTdx5000MP Ltd

You can add an SM-5000 pan-adapter with superior speaker audio.

The very best selling 200W HF Base station available at under £3500.

NEW PRODUCT COMING SOON!

SUPER SUMMER SAVING SEE WEB

* shown with optional SM-5000 Panadapter.

YAESU FT-857D ONLY £629.95

Want to work HF mobile? Thousands of Hams around the world use the FT-857D. 160m-70cm, add the optional ATAS-120D to your car and you have an instant HF station on 4 wheels. We even include the YSK-857 remote kit for mounting FREE.

YAESU FT-2D ONLY £299.95
C4FM/FM 2/70 Dual band Handie

SUPER SUMMER SAVING SEE WEB

Exciting leading edge Handheld with full back-lit touch screen 1.7" display.
FREE NH-85a11u Snapshot Camera

YAESU FTM-400XDE NEW MODEL ONLY £414.95
Large Colour Touch Screen Display.

SUPER SUMMER SAVING SEE WEB

The all new FTM-400XDE offers 4 modes of transmission including Voice & Data at the same time, Voice FR Mode, Data FR mode & Analogue FM. Massive 3.5" colour display, Dual receive and more.
SEE: HamRadio.co.uk/ttm400

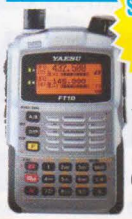
YAESU DR-1XE 2/70 C4FM + FM REPEATER
ONLY £949.95
£400 CASH BACK STILL AVAILABLE

The most advanced mixed-mode repeater available today.

SEE WEB FOR MORE DETAILS

YAESU FT-1XDE

SUPER SUMMER SAVING SEE WEB



Very first Dual Band Full Digital Handie using C4FM & FDMA Digital technology.

NEW! NIFTY DESK-TOP STAND HOLDER
FOR YAESU FTM-400 SERIES.
ONLY £29.95

NEW! MYDEL RADIO DUST COVERS

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

See Hamradio.uk/covers

FT-891

The new FT-891 is a 100W HF-50MHz mobile size transceiver.
More details see: Hamradio.co.uk/ft891

YAESU FT-450D
Full feature HF-6M base transceiver with large easy to read display. The baby of the range but not in performance or functionality.
NOW ONLY £499.95

YAESU FTDX9000 SERIES
Yaesu Flagship Champion!
CALL FOR BEST PRICE!

YAESU FT-817ND
The Worlds Only All Band Portable! **£40 CASH BACK**
NOW ONLY £459.95

YAESU FT-857D Includes YSK-857 Remote Head Kit.
NOW ONLY £629.95

ATAS-120A
ATAS-120A Auto Mobile 40m-2m Antenna for FT-857/897/450/991
ML&S PRICE £259.95

YAESU FT-2900 2m 75W, MiL spec, high performance.
NOW ONLY £129.95

YAESU FT-8900E
With FREE YSK-8900 Remote Kit
High-power FM on 10m, 6m, 2m & 70cm. When your local repeater is busy, slip onto 10m & work DX!
NOW ONLY £249.95

YAESU VX-3E
Micro Handie 2/70 with scanner
WAS £129.95 NOW £109.95

YAESU FT-60E Twin band handie
WAS £119.95 NOW £99.95

YAESU VX-6E 2/70 handie
WAS £179.99 NOW £164.95

YAESU VX-8DE Triple Band 6/2/70 with enhanced APRS.
NOW ONLY £199.95

YAESU VR-120D
100kHz - 1300MHz FM/WFM/A
NOW ONLY £109.95

YAESU VR-160 Miniature communications receiver
NOW ONLY £149.95

MD-100A8X Base Station Microphone
NOW ONLY £99.95

MD-200A8X Elite Deluxe base Station Microphone.
NOW ONLY £189.95

Yaesu Rotator Special Summer Offer!

G-450C	NOW ONLY £299.95	GS-065 Mast bearing	NOW ONLY £49.95
G-550	NOW ONLY £279.95	GC-038 Lower clamps	NOW ONLY £29.95
G-1000DXC	NOW ONLY £399.95	Rotator cable 25m	£69.95
G-5500	NOW ONLY £549.95	Rotator cable 40m	£123.95
G-2800DXC	NOW ONLY £799.95	Rotator connector plugs	£25.95

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

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

NEW PRODUCT

SHACK-CAMS

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

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

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

MyDEL

Two-year warranty on all MyDEL PSUs

MyDEL MP-30SW1V £89.95

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

MyDEL MP-9626

120A, 13.8V DC power supply, switch mode.

~~£399.95~~
Now £359.95

MyDEL MP-50SW111

50 Amp DC power supply. £125.00

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

MyDEL MP-304MKII £99.95

Heavy Duty LINEAR 30Amp

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

NEW MyDEL MP-7L £29.95

Small & compact, this new Linear 6-7Amp PSU is ideal for running ancillary items in the shack.

MYDEL CG-3000R ANTENNA TUNER

NOW ONLY £249.95

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

NEW ALINCO DM-330FX

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

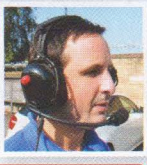
ONLY £119.95

DIAMOND GSV-3000

RRP £209.95
ML&S £179.95

* Output voltage 1 - 15V DC & 13.8V Fixed * Output current 25A continuous (CE protocol)
* Built-in cooling fan
* Supply 230V AC 50Hz
* Size 250 x 150 x 240mm
* Weight 9.5kg

RADIOSPORT HEADSETS



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

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

RS60CF	Deluxe Dream Edition Stereo Headset with boom (as featured) £179.95
RS20S	Deluxe Dream Edition Stereo Headset only no boom £119.95
Mini-XLR	lead set for any radio (Yaesu/Kenwood/Icom/Flex/Elecraft) £59.95
PTT-FS-RCA	Foot switch with 7ft cable with phono plug £44.95
PPT-HS-RCA	Hand PTT Switch, 7 foot cable with phono plug £44.95

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

WATCH ML&S TV

Get yourself a brew, pull up a chair & watch ML&S TV!

All of our videos on one TV channel.

Click www.MLandS.TV

NEW MyDEL HAMFONE

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

MLS PRICE IS ONLY £149.99

See www.MLandS.uk/hamfone for full specifications

NEW! ADMS SOFTWARE FROM RT SYSTEMS

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

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

See:
www.hamradio.co.uk/rtsystems

NEW MYDEL MAGNUM Pi

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

See **www.HamRadio.uk/magnum**

To view the video see: **www.MLandS.tv**

HELITRON DV4MINI USB STICK FOR D-STAR AND DMR

DV4mini is a tiny but powerful USB stick that can change any PC into a HOTSPOT for the modes D-Star and DMR (C4FM Fusion is being prepared). It contains a powerful 32-bit micro controller as well as a complete 70cm transceiver and modulator/demodulator for GMSK and 4FSK (including raised cosine) as well as a USB interface.

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

see www.MLandS.uk/dv4mini

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

LOOKING FOR COMMERCIAL GRADE DMR FROM YOUR FAVOURITE STORE?

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

NEW PRODUCT

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

Hytera

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

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

MD-380 DMR HANDIE FROM TyT

The new **MD-380U from TyT** is the latest DMR Handie for use on 70cm. featuring selectable 1/5W output and colour display. Simple to program and ML&S are offering FREE programming lead & software to the first 100 purchases.

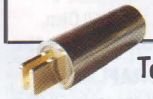
NOW ONLY £99.95. SAVE £50 ON RRP!

For more information see **Hamradio.uk/tyt**

AIRSPY & SPYVERTER COMBO

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

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



Touch Paddles by BASICOMM

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

And another thing...Have you noticed how other retailers seem to be fiddling with their web addresses? Many years ago I was the only UK retailer to list "HamRadio" in our URL and indeed refer to ML&S as "a Ham Radio Store." Others were still referring to "Amateur Radio", not Ham.

It seems that all of a sudden the words "Ham Radio" can't be left out of their web address or indeed strap-lines in adverts. So, before you get misguided on to the wrong site for your next purchase, or indeed information on the vast range of products we actually stock, there is only one **HamRadio.co.uk**

That's the one without hyphens and other words stuck in at random. Can someone help me down off my soap box please? My legs aren't as agile as they used to be.

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

ACCESSORIES AND ANTENNAS ON SHOW AT THE NEW SUPERSTORE!

Wonderwand Wonderloop Antennas

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

Wonderwand Antennas U.K.

The UK's favourite rig-mounted antenna system!

New! WonderLoop 4010, 40m -10m

If you are an avid FT-817 or KX3 operator and enjoy nothing more than heading for the hills on a weekend to active those rare WAB squares. Take a look at the all new WonderWand WonderLoop Antenna. Incorporating their easy to use tuning circuit, which offers frequency coverage from 40m-10m and handling 10W of RF power, you can be on the air in seconds. The tuning unit is enclosed within a lightweight ABS case, no larger than a pack of cards. This means you will no longer need to carry around all those additional extras needed to string up a wire in the field. There is also no need to worry about running a counterpoise with this efficient loop design. So how does it perform? As we had sunshine this afternoon, we popped out into the car park here at ML&S and attached the loop to our demo FT-817. Within minutes we had tuned to the 20m band worked into EA, I and 9A. Not bad for 5W and the 'shack' in our hand.

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

HighEndFed Antennas

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

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

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

Super Antenna MP1DLR Package

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

MP1DLR Package includes:

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

Super Antenna Features:

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

NEW IMPROVED VERSION

All for only £259.95
Plus £10.95 post & packing

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

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

DIAMOND

Base Antennas

CP-VU8	80m-70cm 200W Compact HF Base, only 2.7m Long!	£399.95
X-30	2/70, 3/5.5dB, 1.3m Long	£39.95
X-50N	2/70, 4.5/7.2dB, 1.7m Long	£54.95
X-300N	2/70, 6.5/9dB, 3.1m Long	£79.95
VX-1000	6/2/70 2.15/6.2/8.4DB 1.42M Long	£99.95
X-510N	2/70 Fibre glass 8.3/11.7dB gain. 5.2m long "N"	£129.95
VX-1000	6/2/70, 2.15/6.2/8.4dB, 2.5m Long	£99.95
V-2000	6/2/70, 2.15/6.2/8.4dB, 2.5m Long	£79.95
X-7000	144/430/1200MHz (2m/70cm/23cm) 8.3dBi (144MHz), 11.7dBi (430MHz), 13.7dBi (1200MHz) 5M Long	£145.95

Mobile Antennas

NR-770RSP	100W, 2/70, 3/5.5dB, 98m Long, spring loaded	£31.95
NR-7900	2/70, 3.2/6.4dB, 1.46m Long	£44.95
AZ-504FXH	Extremely compact dual band antenna for 144 & 430MHz. 15.5" long	£37.46
MR-77	Magnet mount/antenna combination. Includes 13' RG58 coaxial cable with BNC or SMA connector	£34.96
SG-7500	2m/70cm, GAIN 3.5/6.0, 41" long	£41.63
SG-7700	1/2wave C-Load radialless(144MHz), 2x5/8wave radialless(430MHz), 3.5dB(144MHz),6.0dB(430MHz). 1.06m long	£62.95
SG-7900		£72.95

Duplexers/Triplexers

MX-72N	1.6-150/400-460MHz Duplexer	£32.95
MX-62M	1.6-56/140-470MHz Duplexer	£46.95
MX-610	HF/6+2+70 (for FT-8900)	£52.95
MX-2000	6/2/70 Triplexer	£62.95
MX-3000N	2/70/23 Triplexer	£59.95

Switches

CX-210A	2-way, SO-239 Die Cast	£34.95
CX-210N	2-way, N-Type, Die Cast	£54.95
CX-310A	3-way, SO-239, Die Cast	£54.95
CX-310N	3-way, N-Type, Die Cast	£89.95

Hustler Antennas

HUSTLER

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

See web for full listing!

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

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

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

COAX CABLE STRIPPERS

DXE-UT-8213
ONLY £44.95!

This tool prepares RG-8, RG-213, 9913F7, LMR-400 (not LMR-400UF) and other similar size coax cable for installation of a PL-259 connector - or DXE-N100 1S two-piece Type N connector (requires a slight additional trimming of the cable center conductor length).

DXE-15035 ONLY £23.95

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

Messi & Paoloni

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

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

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

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

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

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

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

mRS MiniVNA Antenna Analysers

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

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

MyDel-Sark110 Vector Impedance Antenna

The SARK-110 Antenna Analyser is a pocket size instrument providing fast and accurate measurement of the vector impedance, VSWR, vector reflection coefficient, return loss, and R-L-C (as series or parallel equivalent circuits). Typical applications include checking and tuning antennas, impedance matching, component test, cable fault location, measuring coaxial cable losses, and cutting coaxial cables to precise electrical lengths. The SARK-110 has full vector measurement capability and accurately resolves the resistive, capacitive and inductive components of a load. The measurement reference plane is automatic adjusted via the Open/Short/Load calibration standard to enable the accurate impedance measurements at the end of an intermediate coaxial cable. **ONLY £329.94**

MFJ Products - Lots more MFJ stocked!

MFJ

MFJ-939	Plug & Play 200W ATU, you won't even know it's there!	£169.95
MFJ-974HB	Manual ATU for balanced line antennas, 160-10m	£229.95
MFJ-974	as above but without 160m	£219.95
MFJ-16010	Random Wire ATU 160-10M	£69.95
MFJ-949E	Manual ATU metered, Dummy Load, 1.8-30MHz, 300W	£189.95
MFJ-901B	Manual Mini ATU 1.8-30MHz, 200W	£119.95
MFJ-971	Manual ATU metered, 1.8-30MHz, 200W	£129.95
MFJ-904H	Manual ATU, metered, inc balanced, 1.8-30MHz 150W	£169.95
MFJ-969	Manual Roller ATU Metered 1.8-54MHz, 300W	£229.95
MFJ-993B	Auto ATU Metered 1.8-30MHz, 300W	£269.95
MFJ-1786X	Magnetic Loop 10-30MHz, 150W re-built & re-aligned by ML&S	£499.95
MFJ-1788X	Magnetic Loop 7-22MHz, 150W re-built & re-aligned by ML&S	£549.95
MFJ-259C	Antenna Analyser 530kHz-230MHz	£269.95
MFJ-266	V/U Portable Antenna Analyser 1.5-185MHz + 300-490MHz	Free UK carriage £359.95
MFJ-269C	530KHz-230MHz, 415-470MHz Analyser	£324.95
MFJ-260C	Dummy Load 300W SO-239	£45.95

DX Accessories are available at ML&S

Array Solutions

PowerMaster II

VSWR & RF Power Meters.

AIM 4300DX

Lab & Field Grade Impedance Analyser.

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

microHAM

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

USB micro KEYER II All-in-one USB Interface

Station Master & Station Master Deluxe Network Controller

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

Daiwa Meters

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

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

IN STOCK NOW!

NEW MAESTRO CONTROL CONSOLE FOR THE FLEX-6000 SERIES.

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

ML&S PRICE: £1199.00

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

FLEX 6300

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

ML&S Price: 2099.95.95
ON DEMO & IN STOCK NOW!

FlexRadio Systems
FACTORY APPOINTED DEALER

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

Flex-6300 1.8-60MHz, 2 Slice RX 100W SDR TCVR	£2099.95
Flex-6500 1.8-60MHz, 4 Slice RX SDR 100W Transceiver	£3579.95
Flex-6700 1.8-60MHz, (+RX 135-165MHz) 8 Slice RX SDR 100W Transceiver	£5999.95
Flex-6700R as above, Receiver only	£4799.95
Flex 1500 SDR Low cost SDR Transceiver, connect via USB & you have 5W 160-6m	£639.95

ELAD FDM-DUO

MULTI-USE 5 W SOR TRANSCEIVER

SPECIAL SUMMER OFFER!

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

BLACK ONLY £799.95

RED LIMITED EDITION £839.95

ELAD FDM-S2

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

£449.95

RF EXPLORER 3G COMBO HAND HELD SPECTRUM ANALYSER NOW ONLY £169.95

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

ELAD FDM-DUO"R"

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

ML&S PRICE: £639.95

SUNSDR2PRO TRANSCEIVER

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

In stock & on demo.

SPECIAL OFFER: £1189.95

See HamRadio.uk/sunsdr

COLIBRI SDR

ColibriDDC Ethernet controlled SDR receiver.

EXPERT ELECTRONICS

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

ONLY £429.95

See HamRadio.uk/colibriddc

NEW! CLOUD iQ

ONLY £599.95

Available HF/6m SDR with iQ Streaming & built-in Internet Server.

See HamRadio.uk/cloudiq

NEW EXPERT ELECTRONICS MB-1

"For a New Direction in Ham Radio"

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

Limited quantity available NOW!

INTRODUCTORY OFFER: £4299.95

HamRadio.uk/MB1

MYDEL COAX SWITCHES

MYDEL CO-201 COAXIAL SWITCH 2-WAY COAX SWITCH SO-239. 500W MAX	SPECIAL OFFER £19.95
MYDEL CO-201N 2-WAY COAX SWITCH. N-TYPE SOCKETS. 500W MAX	SPECIAL OFFER £21.95
MYDEL CO-201AM 2-WAY DELUXE HEAVY DUTY COAX SWITCH SO-239 1KW	SPECIAL OFFER £32.95
MYDEL CO-201AN 2-WAY DELUXE HEAVY DUTY COAX SWITCH N-TYPE 1KW	SPECIAL OFFER £33.95
MYDEL CO-301M 2-WAY DELUXE HEAVY DUTY COAX SWITCH 1KW	SPECIAL OFFER £39.95
MYDEL CO-301N 2-WAY DELUXE HEAVY DUTY COAX SWITCH N-TYPE 1KW	SPECIAL OFFER £40.95

PERSEUS VLF-LF-HF RECEIVER

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

Save £100 this month.

ONLY £599.95

NEW AOR AR-DV1

WIDEBAND COMMUNICATIONS RECEIVER

Covers 100kHz to 1300MHz in traditional analogue modes (SSB, CW, AM, FM, S-FM, W-FM) as well as various digital modes. In fact, we know of no other radio in this category that can decode Icom's D-STAR mode, Yaesu's new C4FM mode, Alinco's digital mode, NXDN (note: 6.25kHz only), P25 Phase 1, etc. Interesting features include: 2,000 Memories (in 40 banks of 50), Memory Scan, AM Synchronous Detection, Noise Reduction, Notch, Digital Data Display, Clock, Calendar, Alarm, Timer. The SD/SDHC jack supports logging functions. Plus much more!

~~£1195.95~~
£1099.95

See web for full specification.

FUNCUBE DONGLE PRO+

£149.95

- Coverage is from 150kHz (yes, that's kHz) to 1.9GHz.There is a gap between about 250MHz to 410MHz. There isn't a gap anywhere else.
- Eleven discrete front end filters, including some really, really serious SAW filters for 2m and 70cm
- 0.5ppm TCXO
- Much improved phase noise
- Better Dynamic Range by up to 7dB
- Tuner PLL Steps from memory
- All this plus more and still no drivers required!

bhi

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

NES10-2 MK3

Amplified DSP Noise Cancelling Speaker

£109.95

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

DSPKR - 10W DSP Speaker

Easy to use - Sleep mode

£129.95

- Filter level select & store
- Separate volume control
- Input overload LED

NEIM1031 MKII

Fully featured Amplified Noise Eliminating In-Line module

£149.95

- 2.8 W audio - Audio & iline level inputs/outputs
- 50Hz to 4.5KHz bandwidth
- 12 to 24V DC, 500mA
- Headphone socket

Dual In-Line

Dual Channel DSP noise eliminating module

£199.00

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

DESKTOP

£179.95

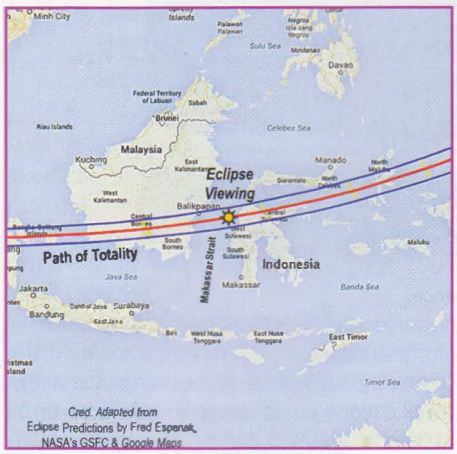
- Separate volume and filter level controls - 8 DSP filter levels
- Speaker level and line level input - Sleep mode
- Easy to use
- Size 200(h)x150(d)x 160(w)mm
- Supplied with manual, audio lead and fused DC power lead

New Compact In-Line

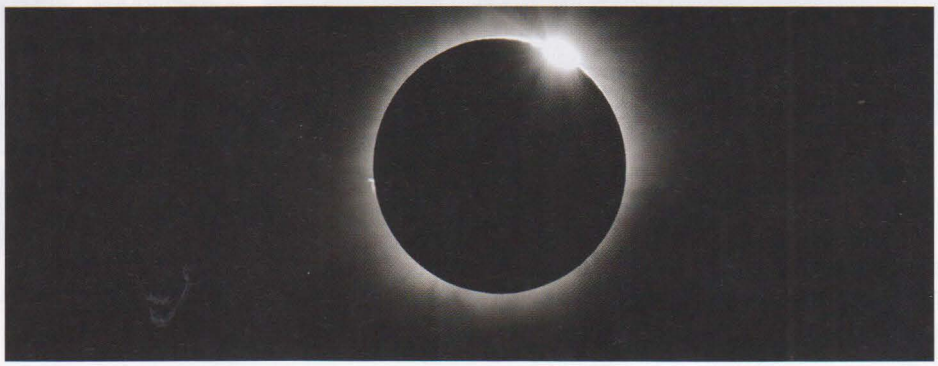
£179.95

- Compact DSP noise cancelling module with new improved DSP algorithm giving even better noise elimination
- Easy to use with mono/st… inputs
- Use mobile or in the shack
- Over 40 hours battery life from 2 x AA batteries or use 12V DC input
- Size: 121x70x33mm

Eastern total solar eclipse rendezvous



Makassar Staight eclipse track.



Indonesian Makassar total solar eclipse, 9 March 2016.

Michael Knowles at the Sherwood Observatory in Nottinghamshire.

On 28 February 2016, I travelled to the Far East, flying to Singapore then a cruise on the MS *Volendam*, enticed by the promise of witnessing my 6th total solar eclipse.

The MS *Volendam* set sail from Singapore on 1 March. Its callsign is MSPCH and it uses MMSI Repeater (R) Frequency 457.525MHz and (S) simplex Frequency 457.5500MHz [1].

The ship's course included several Indonesian Island ports stops; Tanjung Priok, Semarang, Probolinggo, Ujung Padang Sulawesi to name a few. This was before heading for a rendezvous within the total solar eclipse track path at coordinates GPS 01° 35.9' (S) / 118° 02.6' (E) to view first solar contact at 7.27am. This placed us at the Makassar Strait between Borneo and Sulawesi to view our prime objective, totality of the Sun.

Cruising from port to port, the eastern omens looked good. However on 3 March a 7.9 Richter scale shallow under sea quake hit off Sumatra, Indonesia's main western island. Panicked residents in the area fled for the hills as a tsunami alert was triggered. Our ship was positioned West of Java at the time.

After 9 days of cruising we reached the Makassar Strait that lies between Borneo and Sulawesi. To capture this total eclipse event I used a DSLR Nikon 7100 camera. At 4.30am I did a preliminary camera and tripod set-up on the ship's top deck. Finding the wind gusts too much, I moved down to the deck. It turned out to be a perfect strategy.

The captain of our vessel, James Russell-Dunford, made a late course change of 20 miles to evade any cloud threats. This strategy gave more than 1000 passengers and crew a pristine sky window to view an unobstructed totality eclipse encounter at 8.35am. We had 2 minutes and 45 seconds of totality.

It puts it into perspective the capabilities of modern day maritime systems on board a cruise liner like *MS Volendam* and the professional crew needed to manoeuvre 61,214 gross tonnage of vessel to a precise target and point in time. It can be taken for granted.

Compared to the other total solar eclipses I have witnessed, this one was unique in my eyes. There was less colour variants surrounding the horizon with more light glow. The black central orb was very distinctive against an intense illuminating silver corona. The diamond ring phase was so dominant at totality eclipse event in my opinion.

What is amazing about viewing a total solar eclipse is we are given a chance to view mechanisms we could not see otherwise. Prominences are revealed and I captured several on the left solar limb at 00:44 position with my camera. It is these dynamic prominences that are the cause of enhancing or disrupting ship long range radio communications, satellites and radar.

Websearch

[1] This website gives a useful log of maritime vessels that can be scanned: http://scanmaritime.com/frequencies.htm

Michael Knowles
m_knowles1@hotmail.com

EMC

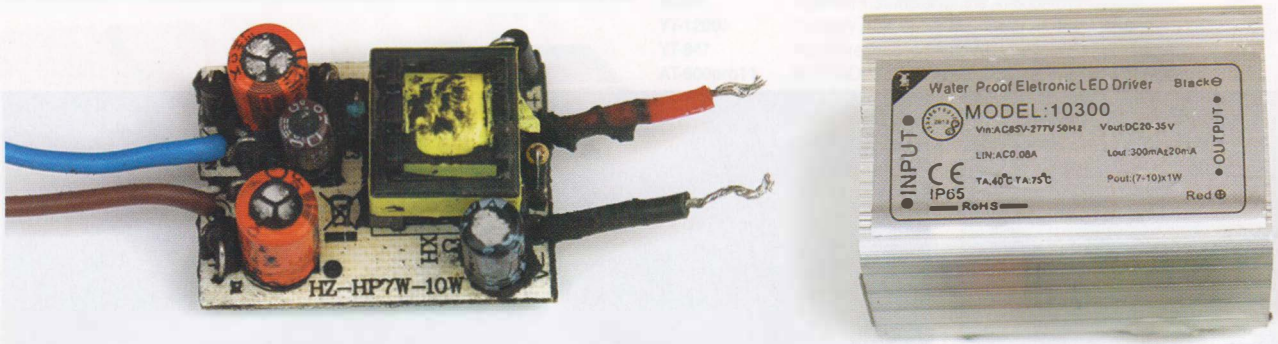


PHOTO 1: The driver from a 10W LED floodlight that exceeds the EN55015 limits for conducted disturbance.

This month's EMC looks at LED floodlights, the future prospects for UK EMC Regulations following the EU Referendum and the current UK situation for EMC market surveillance.

LED floodlights

It appears that the market is being flooded (!) with products such as LED floodlights whose emissions of radio frequency interference are far in excess of those allowed by the harmonised EMC standards. A 50W outdoor LED floodlight was purchased from a major UK distributor for testing on behalf of the RSGB EMC Committee and the results are described later.

The Harmonised EMC Standard for lighting was BS EN 55015:2006+A2:2009 but this made no reference to LED lighting and there was some question about the applicability of the 2006 version to LED lighting. The 2006 version has been withdrawn (from 12 June 2016) and is replaced by a 2013 version, BS EN 55015:2013+A1:2015. The preamble states that it "introduces LED lighting to the standard". Before 12 June 2016, a Declaration of Conformity (DoC) for lighting products could be made to the previous version although its applicability to LED lighting is not clear.

Manufacturers are not obliged to test to an EMC standard as they can also self-certify by completing an 'EMC assessment'. In either case, the product needs to meet the Essential Requirements of the UK Electromagnetic Compatibility Regulations 2006 (SI 2006 No 3418). It is difficult to see how a product could claim to meet the Essential Requirements if its emissions are far in excess of the limits in EN55015 or the Generic Standard.

Figure 1 shows the conducted emissions from the sample floodlight below 30MHz. The plot uses 9kHz bandwidth with Quasi-Peak (QP) detection. The EN55015 QP limit is also shown for comparison. The test was done using pre-compliance EMC test equipment, so that measurement uncertainties are increased but there can be little doubt that emissions are substantially in excess of EN55015 QP limit. The emission was so large that the transient limiter that is normally used in conducted EMC testing was clipping the signal, so it was replaced with an ordinary attenuator with the same loss.

The EN55015 limit only applies from 150kHz – 30MHz but the test has been extended down to 50kHz to show the fundamental switching frequency of 99kHz. The 99kHz fundamental spreads up to the 136kHz amateur band. EN55015 has no mandatory limits below 150kHz but it does have a limit at a slightly higher frequency of 150kHz and above, and this limit is exceeded by about 40dB. The second harmonic of the switching frequency at 198kHz is also about 40dB above the EN55015 QP limit and this can cause interference to nearby reception of Radio 4 Long Wave, also on 198kHz. To put it another way, one non-compliant LED floodlight can emit as much disturbance power as 10,000 compliant LED floodlights!

Emissions are about 20 to 25dB above the limit on all amateur radio bands from 1.8MHz to 14MHz and about 15dB or more above the limit up to 30MHz. In practice one of these lights operating nearby is likely to cause severe interference to amateur radio reception.

In addition to radio reception, this type of product may cause interference to narrowband powerline communications (PLC) operating below 150kHz. Narrowband PLC has three bands between 9kHz and 140kHz. It can be used for various purposes including 'smart metering'. Although some narrowband PLC applications could cause interference to the 136kHz amateur band, no other amateur bands are likely to be affected.

An RF disturbance on the mains wiring can also be coupled onto phone wiring via any equipment that has connections to both mains and phone line. This could reduce the performance of broadband Internet connections via phone lines using ADSL, VDSL2 and future G.Fast systems.

Although EN55015 does not require emissions from lighting apparatus to be measured in the time domain (using an oscilloscope), the results are interesting. There are two narrow switching spikes for each cycle of the 99kHz switching frequency. The larger one of these is shown in **Figure 2**. The horizontal axis is 50ns per division and the measured amplitude is 29.7V peak-to-peak into 50Ω. Due to the test method used with a Line Impedance Stabilisation Network (LISN), the total spike amplitude between Phase and Neutral is approximately double (or 59.4V p-p into 100Ω).

To sum up, although this product is CE marked, it has the dubious honour of being the worst radio interference generator in MF/HF amateur bands ever tested by the RSGB EMC Committee and we are taking this matter further.

EMC Directives and Regulations

The recent UK referendum decision to leave the EU could affect future UK EMC regulations. A guide to EU Directives can be found in Websearch **[1]**. The original EMC Directive, 89/336/EEC was one of a number of European Directives that were intended to remove technical barriers to trade and to create a single European market in goods and services. The 1989 EMC Directive was amended several

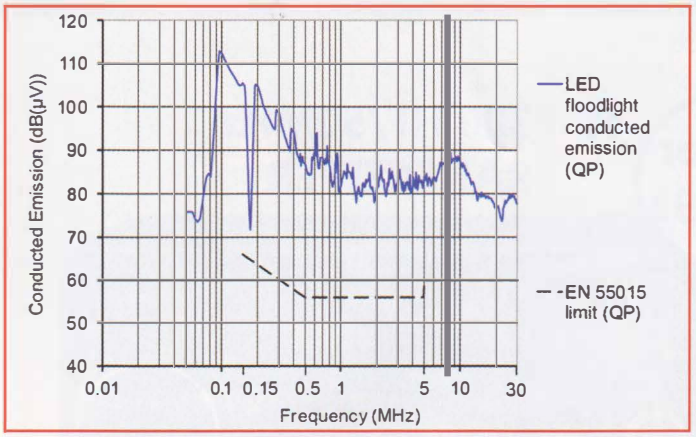


FIGURE 1: Conducted emission plot for 50kHz – 30MHz from a 50W LED floodlight.

FIGURE 2: Switching spikes injected into the mains by a 50W LED floodlight. The actual spike amplitude is twice as large (see text).

times and was eventually replaced by the 2004 EMC Directive.

A European Directive has no force of law in EU Member States until it is transposed into National Legislation. The 2004 EMC Directive (2004/108/EC) was transposed by the UK Electromagnetic Compatibility Regulations (SI 2006 No 3418) but the 2004 EMC Directive has now been replaced by a 2014 EMC Directive, 2014/30/EU.

The 2014 EMC Directive and eight others related to CE Marking are revised versions of previous Directives that take account of the European Commission's New Legislative Framework (NLF). Objectives of the NLF include improving market surveillance rules to provide better protection from unsafe goods and tighter controls on the use of the 'CE Mark' to enhance its credibility. The 2014 EMC Directive refers to risk to aspects of public interest protection covered in the Directive as electromagnetic compatibility is considered to be in the public interest.

The 2014 EMC Directive 2014/30/EU (and the 2004 EMC Directive) specifically mention the Amateur Radio Service in the Recitals ("Whereas" clauses) at the beginning. Although the Recitals themselves do not need to be transposed into national legislation, they do make it clear that the Amateur Radio Service is within the scope of the EMC Directive and should be protected against electromagnetic disturbance.

The 2014 EMC Directive and others came into force on 20 April 2016 and repealed the previous Directives without a transition period. All EU Member States including the UK were required to transpose these directives into national law before 20 April 2016 but this has not yet taken place in the UK. Guidance from the Department for Business, Innovation and Skills (BIS) is that economic operators should comply with the requirements of the new directives from 20 April 2016 and make declarations of conformity against the new Directives.

Unless the 2014 EMC Directive and others are transposed into UK legislation, there seems to be little prospect of any improvement in market surveillance, protection from unsafe goods or protection of public interest, eg EMC. It could also be argued that the UK is in breach of its Treaty Obligations, which last for another two years.

At the time of writing (immediately after the Referendum) the future of UK trade agreements with the EU is uncertain but one possible outcome could be a Norway-style trade agreement that would require, among other things, that the UK continues to implement all European Directives related to the European Single European Market.

Market surveillance

The European Commission 'Blue Guide' gives guidance on the implementation of EU product rules 2016 [2]. Section 7.1 states, "Member States have to take appropriate measures to prevent the making available on the market and use of non-compliant products."

It is interesting to compare the Blue Guide recommendations with the current situation in the UK, where enforcement of the EMC Regulations is the responsibility of Ofcom and Trading Standards. Ofcom has always been the point of contact for non-compliance for apparatus within scope of the EMC and RTTE (Radio and Telecommunications Terminal Equipment) Directives where spectrum management is concerned (ie interference). Trading Standards has always been the point of contact for non-compliance of non-radio apparatus or items where non-compliance, either technical or documentation, is suspected but there is not an interference issue.

One Member reports that in January 2015, his neighbour about 20 metres away installed a 10W outdoor LED floodlight that caused very loud 'hash' on amateur bands. The neighbour was helpful, they agreed to call Ofcom but when the engineer visited, he said that Ofcom did not have powers to act. Ofcom did not take up the case of possible non-compliance of the LED floodlight.

Our Member tested several LED floodlights that were provided on loan by a trade contact and he identified a quiet one. He bought one, had it fitted in the neighbour's premises and it solved the problem. He then contacted his local council's Trading Standards department and gave them the noisy LED floodlight. Trading Standards then bought an identical light and had it tested. 15 months later in May 2016, Trading Standards reported that the light did not pass the tests but it was from a batch from about 18 months previously and the lights now in stock pass the required tests. Trading standards said that they had completed the case and could go no further. The radio amateur removed the soft 'potting' material from the 10 watt LED driver and sent it to the EMC Committee for testing (see Photo 1). This driver has no RF interference filtering components.

This case shows the current situation with market surveillance in the UK. The new powers that Ofcom has under the Wireless Telegraphy (Control of Interference from Apparatus) Regulations 2016 do not make any difference in such cases where the apparatus was non-compliant when first placed on the market. The 2014 EMC Directive, 2014/30/EU would probably improve market surveillance if it is ever transposed into UK Legislation.

Websearch

[1] Conformance Ltd, web page on European Directives and Regulations: www.conformance.co.uk/adirectives

[2] The European Commission 'Blue Guide' on the implementation of EU product rules 2016: http://ec.europa.eu/DocsRoom/documents/16210

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

Radioworld

sales@radioworld.co.uk
Live Online Chat
Response In 24 Hours
Showroom Address:
263 Walsall Road, Great Wyrley, Walsall, WS6 6DL
01922 414796
9am - 5.00pm Mon - Fri
9.30am - 4pm Sat

ICOM

New technology is changing the way receivers are being designed and the IC-7300 is an industry first as an RF, Direct Sampling System is being used in an entry level HF radio. The ability to digitize RF before various receiver stages reduces the inherent noise that is generated in the different IF stages of a radio. We feel the performance of the '7300 will far exceed your expectations for a radio considered entry level.

Yours for £1,049.95

IC-7300 HF/50MHz TRANSCEIVER

"Real-Time spectrum scope"

Now with ~ Free Delivery

Yaesu FTDX5000MP limited with SM-5000

Yours for £3,399.95

"Awesome rig to look at, but it is even more impressive "under the hood"

CASH BACK OFFERS NOW ON!
YAESU
Selected Products Only

Enjoy state of the art on the transmit side with a pair of reliable VRF 150 FETS in a push-pullconfiguration yielding 200 watts (75 watts class A operation). Three electro-luminescent sub displays indicate sub frequency, graphical wave and menu functions. The rear panelfeatures a 9 MHz IF out from VFO Main receiver. Other enhancements include: large multi-function meter and variable CW audio peak filter

Speakers and Accessories

Go to www.radioworld.co.uk to see our extensive product range. Here at radioworld we believe that online shopping should be effortless, so most of our products now have there correct accesories listed on the same page, Saving you time and sometimes money.

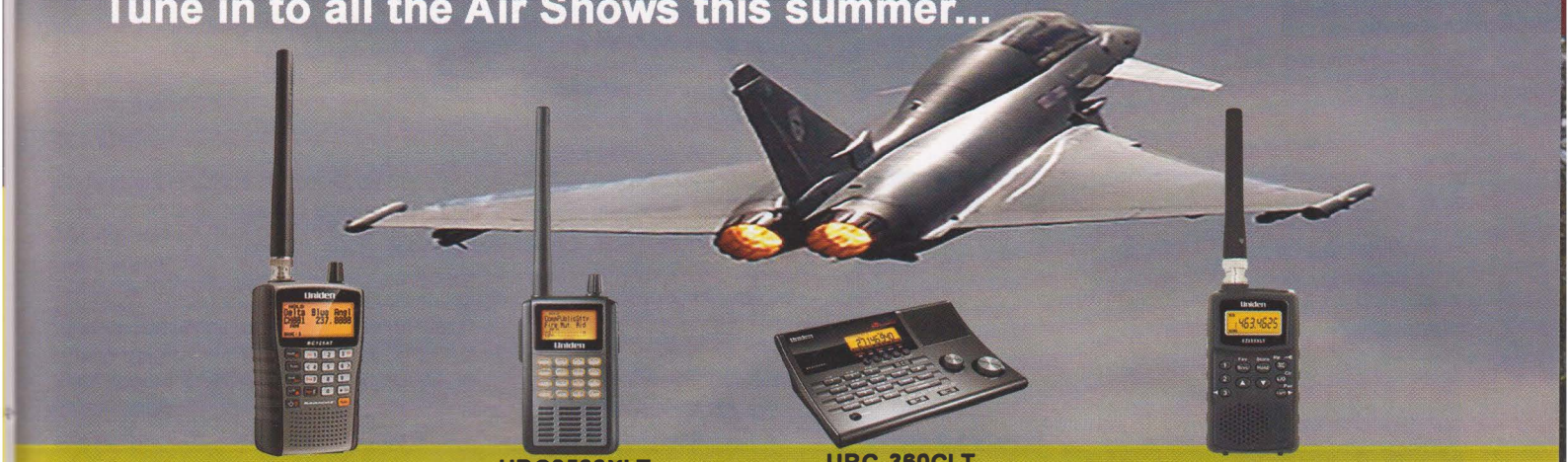
Social Media

Stay upto date with new products, events and more...

Follow Us On Twitter
twitter.com/Radioworld_UK

Like us on Facebook
www.facebook.com/radioworlduk

Tune in to all the Air Shows this summer...



UBC125XLT
£109.96
Ideal for listening to the communication from Civil Air traffic Control, Boats, truckers operating on CB radio, Ham Radio/Amateur Operators, Sporting events, Churches and Mosques

UBC3500XLT
£189.95
The UBC3500XLT Scanner State of the art scanner receiver with the 'Close Call'. Ideal for ham, air band and marine usage. Also includes Air Service Search with CTCSS and DCS squelch modes.

UBC-360CLT
£99.95
Uniden Bearcat UBC 360CLT is designed for home use, with a big speaker for excellent sound. This specialist scanner has numerous great features including up to 300 channels , Aircraft Search, AM/FM Radio and many more. The desktop style enclosure has an integrated antenna and a BNC socket to use with standard external antenna solutions

EZI33XLT
£69.95
The Uniden Bearcat EZI33XLT Handheld Air Marine VHF Scanner Receiver, Replacing the popular UBC30XLT, the EZI33XLT pocket sized handheld scanner receiver from Uniden is designed especially for the airband or marine enthusiast.

LOOKING FOR USED EQUIPMENT?

Yours For £1,899.00

Second Hand ACOM 600S HF & 6m Linear Amplifier

Yours For £1,299.00

Second Hand Icom IC-756ProIII Transceiver With Band Scope

Yours For £799.00

Second Hand Yaesu FTDX1200 HF Transceiver

Yours For £3,995.00

Second Hand Icom IC-7700 HF Transceiver with Band Scope

Yours For £4,200.00

BEST BUY

Second Hand Kenwood TS-990 Flagship Base Station Transceiver

Only 3 Months Old
Boxed
Excellent condition

All of our used equipment is in exellent condition and are fully tested and sealed to ensure that you receive the best quality product and with 3 months warranty theres never been a better time to buy. To see our full range of used equipment go to www.radioworld.co.uk

5% OFF

Get 5% OFF your online order by using promotion code AUG2016 at the checkout.

Secure Payments By PayPal
NO PAYPAL ACCOUNT NEEDED!

amazon payments

Google Certified Shop
Shop online with confidence

TRUSTPILOT

Finance Available powered by Pay4Later

Antennas

Although many factors can affect an HF beam's installation at a given location, a key consideration is the physical space available. This is because this influences the actual size of the antenna and so the HF bands that are feasible. So this month we revisit a compact old favourite.

The VK2ABQ 2 element HF beam

A compact HF 2 element beam was designed by Fred Caton, VK2ABQ, in the 1970s [1] and the multi-band version for the 20m, 15m and 10m bands is illustrated as **Figure 1**. This antenna continues to be one of the few designs that can be readily *homebrewed* because it does not require any special tools and the materials can be obtained from most hardware stores, electrical suppliers or online.

The VK2ABQ beam can be thought of as a 2 element beam that has been folded back on itself. This results in an antenna that has about half the turning radius and area of an equivalent 2 element beam for the same band.

The antenna consists of approximately a wavelength of wire formed into a square loop for the required band and mounted on an X shaped frame. However, as shown in Figure 1, it is possible to make up a multiple-band version of the beam by adding additional loops to cover other bands. The length of each wire-side forming the loop is given by Wire-side (m) = $75.64m/f_{MHz}$ where f_{MH} is the frequency in MHz.

Usual practice is to use a value of f_{MHz} towards the lower end of the band. This results in a longer wire length, allowing the wire to be trimmed to tune the antenna. Tuning is usually done at about 1.5m above the ground and the antenna should be tuned towards the lower end of the band. This is because the antenna tends to adopt a slightly higher frequency when installed at its operational height.

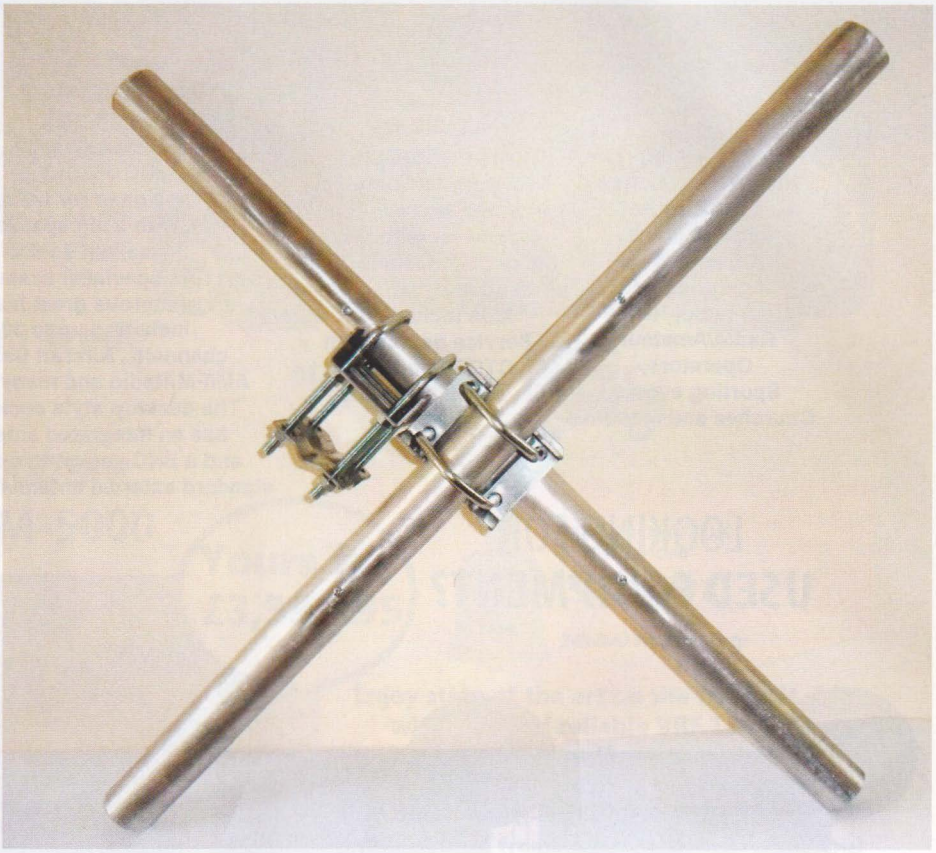


PHOTO 1: Central X former.

With the antenna tuned, the antenna can then be made unidirectional by symmetrically cutting the loop to form a dipole and a reflector of equal lengths. This turns the antenna into a 2 element beam as shown in Figure 1. Insulators can then added between the dipole and reflector ends, leaving a gap of about 6 to 10mm between them.

The impedance at the dipole's feedpoint has been found to vary with height, up to around half a wavelength. This is due to the effect of the ground and the impedance varies from about 25 to 100Ω. The feed impedance can be made less variable if the antenna is modified by making the reflector about 10% longer than the dipole's length. When tuning the antenna the overall dimensions of the square loop are still maintained, however the

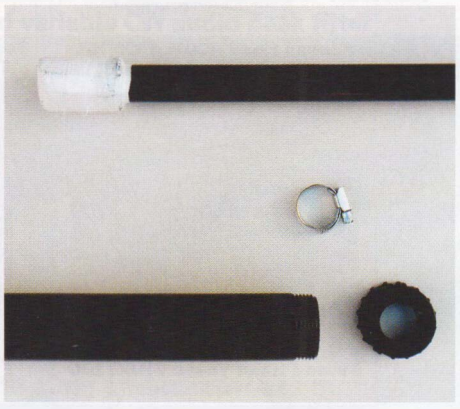


PHOTO 2: Telescopic leg arrangements.

PHOTO 3: The telescopic leg assembly.

Table 1: 20m and 10m beam dimensions.

Band	Reflector	Dipole: per leg	Frequency	X frame diagonal length
20m	10.96m	5.12m	14.15MHz	7.5m
10m	5.64m	2.51m	28.25MHz	3.8m
6m	3.11m	1.44m	50.15MHz	2.12m

reflector's length is increased as the dipole is shortened until close to a 50Ω match is found at the dipole's feedpoint. This can be done by bending the wires back upon themselves through the insulators until a good match is found. Once the optimum dimensions have been determined the wires can be trimmed, then the ends soldered and weatherproofed.

Constructing a VK2ABQ beam for the 20m and 10m bands

Although a VK2ABQ beam is about half the size of a conventional 2 element beam, the antenna can be of a significant size (depending upon the band required). Therefore, the central X frame used to support the wire loop needs to be sturdy to avoid the X frame's legs deforming under the mechanical load.

Both the 20m and 10m beams used a central cross-former made from two 750mm lengths of 38mm diameter 16swg (1.626mm) aluminium tube. The tubes were fastened crossways using a mast clamp as shown in **Photo 1**. A hole was drilled 200mm from each tube end to take a self-tapping screw to act as an end-stop for each X frame leg. A second mast clamp was secured to one of the legs to attach the antenna to its mast when completed.

Four 1.5m lengths of 40mm diameter PVC pipes were used as legs to form the X frame for the 10m beam. These provided a snug-sliding fit on to the central cross-former and moved along the tubing until reaching the end-stop screw. Then, hose clips were used to secure each leg in place.

The 20m beam's dimensions required an X frame with longer legs. This was done by joining two of the same pipes together forming a longer leg. To join the pipes a 400mm length of pipe, with a laterally sawn slot, was equally inserted and glued in between each pipe. This process was then repeated to fabricate the four legs required.

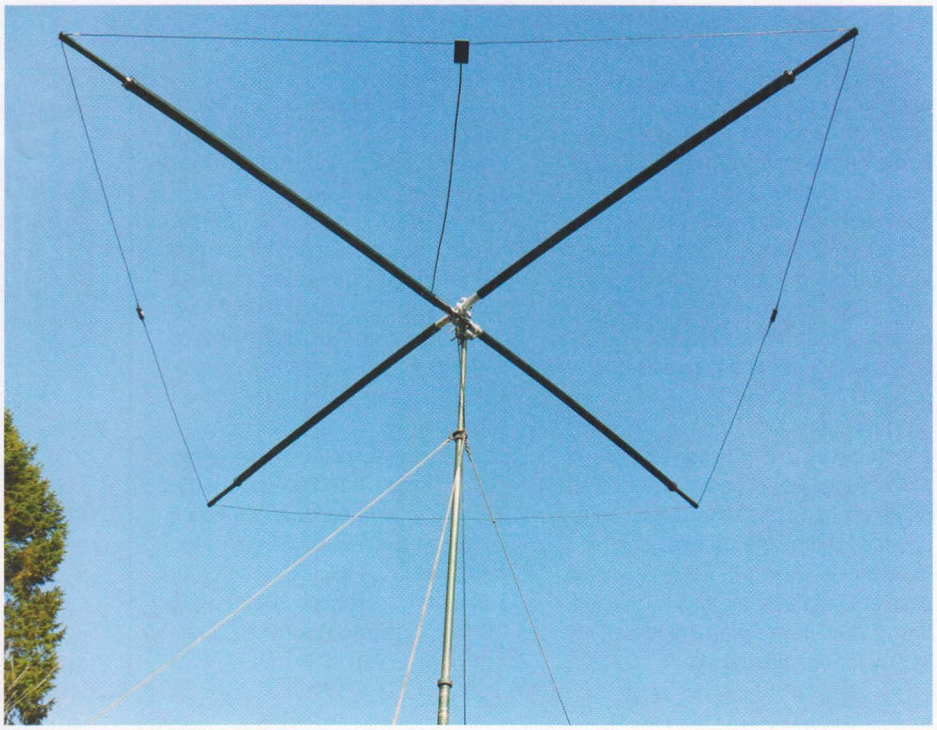


PHOTO 4: 10m 2 element beam.

The legs needed to be extended to accommodate the wire loop and a telescopic arrangement was used for this. A 25mm hole was drilled into a 40mm pipe access cap to allow a 1m length of 25mm diameter PVC tube to be passed through. The end of the 25mm diameter tube was enlarged by gluing scrap PVC pipe around it and covered in PTFE tape enabling the tube to slide inside the 40mm PVC pipe. The end cap was then glued to the end of the 40mm diameter pipe as shown in **Photo 2** and **Photo 3**. A hose clip was used to secure the 25mm pipe in place as required (discussed later). This process was repeated for the other three legs.

Push-on 25mm tube couplings were used to hold the wire loop in place on the end of the X frame. Suitable holes were drilled through each coupling enabling the wire to be passed through with heat-shrink sleeving also added either side. Once the beam was tuned, the heat-shrink sleeving was shrunk on to the wire either side of the coupling to indicate the wire's position.

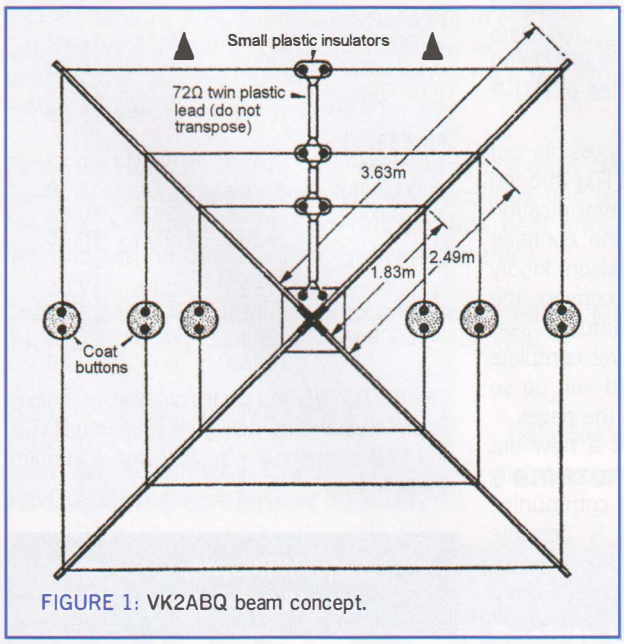


FIGURE 1: VK2ABQ beam concept.

The wire used to make the beam's loop was 17A-rated stranded copper insulated wire of the type used in the automobile industry. Dog-bone insulators were used between the dipole and reflector ends to complete the loop. The dimensions for the reflector and dipole are shown in **Table 1** along with the dimensions for a 6m version (as described in the September 2012 *RadCom* **[2]**).

The dipole centre was made from an ABS box with holes drilled to take the dipole's wire ends and the coaxial feeder cable, with these soldered to a connection-plate. This plate was made from a length of PCB with a strip etched down the centre to provide electrical isolation. The design used was similar to that described in the February Antennas column (as Photo 5). Both antennas used a current choke comprising ten turns of the coaxial feeder cable that was wound around a 25mm diameter former and held in place with cable ties.

The 10m and 20m beams were modelled using the *MANNA-GAL* antenna analysis application to predict the antennas' dimensions and performance. This gave a free-space gain of about 3dBd and a front-back ratio of around 8dB. **Figure 2** illustrates the measured horizontal polar plot for the 10m beam made at about 2m above the ground and is representative of the directivity for both beams.

Mike Parkin, G0JMI
email2mikeparkin@gmail.com

The X frame was assembled and clamped to the mast. Then the antenna's loop was attached to the X frame's ends and the feeder cable run from the dipole centre to the mast. The telescopic legs were then equally extended to tension the antenna's loop to hold it in place and the hose-clips tightened keeping everything taught. **Photo 4** illustrates the 10m 2 element beam and is representative of the 20m version.

Having first signed on in CW, each antenna was tested using a power of 10W. Fine adjustments resulted in an SWR of better than 1.1:1 being obtained with the dimensions and frequencies shown in Table 1. When each antenna's tuning was completed, the power level was increased to 100W for operational use.

Conclusion

The VK2ABQ antenna, at about half the size of an equivalent 2 element Yagi beam, provides a potential solution for an HF beam where the space is limited. I hope the antennas described have provided something to think about if you are considering how you could fit an HF beam into a smaller space.

References

[1] *HF Antennas for Everyone*, edited by Giles Read, G1MFG, page 103, Figure 1; or *HF Antenna Collection* (out of print) edited by Erwin David, G4LQI, page 23, Figure 1

[2] *RadCom* September 2012, pages 44 to 46, Collapsible 6m 2-ele Beam Antenna, Mike Parkin, G0JMI

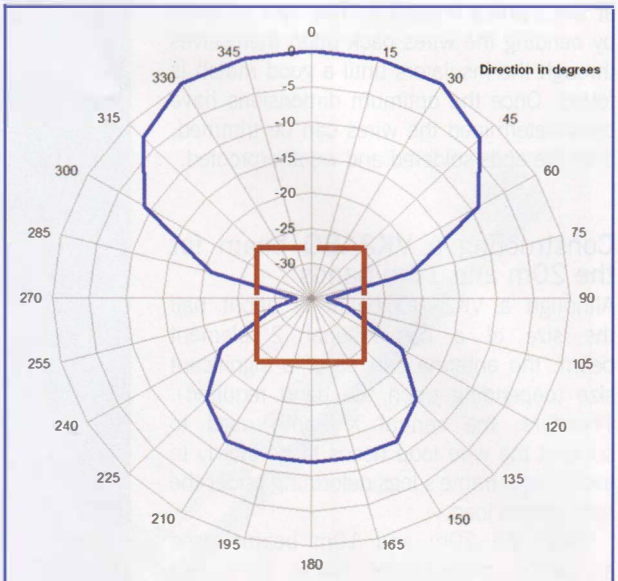


FIGURE 2: 10m beam measured horizontal polar plot.

RSGB PSC project

The Propagation Studies Committee (PSC) is very pleased to announce major steps forward with regard to the *ITURHFProp* online HF Propagation Prediction project.

Some months ago it was announced that www.predtest.uk is up, running in test mode.

It is a worldwide area coverage prediction display centered on the middle of the UK. At the bottom of the display is an explanation of its usage, but it should be borne in mind that a complete picture will not be seen unless all the various outputs are studied, ie 'SNR', 'Reliability' and 'Signal Strength'. At the very bottom is a link that will take you to a point-to-point (P2P) on-demand prediction tool. All the features found on the new site will be migrated to www.rsgb.org/iturhfprop in the short term and eventually to the RSGB website. This is all still in development and things can and will change.

Why *ITURHFProp*?

ITU-R P.1148-1 details a standardised procedure enabling comparisons to be made between various prediction engines. The ones chosen for comparison are the same as those mentioned by the recommendation, which details all the algorithms necessary to carry out the comparisons. However, I was offered the usage of software that was already fully developed, so I accepted. The relevant output subset is shown in **Table 1**.

For the sharp-eyed, the distance count differences in Table 1 are the product of the various prediction engine producers choosing different distances for their software, not wanting to standardise. It may not be plain but the Measured Data Bank D1 is a collection of monitored circuit output, which in itself is specified in ITU-R P.845-3.

The website would not be possible but for the kind co-operation of the ITU through Chris Behm, Institute of Telecommunication Sciences, Boulder, Colorado, the compiler of the program. James A Watson kindly produced an application to convert the *ITURHFProp* textual output into a user friendly web output. It is not yet complete but the work is continuing and will do so until the PSC are satisfied with the pages.

These web pages represent a new era in HF propagation predictions, specially adapted for the radio amateur community. On the new 'proppy' site it is possible to centralise the area output to any co-ordinate. Feedback and suggestions are very welcome. Enjoy!

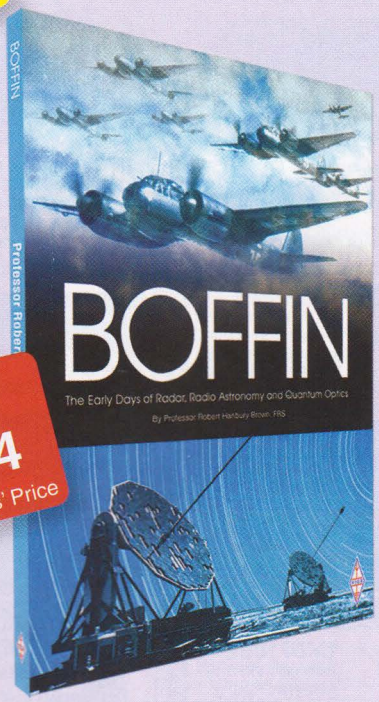
TABLE 1: Measured field strengths vs predictions.

Distances	Count	Mean difference (dB)	Standard deviation (dB)
ITURHFProp			
<7000km	11620	-0.00	9.11
7000-9000km	59	-4.02	8.85
>9000km	4589	-0.01	10.46
	16268	-0.02	**9.51**
VOACAP			
<7000km	11620	2.34	16.63
7000-10000km	2216	4.10	16.53
>10000km	2432	-10.23	22.59
	16268	0.70	**18.23**
Rec533			
<7000km	11620	0.08	10.30
7000-9000km	59	-1.00	7.28
>9000km	4589	-0.08	10.84
	16268	0.03	**10.45**
ICEPAC			
<7000km	11620	2.96	17.01
7000-9000km	2216	4.15	16.15
>9000km	2432	-14.75	27.00
	16268	0.47	**19.80**

Clearly *ITURHFProp* comes out best; emphasis is put on standard deviation. The Rec ITU-R P-1148-1 method was followed to obtain these figures.

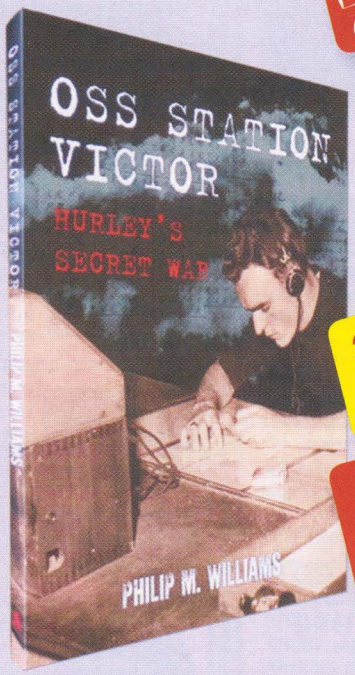
Gwyn Williams, G4FKH
g4fkh@sky.com

NEW



ONLY £11.04
RSGB Members' Price

P&P FROM FREE
(Over £30 See Page 78 For Details)



33% OFF

ONLY £9.99
RSGB Members' Price

Boffin

The Early Days of Radar, Radio Astronomy and Quantum Optics

By Professor Robert Hanbury Brown, FRS

Professor Robert Hanbury Brown was one of the most important figures in the development of radar and of observational astronomy that the UK has ever produced. This fascinating autobiography provides a unique account of the history of radar in WWII and the development of radio astronomy in the post war years.

Boffin traces the evolution of radar from the static Home Chain used in the Battle of Britain to the inclusion of the first airborne radars used in aircraft for night-fighting. The book covers his work on the polarisation of radio waves, crucial in determining the optimum configuration of the radar aerials on all the early air-to-surface equipment operated by Coastal Command. Air-to-surface radar played a huge role in the detection of surfaced submarines and the winning of the 'Battle of the Atlantic'. In 1942, Hanbury Brown was seconded to the US Naval Research Laboratory in Washington, and working in conditions of great secrecy, he continued the development of the Eureka and Rebecca airborne radar programme.

Post war Hanbury Brown was involved in the early days in the development of Jodrell Bank. *Boffin* describes this period and his later work where he became perhaps best known for his invention of the optical intensity interferometer.

This book is thoroughly recommended reading for anyone interested Radar, Astronomy and much besides.

Size: 174 x 240mm, 176 pages
ISBN: 9781 9101 9317 4
Non Members' Price: £12.99
RSGB Members' Price: £11.04

Also available on amazonkindle

OSS Station Victor

Hurley's Secret War

By Philip M. Williams

Whilst stories of Bletchley Park, SOE and Churchill's Toyshop have become well known in recent years, the fascinating story of how a quiet Berkshire village became a US communication base controlling foreign agents working in Nazi-occupied Europe simply hasn't. This book describes the activities of the US Office of Strategic Services (OSS) a forerunner of the CIA and the establishment of the top secret Station VICTOR at Hurley in Buckinghamshire in WWII.

Over the past 1,000 years Hurley has experienced its fair share of historic events, from royal visitations to the Glorious Revolution of 1688 and it has now been discovered that during the Second World War Hurley was used as a top secret communication centre. Established in 1943, Station VICTOR communicated with secret agents throughout occupied Europe and within the German Reich. VICTOR's role was to receive and send coded messages in order to obtain vital intelligence on Hitler's Panzer Divisions, secret weapons and industrial war machine. This is the story of Station VICTOR, from is conception, construction and operation and about the lives of those agents who risked torture and death in order to rid Europe of the Nazi tyranny. Operations such as the SUSSEX plan and the liberation of France used Hurley as their base station where even General Eisenhower as Supreme Commander and Prime Minister Churchill were seen as visitors. It is only now that the story of OSS Station VICTOR can be told due to the declassifying of VICTOR's operational war diary by the CIA and the discovery of a remarkable set of official photographs. Hurley's long-forgotten wartime secret can now be revealed.

Size: 234 x 165mm, 96 pages
ISBN: 9781 4456 5428 7
Non Members' Price £14.99
RSGB Members' Price £9.99 (33% off)

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

47 years of Award Winning Service!

ALINCO

DX-SR9
Hybrid HF Transceiver
- ALL Mode Analogue + SDR capability
- 1/10/100W output, 1-30MHz
- General coverage receiver
- 3 Ceramic Filters

£499

DX-R8
HF communications receiver - top seller!
- Frequency range: 150kHz-34.999MHz
- Modes: AM/FM/LW /MW/CW/LSB/USB
- Power 11.7 - 15.8V DC (not supplied)

£449

DR-735E
Twin Band Mobile "Rainbow" display
Full featured VHF/UHF transceiver
- Extended RX 108-174MHz, 400-479MHz
- Power 50/20/5w output
- Computer programmable

£269.95

DR-138HE
Hi-power VHF/FM mobile transceiver
- 144-146MHz
- Output power selectable: 60W/25W/10W
- Channel space: 25kHz Wide 20kHz Middle 12.5kHz Narrow

£129.95

DR-638HE
High power 5-85W VHF FM transceiver
- 144-146 / 430-440MHz (2m + 70cms)
- 50W on 145MHz / 40W on 433MHz
- EMS-77 multi-function DTMF hand mic included

£229.95

DR-B185H
High power 5-85W VHF FM transceiver
- Frequency coverage: 136-174MHz
- CTCSS, DCS encode/decode, DTMF
- Channel steps: 5, 8.33, 10, 12.5, 15, 20, 25, 30, 50kHz

£149.95

DR-135UK
28MHz (10m) all mode mobile transceiver
- Frequency range: 28.000 - 29.700MHz
- 1-12W FM/FM/CW 0-25 Watts USB/LSB
- AM/CW/FM/LSB/USB

£159.95

DJ-A10
Tough, Rugged Mil Spec VHF Handheld plus FM radio receiver

£79.95

DJ-500
VHF/UHF handy + Li-Ion battery
Built-in vox & FM radio coverage

£89.95

DJ-V57
VHF/UHF Handy + tough case & IPX7 waterproof fully featured

£129.95

DJ-G7E
Triple Band Handheld 2m,70cms, 23cms Full Duplex Fully featured

£289.95

DM-330MW MkII
Deluxe version - extra filtering
- 25-30A switch mode power supply
- Lightweight - ideal for travel

£129.95

ICOM

IC-7851
Flagship HF/6m transceiver
- Covers HF/6m all modes
- Output power: 5-200W
- High speed waterfall display

GENEROUS Part X CALL NOW!

£8999.95

IC-7600
100W HF/6m DSP/ATU/colour screen

£2399.95

IC-7410
100W HF/6m DSP base transceiver with ATU

£1449.95

IC-7300
100W HF+6m-4m Touch screen

£1049.95

IC-7100
Touchscreen all band HF/VHF/UHF with 4m (70MHz)

£999.95

IC-7600	HF+6m twin DSP base transceiver	£2495.00
IC718	100w 160-10m base/portable	£589.95
IC-7200	HF+6m rugged style transceiver	£829.95
IC-9100	HF+VHF+UHF transceiver	£2699.95
IC-2730E	145/433MHz large screen	£269.95
ID51EPlus	Dual Band Handheld D-Star	£389.95
ID5100E	Standard version Dual Band D-Star	£499.95
AH-4	Automatic antenna tuner 120W	£333.95
UT123	Digital/GPS unit E2820 etc	£249.95
SM50	Top of the range desktop microphone	£249.95
SM30	New compact style microphone	£119.95
SP23	Deluxe extension speaker	£68.95
SP33	New style speaker "sounds great"	£129.95
SP34	Filtered speaker 7800/7700 etc	£239.95
IC-R6	1300ch H/H scanner 1-1300MHz	£179.95
HM151	Multi-function hand microphone	£49.95

KENWOOD

Kenwood TS-990S
Kenwood's Flagship HF/6m Radio
- Dual TFT display
- 200W output
- High performance RX

GENEROUS Part X & FREE DELIVERY!

TS-590SGE
100W HF/6m all mode transceiver

now £1159.95

TS-480SAT
100W mobile/base HF/6m, ATU/DSP

£659.95

TS-2000E
HF/50/144/430 MHz transceiver

£1279.00

TMD710GE
Twinband VHF/UHF APRS/TNC/GPS

£479.95

TS-2000X	Allbander classic includes 23cms	£1469.00
TS480HXE	200W DSP mobile/base HF/6m	£799.95
TM-V71E	Twinband 145/433MHz with APRS	£299.95
TH-D72E	VHF/UHF handheld GPS/TNC/APRS	£399.95
TM-281E	High power 2m 145MHz mobile	£169.95
MC60A	Classic style desktop microphone	£122.95
HS5W	Top selling comms headphones	£59.95
HS6	Lightweight style headphones	£35.95
KES3SW	Replaces SP50B mobile speaker	£27.95
SP990	Filtered speaker for TS990S	£209.00
MC43S	Standard 8-pin hand microphone	£23.95
YF107C	Narrow 500Hz CW filter TS480 etc	£111.99
YF107CN	Narrow 270Hz CW filter TS480 etc	£111.99
YF107SN	Narrow 1.8kHz SSB filter TS480 etc	£109.95
SO-3	High stability TCXO TS590S etc	£99.95
VGS-1	Voice guide unit TS590S etc	£83.95

YAESU

FREE UK MAINLAND DELIVERY

FT-991
HF/VHF/UHF with touch screen! SSB/CW/FM/C4FM Digital/AM/RTTY/PSK!
- Up to 100W (2m/70cms 50W) output
- High speed spectrum scope
- 2 x antenna connectors

£949.95

FTDX3000
100W HF/6m all mode transceiver

£1729.95

FTDX1200
100W HF/6m all mode transceiver

£999.95

FT-450D
100W all mode HF/6m + ATU

£499.95

G1000DXC
Heavy duty Rotator

£478.95

FT857D	Multiband HF/VHF/UHF mobile	£599.95
FT817ND	All mode multiband portable	£439.95
FT7900	Twinband 145/433MHz mobile	£219.95
FT2900	Powerful 75W 145MHz mobile	£129.95
FT1DE	Ipx5 digital handy	£214.00
FT2DE	Digital twinbander HERE NOW	£349.95
FTM400DE	Colour screen VHF/UHF	£479.95
FTM100DE	New C4FM 50W Dual Band Mobile	£299.95
VX6E	Submersible 145/433MHz handy	£164.95
G2800DXC	Extra heavy duty rotator	£799.95
G450C	Rotator + 25m cable kit	£399.95
40m-WP	40m rotator cable w/plugs	£114.95
25m-WP	25m rotator cable w/plugs	£65.95
GS-065	Medium staybearing	£55.95
GS-050	Standard staybearing	£39.95
STA77	Headphones	£69.95

COMET Power Meters

CMX-200 SWR Meter
- Cross needle/AVG/PEP
- Frequency range: 1-200MHz
- Power: 3/300/3kW

£79.95

CMX-400	140-525 MHz 200W	£89.95
CMX-2300	Two in one unit HF, VHF, UHF	£139.95

DAIWA Products

CN-801HP
Top of the range meter
- 1.8-200MHz
- 20/200/2kW

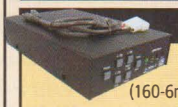
~~£129.95~~ £109.95

CN101L	1.8-150MHz	~~£99.99~~ £74.99
CN801-SII	900-2500MHz 200mW/2/20W N type	£199
CN801VN	SWR/PWR 140-525MHz..N Type	£119.95

CS201A 2 Way Antenna Switch, SO239 Type £24.95

CS201G11 2 Way Ant Switch N Type £29.95

LDG



Z11-Pro2
(160-6m) 125W

£167.95

AL-100	NEW Auto Tuner for Alinco	£139.95
AT100 Pro II	(160-6m) 125W	£209.95
AT897 Plus	for Yaesu FT897	£187.95
AT1200	for FT450/FTDX1200	£199.95
IT100	for Icom Models 125W	£167.95
RC/RT100 Kit	100W remote w/proof auto ATU	£209.95
YT 100	Yaesu Models 125W	£186.95
Z817	QRP for FT817 160 - 6m	£124.95

DM-330FXE
9-15 Volt 30A peak Twin 2A USB ports
- 25-30A switch mode power supply

£119.95

spiderbeam

Antennas, Telescopic Poles, Aluminium Masts

UL-404L Ultra-lite Dxpedition antenna
Dipole covers: 40, 20, 17, 15, 12, 10.6m £99.95

Fibreglass Telescopic Poles

12mtr Heavy Duty	£89.95
18mtr Standard	£189.95
22m 'Long John' **NEW - just released**	£265.00
26mtr Standard	£469.95
Base Plate for Fibreglass Poles	£28.95

Aluminium Telescopic masts

10.metre	£289.00
10 metre Heavy Duty	£299.95
12.5 metre	£319.00
14.5 metre	£399.95

MFJ

MFJ-1835
NEW 5 Band Cobweb Antenna

£209.95

225	1-180MHz graphic analyzer	~~£299.95~~ £269
226	Graphic Analyser (1-230) MHz	£359.95
259C	HF/VHF portable antenna analyzer	£279.00
266	New style HF/VHF/UHF analyzer	£349.95
269C	HF/VHF Digital Analyser	£369.95
550	Popular Morse code practice key	£19.95
557	Morse code key with oscillator	£46.95
901B	Versa Tuner 200W HF	£119.95
912	Remote 4:1 balun box	£84.95
931	Artificial ground unit	£114.95
934	300W Tuner + artificial ground	£209.95
941E	300 Watts max Versa Tuner II	£149.95
945E	1.8-60MHz 300W manual tuner	£139.95
948	300W PEP reading antenna tuner	£159.95
949E	300W tuner + Dummy load	£189.95
959C	Receive antenna tuner + pre-amp	£145.95
969	300W tuner 160-6m	£229.95
971	Portable Ant. tuner 1.8-30MHz	£122.95
986	1.5kW HF tuner	£369.95
989D	1.5kW HF tuner	£399.95
998	1.5kW Auto Tuner 1.8-30MHz	£719.95
998RT	1.5kW remote Auto ATU	£779.95
1025	Noise canceller/signal enhancer	£209.95
1026	QRM eliminator + active antenna	£214.95
1701	6 Way coax switch 2kW (SO239)	£89.95
1704 (P)	4 way coax switch 2.5kW (SO239)	£84.95
1704 (N)	4 way coax switch 2.5kW (N type)	£95.00
4416B	Super battery booster	£174.95

SIRIO Antennas

SY50-5
5 element 50MHz 10.5 dBi

£129.95

HF/VHF/UHF Beams

SY50-3	3 el 50MHz 8.5dBi	£99.95
SY68-3	3 el 70MHz 7dB	£69.95
SY27-3	3 el (26-28)MHz 10.65 dBi	£84.95
SY27-4	3 el (26-28)MHz 13.15 dBi	£99.95
SY-400	6 el 70cms (wide band) 11.0 dBi	£79.95
WY-140	3 el 144MHz (wide band) 10.5 dBi	£89.95

Base Antennas

CX4-68	70MHz 4.15 dBi (wideband)	£69.95
SA-270SN	Dual Band 3.15/4.15 dBi 1.325m	£59.95
SA-270LN	Dual Band 5.35/7.95 dBi 2.79m	£99.95

Mobiles

HP2070	Dual Band 0.445m	£29.95
HP-2070R	Dual Band 1.00m	£34.95
HP-2070H	Dual Band 1.08m	£36.95

MASTRANT

Quality guy ropes and accessories Full range in stock

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

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

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

M2	2mm 240kg B/s	£31.95
M3	3mm 100m 390kg	£49.95
M4	4mm 900kg B/s	£119.95
M5	5mm 1150kg B/s	£189.95
M6	6mm 1850kg B/s	£237.95
M8	8mm 2600kg B/s	£336.95

Guy Rope 31m (100ft) drums

M2	2mm 240kg B/s	£10.00
M3	3mm 100m 390kg	£17.00
P4	4mm 400kg B/s	£9.95

Full range of Pulleys, clamps and fittings in stock

See our web site for full details

MUCH MORE ON OUR WEBSITE 24/7.....SHOWROOM OPENING HOURS: MON - FRI 9AM - 5:30PM CLOSED SATURDAY

OPEN: Mon to Fri 9.00am - 5.30pm
Unit 1 Fitzherbert Spur Farlington
Portsmouth Hampshire PO6 1TT

023 9231 3090

Active for over 50 years, I have been involved in many of the world's largest Dxpeditions, the recipient of the prestigious RSGB ROTAB trophy, a member of the First Class operators club and lots more!

My sales team and I can offer you the very best advice and support- backed by years of real 'hands on' experience - unrivalled by most of our competitors!

Mike Devereux - G3SED
Managing Director

nevada®

BEST PRICES - EXPERT ADVICE - FAST DELIVERY

PALSTAR

HF-Auto 1.5kW fully auto antenna tuner

Covers 6-160m
Output power: 2-1800W
Display: 4 line large print
£1399.95

AT-2K 2kW manual antenna tuner

Covers 6-160m
Output: 2000W PEP
Metering: Active cross needle
£549.95

AT-500 600W manual antenna tuner

Covers 6-160m
Output: 600W PEP
Built in 4:1 balun
£439.95

AT-5K.....3.5kW manual tuner.....£999.95
AT-4K.....2.5kW manual tuner.....£929.95
AT-2KD.....2kW Differential manual tuner..£539.95
DL-1500....1500W high power dummy load..£189.95
BK4C/1:1..4kW 1:1 ratio current balun.....£79.95
BK4C/4:1..4kW 4:1 ratio current balun.....£79.95

nevada® Power supplies

Quality power supplies with a 2 YEAR WARRANTY!


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

£129.95


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

£99.95


PS-08 Linear
- 8A (max) with meter
- Voltage: 13.8V DC
- Cigar adaptor output

£34.95


PSW-50 Switch Mode
- 50A (max) with meter
- Voltage: 9.0-15V DC
- Cigar adaptor output

£129.95


PSW-30 Switch Mode
- 30A (max) with meter
- Voltage: 9.0-15V DC
- Cigar adaptor output

£79.95


PSW-30H Switch Mode
- 30A (max) with meter
- Voltage: 9.0-15V DC
- Cigar adaptor output

£69.95


PS23-SW1 Switch Mode
- 23A (max)
- Voltage: 13.8V DC
- Lightweight: 1.6kg

£59.95

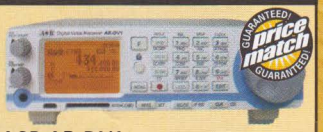

PSW-07 Switch Mode
- Current: 7A (max)
- Voltage: 13.8V DC

£29.95


PSW-04 Switch Mode
- Current: 5A (max)
- Voltage: 13.8V DC

£24.95

AOR



AOR AR-DV1
NEW Analogue/Digital Voice Receiver
Decodes virtually ALL popular digital modes: DMR, D-STAR, Yaesu Fusion & lots more
- 100kHz-1300MHz Wide band reception
- Multi-mode digital demodulation
- All mode analogue reception
- Memory Scan, NR, Notch

4GB SD CARD included **£1199.95**

ANTEX Soldering Irons

NEW 
Antex 760RWK
A complete temperature controlled station for the professional.
- Temp. adjustable 200°C to 450°C
- 700W hot air rework tool
- 2 x hot air rework nozzles
- Hot air tool also suitable for heat-shrinking

£249.99

NEW 
690D
Digital 50W solder station
£199.99

NEW **TCS**
50W digital iron - with temperature control

Easy button operation from 200° to 450°C
Iron plated - Nickel coated tip for long life
Burn proof silicone cable
£69.99

XS25/S.....25W w/burn proof silicone cable..£29.95
XS25.....25W with PVC mains cable.....£24.95
Gascat 75P..75W gas powered.....£39.99

TECSUN


Tecsun PL-880
Flagship SSB radio uses multi-conversion and DSP decoding technology
- FM, SW, MW, LW
- 3050 memories, 25 storage pages
- AM Bandwidth selectable
- Built-in charging system

£169.95

Supplied with: • SW antenna • Stereo earphones • USB charging lead • Battery • Case

Tecsun PL310ET
Pocket size radio with LW, MW, SW & FM bands.£39.95

MAHA Chargers & Batteries


MH-C9000
Ultimate Charger Analyser with 4 independent slots for AA/AAA batteries
£49.95

MH-808M..8 independent charging circuits...£79.95
MH-800S...Charge 1-8 AA/AAA in any combo .£79.95

Headphones


Kenwood HS5
Communications Headphones
£52.95


Yaesu STA77
Stereo Headphones
£69.95

Kenwood HS6.....lightweight style.....£35.95

ICOM


Icom IC-R8500
Top of the range wideband communications receiver, a long-time favourite for serious listeners!
- Modes: SSB (USB, LSB), CW, AM, FM, WFM
- IF shift and Audio Peak Filter
- Covers: 100kHz-2GHz
- 1000 memories

~~£1788~~ **£1399**

MIDLAND Amateur Radio


CT-890
Dual Band Handheld with colour screen
- UHF-VHF/UHF-UHF/VHF-VHF
- 88-108MHz FM receiver
- Vox function
- Full Duplex
- 999 memories
- 2,600 mAh Li-ion battery

~~£129.95~~ **now £99.95**

CT-410.....UHF Handheld.....£79.95 £59.95
Base Antennas - Fibreglass
X-50.....Dual Band 200W 1.7m.....£69.95
X-30.....Dual Band 150W 1.3m.....£59.95
F22.....144MHz 200W 3.2m hi-gain....£89.95
Mobile Antennas
NW-2000..Dual Band 98 cm fold over.....£39.95
NR-770S..Dual Band 43cm 100W.....£24.95
NR-770R..Dual Band 98cm 200W.....£29.95
AZ-504.....Dual Band 46cm 50W.....£26.95
M-285.....144MHz 5/8 whip 50W.....£24.95
SWR Meters


KW-520
(1.8-200), (140-525)MHz
£84.95

KW-505....(15-150)MHz 100W.....£22.95

METRO VNA Pro

NETWORK ANTENNA ANALYSER
with Bluetooth or USB connectivity

as reviewed this month


Phone not included

- Touch Screen - colour display
- Frequency coverage: 1 - 180 MHz
- Measures: SWR, R, Z, X, phase, filters, Return Loss, Transmission Loss (display as single or simultaneously)
- Link via Bluetooth or USB to your Smartphone, Android, Tablet or computer
- Portable - uses 5,000 mAh Li-Ion Rechargeable batteries
- Fast - refreshes in less than 0.1 sec.
- Export data in easy formats, 'jpg, csv, pdf, Zplot
- Compatible IG/VNA, VNA/J, BluVNA & more
- Compatible OS: Windows, Linux, Android, MAC OSX
- Firmware upgradeable
- Dimensions: 125mm x 95mm x 20mm
- Weight 200g

FREE DELIVERY **£249.95**

NEW! TYT - UHF DMR Radio!


MD380
- 70cm UHF band
- 1W or 5W output
- 1,700 mAh Li-ion battery
- Large colour display
- Easy to programme
- Includes FREE lead and software

~~£149.95~~ **£99.95**

USED GEAR ALWAYS WANTED FOR CASH !

COMET

Comet H-422
4 Band HF V Dipole
- 10/15/20/40m
- Max Power: 1kW SSB
- Connector: SO239
- Length: 10.3m (straight)
- Weight: 5.4kgs

~~£299.95~~ **£259.95**

HF Antennas
CWA1000 ...5 band trapped dipole 19.9m lgth £99.95
CHA2508X..Wide band vertical (80-6mtrs).....£269.95
VHF/UHF Antennas
GP1 .....145/433MHz length 1.25m £59.95
GP3M .....145/433MHz length 1.78m £69.95
GP6 .....145/433MHz length 3.07m £99.95
GP9 .....145/433MHz length 5.15m £149.95
GP15N.....50/145/433MHz length 2.42m £109.95
GP93N.....145/433MHz+23cms lgth 1.78m.....£99.95
GP95 .....145/433MHz+23cms lgth 2.42m....£119.95
50MHz Antennas
CA52HB.....2 element Yagi.....£79.95
CA52-HB4...4 element Yagi.....£119.00
Quad Band Mobile for FT-8900
UHV-4.....Mobile whip 4-Bands 10/6/2/70cms .£69.95
Antenna Tuners
CAT10.....10W 3.5-50MHz Manual Tuner.....£99.00
CAT300.....300W 1.8-60MHz Cross Needle.....£199.95

LOTS MORE on our WEBSITE!

ANYTONE AT-588

70MHz (4m) 50W FM Transceiver


- Covers: 66-88MHz
- Memories: 200
- DTMF Microphone
- CTCSS/DCS/DTMF/ 2 Tone / 5 Tone
- Compander function

£129.95

Cables and Wire


Ecoflex 15
per metre.....£5.99 price per 102m drum.....£539
PL259 connector (Part: 7350).....£8.95
N type connector (Part: 7395).....£9.95
Ecoflex 10
per metre.....£2.89 price per 102m drum.....£289
PL259 connector (part: 7378).....£5.95
N type connector (part: 7367).....£6.50
BNC type connector (part: 7379).....£6.50
Aircell 7
per metre.....£1.99 price per 102m drum.....£179
PL259 connector (part: 7390).....£2.65
N type connector (part: 7392).....£5.25
BNC type connector (part: 7391).....£5.25
Aircell 5
per metre.....£1.39 price per 102m drum.....£125
PL259 connector (part: 7760).....£2.25
N type connector (part: 7700).....£3.95
BNC type connector (part: 7720).....£3.25

OTHER 100M DRUMS
Westflex 103.....Ultra low loss.....£139.95
RG-213™.....Low loss.....£89.95
RG-213U.....Mil spec.....£116.00
RG-Mini 8.....Super XX.....£59.95
RG58/CU.....Mil spec.....£39.95
450 Ohm.....Twin feeder.....£89.00
300 Ohm.....Twin feeder.....£76.50
Coated flexweave.....Antenna wire.....£59.95

Nevada Antenna Wire


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

Nevada 28....2.8mm 2kW ....per metre.....£0.99
Nevada 28D..2.8mm 2kW .... 100m Drum.....£89.95
Nevada 32....3.2mm 5kW ....per metre.....£1.20
Nevada 32D..3.2mm 5kW ....100m Drum.....£110

MUCH MORE ON OUR WEBSITE 24/7.....SHOWROOM OPENING HOURS: MON - FRI 9AM - 5:30PM CLOSED SATURDAY

www.nevadaradio.co.uk

LF

It looks as though the summer conditions have taken their toll on 136kHz trans-Atlantic DX, with no recent crossings reported.

That doesn't mean that there was no long distance work being done. Alex, R7NT collates WSPR and *OPERA* reports regularly and, from his data, we can see that the maximum distances reached have tended to be just under 3000km. In early May, R7NT's 136kHz *OPERA* transmissions were received by 2E0ILY and G3XDV. Chris, 2E0ILY was the furthest away at 2988km. Alex was running only 200W into a loop aerial. In the reverse direction Mike, G3XDV was spotted by RN3AUS, again on 136kHz *OPERA*, also received by SV8RV.

On 472kHz things have been a little better with Laurence, KL7L (Alaska) getting good reports from WH2XCR in Hawaii. Laurence was using his experimental call WE2XPQ and a new MF aerial. He also got some good reports down the West coast of Canada to Washington state. All this despite it being broad daylight at midnight in Alaska at this time of year.

VO1NA has been getting mid-summer 5wpm CW reports from PA0RDT, and from DK7FC on 477.7kHz in QRS10. WH2XCR (Hawaii) was pleased to get a report from VK7TW in Tasmania at his sunrise, but it's not mid-summer down there so conditions are likely to be better!

Hungary finally gets 472

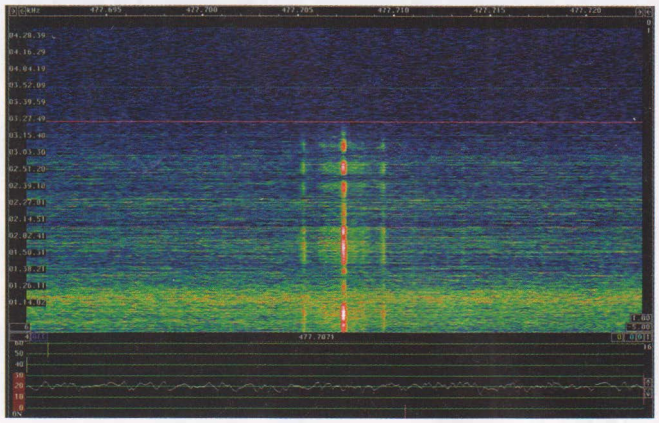
Gyuri, HA6PC tells me that since March all Hungarian amateurs now have access to the 472kHz band. He is currently busy on 50 and 70MHz but intends to concentrate on 472kHz when the Sporadic-E season ends.

EbNaut on 136

Although primarily used by VLF operators, digital mode *EbNaut* can be used over any stable path. 136kHz is pretty stable over medium length paths, especially in daylight. IZ7SLZ in Apulia (S Italy) has been received well by DK7FC and F5WK. Domenico was using a 120W GPS-disciplined TX that put 1.5A of RF current into his 8m high inverted-L aerial.

VLF or ULF

During the summer months the long hours of daylight and the high level of static makes MF and LF communication difficult. Long duration modes can still work in the presence of static crashes, the short noise bursts being integrated out in the processing. Faster modes like CW or two minute WSPR are more susceptible to corruption because each noise burst can knock out a significant proportion of the transmission.



Sidebands of VO1NA's 5wpm keying easily seen on PA0RDT's spectrogram.

Down on VLF, propagation varies very little between day and night, in fact it is often better during the day because static levels tend to be lower. Therefore the obvious choice of summer mode and band is to go as slow and low as possible, and that is what the intrepid band of 'Dreamers' have been doing: using *EbNaut* on frequencies below 9kHz. Leading light on VLF is Stefan, DK7FC who has been stretching things to the limit by attempting to radiate a signal on 2.97kHz, a wavelength of about 101km! His first test at 6.47kHz was a success, the message being decoded by Markus, DF6NM.

It's easy to generate power on this part of the spectrum, an audio amplifier is all you need, but resonating the aerial is another matter. A suitable loading coil for sub 3kHz needs to be able to pass a few hundred milliamps and withstand many kV whilst having an inductance of six Henries or so. Quite a challenge!

Stefan's first attempt involved a job lot of ferrite toroids inside a cardboard tube that would carry the windings, but that was rejected when it was realised that it wasn't going to be big enough to carry a sufficient number of turns in one layer. The current solution is to use some large 65mm wide ferrite 'E' cores of N27 material and make what looks like a monster TV line-output transformer with 15 layers of windings, about 3000 turns by hand! So far he has managed to generate a theoretical ERP of 100nW. To see how far the signal radiates he will visit a quiet site with a portable e-probe and Raspberry Pi recorder.

What's a Red Pitaya?

A number of amateurs have been experimenting with the Red Pitaya board, which is a development board containing a dual 14 bit ADC, dual 14 bit DAC and an FPGA – the makings of a software defined radio transceiver capable of use from VLF to 50MHz.

Pavel Demin has written some code for the board so that it presents itself to software such as PowerSDR mRX as a Hermes board and has most of its functions including Pure-Signal pre-distortion on transmit, which can clean up non-linear amplifiers. Initial results are very encouraging and I can see a lot of interesting projects being started. An SDR transceiver for the impoverished at last! Details at redpitaya.com or search for "red pitaya sdr transceiver".

Stefan's tasty ferrite loaded coil-former experiment.

Propagation

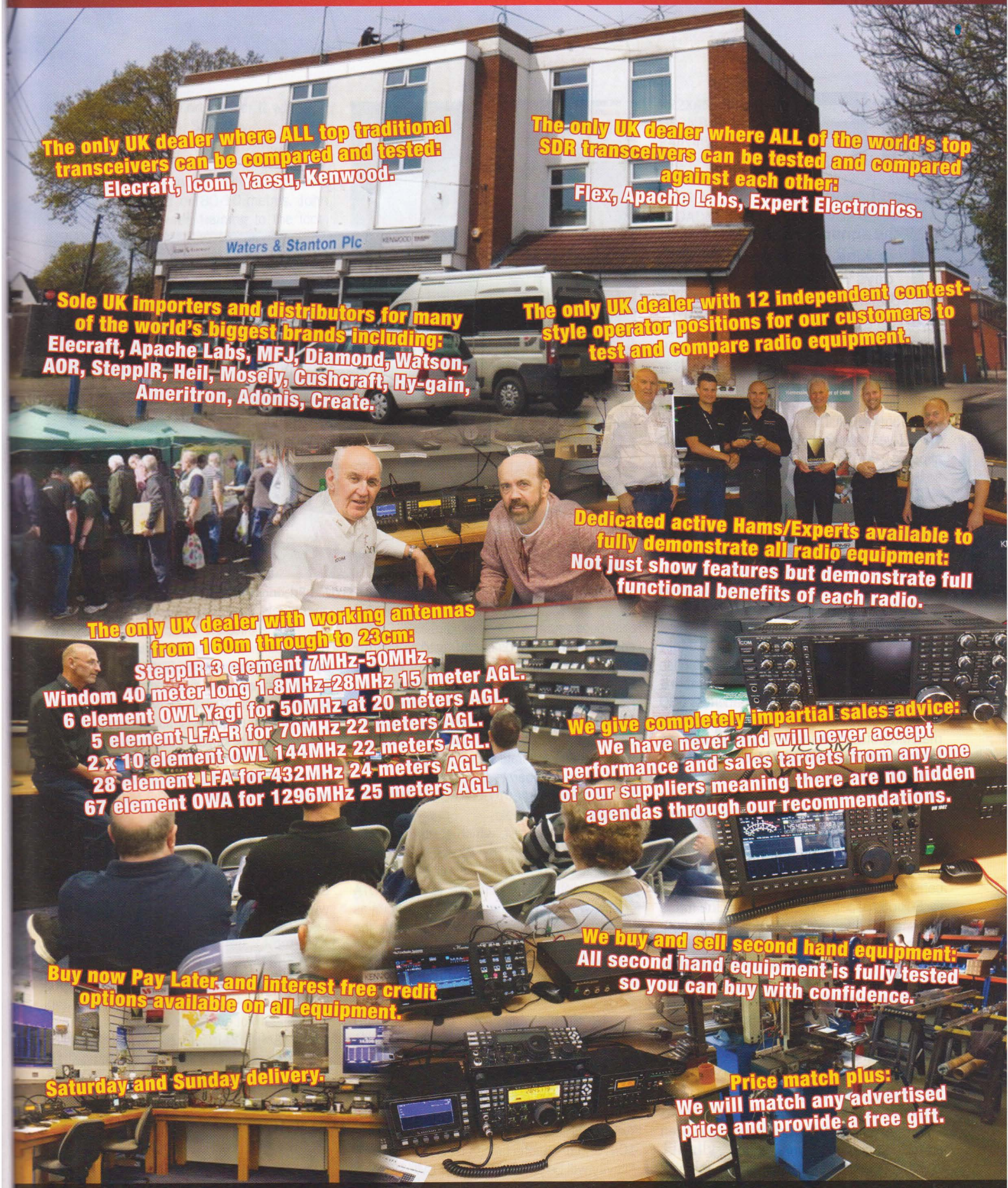
Is a mystery to many of us, especially on 'new' bands like 472kHz. Alan, G3NYK has been studying the subject for many years and has set down his thoughts in a very interesting article on the 472khz.org website. Recently there have been a lot of solar flares upsetting propagation on all bands and Alan explains the mechanisms by which this happens.

Derek Atter, G3GRO, SK

I was sorry to hear of the death of Derek, G3GRO recently. As a leading member of the Crawley club Derek encouraged many people to have a go on 73 and 136kHz in the early days. I remember that the club got hold of a quantity of ex-Decca Litz wire coils and Derek made sure that whoever wanted to construct that ultimate LF loading system was able to get hold of suitable parts. I still have mine: thanks Derek.

Dave Pick, G3YXM
daveyxm@gmail.com

WHY CHOOSE WATERS & STANTON?



The only UK dealer where ALL top traditional transceivers can be compared and tested:
Elecraft, Icom, Yaesu, Kenwood.

The only UK dealer where ALL of the world's top SDR transceivers can be tested and compared against each other:
Flex, Apache Labs, Expert Electronics.

Sole UK importers and distributors for many of the world's biggest brands including:
Elecraft, Apache Labs, MFJ, Diamond, Watson, AOR, SteppIR, Heil, Mosely, Cushcraft, Hy-gain, Ameritron, Adonis, Create.

The only UK dealer with 12 independent contest-style operator positions for our customers to test and compare radio equipment.

Dedicated active Hams/Experts available to fully demonstrate all radio equipment:
Not just show features but demonstrate full functional benefits of each radio.

The only UK dealer with working antennas from 160m through to 23cm:
SteppIR 3 element 7MHz-50MHz.
Windom 40 meter long 1.8MHz-28MHz 15 meter AGL.
6 element OWL Yagi for 50MHz at 20 meters AGL.
5 element LFA-R for 70MHz 22 meters AGL.
2 x 10 element OWL 144MHz 22 meters AGL.
28 element LFA for 432MHz 24 meters AGL.
67 element OWA for 1296MHz 25 meters AGL.

We give completely impartial sales advice:
We have never and will never accept performance and sales targets from any one of our suppliers meaning there are no hidden agendas through our recommendations.

We buy and sell second hand equipment:
All second hand equipment is fully tested so you can buy with confidence.

Buy now Pay Later and interest free credit options available on all equipment.

Saturday and Sunday delivery.

Price match plus:
We will match any advertised price and provide a free gift.

Waters & Stanton Ltd, Spa House, 22 Main Road, Hockley, Essex SS5 4QS

01702 204965 | 01702 205843 (FAX) | sales@wsplc.com

@wsplc | blog.hamradiostore.co.uk | facebook.com/WatersandStanton | YouTube Waters and Stanton

W&S @ Jaycee, 20 Woodside Way, Glenrothes, Fife KY7 5DF

01592 756962

jayceecoms@aol.com

We have free parking, a cafe opposite and a pub nearby 'pay us a visit'

HF

The sunspot count sank further in June. There were quite a few days with no visible spots and the solar flux index dropped to the mid-70s at times.

There was still some DX around – particularly on 20m – but it seems we are into sunspot minimum conditions even though the actual minimum may still be a couple of years away. The 11 year cycle seems to be weakening and slipping out of sync in the two hemispheres so it is anyone's guess what will happen next.

G3ZAY with JH1RFZ, JR4OZR, JJ2VLY and JQ2GYU at Friedrichshafen. Photo courtesy G4JKS.

IOTA

The IOTA Award Programme is now being managed by a new not-for-profit company Islands on the Air (IOTA) Ltd. Its Directors currently are G3KMA, G4XXI and VE3LYC but a full Board will be formed shortly.

Since the end of 2015, a professionally supported IT team under the leadership of Johan Willemsen, PA3EXX has been re-engineering the IOTA website to incorporate paperless QSO confirmations and electronic QSLing by the matching of a chaser's QSO details with the island operator's log in Club Log. Some elements of this work should have been launched on the existing website by the time you are reading this – check the 'My Credits' section after login to find a new option. The new website will come on stream in early 2017. Linking with other major platforms such as LOTW will be considered later.

Besides paperless confirmations the future website will offer many new features to both users and administrators. It will contain a fully automated payment system via PayPal, the option for activators to publish articles on expeditions and other IOTA related news, an interface allowing third parties to download data on IOTA groups and islands, an electronic awards system and a professional ticketing framework for user support. In order to keep the integrity of the programme at a high level, strict rules for validation of IOTA activations and processing of IOTA applications have been embedded in the software.

To help fund these developments, the new company has created a supporters' group called Friends of IOTA. There are four levels of support: IOTA Group Level £500+, Archipelago Level £250 – 499, Island Level £100 – 249 and Atoll Level £10 – 99. Donors will be listed on the IOTA website as Friends of IOTA at the appropriate level. They will receive an electronic certificate and will be encouraged to use the appropriate level title on QSL cards, etc. See www.rsgbiota.org for more information.

On the admin front, and as expected, Kingman Reef has been deleted as a separate island group and now counts for Palmyra (OC-085). Its separate status always depended on it being a separate DXCC entity so when it was deleted from the DXCC list the IOTA change was inevitable.

The IOTA Contest, which continues to be managed separately by the RSGB Contest Committee, takes place at the end of July and is another great chance to claim IOTA credits without needing any QSLs. As long as the stations you work submit their logs for the contest you can claim the QSO later via the rsgbiota website if your log details are a match.

A major IOTA DXpedition is being planned for February-March 2017 to commemorate the 120th anniversary of Fridtjof Nansen's legendary expedition to the Arctic Ocean on the ship *Fram*. The team is expected to include five operators (UA9KDF, UA9KFX, UA9LDD, UA0BA and RW0BG) who hope to be active as RT9K/9 from the Firnley Islands (AS-054), Tyrtov Island (AS-121), Nansen Island (AS-104) and the Scott Hansen Islands (AS-068). Activity will be on 40-10 metres CW, SSB and digital modes (PSK, APRS and Pactor) with three stations. Check www.qrz.com/db/RT9K/9 for further information.

Pavel, VK6NX, will be QRV as VI6DH400 from Dirk Hartog Island (OC-206) on 14-18 August. He will operate CW and SSB on 40-15m. The special callsign celebrates the 400th anniversary since the discovery of the island by the Dutch explorer Dirk Hartog, whose expedition was the first recorded European one to land on Australia's west coast.

After their unsuccessful landing attempt on the Pajaros Rocks (SA-100 new) last month, I1SNW and IT9YRE returned home and have announced their next attempt will take place in the early months of 2017 with help from some Chilean ops.

Silvano, I2YSB and the Italian DXpedition Team have announced that they will be active from the Bijagos Archipelago (AF-020) in Guinea-Bissau in mid-November. Check www.i2ysb.com/idt/ for updates.

DXpeditions

Three experienced DXpedition leaders (Ralph, KOIR, Bob, K4UEE and Erling, LA6VM) and a large team of operators will activate Bouvet Island (AN-002) in late 2017 or early 2018. They are making this announcement now "so that other DXpedition teams which may be considering Bouvet as a destination can redirect their time and effort elsewhere". They already have an agreement with Nigel Jolly for the *Braveheart* to provide transportation and the Norwegian Polar Institute has accepted their preliminary plan. Fundraising will begin in the next few months.

Dom, 3Z9DX has received confirmation from the North Korean government that he can make a return visit to P5 and operate amateur radio equipment for up to five days. There are no dates yet and the operation is

likely to be at very short notice. It will be a single band operation, SSB only.

John, KK7L, and Jared, N7SMI, will be active as T2R from Tuvalu (OC-015) from 27 September to 4 October. They will operate SSB, CW, and RTTY on 80-10 metres. John and Jared will provide training to the local amateurs and ensure equipment is in place to establish a permanent and active Tuvalu Amateur Radio Club. Any donations will go directly to supporting local amateurs getting on the air. See www.T2Radio.com for further information.

JT5FW will be QRV from Mongolia from 11-19 July with RZ3FW and R4WAA operating on HF with a kilowatt and beams, mostly on CW, but with some SSB & digital modes. And Russian operators UA9YPS, RA9YTX and RA9YGC will be QRV from 19-24 July as JT0YPS, JT0YTX and JT0YGC respectively on 3.5 to 50MHz.

S9YY will be aired from Sao Tome and Principe by DK8YY, DL1RPL and others from 8-23 October. The HF team will be on 160-10m. See http://www.dl1rpl.de for info.

6V1IS from Ngor and Goree Islands (AF-045) in Senegal is a humanitarian DXpedition in aid of Save the Children – Senegal and will run from 7-19 November. Sponsors and contributors are being sought. See www.qrz.com/db/6v1is for details.

Tom, 5W0C0W (KC0W), who was QRV from Samoa last month (and worked by a few Gs on 20m CW) says his trip to Tokelau is postponed so his next stops will be Tuvalu (T2) 19 July to 18 August, Vanuatu (YJ) 20 August to 21 September, Kiribati (T3) 24 September to 24 October, and Fiji (3D2) 25 October to 24 November.

Alan, KE4TA will be in Rwanda this autumn for a two-year stay. Activity will be mainly on SSB and digital modes. He will mainly be on 40, 20, 17 and 15m. His callsign is not yet known.

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	175	114		249
G5LP	236	22	173	245
M0NKR	117	207	63	245
G1XOW		223		224
G4IDL	189			189
GI4DOH	178	22	46	183
G0RPM	114	46	117	177
G3SVK	174			174
G3HQT	157		55	162
CT7AGZ	154	1	2	159
G4XEX	57	88	86	142
G4CCZ	91	53	41	117
G3PXT	45	80	109	116
G3YMC (QRP)	97			97

CT7AGZ's new Hexbeam. (He's also G4RWD and a regular contributor to the column).

The 2016 KB8OCP Dave Kalter Memorial (SK) Youth DX Adventure team is heading to Saba (NA-145) to the QTH of PJ6/NM1Y, Jeff Jolie, who will host three teenage amateur radio operators and their chaperones from 2-9 August. They will be using the callsign PJ6Y (Papa Japan Six Youth). This year's team includes KD8ZLK, KM4LAO, and AE4FH. See www.qsl.net/n6jrl/2016Team/2016_team.html

Correspondence

Fred, G3SVK (dipoles + 400W) found conditions very variable. 20m was his best band and he was delighted to work XX9TGM for an ATNO. He found: on 15m – 9K2HN; 17m - PZ50X, 7Z1JA, XW1IC, A47RS, JY5HX, E21EJC, E21YDP, 9M2A, SU9CB. A61Q, A92GE, YB0O, D44TWO, 5Q7DX; 20m - 9M2PUL, VR2XAN, YC8UTI, XV9NPS, WH7W, PZ5OX, HS3NBR, 4S7AB, JA4FKX, 3V8SS, OA0V, P4/N4QS, VP5M, 9V1XX, ZF2ET, E41WT (SSB), VU2PHD, SU9VB, XR0YS, FM/DL7V0G, E21YDP, HS5NMF, HS3XVP, VU2CPL, XV9NPS, BV2FB, 7Z1JA, XE2MVY, JW/M0UNN (SSB), TG9ADM, XE1XR, 5R8UI, VU2XE, 9M2ZAK, A71A, A45XR, A61Q, 9K2HN, 7Z1SJ, A93JA, A65BP, A45WG, 9M2CNC, BD0AAI, JT1DX, A61EK, D44TWO, 5Y5HX, HR5/F2JD, XE1XR, FS/K9EL, 3B9FR, YV5LAY, 9V1VV, V44KAI, XX9TGM, 9K2MU, J6/NY3B, FM/F6BCW; 30m - J68GU, A92GE, FM/DL7VOG, XR0YS, PZ50X, HI3Y, KP2/N5PV, VU2DL, ZP6CW, VP2/K6TOP, 7Z1JA, OH0BT, D44TW0, 5Q7DX; 40m - HR5/F2JD, HC2AO, C6AKV, WP2Z, OH0V, P4/N4QS, P44W, 3V8SS, FM/DL7V0G, XR0YS, HK1X, LU1YT, CO6RD, OA1F, KP2/N5PV, CO8CY, D44TWO, S01WS.

Peter, G4XEX (Cobweb + 400W) thought conditions had been reasonable but spent little time on the air. His favourite QSO was with 9J2HN in Zambia. He found: on 17m – JH1MDJ, JH0INP; 20m – 9V1VV, 9M2PUL, SU9VB, 9J2HN, 9M2TO, FG5FI, LU1YT.

Tom, G4IDL (Hexbeam + 200W) was busy sending off QSLs for his 12m DXCC endorsement and experimenting with 30m antennas. He found TY2AC on 10m and XX9TGM on 20m.

Richard, GI4DOH updated his scores for the table and commented that he can use 400W but does not have a beam. He does however use his K3 in diversity receive with a magnetic loop as the alternate antenna.

Peter, G3HQT runs 100W to a tunable inverted V and a vertical. His best DX was: 15m – TY2AC, CP4BT; 17m – PZ5DX; 20m – XE2HQI, BY5CD; 40m – 6Y6N.

Kev, ZB2GI runs 10W into a magnetic loop from his apartment and worked a number of Europeans (including GS3PYE/P and SM0OWX) on 17-40m. He also operated from Rosia Bay and the top of the Rock with 10W to a short vertical and worked around Europe as well as a number of US and Canadian stations who were doubtless pleased to get a rare one.

Gordon, G3PXT (400W on 40m, 100W on other bands + wire antennas) reported in to say that he was mostly QRV on 6m last month. He found: 15m – YE6YE, PY4KS; 17m – KY7M, JA6ATL, 7Z1HL; 20m – YB0AR, YC0LOU, YB3VO and K3DBG.

TABLE 2: Forthcoming activity.

Until 22 July	MM5GAC/P Mull
11-19 July	JT5FW
19 July – 18 Aug	Tuvalu by KC0W
19-24 July	JT by Russian ops
From 25 July	YJ8RN (OC-110)
30-31 July	IOTA CONTEST
2 – 9 Aug	PJ6Y
9-14 Aug?	UE23RRC (AS-142)
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
3 Sept – 25 Nov	VP6AH (OC-044)
6-24 Sept	JT by OK ops
11-19 Sept	TO5FP St Pierre/ Miquelon
15-30 Sept	D66D
24 Sept – 3 Oct	H44GC
24 Sept – 24 Oct	Kiribati by KC0W
27 Sept – 4 Oct	T2R
4-17 Oct	H40GC
8-23 Oct	S9YY
18-21 Oct	H44GC
25 Oct – 24 Nov	Fiji by KC0W
27 Oct – 10 Nov	ZL7 by 6Gs
4-14 Nov	XU7MDC
7-19 Nov	6V1IS
mid Nov	AF-020 by Is

Finally

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

Martin Atherton, G3ZAY
g3zay@btinternet.com

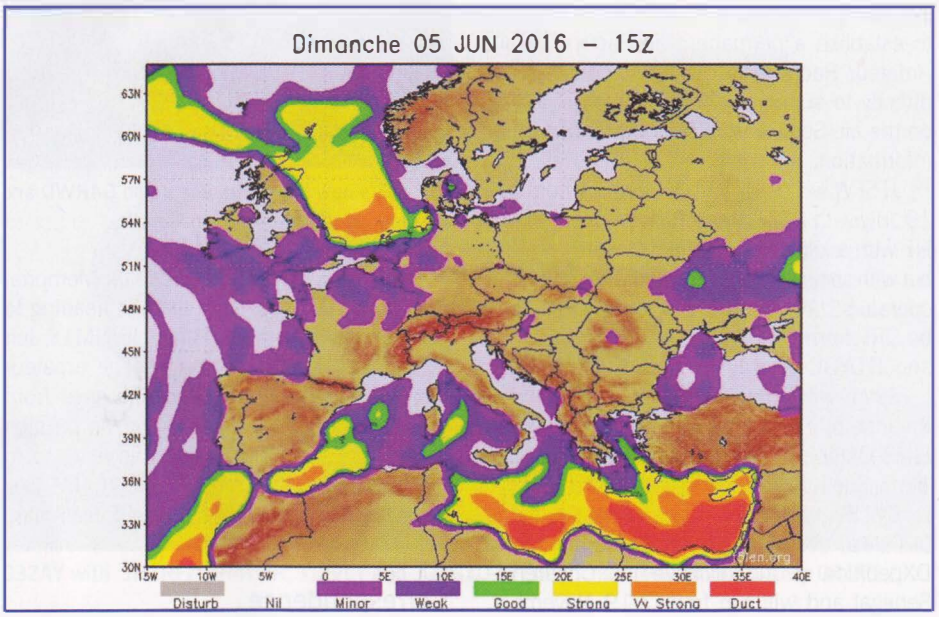
VHF/UHF

Excellent tropo conditions over the North Sea mixed with aurora, Sporadic-E and a major opening to North America on 6m.

Conditions from the end of May and throughout June were excellent across the VHF/UHF spectrum with a major Transatlantic opening on 6m plus good Sporadic-E and tropo conditions on 4m. A persistent high pressure system over the North Sea gave superb ducting from easterly located sites. Sites further inland didn't fare so well, with only slight enhancements into PA, ON and DL.

At last, Sporadic-E appeared on 2m to give most of the UK a chance to work some DX and new locator squares. 70cm also benefitted from good tropo conditions with a few lucky stations working into OY (Faroe Islands) on the band, a usually difficult path. Rare squares were also activated by EA6/PA2CHR, ES0UG (KO08), LA0BY/P (JP42) and Keith, GM4ODA/P (IP80).

There was also a very timely aurora on 5/6 June that provided excellent chances for propagation testing with tropo enhancement.



Tropo ducting across North Sea on Sunday 5 June from John, G4SWX. Courtesy of Pascal, F5LEN.

Connected propagation

Many will remember the continuing tests over the past year or so trying to connect one propagation medium to another ie tropo assisted meteor scatter.

John, G4SWX (JO02) has been experimenting with this for some time however the excellent tropo conditions over the North Sea enabled a tropo assisted aurora. He continues, "there had been very strong tropospheric ducting over the Northern North Sea for all of the past weekend (4-5 June). There were reports on the DX cluster of 144MHz aurora in Russia, Finland and Northern Sweden too far north even for many stations in Scotland.

"However, at around 1510 on 5 June, Richard, G4CDN in North Norfolk (JO02SS) reported he was hearing LA2VHF in JP53 with an auroral note. After a little searching I also found LA2VHF that is well to the North of what I would expect to hear via auroral reflection.

"This is what I heard and worked during the next hour or so in a QTF (direction) between 330-20 degrees: LA2VHF/B (JP53), SM2A (KP04) QTF 024 – his QTF 330, OH3LWP (KP21) QTF 024, OH6KTL (KP02) QTF 024 – his QTF 320, OH3UW (KP21) QTF 024 and OH4LA (KP20) at QTF 024. LA6OJ (JO38) was a very strong 599 tropo signal showing the extent of the tropo propagation. By 1610 the LA2VHF beacon in JP53 tropo signal had faded.

"In 35+ years at the leading edge of 144MHz DX I have not worked any of these SM2 or OH stations via aurora before. Therefore this event was really exceptional! In the evening, stations in Russia and Finland again observed aurora. So I chose the same beam heading and called 'CQ'. Luckily the peak auroral signals were only a few degrees away. This time the LA2VHF beacon in JP53 was not audible via tropo but OH6KTL KP02 and SM6BFE (JO56) were worked on a 20 degree QTF.

"One might expect to work the SM6 station in a 'normal' aurora but not the OH6. The beam headings of 020 to 024 from my location, JO02RF align with the South West tip of Norway. The beam heading of 320 degrees from KP04 suggests that that the auroral reflection point was over the North of Norway, which is not normally accessible from my location.

"I have therefore concluded that the tropospheric ducting carried the signals from here to around JO27 where they were reflected off the sea or escaped the end of the duct and then hit the auroral belt much further North than is normal. A number of large stations in Northern England and Denmark reported that even when they could hear me by tropo working stations that they hear no auroral signals. This I see as further evidence of the auroral reflection being far to the North then being carried some 800km further South in the tropospheric ducts. As per the coupling of tropospheric ducting and meteor scatter the coupling mechanism and limits are unclear."

Band Reports

Paul, G3YDY (JO01) reports a fantastic first week of tropo in June but very frustrating as G4SWX and M0HKB were working into SM/LA/OZ at S9. Here is summary of the best QSOs over the period: Sunday 5th 70cm OZ1BEF stronger than locals and end stopping the FT-847 S-meter at S9+60 and also 2m SM7FMX at 923km worked. On the 6th, GM4ODA/P was worked on 2m and 70cm (much stronger) during the day. The evening was a mix of SM/OZ & LA stations for the best DX. The 9th was again a great evening session particularly on 70cm with LA4YGA as ODX and SM7XWX at 935km. An early start at 0530UTC produced a busy couple of hours on 2m with SO3Z ODX at 1129km with many others worked in the JO50s to 80s line of locator squares. In the period listed he worked 135 stations in all.

Dave, G4RQI (IO93) also had a good month on 70cm including numerous QSOs with very active Dutch low power stations.

The two main highlights were working SM6CEN at 930km and GM4WJA at 439km for a new square on 70cm when he could hardly hear GB3ANG. Dave's equipment comprises of a 10-ele Yagi on the chimney that is hand rotated and about 250W output. The prime mover is an old TS-780 that is much improved with a mast head preamplifier.

Dave, G4IDF has been constructing his new Nacton 28, a 70MHz transverter design from Sam, G4DDK with an Anglian 28-144MHz transverter also underway. The Nacton was built and running in time for the 2nd 4m Cumulative contest and provided contact into IO90 in the south and IO84/IO94 to the north using a 5 element Yagi. Recent Sporadic-E events gave an opportunity to see what can be worked into Europe on 4m. On 26 May successful QSOs were had with OH1MN in KP10 at 1767km and OH2TP in KP20 at 1836km and on 28 May a QSO with HA6ZB in KN07 at 1669kms. Six metres between 26 and 28 May provided a total of 22 contacts with OY9JD (IP62), DL1SMA (JN48), OE5RBO (JN68), LA6OJ (JO36), OZ6PI (JO47), SM0CXS (JO99), SP7VTO (KM00), SP8AWL (KO11), LY2BBF (KO24), LY3A (KO25), YL2GB (KO26) all providing new squares.

Martin, GM8IEM (IO78) reports the Es season well under way from Northern Scotland. Notable catches on 6m were 9K2NO (LL39) on 14 May and TY2AC (JJ16) on 7 June, both CW. The big transatlantic multi-hop Es opening occurred at Martin's QTH between 1330 and 1611UTC on 13 June when 16 North American stations were worked (12 SSB, 4 CW), giving 8 new grids with the best DX being N4OX in EM60. Got-aways this month were A92GE (LL56), EX8M (MN62) and PJ4VHF (FK52) on SSB at 1943UTC on 11 June. The Cape Verde Islands beacon D4C was also heard on 11 June. On 2m Martin was just on edge of the propagation during the excellent conditions of 5/6 June with only PE1GUR (JO22) and OZ1ALS (JO44) worked on SSB.

Ken, G4APJ (IO83) was pleased to actually have some Es at his QTH with new locator squares worked on 6m. 26 May brought a lot of French and Italian stations (including colossal signals from IS0BSR/P and IT9FXY in Sicily) from 1430 with the band open for 4 hours until OK1IO was the last at 1830. On 4m contacts included EA/SP/OM around 1700UTC. Activity was helped on the 29th by an Italian contest and Ken worked IZ3ENH in JN56. IS0ANY/M was another colossal signal around 1830.

On 2 June, with the MUF rising, Lyn, GW8JLY (IO81) noticed a real possibility of a 2m Es opening. With DX cluster spots being posted by other UK stations a few CQ calls were answered by Massimo, IV3NDC in JN65RV. After a QSY to 144.305 Ivo, S57VW in JN76HD was also worked. Later in the opening other stations worked included S50C (JN76), YU1WS (JN93), 9A5CY (JN85), 9A2SB (JN75) and YU1BBV in KN04GR. Also heard was YU1OS (KN04) and YO2BBT (KN05). On the 5th, Lyn was able to complete a QSO with OZ1BEF in JO46. On the 6th the tropo ducting reached IO81 and Lyn was able to make QSOs with many DL. PA and ON stations in locators JO20-23, 31-33, 42, 43 and 53. ODX was to DO2HSP in JO53. 2m meteor scatter QSOs were made with the major DXpeditions to rare locators JN10, JN20 and JM29 in the Balearic Isles activated by Chris, EA6/PA2CHR.

Rich, GD3YEO (IO74) continued his 4m activities with the most recent notable being TF3ML/P on 13 June who was also heard working loads of UK and near continent stations. From the end of May to 14 June, Rich's log includes HA6ZB, EA3AQJ, S51RM, 9A6R, 9A2SB, HA1WA, HA5OO, S51RM,EA1HRR, SP8SN, SP7VC, SP8WJS, SO8FH, OK2BRD, CT1JAD SP2MKO, LY2BAW, OK2BRD and PA2CEV.

David, GM4JJJ (IO86) was QRV for the end of the *Practical Wireless* QRP contest, with best DX of the day US5WU in KO20 at 1939km. The log also included SP8QEJ (KO11), SP5WCK & EW3AA (KO12) and SP5XMU in KO02. A got-away was 9A8DXG in JN82. Interest in 70cm continues and David was amazed to hear the OY6BEF beacon in the tropo opening starting on 4 June. The 70cm OY6BEC beacon on 432.400MHz was heard at 539 on a 18 element Yagi with a MGF1402 preamp in shack and a FT-736R.

Mike, GM3PPE (IO75) sends in his first report to the column, "After I got a K3 last year I decided to try 6m and, in late April of this year, I put up a small 3 element Yagi at only 16ft off the ground. What fun I have had! In the first two weeks of May I worked numerous stations throughout Europe. Then on 22 May the band opened to the eastern Med and I worked 5B4AAS (KM64) and 9K2NO (LL39) and later that afternoon an opening in the opposite direction to TF3ML and TF3SG (HP94). Then, on 7 June, TY2AC (JJ16) and 9H1XT (JM75) were logged. The big opening on 13 June to the US/Canada meant I worked a dozen stations all the way from VE1PZ (FN85) in Canada down the east coast of the US to W3EP (FN31).

Geoff, MW0ATI (IO83) has been QRT since 2012 and his new competitive HF/VHF station includes a Yaesu FT-736R or FT-991 plus 12 element Powabeam on 2m and Wimo WY7023, 23 element Yagi on 70cm. On 4m an Icom IC-7300 and a 6 element Powabeam finishing off on 6m with Icom Pro III and M2 7 element monoband Yagi on a 10m boom all hopefully grouped together with the HF antennas by July. He was lucky enough to catch some good Es conditions on 4m with ODX being LY2BAW at 1828km in KO25KA square.

Darrell, G0HVQ (IO81) says, "On 13 June I noticed that EIs were hearing West Coast USA on multi-hop Es, I couldn't hear anything on SSB/CW so I ran up JT65 and left it monitoring. When I checked back via Pskreporter [1] on the family PC I was amazed that it had copied NA6L (DM12, San Diego) and KF2T (DM25, Nevada). It seems to me that JT65 on 6m is a game-changer this year: there are now sufficient stations active to be able to spot unusual openings. Early this morning (18th) was productive, not much on the band other than the OH2 beacon so I tried some CQs and UK8OM Uzbekistan (MN51) and EX8M Kyrgyzstan (MN62) both came back to me, UK8 was a new DXCC #140."

Paul, G4IJE (JO01) comments on a challenge he set himself at the beginning of 2016. "These days I have only a halo antenna for 6 metres (7m above ground) and thought it might be fun to try to work 100 grid squares with it during this calendar year. The 100 Square challenge was easily reached by June with the current total now standing at 103 squares, 36 countries and a total of 162 QSOs, mixed SSB and CW (no data or MS). It just goes to show what can be done on the 'magic band' with a modest antenna from a poor VHF location (I am only 9m ASL). Best DX so far this year is 4X4DK at 3529km closely followed by a couple of EA8s at just under 3000km."

August Persieds

The major meteor shower of the year occurs in August peaking during the evening of 12/13 August. This shower should give a good visual display and well as good radio reflections.

Conclusion

Thanks to all contributors this month particularly newcomers Mike, GM3PPE, Geoff, MW0ATI, Darrell, G0HVQ and Paul, G4IJE, and I look forward to more reports during the summer/autumn months.

Websearch

[1] https://pskreporter.info/pskmap.html

Richard Staples, G4HGI
g4hgi@live.com

+44(0)1588 620126
www.thedxshop.com

The DX Shop
...going the extra mile

WORK THE Es WITH EASE

If you have one of these...
(or are QRV on 50/70MHz)

...you'll need one of these...

THE IDEAL AMPLIFIER FOR 4M AND 6M ES DXING

Gemini 4/6 £849 incl VAT

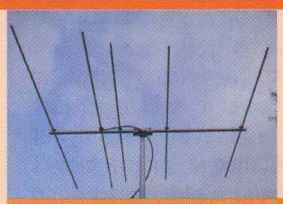
50/70MHz 300W dual Band

- DUAL BAND Operation on 50Mhz and 70MHz
- Solid state design
- 300W output (270W on 50MHz)
- Freescale MRFE6VP6300H LDMOS
- Integral 50V Linear Power supply
- Drive requirements 2.5/10/25W (specified at purchase)
- Advanced cooling for MGM operation
- Full protection for overdrive/swr/temperature
- N Type connectors on input and output
- All aluminium chassis
- Compact dimensions – just 270w x 300d x 120h mm
- Weighs just 10Kg
- UK Manufactured by us here on the Welsh Borders

www.linearamp.co.uk UK DESIGNED AND MADE LINEARamp

...and some of these

PowaBeam ANTENNAS



4m 70MHz 5 ELEMENT WIDEBAND

8.7dBi Gain
16dB F/B Ratio
2.1m boom
Stauff clamp element fixing
All stainless steel fixings
Mast clamp included
10 minutes to assemble

£82.80 (incl. VAT)

SEE OUR WEBSITE FOR THE FULL RANGE

6m 50MHz 6 ELEMENT WIDEBAND

10.2dBi Gain
23dB F/B Ratio
4.3m boom
Stauff clamp element fixing
All stainless steel fixings
Mast clamp included
10 minutes to assemble

£138.00 (incl. VAT)

SEE OUR WEBSITE FOR THE FULL RANGE

FEED THAT ANTENNA

ECOFLEX CABLES AND CONNECTORS

10, 10+, 15, 15+, Aircell S, 7, Aircom Plus, Aircom Premium all in stock

Example: Ecoflex 15 Plus attenuation @ 432Mhz 5.8dB/100M, power handling @ 500MHz 890W, fmax 8GHz

BESPOKE CABLES

Any coax Cable, any length with any connector. We are able to supply patch cables to long runs with termination to suit your requirements. RG174 to Hard line. Call us and discuss.

Andrew Heliax COAXIAL CABLES

LDF, AVA, Semi-rigid and PTFE coax and the new FXL range all in stock.

CONNECTORS

UHF, PL259, N-type, BNC, SMA, TNC, 7-16DIN etc. Interseries adaptors. Huge range in stock.

Free termination service available – we will make up your leads for you. We can make up phased matched cables to any frequency up to 3GHz on our VNA – ideal for any phase driven and polarisation switching situations.

TURN THAT ANTENNA

SPID Elektronik

RAU AZIMUTH ROTATOR

- A lighter duty rotator
- Up to 180 Nm torque
- Worm gear drive so precise stop with nil backlash
- Supplied with digital controller
- Future-proof firmware upgradable via PROM
- Mast or head unit mounting with adaptor plate

Smaller Tri-band beams +VHF and UHF yagis

RAK AZIMUTH ROTATOR

- A medium to heavy duty rotator
- Up to 3240 lb-inch / 336 Nm torque
- Equivalent to G-1000/2800 but with digital control
- Worm gear drive so precise stop with nil backlash
- Supplied with digital controller
- Future-proof firmware upgradable via PROM
- Mast or head unit mounting with adaptor plate

Medium size HF/VHF arrays

BIG-RAK HEAVY DUTY AZIMUTH ROTATOR

- A heavy duty rotator
- Up to 3600 lb-inch / 403 Nm torque
- Equivalent to G-1000/2800 but with digital control
- Worm gear drive so precise stop with nil backlash
- Supplied with digital controller
- Future-proof firmware upgradable via PROM
- Mast or head unit mounting with adaptor plate

Big HF antennas or multiple VHF/UHF Arrays

COMPLETE ALT/AZ ROTATOR RANGE ALSO AVAILABLE. PLEASE ENQUIRE

GHz Bands

New RSGB Microwave Manager

The RSGB has appointed Barry Lewis, G4SJH as the new Microwave Manager, taking over from Murray, G6JYB. Barry is a keen homebrewer of HF to microwave equipment. As well as contesting at VHF and UHF he has been regularly participating with the Combe Gibberlets contest group on the low and mid-band microwave bands. Barry has been engaged in the world of radio regulation since the early '90s and has regularly worked with the relevant national and international bodies. I'm sure this experience will benefit the Society.

East coastal tropo opening

5 and 6 June brought a settled high pressure system to the NE coast of Scotland and some welcome tropo ducting up the east of the country and into Scandinavia. Keith, G4ODA was operating from Shetland (IO99IV) as GM4ODA/P and had gear for 1.3, 2.3 and 10GHz, giving many people a new square. I worked him on 1.3GHz at 59+ and he was copyable at that level for more than 2 days. I also worked LA3EQ (JO28XJ). Keith worked PE1EWR (JO11SL) at 982km on 2.3GHz, and on 10GHz reported hearing GB3CAM (IO92WI) at 844km on a number of occasions but I didn't manage to work him on that band. I did work G4KUX (IO94BP) at almost 59 on two occasions. Nice to have an SSB ragchew instead of struggling with marginal CW signals. I also worked DF6IY in JN48EU on 10GHz rain scatter, so a good choice of propagation modes. The tropo enhancement brought in the new 24GHz GB3PKT beacon (JO01MT) here and 59 signals from 24GHz GB3SEE. Neither are copyable here under flat conditions.

The GB3PKT story

Shortly before his own tragically early death in February 2013, Russ, G3PBP completed an upgrade for the GB3CEM 10GHz beacon – only to lose access to the beacon site on the sale of his late father's QTH. The UKuG were offered the beacon hardware and at the same time approached by Tony, GOMBA and the Martello Tower group [1] offering to host the beacon on the Martello Tower at Point Clear near Clacton (JO01MT22). The site already hosted a number of other beacons and repeaters so the UKuG gladly accepted their offer, especially as no charge was levied for rental or electricity. The Martello group saw this as an opportunity to learn about the GHz bands. I took delivery of the hardware from Russ's estate and reprogrammed the beacon to 10368.945MHz and to send GB3PKT in Morse and JT4G. As a permanent memorial to G4PBP it also sends 'Russ' in Morse with the ident. The beacon went on air at the end of February 2014 and has been running since with just a few outages. It's been heard at 418km. Its Figure of 8 antenna pattern favours the continent from North Netherlands round to Paris and the bulk of the UK.

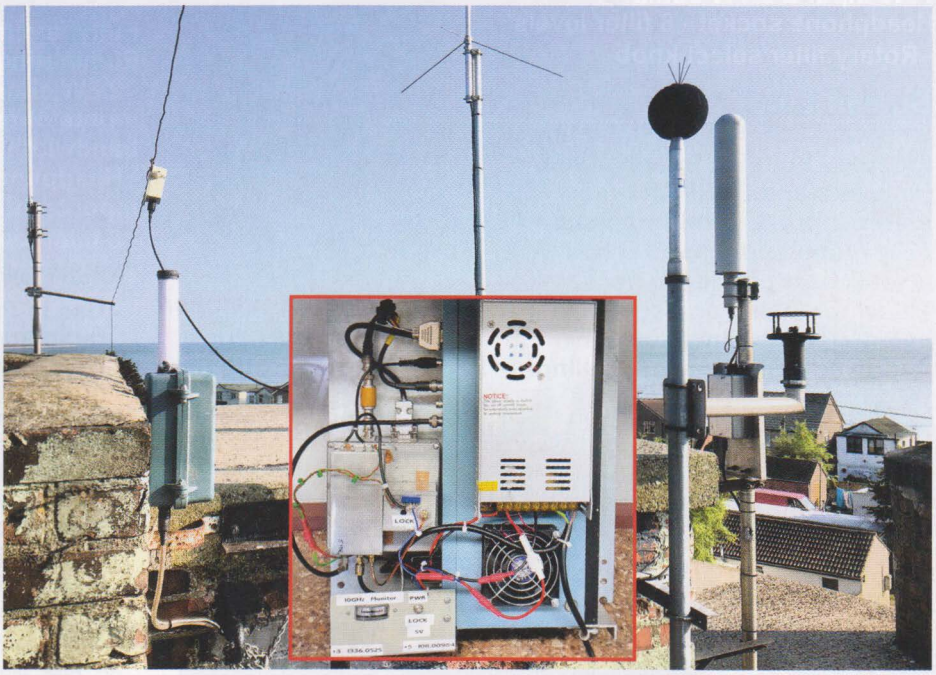


PHOTO 1: The 10 and 24GHz beacons at GB3PKT (blue box on left is 24GHz, long 'radome' on right is 10GHz). Inset: the GB3PKT 10 and 24GHz indoor unit. Photos: GOMBA and G4BAO.

In mid-2015 I decided that it would be fun to add a 24GHz beacon to the site. GOMBA was very enthusiastic and again offered to install and host the beacon, so I started looking for parts to build GB3PKT/24. I decided to base the beacon's JT4G source around G4JNT's LMX2541 synthesiser boards [2]. While not the best LO source in terms of noise when multiplied up to 24GHz I concluded it would be adequate for a low power beacon on an Exclusive band. The circuit generates 1336.0525MHz from the same 5MHz reference used in the 10GHz beacon. This is amplified by a G4BAO 1296MHz driver amp and fed to a x9 varactor multiplier to 12024.4725. This is then doubled using a design by F6CXO [3] based on a 'Franco' board [4]. The 24048.945MHz signal is then fed to a 1W WR28 waveguide amplifier and to a slotted waveguide antenna from ebayer Pyrojoe [5]. At the same time as the 24GHz beacon build, Tony asked me if I would rebuild both beacons in to the same lockable outdoor cabinet, and I of course obliged, so the 10GHz beacon also got a facelift in early 2016. The 24GHz NoV was procured in an amazing 4 days, so hats off to RSGB Spectrum forum chairman Murray, G6JYB and Ofcom for moving so quickly! Both beacons came on air again over the weekend of 28 May, and to date the 24GHz beacon has been heard via tropo by G4BEL (JO02BI) for an ODX of 88km.

Initially both beacons mysteriously dropped by 10dB on a very regular time schedule. We realised it was linked to the transmissions of the co-sited 10.1MHz WSPR beacon. For 10GHz, this turned out to be RF pickup from the dipole antenna that ran above and parallel to the beacon's DC cable. Moving the PSU fixed that fault, and we are working on a similar fix for the 24GHz beacon.

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

Websearch

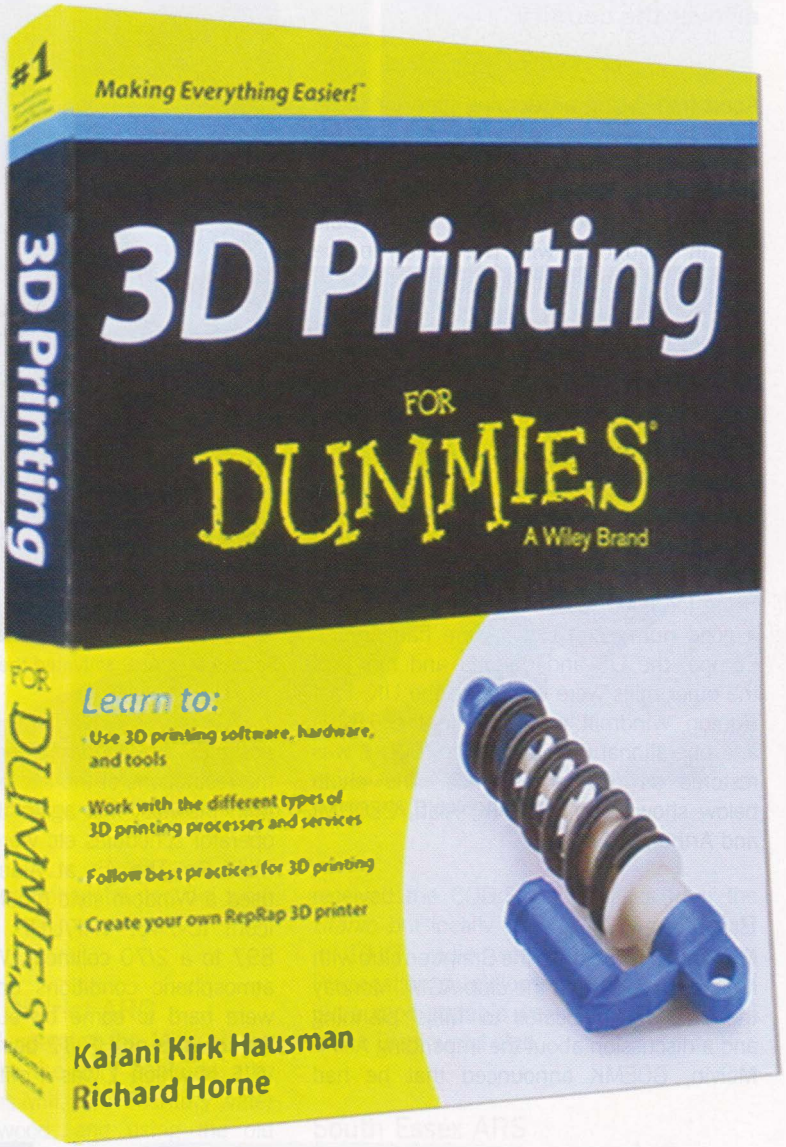
[1] www.martellotowergroup.com
[2] www.g4jnt.com
[3] VHF Communications 1/2005
[4] 'Franco' PCB SU02 – http://bit.ly/1S5r884
[5] www.ebay.com/usr/pyrojoseph
[6] http://g4bao.blogspot.co.uk

Dr John Worsnop, G4BAO
john@g4bao.com

Book Review

3D Printing for Dummies

by Kalani Kirk Hausman and Richard Horne



The For Dummies series of books by Wiley is well known as a solid way of finding your feet in a subject, starting from a position of curiosity rather than knowledge. And so it is with this book.

3D printing is one of the so-called emerging technologies that will become increasingly important as the century progresses. In essence, it involves creating objects by precisely depositing very thin layers of material, building it up one slice at a time. A prerequisite is a 3D design – normally created using a CAD system – and of course a 3D printer. But where do you *actually* start? This book has the answers.

One of the interesting points made very early on is to compare the sophistication of today's 3D printers to the first automated cloth-weaving looms of the early 1700s. It goes on to say, "We stand at the start of a new Industrialized Age, where traditional mass manufacturing will give way to personalized, individualized, ecologically-friendly and on-demand manufacturing close to home". I tend to agree – it's an exciting time, one that some are understandably referring to as the dawn of the Third Industrial Revolution.

But back to the book. The first sections concentrate on how 3D printers fit into modern manufacturing and some of the materials used, ranging from ABS plastic to metallic silver to concrete. Along the way we learn of a gentleman who made a solar-powered, sand-fusing 3D printer: google 'solar sinter'. We also learn of 'repositories' where vast numbers of 3D designs are freely available on the internet, either to use directly or as the basis of your own unique creation.

Next we move onto commercial and ethical aspects of 3D printing, ranging from how it might transform production to the issues surrounding intellectual property rights. Then there's a look at some of the practical and artistic uses of 3D printing such as medical implants, custom guitar bodies and much more.

There is a large section devoted to the basics of consumer-level 3D printers – the sort of thing you or I might be able to save up for. There are several basic types of mechanism, not to mention material and deposition methods. The main focus is on the various open-source 'RepRap' printers (and I've seen these on ebay for under £150) plus, as always, the choice of materials. Finding the parts – or building a kit – is covered in considerable detail, with lots of very useful snippets here and there that have applications well beyond 3D printing. Most of the electronic elements (eg controllers, stepper motors, extruder heads, heated bed) are available as off-the-shelf modules, which makes life a lot easier. The important, but seldom spoken-of, aspects of calibration are also covered in useful detail.

3D printing technology is a very fast moving subject. This book gives you a solid grounding in this exciting new technology and equips you with the background necessary to ask intelligent questions and understand the latest developments.

ISBN 978-1-118-66075-1
384 pages, 234 x 189mm
Non-Members' price £21.99
Members' price £16.49 (25% off)

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

Mills on the Air 2016

On a weekend in May each year radio amateurs set up stations in windmills and watermills all over the country.

Apart from being an exciting time for those involved, the event promotes both the site itself and also amateur radio since members of the public encounter enthusiasts at work. The event is coordinated by Denby Dale ARC in conjunction with The Society for the Protection of Ancient Buildings.

South Essex ARS activated the historic Rayleigh Windmill.

Norfolk Coast ARS

Norfolk Coast ARS operated from a location adjacent to the windmill in the village of East Runton on the North Norfolk coast with the call GB2ERW. Two stations were operational – one was mostly 20m CW and the other SSB on 40m. The antennas for both bands were dipoles. Despite the conditions not being too good, particularly in the morning, a good number of QSOs were had around Europe, the US and Canada and many of the other mills were worked in the UK. East Runton Windmill was built in the 1820s and operational until 1908. In 2000 it was restored as private residence. The photo below shows Ken, M0SHK, Alan, 2E0DMI and Arthur, M0VAW.

Braintree ARS

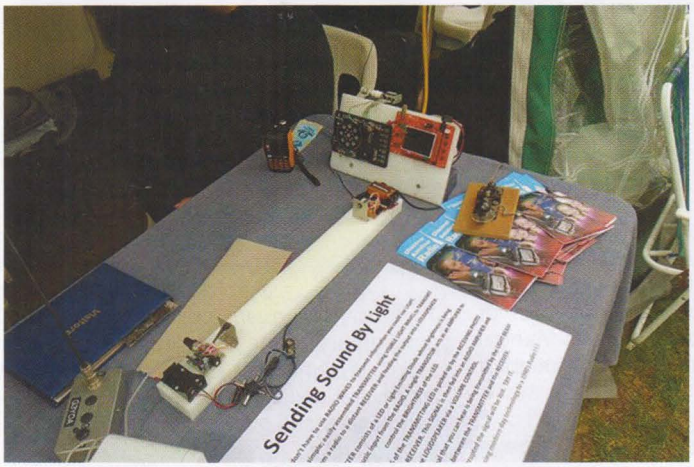
May is a busy month in the Braintree club with Mills on The Air and the club AGM. Monday the 2nd was dedicated to 'Mills' planning and a discussion about the impending AGM. Melvin, G0EMK announced that he had designed a Windom type antenna to suit the restrictions of the site at Alderford Water Mill, the host Mill again this year. Set up, operator schedules etc were also organised. Mills On The Air at Alderford Water Mill used a Windom style dipole with the club's Icom IC-746. VHF/UHF involved an FT-897 to a 2/70 collinear. With very difficult atmospheric conditions on 40m, contacts were hard to come by but they managed 21 contacts on HF, 12 being mills and 8 on VHF, of which 1 was a mill. The poor band conditions mixed with various contests made for a frustrating weekend.

Bittern DX Radio Group

Bittern DX Radio Group returned to Gunton Park Sawmill for the Mills on the Air weekend to activate GB5GSM. Gunton Park Sawmill is a privately owned early 19th century, thatched water-powered sawmill that has been preserved and now restored to working order over the past 30 years. They had three


GB2ERW operated by Norfolk Coast ARS.


Braintree ARS operated from Alderford Water Mill.



Bittern DX Radio Group returned to Gunton Park Sawmill.

Southgate ARC set up at Mill Green Museum and Watermill.

stations on the air; HF SSB, HF data and VHF FM. Band conditions were dire and they managed just under 100 contacts with the majority on 40m SSB. Of those, 21 were Mills stations. Apart from the radio side of things, Sue's spinning wheel attracted a lot of interest from the public as did Peter's little car. Thy also had a growing display of demonstration projects that combine to show the transmission of sound by light thanks to Chairman Steve, MOHET, see photo above. Overall it was a pleasant weekend despite the rather poor propagation conditions!

Southgate ARC

A station was set up at Mill Green Museum and Watermill near Welwyn and Hatfield. Conditions were awful – everyone contacted agreed! Only five other mills stations were contacted plus another five QSOs including a station in Switzerland and David, MOXDS who had visited and then spoke from home. The museum staff, most of whom are volunteers, were very welcoming and have asked the club to do the event again next year. It was an opportunity to 'play radio' and make good use of the new Kenwood TS-590s. For the antenna a folded L dipole made of 300 ohm ladder-line was tried but on the day this did not work too well, however an inverted 'L' with a 10m vertical section and a 30m horizontal part did work quite well.

Andy, MW0MWZ operating at Gelligroes Mill with Blackwood & District ARC.

Blackwood & District ARC

Andy, MW0MWZ operated the Mills on the Air weekend from the very confined attic space at Gelligroes Mill, a 17th century water mill near Blackwood, and using the old fashioned paper log book, see above. This is the location where a young Artie Moore received the CQD/SOS messages from the *Titanic* but locally no one believed him as, in 1912, radio was a mystery to most. Propagation conditions were not at the best but a good sociable weekend was had by all in the Blackwood club.

South Essex ARS

In support of the Mills On The Air weekend, the South Essex ARS activated the historic Rayleigh Windmill under the callsign of GB2RWM. The station was active on HF, VHF and DMR, operating voice, CW and PSK. The HF bands were not in great shape, but we had a great team, a good day was enjoyed by all, they had many visitors and a good turn out from the membership – and the bacon rolls from Vic's cafe went down a treat.

South Essex ARS activated GB2RWM.

Mike Franklin, G3VYI
mike.franklin3@btinternet.com

Best Books from

Haynes - Build Your Own Drone Manual

By Alex Elliott

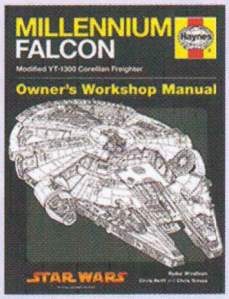
Haynes - Build Your Own Drone Manual is a practical guide to safely build, maintain and operate an Unmanned Aerial Vehicle (UAV) with advice and step-by-step procedures to enable the building of a basic, affordable, drone.

'Ready-to-fly' drones and self-build kits are available to suit all pockets and purposes. The *Haynes - Build Your Own Drone Manual* is an extensively illustrated and practical manual for anyone contemplating building a bespoke drone using available components. The book takes a brief look at the origins and history of unmanned aircraft and drones, before explaining the various types of drones available today and their applications.

Hardback Size 270 x 210mm, 160 pages,
ISBN: 9780 8573 3813 6

Non Members' Price £22.99
RSGB Members' Price: £16.99

26% OFF RSGB Members' Price



Haynes Millennium Falcon Manual

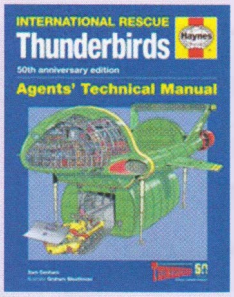
From the same authors as the *Haynes Owner's Workshop Manual for the Imperial Death Star* comes the workshop manual for the Millennium Falcon. Using brand-new, full-colour cutaways, together with other art and photographs, this Manual provides a thorough technical description of the Millennium Falcon.

An official Star Wars product, this 124 page Hardback technical manual offers much on this modified YT-1300 Corellian Freighter, tracing the history of this series of spaceships before focusing on the Millennium Falcon itself. The on-board systems, controls and their operation are described, supported by photographs, line art, floor plans, exploded diagrams and computer-generated artwork.

Hardback, Size 270 x 210mm, 124 pages
ISBN: 9780 8573 3096 3

Non Member's Price £16.99
RSGB Members Price: £6.99

£10 OFF RSGB Members' Price



Haynes Thunderbirds Manual

50th Anniversary Edition

by Sam Denham

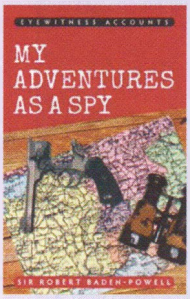
A new paperback edition of the *Haynes Thunderbirds Agents' Technical Manual*, celebrating the 50th anniversary of the first airing of the original series, in September 1965. This is an inventive, informative and entertaining guide to the world's foremost rescue organisation.

Featuring cutaway drawings, detailed diagrams, colour illustrations and photographs, this updated edition also has an additional seven cutaways of vehicles used in rescue missions. *The Haynes Thunderbirds Manual* provides the ultimate insight into the secrets of the fabulous International Rescue team. Not only a thoroughly recommended read but also a great gift or treat.

Size: 270 x 210mm, 152 pages,
ISBN: 9780 8573 3823 5

Non Members' Price £12.99
RSGB Members' Price £8.99

30% OFF RSGB Members' Price



Eyewitness Accounts - My Adventures as a Spy

by Sir Robert Baden-Powell

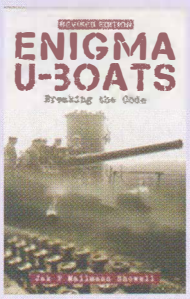
Lord Baden-Powell, the founder of the scout movement and national hero. This book highlights his service as intelligence officer for the Mediterranean for the Director of Military Intelligence. Written in 1915, and including Baden-Powell's thoughts on German espionage before and in the first years of the First World War, the book describes how to convey secret information using drawings of butterfly wings, how to quickly disguise yourself, how to safely produce plans of fortresses, observe troops and how to get past sentries.

Written by one of the major figures of the Edwardian age this book is a great read.

Size: 210x297, 128 pages,
ISBN: 9781 4456 3610 8

Non Members' Price £8.99
RSGB Members' Price £6.74

25% OFF RSGB Members' Price



ENIGMA U-BOATS: Breaking the Code

By Jak P Mallmann Showell

Revised updated and made available for the first time as a paperback *ENIGMA U-BOATS: Breaking the Code* is the true story of the Enigma machines taken from U-Boats in WW2.

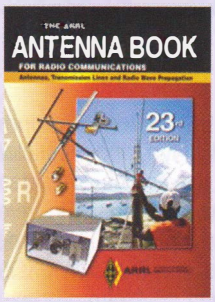
This book analyses the development of Enigma, following the story from the shocked German admirals who discovered that the Royal Navy had penetrated their secret radio codes during WW1. The response of the German navy to make a coding system, so complex that breaking their codes, would be theoretically impossible - the Enigma machine.

This book is a highly enjoyable read and is thoroughly recommended.

Size: 194x130mm, 232 pages.
ISBN 9780-7110-3396-2

Non Members' Price £8.99
RSGB Members' Price £6.74

25% OFF RSGB Members' Price



ARRL Antenna Book

23rd Edition

The ARRL Antenna Book is the book by which all other antenna books are judged. It has everything you need to design your own complete antenna system.

The ARRL Antenna Book is a single resource covering antenna theory, design and construction, and practical treatments and projects. There are hundreds of antenna designs: wire, vertical, portable and mobile, and new high-performance VHF/UHF Yagi designs. Many new projects include Multiband HF antennas from 160 through 10 meters, omnidirectional satellite antenna system and Stealthy, portable antenna designs.

FREE CD-ROM
The ARRL Antenna Book includes a CD that contains the book as fully searchable text.

Size 208x274mm, 992 pages
ISBN: 9781 6259 5044 4

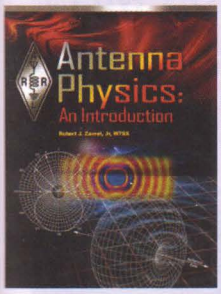
Non Members' Price £46.99
RSGB Members' Price £39.94

FREE UK STANDARD DELIVERY

P&P FROM FREE

Order on the internet at **www.rsgbshop.org** or you can order by post making cheques and postal orders crossed and made payable to Radio Society of Great Britain or telephone your credit card order to **01234 832 700**. Open 8.30-4.30 (Mon-Fri). Send no cash. **Post & Packing:** Standard Delivery - 2nd Class Post (4-9 Days), For one item £1.95, For two or more items: £3.50, **For orders over £30.00 standard delivery is FREE.** Priority Delivery - 1st Class Post (2-4 Days), For one item £2.95, For two items: £4.95 , For three or more items: £5.95. **Overseas:** Worldwide Surface Delivery, For one item: £3.00. For two items: £5.00, Extra items: £1.00 per item. Worldwide Air Delivery: For one item: £9.00, For two items: £15.00, Extra items: £3.00 per item.

Other Publishers



ARRL Antenna Physics: An Introduction

Delve Deeper into Antenna Theory

By Robert J. Zavrel, Jr, W7SX

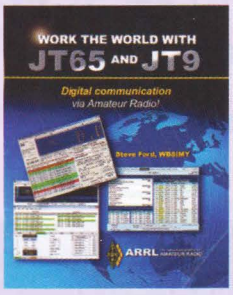
For most radio amateurs who learned basic antenna theory the physics of why particular designs work and others don't can be a mystery. *Antenna Physics: An Introduction* sets out to extend insight without resorting to degree level texts.

Antenna Physics: An Introduction explains many of the underlying principles of antennas and antenna physics and introduces the mathematics behind these principles. Written by Robert J. Zavrel, Jr, W7SX, a professional antenna engineer readers to follow along and understand the concepts without needing to solve the complex equations. The examples used help to tie the concepts learned to a number of antenna types.

For those who are interested in the how antennas work, the theoretical and mathematical approach that *Antenna Physics: An Introduction* provides can be of great insight.

Size 208x275mm, 160 pages,
ISBN: 9781 6259 5049 9

Non Members' Price £26.99
RSGB Members' Price £22.94



Work the World with JT65 and JT9

Explore a New World of Digital Communication

By Steve Ford, WB8IMY

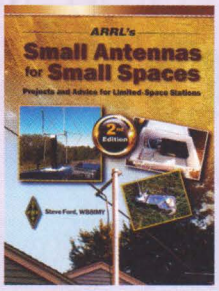
Thanks to these two revolutionary digital communication modes, any radio amateur can make contacts throughout the world. *Work the World with JT65 and JT9* shows you how to assemble an effective station and configure the software for best performance. You'll learn how to make contacts, and also how to use these modes as tools.

The book starts with a chapter on 'Getting to Know the JTs' which provides what you need to know about JT65 and JT9, from how these protocols work through to the advantages they offer. The book provides instructions on building a JT capable station along with the hardware and software you'll need to get on the air with JT65 and JT9.

Simply put *Work the World with JT65 and JT9* provides the tricks and tips on how to get started in and make the most from the digital world of JT65 and JT9.

Size 184x229mm, 80 pages,
ISBN: 9781 6259 5043 7

Non Members' Price £17.99
RSGB Members' Price £15.29



ARRL Small Antennas for Small Spaces

By Steve Ford, WB8IMY

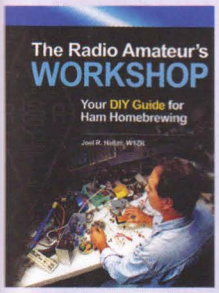
This new second edition of *Small Antennas for Small Spaces* is fully updated and remains a valuable resource for radio amateurs living in apartments, houses with small gardens or anyone restricted in what antennas they can use.

ARRL's Small Antennas for Small Spaces contains design ideas and projects for VHF and HF antennas you can use inside your home. Whilst this book provides a US view of what constitutes a small antenna it is still a valuable resource. For outdoors there are dipoles, inverted Ls, end-fed wires, loops, verticals and temporary antennas for HF. You will find compact omnidirectional and directional antennas for VHF that you can install anywhere. There are a number of new projects including a "privacy fence" stealth antenna, self-supporting inverted V dipole and the extended double Zepp dipole.

ARRL Small Antennas for Small Spaces provides ideas and projects to get you on the air regardless of where you live!

Size 208x275mm, 128 pages,
ISBN: 9781 6259 5051 2

Non Members' Price £22.99
RSGB Members' Price £19.54



ARRL The Radio Amateur's Workshop

Make the Most of Your Home Workshop

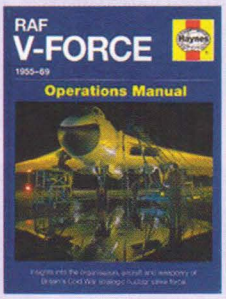
By Joel R. Hallas, W1ZR

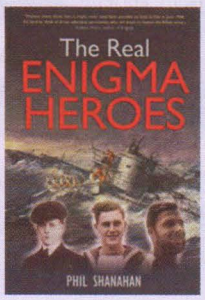
Radio amateurs often go beyond operating, moving into technology development, home construction, and experimentation. Designing and building your own station equipment can be rewarding and informative. *The Radio Amateur's Workshop* is a guide to setting up and maintaining an efficient home laboratory and work station. It describes the tools you'll need for projects ranging from assembling electronic kits to building and testing antennas.

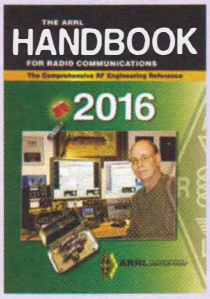
Size 184x229mm, 160 pages,
ISBN: 97816259 5048 2

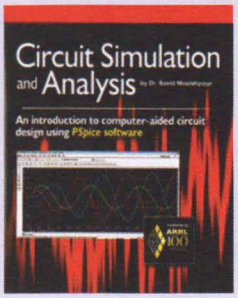
Non Members' Price £22.99
RSGB Members' Price £19.54

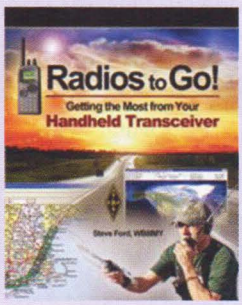
Even more choice online www.rsgbshop.org

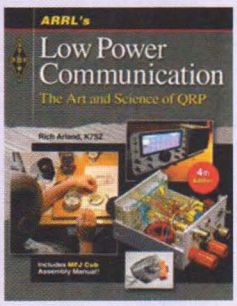












Sport Radio

The new series of 80m Club Sprints starts this month Let's hope for more participation this year.

G4ZAP/P 70cm shack in 2009, with G0SPA just visible.

Last year there was a question in the Contest Committee's White Paper, asking if the Sprint series should continue. They have been running since 2007, but never really gained momentum. Although the response to keeping them going was generally negative, the committee were persuaded not to discontinue them. Let's hope that those who campaigned to keep them going will not only all take part themselves this year, but also seek to persuade others to do so. The CW leg is on Wednesday 10th and SSB leg on Thursday 25th. There are 10 watt and 100 watt sections and – because these are sprints – a reminder that if you initiate a QSO (ie call CQ/QRZ and make a QSO) you must then vacate the frequency.

On VHF, the first contest of the month is the 2m UKAC on Tuesday 2nd. The first weekend of August is dedicated to low power. The first contest to begin – at 1300TC on Saturday 6th – is the fourth session of the 2m Backpacker series. It runs for four hours and the power limit is 3 watts or 10 watts, depending on which section you enter. One hour later the 2m Low Power Contest begins. It runs for six hours and the power limit is 25 watts. On the following morning (Sunday 7th) the 70cm Low Power Contest runs for four hours. A tip for low power entrants in any contest and low power contests in general is to use FM, as well as SSB/CW. There are a couple of reasons for this. Firstly, there is a lot more FM-only equipment in peoples' shacks. Secondly, because there is more everyday activity on FM than SSB/CW, a vertically polarised antenna for FM is likely to result in some QSOs with casual non-contesting operators, who just happen to be on the band anyway. It could tip the balance in your favour and it's exactly what G4ZAP/P do (**Photo 1**); and they've been winning both Low Power contests for years. In both Low Power contests the multipliers are Countries, Postcodes and Locator squares. We then move back to the UKACs for the remainder of the month; 70cm on Tuesday 9th, 23cm on Tuesday 16th, 6m + SHF on Tuesday 23rd and – because it's a 5-Tuesday month – 4m on Tuesday 30th.

The Worked All Britain (WAB) 144MHz Low Power Contest takes place for four hours on Saturday 6th. The date has been moved this year, to make it coincide with the RSGB 144MHz Low Power Contest. Exchange a signal report, serial number and your WAB square (the first, second, third and sixth digits of your 8-digit National Grid Reference). The power limit in this one is 10 watts. The Worked All Europe (WAE) DX CW Contest runs for the entire 48 hours of the weekend of 13-14th. Europe works non-Europe only in this event, so – propagation permitting – there' a lot of DX working. Next we have two UK Microwave Group (UKuG) events; 24/47GHz on Sunday 14th and 5.7/10GHz on Sunday 28th. Finally, the IRTS (Irish) 2m Counties Contest takes place for two hours on Sunday 29th. In this contest QSOs with EI and GI are the only ones that count for points, each of the 32 Irish counties being a multiplier. You can find a list at http://www.mapability.com/ei8ic/contest/eicounty.php

Steve White, G3ZVW
steve.g3zvw@gmail.com

RSGB HF Events

Date	Event	Times (UTC)	Mode(s)	Band(s)	Exchange
Aug 10	80m Club Sprint	1900-2000	CW	3.5	Both callsigns + SN + name
Aug 25	80m Club Sprint	1900-2000	SSB	3.5	Both callsigns + SN + name

RSGB VHF Events

Date	Event	Times (UTC)	Mode(s)	Band(s)	Exchange
Aug 2	144MHz UKAC	1900-2130	All	144	RS(T) + SN + Locator
Aug 6	144MHz Backpacker #4	1300-1700	All	144	RS(T) + SN + Locator + Postcode
Aug 6	144MHz Low Power +	1400-2000	All	144	RS(T) + SN + Locator + Postcode
Aug 7	432MHz Low Power +	0800-1200	All	432	RS(T) + SN + Locator + Postcode
Aug 9	432MHz UKAC	1900-2130	All	432	RS(T) + SN + Locator
Aug 16	1.3GHz UKAC	1900-2130	All	1.3G	RS(T) + SN + Locator
Aug 23	50MHz UKAC	1900-2130	All	50	RS(T) + SN + Locator
Aug 23	SHF UKAC ~	1900-2130	All	2.3-10G	RS(T) + SN + Locator
Aug 30	70MHz UKAC	1900-2130	All	70	RS(T) + SN + Locator

Best of the Rest Events

Date	Event	Times (UTC)	Mode(s)	Band(s)	Exchange (info)
Aug 6	WAB 144MHz Low Power Phone	1400-1800	Phone	144	RS(T) + SN + WAB square
Aug 13-14	WAE DX CW	0000-2359	CW	3.5-28	RST + SN (Eu works non-Eu only)
Aug 14	UKuG	0900-1700	All	24/47/76G	RS(T) + SN + Locator
Aug 28	UKuG	0600-1800	All	5.7/10G	RS(T) + SN + Locator
Aug 28	IRTS 2m Counties	1300-1500	SSB/FM	144	RS(T) + SN (EIs & GIs also give county)

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

LAMCO
LAM COMMUNICATIONS LTD

01226 361700
0191 6040255

VINE antennas

sales@hamradio-shop.co.uk

LAM London: (020) 3432 4414 LAMGM: (0141) 530 4077

FREE UK DELIVERY ON ALL TRANSCEIVERS

YAESU

FTM-100DR £279.95

Yaesu FT-817ND
£459.95

FT-450D £499.95

Yaesu FT-991
£937.95

FTM-400
£399.95

FT-857D
£629.95

FT-2DR +
Free Camera Mic
£299.95

FT-DX-5000 Series
£Call

ICOM

Icom IC-9100
£2,679.95

Icom IC-7100 £997.95
+ FREE SD Card

Icom IC-5100
Full Monty £659.95
+ FREE SD Card

Icom
ID-51 Plus
Free Carry Case
£379.95

Icom IC-7600 £2397.95

Icom IC-7851 £8999.95

Icom IC-7700 £4997.95

Icom IC-7300 Deposit £20.00

KENWOOD

TS-990S £ 4997.95

TS-480SAT/HX
£659.95
£719.95

TS-590SG £1,159.95

MC-60a
£124.95

TS-2000e £1279.95

SP-23
£74.95

TS-2000X
£1467.95

TMV-71 £299.95

www.hamradio-shop.co.uk

NEW ARRIVALS

www.hamradio-shop.co.uk

ACOM

PRO.SIS.TEL.
Produzione Sistemi Telecomunicazioni
Antenna rotators - Towers

BEKO ELEKTRONIK

YAESU
The radio

Cash Back Offer From YAESU UK!

Yaesu FT-991 £857.95
After
£80.00
Cash Back

Yaesu FT-817 ND £419.95
After
£40.00
Cash Back

Yaesu FTM-100DE + HRI-200
Purchased Simultaneously
Call
£40.00
Cash Back

Yaesu FT-2DE £299.95
Free Gift MH-85A11U
Snapshot Microphone

The new bhi "DESKTOP" DSP noise cancelling base station speaker

Noise Cancellation Products £109.95

spiderbeam

Spiderbeam HD 12m Fibreglass pole
£89.95
Spiderbeam 18m Fibreglass pole
£199.95

USED

LAMCO
LAM COMMUNICATIONS LTD
APPROVED
12 MONTHS
WARRANTY

ICOM
KENWOOD
YAESU

twitter @lamcomms facebook @lamcomms

LAM Communications Ltd. | 52 Sheffield Road | Hoyland Common | Barnsley | South Yorkshire | S74 0DQ | UK
Shop Opening Times - Mon to Fri : 0930 hrs - 1700 hrs | Sat : 0930 hrs - 1600 hrs

HF F-Layer Propagation Predictions for August 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	63.....366	65421.123566	255433334563	.15544455521	..122222321.	...1111121..	.....1...	.....
*** Asia								
Yakutsk	.....	11.1.....122	.11111...22.	...222.....	.....	.....	.....	.....
Tokyo	.....2..	.....34..	.....11231.	.....1..1..	.....	.....	.....	.....
Singapore	.....22.	14432	24311	.....1232..	.....1...	.....	.....	.....
Hyderabad	333	2.....13444	23432	.....211..	.....	.....	.....	.....
Tel Aviv	54.....355	552.....3555	25421.134553	..533234552.	..1111.132..	.....1...	.....	.....
*** Oceania								
Wellington	.....	.....	.....	.....	.....	.....	.....	.....
Well (ZL) (LP)	.....	134.....31.	224.....332	1.2.....32	.....2.	.....	.....	.....
Perth	.....11.	3322	.....121.2	.....	.....	.....	.....	.....
Sydney	.....1..	.....133..	.....2221.	.....	.....	.....	.....	.....
Melbourne (LP)	.....	..21.....	..22.....	...1.....	.....	.....	.....	.....
Honolulu	.....	..1.....	..111.....	....1.....	.....	.....	.....	.....
Honolulu (LP)	.....	.....	.....	.....1...	.....1...	.....1...	.....	.....
W. Samoa	.....	.....	..11.....	...111.....	.....	.....	.....	.....
*** Africa								
Mauritius	2.....222	1.....3442	.....1342.	.....122..	.....	.....	.....	.....
Johanesburg	22.....132	12.....3433	.....432.	.....132..	.....12...	.....	.....	.....
Ibadan	554.....345	5552....2555	52531..13555	..5421124552	...42111451.	...1....23..	.....	.....
Nairobi	33.....233	441.....2444	142.....3444	..311..1342.	....2...32..	.....1...	.....	.....
Canary Isles	6641.....256	66541...2466	656532224566	213532225663	..1555425531	...22221351.	...1111.22..	.....11..
*** S. America								
Buenos Aires	222.....	434.....23	213.....33	221	.....21.	.....1..	.....	.....
Rio de Janeiro	332.....3	444.....245	322.....344	432	.....31.	.....2..	.....1..	.....
Lima	222.....	333.....13	1.21.....23	.....2.	.....	.....	.....	.....
Caracas	333.....3	4342.....24	1.221.....23	....2....12.	.....2..	.....	.....	.....
*** N. America								
Guatemala	222.....	3331.....2	1.11.....12	.....1.	.....	.....	.....	.....
New Orleans	333.....	3331.....1	2	.....1.	.....	.....	.....	.....
Washington	4432.....2	44431.....13	2...211..123	.....211122.	.....	.....	.....	.....
Quebec	4431.....1	44321.....13	....1...1123	.....22.	.....	.....	.....	.....
Anchorage	.....	.....	..1.....	.....	.....	.....	.....	.....
Vancouver	.....	.12.....	..1.....	.....	.....	.....	.....	.....
San Francisco	.12.....	123.....	..1.....	.....	.....	.....	.....	.....
San Fran (LP)	.....	.....	.....	.....	.....	.....	.....	.....

Key: The figures represent approximate S-meter readings, whilst the colours represent expected circuit reliability. **Black** equals low to very low probability, **Blue** equals good probability and **Red** equals a strong probability. No signal is expected when a '.' is shown. The RSGB Propagation Studies Committee provides propagation predictions on the internet at **www.rsgb.org.uk/propagation/index.php**. An input power of 100W and a dipole aerial has been used in the preparation of these predictions; therefore a better equipped station should expect better results. The predicted smoothed sunspot numbers for August, September & October 2016 are respectively (SIDC classical method – Waldmeier's standard) 35, 33 & 31 and (combined method) 50, 50 & 50. The provisional mean sunspot number for June was 53.3. The daily maximum / minimum numbers were 50 on 19 June and 0 on 3, 5, 6 and 25-30 June.

Please send news reports to radcom@rsgb.org.uk. To get future events listed here and put on GB2RS, email details of your meetings as early as possible to radcom@RSGB.org.uk include your club name, RSGB Region number, contact name, callsign & phone number, date and details of meeting. Example: Fraser Road Radio Club, Region 9, Steve, M1ACB, 01234 832 700, 29 Oct, On the Air. We normally acknowledge all submissions within 3 working days: if you don't hear from us, please phone. We don't normally print 'closed', 'TBA' or 'every Tuesday'-type entries. The deadline for the September edition is 28 July and for the October issue it's 25 August. For GB2RS, the deadline is 10am on the Thursday of the week of broadcast.

CLUB EVENTS CALENDAR

INTERNATIONAL

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

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

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

NATIONAL

Amateur Radio Caravan and Camping Club
membership@arcc.org.uk, www.arcc.org.uk
Caravan rallies this month: AGM Normanton on Soar

AMSAT-UK
http://amsat-uk.org/
Open net every Sunday, 10am, 3.780MHz (±)

British Amateur Radio Teledata Group
bartg@bartg.org.uk, www.bartg.org.uk
Membership open to those interested in datacoms. Contests and awards organised.

British Railways Amateur Radio Society
m0zaa@brars.info, www.brars.info
2016 is Golden Jubilee. Membership open to those interested in amateur radio and railways.

Civil Service Amateur Radio Society
Weekly net every Tuesday, 8pm, 3.763MHz

Radio Amateur Old Timers' Association
MemSec@RAOTA.org, www.RAOTA.org
Membership is open to anyone active in amateur radio. Nets on Wed 3.763 at 1000, 1.963 at 2100, Thurs 7.163 at 1100, 3.763 at 1930 and Sun 3.763MHz at 1000.

Travelling Wave Contest Group
secretary@twcg.org.uk, www.twcg.org.uk
Friendly contest group for those who want to be involved with contesting, but who don't have a local club or whose club isn't active in contesting, from anywhere in the UK.

REGION 1: SCOTLAND SOUTH & WESTERN ISLES

Regional Manager: Marcus Hazel-Mcgown, MM0ZIF, RM1@rsgb.org.uk

Cockenzie & Port Seton ARC
Bob, GM4UYZ, 01875 811 723
5 Normal club night
12 23rd Annual Mini-Rally night
20-21 Lighthouse Weekend, GB2LBN, Barns Ness

Livingston and District ARS
Cathie, 2M0DIB, 01506 433 846
2, 16, 23, 30 Training and operating
9 Introduction to PSK talk

Lothians RS
Mike, MM0MLB,
secretary@lothiansradiosociety.com
10, 24 Summer pub night
12 Table at Cockenzie Mini-Rally

West of Scotland (Glasgow) ARS
wosars@gmail.com
5, 12, 19, 26 Club night, 8pm, Garnethill Centre

REGION 2: SCOTLAND NORTH & NORTHERN ISLES

Regional Manager: RM2@rsgb.org.uk

Aberdeen ARS
Fred, GM3ALZ, 01975 651 365
4 Junk sale
11 Visit to lifeboat station
18 Surprise talk
25 Construction and on the air

REGION 3: NORTH WEST

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

Furness ARS
Chris, M0KPW,
furnessamateurradio@outlook.com
1, 15, 29 Social meeting at the Farmers, Newton
10, 24 Presentations / demos, HPSSC, Barrow
22 Committee meeting, HPSSC, Barrow

Macclesfield & DRS
info@gx4mws.com
1 Shack on the air
9 Shack in box, 2E0NSR
15 CW training / check of Field Day kit
19 Field Day at Brandside Village Hall
22 Pack Field Day kit
28 Afternoon activation of Bosley Cloud
29 Closed

South Manchester R&CC
Ron, G3SVW, 01619 693 999
4 Planning the shack
11 Morse practice night
18 Evaluating the club library
25 Laying out the shack

Stockport Radio Society
Heather, M6HNS, 07506 904 422
2 Society meeting
7 Stand at the VW Show, Tatton Park
9 6m net, 7.30pm
11 Club net, 7.30pm, ±145.375MHz
16 Radio night
23 Skills night

Thornton Cleveleys ARS
John, G4FRK, 01253 862 810
1 Natter & practical
8, 15 Halo construction
22 SSB Field Day/2m Trophy planning
24 Committee meeting, AGM planning
29 2m FM net

REGION 4: NORTH EAST

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

Angel of the North ARC
Nancy, G7UUR, 01914 770 036
1, 2, 8, 15, 29 On the air

Denby Dale RC
Darran, G0BWB, 07974 423 227
1 Yorkshire Day SES from Farnley Tyes
3 TV repeaters by Kay
7 WAB 144MHz QRP contest
31 Real Ale night at The Star Inn, Lockwood

Newsham ARTC
John, 2E0DCV, 01912 371 729
3, 10 Foundation training
17, 24, 31 Radio construction session

Ripon & District ARS
David, G3UNA, 01423 860 778
4, 11, 18 Club night
25 SSB FD preparation

Sheffield & District Wireless Society
Krystyna, 2E0KSH, 07884 065 375
3 Portable night on the moors
10, 24 Social night
17 HF SSB NFD preparation night
31 Meal out

Sheffield ARC
David, G6DCT, littlewood20@btinternet.com
1, 15, 29 Club night
8 Shack night operating, MORCU
22 QSL systems and HF Awards, David, G6DCT

REGION 5: WEST MIDLANDS

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

Central Radio Amateur Circle
Martin, G1TYV, 07948 027 994
2 UKAC 144MHz
4 Group meeting
6, 13, 20, 27 Group meeting, shack on the air

Coventry ARS
John, G8SEQ, 07958 777 363
1, 8, 15, 22, 29 Open net, 145.375MHz FM and/or 7.16MHz ± QRM, 8pm
4, 11, 18, 25 Open net, 50.175MHz SSB, 8pm
5 South America, Bob, G4GEE
12 BBQ & Portable Night, Newbold Comyn
19 G4ZMC Portable Trophy – 3rd Round
26 Radio workshop
28 Stand at Rugby Radio Rally

Gloucester AR&ES
Anne, 2E1GKY, 01242 699 595 daytime
1, 15, 22 Net (no meeting)
3, 4, 10, 11, 17, 18, 24, 25, 31 Net, 7.30pm, 145.500MHz then QSY
8 Summer picnic / operating, 6pm, Crickley Hill car park
29 Operating from Crickley Hill car park

Malvern Hills RAC
Dave, G4IDF, 01905 351 568
9 Construction show and tell

Next three deadlines are 28 July, 25 August and 22 September

Midland ARS
Norman, G8BHE, 07808 078 003
3 Open meeting, on the air and training classes
10 Ragchew and training classes
17 Planning Farm Field event, training classes
21 Rugby Radio Rally
24 Shack on the air with training classes
31 Planning trip to Telford Hamfest, training classes

Mid-Warwickshire ARS
Don, G4CYG, 01926 424 465
6 Club Field Day
16 Barbecue at Fred's
23 Closed

Nuneaton & District ARC
Neil, 2E0NEI, info@ndarc.co.uk
2 2m UKAC
4, 11, 18, 25 Club net, 145.475MHz, 9.30pm
5 Social pint and chat at The Harvester
9 70cm UKAC
19 Digital PSK31 talk, 7.30pm
23 6m UKAC

Rugby ATS
Steve, G8LYB, 01788 578 940
2, 9, 16, 23, 30 UKAC, radio operation
6 Presentation on GB3ME
13 Preparation for rally
20 Rally setup
21 Rugby Rally, Princethorpe CV23 9PY
27 Rally post-mortem & shack tidy-up

Salop ARS
salopamateurradio@gmail.com
2, 9, 16, 23, 30 Club CW net, 4.30pm, 144.070MHz
3, 10, 17, 24, 31 Club net, GB3LH, 8.30pm
4 Natter night / committee meeting
11 Table top sale
18 Mobile fox hunt
25 Shack night with G3SRT on the air

South Birmingham RS
Gemma, M6GKG, gemmagordon.m6gkg@gmail.com
1, 15 Sorting stock for Telford Rally
2, 9, 16, 23, 30 Coffee morning, 11am to 1pm, visitors welcome
5, 12 Work in the shack
11, 18, 25 Training classes with Dave, G8OWL
19, 26 Cleaning trailer for Telford Rally
21 Attending Rugby Radio Rally
29 Closed

Sutton Coldfield ARS
Robert Bird, spirit.guide@hotmail.co.uk
1, 15, 19 Open net on ±145.250MHz, 7.30pm
8, 22 Club meeting
9 Open net, 70.475MHz FM, 7.30pm
23 DMR open net, GB7FW slot/local2, 7.30pm

Telford & District ARS
John, M0JZH, 07824 737 716
3 Competitive DF hunting with Bob, G3ORY
10 Committee meeting; GX3ZME OTA HF
17 Preparation for Telford Hamfest
24 Talk
31 Final prep for Telford Hamfest

Wythall Radio Club
Chris, G0EYO, 07710 412 819
2, 16, 23, 30 Morse Class, 7.30pm, club meeting, 8pm
5, 12, 19, 26 Nibbles night in the shack,
7, 14, 21, 28 Club Net 145.225 or GB3WL 8pm
9 Morse, 7.30pm, club meeting, 8pm, committee, 8.30pm
14 Wythall 50th Carnival special event
29 Curry night

REGION 6: NORTH WALES

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

Dragon ARC
Stewart, GW0ETF, 07833 620 733
1 Amateur television, Chris, MW0LLK
15 Film night

North Wales Radio Society
Liz, GW0ETU, 0776 019 0355
4 Discussion night
11 Operating on the Prom at Colwyn Bay
18 Technical talk by John, GW4GRW
25 Quiz night

REGION 7: SOUTH WALES

Regional Manager: Glyn Jones, GW0ANA,
RM7@rsgb.org.uk

Aberystwyth & DARS
Ray, GW7AGG, 01970 611 853
11 Closed
25 Net on 145.500 then 145.550MHz

Llanelli ARS
Craig, MW0MXT, 01269 845 773
1 Social evening
8 On air night & raffle
15 DVD Night
20-21 GB1BPL for ILLW
22 Junk sale, antenna inspection & raffle
29 Closed

Newport ARS
Margaret, GW4SUE, 01633 665 289
2, 9, 16, 23, 30 Club net, 8pm, 145.425MHz
7, 14, 21, 28 Club net, 10am, 3.705MHz
22 Fish and chip supper
20 GB4EUL, Lighthouses on the Air
26 Test equipment night, Ross, GW3NWS

REGION 9: LONDON & THAMES VALLEY

Regional Manager: Tom O'Reilly, G0NSY
RM9@rsgb.org.uk

Aylesbury Vale RS
avrs@rakewell.com
10 Summer party hosted by Roger

Burnham Beeches RC
Charles, G0SKA, 01753 647 101
1 Pub meeting at The Pineapple
15 Video and natter night and on the air

Edgware & District RS
Mike, G4RNW, 02089 500 658
25 Natter night

Radio Society of Harrow
Linda, G7RJL, lcasey@imperial.ac.uk
21 Outdoor event 2pm to 5pm Old Redding

Reading & District ARC
Laurence, G2DD, 0758 470 6625
11 Night on the air, Woodley Park Leisure Centre

Southgate ARC
Mr K Mendum, G8RPA, g8rpa@arrl.net
10 Barbecue in the Spinney

Verulam ARC
Greg Beacher, M0PPG, 01582 413 345
11 Social with GB3VH Repeater Group, 7.30pm, Rose and Crown
16 Fox Hunt on 2m in St Albans area

REGION 10: SOUTH & SOUTH EAST

Regional Manager: Michael Senior, G4EFO
RM10@rsgb.org.uk

Bromley & District ARS
Andy, G4WGZ, 01689 878 089
3, 10, 17, 24, 31 Net 145.500MHz (and QSY), 9pm
16 Construction and testing of aerials

Coulsdon ATS
Mike, M1CCF, 020 8654 2582
8 Annual barbecue at Prue's, G4RWW

Cray Valley RS
Richard, G7GLW, 07831 715797
4 Current spectrum issues, Murray, G6JYB
18 Club meeting

Darenth Valley Radio Society
Mike, G8AXA, 01689 856 935
10 Radio on the air
24 Barbecue, prep for SSB NFD & 144MHz Trophy

Dorking & District RS
David, M6DJB, djb.abraxas@btinternet.com
23 Social evening

Dover RC
Aaron, 2E0FQR, 0771 465 4267
10 Dover Patrol portable evening, Old Park Community Centre

Eastbourne Electronics & Radio Club
Peter, g4urt@btinternet.com
8 Project/demo

Fareham & District ARC
Steve, G7HEP, 01329 663 673
3, 10, 17, 24, 31 Informal meeting in clubhouse, 7.30pm

Fort Purbrook ARC
Graham, M0CYX, 0785 040 0108
26 Operating from the Fort ramparts through the weekend

Hastings E&RC
Gordon, 01424 431 909
24 Construction Contest at 7.30pm

Hilderstone R&EC
Ian, 2E0DUE, hilderstoneclub@gmail.com
20-21 GB0NFL for ILLW

Horndean & District ARC
Stuart, G0FYX, 02392 472 846
4 Natter night/social evening
18 Modulation techniques, Brian, G1UFA

Horsham ARC
Alistair G3ZBU, 07855 268 666
4 Old radios talk, Keith Evans, G3VKW
18 Social at The Cricketers, Wisborough Green

Mid-Sussex ARS
Stella, M6ZRJ, 01273 844 511
5 Noise cancelling by Graham Somerville of bhi
12 Radio night
19 Radio night & table top sale
26 Fox hunt

Next deadlines are 28 July, 25 August and 22 September

Southdown ARS
Andy, M6GND 01323 486 924
1 Monthly club meet Raspberry Pi
3 BHRS 2.30pm 144.300SSB\145.500FM\51.600FM + Hailsham Shack 1030 open HF SSB and CW + 08.30am 145.275 FM G3AGF,G3DQY,G4BJP + Cafe Meet 12.30pm
4, 6, 11, 13, 18, 20, 25 9.50am 145.275 FM\10.00am 7.035 CW G3AGF, G3DQY, G4BJP
5-6 Low Power Contest BHRS
10, 17, 24, 31 BHRS 2.30pm 144.300SSB\145.500FM\51.600FM + 08.30am 145.275 FM + Cafe Meet 12.30pm
13-14 Military World show, Detling
27-28 Festival of Transport, Hellingly GB3FOT

Surrey Radio Contact Club
John, G3MCX, 020 8688 3322
1 African Safari, Peter, G3ZPB
4, 11, 18, 25 Net, 70.300MHz, 8pm
5, 12, 19, 26 Net, 145.350MHz, 8pm
7, 14, 21, 28 Net, 1905kHz, 9.30am
15 Chat and Fix-it, John, G8MNY

Sutton & Cheam RS
John, G0BWV, 0208 644 9945
18 Kite & balloon supported antennas, Roger, G4ROJ

Worthing & District ARC
Al, M0OAL, information@wadarc.org.uk
1, 8, 15, 22, 29 Club net, 7.30pm, 145.425MHz FM
3 Outside on the air
4, 11, 18, 25 Club net, 11am, 7.106MHz SSB
7 Sunday breakfast, 9am
7, 14, 21, 28 Club net, 7.30am, 3.172MHz SSB
10, 24 Club meeting
17 Barbecue
31 Fox hunt

REGION 11: SOUTH WEST & CHANNEL ISLES

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

Appledore & District ARC
Alan, M6CCH, 01237 422 833
15 A Life on the Slide, Peter Smith, a freelance orchestral trombone player

Burnham on Sea ARC
Brian, G4RGY, 01278 683 645
3, 17 Club night

Cornish Radio Amateur Club
Steve, G7VOH, 01209 844 939
3 Committee meeting
4 Main meeting
12-14 GX4CRC Steam Rally
18 Club evening
26-28 GX4CRC VW Jamboree

Exeter ARS
Nick, M0NRJ, 01363 775 756
2 GB3EX net, 7.45pm
9, 16, 23, 30 GB3EW net, 7.45pm
10 SOTA radios and aerials, Nick, M0NRJ
24 Ham experiences in WWII, Bas, G3FGE

Exmouth ARC
Mike, G1GZG, 01395 274 172
3 Quiz night, Tony M0THJ
17 Operating night & antenna testing

Plymouth Radio Club
David, 2E0DTC, d.beck123@btinternet.com
9 M6 licensees help night
20-21 International Lighthouse Weekend, Smeaton's Tower

Riviera ARC
rivieraarc@gmail.com
4 Audio & noise filters past & present
18 Club night

South Bristol ARC
Andrew, G7KNA, 07838 695 471
4 Darts tournament
18 ILLW Briefing
20-21 ILLW
25 Open House and on the air night

Thornbury & South Gloucestershire ARC
tsgarc@gmail.com
3 SDR, Andrew, G0EVM
5, 19, 26 Club net
10, 24 On the air
17 Project night
31 Video

Weston Super Mare RS
Martin, G7UWI, 01934 613 094
1, 8, 22, 29 Construction, operating & natter night
15 Talk by RSGB Communications Manager Heather Parsons

Yeovil ARC
Rodney, M0RGE, 01935 825 791
4 Mini talks
11 Aerial essentials, G3YMY
18 Morse practice, G3MYM
25 On the air and problem solving

REGION 12: EAST & EAST ANGLIA

Regional Manager: RM12@rsgb.org.uk

Braintree & District ARS
John, M5AJB, 01787 460 947
1 TX Factor 10
15 Kenwood and DXpeditions, Mark, M0DXR

Cambridge & District ARC
Ian, M0HTA, publicity@cdarc.co.uk
3, 10, 17, 24, 31 Club net, 8pm, 145.550MHz FM
7, 14, 21, 28 Club nets: 8.30am, 144.180MHz USB; 10.30am, 7.0875MHz LSB or 3.620MHz LSB; 11.30am, 145.550MHz FM
12 Data mode decoding – open floor event
26 ELF & VLF signal presentation by John, M0MTW

Chelmsford ARS
secretary@g0mwt.org.uk
2 Constructors competition, Carl, G3PEM
6-7 Sandford Mill Museum
15 Skills night at Danbury Village Hall

Essex Hams
Pete, M0PSX, news@essexham.co.uk
1, 8, 22, 29 Club net, GB3DA, 8pm, plus live audio feed at www.essexham.net
6 Essex YL net on GB3DA

Felixstowe & District ARS
Paul, G4YQC, pjw@btinternet.com
1, 15, 29 Club net, 145.400MHz, 8pm

Leiston ARC
m0iah2008@gmail.com
7 Antenna Day, G4HUP QTH, 10am
22 2m+70cm contest

Loughton & Epping Forest ARS
Dave, M0MBD, 0798 016 5172
4, 11, 18, 25 Club net, 144.725MHz, 8pm

Norfolk Coast ARS
Steve, G3PND, info@norfolkcoastamateurs.co.uk
11 Construction meeting
25 Restoring a 1920s superhet

South Essex ARS
Terry, G1FBW, 07986 070 040
9 Talk with the members of the Essex CW Club

Thames ARG
targradio@outlook.com
5 Club night
6-7 GB2MFM, Damyns Airfield
12, 26 Club net on GB3DA
19 Members only construction & Advance exam tutoring
20-28 Crowsheath Camping

Thurrock Acorns ARC
Gordon, 2E0ELI, acorns@taarc.co.uk
4, 11, 18, 25 Open net, 2m FM simplex, 7.30pm

REGION 13: EAST MIDLANDS

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

Loughborough & District ARC
Chris, G1ETZ, 01509 504 319
2 2m net
9 Open forum on going portable
16 My route to Advanced licence, Tim, M0ZRR
23 Club on the air, 6m
30 Practical evening

RAF Waddington ARC
Bob, G3VCA, 07971 166 250
1, 8, 15, 22, 29 Club net, 145.325MHz, 8pm

South Kesteven ARS
Andrew, M0NRD, 07969 062 859
3, 10, 17, 24, 31 Club net, 145.525MHz, 8pm
5, 19 Club meeting

Welland Valley ARS
Peter, G4XEX, 01858 432 105
1 Club net, 433.475MHz FM
15 Operating evening from Prince Rupert's View Point
21 Rugby Radio Rally

Worksop ARS
Paul, M0PJA, 07890 626 684
2, 9, 16, 23, 30 Club Night & UKAC
4, 11, 18, 25 Technical night, construction / CW tuition / radio operation/ data modes

If you have entered your local club's Construction Competition, think about entering the RSGB's annual event, see the RSGB website for details

REGION 3: NORTH WEST

Furness ARS held their annual summer BBQ at Gleaston Water Mill. The evening offered fantastic food, glorious weather and the chance for members to browse, and buy, a large collection of SK kit. The event was also the perfect opportunity for the club to award honorary membership to Dave, G3VUS, Ivan, G3IZD and Bill, G4USW for their many years of service to the club and amateur radio as a whole. Their hard work over the years has not gone unnoticed.

The club was approached by the Rotary Club of Lancaster to provide communications cover for a section of their 117 mile 'Wrynose or Bust' cycle event. Part of the route ran along the bottom of the Duddon Valley in the Lake District then climbed up the long and steep Wrynose Pass before continuing on returning to the event HQ near the City of Lancaster. It was decided to set up a chain of four 2m stations that would give end to end cover over the road in question. On the day there were no problems setting up three out of four stations. However, the top of Hard Knot was in a snow cloud and the few parking places were already occupied. Plan B was activated and by establishing an extra station along the route they managed to achieve the required coverage. The event was uneventful with no incidents and the stations were able to keep event HQ updated with the progress of the riders as they cycled past apparently undismayed by the climb ahead – well done all. From a technical/radio perspective they found that propagation was highly variable as a result of small movements (within about 2 metres). Several members were using basic handheld radios and the low power and aerial gain of these did limit their effectiveness.

Newton-le-Willows ARC has another two Foundation licensees. Cath Singleton became M6SQA, followed two weeks later by Lee Boylan who became M6OUA. Both are now progressing onto the Intermediate course and Lee's son, Liam, has taken up the challenge of becoming an M6 after watching his dad during a club net. Many members are actively experimenting, including Cath, M6SQA who is currently using a homebrew QFA antenna to receive weather satellite images. Francis, 2E0YGH is currently working on a homebrew spectrum analyser (before joining the club Francis had never picked up a soldering iron – he is now happily soldering SMD components into useful projects) and Lee, M0LGL has just completed a fully automatic magnetic loop controller from a design by TF3LJ/VE2LJX.

North West ARC were invited to attend Bolton FM's Community Corner show that went out live in June. Simon, 2E0SIA and Chris, G4HYG attended the hour-long broadcast. They talked about the Museums on the Air event at the Fred Dibnah Heritage Centre and all about the club. The presenters, Tony & David, were given a framed QSL card to mark the event, seen above.

REGION 5: WEST MIDLANDS

Stratford-upon-Avon & District RS operated GB2WS for the 'Shakespeare 400' commemoration. The station was located in an office in the town centre with a superb view of the parade. They received only a limited number of visitors including Robert, G3ORI who was an operator on the first GB2WS run as part of the 400 years since Shakespeare's birth in 1964. It is generally accepted that he was born and died on the same day of the year 52 years apart. Operation was mainly on 20 and 40m using a Kenwood TS-570 into a trap dipole on the roof. Unfortunately conditions during the day were poor with few G stations worked but quite a few Europeans including a couple of the Italian Marconi Day stations.

REGION 7: SOUTH WALES

Newport ARS enjoyed a hands-on demonstration of the G3TXQ Hexbeam and a superb buffet put on by members recently. Ant, MW0JZE (the Hexbeam man) drove up from Llanelli with XYL Laura, MW6INK for the evening.

Blackwood & District ARS will be running all three exam courses from 9 September at Oakdale School, NP12 0DT. Contact GW4FCV@Gmail.com, GW4HBK@talktalk.net or rackhamone@aol.com for the three courses respectively.

Six members of **Llanelli ARS** recently passed either the Intermediate or Foundation exam. Congratulations to Martin, 2W0FQD, Ray, 2W0RKF, Adrian, 2W0KPN, Michael, MW6HEI, Michelle, MW6HDP and Dean, MW6HDT. Club members look forward to hearing them on the air.

REGION 8: NORTHERN IRELAND

Mid Ulster ARC recently had nine people sit their Intermediate exam. Congratulations to Dave, Charlie, Andy, Bob, Neil, Graham, Keith, John and Errol for passing. In June the club were invited to Divis mountain to take part in an event celebrating radio communications during World War 1. Based at the National Trust building, they were active on 2m, 70cm, HF and a QRP HF CW station at 1W. Thanks to Dermot, the warden, for his hospitality: a great was time had by all.

radcom@rsgb.org.uk

REGION 9: LONDON & THAMES VALLEY

In May, Tony, G2NF gave a very well received talk to a packed **Reading & District ARC** meeting on the challenges and issues with interference caused by the broadband internet transmission mode VDSL2 (Very High Bit Rate DSL). Tony described his experiences and how to carry out the forensics required to trace and report suspect faulty VDSL installations.

Burnham Beeches RC used the fine weather of the 6m Trophy weekend to present a very special trophy to the man behind the club, Dave, G4XDU. As it turns out Dave also snapped up the Club Competition Trophy as well. Trevor, 2E0LDZ was awarded the Bob Green construction trophy, built in the shape of Bob's experimental magnetic loops he used to run, often setting fire to the loft with them. The weekend was great fun, with 6m buzzing. More can be found out about it on the club website and Facebook pages. The club is running exam courses in October and anyone interested should email ldz@chopcat.co.uk

REGION 10: SOUTH & SOUTH EAST

Mick, G4EFO, the Region 10 manager, presented the Hilderstone RC with the Region 10 Club of the Year shield for the second year running. Mick said that the club's application was outstanding for its outreach work, organising of special event radio stations, training of new members and for its interesting programme of talks. The club has supported Wellesley House school with astronaut Tim Peake's amateur radio contact and coached two pupils, Ethan and Benny, through their Foundation licence. The boys gave a presentation to the club members about their experience.

Trowbridge & District ARC has a new website www.tdarc.uk/ where you will find information on the club including the calendar of events up to the end of the year.

Chertsey Radio Club has been working with a Chinese manufacturer to produce a low cost DMR hand held radio. Samples have been received and testing is underway. Initial results look good. The aim of the project is to provide a low cost DMR hand held, fully programmed with 3 or 4 of the local repeaters, ready to use out of the box. More information will be posted on their blog http://chertseyradioclub.blogspot.co.uk/p/blog-page_6.html

Peter Robinson, G8MSQ, the Vice President of the Worthing & District ARC has become a Silent Key, having borne his illness with great fortitude over the past few years. He was one of the first members of the club with an interesting career as a radio and television engineer before and after service in the RAF, where AR88s were his speciality. During his time with the club, he was Chairman, a very long serving Secretary and also editor *RAGCHEW*. He was a standby GB2RS newsreader, latterly taking over as primary news reader. Peter was always a very approachable person with a truly encyclopaedic knowledge of the club, its origins and members. He was very ably assisted by his partner Francis, to whom we convey our sincerest condolences. Chris, G3UFS.

Nigel, G0GDA organised GB90QB to celebrate the Queen's 90th birthday between 9 and 13 June. The station consisted of a Yaesu FTDX3000, a Tokyo Hy-power amp and a Palstar AT-500 ATU to run 400W. On firing up the system they found the bands were either completely dead or suffering with deep QSB. They ran PSK on 20m to pick up some contacts for the log and then hopped from one band to another using SSB and data from 2m up to 40m. The photo (left) shows a junior visitor watching Slawek, M0WTD and Steve, G4HJE operating.

REGION 11: SOUTH WEST & CHANNEL ISLES

Plymouth Radio Club attended the Lord Mayor's Festival. The radio caravan opened its door to the public with a display of transmitters, and, for the first time, a remote transmitter was used. The remote transmitter was sited at West Park, Plymouth and controlled by a computer within the caravan. Contacts were made with the USA, Spain, Italy, Russia and Scandinavia. This year's theme was a display of antennas and radio transmitters built and operated by club members. Much interest was shown, with a steady flow of visitors throughout the day.

The Bristol Contest Group entry for CW Field day used an Elecraft K3 and a K3s with wire dipoles for 160 and 80m and also three driven elements from a triband optibeam used as dipoles for 10/15/20, there was also a 40m dipole below that was an interesting shape, caused purely by chance, of 'guessing' the lengths of the strain support guys to take some of the droop out of it! The photo (left) shows Matt, M0MAT doing some on-site maintenance during the event.

REGION 12: EAST & EAST ANGLIA

It was a case of trying to get a quart into a pint pot for Norfolk Coast ARS when they built their latest antenna – a cubical quad for 20m. Once completed and raised to the top of their push up mast, they were just able to rotate it through 360 degrees and compare its performance with the club's 20m dipole using the Reverse Beacon Network.

In June, members of the **Thurrock Acorns ARC** were invited to support the Tilbury Riverside Project celebrating the Queen's 90th birthday. The event was run at the Tilbury Community centre and was attended by over 100 people. The station contacted others both in the UK and Europe. However as the event developed it soon became obvious it was going to be challenging to talk to stations on the air with all the other activities going on in the hall. Club members scaled down their radio operation and joined in the festivities and at the same time told people about amateur radio.

South Essex ARS is very pleased to welcome five new amateurs from their third Foundation course. The club would like to thank Pete, M0PSX and Steve, 2E0UEH and the rest of the training team for all their efforts in making this so successful.

Braintree & District ARS held its annual construction contest and seven entries were submitted, ranging from completed kits to scratch built items. All very closely scored, in fourth place was Mike, G8DJO's collection of modules for EI9GQ's 10m transceiver design as serialised in *RadCom*. In joint third were Edwin, G0LPO and John, M5AJB's individual entries of the G-QRP Club Limerick Sudden 40m transmitter, receiver and tuner modules. In first place was Derek, G3MMA's scratch built (in two hours) vertical folding dipole for 20/40m but operable between 10 and 80m with an ATU. This could be hung off a 20 foot pole and Derek had used a similar construction on a DXpedition in Taiwan with successful contacts of up to 3000 miles. He received the Construction Shield from the chairman (see left).

REGION 13: EAST MIDLANDS

Welland Valley ARS is a small and friendly club based in the town of Market Harborough. They have a small and ageing membership but are trying to attract some younger blood into the group so they can again get more involved with the local carnival, youth groups and run some special events. They meet on the third Monday of each month at Great Bowden Village Hall at 7.30pm and hold a regular net on 145.275MHz on the second Monday of each month. Anyone who has an interest in radio or electronics is welcome.

Jacqui, M6JJX passed her Foundation exam at **South Kesteven ARS** following her husband Mark, M6YBA who gained his licence a month earlier. The club also operated GB9OFQ at the Fete Fit for a Queen event in Grantham to celebrate the Queen's 90th birthday. Over 200 contacts were made under difficult band conditions. Newly licensed junior member and ATC Cadet Ivan, M6HET was only issued his callsign the day before but did a sterling job on the microphone: it was all the more impressive as English isn't Ivan's first language.

The photo shows most of new Region 13 East Midlands team at the Junction 28 QRP rally. From left to right is Paul, M0PJA, John, M0JAV, Jim, G0EJQ RM 13, Ian, G4EVK and Amanda, M0HLF.

Classified Ads

For Sale

FIBREGLASS TUBE
High strength tube, square box, rod, and other sections stocked in 6m lengths, can be cut. Engineered Compositions, Chester. Tel: 01244 676000
e. info@engineered-composites.co.uk www.engineered-composites.co.uk

SINOTEL UK - AUTHORISED UK
importers of Baofeng & TYT handhelds, Xiegu X108G HF transceivers. Accessories, antennas and more. www.sinotel.co.uk, 01926-460203, sales@sinotel.co.uk

CTCSS ENCODER AND DECODER KITS,
DTMF Kits and Modules, PIC Microcontroller Development Kits. www.cstech.co.uk

MICROPHONES & ACCESSORIES.
Replacement microphones for a wide range of transceivers. Cables for Heil and studio microphones, headsets and mixers, adapters, PTT switches and replacement curly cords. DTMF microphones for echolink. For these and more great items go to www.technofix.co.uk

Wanted

VINTAGE RADIO & VALVES WANTED
national cash settlement for silent key, shack clearouts 07552 678725, vintageradio@btinternet.com

Aerials

M0CVO ANTENNAS
For all your amateur radio antenna needs. Full details at: www.m0cvoantennas.com

WESTERN HF 10
67ft wire dipole 160-6m, full details lookup m0bzi at: www.qrz.com buy direct: m0bzi@outlook.com or 07748331458 reviews at: http://g0kya.blogspot.com/2010_08_01_archive.html **or** http://www.eham.net/reviews/detail/9424

G4TPH MAGLOOPS BACK IN PRODUCTION.
Remote tune and manual tune models for 40m through 10m. Details at www.g4tph.com

QUAD BAND COLINEARS.
10/6/2/70 Quad band 2.5/2.5/3.5/5.5 dbi gain only 1.2m length £59.95 ea 6/4/2/70 Quad band yes Includes 4m, 2.5/2.5/3.5/5.5 dbi gain 1.2m length £59.95 ea 2/70 Dual band 3.5/5.5 dbi gain 1.1m length only £35.00 ea NEW 6/4/2/70 MOBILE ANTENNA Just arrived a 6/4/2/70 mobile antenna, 2.15/2.15/3.5/5.5dbi gain 1.1m length, PL259 connection. £39.95 ea. UK post £7.95. Now stocking TYT, digital MD380 radio, battery, mains charger, belt clip Only £99.95 programme lead and software £9.95 post £5.00
Website: mirfield-electronics.co.uk
Email: martin.stokes@hotmail.com or
Tel: 07825549430

Miscellaneous

ALL UK STATIONS – CALL IN ON OUR 'M1CRA' CHRISTIAN NETS!
WACRAL welcomes all amateurs to our Sunday morning 'GOOD NEWS' NETS, now at 0730-0830AM on 3747Khz and, again, at 2pm on 3747or 7147Khz. Our 2m SSB net at 3pm is held on144.205. Or, do join us on Wednesday evenings at 9.30pm, 3747Khz , for nationwide Christian fellowship and relaxed chat. See www.wacral.org for more net info and WACRAL details or just call G4OPP on 01622 746650 or g4opp@wacral.org

VINTAGE FIREWORK COLLECTOR
will pay cash and collect from anywhere call Tony - 07956 506300 Licensed explosive storage

Equipment

REPAIRS TO RECEIVERS, TRANSMITTERS
New/Old, valve/transistor. Call 07903 023437 for details: www.kent-rigs.co.uk

Computer Software

SD CONTEST LOGGER - EI5DI.COM
Fast, simple, effective, reliable. Supports all RSGB HF contests. €20

Cards & Design

QSLERS SPECIAL OFFER
1000 full colour both sides qsl cards £45 plus postage. 07720 580968
www.QSLers.co.uk

LOW COST AND HIGH QUALITY QSL CARDS
By LZ1JZ QSL PRINT www.LZ1JZ.com

Classified advertisements 58p per word (VAT inc.) with a minimum of 14 words £8.12.
All classified advertisements must be prepaid. Please write clearly. No responsibility accepted for errors. Latest date for acceptance is 1st of the month prior to publication
Payment to: RSGB, 3 Abbey Court, Priory Business Park, Bedford, MK44 3WH

Advertising. All display and classified advertising enquiries (except Members' Ads, which go to memads@rsgb.org.uk) should be sent to: Chris Danby, G0DWV, Danby Advertising, Fir Trees, Hall Rd, Hainford, Norwich, Norfolk NR10 3LX
Tel/Fax 01603 898 678
e-mail adsales@rsgb.org.uk

Business Cards

For cost effective Business Card advertising call Chris on 01603 898678 to find out more

Advertisers Index

FREE MEMBERS' ADS OF UP TO 40 WORDS

Email your Members' Ad to memads@rsgb.org.uk. You must include your name, callsign, phone number, email address and location (not counted in the 40 word limit). Optionally, attach your own photo of the item (min res 800 x 600, must be in focus and well lit). Max 1 ad per Member per month; other terms & conditions also apply (see tinyurl.com/MemAdsInfo).

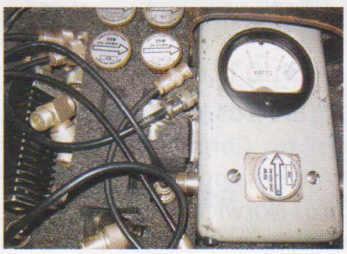
FOR SALE

3 SECTION LATTICE TOWER, make unknown. Extends to about 30 feet. Kenpro rotator and 7 core cable. Two winches, wire ropes, all good, some new pulleys. Looking for £130 ONO. Graham, MODIW, 01522 809 463 (Lincoln).

AKAI 4000DB, 7" R to R, 4 track recorder (vintage 1970s). Plus approx. 30 reels of recorded tape (2 new & unused). Only known fault is nonworking tape counter. Buyer inspect & collect preferred. £60. Peter Carey, G3UXH, 0114 245 9081 (Sheffield, South Yorkshire).

ALAN 451UHF walkie-talkie PMR 446 with handbook & circuit diagram, £30. Danita 2-channel 27MHz CB FM walkie-talkie, £25. Realistic Tandy FM single channel 49MHz FM walkie-talkie, ideal convert to 6m, £30. Brian Williams, GW0GHF, 02920 703 429, b.williams538@gmail.com (Cardiff).

BIRD THRULINE MODEL 43 meter, used condition. Elements: 50W 100/250, 10W 200/500, 1W 425/850, 25W 50/125, 25W 200/500. Termaline 25W 50Ω load. Test leads/adaptors. Cased. Handbook. GWO. £150. Local pickup only. Also available, box of RF adaptors, includes dummy loads. G3XTH, graking@tailtalk.net, 01273 843 276 (Hassocks, West Sussex).



BUDDIPOLE W3BP inc TRSB (2009), 6m Yagi kit, 4 long whips, counterpoise wire adaptor & wire, mast guying kit, VGC, £450. Vibroplex Blue Racer, thumb tab broken, vari-speed, in wooden box, £100. Palstar BT1500A balanced line tuner (2014), £500. Colin, MOXED, 01227 904 492 (Canterbury).

CUSHCRAFT A3S with instructions and in original box, £280. Yaesu G450XL rotator with 24 page instructions, approx 70/80ft connecting cable to control box, £260. Both for £495. Prefer buyer/s collect please. Gordon, G3MDM, 01980 862 215, g3mdm21a98@yahoo.co.uk (Salisbury area).

ELECRAFT K3S/100-K 100W 160m-6m, KAT3-F internal 100W ATU, KFL3A-400 roofing filter, MH2 microphone, P3-F panadapter, P3TXMON 200W sensor. Never used on air. £3,200. Elecraft K2, offers over £400. Yaesu FT817ND, offers over £200. Buyer collects. SK sale. Mike, G3VTO, 01225 429 658, mpcvto@gmail.com (Bath).

FT-450D, good condition, also Yaesu VX-7R and a Baofeng 2 /70cm, £550 the lot, postage paid. Or may sell separately. Chris Donaldson, 07790 993 226 (Meltham, Huddersfield).

HARDROCK 50 AMPLIFIER. 5W drive for 50W output (35W on 6m). Interfaces with the FT-817, KX3 or FlexRadio FLEX-1500. Ideal for when QRP doesn't hack it or as a high power amp driver. 160-6m. 12V 10A supply. £160 plus carriage. Bob, G3PJT, 01223 263 137, bob@g3pjt.com (Cambridge).

ICOM IC-9100, fully loaded, mint and boxed, £2295. Amp UK Discovery 800W VHF amp, £775. IC-2820h D-Star, boxed and mint, £325. IC-D92 D-Star, boxed, mint, £225. VCI300 ATU, £85. MFJ versa tuner 2 ATU, £80. G0NMP, 0778 546 2445 (Norfolk).

JRC JST135 DX TRANSCEIVER, working well. Like the NRD525 receiver with a transmitter too. A few marks but in good condition. Includes the bandwidth control board and two optional filters, 2.7kHz and 500Hz. Original box and manual. £625 ONO. G8OAD, 01778 560 535, graham@delphe.co.uk (Baston, Peterborough).

KENWOOD SP31 speaker in very good condition and in original packaging, £69. This price includes postage within UK. John, G4NTY, 0161 790 7673, jhigson42@gmail.com (Manchester).

KENWOOD TS-570D transceiver, good condition in non-smoking environment, complete with its hand mic, power lead and manual, one careful owner, £375 ONO, carriage at cost. Bert, G3FVO, 01908 501 845, wendy.gladwin@btinternet.com (Milton Keynes).

KW E-ZEE MATCH manual ATU. Designed for pre-WARC bands. Weighs about 5kg. £50 inc P&P. Anthony Skaife, G4XIV, 01904 330 502, tonyg4xiv@virginmedia.com (York).

MFJ-1026 Noise Cancelling Signal Enhancer. Excellent condition and does what is says on the tin. Boxed with manual, £140 inc P&P. John, G3UCQ, 0173 6752 982, email@johnfarrar.plus.com (Cornwall).

MOONRAKER 6m 3-ELE YAGI YG3-6. Excellent condition, £35. Buyer collects or can deliver 30 mile radius of Cambridge. Steve, G4FOH, 07774 613 557, g4foh@tambourine.org.uk (Royston, Herts).

PAIR BROWN-BOVERI Q450-1 TETRODES (like 4-400) c/w bases £60. Maxon PM150 programmed and aligned for 4m, £30. Tradiper TE-15 Dip Meter £20. Heathkit GD-1U c/w 3 coils £15. HF LPF £20. Mains Transformers, email for list. Collect or carriage extra. Nick, G3VNC, g3vnc@uk6.net (Cheddar).

PEAK ATLAS LCR40 passive component analyser – inductance, resistance, capacitance etc. Unit as new, only used once. Complete in original packaging. Sell at half price, £45 + p & p £5 extra. Robert Riddington, G4IHT, 01285 841 203, robert@riddington.me.uk (Tetbury).

PELI 1600 CASE (waterproof) containing a Yaesu FT-100 with CW 500Hz filter, SEC-1223 PSU, CW keyer/paddle and headphones. Total weight is 12kg. £350, buyer collects. Gwyn Williams, G4FKH, 0798 407 3007, g4fkh@sky.com (Chelmsford).

PRO-SISTEL PST641D antenna rotator complete with control unit and 65 feet of control cable with connectors for motor and control unit fitted. The rotator is in very good working condition. £250. Brian, G3WCY, 01276 500 648, briansfx@btinternet.com (Camberley).

RACAL RA17 RECEIVER. Ex display item at Bletchley Park Radio Museum since 1994. Cosmetically excellent. Best offer over £100 secures. Collection only. David, G3ZPA, 01908 501 310, davidg3zpa@gmail.com (Milton Keynes).

RANGER 811H linear amplifier. GWO, 811a valves, circuit diagram, handbook. £690. Peter, G4AKG, 01444 239 371 (West Sussex).

TEKTRONIX OSCILLOSCOPES (2). A 7403N 60MHz mainframe with 1x 7A18 and 1x 7B50 fitted and a 7623A 100MHz mainframe with 2x 7A18 and 1x 7B71 fitted. GWO all items. Email for details/pictures/pricing. Nigel Pritchard, G8AYM, 01296 432 144, nigel-pritchard@outlook.com (Aylesbury).

TRAILER MAST 3 x 12ft sections with winch, £350 ONO. Malcolm, M0XAT, 01900 601 551 (Workington).

YAESU FT-767 HF, 6m, 2m & 70cm transceiver. Has problems but is still serviceable. £250 ONO. Yaesu FT-736R, 6m, 2m & 70cm transceiver, £400 ONO. Both boxed with instruction books. Buyer to collect. Rick Keens, G8NDN, 01264 351 763 (Andover).

YAESU FT-840 fully functioning with FM module, owned for last 3 years but have little time for use since not at home much anymore. Very good condition with small signs of cosmetic wear from non-smoking household. MH-31 microphone included. £380 ONO. Glenn, MW0URC, 0771 673 5466, glenn.pritchard@outlook.com (Hereford).

YAESU FT-950 HF-6m all mode base radio, built-in auto ATU, VGC, GWO. DC lead, original box, manual, Yaesu MD-1 desk mic, £725. Yaesu FP-1030A linear PSU, boxed, VGC, GWO, £135. Both for £800. All inc mainland UK P&P. Giles, G1MFG, 01234 832 714 (office hrs), giles.read@rsgb.org.uk (Bedford).

YAESU FT-991 as new, boxed etc. Purchased Dec 2015 from ML&S. 5L serial no. £725. Tim Cowell, G6GEI, 07976 262 497 (Milton Keynes).

YAESU FT-290R MARK 2. This transceiver is blemish free and in full working order. With original manual, original fist microphone, original, telescopic, chromed steel antenna. Also has adapter for PL-259 socket, together with charging unit. Prefer buyer collects. £195 ONO. Graham, 2E0VPT, 0774 258 9369, graham.2e0vpt@gmail.com (Walsall, West Mids).

WANTED

70cm MASTHEAD PREAMPLIFIER; heavy duty rotator & controller. For sale: FTV 901 transverter with 2m insert, £75. Keith, G4GZS, 07859 917 317, keith4gzs@hotmail.co.uk (Rugby).

BASIC, EASY TO USE HF transceiver for my sister who has passed her Foundation. An old radio is fine but must go down to 10W. Any make/type, FT-7, FT-707, FT-107 TS-120 etc; prefer not to have menu if possible. John, GW4LPB, 0754 645 1829 after 7pm (Gwent).

HF BEAM. Any make, preferably Cushcraft A3S. Peter, G8KEK, 0778 837 1745 (Harpenden, Herts).

HUSTLER 6-BTV vertical. Merv, M0TAM, 0797 575 4153, m0tam@btinternet.com (Isle of Wight).

PROGRAMMING SOFTWARE for the HYTERA UHF TM600 radio. George Watson, GW4EVJ, 01792 843 948, george@gw4evj.plus.com (Swansea).

TWO OF THE NEON LAMPS used in the LM13 series frequency meters. The ref is JAN991. Also a head lead for a HP 435 power meter. Dennis Goacher, G3LLZ, 01793 828 188 (Swindon).

YAESU FNB-78 for Yaesu FT-897D, in any condition provided it is undamaged externally. Please state condition and price wanted. Bob White, G8SPC, 01275 874 001, g8spc@blueyonder.co.uk (Clevedon, North Somerset).

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.

01/08/16	GB2MOP	Museum of Power	Castell Pridd	LH2	GW7EUL
	GB1OL	Orkney Lighthouses	Orkney Islands	LHV27	MM5DWW
	GB0YD	Yorkshire Day	Yorkshire	LHV2	G0BPK
02/08/16	GB5CRC	Chippenham Radio Club	Chippenham	TLHV27	G6HUI
	GB8EMF	Electromagnetic Field	Surrey	LHV27	G7LFC
03/08/16	GB2MFM	Military Flying Machines	Essex	TLHV27	G1GKN
	GB4EMF	Electromagnetic Field	Guildford	LHTV27	MONIT
06/08/16	GB1CSR	Cromford Steam Rally	Derbyshire	LHV27	MOTVX
	GB0TRN	Train	Surrey	LHV27	G7LFC
13/08/16	GB1HA	Headcorn Aerodrome	Kent	TLHV27	G0UXG
	GB0QB	RAF Harrowbeer WWII callsign	Yelverton	LH2	M0CCA
	GB2LCT	Little Cumbrae Tower	Firth of Clyde	LHV27	GM3MWX
14/08/16	GB8WW	Willesborough Windmill	Ashford	LHV27	G8WMZ
15/08/16	GB2KAA	Kent Air Ambulance	Kent	TLHV27	G0UXG
19/08/16	GB2LBN	Lighthouse Barns Ness	Dunbar, E Lothian	LH	GM4UYZ
	GB0CCC	Cabot Cruising Club	Bristol	LH27	G7KNA
	GB2BHL	Bidston Hill Lighthouse	Wirral	LH27	M0WAD
	GB2BML	Blankeney Mariners Light	Blakeney	TLH27	G3YOA
	GB5HCL	Hurst Castle Lighthouse	Lymington	LH2	M0KZC
	GB1CL	Cromarty Lighthouse	Cromarty Lighthouse	LH	G4IAR
	GB2RPD	Roman Pharos Dover	Kent	TLHV27	G0KOK
	GB8SL	Shoreham Light house	West Sussex	LH2	G4LKW
20/08/16	GB0CLH	Clovesea Light House	Cloveseas Lighthouse Cottage	LH2	G0PFH
	GB4MO	Military Odyssey (show)	Nr Maidstone, Kent	LH2	M1CCF
	GB4KSC	Kenilworth Siege Commemoration	Kenilworth	L27	G8GMU
	GB0TBW	Trinity Buoy Wharf	London	LH2	G0TOC
	GW4SUE	Golf Bravo 4 East USK Light House	Newport	L	GB4EUL
	GB5FLM	Fraserburgh Lighthouse Museum	Fraserburgh	LH2	MM0JGP
21/08/16	GB3HLS	Helwick Lightship	Swansea	LHV27	M0SGX
26/08/16	GB2PPS	Papplewick Pumping Sation	Nottingham	LH	G0UYQ
27/08/16	GB2BRS	Bawdsey Radar Station	Bawdsey	LHV2	G4YQC

HELPLINES

Circuit diagram etc wanted for Dutch receiver QF7 110 owned by Mpampis Makris (Hary, SV8XW), QTH Marinou Korgialeniou 14, Argostoli, Kefalonia Island, Greece. Please send direct or via me, Andy, G0SFJ, andythomasmail@yahoo.co.uk.

I am looking for any information about the radio below, who built it, circuits etc? Any help would be gratefully received. Maurice, F6CJS, f6cjs.1@free.fr.

Does anyone have any information for the PYE Modulation Meter MM1? A copy of the service manual or circuit diagram would be excellent. Postage and costs will be refunded. Roger, G7OBC, 0795 256 3345, roger@egerton.myzen.co.uk.

Does anyone know (or knew) a Sam Lydiate, 2E0ACJ / G4IFD or Jean Lydiate, G8PKP? I am trying to get the Thurrock Sea Cadets callsign back. The Cadets' licence was originally taken out by a G3 who subsequently moved away from Grays and passed the licence on to another amateur. Over time the Sea Cadet connection disappeared and if finished up being looked after by Sam Lydiate. Ofcom cannot release the callsign back to the Cadets without a letter from the Lydigates or their close family. Despite my best efforts over a couple of years I have been unable to make contact with any family member so any assistance at all would be most appreciated. Nick, G4HCK, ttt@taarc.co.uk.

UP FOR GRABS

I have a selection of books and magazines from my late father's estate. These include the *VHF UHF Manual* 4th edition, *ARRL Handbook* 1991 and 1994, plus a total of around 64 *RadComs* from 1996 to 2007. I am happy to give them to anyone who is interested, possibly sending small quantities at my expense if collection can't be arranged. David Rollo, 0141 776 2065, david.rollo673@btinternet.com (Glasgow).

RALLIES & EVENTS

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

7 AUGUST

27th KING'S LYNN ARC GREAT EASTERN RADIO RALLY

Gaywood Community Centre, Gayton Road, King's Lynn, Norfolk PE30 4DZ.
Talk in will be available on 145.550MHz and doors open at 9am, with admission £2. Car parking is free. There will be trade stands and a Bring & Buy. There are amateur radio pitches outside as well as table inside. Onsite catering will be available. Ted, G4OZG on 01553 768 701. [www.klarc.org.uk

7 AUGUST

LORN RADIO RALLY

Crianlarich Village Hall, Main Street, Crianlarich, Perthshire FK20 8QN.
Doors open at 10.30am and entry will be £2. Raffle tickets cost £1 and the draw will take place at 1.30pm. There will be a Bring & Buy, trade stands and local groups. Tea, coffee and light refreshments will be available. Email lornradioclub@gmail.com.

12 AUGUST
PORT SETON 23rd ANNUAL MINI-RALLY NIGHT
Community Centre, Main Hall, Port Seton, East Lothian EH32 0BQ.
Bring along your own 'junk' and sell it yourself. Tables on a first come first served basis. Entrance fee £2 for everyone. Refreshments will be available. Doors open from 6pm to 9pm. The venue has disabled access.

14 AUGUST
FLIGHT REFUELLING ARS HAMFEST
Cobham Sports and Social Club Ground, Merley, Nr Wimborne, Dorset BH21 3DA.
The venue has car parking on site and camping is available (Saturday night only, in adjacent field). Talk-in will be provided on S22. Gates open at 10am and admission is £3.50. There will be trade stands, a car boot sale and indoor and field pitches for traders. Lectures will take place during the day. A licensed bar and catering facilities are on site. Tony Baker, G3PFM, 0774 347 5018 or email hamfest@frars.org.uk. [www.frars.org.uk].

20 & 21 AUGUST
TOKYO HAM FAIR
Tokyo International Exhibition Center, 3-11-1 Ariake, Koto-ku, Tokyo, Japan 135-0063.

21 AUGUST
RUGBY ATS ANNUAL RADIO RALLY
Princethorpe College, Princethorpe, Rugby, CV23 9PY Doors open at 8.30 for traders and at 10am to 4pm for the public. Admission is £3. There will be a car boot area and catering will be available on site. Tony, G0OLS, 07759 684 411.
[www.rugbyats.co.uk].

28 AUGUST
MILTON KEYNES ARS RALLY
The MK Irish Centre, Manor Fields, Watling Street, Bletchley, Milton Keynes MK2 2HX (Opposite Dobbies Garden Centre).
The doors open at 10am and admission is £3. There will be a talk-in station on the air. There will be trade stands, special interest groups and local clubs. A licenced bar and catering will be available on site. Roy, G8RCK, 0786 667 3192.
[www.mkars.org.uk/mkars/rally]

29 AUGUST
HUNTINGDONSHIRE ARS ANNUAL RALLY
Ernulf Academy, St Neots PE19 2SH.
Details from Malcolm Hirst on 01480 214 282 or by email to henry_hirst@hotmail.com.

4 SEPTEMBER – **TELFORD HAMFEST**

10 SEPTEMBER – **CAISTER LIFEBOAT RALLY**

11 SEPTEMBER – **TORBAY ANNUAL COMMUNICATIONS FAIR**

11 SEPTEMBER – **ANDOVER RADIO AND COMPUTER BOOT SALE**

17 SEPTEMBER NEW DATE – **FOG ON THE TYNE RALLY**

18 SEPTEMBER – **28th GREAT NORTHERN HAMFEST**

18 SEPTEMBER – **WESTON SUPER MARE RADIO & ELECTRONICS RALLY**

23 – 25 SEPTEMBER – **WACRAL FELLOWSHIP WEEKEND**

24 & 25 SEPTEMBER – **BATC CONVENTION**

25 SEPTEMBER – **CHIPPENHAM & DAR MINI-RALLY**

25 SEPTEMBER – **BELGIUM AMATEUR RADIO & COMPUTER RALLY**

30 SEPTEMBER & 1 OCT – **NATIONAL HAMFEST**

2 OCTOBER – **BVWS AUTO JUMBLE**

2 OCTOBER – **BLACKWOOD ARS RALLY**

7-9 OCTOBER – **RSGB CONVENTION**

9 OCTOBER – **HORNSEA RALLY**

9 OCTOBER – **HACK GREEN BUNKER RALLY**

16 OCTOBER – **HOLSWORTHY RADIO RALLY**

22 OCTOBER – **CARRICKFERGUS ARG RALLY**

23 OCTOBER – **GALASHIELS RALLY**

6 NOVEMBER – **WEST LONDON R & E SHOW**

6 NOVEMBER – **BUSHVALLEY ARC RALLY**

19 NOVEMBER – **ROCHDALE & DARS RALLY**

20 NOVEMBER – **39th CATS R & E BAZAAR**

20 NOVEMBER – **PLYMOUTH RADIO RALLY**

3 DECEMBER – **SOUTH LANCS WINTER RALLY**

4 DECEMBER – **BISHOP AUCKLAND RAC RALLY**

SILENT KEYS

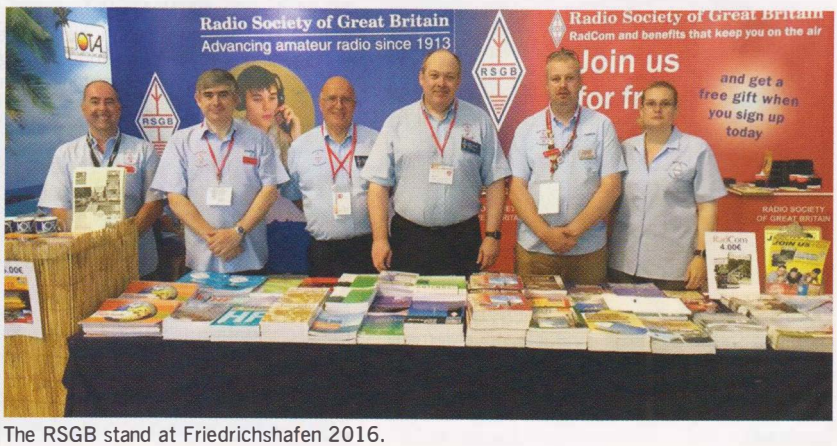
We regret to record the passing of the following Members:

Mr C E Parish, G0VVU	04/06/16
Mr T J Wynn C.Eng FIET, GW1RIK	30/04/16
Mr L Yan Hip, GM1RXH	27/05/16
Mr D Atter, G3GRO	27/05/16
Mr B S Atkinson, G3GSI	07/06/16
Mr E T Howell, G3GUP	
Mr R R Thorogood, G3KKT	25/06/16
Mr D G Varney, GM3OAV	
Mr J G Watt, G3PFY	07/06/16
Lt Cdr P J Patrick, G3TWG	2015
Mr V J Blackmore, G3VGK	12/06/16
Mr J H Brazzill, G3WP	29/05/16
Mr B M Crook, G4AZN	11/06/16
Mr J Everett, G4CDP	17/5/16
Mr A M Dalziel, GM4FGD	11/6/16
Mr B M Hartley, G4SXI	12/06/16
Mr L Fairbairn, GM4XZZ	27/05/16
Mr G E Snaith, G6KVX	06/16
Mr P J Robinson, G8MSQ	20/06/16
Mr G F Ronconi, IK4GMI	09/05/16
Mr W G Newman, M0BNN	31/05/16
Mr M Carr, MM0MUK	28/05/16
Mr N R Male, M0NRM	29/05/16
Mr G de Voil, M0SKK	05/16
Mr D E Walker, M0SZZ	20/05/16
Mr W Connolly, M0WPC	28/05/16
Mr B T Poulton, M3ZKZ	05/16
Mr R Anderson, M5RAR	08/05/16
Mr R V Silvester, M6RVS	20/05/16
Mr M O Braime, RS205115	06/16
Mr S J Tomsett, RS95069	02/16
Mr H C Kingsland, ZD6GHK/7Q7HK	02/06/16
Mr R Rampersad, 9Y4EH	

Members and Friends at Friedrichshafen

The following callsigns were entered in the Visitors' Book on the RSGB stand at Friedrichshafen this year.

2E0HKS
2G0FNW
AD6QF
DD2RE
DE9RJJ
DF3EC
DF3GJ (ex GW5BPC)
DG2NBS
DG6PW
DH3RW
DJ0MCL
DJ2XB / M0DXM
DJ2XB / M0DXM
DJ6ZC
DK1AQ
DK1RLF
DK2PB/EI2ET
DK7YGL
DL1REW
DL1YDD
DL2KCK
DL2YDP
DL3LUM / PA1MUC / PA65HSC
DL4GX
DL5KUA
DL6KCR
DL6SG
DL7TO
DL9A0
DL9HAL
DL9SAW
DM2AM
DO1YHN
DO3CAT
EI3IO
EI7CD
EI9DZ
EP3CQ
F1BJD
F1TA / AC8QT
F1ULQ
F2DX
F5JY / AI6AW
F6GNK
F6HYE
F6IOC
FH6DI
G0AUR
G0DWV
G0FDZ
G0GCC
G0GGM
G0K0K / 8P9CC
G0MGC
G0MQP
G0STK
G0THF
G1EGL
G1FPK
G1SAA
G1UAF
G27L / DA1YL
G3ISB / DJ0OK
G3LHZ
G3LQP
G3MLO
G3OGP
G3PYE/P
G3SDH
G3SUL
G3SWC
G3TCT
G3TCU
G3TJE
G3UVR
G3XEK
G3XLG
G3YBO
G3YBY
G3YCV
G3YJQ
G3YSX
G3ZIY
G4OBK
G4ANN
G4BLX
G4BWP
G4CCC
G4CXQ
G4DDP
G4DPH
G4DRS
G4DYC
G4EBY
G4EFO
G4ENC
G4ERO
G4ETG
G4EVK
G4FUO
G4HGI
G4HIZ
G4HKS
G4HUE
G4IUA
G4KOQ
G4LRP
G4LUE
G4LUL
G4NNZ
G4PVM
G4PZK
G4TKR
G4TMC
G4XEE
G5KC
G6GLP
G7HHQ
G7RMG
G7SOZ
G7UUO
G7UVW
G8DCD
G8DGX / 9H5MC
G8DZH
G8JKR
G8PLJ
G8WWE
GI6RD
GM4AFF
GU0SUP
GW4HAT
GW4ZAR
HA8FM
HA8RT
HB9AYX
HB9EKY
HS1JOY
IK0PRG
IK2MPR
IK4DDI
IK5EKB
IV3FDO
IW0HPT
IW1GHJ
IW8EKX
IZ0MTE
IZ2DLV
IZ3GJY
KB7NJV
LX1MA
LZ1RA
LZ1RF
M0CZR
M0DDC / G8AQO
M0KFT
M0LJD
M0NKR
M0PEA
M0RBI
M0RSJ
M0VLN
M0ZMB
M1BXF
M1SYM
M3ZKA
MM0KFX
ON4KPU
OZ1LO
OZ8SW
PA3HCA
PA8NPT / G8NPT
PD5CW
PD5LKM
PL8OR
SB4AHT
SM0WHH
SM5DEV
SM5DEV
SM5ENX
SM5ENX
SP3IPB
SP5CCC
SV4FFL
SV9FFL
TA2SD
TF3ABN
TF3VG
VK3EPQ
VK5KK
VK5ZD



The RSGB stand at Friedrichshafen 2016.

KENWOOD

"Outstanding"
- Peter Hart

Our new flagship model
for real DXers

TS-990S

HF/50MHz TRANSCEIVER

- Dual receivers for simultaneous reception on two different bands
- Newly developed mixer that helps to achieve +40 dBm IP3[1]
- Equipped with five types of newly developed 270 Hz–15 kHz roofing filter[2]
- Dedicated DSPs installed in bandscope and main and sub receivers
- 200 Watts on HF/6M - Heavy-duty TX capability for prolonged operation
- Dual TFT display configuration allowing an intuitive grasp of conditions

[1,2] Main RX only. [2] plus space for an optional filter

[Other functions] •Newly developed dividing PLL that divides high frequencies and achieves a high C/N ratio •Transceiver equipped with ±0.1 ppm TCXO, which has a high degree of stability yet still conserves energy •Advanced AGC combining digital and analogue technology •Functions for eliminating various types of interference and noise •Built-in automatic antenna tuner that enables high-speed operation •Twin cooling system that circulate sufficient airflow internally

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

www.kenwoodcommunications.co.uk

OPERATING FROM A CARE HOME

John, GK3UCQ

Back around 1957/8 when I was a spotty SWL, A1965, I used to often visit Graham Thomas, G3OGT and Enid Bottomley, G3OHB at the Group Captain Leonard Cheshire home at Long Rock, near Penzance in Cornwall. Both were severely disabled and some of the switches on the Labgear transmitter and HRO receiver had been modified so that Graham could literally knock them into position with his knuckles.

Their antenna was a Mosley TA33jr on a telephone pole. All of this gear was allowed at the Cheshire Home in those days but I doubt if it would be today.

A few years later, after I had joined the RAF, I was posted to Cyprus and made a few QSOs with Graham from my home in Limassol. That was special and I also knew that my Mum and Dad were also listening to the QSOs as my Dad was a keen SWL.

Sadly, Enid died quite early in her stay at the Cheshire Home but the Cornish Radio Amateur Club took up her callsign, G3OHB, and used it in field days etc.

Funny how a letter stirs the memories. Thank you G4BDO.

BUYER COLLECTS

Howard Murray, G3NBY

Have you any idea by how much advertisers reduce their market by 'Buyer Collects' or similar? More and more frequently, adverts contain that dreaded phrase. Don't forget that you carve up your market drastically, at a stroke!

In this month's *RadCom* (arrived today) there are two advertisers whose hand I would have bitten off, just above the elbow, but dismissed (disappointedly) at a glance. I was going to say 'out of hand' but that's a bit corny. What *is* certain is that two of you missed a VERY enthusiastic purchaser.

*[Whether it's in Members Ads or on eBay, something 'buyer collects' has to be an extraordinarily good bargain and/or very local for me to take interest. Several courier companies are willing to deliver 20kg parcels the size of an HF base transceiver next day countrywide for little over £10, so cost surely isn't an issue any more? – **G1MFG**].*

CONVERTING RADIOS

Paul Billingham, 2E0MIY

When I first became interested in radio as a teenager in the late 1970s, it was almost expected that radio amateurs would adapt or convert ex-military or public service equipment to be used for the hobby. I remember wonderful dusty shops, now sadly only a memory, filled with half cannibalised No 19 sets from tanks and PYE Westminster valve VHF radios that once graced minicabs, all waiting to be bought, loved and converted to amateur radio use. I have noticed that recently the MOD may have released a large amount of Clansman radios that I believe were in use until around 10 years ago. Certainly dealers are listing large quantities of this this equipment on the internet and the prices for radios such as Clansman 320s appear very good value at £100-£300, when considering the build quality of these radios and original cost to the taxpayer some years ago. With very little or no work they can be made into useful multi mode radios from 2-30MHz. Clearly these are extremely robust and well built radios made for field use and I believe would make excellent and affordable routes into HF for newly licensed radio amateurs, or for anyone wanting something different, having a low powered option and very keenly priced ancillaries.

There appears to be very little written about these radios and how they can be adapted to amateur use. Could I respectfully ask that an article is written in *RadCom* about military radio equipment by someone with in depth knowledge of this equipment and what can be achieved, what prices to pay and a dozen other questions I and I suspect others have regarding these radios. There is a clearly a body of people using these radios and it would be great if this knowledge was shared in some form.

*[NB: Foundation licensees should refer to Licence clause 7 (2) – **Ed**]*

RSGB PAC TO THE RESCUE

Larry Sharps, G4OHP

I wish to express my sincere thanks to the RSGB Planning Advisory Committee (PAC) and especially John Mattocks, G4TEQ for his help, advice and letter of support on behalf of the Society, when I successfully applied for planning permission to erect a small HF antenna wire support mast at my home QTH.

Without the Society's letter to my Local Planning Authority, I believe that the outcome would be very different, as the pre application information from the authority was incorrect. My initial enquiry concerned permitted development under the Permitted Development Rights for Householders legislation, the LPA sighted Section 'H' (that relates to the siting and erection of 'Microwave Antennas') as a reason for withdrawing Permitted Development Rights, hence the formal application for planning permission. John pointed out in the letter of support, that antenna wires were generally considered as not constituting development and that the LPA should have applied Section 'E' of the legislation (that refers to buildings and other structures).

Fortunately, thanks to the RSGB, things have worked out in the end for me, however I believe that local government has little idea of what amateur radio is, and the contribution it continues to make to our world. The recent activities associated with Tim Peake and the ISS have done much to raise the profile of amateur radio, but, I feel we all need to do more.

It is always good to receive a letter of appreciation for the work of the PAC. Thank you, Larry. Watch these columns over the coming months for an article on some of the issues that have arisen lately in Members' dealings with local planning authorities. Larry is absolutely right that there is a general lack of understanding amongst planners of the nature of the amateur radio hobby. I should know, I am a chartered town planner myself.
John Mattocks, G4TEQ Chairman, Planning Advisory Committee

WOES OF IMPORTING SOFTWARE

Peter Butterworth, G0GPH

Following on from the excellent review of the *ACE-HF PRO* propagation software by Steve Nichols, G0KYA, I decided to buy it. Unusually, the software can not be downloaded, but must be purchased on CD-ROM from the USA. Undeterred, I ordered it and the printed manual, from Long Wave Inc and a fortnight later received the dreaded card from Royal Mail informing me that there was £44.28 to pay. That amounts to 28% on top of the cost of the order. Interestingly, when I contacted Long Wave they said how deeply sorry they were for the additional expenses and that they are planning to be able to offer the software for download in the very near future.

The software installed without any issues, but you have to email a code and wait for an unlock key to be emailed back – a bit frustrating with the time difference with America. Nevertheless, it is a powerful piece of software, full of very useful features, but the printed manual is an essential item!

CUSTOMERS CARE IS ALIVE AND WELL!

Tony Cadney, G0HUZ

In January this year discovered a fault on my Elecraft KX3, my problem was that at the time I was 'maritime mobile' off the coast of Columbia (HK). I e-mailed Elecraft via a very shaky satellite link, within hours I received a response stating that they had contacted the retailer in the UK (Waters and Stanton) and that although the fault was annoying it should not prevent the operation of the KX3. Later that same day I received an e-mail from Peter Waters stating he would welcome the radio back for a thorough examination when I returned to the UK at the end of March.

Letters published in 'The Last Word' do not necessarily reflect RSGB policy. 'Last Word' letters may be e-mailed to radcom@rsgb.org.uk Please note that letters submitted for 'The Last Word' may not be acknowledged. The RSGB reserves the right not to publish any letter, with no reason being given. It is a condition of publication that all letters may be edited for grammar, length and / or clarity. Due to the limited space available, please keep letters as short as possible.

On my return the radio was conveyed to Hockley and retained while a test rig was constructed to reproduce conditions that prevailed in the equatorial zone with temperatures in excess of 40°C.

I was kept informed as to the progress and was encouraged when Steve Davies, the engineer who specialises in Elecraft, stated he had reproduced the fault and a solution was at hand. Although repair took several weeks it was a fault that had not presented before and covered new ground. Thanks to the tenacity and the professional approach of Steve I received my KX3 back in fine order, complete with the latest edition of the firmware installed.

All at zero cost to me. Now that's customer care!

I wish to point out that I am purely a customer and have no other contact with either Elecraft or Waters & Stanton whatsoever!

HEALTH AND SAFETY

David Howard C.Eng. FIET, M0BGR

The July 2016 *RadCom* contained a feature on Health and Safety by Steve Hartley, G0FUW. I welcome exposure of this subject but I am concerned that you followed the tabloid press practice with the title. "Elf 'n' Safety" is disparaging and seeks to ridicule this very important issue.

The article covers the legal aspects of health and safety, which RSGB Members need to be aware of, however the best way to avoid criminality, legal tangles and messy insurance claims is to prevent accidents in the first place. Since modern health and safety requirements were introduced into UK industry in 1970s accident rates have dropped dramatically. Amateur radio is a very safe hobby, but 'life changing injuries', to use a safety-industry euphemism, are devastating for the individuals involved and their families. Regardless of the legal framework, we would do well to introduce the appropriate parts of industry best practice into our hobby to make it even safer.

RadCom all too often prints pictures of amateurs doing things that are potentially unsafe. The steps needed to dramatically reduce the likelihood of accidents are not difficult, expensive or time consuming and I would urge all clubs and individuals to consider safety matters carefully before any activities. I would also urge *RadCom* editors to think about the safety message the magazine conveys before printing such articles and pictures.

Thank you for the supportive comments. The title was my choice in an attempt to connect with the readership. It seems to have caught the attention of quite a few readers. I am not sure a more technically correct title would have had the same impact. Had it been for a safety professional journal it would have been different for sure.
Steve Hartley, G0FUW

EXCHANGING INFORMATION

Mike Stewart, G4RNW

It has occurred to me that it would be worthwhile for the society to set up a Members' forum for the purposes of exchanging information, either technical or practical, in order to help Members solve the various problems that arise in operating and maintaining equipment. It would be necessary for all Members to supply to the forum manager or avatar, details of all the equipment that one owns, plus perhaps those of previously owned equipment.

Then when anyone needs help or assistance on a particular item, the request for assistance could be published on the forum web page, plus an email could be sent to all Members who own or have owned the particular item, as listed by them and held on the data base. The answer or answers could then be published alongside the original question with possibly a confirmation email (or emails)

I agree that most modern gear is not repairable by the vast majority of hams nowadays, due to its complexity and method of assembly, but nevertheless the problems that arise are often of a practical nature, whereby the previous experience of current or erstwhile owners can often be invaluable. Let's face it, there is an enormous reservoir of expertise available in the society that could easily save the not so knowledgeable members a lot of frustration and/or expense.

The committee will no doubt note that Amazon operates a similar system for items sold by them, whereby recent or potential purchasers with queries have their problems forwarded to previous purchasers for their comments or advice.

REMEMBER THE JOYSTICK

Mike, RS190937

With regard to David's (G6IYD) letter about the Joystick antenna, yes I remember these well and used one myself in the mid to late 1980s. I still have it packed away in the loft. Mine had the metal cased tuner – a cheaper version was available with the tuner housed in a plastic box.

I was very impressed with the performance of this antenna. Using the Joystick mounted horizontally in the loft I could hear low power amateurs and clandestine / regional broadcast stations from all over the world just as well as I could on my main 85 foot long wire. Only with the very weakest signals did the long wire out-perform the Joystick – and then not by much. I understand the Joystick is now something of a collector's item although mine's not for sale!

Do I still use the Joystick? No, these days I use a Wellbrook loop mounted well away from the house to combat local QRM.

There was an error in the Joystick letters in last month's Last Word. The 2nd letter regarding the Joystick was actually written by John, GK3UCQ. Apologies for the error.

WHAT CAN YOU DO?

GM3BST

I have recently passed my 96th birthday and while reading through the *RadCom* that arrived in the post this morning, I wondered what can you actually *do* today that was so different from what I did when I called Niton Radio from the *Alcantra* to tell them that we had left Southampton en route for Buenos Aires with a rotary spark transmitter and a two valve receiver?

I passed a bit of information from one place to another – can you do anything different with the rig costing thousands of pounds?

It's all just radio isn't it? I think it was a lot more fun in the early days, amateur or commercial. It's all getting so serious now – contests, league tables, scores.

You will say you can work vast distances – I'll give you that one. Though wait a minute, I worked ZSC Capetown on 600m with the rotary spark transmitter from the coast of Portugal one night, which is DX by any standard. What could be more exciting than sitting at the set with the door open to the promenade deck and a dozen amazed passengers watch me sending messages with this magical ring of noisy fire to our first port of call – Pernambuco.

That really *was* radio! I think things have changed a bit and I'm convinced I had the best of it.

MFJ - OFFICIAL DISTRIBUTORS FOR OVER 30 YEARS

MFJ-226
VNA Antenna Analyzer covers 1 to 230 MHz, 1Hz resolution.
~~£359.95~~ £329.95

MFJ-971
Compact 200-Watt portable tuner MFJ QRP transceivers.
£129.95

MFJ-461
Pocket size morse code reader no cables or extras needed.
£104.95

MFJ-926B
Remote 200W ATU can cover the entire HF band.
£289.95

MFJ-998
ATU with full 1500 watts SSB/CW Digital & Analog SWR/WattMeter. 1.8-30MHz.
£719.95

MFJ-1835
This five-band (20, 17, 15, 12, 10 Meters) half-wave open-loop is perfect for restricted space or portable operation.
£199.95

MFJ-949E
Full 1.8-30MHz operation 300W antenna tuner withpeak cross meter.
£189.95

MFJ-434
Deluxe Voice Keyer.
£219.95

MFJ-901B
MFJ's Smallest and most affordable 200W antenna tuner.
£119.95

MFJ-1786X
MFJ's tiny 36 inch diameter loop antenna lets you operate 10 through 30MHz continuously -- including the WARC bands! Ideal for limited space.
£479.95

MFJ-1788X
MFJ's tiny 36 inch diameter loop antenna lets you operate 15m through 40m continuously -- including the WARC bands! Ideal for limited space.
£529.95

MFJ-259C
HF/VHF/220 MHZ, .53-230 MHZ, SWR Analyser.
~~£279.95~~ £259.95

MFJ-993B
300 / 150W Dual power ATU 1.8 - 30MHz.
£289.95

MFJ-991B
HF 300/150W Dual Power ATU.
£259.95

MFJ-417
Learn Morse code anywhere, anytime with this MFJ Pocket Morse Code Tutor!
£79.95

MFJ-616
Powerful communications tool that provides electronically enhanced audio to increase speech intelligibility.
~~£209.95~~ £199.95

AL-811XCE
Linear Amplifier 10 - 160m 600W 3 x 811A.
~~£929.95~~ £899.95

MFJ-969
HF+6m 300W antenna tuner with roller, antenna switch and XMTR.
£229.95

MFJ-994BRT
Heavy Duty remote 600W ATU 1.8-30MHz.
£419.95

MFJ-704
Designed for HF operation with virtually no loss between 1.8-30MHz.
£74.95

HEIL - OFFICIAL DISTRIBUTORS

FIN-B-B
Dynamic Microphone

The Fin Dynamic Mic captures remarkably natural, clear sound and is designed for live sound, recording, and broadcast applications.
£209.95

HTH I/K/Y
Headphone w/PTT and Mic

Single sided, lightweight headset, which is hands free and provides high quality discreet two way communications.
£35.95

HB-1
Articulated Boom
An articulated arm capable of supporting up to 2.5lbs and with a reach of 40" giving you Improved movement around the shack.
~~£69.95~~ £64.95

PR-781
Broadcast/Recording Mic
High quality END-FIRE dynamic cardioid microphone suitable for most High-End HF transceivers such as from Kenwood, Icom and Yaesu.
£179.95

PRO-7
Profesional Boom Mic Headset

Bringing new technology the Pro-7 provides extreme comfort and amazing sound.
£239.95
Icom Model including lead
£259.95

SM-1
Shock Mount

8-point flexible suspension support system that helps suppress low-frequency rumble on the microphone line by absorbing and damping vibrations picked up from the studio desk or console.
£64.95

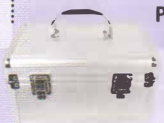
GM-ELITE
Hand Microphone

GM-Elite contains two distinctly different high performance dynamic elements, available at the flip of a switch.
~~£159.95~~ £149.95

PRO-SET-6
Headphones w/Boom Mic

Combined boom microphone and headset with HC-6 element which has a wide frequency.
£154.95

RC-PR-30



Protect your Heil PR-30 with an aluminum case with padded cut-outs for extra protection.
£27.95

FS-3
Foot Switch
Single channel foot switch to control the transmit/ receive function of an amateur radio transceiver.
£32.95

HMM
Clam Shell Mic

Microphone that detunes the internal resonance of the housing giving clearer sound.
£84.95

PRO-SET-ELITE-6
Headphones w/Boom Mic

Large dual headphones boom mic with HC-6 element and Heil Phase Reversal System.
£184.95

HDK-8
The ultimate Drum Microphone Bundle is here. Put the PR-48 on your Kick, PR-22s on your Snare and Hi-Hat, PR-28s on your 2 Rack Toms and Floor Tom, and PR30s over your cymbals. Sorted.
£1474.95

CABLES
Required for most products
To Find which cable/adaptor you will need visit:
heilsound.com/amateur/support/find-an-adapter

BUY NOW PAY LATER
FINANCE AVAILABLE!
CONTACT US FOR MORE DETAILS

www.hamradiostore.co.uk

Sign up to our Newsletter at hamradiostore.co.uk for exclusive deals and latest news

AOR

AR-DV1

Here is the next generation multi digital mode demodulation receiver, the AOR AR-DV1! This incredible digital voice receiver features wideband reception (100 kHz - 1300MHz), multi-mode digital demodulation, memory scan, all mode analogue reception and much more! Order yours now!

£1199.95

AR-8200D

Handheld scanner 530KHz-3GHz 1000mem SSB/FM/AM/CW with digital decoding and voice recording.

£569.95

AR-8200MKIII

Sensitive and strong signal handling over the extremely wide coverage of 530kHz to 3000MHz with telescopic whip on a swivel base, and a MW bar aerial is provided as standard.

£389.95

LA-400

A wide range receiving magnetic loop aerial that covers 10 kHz to 500 MHz. Four selectable band ranges from 150 kHz to 30 MHz for manual tuning and fixed operation frequencies from 10-149 kHz and 30-500 MHz.

£369.95

AR-8600-MKII

Mobile/Desktop all mode receiver with frequency range of 100kHz all the way up to 3GHz. Other enhancements.

£569.95

TONNA

220635

23cm (1260 - 1300MHz) 35 el Yagi with power rating 300W, boom length 3.07m and weight 2.5kg.

£93.95

220809

2m 9 element power rating 1000W boom length 3.47m long and weight 3kg.

£79.95

220818

2m (144-146MHz) 9 element crossed yagi power rating of 1000W and weight of 3.3kg.

£139.95

WSDRX-1-MK3

Ultra wide-band coverage SDR receiver with full coverage reception from 100KHz/2GHz. It has independent antenna inputs for HF and VHF/UHF.

MULTI-PLATFORM COMPATIBILITY

£99.95

MICROHAM

MICRO KEYER II

Using a single USB port, microKEYER II can interface with any Windows-based logging or control program to run any FSK, CW , AFSK, SSB, AM, or FM mode.

£254.95

DIGI KEYER

Powerful All-In-One USB interface for amateur radio digital mode operation including RTTY, PSK31, MFSK, Olivia, WSJT, APRS, PACKET, and many others which builds on the proven DIGI KEYER.

£199.95

HAM RADIO DELUXE

Integrated suite of software products for amateur radio. The five modules in the suite provide rig control, logging, digital communications, satellite tracking, and rotator control.

£79.95

bhi SUMMER SALE

FULL RANGE IN STOCK

DUAL IN-LINE

Noise eliminating device

7W stereo/dual channel DSP noise eliminating in-line module.

£229.95

COMPACT IN-LINE

Small compact battery operated unit has the latest bhi dual channel/stereo DSP noise cancelling technology.

Usually: £179.95

Special Price: £161.95

NEIM-103MKII

Versatile desktop noise cancelling unit for improving quality in all types of voice and radio communications.

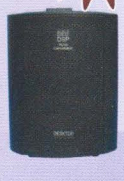
Usually: 149.95

Special Price: £134.95

DESKTOP

Base station speaker

10W DSP noise cancelling base station speaker.



£179.95

ANEM-MKII

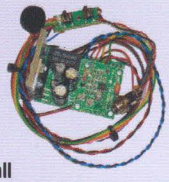
Compact amplified DSP Noise Elimination in-line Module, easy to use solution to noise and interference problems.

Usually: £139.95

Special Price: £125.95

NEDSP-1062-KBD

Easy to install amplified DSP Noise Eliminating PCB Module suitable for all makes of passive speakers.

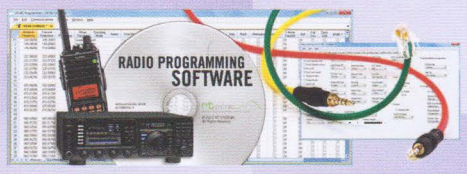


Usually: £119.95

Special Price: £107.95

RT SYSTEMS

CALL TODAY TO GET THE RIGHT CABLE FOR YOUR RIG



High quality, easy to use radio programming software and cables.

WCS-D5100-USB Icom ID-5100 Programming Software **£42.95**

ADMS-4AU Yaesu FT-817 Programming Software **£42.95**

KRS-V71 Kenwood TM-V71 Programming Software..... **£42.95**

MORSE

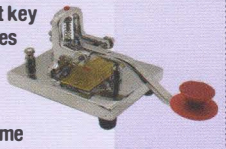
BENCHER BY-1

Dual-lever iambic paddles featuring adjustable contact spacing and tension, self-adjusting needle bearings, polished clear Lucite paddles, heavy-steel bases, and non-skid feet.

£174.95

VIBROPLEX V-SKD

The first straight key in its line, features a heavy solid highly polished chrome base with bright chrome top parts and the lever arm pivots in the famous chromed mainframe.



£219.95

Impartial advice at W&S!

At W&S we have not and will not associate ourselves with any one manufacture and as such, will not accept sales targets or provide forecasts. This means our selection advice remains completely impartial with no hidden agendas! Come to the only dealer in the UK were ALL current top transceivers can be tested alongside each other.

See you soon. Justin G0KSC

Waters & Stanton Ltd, Spa House, 22 Main Road, Hockley, Essex SS5 4QS

01702 204965 | FAX 01702 205843 | sales@wsplc.com

@wsplc | blog.hamradiostore.co.uk | facebook.com/WatersandStanton | YouTube Waters and Stanton

W&S @ Jaycee, 20 Woodside Way, Glenrothes, Fife KY7 5DF

01592 756962

jayceecoms@aol.com

We have free parking, a cafe opposite and a pub nearby 'pay us a visit'