RadCom

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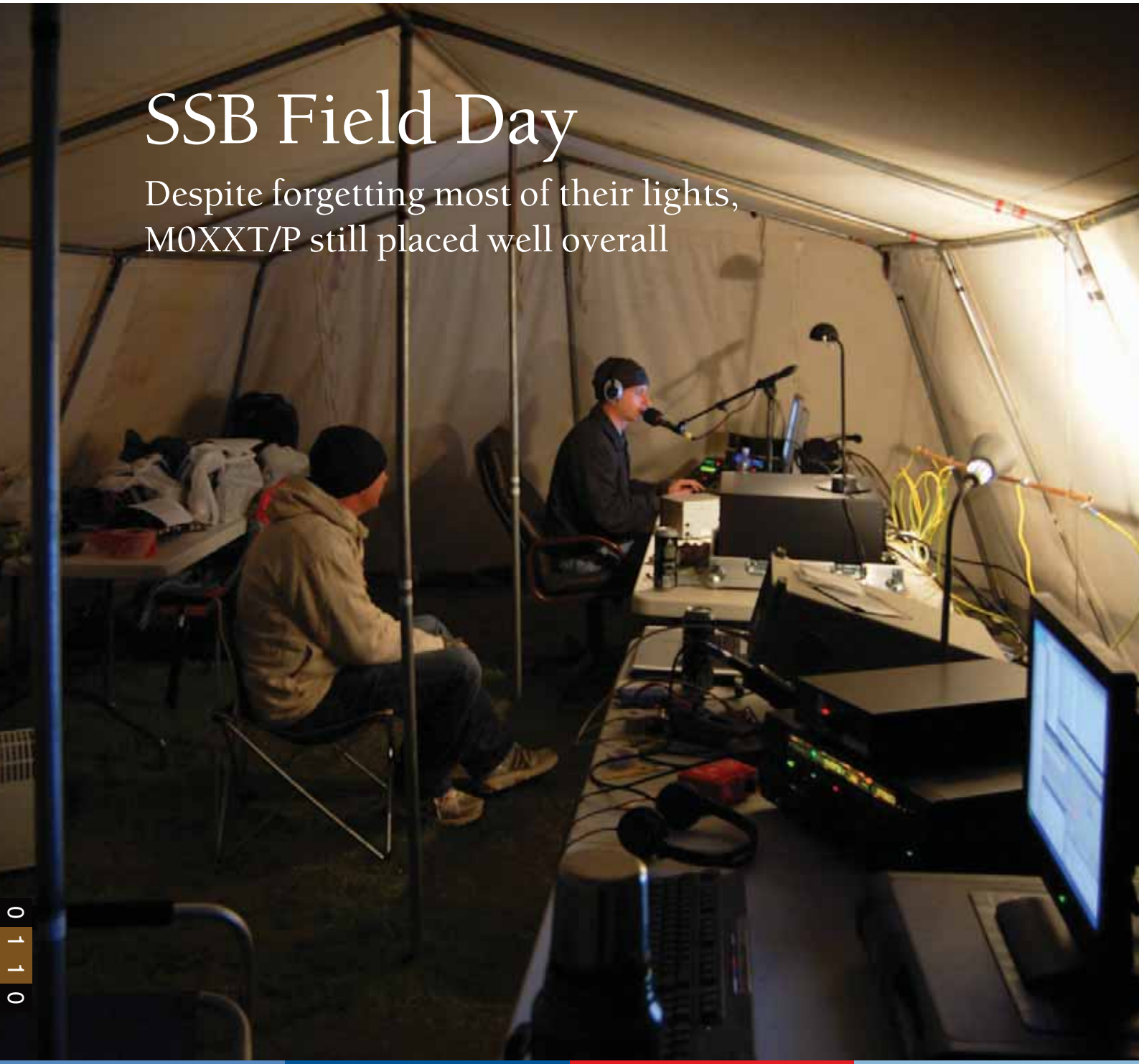

SSB Field Day

Despite forgetting most of their lights, M0XXT/P still placed well overall

0110

ATV

Reporting visual signal strengths – P grades explained

In Practice

The ins, outs and assumptions of SWR meters

KW Story

Introducing British amateurs to SSB operation in the 1950s

Planning

A thing of beauty or a planning nightmare?

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£1395 D

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Complete mixer system for your station including Headset and leads.

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ICOM

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IC-7400	100W HF - 2m w. large display	**£1329 D**
IC-7000	Great HF-UHF 100W mobile	**£939 D**

SAVE at least £100 on ICOM HF!

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No VAT Increase 'til February!

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Making now a great time to buy!

Good Times!
It is a great time to buy your gear at W&S - the UK's largest ham radio dealer by far.
FREE WARRANTY - NO VAT INCREASE - GREAT PX DEALS

YAESU

FT-450

The most cost effective answer to those wanting HF to 6m. It really is a great package.

£589 D

FT-450AT As FT-450 but with auto atu built-in **£679.95**

FT-950

£1099 D

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FT-2000D	200W HF-6m inc AC PSU	**£2399 D**

KENWOOD *Classic Base Transceivers - UK's Largest Dealer*

The famous **TS-2000** covers 1.8 - 440MHz

Independent reception on 2 bands with a VHF sub band 118 - 174MHz, built-in automatic ATU, built-in TNC for DX alerts, extensive DSP processing and magnificent selectivity. This really is the DC to light rig. **TS-2000 £1479 D** **TS-2000X £1745 D**

No VAT Increase 'til February!

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TS-480HX £849 D

The compact TS-480 comes in two flavours, both covering 1.8 - 54MHz. The "SAT" is 100W with built-in ATU and the "HX" is 200 Watts without atu. Great for mobile or portable

VX-8E *NEW*

Triple Band

The VX-8 is another Yaesu first. APRS and Bluetooth, plus waterproof housing make this a "must have" radio. A barometer is included, plus GPS option and you have dual simultaneous receive.

£379 D

No VAT Increase 'til February!

Carriage Charges: A=£3, B=£4, C=£6.95, D=£10, E=£12

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NEW

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£689.95 D

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HF/6m linear amplifier
1.8-28.00 & 50MHz
5W in 45W max out

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FAST SAME DAY DESPATCH SERVICE!
Orders must be received before 3pm.

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Portable HF Transceivers

Yaesu Warning!
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FT-857D
SPECIAL OFFER!

HF/6m/2m/70cm all mode 100W transceiver

~~Was £569~~
Now £549

FT-897D
SPECIAL OFFER!

HF/6m/2m/70cm all mode portable 100W transceiver inc TXCO

~~Was £659~~
Now £629

Icom
VHF/UHF Mobile/Handy

IC-E208 Dualband Mobile

*Freq range 144-146MHz, 430-440MHz Tx
*55/50W (3 pwr steps each band)
*Wideband Rx 118-173, 230-549 & 810-999MHz

£254 D

IC-910H £1239 D
2m / 70cm 100W Base station all modes with option for 23cm module (UX-910 £359)

IC-910HX £1439 D
As above but with 23cm module ready fitted and a big saving as well.

IC-2200H £199 D
2m 55W FM mobile with rugged construction and with digital option.

IC-2725E £319 D
Dual band 2m/70cm. Easy to operate and install and a lovely detachable head.

IC-E90

6m / 2m / 70cm Handheld Transceiver. £232 C

Yaesu
VHF/UHF Mobile/Handy

FTM-10SE Dual Band Transceiver

NEW

W&S £269 D

FTM-10SE Motor Sport Radio -
50/40W design with optional Bluetooth, receiver coverage from 0.5-800MHz, PA system, Stereo radio capability

FT-7800E

Dual Band Mobile
**2m/70cms*
**50W*
**Wide receive inc. civil & military airband*
**CTCSS & DCS*
**Detachable front panel*

£189 D

FT-2800M £124 D
*2m FM Mobile transceiver *High power 65W *Capable of VHF wideband receiver

FT-8800E £289 D
*2m/70cm Dualband FM Mobile transceiver *50W 2m, 35W 70cm *Wideband receiver

FT-8900R £334 D
*2m/70cm/6m/10m Quadband FM Mobile transceiver *Independent dial for each band

FT-1802E £119 D
2m 50W FM Mobile DTMF Mic 138-174 RX

VX-3E

2m / 70cm, wide Rx, Lithium cell.
**Wideband Rx*
**Built-in AM Ant.*
**SW Broadcast*
**Stereo FM*
**Lithium Cell*

£139.95 D

VX-7R (Black or Silver) £259 C
Wide freq. coverage 500kHz-900MHz

VX-6E £199 C
2m/70cms, 5W Wideband Receive

FT-60E £142 C
2m/70cms, 5W Wideband Receive

VX-170 £95 C
2m 5W handheld with 16-key pad

Kenwood
VHF/UHF Mobile/Handy

TM-V71E

*2m 70cm
*Wideband Receive
*Built-In Echolink
*Removeable Control Head *CTCSS Encode/Decode
*Supplied w/ DTMF Mic.

£289 D

TM-271E

2m FM 60W Mobile Transceiver. MIL-SPEC DTMF Mic. Built-in CTCSS & DCS encoder / decoder.

£165 D

TM-D710E

Kenwood's new mobile FM station is Great! APRS, Builtin TNC DTMF Mic and Weather Station ready.

£429 D

TH-F7E

- 144-146MHz Tx/Rx: FM
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Up to 6W out with Li-ion battery and **"scanner" style coverage from 100kHz to 1300MHz** including SSB on receive!

£229 D

TH-K2E 2m 5W FM £159 D

TH-K2ET 2m 5W FM £165 D

TH-K4E 70cm 5W FM £159 D

Tigertronics
SignaLink SL-1

Compatible with most soundcard programs
- *No serial port required*
- *USB self-powered*
- *Aux output for speaker*
- *Adjustable Rx & Tx levels*
- *Variable transmit delay*
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- *Accessory kit available*

Just £69.95 C

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Just £49.95 C

NEW Watson
Wireless Weather Station

W-2001

- *5-day Forecast*
- *Date & Time*
- *World Weather*
- *Backlit LCD*
- *Wireless Link*
- *PC Dongle*
- *Outdoor Sensor*

This new wireless weather station allows you to see a 5-day forecast for anywhere in the world! The clear LCD screen is wireless linked to your PC via a dongle. Just press the LCD screen panel command and it will interrogate your PC, display and store the results on the wireless linked weather display panel. So you can monitor your local weather trends directly and see an accurate 5-day forecast.

Carriage Charges: A=£3, B=£4, C=£6.95, D=£10, E=£12

ICOM @ WATERS & STANTON

NO VAT INCREASE 'TIL FEBRUARY 2010 & FREE 3 YEAR WARRANTY

Another reason for buying from us.
No ficticious RRPs - Just honest selling, honest prices and honest after-sales service.

IC-718 HF Transceiver

It doesn't cost a lot to own an Icom transceiver. And the IC-718 is a fine example of Icom's developed technology filtering down to the budget class radio. A full 100 Watts of finely engineered RF design that can easily cope with the demands of today's challenging bands. Keypad control and a lovely clear display make this a popular choice for hams around the world.

£449 D

IC-7700 HF Transceiver

Unquestionably, one of the best radios ever produced for ham radio. This feature packed radio achieves "lab standards" where test equipment itself is challenged to measure some of the parameters. If you take HF seriously, then this radio has to be on your list. It has the solid engineering and ergonomic concept, so typical of Icom.

£4999 D

IC-E2820 VHF-UHF with D-Star

This ground breaking mobile from Icom embraces the latest digital technology. Not only does it offer dualband FM, it also offers Icom's digital mode. And with the optional module fitted, you can join in the D-Star fun through the many UK repeaters. This means you can enjoy noise free reception, even at low signal levels and work the world through equipped D-Star repeaters.

£539 D

IC-E2820 Without D-Star Built-in £539 D

IC-7200 HF & 6m Transceiver

A rugged, eye catching radio that costs surprisingly little for a radio with this level of performance.

£1329 D

IC-706 HF-UHF Transceiver

This radio just keeps going - in more ways than one! 100 Watts of pure joy and performance in a package that makes it ideal for mobile or portable, particularly with its detachable head.

£379 D

IC-7600 HF Transceiver

Only a few years ago, this design would have been beyond the pockets of all but a very few enthusiasts. Today, it brings this kind of performance much closer to an affordable level that dedicated hams are prepared to pay for such performance. Its reputation makes this radio a great investment - the IC-756 series is dead - long live the IC-7600!

£3365 D

IC-E92D VHF-UHF with D-Star

The IC-E92D is a waterproof dual band transceiver. The IC-E92D is ideal for D-STAR enthusiasts, active amateurs who are fans of outdoor pursuits or organisations that are looking for a simple GPS position reporting system.

Used with the newly designed GPS speaker-microphone, HM-175GPS, the IC-E92D shows your position data on the display and offers a position reporting function in DV mode. The IC-E92D shows the direction to a memory position or to a received D-STAR station with a compass like display needle. In addition, the GPS-A mode assists in easy D-PRS mode operation.

£369 D

To Order:
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For Full contact details including address, see previous page.

RadCom

THE RADIO SOCIETY OF GREAT BRITAIN'S MEMBERS' MAGAZINE

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Full membership £48.00
(individual & club)

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Subscriptions include VAT where applicable. Special arrangements exist for visually impaired persons. Details and membership application forms are available from RSGB HQ.

P&P on RSGB orders:
£1.95 for 1 item, £3.50 for 2 or more items. Overseas rates on request.

The Double X-Ray Firm M0XXT/P working with QRP illumination during SSB Field Day 2009. Read the full story of the event on page 80.

News and Reports

GB4FUN visits Northern Ireland – full story on page 15.

Reviews

The late Rowley Shears BEM, G8KW, with his Viceroy transmitter. See page 44.

Features

Technical Features

Regulars

A simple portable antenna is revealed: page 32.

RADIO SOCIETY
OF GREAT BRITAIN

THE NATIONAL SOCIETY WHICH
REPRESENTS UK RADIO AMATEURS

Founded in 1913 incorporated 1926.
Limited by guarantee
Member society of the
International Amateur Radio Union

**Patron: HRH Prince Philip,
Duke of Edinburgh, KG, KT**

Membership is open to all those with an active interest in radio experimentation and communication as a hobby. Applications for membership should be made to the Subscriptions Department from which full details of Society services may also be obtained.

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Rupert Thorogood, G3KKT
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Dr R Dingle, G0OCB

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Dave Wilson, M0OBW (from 1 January 2010)

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J Stevenson, G0EJQ - Region 13

Details of the Society's volunteer officers can be found in the RSGB Yearbook and on the RSGB website.

The above details were correct at the time of printing, 7 December 2009, and do not take into account the result of the Board & Regional Elections that closed on 10 December 2009.

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The online *RadCom* can now be found at www.rsgb.org/radcom.

The Challenges Ahead

First, I would like to say thank you. What an honour it will be to serve you as President of the RSGB for the next two years. When I joined the Society in 1994 I never expected I'd end up as President.

I'm sure that every presidential term has had its challenges since the formation of the Society almost 100 years ago. My term has many ahead. Three immediately spring to mind: Bletchley Park, Membership and PLA/PLT.

BLETCHLEY PARK. As you know, the move from Potters Bar to Bedford went extremely well but there is still one outstanding element of that move that needs to be concluded. It was always, and it still is the plan to have a presence at Bletchley Park. The synergy with the history of the site and the footfall through BP make it the ideal place for the public face of the Society. For various reasons, not least delays in planning permission, the project has not moved on as intended. I'm pleased to say that things are now moving and work will commence in January 2010 – with the idea being to be complete by June 2010. We will, of course, keep you advised of progress with regular updates in RadCom and via GB2RS news. I look forward to meeting many of you there at the official opening.

MEMBERSHIP. This is also a challenge, not least because of the pressure that we are all feeling on our disposable income. We need to retain current members and, at the same time, find innovative ways to encourage non members to recognise the benefits that membership gives – not least in supporting the National Society to defend our Spectrum. In addition to our individual Portfolios, I believe that the Board should take a strategic view, looking at the bigger picture. We need to distinguish between strategy for the Society and that for developing amateur radio in the UK. The two are undoubtedly linked, but we must recognise that our first duty is to the Society. With that in mind my predecessor Colin Thomas, G3PSM recently initiated a small Strategy team and invited a number of people who are at the cutting edge of radio development to join. The thought is that looking at things from a different perspective they will come up with ideas to bring to the Board. The important thing is that it will stir up the little grey cells and provide us with ideas as to how to move forward. Likewise if you have any ideas, we're always interested as to how you feel the hobby needs to develop. Please don't be shy in coming forward.

PLA/PLT. Those two challenges are undoubtedly difficult enough but the third challenge is probably the most difficult in which to achieve success. This is the threat to the radio spectrum from PLA/PLT devices.

The Society recently announced that we are seeking legal opinion with regards to Ofcom's interpretation of the various acts and directives that cover PLA/PLT and the threat that they pose. We have been prompted to do this by reports and complaints from members and non-members of interference to amateur radio operation from PLA devices and our own investigations have shown that this interference almost makes operating on the lower HF bands impossible. We are also conscious that other 'wireless' devices are coming along that could also affect the bands, including Smart metering and Smart grid. By 2020 all homes in the UK will be fitted with Smart meters that will monitor energy usage. We as radio amateurs need to ensure that we are given a level playing field to protect the spectrum that we enjoy. First and foremost the Radio Society of Great Britain is a representative body and it is in this role that we raise this legal challenge on behalf of the UK amateur radio community.

Any legal challenge is costly and the RSGB cannot fight this alone. We need the support and financial help not only from our members but also the amateur radio community as a whole.

SPECTRUM DEFENCE FUND. To this end, with this 'Editorial' I am announcing and establishing a 'Spectrum Defence Fund'. This fund will be used in the first instance to challenge Ofcom at law as described above. This may take the form of a judicial review but we will be advised by our lawyers on the direction to take.

I will be quite open with you: the cost of a judicial review to challenge Ofcom and their interpretation of the EMC directive will be in excess of £75,000, and we are not guaranteed success. But, we do feel that now is the time to stand up and be counted and make it known that we, as a community, are not prepared to accept any level of interference from non-compliant devices. We are looking to our administration (Ofcom) to protect our interests, which it is their statutory duty. As I mentioned there are other challenges ahead and the fund will be used only to protect the Spectrum when and where we need to do so. This is a long term project and all monies donated will be 'ring fenced' for these actions alone.

If every radio amateur in the UK pledged £10 to the Spectrum Defence Fund we could quickly raise in the region of £400-500K but if only 10,000 amateurs pledge £5 we would fall woefully short of what we believe is a realistic figure to fight the challenges ahead. Please help the RSGB in this most important area.

We realise that it would be impossible to remove from the market the devices that

currently cause interference. This is an expectation too far. Neither are we likely to see rapid results. What we want to achieve is for Ofcom to recognise that they do have a statutory duty to protect the amateur radio community alongside their duties to commercial stakeholders.

CONCLUSION. Thanks again for allowing me the privilege of being your President for the next two years. I look forward to exciting times ahead and working with the Board to meet the challenges. I will meet as many of you as I can at rallies, club visits and so on. I can't promise that everything we do as a Board will please everyone, but it'll done for one reason only – to promote our great hobby and move it forward on a positive footing deep into the 21st century.

Dave Wilson, M0OBW

Spectrum Defence Fund

If you wish to donate to the 'Spectrum Defence Fund' could you please make cheques payable to 'The Spectrum Defence Fund' and send them to Spectrum Defence, RSGB, 3 Abbey Court, Fraser Road, Priory Business Park, Bedford, MK44 3WH.

The 'Spectrum Defence Fund' is a secure and independently audited fund, the proceeds of which will only be used in defence of the radio spectrum.

Welcome

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.

2E0BFM	Mr A S Knights	G0TEV	Mr J A Mullin	GW0UXJ	Mr A N Burns	M1EAK	Mr C R Day	N2ADR	Mr J C Ahlstrom
2E0BMY	Mr A F Farrar	G0TUO	Mr M J W Brough	GW0WTT	Mr P D Clark	M3EHA	Mr T Williams	N6KZB	Mr M A Burton
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2E0CBA	Mr P Humphries	G0WUY	Mr A Williamson	GW7BVY	Mr K Williams	M3RAU	Mr T Rowlands	OH2BUF	Mr M Leikola
2E0DAL	Mr D Stringer	G1DEO	Mr B Davies	I8RAR	Mr A Ramundo	M3SOJ	Mrs S Farrar	OZ7MHZ	Mr A A Briggs
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2E0WKV	Mr K J Dale	G3MQR	Mr D J Robinson	K5MOG	Mr R H Foll	M5AXA	Mr I Bassett	RS204005	Mr M Ponsford
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AA6B	Mr P R Bauer	G4XEE	Mr D Bate	M0BIZ	Mr M Thomas	M6LAG	Miss L Burgess	RS204819	Mr P J Hayward
AB9SM	Mr L L Hacker	G6AXH	Mr P Brothers	M0CNY	Mr S B Hayes	M6SOA	Mr D Sewruk	RS204841	Mr R Skingley
AE5V	Mr E B Scott II MD	G6GWX	Mr C Hore	M0DED	Mr C D Frizell	M6ZBD	Mr I Painter	RS92010	Mr C P Knight
DL7JOM	Mr O Matthaei	G6VQU	Mr P A Pieda	M0DEL	Mr A M Lindley	MI6ALL	Mr A Armstrong	VE7YC	Mr A Stunden
EB3BRJ	Mr M E Cividino	G6ZTL	Mr B Rogers	M0EGL	Mr W Dunne	MM0DSM	Mr D S McNeill	VK4XRS	Mr R J Sargeant
G0AXJ	Mr RCI McCluskey	G7DSJ	Mr D M Terrett	M0GPU	Mr A D Norrie	MM6GGB	Mr G Blues	W1UP	Mr R W Wiitala
G0JKM	Mr P J Renvoize	G7III	Mr IRP Young	M0RXW	Mr R Wells	MU3EYU	Mr G M Williams	W4ZST	Mr R S Lear
G0LVH	Mr J Wimpenny	G7SQC	Mr P Young	M0TLN	Mr S Moissejev	MW0ICO	Mr P Jones	W5OPB	Mr S J Dzurik
G0OZU	Mr D Millan	G7WEM	Mr T D Hewitt	M0YIJ	Mr G C S Chesters	MW3WZZ	Mr S J Bobby	WB6NAM	Mr M M Koffel
G0SDM	Mr P J Robinson	G8VG	Mr A P W Windle OBE	M0ZLI	Mr D Challis	MW3YNA	M D Seagrave	WB8BER	Mr W E Goodwin
G0SEW	Mr K A Green	GI8ELZ	Mr O Cathcart	M1AYM	Mr R Shanks	MW3YZB	Mr C A Wilkinson	WD0ERJ	Mr D R Hugerford

GS0COD	Dunoon & Cowal Amateur Radio Club	G7FCR	Fylde Coast RAYNET Group
G0NLR	North Lancashire RAYNET Group	MQ0RVR	Ribble Valley RAYNET Group

21st Foundation Course

The Chelmsford ARS will be holding their 21st Foundation evening course starting 14 January. Thanks to the work of the CARS training team, over 170 newcomers have successfully obtained their amateur licence. The club has been very fortunate in having so many members willing to assist in the training in a variety of roles from teaching, acting as out-stations and ensuring there was always tea and coffee available. To find out more about CARS courses speak to Clive Ward, G1EUC on 01245 224577 or e-mail training2010@g0mwt.org.uk. www.g0mwt.org.uk/training.

Candidates and tutors at 20th CARS Foundation course.

Waterproofing

Contralube770 is a synthetic hydrocarbon grease for the protection of contact areas/surfaces. Primarily an electrical contact grease, it it can be used for many different jobs including cables outside. We have several amateurs testing this on their cables and we'll report back in a couple of months. More details at www.contralube.com.

MKARS Success

Following the recent Foundation course classes at Milton Keynes ARS, there was a 100% result with 14 passes from 14 entrants. So far in this current year the club has had 39 passes at Foundation level, 17 passes at Intermediate level and two passes at Advanced level. The club is currently running an Advanced course with 10 students and is beginning Foundation and Intermediate courses in January. The photograph shows the successful candidates in the recent Foundation exam.

Exam Success

The most recent batch of Intermediate candidates to pass at GM6NX in Stirling are to be congratulated. Front row, l-r: John, father and son team Myles and Duncan, Alex and Michael. The range in ages shows clearly that it is a hobby for all ages and that a new generation is ready to evolve. Thanks to Jim, GM4VGR and Wullie, GMN0MZB who held the exam (pictured in the back row).

GM0FRC

In the summer, Falkirk & DARS activated Torwood Castle with the club call GM0FRC. The castle, built in 1566, is located close to the A9, 8 miles north-west of Falkirk. This was the first opportunity for the club to use their new Acom 1000 linear amplifier, acquired as part of the recent lottery grant to improve the HF special event station.

The club encourages its newly licensed members to partake in these activities, giving them experience in operating a first class HF station. On this occasion, the majority of the operating was done by members with MM3, MM6 and 2M0 calls, with several more experienced members on hand to help when needed – and very little help was needed!

As the activation coincided with VHF NFD, equipment for 2m and 6m was assembled and advantage taken of the opening on the Saturday gave them 30 QSOs – not bad for this location. In addition to the expected GM and G stations several EA and CT calls were also worked.

NEWS IN BRIEF

• Lincoln Short Wave Club is celebrating Australia Day on 24 January with a Big Australian Breakfast and a Special Event Station at the Lawn, Union Road, Lincoln. Further details from Pam Rose, G4STO, on 01427 788356 or e-mail pamelagrose@tiscali.co.uk.

GB75XX

GB75XX was operated by the Bromsgrove & DARC for 30 days from mid-October to mid November. The event was to celebrate the first transmissions from the BBC Station at Droitwich, 75 years ago. The two main masts at 700ft high are the originals erected in 1934. The station's original callsign was 5XX, the call having moved with the transmitter equipment from Daventry. Many people will have seen the masts, as they are easily visible by Junction 5 of the motorway M5 in north Worcestershire. The club had particular success on 80m, 40m and 20m. Modes were mainly CW and SSB but there was also FM operation on the 2m band. Around 2000 QSOs were made to countries across the world.

Roy, G6NYG worked hard organising the callsign, with a lot of help from Arqiva, Ofcom, RSGB, the BBC and BBC engineer Simon, GW0NVN in particular. Many club members operated the station including G6OPY, G4AHK, G3KWK, G3LRF, M0BQE, G4OJS, G4LRL and GW0NVN.

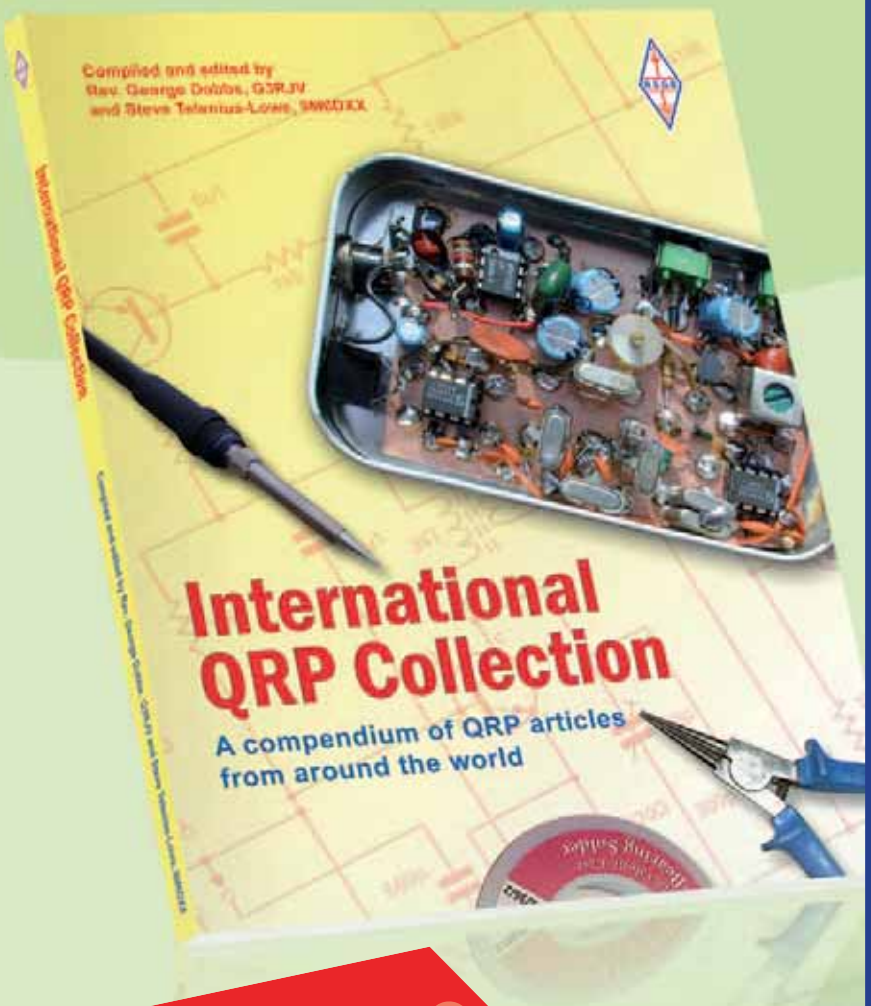
A Yaesu FT1000MP feeding 100W to a doublet at 50ft was used mainly for SSB on 40 and 20m. For some of the SSB, but most of the CW, an Icom 756 Pro and a Ten Tec Orion II were used, both feeding a three element beam at about 40ft. VHF operation used a Standard 2m multimode transceiver running 25W to a collinear at 40ft.

Operator Roy, G6NYG with the Yaesu.

Intermediate Passes

Cockenzie & Port Seton ARC recently held another successful Intermediate course. The photograph shows l-r: Gary, MM0FZV Assistant Invigilator, Barry, MM3ZFK, Adrian, MM3YPQ, Robin, MM3SRF, Stevie, MM3YPN, Bob, GM4UYZ Instructor, Martyn, MM3XXW, Graham, MM3ZFW, Brian, MM3WZB, Cambell, MM0DXC Lead Invigilator.

RSGB shop



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Compiled and edited by Rev. George Dobbs, G3RJV and Steve Telenius-Lowe, 9M6DXX

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Scout Training

Recently, two of the Wakefield District Scout Leaders passed their Foundation examination with the Wakefield & DRS. The leaders decided to take the exam after a Scout Night Hike last year when CB radio was used (along with amateur radio support from the Wakefield & District). The CB radios unfortunately failed, but amateur radio managed to keep communications going. The District Commissioner (himself a licensed amateur) immediately made arrangements for the training of several scout leaders, of which these were the first two.

In the photo, l-r, the successful candidates are Nick, M6NJF and Brian, M6BNC. The lead instructor was Dave, G4CLI ably assisted by assistant instructors Darryl, 2E0DJB and Steve, 2E0SLT.

SOS Week

SOS Radio Week is an opportunity to show off amateur radio to the public. The event starts at 0000 on 23 January and finishes at 2359 on 31 January. This includes the RNLI's own SOS fund raising day on 29 January. For the nine days, amateur radio operators all over the country will be raising money for the Royal National Lifeboat Institution (RNLI). Individuals and clubs will be raising sponsorship money in the run-up to the event and then having a great time during it contacting other stations around the world. Some will operate for a few hours, others will operate for a day or two and sometimes a club manages to operate throughout SOS Week. To operate under the banner of SOS Radio Week you simply need to register for free at www.sosradioweek.org.uk.

Pencoed Results

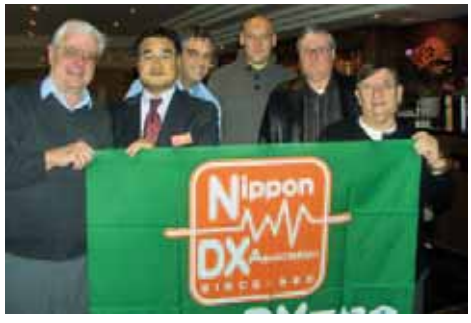
Pencoed Amateur Radio Club had two Intermediate exam successes in Paul Kyte and Alan Jones and a Foundation pass too with Tyrone Lawrence (right).

JOTA

Many North Devon Scouts girls and boys – and their parents – attended a demonstration of the wonders of amateur radio and were able to talk under guidance of the qualified operators of Appledore & DARC of North Devon, to amateurs in Saudi Arabia, Cyprus, Germany, Holland, Wales, Poland and, of course, the UK. The thrill of these contacts could be seen on their faces. Morse code keys and the use of Morse code was also demonstrated by the A&DARC and proved to be a great attraction to the scouts who showed immediate skills in sending and receiving of the code.

Visiting Delegate

Recently world leaders and bankers met in St. Andrews for the G20 conference to discuss the current financial crisis. One of the delegates at the conference was Yoshihiro 'Skip' Sugimoto, JE2HCJ who works for the Bank of Japan in Tokyo and Manhattan. As this was his first visit to Scotland he was keen to meet local radio amateurs. He contacted the Dundee ARC to see if they could help. A group of club members arranged to meet Skip at his hotel. Naturally the conversation centred on radio, in particular the differing UK and Japanese licence conditions and operating procedures, and of course about operating portable. He chatted at some length with Paul, MM6BKC, the newest licensed member, as Skip was interested in what attracted him to the hobby. The longest licensed member Tom, GM3NHQ was also there and the discussion moved on to how amateur radio had changed over the years. After the meeting Skip was given QSL cards from the club and its members and in return he presented the club with a banner from the Nippon DX Association, which will now take pride of place in the club's shack.



Skip presenting the banner to club with members looking on l-r Tom, GM3NHQ, Jim, MM0DXD, Paul, MM6BKC, Stewart, GM4ZFS and club president Ally, MM0DRA.

Lottery Award

Aberdare & DARS have recently received a grant from Awards for All Wales of £5000. The application was made to provide training facilities, materials, equipment and projects for students wishing to undertake a course leading to a Radio Communications Foundation, Intermediate or Advanced accredited examination. To assist in the delivery of this training, the Club will be purchasing two new HF transceivers, a laptop and various other training aids including books and the relevant software to provide PowerPoint presentations. Existing and new members will also benefit with money being spent on equipment to upgrade the existing station to facilitate reception and transmission of additional modes.

The Society would like to express their thanks to Interlink and in particular Mr Phil Barrett for their help towards our successful application. It has already helped five people through the Foundation licence whose ages ranged from 14 to 65 and there are currently two more students preparing for their Foundation exam. The club website is www.radioclubs.net/aadars.

25 years of TDOTA

To celebrate 75 years of Guiding in 1985, some licensed Guiders from UK, Canada and Australia arranged a Thinking Day On The Air event to enable members speak to each other across the world. The event has continued through waxing and waning sunspot cycles and will celebrate 25 years of TDOTA during the centenary of Guiding in 2010. Ofcom has granted Girlguiding UK stations the very special prefix of GG100, so listen out during 2010, and particularly during TDOTA weekend, 20/21 February.
More information and a list of stations are on the website www.guides-on-the-air.co.uk. Also on the site are previous years' reports, an information pack, as well as a participation certificate and details of a badge to celebrate 25 years of TDOTA. Contact Liz, M0ACL, QTHR or e-mail liz@guides-on-the-air.co.uk if you need any further information.

GB7HQ 2010

On 10/11 July, the UK Headquarters team will again be taking part in the IARU HF World Championships. In 2010 this contest coincides with the WRTC event in Russia, where two team members Andy, G4PIQ and Dave, G4BUO will be representing the UK. This year, the UK Headquarters team has been expanded with new operators from contest clubs and will be operating from several new locations around the UK. The team needs your help – by working the UK HQ station on as many of the 12 band/mode slots as possible you, your friends and your club will be eligible for several new trophies and existing award certificates. More details will be published nearer the time in the June issue of *RadCom*.

Chris G3SVL operating 160m SSB from the G0KPW station in Suffolk.

North Wales Rally

The 23rd North Wales Radio Rally was officially opened by the RSGB President elect, Dave Wilson, M0OBW. This year they welcomed some new traders and had many familiar faces return achieving a good mix of traders selling new rigs and equipment, aerials, components, computer hardware and software and much more. There were also many items of vintage radio equipment & military kit. The RSGB were in attendance as were many local clubs selling surplus equipment and the Bring & Buy was busy all over the weekend.

Attendance was significantly up on last year despite inclement weather on the Sunday. The organisers find John Bright School an ideal venue with ample parking and the halls all on one level. The catering was supplied by the outsourced school caterers – but it was nothing like school dinners used to be!

It was thanks to the hard work and support of all North Wales RS members and friends that it happened and was a success. The rally will be back on the weekend of 30 & 31 October 2010.

The Cavity Magnetron

The Defence Electronics History Society, IET and IEEE are hosting a two-day conference at Bournemouth University on 19–20 April 2010 to celebrate 70 years since the development of the high-power cavity magnetron by Randall and Boot at Birmingham University. This historic development let to the introduction of microwave radar, which played a key role in the Second World War.

The purpose of the conference is to review how the magnetron evolved from work carried out in many countries from the mid-1930s. Later, post-war developments will also be covered in the conference. To give the subject its international perspective, in addition to speakers from the UK, there will be speakers from Germany, France, The Netherlands, Japan, the Czech Republic, Russia and the USA.

The conference will also feature an exhibition of historic artefacts and there will be a visit to the Royal Signals Museum at Blandford. In order to attract the maximum number of delegates, the registration fee has been kept to £80 (with a reduced fee of £65 for members of the DEHS, IET and IEEE). This fee includes a hot lunch on each of the two days. For more information visit the conference website at www.cavmag2010.org.uk or e-mail the conference chairman, Keith Thrower, at kthrower@theiet.org.

Intermediate Success

At the recent Intermediate course and exam held by the Poldhu Amateur Radio Club at Helston Community College all seven candidates were successful. The tutor was Keith, G0WYS.

L-R. Mike, M3UML, Roy, M3WOY, Sid, M3XUE, Mark, M6MAP, Jason, M3XZI, Mike, M6SRM, and Dave, M6SUV.

GB2AD

The Mid Ulster ARC ran a special event callsign, GB2AD, on 11 November to commemorate Armistice Day. A number of members setup the station that morning at Brownlow House, Lurgan, which had been chosen as it had been used during both world wars, first as a Battalion HQ during WWI and as American HQ in WWII, with Eisenhower reportedly having stayed two days before the D-day landings.

The callsign was active on a number of HF bands, 2m, CW and PSK with a very busy day full of contacts, despite the setback of a swine flu outbreak amongst some members who were unable to attend. All contacts will receive a specially designed QSL card that was sponsored by the Royal British Legion Portadown Branch and Mervyn Harrison Tiling in Portadown.

The club wishes to thank all those who supported the day, its members and Brownlow House for opening its doors. The club hopes that this will become an annual event.

NEWS IN BRIEF

• Shefford & District Amateur Radio Society now has a new website: www.sadars.co.uk.

• GB3ET went live on 19 November from its new location near the Hannington TV transmitter north of Basingstoke on RB13 with 433.325MHz output, 434.925MHz input and either 1750Hz toneburst or 71.9Hz CTCSS access. The main service areas are Basingstoke, Fleet, Newbury, Thatcham and Reading. The repeater keeper is Noel Matthews, G8GTZ who can be e-mailed at g8gtz1@googlemail.com.

• A frequency source achieving fast switching and very low phase noise won best paper award at the November ARMMS Conference. In total fifteen papers were presented over two days. The next meeting is at Oxford on 19 and 20 April. You can download the papers from the Conference at www.armms.org.

• Aylesbury Vale RS have a new meeting place, the function room at The Doghouse Inn, Broughton Crossing, Broughton, Aylesbury, Bucks HP22 5AR. They meet at 8pm on the second Wednesday in the month.

Presentation by G4FKH

Gwyn Williams, G4FKH, who produces the RSGB HF predictions, gave an outstanding presentation to the Chelmsford ARS on the Flex-5000A software defined transceiver. He spoke to a packed audience and illustrated the benefits of software defined radios. His demonstration of a live CW contact during the presentation was particularly impressive. Gwyn has also been very active in promoting the use of Morse code among Chelmsford amateurs, a number of whom have taken up the mode.

GB4RNLI

The Scarborough Special Events Group will be on the air as GB4RNLI for the RNLI SOS week commencing 23 January. The QSL card shows the Scarborough Mersey class all-weather lifeboat and the D class inshore lifeboat exercising in the South Bay with HMS Explorer, an Archer class P2000 coastal training craft and a rescue helicopter from RAF Leconfield. QSL via the bureau or direct to club call G0000.

New Improved Radio Mate

The new improved bhi Radio Mate compact keypad for the Yaesu FT-817, FT-857, FT-897 now comes with extra features. There are now 40 memories, 20 pre-programmed and 20 filled with random frequencies and a direct frequency nudge function that allows you to fine tune the frequency on your radio directly from the keypad in steps of ±10Hz, 100Hz, 1kHz, 10kHz, 100kHz and 1MHz. Pressing the Dir, Mod or Mem buttons exits the frequency nudge mode. More details at www.bhi-ltd.com.

Wainwrights Award

Phil, G4OBK has become the first amateur to claim an award under the Wainwrights On The Air scheme. On 11 November, after a walk that started in Patterdale and took in Helvellyn and Striding Edge via several Wainwright summits, Phil contacted G4BLH, G0TDM, G4WHA/M and G1OHH from Birkhouse Moor, LDW-078, to complete activations of all the summits in Alfred Wainwright's Guide to the Eastern Fells and become eligible to claim an award.

Phil's next target is to activate all the Far Eastern Fells. His intention is to become the first amateur to make contacts from all 214 Wainwright fells in the Lake District. Wainwrights On The Air was set up in March 2009 by Julian Moss, G4ILO. For more information see the WOTA website, www.wota.org.uk.

JOTA 2009

The JOTA 2009 station GB2RUN at the Runway's End Scout Activity Centre was hailed a success by organisers from the Hog's Back ARC. Assisted by equipment on loan from Mad Jack's ARS Contest Group and Linear Amp (UK) courtesy of HBARC member Paul Cullen, G4KTZ, a continuous stream of worldwide contacts kept the visitors enrapt.

Frank Heritage, M0AEU, Odiham Scouts District Commissioner and HBARC member explained, "In my 27 years of involvement in JOTA this has been by far the most successful station, with 70 scout stations contacted on air, and 265 contacts in total over 52 countries. Our tribander at 100ft with 400W out gave us great HF signals all over the world, which was a thrill for our visiting scouts and their families." Scout Jack, 2E0SKZ is seen here running a lengthy pile-up of Californian stations.

Advance Upgrade

Mexborough & DARS has had two more successful candidates that have upgraded to the Advanced level. Pictured left is Kev, M0KVM, and on the right Chris, M0KCW. Congratulations from all at Mexborough & DARS.

NEWS IN BRIEF

• Paul Millington, 2E0PTM was elected to the position of Group Controller by the members of Mid Thames RAYNET at the Annual General Meeting. He was not replaced in the position of Deputy Controller, which remains a vacant post. Please use midthamesraynet@yahoo.co.uk for all e-mail correspondence relating to the Mid Thames RAYNET Group.

• Castles And Stately Homes On The Air have launched a new website for Northern Ireland, www.cashota-ni.org. All information and details of historical sites and how to activate them can be found here, including activation forms for those amateurs that wish to have a go gaining the award. Information can also be obtained from The Northern Ireland Representative, Bobby, 2I0ULL on 0774 7019 438. Gilford Castle will be activated on 22 January from 10pm on various HF bands and PSK by Bobby, 2I0ULL.

• Aberdare & District ARS will be putting on a Special Event Station again this year to celebrate the Nos Galan Races which are held every New Years Eve at Mountain Ash near Aberdare. The callsign this year will be GB0NG and will be active throughout the month of December. At last year's event, which was the 50th Anniversary of the event, the callsign GB5ONG was used and over 1000 contacts were made all over the World. More details can be found at www.radioclubs.net/aadars.

• In the Contest Supplement in December *RadCom*, the Camb Hams caption should have read G4ERO rather than G3ERO. Our apologies to both callsigns.

• The photograph and report on the PLC Meeting in Manchester was supplied by Stewart, G3PMJ. Our apologies for missing this from the report.

RSGB shop

FROM £6.74

RTTY/PSK31 for Radio Amateurs

By Roger Cooke, G3LDI

Data modes appear to be a daunting prospect to newly licensed radio amateurs, but they do not have to be. This book is a practical guide to the two most popular data modes, RTTY and PSK31.

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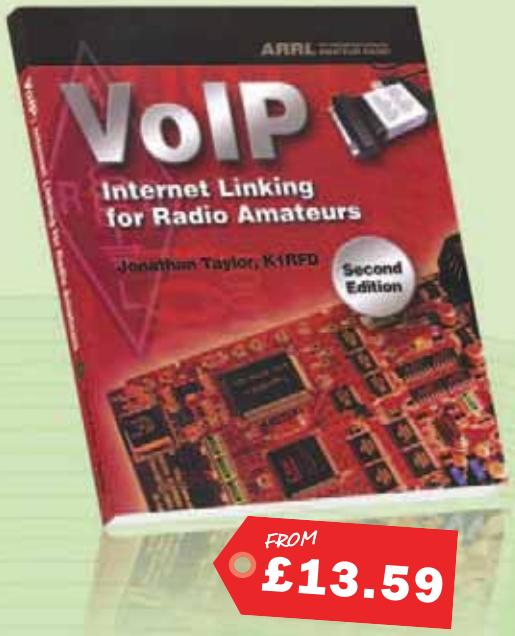
Free CD

The free CD that accompanies this book provides an A-Z of amateur radio data mode programs to get you started. You will also find reviews of equipment, lots of reference material and web links, essential reading for anybody interested in Data.

RTTY and PSK31 for Radio Amateurs does though carry a warning: Buying this book may lead to an enjoyment of RTTY, PSK31 and Data modes in general that is highly addictive.

Size 240x174mm, 32 pages, ISBN 9781-9050-8652-8

Non Members' Price £8.99 **RSGB Members' Price £6.74**



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By Jonathan Taylor, K1RFD

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Size 227x185mm, 144 pages, ISBN 9780-87259-926-4

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Premier Inn Course

Widnes and Runcorn ARC have concluded another successful Foundation course. The course, organised by lead instructor and RSGB President-elect Dave Wilson, M0OBW, was held over two days at The Premier Inn, Manchester Airport. Premier Inn's Duty Manager Helen Giddings offered the use of the hotel's conference facilities free of charge in an effort to support The Widnes and Runcorn ARC, which was much appreciated by all.

In total, 11 students studied hard and 10 out of 10 registered students passed the Foundation exam on Sunday afternoon. This achievement was not only due to the hard work of the students but also to the dedication of the instructors and assistants. These included, Dave, M0OBW, Dave, G1PIX, Albert, G3ZHE, Roland, G0GZI, Steve, M0SJR and Kevin, M0XDJ.

NEWS IN BRIEF

• The team of five GB2RS Newsreaders in NW England have been given transceivers for 2m, 4m and 6m for use in transmitting the news. The radios have come from Graham, G1PYA, a regular listener to GB2RS. The five newsreaders – G4GSY, G0MRL, G0NAJ, M1NTO and M0HDE – would like to record their very great thanks to Graham for this valuable gift, which is so clearly in the traditional spirit of amateur radio.

• It is with deep regret that Meirion ARS have to announce the passing of Bert Cooper, GW1ZBE. Bert was an honorary member of MARS after supporting the club for over 25 years and will be fondly remembered as a true gentleman in every sense of the word. Condolences go to his family in Dolgellau. MARS and the RSGB were represented at Bert's funeral by Max Heron, MW1KDP and thanks go to him for his attendance.

• M0CVO Antennas has changed its website URL to www.m0cvoantennas.co.uk. They will still be offering the same products for radio amateurs - antennas for HF, VHF and UHF, portable and fixed station use.

Intermediate Course Planned

Newbury & DARS is in its 8th year of providing courses and examinations on behalf of the RSGB at its exam centre in Newtown near Newbury, Berkshire. Some 370 licences have been obtained by people not only from Berkshire but from places as far a field as Jersey, Carmarthanshire, Cornwall and the Lake District through the efforts of the exam team.

Altogether, 19 Foundation and 8 Intermediate courses and exams have been held as well as 4 Advanced exams. This has involved some 291 Foundation, 75 Intermediate and 16 Advanced candidates. Several members of NADARS help regularly with the courses, including Tom, G4TPH who runs the Intermediate construction and practicals. Thorough preparation by the tutors has led to pass rates over 96%.

NADARS has already planned its 9th Intermediate Course to run early in 2010. More details about NADARS and its training can be found at www.nadars.org.uk or by e-mailing courses@nadars.org.uk.

Richard, G3ZGC shows the location of the UK 2m repeaters in a lecture to the Foundation candidates.

Four Foundation Licences

Tamworth ARS held a Foundation Course in October the successful candidates were Don, Matthew, (son of tutor Ian, G6IYS) Steve and Becky. Steve is Assistant District Commissioner for Scouts in Tamworth and is hoping to encourage scouts in the district to become licensed now that he is. The next Foundation course starts on 16 January. A few spaces are available; details can be had from Bob, G1BCZ.

Young Recruit

The Elderslie ARS believe that they may have the youngest Foundation licensee in Scotland. Stephanie (nicknamed 'bear'), aged 7, now holds the Foundation call MM6BER. After receiving her licence, she did some operating from the Gleniffer Braes while she was out with her family having a barbeque. Eddie, 2M0EDY, Dennis, MM0DNX and Alan, GM1SXX talked with her on 2m, later moving to 20m. Initially a little bit mic shy she was soon chatting about her experiences at school and how much fun she was having.

Thank You

Darren, M0PRV, Derek, M0RFY, Warren, M0WLS and Jim, M0JJK would like to thank Sutton & Cheam RC, especially their team of enthusiastic instructors, Martin, M1MRB, Paul, M0TZO and Tim, 2E0TTA with whose help and dedication brought them through from Foundation to Advanced inside 10 months.

Derek says, "We all came into radio from very different backgrounds and for different reasons, such as military radio restoration, propagation and ex-CB interests. Now we have all had QSOs around the world, built QRP transceivers and designed our own antenna systems to suit our particular interests and restricted locations. The learning doesn't stop with an Advanced ticket, like a new language there's no substitute for gaining experience other than getting on the air and just doing it".

GB4FUN in Northern Ireland

By Maurice Lynch

Pictued outside the GB4FUN Communications centre are year 8 students from Thornhill College, Derry with Science Teacher Martin Johnston and WELB Multimedia Support Officer, Philip Hosey.

Bryan McKinley, St John's High School, Dromore and his Year 12 classmates make contact with other radio operators around the globe at the GB4FUN 'Communications in Space' roadshow.

Nichole Nethery, Year 11 student Omagh Academy GS, Omagh is pictured demonstrating the 'Hat Cam' to her classmates, a communications device that transmits a signal from a mobile transmitter back to a terminal inside the vehicle at the 'Communications in Space' roadshow, held in the Technology Education Centre, Omagh.

We were delighted to welcome back the GB4FUN module to Northern Ireland for a second time. The new unit is a really worthwhile improvement on the previous model, in that it is more spacious and capable of handling an average class size with some comfort. The module is large enough to deliver talks and allow pupil interaction but also compact enough to park up at all the schools with minimal fuss and disruption. The mobility is also important and the fact that we were able to visit four centres, with only a short period of time required to dismantle and rebuild the module, was a huge plus. The design has been carefully thought out and it worked very well for the groups we were working with.

We decided, from an early stage of the planning, to ensure that the module would visit a significant number of schools and impact on as many pupils as possible. We choose four strategic locations across the Western Education and Library Board (WELB). The WELB in Northern Ireland is the local authority for the provision of education, library and youth services in the Council areas of Omagh, Fermanagh, Derry, Strabane and Limavady.

The largest population of students is in the Derry district and so we agreed to use two city locations and Thornhill College and Lisneal College were chosen. Omagh and Enniskillen were selected as the other venues further south in the Board. An online calendar was made available three weeks prior to the event and other schools were invited to bring groups along, for a one hour session, to attend the training. The host school generally took up the first and last slots in the day, to facilitate the transportation of pupils from the other locations. A number of schools in this district had previously availed of the training and what was particularly noticeable and welcomed was the uptake amongst girls. Science and Technology are strong in this region, this is evidenced by the fact there four Specialist schools in the immediate area.

The sessions themselves were extremely well received by both pupils and staff. The range of issues addressed through the talk and demonstration included:

- That radio communication is an area of study within Science
- Pupils were given a brief history of early communication including the work of Morse and Vale
- The increasing importance of voice transmission
- Demonstration on slow scan imagery
- A demonstration of the 'Hat Cam' Images
- HF Propagation – UHF/VHF
- Satellite space communication
- An explanation and demonstration of the various modes of transmission including a live link up to some far-off location which the pupils found fascinating
- The role of radio signals in remote control, research and military applications.

RSGB Amateur Radio Manager Carlos, G0AKI is knowledgeable and experienced in this particular field but his strength for me remains his ability to take a high level and complex subject like this and enthuse pupils by giving them a genuine understanding of how the technology works. His presentations are well planned and suited to the audience. He is a fantastic communicator and extremely enthusiastic. In Northern Ireland we all have a huge respect for Carlos and he will always be welcome to visit.

This has proved to be a really excellent visit and a large number of pupils (around 1000) received a really worthwhile experience. At the start of a year where we are trying to raise the profile of the STEM agenda, this visit has been the perfect introduction.

The GB4FUN Project

The RSGB is looking to recruit five 2-person teams to deliver high quality presentations to schools and organisations across the United Kingdom using the GB4FUN mobile classroom. The teams would be based in the South West, North of England, the Midlands, Wales and Scotland. Experience in towing caravans and trailers would be of benefit but is not essential. Experience in giving presentations would be of benefit but is not essential.

The RSGB is also looking to recruit two delivery drivers for the GB4FUN project. Based in the Bedford/Milton Keynes, their role will be to deliver the GB4FUN mobile classroom to the GB4FUN presentation teams based across the United Kingdom. Candidates must be willing to undertake full training, which will include a CRB check and the Caravan Club Motoring and Driving Course. They must also undertake to meet all booking commitments within their area of operations, which may mean several days away from home.

These are voluntary roles but the RSGB will pay travelling expenses and subsistence. Candidates must be fit and active and have a clean driving licence. These positions would suit active, fit early retirees who are experienced radio amateurs and technically adept.

If you are interested please e-mail GM.Dept@rsgb.org.uk enclosing a CV of your professional and amateur radio experience.

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All tuners cover 7-30MHz 300W

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- *Standard 'T' network*
- *VSWR meter*
- *0-200/0-2kW*
- *6-way Antenna/load switch*
- *Balanced feeder terminals*
- *Roller coaster Inductor*

W&S £289.95 C

MFJ-969 300W 1.8-54MHz ATU

- *'T' match network*
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This Ultra compact tuner covers 3.5-30MHz up to 150W and matches coax or wire. Size: 11.5 x 5.7 x 5.7cm

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* *300W*
* *Cross needle meter*
* *VSWR & 30/300W pwr meter*
* *Size 260x180x70mm*
* *Weight 1.6kg*

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* *Weight 865g*

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MFJ-976 BALANCED LINE ATU

* *1.8MHz - 30MHz * 1500W PEP*
* *Matches 600 Ohm open wire, 450, 300 Ohm ladder lines, 300/72 Ohm twin, coax & random wires*
* *Size 310x180x410mm*
* *Weight 4kg*

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MFJ-921 2m VHF ATU 200W

W&S £96.95 C

MFJ-924 70cms UHF ATU 200W

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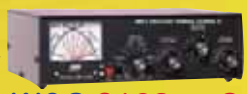
MFJ-834 RF CURRENT METER 1.8-30MHZ

* *Current: 0.3A, 1A, 3A*
* *Sockets: SO-239*
* *Calibrated RF ammeter (3in meter)*
* *Size: 140 x 86 x 79mm*
* *Weight: 425g*

W&S £84.95 C

MFJ-948 1.8-30MHz ANTENNA TUNER



* *300W*
* *Large cross needle meter*
* *30/300W PEP power meter*
* *Size 260 x 190 x 83mm*
* *Weight 1.65kg*

W&S £162.95 C

MFJ-949E 1.8-30MHz ATU / DUMMY LOAD

* *300W*
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* *Size 260 x 190 x 83mm*
* *Weight 1.8kg*

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* *1.8-30MHz 1kW max*
* *Less than 0.5dB loss*
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* *1.5kW SSB & CW*
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* *20,000 memories*
* *Radio interfaces optional*
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Tough all-weather tuner for hams and marine use. Ideal for end fed wires, this is really fast! Requires 10W min input.

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LCD readout, 20,000 memories, long wire & coax, radio interface.

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The new ultra small auto atu that sits snuggly with IC-706, FT-857, IC-7000 etc. Use with coax or wire. Great for mobile or base station use.

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MFJ-991B AUTO ATU 1.8-30MHz

* *Frequency: 1.8-30MHz*
* *150W SSB, 100W CW*
* *Matches 6 - 3200 Ohms*
* *Cross needle SWR/PWR meter*

W&S £209.95 C

MFJ-993B AUTO ATU 1.8-30MHz

* *Frequency: 1.8-30MHz*
* *300W SSB, 150W CW*
* *Matches 6 - 1600 Ohms*
* *Cross needle SWR/PWR*

W&S £249.95 C

MFJ-994B AUTO ATU 1.8-30MHz

* *Frequency: 1.8-30MHz*
* *600W SSB, 300W CW*
* *Matches 6 - 800 Ohms*
* *Cross needle SWR/PWR meter*

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Tel: 01592 756962 Fax: 01592 610451 Email: jayceecoms@aol.com

HF Antenna Selection

Diamond BB7V

* *HF 2 - 30MHz Base Vertical*
* *No radials needed*
* *250W PEP 6.7m length*
* *VSWR less than 2:1*
* *Weight 2.3kg*
* *50 Ohms SO-239*

Ideal antenna where space is restricted & no ground plane available, Erects in minuites.

£325.95 D

Diamond BB6W

* *HF 2 - 30MHz End Fed Wire*
* *No radials needed*
* *250W PEP 6.4m length*
* *VSWR less than 2:1*
* *Weight 0.8kg*
* *50 Ohms SO-239*

This is a beautifully engineered end fed wire system that is very compact and could also be great for indoor attic use.

£194.95 D

Diamond W-735 Short 80/40m Dipole

This is a superbly built loaded dipole for 80 and 40m. Overall length reduced from normal dipole dimensions by use of load coils rather than traps. Antenna contains all parts from load coils, pre-cut antenna.

£99.95 D

Radio Works USA G5RV PLUS

£79.95 C

* *80 - 10m (Inc WARC)*
* *Length: 31m (102ft)*
* *Feeder: 50 Ohms*
* *Matching: Y1-5K Precision Balun*
* *Transmatch: Required*
* *SWR: Low • Power: 1.5kW*
* *Extra strong ladder line: 9.4m (31ft)*

Well engineered, tough design, 1kW balun & proper feeder!

Radio Works USA Carolina Windom CW-80

The most famous all-band windom ever. A coax fed dipole that is fed off centre, with kW balun, line isolator & works all bands (inc ARC) 80m-10m. No traps. The short vetical feed section is forced to radiate & gives great low angle radiation. Total length approx 134ft. Can be bent to fit garden.

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WDC-50 Dipole Centre

A dipole centre piece with SO-239.

£6.95 A

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Dipole centre piece for 300 Ohm ribbon feeder.

£5.95 A

INSUL-8L Insulator

Dog bone insulator.

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Combined dipole centre & balun. 1kW 3MHz - 75MHz.

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This antenna includes 12V electronic control box & cable. Mount it on our three-way mag mount - its that easy!

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* *1.5:1 or less typical SWR*
* *200W to the antenna*
* *High-Q phenolic coil*
* *Black Hawk MotorTM*
* *Control box and filter*
* *Standard 3/8in base*
* *Remote control Box*
* *Stainless steel whip*
* *DC cable assembly*
* *Requires 12V DC*
* *Size: 1.2 - 1.37m*
* *Weight: 907g*

W-300T 3-Way Mag Mount for Sidekick **£39.95 C**

The 2KW **PLATINUM** **£549.95 D**
From 80m to 6m with VSWR of 1.5:1 or better, it outclasses everything - includes control box & cable.

The HS-1800/Pro is High Sierra's very latest version of their "all-band" 80m to 10m variable frequency mobile whip. With a coil nearly 5cm (2in) diameter, and a matching unit built into the Universal Mount Bracket, nothing out performs it and nothing approaches its standard of engineering. This really does radiate a potent signal. With 100 Watts, contacts are as easy as from a base station. The secret is in its amazing efficiency. We measured up to 6dB power gain compared with a simple helical - and you don't have to get out of the car to change bands!

GAP Antennas

Challenger-DX 8-band HF-VHF(illustrated)

* *Bands: 80, 40, 20, 15, 12, 10, 6, 2m. • 2kW PEP SSB*
* *VSWR: Better than 2:1 • 3/8 wave basic concept*
* *Height 9.6m (31.5ft) • Radials 3 x 7.6m (25ft)*
* *3ft drop-in ground socket supplied*
* *Can be mast mounted • Weight 8kg*

£299.95 D

Voyager-DX 4-Band LF

* *Bands: 160, 80, 40, 20m • 2kW PEP SSB*
* *VSWR: Better than 2:1 • Height 13.72m (45ft)*
* *Radials 3 x 17.4m (57ft) • Requires guys - brackets supplied • 2ft ground pivot assembly included*
* *Weight 13.6kg*

£389.95 D

Eagle-DX 6-Band

* *Bands: 40, 20, 17, 15, 12, 10m • 2kW PEP SSB*
* *VSWR: Better than 2:1 • GAP centre fed*
* *Height 6.4m (21ft) • 2m (80in) 3 x counterpoises*
* *Support pipe user supplied (31.75mm max)*
* *Weight: 4.9kg.*

£329.95 D

MFJ Compact Loop Antennas

MFJ-1788X £489.95 D

* *7 - 22MHz (40 - 15m)*
* *Size: <1m (36in) loop*
* *Feeder: 50 Ohms*
* *Power: 150W*
* *Remote control included*
* *Auto band selection*
* *Dual Fast/Slow tune buttons*
* *Built-in cross-needle VSWR/Wattmeter*

MFJ-1786X

* *10 - 30MHz*
* *Size: <1m (36in) loop*
* *Feeder: 50 Ohms*
* *Power: 150W*
* *Remote control included*
* *Auto band selection*
* *Dual Fast/Slow tune buttons*
* *Built-in cross-needle VSWR/Wattmeter*

£449.95 D

Watson Antennas Bargain Prices!

Pre-tuned & Weather Sealed Fibre-glass Encapsulation

W-30 2m/70cms 3/6dB length 1.15m 150W SO-239 **£49.95 C**

W-50 2m/70cms 4.5/7.2dB length 1.8m 150W SO-239 **£54.95 C**

W-300 2m/70cms 6.5/9dB length 3/1m 150W SO-239 **£74.95 D**

W-2000 6m/2m/70cms 2.15/6.2/8.4dB length 2.5m 150W **£85.95 C**

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Watson mobile antennas are made to a high specification and employ stainless steel whip sections with SO-239 receptors. All models are pre-tuned and will withstand at least 100 Watts RF.

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W-285	2m 3.4dBv length 1.33m	**£14.95 C**
W-77LS	2m/70cm 0/2.4dBv length 0.43m	**£14.95 C**
W-770HB	2m/70cm 3/5.5dBv length 1.1m	**£19.95 C**
W-7900	2m/70cm 5/7.5dBv length 1.58m	**£31.95 C**
W-627	6/2/70cm 2/4.5/7.2dBv length 1.6m	**£34.95 C**

WSM-270 Dual Band Mag Mount whip.
Ideal for use with handhelds or for occasional mobile. Just place it on the roof of the car and connect the 3m thin RG coax cable (terminated in BNC connector) to your radio. (cable adaptors available for all radios - extra).

£19.95 C

SGC Auto ATU

SGC-237

* *Frequency 1.8 to 60MHz*
* *Power input 3-100W (PEP) 40W max CW*
* *VSWR: <1.4:1 (typical)*
* *Antenna: Min length 2.4m 3.5-60MHz, min length 7m 1.8-60MHz*
* *Input impedance range 45 - 55 Ohms*
* *Output: Ceramic terminal*
* *DC supply 13.8V DC 0.3A*
* *Fully waterproof housing*
* *Size: 178 x 229 x 38mm*
* *Weight: 0.9kg*

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Works amazingly well even without any radials. Just insert a 1m earth stake into the ground and enjoy DX from the smallest of Gardens.

Spec.	6-BTV	5-BTV	4-BTV
No. Bands	6	5 4	
Bands	80,40,30,20, 15,10m	80,40,20, 15,10m	40,20,15, 10m
Width	Full	Full	Full
Width 80m	100kHz	100kHz	N/A
VSWR	1.15:1	1.15:1	1.15:1
Power	1kW	1kW	1kW
Base (mm)	44.45	44.45	44.45
Height (m)	7.3	7.64	6.52
Weight (kg)	7.48	7.7	6.8

6-BTV Was: £289 **Now: £249**
5-BTV Was: £249 **Now: £219**
4-BTV Was: £209 **Now: £179**

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A complete range of single band antennas. Purchase a base whip section and then as many resonators as you need. These are amazingly efficient and rated at 200W.

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Model		
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MO-3	137cm Non Folding	**£29.95 C**
MO-4	67cm Non Folding	**£26.95 C**

Resonator Heads

Model	Band	Bandwidth	
RM-10	10m	150-250kHz	**£21.95 C**
RM-11	11m	150-250kHz	**£21.95 C**
RM-12	12m	90-120kHz	**£21.95 C**
RM-15	15m	100-150kHz	**£21.95 C**
RM-17	17m	120-150kHz	**£26.95 C**
RM-20	20m	80-100kHz	**£26.95 C**
RM-30	30m	50-60kHz	**£29.95 C**
RM-35	40-30m	7-10MHz	**£29.95 C**
RM-40	40m	40-50kHz	**£29.95 C**
RM-50	60-40m	5-7MHz	**£29.95 C**
RM-60	60m	5MHz	**£32.95 C**
RM-80	80m	25-30kHz	**£32.95 C**

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We Stock The Range Of Hustler Products - We're Not Cherrypickers!

Homebrew

This month we build a low frequency receive converter that covers up to 80m and uses a 10.7MHz IF.

PHOTO 1: The front end of the LF receiver is a conventional low pass filter, mixer and buffer amp – see Figure 3.

A NEW BAND. This month's first project was built as a result of a conversation on 160m. Last winter Roger, GW3UEP asked me if I could hear the signals from his 600m beacon transmitter on 501.5kHz. As I had no LF receiver in the shack, I was unable to give him a report. My main transceiver only covers the amateur bands from 160m to 10m. I left the 160m QSO for a few minutes so that I could dig into the junk-box to see if I could find anything that could be quickly pressed into service as an LF receiver. The junk-box yielded a fistful of 1N5711 Schottky diodes and a few trifilar wound ferrite cored transformers that were left over from a previous project. This would serve as a mixer for a simple 500kHz to HF receive converter. All that was needed to complete the project was a local oscillator and suitable filter for the RF input.

One of the 10MHz oscillators that was used for the two-tone dynamic range tests in the January 2009 Homebrew was used as the local oscillator. This was a perfect device for this application. The 10MHz oscillator was designed to produce a high level, spectrally pure RF signal into a 50Ω load. This is exactly what is required at the LO port of a diode mixer. The only block that was missing was the input low pass filter (LPF). A repeat visit to the junk-box produced a few T131-8/90 powdered iron toroid cores. I decided to make a simple 3rd order PI LPF using a home made inductor and a couple of capacitors. As it was getting late and the 160m net was about to retire for the night, I didn't have time to come up with a proper filter design. A few quick mental calculations suggested than an inductance value of around 8-10μH and a pair of capacitors with a value of a few nF would be about right. This haphazard approach to RF design left me with a few problems. I wanted to use a pair of 3.3nF capacitors, but as there were none available at such short notice, I used a 2.2nF in parallel with 1nF for each of the two capacitors. The properties of the toroid cores were completely unknown, so I just put a few turns of insulated wire on one core and measured the inductance using an L-C meter [1]. 14 turns resulted in an inductance of around 10μH. This combination of component values makes a PI LPF with a cutoff frequency of about 1MHz. As this is well above the intended RF signal frequency of 0.5MHz, at least I had a fairly large margin of error to play with.

This collection of components was quickly assembled on a sheet of copper PCB laminate. The entire design, construction and testing process took no more than ten minutes! I connected one side of the 600Ω feedline to my HF doublet to the converter RF input, the crystal oscillator to the mixer LO port and the output from the IF port of the mixer to the input of my main station receiver. A 10.7MHz crystal was used in the local oscillator, meaning that 500kHz signals would be converted to 10.7 - 0.5 = 10.2MHz. I was pleasantly surprised to be able to hear GW3UEP as soon as I connected the aerial. It was one of those rare success stories where everything goes exactly according to plan.

The performance of this hastily-designed circuit turned out to be surprisingly good. The lack of RF amplification is certainly not a problem at LF. Several other beacons were heard including GI0DPE, as were several UK stations working on CW. I was also able to copy QRSS (very slow Morse) stations DI2AT and DI2AM from Germany. See **Figure 1**. The crude LPF at the receiver input only gives 50-60dB of IF rejection and IF image rejection, but this was usually enough to keep 10MHz signals from breaking through to the IF output.

After I had spent some time playing with the prototype, I decided to have a go at improving the circuit. The input filter was replaced by a 5th order LPF using a pair of toroid inductors and three capacitors in a PI configuration. The original circuit configuration worked very well at 500kHz, but it seemed a bit deaf at very low frequencies. This was probably due to the limited low frequency response of the mixer RF port. Since a diode DBM is a bidirectional device, I rearranged the circuit by connecting the RF input to the IF port of the mixer and taking the IF output from the RF port of the mixer. As the IF port is DC coupled, it works efficiently even at very low frequencies. This modification extends the frequency range of the converter from 1MHz all the way down to DC.

CONVERTER CONSTRUCTION. The Mk II version of the converter is shown in **Figure 2**. The revised input filter was designed as a 0.1dB ripple Chebyshev LPF with a cutoff frequency of 1MHz. The values were then tweaked slightly so that standard capacitor values could be used. The inductors are each 14t on a T131-8/90 core. The required value of inductance is 10.3μH, but this is not very critical and any value from 10.0μH to 10.5μH should be fine. This filter has more than 100dB rejection at 10MHz and above,

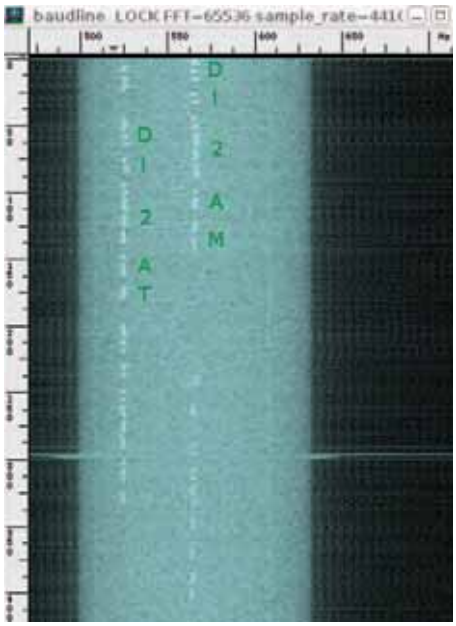


FIGURE 1: 600m QRSS signals from DI2AT and DI2AM.

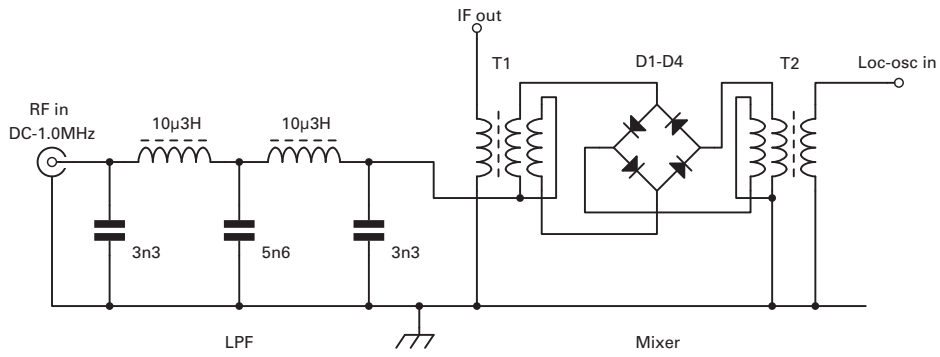


FIGURE 2: The Mk II LF converter

so for all practical purposes the IF image signal and IF breakthrough are completely eliminated.

The mixer is made from a ring of 1N5711 diodes. The mixer transformers are each 8 turns of enamelled copper wire, trifilar wound on a FT37-43 or similar ferrite toroid. A pre-packaged DBM can be used in place of the home made diode mixer. If you do decide to roll your own, the use of Schottky diodes is not mandatory: a ring of 1N4148 or 1N914 silicon diodes will also perform well in this circuit. The local oscillator was described in the January 2009 Homebrew. An alternative local oscillator will be described as part of our second project.

Testing is a very simple affair. Connect a suitably long aerial to the converter RF input and connect the output of the converter to a receiver that covers the 30m band. Use the MSF time signal on 60kHz to check frequency calibration. The original oscillator design has no provision for frequency adjustment. If required, you can place a 65pF (yellow) trimmer capacitor in series with the crystal for fine tuning of the local oscillator frequency. There are plenty of strong signals to be found at LF including time signals from DCF77 in Germany and long wave stations including BBC Radio 4 on 198kHz. Once you have confirmed that the converter is working properly, you can look for the weaker amateur signals on 500kHz and 137kHz.

Our next project is a more complicated superhet receiver for LF/MF. The design is a conventional superhet with a crystal IF filter. I used a pre-packaged 8 pole 10.7MHz SSB crystal filter. Any IF filter in the 7-12MHz range should perform equally well. Suitable candidates include 6 and 8 pole 9MHz SSB or CW filters and 7.8MHz or 10.695MHz SSB filters from old CB rigs. If a suitable filter is not available, you can always make a crystal ladder filter using low cost CPU clock crystals [2].

A LF/MF SUPERHET RECEIVER. The RF front end is broadly based on the earlier LF converter project. I decided to extend the frequency range up to 4MHz so that the receiver also covers the 160m and 80m amateur bands. In summary: the receiver is an up-conversion type of superhet with a 10.7MHz IF. Frequency coverage extends from DC up to 4MHz. A product detector is used for demodulation of SSB, CW and some digital modes. A conventional VFO can be used as the local oscillator, but a high stability synthesised oscillator is preferable because most amateur transmissions at LF/VLF use modulation modes which occupy a very narrow bandwidth. I used the AD9851 DDS from the October 09 Homebrew as the local oscillator.

FRONT END. The schematic of the RF front end is shown in **Figure 3**. The input LPF is a 9th order 0.1dB Chebyshev design. This filter has a nice flat response up to 4MHz and about 100dB of rejection of signals at 10MHz and above. The 2.8µH inductors are 23t of enamelled copper on a T50-2 powdered iron toroid. The 3.1µH inductors are 25t, also on a T50-2 core. The mixer transformers are each 8 turns, trifilar wound on an FT37-43 ferrite toroid. The post mixer amplifier is a 2N3866 or 2N5109 VHF/UHF power transistor. A small clip-on heatsink is required for this stage. T3 is 10 turns bifilar wound on a FT37-43 toroid. The gain of the amplifier is 20dB. The amplifier is followed by a 4dB attenuator, giving an overall amplifier stage gain of 16dB.

I ran into a problem when I was testing the amplifier stage. The measured gain was around -10dB. Apart from this dramatic loss of gain, the amplifier was otherwise well behaved. It had a flat response from LF to well above 40MHz, tapering off in the VHF region. A quick check of DC voltages showed that the bias conditions were about right. The transistor was running warm, but not hot. I even replaced the transistor and checked over the circuit several times without finding the problem! After much muttering and head scratching, I eventually discovered that I had used the wrong resistor values in the attenuator. The 4dB attenuator should have two 220Ω shunt resistors and one series 22Ω resistor. I had installed two 22Ω shunt resistors and a series resistor of 220Ω! As the great American philosopher Homer would have said: D'oh! Even if you think that you know what you are doing and you are sure that everything is done properly, check, check and check again. Once the resistors were replaced, the amplifier performed as expected. The attenuator is followed by a simple 1:10 impedance transformer which matches the 50Ω amplifier output to the 500Ω impedance of the SSB filter in the IF amplifier module. T4 is 13 turns on a T37-43 with the 50Ω tap at 4 turns from the grounded side.

IF AMPLIFIER. Over the last few decades, most amateur IF amplifier designs have been based on ICs. Some of the most popular devices were designed for use as IF amplifiers

FIGURE 3: Circuit diagram of the RF front end shown in Photo 1.

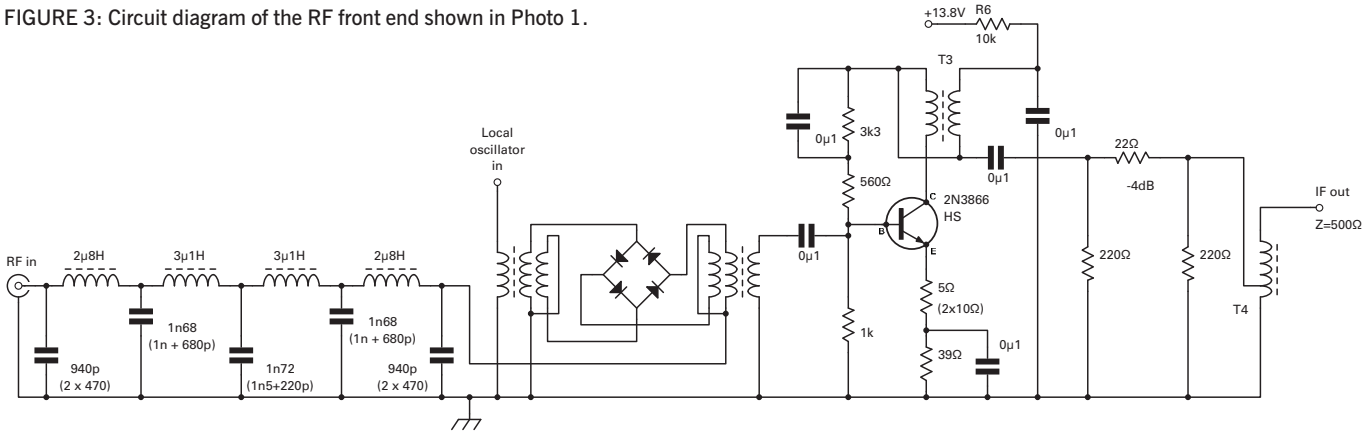


PHOTO 2: One IF amplifier, with the crystal filter on the left.

or video amplifiers in TV, radio and radar equipment. Many of the most popular devices are now obsolete and will not be readily available in the future. It would be unwise to use these devices in a new design. Using readily available discrete components will guarantee that a new design will remain viable in the future. I decided that I would bridge the gap between IC and discrete amplifiers by using a pair of the differential amplifier modules that were described in the September 2009 Homebrew. These modules have three surface mount MMBT3904 transistors mounted on a small PCB. If you don't want to use surface mount components, you can use ordinary 2N3904 transistors instead.

I intend to build at least three IF strips based on this design: one for this project, one for a new HF transceiver and one for a future 2m transceiver.

The schematic of one of the IF amplifier modules is shown in **Figure 4**. Approximate DC voltages are shown on the diagram. Q1 and Q2 form a 'cascode' amplifier, which has substantial gain at 10.7MHz. If the AGC control voltage is between 0V and 5V, Q3 is biased off and it has no effect on the operation of the amplifier. As the AGC voltage is increased above 5V, Q3 will start to conduct and draw some of the Q1 collector current. As Q1 is configured as a constant-current source, any current drawn by Q3 will lead to a reduction in current through Q2. This 'current stealing' AGC method is widely used in IC amplifiers. The gain of each IF amplifier module was measured at 45-50dB, falling to around 0dB with 6V applied to the AGC input.

IF AMP CONSTRUCTION. The amplifier modules are fixed to a sheet of copper PCB laminate using a small drop of cyanoacrylate adhesive (eg Guper Glue). The transistors on the PCB module are the only SM components used in the amplifier. The resistors are ordinary 0.25W metal film. Fixed capacitors are ceramic disc types. The IF frequency trimmer capacitor is 65pF (Maplin WL72P or similar). The IF transformer in the collector circuit of Q2 is a T50-2 toroid with a 31t primary and 8t secondary. You should follow good HF/VHF practice when building the circuit. All decoupling capacitors should have short lead lengths. **Photo 2** shows one of the two identical IF amplifiers.

The completed IF strip, consisting of two amplifier modules and the IF filter, was found have a gain of 85-90dB (including the loss of the filter and input matching transformer), which suggests an amplifier gain of 90-95dB. A very high gain tuned amplifier with a high Q filter at the input is a perfect recipe for instability, so I was quite surprised to find that the circuit was unconditionally stable. I fitted a 100Ω resistor in series with the input of the second stage because previous experience has shown that this will have little impact on the gain of the amplifier but it can significantly improve the stability. **Figure 5** shows the arrangement of the IF amplifiers and product detector.

The product detector is another diode DBM made from a ring of 1N5711 diodes. This is identical to the mixers described earlier. T1 and T2 are 8t, trifilar wound. A 50Ω resistor and 100nF capacitor make a crude but effective diplexer. This ensures that the mixer IF port is properly terminated for RF/IF signals and only the demodulated AF signal is passed to the audio amplifier stages. The product detector is followed by a common-base AF amplifier stage. The output from this stage can be used to drive the line input of a PC sound card or an audio power amplifier IC.

BFO/CIO. The initial tests of the IF strip used the 10MHz test oscillator mentioned earlier as the carrier insertion oscillator / beat frequency oscillator (CIO/BFO). There are some problems with this oscillator, though: there is no way to make fine frequency adjustments and no way of switching the frequency for USB/LSB operation. Frequency stability was not an important consideration when the oscillator was used for two-tone testing. The DC supply of the oscillator is not stabilised and the components used in the circuit were not chosen with frequency stability in mind. However, this is not ideal for narrow bandwidth modes like QRSS or PSK31, which require good short- and long-term frequency stability.

A new oscillator design is shown in **Figure 6**. The DC supply is stabilised by a 7808 voltage regulator. A pair of oscillators are used, one each for USB and LSB. This approach was used because it is easier to switch the DC supply to the oscillators rather than switching the crystals directly, and the other components are cheap. The output from the oscillators is buffered by an emitter-follower (common-collector) amplifier based on Q3. Further amplification is provided by Q4. Harmonics are suppressed by a LPF.

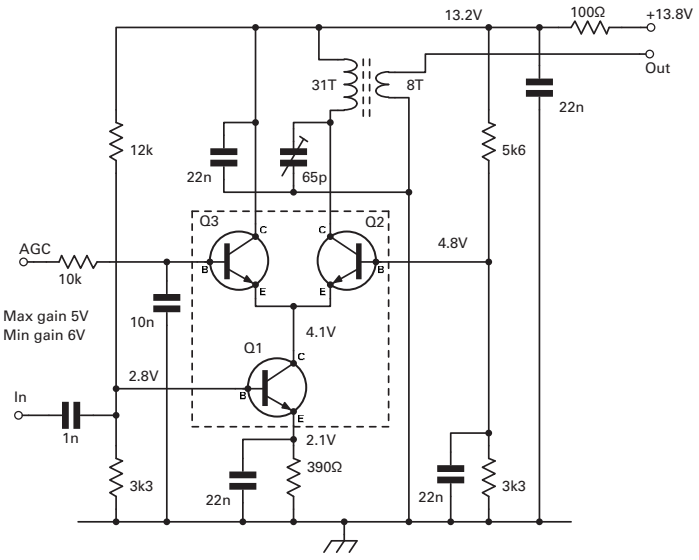


FIGURE 4: Circuit diagram of the IF amplifier module shown in Photo 2 (less crystal filter).

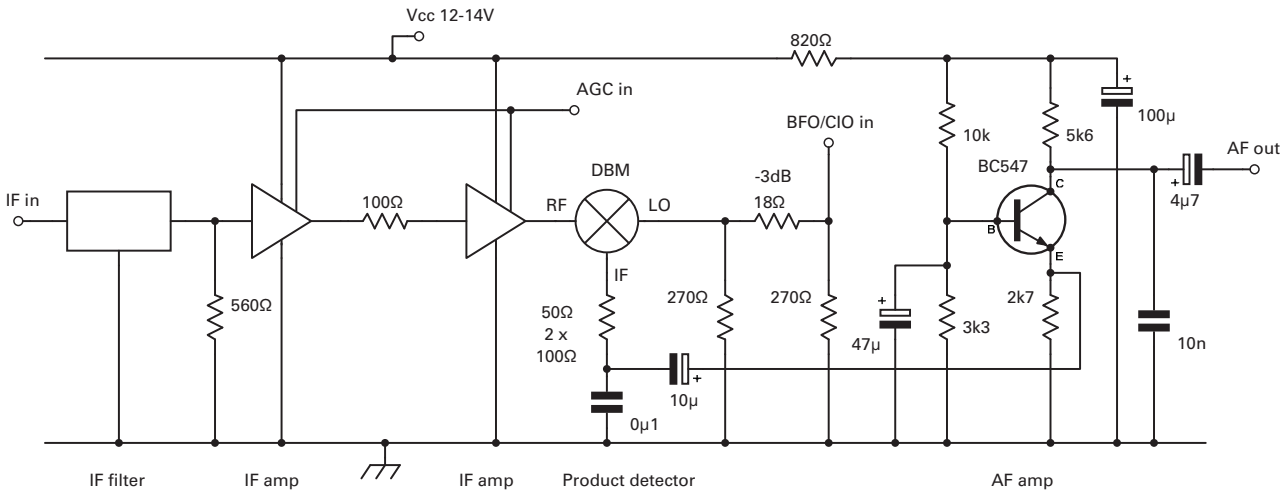


FIGURE 5: Arrangement of the IF amplifiers and product detector.

The 1µH inductors are 13t on a T50-2 core. A 3dB attenuator is fitted between the oscillator and the LO port of the product detector. This oscillator would also make an ideal local oscillator for the simple LF converter project.

OSCILLATOR CONSTRUCTION. The circuit was built using point-to-point wiring on a strip of PCB. I used BC547 transistors for Q1, Q2 and Q3 in the oscillator module. Q4 is a 2N3866 or similar VHF power transistor fitted with a small heatsink. If you want to achieve the best possible frequency stability, the passive components in the two oscillators should be chosen carefully. The 220pF and 22pF capacitors should be high stability polystyrene, silvered-mica or NPO ceramic types. The frequency trimmer capacitors should be of the highest possible quality. Air spaced trimmers or brass/ceramic UHF piston trimmers are the best choice. I was aiming for a drift rate of 1Hz per hour after a few minutes warm up. This level of performance proved to be unachievable, but the drift I achieved is about 1Hz per hour after a one hour warm, provided that there are no dramatic changes in shack temperature.

TESTING. The circuits built so far were wired up as a rather ugly rat's nest. The local oscillator signal was provided by a DDS signal generator based on the October 09 project. The AF output was fed to the Line In connector of my PC sound card. Using my HF doublet as an aerial, I was able to receive good signals from LF to 80m. The stronger signals caused severe overloading of the output AF amplifier. I used a 10k multi-turn pot across the 13.8V supply to provide some form of gain control. This gave me an opportunity to evaluate the performance of the IF gain control system. The first tests would suggest that the total gain of the receiver is too high for use on LF. With 10-15dB of IF gain reduction, the receiver becomes much more usable. Very strong SSB stations on 80m required 20-30dB of IF gain reduction to keep the AF output below the clipping level. With full gain control voltage of more than 6V applied, the receiver gain was reduced to the extent that even the strongest broadcast stations were no longer audible.

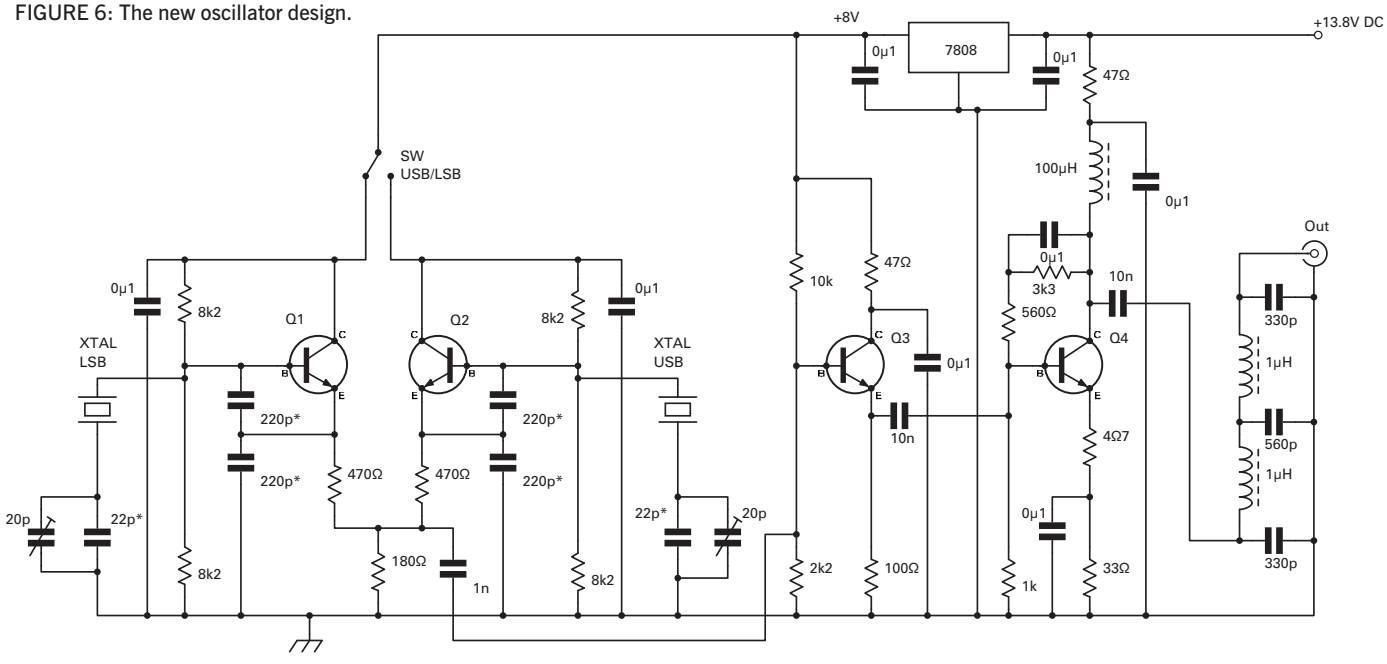
The quality of received SSB and CW signals is excellent. Selectivity is a function of the IF filter: the 8 pole filter I used has a bandwidth of about 2.5kHz. You can find a short sample of a signal received from KF8DX on 80m here: http://tinyurl.com/yb3o3qg.

Next month we will continue developing the receiver and build the AGC circuit.

REFERENCES:

[1] http://ironbark.bendigo.latrobe.edu.au/~rice/lc/ and Homebrew, May 2008
[2] Homebrew, *RadCom* March 2006

FIGURE 6: The new oscillator design.



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Spectran HF-6085 Spectrum Analyser with Hyperlog® 6080 antenna

How does this hand-held EMC spectrum analyser fare in the amateur radio world?

PHOTO 1: Spectran HF-6065 with attached log periodic antenna. (The HF-6085 is similar.)

INTRODUCTION. The Aaronia Spectran HF-6085 is a hand-held portable RF spectrum analyser (see **Photo 1**). It operates from internal rechargeable batteries or an external 5V supply via a mini-USB socket. The front panel is dominated by a large LCD with a 51x25 (sic) pixel spectrum display, bargraph and numeric indicators. Beneath the display is a keypad for entering setup data. The analyser is supplied with a compact log periodic measurement antenna (shown attached) and various accessories including an SMA cable, mains charger and a large, sturdy aluminium carrying case. A 12 volt car charger is available as an optional accessory.

The analyser and antenna are designed for RF field strength measurements from transmitters such as mobile phone base stations or wireless LANs. The Spectran HF-6085 tested here covers the frequency range 10MHz - 8GHz. Other models are available that cover frequency ranges down to 1Hz and up to 9.4GHz, but the whole range is not available in a single instrument.

The review model had a 'beta test' version of the firmware. Aaronia say they are expecting to release a final version fairly soon, which addresses some of the issues found in this review.

IN USE. The analyser has five preset frequency scan ranges 1GHz wide covering 0 - 5GHz. There are also five other preset frequency ranges that cover GSM900, GSM1800 and UMTS mobile phone bands plus 2.4GHz wireless LANs and 1.9GHz DECT cordless phones. A custom frequency sweep can be set for other ranges. Start and stop or centre frequency and span can be set, as can resolution bandwidth, video bandwidth, sweep time and many other settings. Although it is possible to set a sweep that starts from 0Hz, useful measurements can only be made above 10MHz on this model.

Up to three markers can be set and these search for the three highest peaks on each sweep, displaying the frequency and amplitude. An edgewise dial activates a cursor that can be moved across the spectrum display to indicate the frequency of a particular peak. This information updates at the end of each sweep, which may take a few seconds in some cases.

If the analyser is used with one of the antennas available from Aaronia, it is possible to set a mode that takes into account the typical antenna factor and measure RF field strength in volts per metre or watts per square metre. There are various other functions related to field strength and RF exposure measurement. The Hyperlog® 6080 log periodic antenna supplied with the review unit is specified to cover 700MHz - 8GHz so measurements can only be related to field strength over that range of frequencies. A short rod antenna is also supplied, useful as a sniffer.

An AM/FM demodulation facility is included and this allows the type of signal to be identified, for example different types of digital mobile phone transmissions. There is also a logging function that can store a log of the amplitude and frequency of the strongest signal in the sweep range although the manual recommends an optional memory expansion if the logging function is to be used.

The instruction manual mentions that the noise floor of the instrument varies greatly with frequency. It was found to vary from -54dBm to -79dBm at various points on the preset 0 - 1GHz sweep. With no input, the apparent noise floor at a particular frequency may fluctuate by ±10dB although this can be reduced by using a smaller frequency span or a slower sweep.

AMATEUR USE. What about the sort of things that radio amateurs might use a spectrum analyser for? Is it useful for tasks such as checking harmonics from an amateur transmitter, looking at sidebands of a transmitter or searching for nearby interference sources?

First, the maximum input power is 0dBm (1mW) so great care would be required to use suitable attenuation if testing a transmitter. Secondly, it is of limited use in the HF band because the lowest measurement frequency is specified as 10MHz. The instruction manual mentions 'aliases' and 'mirror frequencies' which appear to be spurious responses; for example, a strong 400MHz signal also appears at 800MHz, 1200MHz and 1600MHz.

Regarding other spurious responses, the manual says that the frequency difference between the main signal and its 'alias' is multiples of 20MHz and that the level difference between the 'alias' signals and the main signal is "typically very large (20 - 30dB)". That may be large enough to minimise errors when measuring the power of a carrier but it is rather small in the context of radio communication test and measurement. For example, when looking for spurious outputs from an amateur transmitter, it would be difficult to distinguish between harmonics actually present at a transmitter output and harmonics or spurious responses generated in the analyser.

The resolution bandwidth can be set to 'full' (50MHz!) and from 3MHz down to 1kHz. As expected, reducing the resolution bandwidth results in a corresponding reduction in the noise floor with no signal input. Nevertheless, any carrier within the sweep range can lift the apparent noise floor in a broad peak centred on the carrier. This can make it difficult to resolve sidebands of a transmitter, even on the narrowest 1kHz bandwidth setting.

With any spectrum analyser, it is wise to consider the legal position before connecting it to an antenna. In the UK, the Wireless Telegraphy Act 2006 does not permit you to receive a radio message other than a broadcast

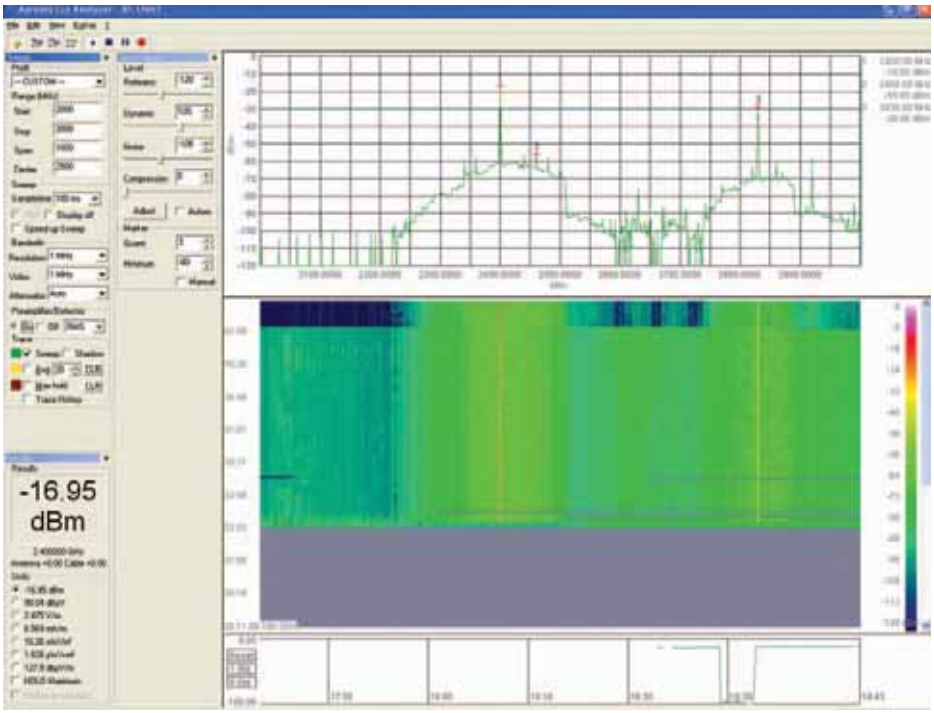

FIGURE 1: Spectran HF-6085 computer software display of a 2.4GHz signal with a 2 - 3GHz sweep.

signal or a licensed radio amateur transmission. It could be argued that simply looking at emissions in the electromagnetic spectrum without demodulating any intelligible information does not actually constitute reception of a message.

LABORATORY TESTS. The Spectran HF-6085 was tested in a laboratory using an RF signal generator and the measurements were compared to a Rohde and Schwarz (R&S) FS300 spectrum analyse as a reference (but only up to 3GHz, which is the highest frequency of the R&S FS300). As the Spectran HF-6085 has a much smaller size and lower cost than the R&S analyser, comparable performance cannot be expected.

When using the HF-6085 to measure narrow band signals such as an unmodulated carrier, care is required to make sure that the resolution bandwidth setting is not too narrow relative to the sweep width. If the resolution bandwidth is narrower than the frequency step of the spectrum analyser, it may miss signals or give incorrect readings that are too low. Provided this source of error is avoided, amplitude readings on the HF-6085 were generally within 2 - 3dB of the reading on the R&S FS300. This is quite reasonable.

The HF-6085 is supplied with PC software that allows it to be connected to a PC via a USB cable. The software reads the settings from the analyser, captures the trace and also shows a 'waterfall' spectrum display and a graph of amplitude against time (see **Figure 1**). This software was used to produce the screen images shown in this review.

The first test signal was a 2.4GHz signal at -20dBm from an RF signal generator. The HF-6085 was set to scan a preset 2 - 3GHz range but the resolution bandwidth was set to 1MHz instead of the default of 3MHz. The built-in preamp was switched on. The result is shown in Figure 1 with a vertical scale of 10dB per division. It can be seen that in addition to the wanted signal at 2.4GHz, there is a spurious response at 2.8GHz that is less than 10dB below the wanted signal. It is understood that this is caused by a bug in the firmware that will be fixed on the final version. The PC software has an option to hide image responses that are spaced by 20MHz from the wanted signal and this option was enabled in Figure 1. Without it, there would be more spikes. **Figure 2** shows the trace from the R&S FS300 for comparison, with the same frequency range and bandwidth settings.

FIGURE 3: Spectran HF-6085 display of a 432MHz signal in a 1MHz span. Note peak in noise floor.

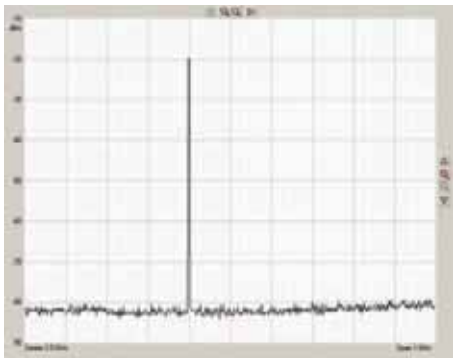

FIGURE 2: Rohde & Schwarz FS300 display with similar parameters to Figure 1.

The second test signal was a 432MHz signal at -20dBm. The Spectran HF-6085 was set to scan a custom range with a centre frequency of 432MHz and a span of 1MHz. It was found that if the resolution bandwidth was set to 1kHz, the indicated amplitude of the signals was 10dB too low but this is also understood to be a known bug in the firmware that will be fixed in the final release. If a bandwidth of 3kHz was used, the amplitude measurement was reasonably accurate. The result is shown in **Figure 3** with a vertical scale of 10dB per division. It can be seen that there is a broad peak in the apparent noise floor and there are some spurious peaks at intervals of 50kHz. Figure 4 shows the corresponding display from the R&S FS300.

CONCLUSION. The Spectran HF-6085 and its associated antenna is best suited for field strength measurements above 700MHz. It could also be used in EMC pre-compliance radiated emission testing above 700MHz (or from 30MHz upwards with a different measuring antenna). Nevertheless, the limited RF performance and spurious responses of the analyser mean that it has restricted use for some of the general RF test and measurement tasks, particularly checking for spurious outputs from transmitters.

We would like to thank Aaronia Ltd, www.aaronia.co.uk, for lending the review HF-6085.

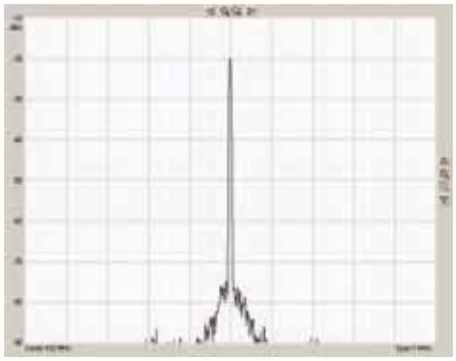

FIGURE 4: R&S FS300 display of the same signal as Figure 3.

Membership Focus

Planning permission for the radio amateur

PLANNING ADVISORY COMMITTEE. The Planning Advisory Committee exists to assist members with planning applications, enforcement notices and planning appeals. Committee members will not actually prepare your planning application or submit and appeal on your behalf but can check your application or provide you with a suggested appeal strategy.

The Committee also provides a guide to the planning process and this is available free of charge from RSGB HQ or as a download from the member's only website.

YOUR RSGB. Membership of the RSGB is more than just *RadCom* every month. Over the forthcoming months we will be focusing on some of the other benefits of your RSGB Membership. This month it's planning permission. The Planning Advisory Committee has prepared this article to guide you through the process and can provide help when you need it via their website, www.rsgb.org/committees/pac.php.

PLANNING PERMISSION. Many, if not most, radio amateurs never see the need to apply for planning permission for their aerials. After all, the aerials work just as well without it and there is a school of thought that if you don't ask for planning permission the Planning Department can't be tempted to say no. This might seem an attractive argument if you use small, visually unobtrusive wire aerials, but if you have aspirations of anything more substantial you are likely to fall foul of the local Planning Department.

URBAN MYTHS. Unfortunately holding an amateur radio licence in the United Kingdom does not convey any special 'rights' under planning legislation to have an aerial and there are a number of urban myths circulating regarding the need for planning permission. Amateur radio aerials and masts are generally treated as a residential development in exactly the same as a garage or conservatory and will require planning permission unless they come under one of the following categories:

Temporary – Present for a total of 28 calendar days in a year or less. That fact that it is in a ground socket and is easily removed is not enough, it's the degree of permanence that counts.

PHOTO 1: 18m mast granted planning permission on appeal. Photo courtesy G3SEM.

De minimis – Visual impact is too small to be a concern to the planning process. There is no legal definition what is de minimis and it is left in the first instance to the interpretation of the Planning Department, but it has been successfully argued that a single wire dipole can be classed as de minimis when it uses existing structures such as a tree to support it. Should you receive an enforcement notice claiming that your installation is not de minimis and you disagree, you can appeal the enforcement notice.

Permitted Development – The Town and Country Planning (General Permitted Development) (Amendments) (No. 2) (England) Order 2008 permits certain alterations and/or improvements to an existing dwellinghouses without the need for planning permission. Although no references are made in this Order to amateur radio aerials and masts, some radio amateurs have successfully argued under Part 1, Class A of the Order that an aerial, mast or pole to the rear of and attached to a dwelling house is an 'enlargement, improvement or alteration

PHOTO 2: A thing of beauty to you but what do the neighbours think? Photo courtesy MM0OVK.

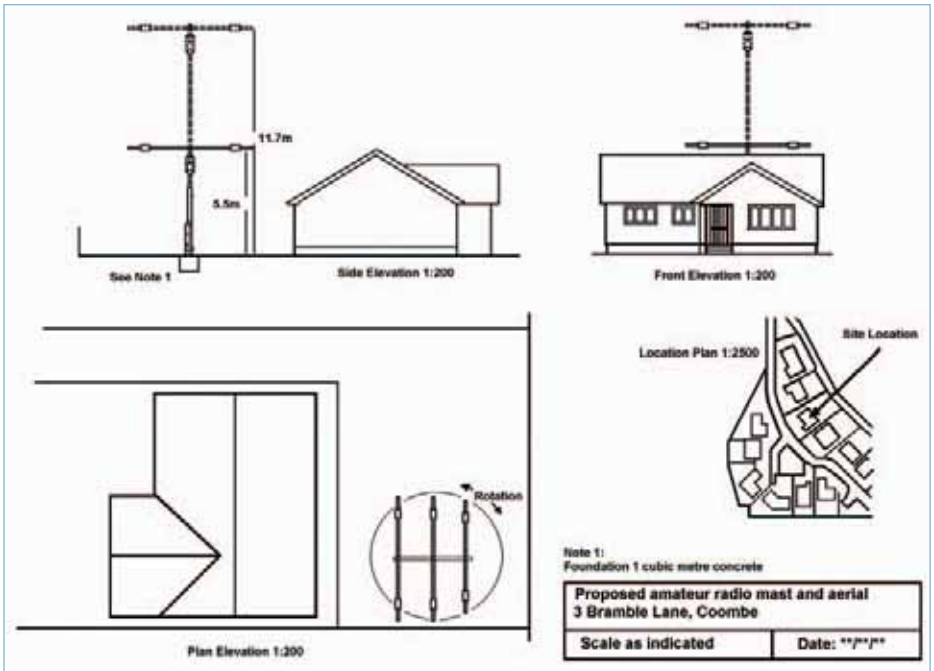

PHOTO 3: Plan layout for planning permission.

of a dwellinghouse' *provided the aerial or mast does not protrude above the ridge of the roof*. Similarly, it has been successfully argued that a freestanding mast up to 3m in height to the rear of the property is also permitted development.

There is currently no legal ruling on whether this type of installation is actually covered by the provision and it is left in the first instance to the interpretation of individual Planning Departments, but it is known that some Planning Departments do accept this argument whilst others don't. Some planners will seek to limit the size of aerials attached to masts under this Order, but it should be noted that the size restrictions for aerials in this Order refers only to *satellite and microwave aerials*. The Order gives no guidance on HF or other aerials. Similar legislation (often verbatim) exists in other parts of the United Kingdom.

Mobile installation – The legal position regarding mobile masts is uncertain if the mast is used for more than 28 days per year in the one location. Some radio amateurs have successfully argued that mobile masts are plant and do not need planning permission whilst others have failed and had enforcement notices served on them.

4 year rule – If your house is not a listed building and you have had your aerials and masts present *and unchanged* for 4 years or more then no enforcement action can be taken against you. You may be required to prove that the installation has been there for 4 years or more but this need only be a letter of confirmation from your immediate neighbours or a receipt if it was commercially installed. Remember if you change any part of the installation, eg the aerial, the clock starts again for the part you have changed.

A Certificate of Lawfulness for your aerials and mast can be obtained from the Planning Department after four years if you want one but there is no legal requirement to do this.

APPLYING FOR PLANNING PERMISSION.

Each local authority will have their own planning permission application forms, but they generally follow a similar style. They will typically require you to complete a Householders Planning Application form, a site location plan(s) and a development plan(s) showing the dimensions of the proposed aerial and/or mast and the distances to your property and the boundary with neighbouring properties. The number of copies and scale for these plans will be specified by the Planning Department in their planning pack. The drawings need not be professionally prepared as long as it is clear what your proposals are and they are to the scale specified by the Planning Department. If you forget to show the aerial on your planning drawings you may receive planning permission for the mast only – without permission to attach any aerials.

You will also need to complete a neighbourhood notification form detailing your 'notifiable neighbours'. A notifiable neighbour is someone who shares a boundary with your property or directly faces any part your property from across the road. It is worth discussing your proposals with them before making your submission that way when the official notice comes through the door it will not be a surprise. If you have TVI issues get these resolved first as although TVI is not part of the planning process, experience has shown they will just object on other grounds, usually visual amenity.

Before formally submitting your planning application, ask if you can discuss the submission with your case officer. Minor changes at this stage may alleviate any concerns he/she may have, giving your application a better chance of success. You can also contact RSGB HQ to ask to put in contact with a member of the Planning Advisory Committee to discuss your proposals prior to submission. A letter of support from the RSGB for your proposed aerial or mast is also available on request.

REFUSAL TO GRANT PLANNING PERMISSION.

Sadly not all planning applications are successful and there is sometimes no apparent reason why one Planning Department will grant planning permission for an aerial and mast in one area and another in a neighbouring area will refuse planning permission for a near identical installation.

You will have been told why your application was refused, usually it's on the grounds of visual amenity. Consider if the Planning Department has a valid point. To a radio amateur a large beam is a thing of beauty and a joy to own, but what do your neighbours think? Does it overly dominate the area? The Planning Department has to weigh up the rights of all involved, not simply take sides. You will usually be able to resubmit a revised application free of charge if it is less than 12 months from the original application. If appropriate, reconsider a less ambitious proposal.

If however you believe the Planning Department has treated your application unfairly you have the right of appeal to the Planning Inspectorate (England and Wales), the Planning Appeals Commission (Northern Ireland) or The Directorate for Planning and Environmental Appeals (DPEA), (Scotland).

The appeal must be made within six months from the planning decision and is usually made in the form of 'Written Submission'. No charge is made for the appeal it is simply a matter of filling in the appropriate form and submitting your evidence writing. It is also possible to submit your planning appeal electronically, but all documentation must be supplied in an electronic form.

To be successful you must state why you believe the original decision was unsound. Simply saying you disagree or it will curtail your operations as a licensed radio amateur is not enough. You must establish that the Planning Department has failed to comply with planning law, policy or guidelines, or has sought to impose a different standard on your application than it has done for others.

The RSGB's Planning Advisory Committee can assist members in the preparation of a planning appeal if required. If you require assistance contact RSGB HQ who will put you in touch with your nearest Committee member.

If your appeal is not upheld and you have not used up your free resubmission, you can submit a revised proposal free of change if it is still less than 12 months from the original application.

ENFORCEMENT NOTICES. The Planning Department is likely to take enforcement action against you in two circumstances:

1: Where you have erected an aerial or mast which, in the Planning Department's opinion, requires permission and you have not obtained it; or
2: Where the Planning Department alleges that you have breached a condition attached to the planning permission they have issued (for example to keep the mast down when not in use).

The first is the most common. If you have not already submitted an application and had it refused, the Planning Department will normally write to invite you to submit an application. It is usually worth doing so unless you want to argue that you have permitted development rights for the aerial or they are de minimalist.

The Planning Department may serve on you a Planning Contravention Notice. This requires you to give certain information as to ownership or to attend the Planning Department's Offices at a specific date and time to give details of your installation and why you believe it does not need planning permission (for example, because it's permitted development or de minimalist). You must comply with the Notice, if you fail to do so you may be prosecuted.

If the Planning Department is not satisfied with your explanation they may elect to issue you an Enforcement Notice. The Planning Department can only do this if they can give reasons why they would not consider granting planning permission and may have to justify their decision to the Planning Inspectorate.

If an Enforcement Notice is issued it will set out what the Planning Department want you do. Usually this will require you to remove the aerial and/or mast.

Should you be served an Enforcement Notice you have two choices:

1: To comply - remove the offending aerial, mast, etc; or
2: To appeal. You must appeal within 28 days of receiving the Notice. Details on how to appeal are available from the Planning Inspectorate, Scottish Government and the Northern Ireland Planning Appeals Commission websites listed below.

If the notice relates to a breach of conditions, the Planning Department may serve on you an ordinary enforcement notice, (against which you can appeal as above), or alternatively a Breach of Condition Notice, against which there is no appeal.

Failure to comply with an Enforcement Notice quickly leads to legal action being taken against you, so don't ignore them. If the Planning Department considers that the aerial/mast has a severe environmental concern which requires immediate action they can apply to the Court for an injunction. If such an injunction is granted, you must comply or you will be prosecuted.

TENANCY MATTERS. As well as requiring planning permission, tenants will generally require the permission of their landlord to erect aerials on their property. Many Council tenants think having been granted planning permission by the Council also includes landlord's permission or vice versa. This is not always so and you should check as you require both. Private tenants should always obtain permission from their landlords before erecting any aerial to ensure they are not breaking their tenancy agreement.

Unfortunately landlord's permission is sometimes withheld even though planning permission was given. I regret the RSGB cannot assist with tenancy disputes, however general information on how to complain about tenancy matters can be found at the 'Howtocomplain.com' website at www.howtocomplain.com/cgi-php/cat_info.php3?MajorID=8&MinorID=11. This is an independent website and the RSGB cannot accept responsibility for any errors or omissions in the advice given.

PHOTO 4: Minibeams can give acceptable performance with a smaller visual impact.

PLANNING

The Planning Advisory Committee is looking to recruit additional members in the North West of England and the North of Scotland to assist with this valuable service to members. Potential members need not be planners although it would be ideal if you were but you should be involved with or retired from a discipline associated with the planning process or have a good working knowledge of the planning process associated with amateur radio masts and aerials through personal experience.

The duties include assisting members with planning enquiries, enforcement notices and appeals but will not include the actual preparation of planning applications on behalf of members. Full assistance and backup is available to assist you in this process.

If you think you can assist please contact Len Paget, GM0ONX on 01563 534383 or by email to PAC.Chairman@RSGB.org.uk.

WEBSEARCH

England/Wales
Online planning information: www.planningportal.gov.uk/
Planning appeals and enforcement notices: http://planning-inspectorate.gov.uk

Scotland
Online planning information: https://eplanning.scotland.gov.uk
Planning Appeals: www.dpea.scotland.gov.uk

Northern Ireland
Online Planning Information: www.planningni.gov.uk
Planning Appeals: www.pacni.gov.uk

Manufacturers of radio communication antennas and associated products

HF Verticals

Heavy duty design HF verticals, with high power preparation, all with great performance

VR3000	3 Band 10-15-20M, Length 3.8M, Power 2000 Watts (without radials)	~~£149.95~~ **now £99.95**
EVX4000	4 Band 10-15-20-40M, Length 6.5M, Power 2000 Watts (without radials)	~~£159.95~~ **now £119.95**
EVX5000	5 Band 10-15-20-40-80M, Length 7.3M, Power 2000 Watts (without radials)	~~£199.95~~ **now £150.00**
EVX6000	6 Band 10-15-20-30-40-80M, Length 5.0M, Power 2000 Watts (including radials)	~~£349.95~~ **now £275.00**
EVX8000	8 Band 10-12-15-17-20-30-40 (80M Optional), Length 4.9M, Power 2000 Watts (including radials)	~~£349.95~~ **now £275.00**
EVXKIT-80	Radial kit for above to add 80M includes radial plus extension top section	**£129.95**

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	**£17.95**
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)	**£24.95**
MRQ750	2/70cm, Gain 5.5/8.0dBd, Length 150cm, PL259 fitting (high quality)	**£34.95**
MR2 POWER ROD	2/70cm, Gain 3.5/6.5dBd, Length 50cm, PL259 fitting (fibreglass collinear)	**£24.95**
MR3 POWER ROD	2/70cm, Gain 2.0/3.5dBd, Length 50cm, PL259 fitting (fibreglass collinear)	**£29.95**
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**

Mono Band End Fed Verticals

Great single band antennas at great prices!

HV-2	2m ½ wave, Gain 2.5dBd, Length 130cm, SO239	**£29.95**
HV-4	4m ½ wave, Gain 2.5dBd, Length 200cm, SO239	**£44.95**
HV-6	6m ½ wave, Gain 2.5dBd, Length 300cm, SO239	**£49.95**
HV-658	6m 5/8 wave, Gain 2.5dBd, Length 375cm, SO239	**£59.95**

Mono Band Collinear Verticals

Totally encapsulated GRP fibreglass antennas which require no tuning!

BM33	70cm 2 X 5/8, Gain 7.0dBd, Length 100cm, N-Type	**£44.95**
BM45	70cm 3 X 5/8, Gain 8.5dBd, Length 155cm, N-Type	**£54.95**
BM55	70cm 4 X 5/8, Gain 10dBd, Length 250cm, N-Type	**£74.95**
BM60	2m 5/8, Gain 5.5dBd, Length 155cm, N-Type	**£54.95**
BM65	2m 2 X 5/8, Gain 8.0dBd, Length 250cm, N-Type	**£79.95**
BM75	2m 3 X 5/8, Gain 8.0dBd, Length 430cm, N-Type	**£99.95**
BM140	4m 1/2, Gain 2.75dBd, Length 230cm, N-Type	**£69.95**
BM260	6m 1/2, Gain 2.75dBd, Length 285cm, N-Type	**£89.95**

HF Mobiles

Get great results with the Moonraker range of HF mobiles !
... from as little as £17.95!

AMPRO-10	28MHz, Length 220cm, 38th fitting (slimline design)	**£17.95**
AMPRO-12	24MHz, Length 220cm, 38th fitting (slimline design)	**£17.95**
AMPRO-15	21MHz, Length 220cm, 38th fitting (slimline design)	**£17.95**
AMPRO-17	18MHz, Length 220cm, 38th fitting (slimline design)	**£17.95**
AMPRO-20	14MHz, Length 220cm, 38th fitting (slimline design)	**£17.95**
AMPRO-30	10MHz, Length 220cm, 38th fitting (slimline design)	**£17.95**
AMPRO-40	7.0MHz, Length 220cm, 38th fitting (slimline design)	**£17.95**
AMPRO-80	3.5MHz, Length 220cm, 38th fitting (slimline design)	**£19.95**
AMPRO-160	28MHz, Length 220cm, 38th fitting (heavy duty design)	**£17.95**
ATOM-20S	14MHz, Length 130cm, PL259 fitting (compact design)	**£24.95**
ATOM-40S	7.0MHz, Length 165cm, PL259 fitting (compact design)	**£26.95**
ATOM-80S	14MHz, Length 165cm, PL259 fitting (compact design)	**£29.95**

Tarheel Motorised Mobile

The best USA motorised antennas available here from Moonraker the European distributor – All models in stock now!

Little Tarheel II 3.5-54MHz 200W max length 48"	**£349.95**
Tarheel 40A HP 7-34MHz 1.5Kw max length 8ft	**£429.95**
Tarheel 75A 7-34MHz 250W max length 8ft	**£429.95**
Tarheel 100A 3.4-30MHz 1.5Kw max length 10.4ft	**£449.95**
Tarheel 200A HP 3.4-28MHz 1.5Kw max length12ft	**£479.95**
Tarheel 300A 1.7-30MHz 250W max length 11.4ft	**£449.95**
Tarheel 400A 1.7-30MHz 250W max length 12ft	**£479.95**

GP2500

All Band HF Vertical

This is the perfect answer for anyone with limited space and requires no radials. Covering 80 through to 6M with a VSWR below 1.5:1 !!

Frequency 3.5-57MHz without tuner, Power 250 Watts, Length 7.13M

All at an amazing £199.95 !

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

SQBM105P	2/70cm, Gain 2/4.5dBd, RX 25-2000MHz, Length 70cm, SO239 (Radial Free)	**£39.95**
SQBM105N	2/70cm, Gain 2/4.5dBd, RX 25-2000MHz, Length 70cm, N-type (Radial Free)	**£44.95**
SQBM110P	2/70cm, Gain 3/6dBd, RX 25-2000MHz, Length 100cm, SO239 (Radial Free)	**£54.95**
SQBM110N	2/70cm, Gain 3/6dBd, RX 25-2000MHz, Length 100cm, N-Type (Radial Free)	**£59.95**
SQBM200P	2/70cm, Gain 4.5/7.5dBd, RX 25-2000MHz, Length 155cm, SO239	**£54.95**
SQBM200N	2/70cm, Gain 4.5/7.5dBd, RX 25-2000MHz, Length 155cm, N-Type	**£59.95**
SQBM500P	2/70cm, Gain 6.8/9.2dBd, RX 25-2000MHz, Length 250cm, SO239	**£64.95**
SQBM500N	2/70cm, Gain 6.8/9.2dBd, RX 25-2000MHz, Length 250cm, N-Type	**£69.95**
SQBM800N	2/70cm, Gain 8.5/12.5dBd, RX 25-2000MHz, Length 520cm, N-Type	**£129.95**
SQBM1000P	6/2/70cm, Gain 3.0/6.2/8.4dBd, RX 25-2000MHz, Length 250cm, SO239	**£79.95**
SQBM1000N	6/2/70cm, Gain 3.0/6.2/8.4dBd, RX 25-2000MHz, Length 250cm, N-Type	**£84.95**
SQBM223N	2/70/23cm, Gain 4.5/7.5/12.5dBd, RX 25-2000MHz, Length 155cm, N-Type	**£69.95**

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-200	6 Band plug n' go mobile, 6/10/15/20/40/80m, Length 130cm, Power 120W, 3/8th fitting	**£39.95**
SPX-200S	6 Band plug n' go mobile, 6/10/15/20/40/80m, Length 130cm, Power 120W, PL259 fitting	**£44.95**
SPX-300	9 Band plug n' go mobile, 6/10/12/15/17/20/30/40/80m, Length 165cm, High Power 200W, 3/8th fitting	**£54.95**
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**
AMPRO-MB6	6 Band mobile 6/10/15/20/40/80m, length 220cm, 200W, 3/8th fitting, (great for static use or even home base – can tune on four bands at once)	**£69.95**
ATOM-AT4	10/6/2/70cm Gain 2m 2.8dBd 70cm 5.5dBd, Length 132cm, PL259 fitting (perfect for FT-8900R)	**£59.95**
ATOM-AT5	5 Band mobile 40/15/6/2/70cm, Length just 130cm, 200W (2/70) 120W (40-6M) PL259 fitting, (great antenna, great price and no band changing, one antenna, five bands)	**£69.95**
ATOM-AT7	7 Band mobile 40/20/15/10/6/2/70cm, Length just 200cm, 200W (2/70) 120W (40-6M) PL259 fitting, (great antenna, great price and no band changing, one antenna, five bands)	**£79.95**





If we advertise it – we stock it!

Yagi Antennas

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

YG27-4	Dual band 2/70 4 Element (Boom 42") (Gain 6.0dBd)	**£49.95**
YG4-2C	2 metre 4 Element (Boom 48") (Gain 7dBd)	**£29.95**
YG5-2	2 metre 5 Element (Boom 63") (Gain 10dBd)	**£49.95**
YG8-2	2 metre 8 Element (Boom 125") (Gain 12dBd)	**£69.95**
YG11-2	2 metre 11 Element (Boom 185") (Gain 13dBd)	**£99.95**
YG3-4	4 metre 3 Element (Boom 45") (Gain 8dBd)	**£59.95**
YG5-4	4 metre 5 Element (Boom 104") (Gain 10dBd)	**£69.95**
YG3-6	6 metre 3 Element (Boom 72") (Gain 7.5dBd)	**£64.95**
YG5-6	6 metre 5 Element (Boom 142") (Gain 9.5dBd)	**£84.95**
YG13-70	70 cm 13 Element (Boom 76") (Gain 12.5dBd)	**£49.95**

ZL Special Yagi Antennas

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

ZL5-2	2 Metre 5 Ele, Boom 95cm, Gain 9.5dBd	**£49.95**
ZL7-2	2 Metre 7 Ele, Boom 150cm, Gain 12dBd	**£59.95**
ZL12-2	2 Metre 12 Ele, Boom 315cm, Gain 9.5dBd	**£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**
HB9-10	10 metre (Boom 52")	**£69.95**
HB9-627	6/2/70 Triband (Boom 45")	**£69.95**

Halo Loops

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

HLP-2	2 metre (size approx 300mm square)	**£19.95**
HLP-4	4 metre (size approx 600mm square)	**£29.95**
HLP-6	6 metre (size approx 800mm square)	**£39.95**

G5RV Wire Antennas

The most popular wire antenna available in different grades to suit every amateur .... All from just £19.95!

G5RV-HSS	Standard Half Size Enamelled Version, 51ft Long, 10-40 Metres	**£19.95**
G5RV-FSS	Standard Full Size Enamelled Version, 102ft Long, 10-80 Metres	**£24.95**
G5RV-DSS	Standard Double Size Enamelled Version, 204ft Long, 10-160 Metres	**£49.95**
G5RV-HSH	Half Size Hard Drawn Version, pre-stretched, 51ft Long, 10-40 Metres	**£24.95**
G5RV-FSH	Full Size Hard Drawn Version, pre-stretched, 102ft Long, 10-80 Metres	**£29.95**
G5RV-HSF	Half Size Original High Quality Flexweave Version, 51ft Long, 10-40 Metres	**£29.95**
G5RV-FSF	Full Size Original High Quality Flexweave Version, 102ft Long, 10-80 Metres	**£34.95**
G5RV-HSP	Half Size Original PVC Coated Flexweave Version, 51ft Long, 10-40 Metres	**£34.95**
G5RV-FSP	Full Size Original PVC Coated Flexweave Version, 102ft Long, 10-80 Metres	**£39.95**
G5RV-HSX	Half Size Deluxe Version with 450 Ohm ladder, 51ft Long, 10-40 Metres	**£44.95**
G5RV-FSX	Full Size Deluxe Version with 450 Ohm ladder, 102ft Long, 10-80 Metres	**£49.95**

Accessories

G5RV-IND	Convert any half size G5RV to full with these great inductors, adds 8ft on each leg	**£24.95**
G5RV-CHOKE	inline balun to reduce RF feedback	**£39.95**
TSS-1	Pair of stainless steel springs to take the tension out of a G5RV or similar	**£19.95**

Trapped Wire Dipole Antennas

Commercial quality trapped wire dipoles that resonate, so require no ATU!

MDT-6 FREQ:40 & 160m LENGTH: 28m POWER: 1000 Watts **£79.95**

MTD-1 (3 BAND) FREQ:10-15-20 Mtrs LENGTH:7.40 Mtrs POWER:1000 Watts **£69.95**

MTD-2 (2 BAND) FREQ:40-80 Mtrs LENGTH: 20Mtrs POWER:1000 Watts **£79.95**

MTD-3 (3 BAND) FREQ:40-80-160 Mtrs LENGTH: 32.5m POWER: 1000 Watts **£129.95**

MTD-4 (3 BAND) FREQ: 12-17-30 Mtrs LENGTH: 10.5m POWER: 1000 Watts **£69.95**

MTD-5 (5 BAND) FREQ: 10-15-20-40-80 Mtrs LENGTH: 20m POWER:1000 Watts **£119.95**

(MTD-5 is a crossed di-pole with 4 legs)

Portable

What's the best portable HF aerial?

SOTA activators are seldom upstaged but this is one case where they were. The photograph shows an 'extreme ironing' expedition to the summit of Tryfan (just over 3000ft) in North Wales. This coincided with a SOTA activation by members of the Cambridge University Wireless Society (their mast can be seen in the background). Tryfan was busy that day with visits from three separate groups of SOTA activators! Photo courtesy Dominic, M0BLF.

WHAT ANTENNA? The most common question that I am asked by people intending to try portable HF operating is 'what's the best portable HF aerial?' As with so many questions, the answer depends upon several factors. My response therefore is usually some further questions to try to decide what it is that needs to be done. The key factors to consider are:

- What frequency band or bands do you want to use?
- What sort of communications are you looking for (inter-continental, round Europe or UK)?
- What sort of operating do you intend (super-light weight, mountain topping, picnic table, camper van, etc)
- What level of complexity do you want?
- Buy or build?

Rather than look at each point in detail, let's examine some typical scenarios.

Bill and his wife have a camper van. They tend to stop on campsites where Bill would like to call in to his favourite local 80m net in the afternoon. Bill wonders if a commercial loaded vertical might be a good choice?

If we assume that Bill will be portable in the UK and that his net is of UK stations, he will need a high angle of radiation to have the best chance of joining in. In theory, a loaded vertical will have a deep null in its radiation pattern that will include some of the angles that he will need for reliable communications. In reality, a small vertical with little or no earth system will not display this deep null. However, it will almost certainly be an inefficient radiator. D layer absorption during the daytime on 80m will further weaken his signal and thus a vertical is not a good choice. Bill would do better using a doublet, a simple dipole or a long-wire at least a quarter-wavelength long. These could be supported on a mast attached to one corner of his camper van. A 'rule of thumb' for the height of the ends of the wire is to keep them at least 1/40th of a wavelength above the ground; this is 2m on 80m. For reliable communications during the day, he should use at least 100 watts.

Tracy enjoys mountaineering and also enjoys CW on 17m. She wonders if a dipole would be a good choice of aerial to allow her to combine her two activities?

While a dipole might work quite well for Tracy, it will need a mast of some sort to support it (mountains seldom have suitable trees on top!). She could reduce weight and complexity by using a quarter-wave vertical that would perform at least as well as a dipole in most situations and at angles of radiation will give her the best results on 17m. This would require a mast of about 4m length and two or three quarter-wave radials.

Greg has just started doing SOTA activations and wants to try SSB on the HF bands.

Greg's problem is a common one! He is not sure which bands he wants to use and he wants to use low power SSB. To maximise his chances of success, he will need an efficient multi-band aerial. Over the years SOTA operators have tried numerous alternatives to fulfil this requirement and only a few designs have proved successful. Greg's best option is probably a 'linked dipole' – a design that has been popularised by John Clifford, GW4BVE. This is a dipole cut for the lowest band Greg might use (probably 80m) with links for the higher bands. By opening the right pairs of links, the dipole can be used on any of the predetermined bands. Typically, these are made for 80/60/40 and 20m. The centre of the dipole is supported by a lightweight fishing pole mast (7m is a popular size) and this is held vertical with a single back-guy (the legs of dipole form the other guys). A linked dipole is lighter and more efficient than a trapped dipole but it does require manual intervention to change bands.

Other popular option is a doublet which again is a multi-band aerial. This will require an aerial matching unit to be used but might allow a slightly faster band-change than a linked dipole. LB Cebik's website gives some useful information on how to design a good multi-band doublet.

I imagine that some reader's requirements will be different to the scenarios above so feel free to e-mail them to me. If there are any unusual ones, maybe I will include some suggestions in a future column.

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Linked dipoles. GW4BVE started using single pole PowerPole connectors in the links but has now moved on to using 2mm gold connectors as used by radio control modellers. The whole antenna including feeder and carry bag weighs 580g. Photo courtesy GW4BVE.

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Antennas

Getting a quart antenna into a pint pot garden

PHOTO 1: The elevated radial system being tested with a Hustler 6BTV antenna.

SMALL SPACE, BIG PROBLEM. The most frequently asked questions I receive in my e-mail, or raised at when I give talks on antennas, is the subject of making or selecting a suitable HF antenna for a restricted QTH. The situation is worse for the lower HF bands where the efficiency of the antenna falls dramatically if you try to make it too small. A half wave dipole for 3.6MHz is 130ft (40m) long and most modern QTHs do not have anything like that sort of space.

A BACKYARD ANTENNA. What I am about to propose, as a possible solution to antennas in QTHs with very little space, is based on an antenna I made many years ago for an amateur friend. He wanted an antenna for the 80m band but lived in a small two-up two-down house with nothing more than a back yard that was about 18ft (5.5m) square. Furthermore, it was paved, with no provision for an earth connection. The only redeeming feature was concrete washing line pole in the far corner of the yard.

I made a scaffold pole extension to the clothes post for a mast. The chimney was pressed into service as an additional support. The objective was to get as much wire into the restricted space as possible, with the area of greatest current as high as possible. The length of the wire element was not measured, just made to fit the space. It resulted in an open loop structure as shown in **Figure 1**. To my recollection the whole structure was about 16ft (4.9m) square. The antenna was fed in the centre and matched to the rig using an ATU in the shack.

Surprisingly, we were able to work stations around the UK on 80m SSB using a QRP rig. Theoretically, the performance of this antenna is very poor. According to EZNEC, the feed point has a feed resistance of about 3Ω and a reactance greater than –j1000, which should have put it outside the impedance matching range of any normal ATU. No doubt matching efficiency was also poor and the feedline loss was high.

I recently used an EZNEC model in an attempt to improve the performance of this antenna. I started with the introduction of a couple of loading coils. A value of 70μH brought the structure into near resonance with a feed impedance of R13 +j20, which is a lot more manageable as far as matching is concerned. A 70μH coil can be made by winding 75 turns of 18SWG wire on a 1.6in (40mm) diameter section of plastic waste pipe. This value is not critical because the antenna is tuned with an ATU.

The model predicted a gain of –6dBi; probably due to the current in the lower section of the open loop cancelling the radiation from the upper section. (To put this into perspective, a good quality 80m mobile antenna has a gain of around –10 to –12dBi.) The gain can be improved by routing the end sections away from each other.

The model also predicts that the antenna will work on other bands but, for some bands, such as 7MHz, the coil may have to be shorted out using jumper wires. The required accessibility of these coils is the reason why they are placed fairly close to the ends of the elements, which are close to the ground.

This antenna does not have to be a true square or even orientated in the vertical position. It can be made so that the square is sloping or lopsided. The most important consideration is to make it as large as your small QTH will allow. The chances are that if you can make it larger than shown in Figure 1, the antenna will work without loading coils on 80m. The antenna is fed with 300Ω balanced line feeder because it has a lower loss than coax with high values of SWR. The ribbon feeder is connected straight to a short length of RG213 via a 1:1 balun.

The shack end of the coax feeder is connected to the coax connector on the ATU. Do not take the twin feeder straight to the balanced feeder connections of the ATU because this routes the connections via a 4:1 transformer found in most ATUs. This will worsen the impedance matching ratio. Because the antenna is electrically small, the feeder will be in close proximity to the radiating elements. This will probably cause common mode currents on the feeder and a 1:1 current choke will be useful in minimising these.

VERTICAL ANTENNAS. For small spaces, vertical antennas appear to be an attractive option. They can generate low takeoff angles of radiation, which means long skip distances. However, there can be problems with installing verticals. The instructions with some commercial verticals allege that you can use them without radials. With the exception of the vertical dipole, a dipole on its end, a vertical antenna is only half an antenna, the radial and the ground is the other half.

ELEVATED RADIALS. You can use resonant elevated radials with a feed point at least 5ft (1.5m) above the ground. With this you need at least two tuned radials per band, and they must not touch the ground. For a small number of radials, the higher you can get the feed point (and radials) the better.

Walter Blanchard, G3JKV tested a Hustler 6BTV on behalf of the Dorking Amateur Radio Club using this approach. The instructions stated that Hustler antennas will work with just a simple earth rod but will perform better with radials. To test this out, G3JKV mounted the antenna it on a tilt-over swivel so it could be lowered for easily for adjustment. The swivel point was about 5ft above ground. The aluminium ground pole was 2in diameter and sunk 5ft (1.5m) into the ground, giving a 10ft (3m) total length. It would not work properly using just the ground pole for earth, which may have been the result of a poor sandy earth. It would not resonate anywhere near the ham bands and where it did resonate the SWR was very high.

Various radials were tried. All the radials were attached at approximately the swivel point. The antenna worked well provided 3 or 4 radials were used, but fewer radials resulted in a reduced performance. Radials spaced out equally around 360° (about every 20°) gave the best results.

After many experimental antenna and radial adjustments a SWR 1.2:1 or less on every band was achieved. However, to get this sort of performance, a cat's cradle of radial wires and sticks was required. With three radials per band, nearly 500ft (150m) of wire was used, all up on sticks at head height around the garden – and that made the garden unusable. Hustler recommends 14SWG or larger gauge copper wire. G3JKV priced the radial wire material on the web at over £200, which is nearly as much as the aerial.

G3JKV goes on to say that this vertical definitely picked up more local noise than his 40ft (12m) high horizontal dipoles. WSPR [1] worked and heard a lot more DX using the wire dipoles than this vertical. Averaging over a large number of different stations and bands using WSPR showed the dipoles had something like a 10dB advantage.

If you haven't got 40ft (12m) high dipoles then a vertical may still be the way to go. It has a low visual impact and has a low angle of radiation provided that they are in the clear of other metal objects and as far away as possible from house electrical wiring.

If you can settle for a single band antenna, the radial problem is nowhere near as acute. My first DX in the late 1950s was working all around South America on 15m using a vertical with four sloping radials. The base was around 12ft high and, as I recall, it was a very simple antenna to construct.

GROUND RADIALS. Most lower HF band DXers use vertical antennas, usually in some sort of multiple antenna gain configuration such as a four square. These antennas are normally ground mounted, that is to say the feed point is just above the ground, with lots of radials on (or slightly under) the soil.

For a ground-mounted vertical mounted over average soil, you will need at least 16 radials, 30ft (9m) long for frequencies 3.5MHz and above. That is 480ft (144m) of wire. More and longer is better, especially for 40/80m operation. John Stanley, K4ERO, notes [2] that if you have the luxury of laying down 120 radials, 33m (108ft) long, the same antenna will have 3dB extra gain compared with the 16 radial model described previously. The downside is that it will take around 13,000ft (4000m) of wire – yes, two and a half miles! Small diameter wire can be used for these radials because there are so many of them to share the return currents. They are also in parallel with the ground currents in the earth.

Ground radials need not be resonant. This is a misconception based on elevated or ground plane type elements. They are different from the elevated ground plane radials in this regard since ground radials supplement ground currents and do not try to replace them entirely. Elevated ground plane radials, especially if few in number, need to be bit longer than 1/4 wave at the operating frequency.

What you absolutely have to avoid with ground radials is to put the feed point a short distance in the air, then run radials down and along the ground.

Ground radials do not actually need to be much longer than the antenna is tall. A shortened antenna with loading coils will have a more compact near field where the majority of the antenna field is. The ground needs only reach out as far as the near field extends. Field intensity drops off with the square of the distance from the base of the antenna.

Keen lower HF band DXers invest a lot of time and effort in building a good ground radial system, particularly with a multi element vertical where a radial system is required for each vertical element.

A practical remotely tuned multiband antenna used with an automatic ATU is shown in **Figure 2**. If we assume the vertical and horizontal sections of the antenna are each 25ft (7.6m), this will make a near quarter wave antenna on 80m and a half wave on 40m. If you want the antenna for 40m and above the total length of the antenna can be shortened and the lengths of the radials can be halved.

FIGURE 1: Suggested layout of a compact 80m plus other bands antenna. The RF voltages at the ends of the antenna are high during transmit so they should be high enough to avoid accidental contact. The loading coils can be provided with jumper wires if the antenna is used on the higher frequency bands.

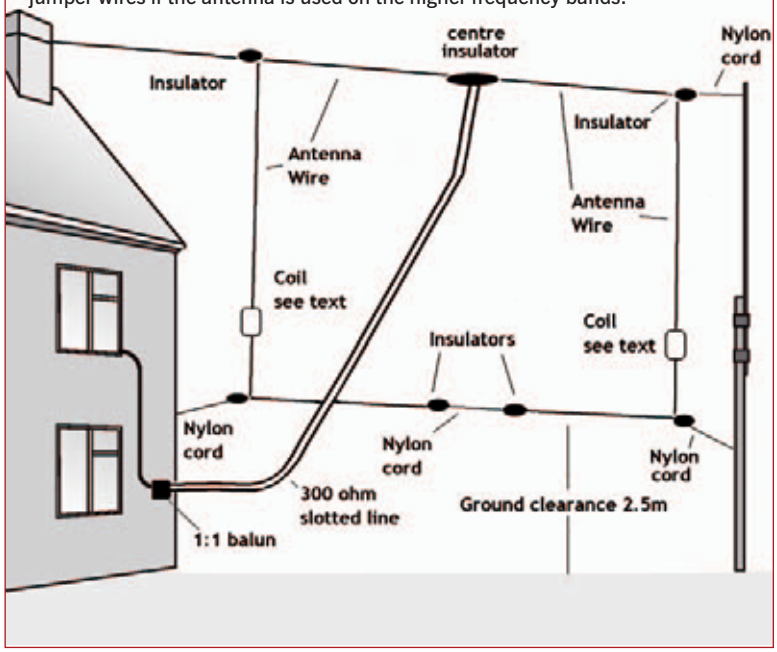
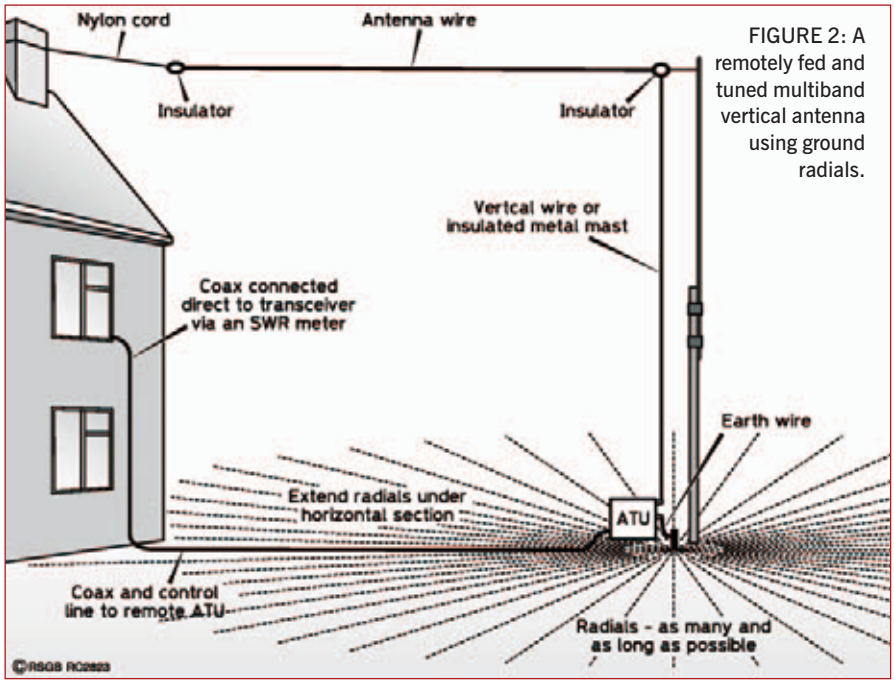


FIGURE 2: A remotely fed and tuned multiband vertical antenna using ground radials.



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[1] I hope to describe a method of testing antennas using WSPR in next month's Antennas.
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HF

All the latest news on the eagerly awaited DXpeditions in the New Year

SEASON'S GREETINGS. Happy New Year and thanks to all who have read and contributed to this column during 2009. Your feedback is always appreciated. Let's hope that 2010 finally brings some life to the higher HF bands!

That said, following my brief comments last month about the CQWW Phone contest, it turns out that 10m really was in good shape, with G0AEV working over 90 countries and all continents on the band during a single-band effort. Not so in the CW leg at the end of November, however. While many UK stations worked 90+ countries on each of the bands 80 through 15, 10m was almost dead, apart from a brief opening to southeast Europe on the Sunday morning. 15m, though, was buzzing. I had taken down my tribander, to put up some good LF antennas, and on 15 was simply using a 40m sloping dipole, but 100 watts into that brought an instant response from VK6AA, as an example. 40m was quite stunning, with loud signals from Japan both morning (long-path) and evening (short-path). I also worked a UA0 in zone 19 during the long-path opening.

This photo shows why the verticals worked so well at TX3A. Photo courtesy AA7JV and HA7RY.

Earlier in the month there had been some useful DXpeditions, such as VK9XX (Christmas Island), A31 (Tonga), 3D2 (Fiji) and 9G5TT (Ghana) all of which provided some welcome band-slots, the 3D2 even being worked from the south coast on 160m. But perhaps most welcome of all was TX3A, Chesterfield Islands, by AA7JV and HA7RY. This two-man expedition focused on the low bands and, for the first few days at least, they enjoyed remarkable propagation on 160 and 80 into the UK, something we really couldn't have expected. Unfortunately those conditions didn't last and later in the trip it was common to see Cluster spots reporting them at good strength elsewhere in Europe while they were inaudible here. The moral of the story is to get in there while the opportunity presents itself.

DX NEWS. Robert, S53R, who is working in Sudan has received the callsign ST2AR. He was busy on 15m in the CQWW CW contest. QSL via S53R "for the time being only direct", says Robert. G3LZQ notes this is a re-issue. The call was held in the late 1950s and early 60s by Eric Dowdeswell of Sudan Airways in Khartoum. Eric's home call was G4AR and he was very active on CW in those days, giving many 'old-timers' their first Sudan contact.

Ivan, OM3CGN, who has been in Nigeria for several months now, has the call 5N7MGI (Mr Gombos Ivan). He too was active in the CQWW CW contest. QSL via OM3CGN.

Sam, F6AML, is back home after an abortive trip to the Comoros Islands (D6) where political problems meant that his equipment was confiscated and he was unable to operate. There have been only a couple of small operations from the Comoros since the record-breaking D68C effort in 2001 and, unfortunately, it now looks as though the islands could become even rarer.

Tom, GM4FDM, and Ron, PA3EWP, have announced their 'intended expedition' to Senegal from 26 January to 9 February. Look for 6W/GM4FDM and 6W/PA3EWP to be active, with emphasis on the low bands and RTTY. Tom says they "will attempt (internet permitting) to upload the logs on LoTW as we go". If not during, then soon afterwards. QSL 6W/GM4FDM via GM4FDM and 6W/PA3EWP via PA7FM.

Al McDonald, ZL1UFB (now ZL1AMD) is back on Pitcairn Island and plans to be active with his VP6AL callsign until March. He prefers "picking up calls on 20m". His amateur radio interest was rekindled when he visited Pitcairn two years ago. He is the medical officer on Pitcairn, with a six-month contract. Tom and Betty Christian (VP6TC and VP6YL) have recently been in New Zealand, but should now be back on Pitcairn.

Geoff, G0PFH will be operating from New Zealand from 31 January to 26 February, 20 SSB only. His callsign is ZL1PFH. In addition he will operate with the Halifax Radio Society's callsign, ZL/G2UG.

A group of operators from Croatia will be in Vanuatu 20 January to 5 February. The calls YJ0XX (9A6XX), YJ0MM (9A8MM) and YJ0DX (9A6DX) have been issued. They will have three rigs and one amplifier. QSL via 9A8MM. There is a website for further information.

G7VJR and G3ZAY will be in the Falklands (VP8) from 21 to 29 January, operating with emphasis on LF with a 60-foot vertical and a receiving Beverage for 160, near saltwater on a site facing north.

In celebration of the bicentennial of the Republic of Chile, members of the Concepcion Radio Club will be putting on an operation from Greenwich Island, South Shetland Islands (AN-010) from 10 to 25 January. XR9JA will be on SSB, CW and PSK31 from the Arturo Prat Chilean Antarctic Navy Base. See the website (in Spanish!) for more details.

5N/LZ1QK and 9Q/DK3MO, who both continue to operate, still do not count for DXCC. The DXCC Desk has contacted the QSL manager of 5N/LZ1QK and continues to wait for a reply. Until then "DXCC accreditation is on hold pending the outcome of the review." 9Q/DK3MO continues to be listed as "no documentation received".

60m REPORT (FROM G4TRA). There has been a considerable increase in recent months in UK stations chasing DX on the band, and being rewarded with global contacts, usually on 5.4035MHz and starting after 2100. So let's start with European activity. At the beginning of November Norwegian amateurs were informed that they now have access to 5.26 - 5.41MHz on a secondary basis, all modes at 100 watts PEP. Initial LA activity has been high, but with them VFO controlled as opposed to ourselves being channelised there are issues of interference happening.

A new country appeared when Tomas, VK2CCC put Vanuatu on as YJ0CCC. This holiday-style operation in early November produced a few contacts into the USA from his 5MHz 5/8 vertical. Here in the UK we heard his signal briefly after sunrise on one occasion, but no contacts were made. A lucky few also worked Dave, T30KI in West Kiribati. That's country number 94 on 60m and the holiday style of operation is typical for the band.

Finally, in South America listen out for

Ramone, PZ1RA on 5.4035MHz. Whilst Surinam was first activated on 60m almost two years ago PZ1RA has a good signal and can often be heard around 0200.

Incidentally, the leading station on 60m in terms of countries worked is G0HNW with 79, followed by W4DR with 75. Most of the leaders are from the US, mainly because there have been quite a few low-key Caribbean activations. Things could change if more European countries gained access. A few have been 'activated' somewhat furtively by local amateurs (ie without permission from their licensing authority), often making just a few contacts and never reappearing.

HOW MANY DXERS? Following his report on contester numbers in his October column, Steve, G3ZVW received a question from Stephen, G3OAG about DXer numbers. This is one perhaps more appropriately answered here (if, indeed, it can be answered) so Steve passed it to me. There's certainly a problem of definition, because some folk who call a DX station will do so because it is loud and because it is there, but won't be actively seeking out DX or applying for awards. But an analysis of the statistics from large DXpeditions suggests that the number could well be of the order of 100,000. A big effort, such as 3B7C or VP6DX, will work maybe 50,000 unique calls (even allowing for mislogged callsigns!) and, because these totals are from different parts of the world, they will not be the same 50,000. Then there will be those would-be chasers who weren't around at the time, those who only bother to chase specialist awards such as IOTA, SOTA or WAB and their equivalents around the world. And what was notable on the FSDXA expeditions was that, even with 150,000 contacts in the log, we were still working something like 1,000 new callsigns each day out of the 5,000 or more daily QSOs. So the 100,000 guess feels realistic. This rather suggests that even the largest expeditions cannot please everyone, though obviously some DXers will only chase specific bands and/or modes that they are missing, while others will want to put every DX station into their log if at all possible.

CORRESPONDENCE AND TABLES. Fewer reports this time than I might have expected, given the recent expeditions and contests. Maybe you are all in recovery mode. Terry, G1UGH has been abroad recently but since his return worked TL0A on 15 for a new country and several DX stations on 17m. Jim, MM0DXH reports 3D2MJ, plus VU and HI on 20 SSB, and mentions that there have been plenty of VK and ZL stations to work on 40 and 20, but very much focused around the morning and evening greyline, with strong signals for a relatively short period around those times.

Shaun, M0BJL says, "I know you have mentioned in past *RadComs* that CQWW is a great way to achieve DXCC over the weekend, I was astonished when during this year's CQWW Phone, as a Single-Op on 40m, I passed the 100 DXCC in a little under 16 hours! This was achieved with a phased vertical array in the field firing to the east (I didn't have time to set up a switchable array) while the only other antenna I used was my trusty Carolina Windom up at 55ft and that's it".

Tony, G1HJW is a welcome new correspondent. He runs a 2-element mini-beam for the HF bands, plus an HF9V vertical. While having the garden paved recently, he took the opportunity to lay lots of radials under the paving. Always a good idea, Tony! He sent in a very respectable list of recent DX worked, some of the best being FP/KV1J on 80 plus JT1BV on 20 (both SSB), along with quite a few US stations on 80, so that vertical must be doing its stuff.

Simon, M0VKY is another who has been installing a new antenna, in his case a Gap Voyager vertical. He is so pleased with it that he has posted a video on YouTube showing progress with the installation. Well worth a look if you are planning a similar project.

Mike, G3SED wrote to me about his 3D2KJ contact on Top Band and his story shows just what is required to catch the very rare ones on the tough bands. Mike says, "I have to say 3D2KJ was one of the hardest 160m QSOs I have ever made. I sat there night after night at sunset glued to the radio listening to white noise for over an hour. Then on 21 October around 1715 I started to hear very weak traces of 3D2KJ, building until we worked at 1723. His signal came up to a solid 559 for about one minute and then dropped like a stone into the noise by 1725. Many other Gs were listening at the time including Dave, G3FPQ (only 10 miles away) and heard nothing. Clearly it must be very focused propagation?".

Peter, G3HQT has his FT-1000 Field back in service and reports a few nice ones including 5H1HS on 17 RTTY plus VP2MNK and R1ANC on 20 RTTY. He says, "Taking a lead from G4XEX (December HF) the set-up here is: FT1000MP MkV/Field. Cushcraft MA5V vertical for 20-10m and HFV1 helical vertical for 160-30m (20 ft long, resonant as quarter wave on 80m), tuned at the base with an SG230 auto ATU, four isolated radials each 9m long; both aerials 3m up. Aerials/tuner isolated with ferrite ring chokes. The PC has a Sound Blaster sound card and two audio transformers between that and the transceiver for isolation. Software is *HRD/DM780*". Peter also asks, "Reading your plans for the 2010 Annual table, I interpret as follows; please advise if not correct: If I work G3XTT on 160m on CW, PSK, RTTY and SSB, that counts as just one country for 160 towards the total. If I do the same for 80m, again one?" Yes, that's right. No focus on modes this coming year, but on bands for a change.

Finally, Peter, G4XEX comments that the recent sunspot (yes, we get excited by just a single spot these days!) helped him work some nice ones, with 17 and 15 open all day on occasion, albeit with deep fading at times. He remarks that the CQWW Phone contest showed how much better the bands were, though I suspect part of it is that these major contests bring some of the best-equipped stations on to the airwaves. That said, in the CW leg, even the 'big guns' were struggling to find any band openings on 10m.

TX3A operators George, AA7JV and Tomi, HA7RY. Photo courtesy AA7JV and HA7RY.

COUNTRIES WORKED, 2009

(starting 1/1/09, listed this month by Mixed totals)

CALL	CW	SSB	DATA	MIXED
G3XYP	191	203	141	239
G3TBK	209	84	93	211
MW0JZE	0	189	0	189
G3HQT	152	0	118	171
M0VKY	0	150	0	150
MU0FAL	139	83	0	145
G3JFS	123	61	43	143
G4LMW	131	36	28	134
M0BVE	130	0	0	130
G4WXZ	72	82	31	120
G4ATA	0	120	0	120
MM0DXH	0	119	9	119
G3LIK	109	0	0	109
G4XEX	0	82	79	99
G4FVK	72	77	0	98
G4NXG/M	0	95	0	95
MM0RKT	45	15	78	87
G6CSY	66	50	67	82
G1UGH	0	82	0	82
G4DDL	74	47	34	76
G7CLY	0	60	0	60
M0BKV	26	47	0	50
GM4ELV	45	2	0	48

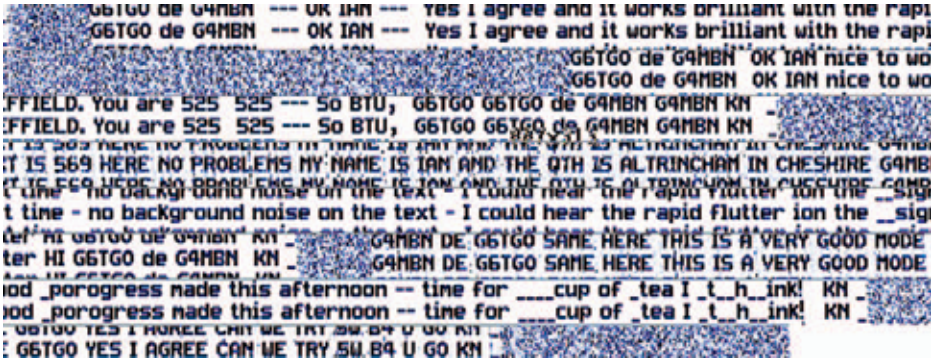
THANKS. Special thanks go to the authors of the following for information extracted: OPDX Bulletin (KB8NW), The Daily DX (W3UR) and 425 DX News (I1JQJ). Please send items for the March issue including your end of year 2009 table totals by **Friday 22 January**.

WEBSEARCH

YJ by 9As: http://vanuatu.rkp.hr/
XR9JA: www.ce5ja.cl/

VHF/UHF

October saw the last of the 2009 Sporadic-E season and a period of slightly enhanced tropospheric propagation before the winter storms



Typical screen shot of a PSK Hell QSO from John Tonks, G4MBN.

SOLAR AND GEOMAGNETIC DATA. At long last it would appear that solar activity is on the increase since, in the 30 days to 20 November, there were only ten zero sunspot days. The maximum count was 30 on 23 October while the 10.7cm radio flux reached 82 units on the 27th and the lowest value was 71, the average for the period being 74.4. Five new sunspot groups were observed. Geomagnetic activity remained in the quiet category with the mid-latitude A-index at Fredericksburg peaking at eight with nine zero days so once again there were no reports of any auroral contacts on the VHFs.

METEOR SCATTER. As forecasters predicted, the Leonid meteor shower peaked during the late hours of 17 November, favouring sky watchers in Asia with an outburst of 100+ meteors per hour. Brian Oughton, G4AEZ, operator of club station G8VYK (JO01), was away for part of this reporting period but completed a QSO on 4m with S51DI (JN76). He was pleased to find that the Norwegian and Finnish stations now have access to the band and looks forward to working them when he finishes upgrading his station. On 2m he had QSOs with OK1MIT (JN89), HA8CE (KN06), I3YZQ (JN65) and IS0AWZ (JM49) for a new grid.

Bryn Llewellyn, G4DEZ (JO03), was very active on 6m using JT6m and lists a total of 47 completed QSOs between 7 and 15 November. Countries worked were CT1, DL, ES, GD, HA, I, LA, OE, OH, OM, ON, OZ, S5, SM, SP, YU and 9A. In the NAC contest on the 12th he made 16 contacts the shortest one taking just 90 seconds and none more that ten minutes. He gave SM7UFR (JO87) is first JT6m QSO. Between 7 and 17 November on 4m he completed 15 QSOs with stations in DL, ES, LA, LX, OK, OZ, S5 and 9A. OH1HTB (JO75) was a new grid on the 9th – the Finns were granted limited licences on 4 November – and the Luxemburg station was LX/PE1ITR (JO20) on the 15th with some tropo assistance. Bryn was also QRV on 2m making 15 contacts in October and on the 23rd he was copied at 2,370km by US8ZAL (KN66). He completed another 13 QSOs in November up to the 19th and the countries worked were DL, EW, F, HA, I, OH, OK, OM, S5, SM, UR5, YO and 9A.

This issue of *RadCom* should arrive before Christmas so a reminder that the all-day Ursids shower should peak around 1440 ±3 hours on 22 December. 2010 starts with the Quadrantids and the OH5IY software predicts a peak at 1810 ±3 hours on 3 January with a possible zenithal hourly rate (ZHR) of 120. Reflections are above half that at maximum for seven hours and the radiant is above a mid-UK horizon all day.

MOONBOUNCE. Bodo Fritsche, DL3OCH/HB9EHJ, is now QRT and back in Switzerland after his extensive operation on 2m, 70cm and 23cm in Nigeria as 5N0EME. He writes, "I am happy with the result. I am really sorry for some guys that didn't make it in the log. Some called me really often but either they didn't copy me or I didn't copy them or the PA died." His final tally was 164 QSOs on 2m with 147 different stations and included 31 'firsts'. On 70cm the respective statistics were nine, eight and six and on 23cm 38, 28 and 16. He concludes, "I updated the log and also the QSL status. You may see the log at www.mmmonvhf.de. There are quite some QSLs still on the way. I gave them yesterday (2 November) to a colleague who will put them in Germany in the mail. Rest of the QSL cards will be answered when I am back in Switzerland beginning of December. If you still want to send your card to me, please enclose a SAE and sufficient postage (otherwise QSL comes via bureau)." Thanks for a fine effort, Bodo.

The current issue of *The 144MHz EME Newsletter* published by Bernd Mischlewski, DF2ZC, starts with an account of the activity of Karsten Hartwigsen, DL2LAH, from Thailand. To quote from the article, "During his stay in OK16BQ this spring he made his first EME tests using just a single 10-element Yagi and 160 watts out. With that set-up he could not yet complete QSOs but he did copy some stations. After most of his work task was completed DL2LAH assembled a second 10-element DK7ZB Yagi and stacked it with the first one for an additional gain of 3dB. To make things easy he used vertical polarisation since only a metal cross-boom was available.

"With that set-up success came. The first complete contact was on 15 October 2009 with his ham neighbour in JO44TR – Reinhard DK5LA – who runs a well-tuned array of 4 x 2M5WLs and, though EME conditions changed for the worse the following days and though the required polarisation shift of 90° on the propagation path did not make things any easier, HS0ZIL completed 29 QSOs with this set-up. There is some very good news for those who were not so lucky to work Karsten this time: he will return to Thailand in March/April 2010 and probably have more time to devote to EME. HS0ZIL will then be QRV with 4 x 10-element horizontal polarised and maybe even some more power. Anyhow, the 3dB more antenna gain will alone make a big difference."

There is also an account of 2m EME operation from Mongolia by Jeremy Alexander, W7EME (as JT1UN) on 10 October, which was marred by power drop-outs. He moved to a better location with reliable power and at times he counted 30 JT65 EME signals in his 2m pass-band. He will be back in

Ulaanbataar this coming September. By now he may have chronicled this operation on his website (Websearch). Meantime the entire JT1KAA club members have been schooled in the appropriate techniques and, with donated equipment, could be QRV before then.

The November edition of *432 and Above EME News* runs to eight pages and the editor Al Katz, K2UYH, writes, "The first leg of the ARRL EME Contest is now history. Mother Nature was helpful this year with some truly wonderful conditions on both 70 and 23cm – read the reports. Congratulations to Michael and Monika for providing a second major (4-band) DXpedition, OH0/DL1YMK was the mystery location, in less than one year! It was a resounding success." Michael wrote, "After two days of travel by car and two ferries we arrived at our 'mystery' DXpedition site. We didn't tell anybody about the destination in advance, a little wooden bungalow in JP90SF on the Åland Isles, which belong to Finland. This was our QTH for 10 days. Problems as usual (and expected) – the WX was horrible, storms and rain, cold, but we managed to set up the dish at a location that was a compromise between a clear Moon shot and at least some shelter against the wind. Two pine trees limited our Moon windows to the east and west, but no problem to the South as we were very happy to have had a high Moon declination. We activated 4 bands and made a total of 150 QSOs." The only contributor to the *Newletter* from these shores was Peter Blair, G3LTF (IO91), whose results were summarised in the December column.

Colin Roberts, G4ZFJ (JO01), added 15 new initials (#) between 16 October and 7 November on 2m and K3CB (FM18), VE1KG (FN84), UN7GK (MN83), KA1ZE/3 (FN01) and RA3LE (KO64) were also new grids to bring his tally on the band to 518. He continued his experiments on 70cm with a single 28-ele Yagi antenna and 180W. On 5 November DL5FN (JO40) and on the 7th DK3WG (JO72) were new initials. At G8VYK Brian's log entries include RV3YM (KO63#), AA4SC (EM94#), K6MYC (DM07), DK8ZJ (JO54), GM6VXB (IO97), OK7AF (JN70), KE7NR (DM33) and YL2AJ (KO16). Lance Collister, W7GJ (DN27), reports a 6m QSO on 10 November with Alvaro, XE2AT, who set up his YU7EF design 10-ele Yagi at his local airport operating from the back of his car.

Up to the time of compiling this month, the *2010 Lunar Weekend Calendar* has not been published but it would seem that a suitable January weekend would be on the 2nd and 3rd when London Latitude stations would have about 27.6 hours of Moon time as the declination varies from +19.87° to +9.16°. The 144/432MHz sky temperature ranges from 259/19K to 200/15K during this perigee weekend when the signal degradation varies from 0 to -0.03dB. There are two Dubus 70cm CW activity time periods (ATP) on 27 December, 1200-1400 and 2100-2300.

ANNUAL VHF/UHF TABLE – JAN TO DEC 2009

	--50MHz--		--70MHz--		--144MHz--		-430MHz-		-1296MHz-		Total
Callsign	Grid	Ctr	Grid	Ctr	Grid	Ctr	Grid	Ctr	Grid	Ctr	Points
G4DEZ	477	80	96	27	179	35	59	12	21	5	991
G4ZFJ	292	68	47	19	347	76	38	14	-	-	901
G8VYK	97	40	13	10	214	53	12	4	-	-	443
GM4JR	196	43	48	17	31	8	14	4	-	-	361
G8HGN	87	40	27	11	87	20	43	13	-	-	328
GM8IEM	249	52	-	-	-	-	4	2	-	-	307
G0LFP	110	37	4	1	14	6	-	-	-	-	172
G4APJ	70	25	-	-	36	12	21	7	-	-	171
G4OBK	24	13	10	6	11	7	6	2	-	-	79
G6NHU	-	-	-	-	41	14	-	-	-	-	55

The grids are the first four characters. eg JO02, and the countries are the DXCC entities plus IT9. No repeater, packet radio, cross-band or satellite QSOs. Next deadline is 22 January.

BAND REPORTS.

50MHz. There was still some Es propagation in October and on the 25th G4DEZ lists a dozen contacts with stations in CR5 (Portugal), EA5, EA7, I0, IS0, IT9 and ZB2. John Tonks, G4MBN (IO93), also worked a few stations on the same day in JN85, JN62, IM76 and EA6CA (JM19) in Mallorca. He writes, "On 23 October, I managed a couple of PSK31 contacts with GW0GHF over a very marginal path down to South Wales. I did some more tests with G6TGO, this time with a variant of Hellschreiber PSK Hell, which is provided in the IZ8BLY software. PSK Hell has similar sensitivity to PSK31 but still with the advantages of Hellschreiber, ie good immunity to signal flutter and Doppler spread. It works remarkably well." On 24 October G4ZFJ had an Es QSO with OE5ARC (JN78) and next day with ZB2EO* (IM76) and IS0GQX* (JM49), the * denoting a CW contact.

Ian, G6TGO (IO83), mentions the Hellschreiber QSO with G4MBN on 20 October after which he continued 5W WSPR tests with G3ZOD (IO83), G3ZJO (IO92) and G6AVK (JO01). The following day brought Es QSOs with EA7DUD and EA7AIN* (IM76). On the 23rd he contacted S51WX* (JN75), OE3ARC* and YU1BT with Hungarian beacons copied. Next day brought QSOs with 9A5CY (JN85), IK0FTA and I0JX (JN61), I0FHZ (JN62) and I0/LZ2OG (JN61). Kevin Jackson, M0XLT (IO83), caught the Es opening on 24 October working IV3EFE (JN65), S51WX, YU1KY (KN04) and OE5MPL (JN78) and next day he contacted IK5RLP (JN52), 9A5CY, IK0FTA and I0JX.

70MHz. Belgian amateurs with a Class A licence now have access on a secondary basis to 69.950MHz, 10kHz bandwidth, 10W EIRP. As of 5 November Norwegian amateurs in Norway, Svalbard, Bear Island, Jan Mayen, Bouvet Island, Peter I Island and the Norwegian land areas on Antarctica have access to segments of the band: 70.0625-70.0875; 70.1375-70.1875; 70.2625-70.3125; 70.3625-70.3875 and 70.4125-70.4625MHz. Power limit is 100W. As of 4 November Finnish amateurs have access to the segments 70.000-70.175 and 70.225-70.300MHz. Maximum power is 25W, 30W or 100W depending on location and license class. G4DEZ worked ONs in JO20, JO11 and JN29 on tropo 20 November. Brian Williams, GW0GHF (IO81), advises that there is a regular net on 70.475MHz FM at 2030 every Wednesday controlled by Chris Clease, G0UZL.

144MHz. There was a tropo lift in the 27 October to 1 November period when G4DEZ made over 30 QSOs with stations in DL, EI, F, LX and SM. In the UKAC on 3 November Bob Harrison, G8HGN (JO01), completed 65 contacts with stations in 24 grids and eight countries for a claimed total of 299,616 points. ODX were DF5NK and DK1FG both in JN59 at 789km and others over 600km were DR3M (JO43), DF9IC (JN48) and DK1PZ (JO41).

GW0GHF continues his digital mode experiments and on 18 November he completed a QSO with G3JKN (JO02) on 144.139MHz in poor conditions over a 272km path when the best decode was on Olivia 250/8 mode after an initial PSK31 contact. Clive O'Hennessy, GM4VVX, braved the sub-zero temperature to participate in the Marconi CW contest on 8 November and found the conditions terrible with no European or south coast UK stations heard. In six hours he only made eight contacts from IO78UB, almost the worst ever even though he was running 300W at 1,000ft ASL.

DEADLINES. That wraps it up for another month. The deadline for copy for February is **18 December** and for March, when I'll need your final data for the 2009 annual table, it is **22 January**. Thanks for your reports in 2009 and I wish you A Happy New Year 2010 with plenty of DX. My AOL ID is g3fpk.

WEBSEARCH
W7EME in Mongolia:
www.w7eme.org/ulaanbaatar

GHz Bands

A round-up of 2009 and look forward to 2010

PHOTO 1: Paul Wade, W1GHZ, holding the Don Hilliard award, presented at the Dallas MUD Conference in 2009.

A SHORT YEAR. It hardly seems like any time at all since I was writing my last review of the year back in 2008. Reflecting on events on the amateur microwave bands in 2009, several things stand out. To date we are still awaiting that big anomalous propagation event, although there have been several smaller but significant openings around Europe during the year. Indeed, as I write in late October, conditions have been quite good towards the south from central and southern UK.

The spread of SDR receivers – if not yet transceivers – has continued, with their widespread adoption amongst those looking for weak signals, who also value their ability to spot operation well away from the centres of activity. This is set to continue in 2010, with the forthcoming introduction of SDR radios like the Flex 1500 and significant updates to the all-important applications that use them. I saw my first 'space model' of the Flex 1500 at the Dallas Microwave Update during October. I hope to report on this radio in the coming year. There can be little doubt that having 'SDR' in the title of any talk in 2009 was guaranteed to draw large audiences.

In 2009, digital modes started to become more popular on these higher bands and JT4G, with its wide tone separation and adaptive receive capability, opened up some interesting paths on the microwave bands from 1.3 to at least 10GHz. I'm sure we will see more of these modes in the coming year.

The UK Microwave Group's Beaconspot web page has continued to grow and is now the most up-to-date source of European VHF and microwave beacon information available. Robin, G8APZ, has further updated the facilities of the web page during the year and you are strongly encouraged to use Beaconspot (www.beaconspot.eu) to report any reception of beacons you might hear.

I have been finding it increasingly difficult to give good coverage of band activity. I believe that activity reports are the life-blood of this column and serve to record the technology, techniques and skills of weak signal (and not so weak signal) operation on these very important bands for future generations of UK radio amateurs. Please send me your activity reports. Even if they seem 'ordinary' to you, they are important records and the RSGB wants to preserve them in the pages of *RadCom*.

MICROWAVE UPDATE 2009. I try to attend Microwave Update (MUD) at least every other year since there can be little doubt that MUD is the premier amateur microwave conference. This is where you hear it first and get to meet the people who make many of the advances in our branch of the hobby.

This year MUD returned to Dallas and between the 22nd and the 25th October we experienced one of the best organised and attended conferences I have yet been to. On the Thursday, many of the 141 registered attendees went on an organised 'surplus store tour' of the Dallas/Fort Worth Metroplex area, visiting a mixture of electronics and microwave establishments, commercial stores and smaller hardware and component outlets. If you couldn't find anything to buy, you just weren't looking!

Proceedings of Microwave Update 2009 is packed with valuable information and my copy will go on my shelf together with similar MUD *Proceedings* going back to 1987. Although all the talks were excellent, a few stand out as particularly thought-provoking. Brian Justin, WA1ZMS/4, spoke on the subject of near phase noise. Those of you who listened to Brian at Martlesham in 2005 will know he is very knowledgeable in this area. Brian repeated, and reported on, some measurements previously made by Paul Wade, W1GHZ, that sought to shed some light on the real degradation effects on weak signal readability of near phase noise (0-10kHz from the carrier). The results presented were quite surprising and the measurements bear repeating by other parties to authenticate the results. I'm sure this isn't the end of the story.

A new award was inaugurated at MUD 2009. MUD grew out of the Central States VHF Conference and was first suggested by Don Hilliard, W0PW. Don organised the first of these conferences in 1985, when it was called the 'The 1296 and 2304MHz Conference'. In 1986 the title was changed to the 'Microwave Update 86' and hence the name of the new conference was born. In recognition of Don's contributions to VHF and Microwave technology the North Texas Microwave Society (NTMS), the current sponsors of MUD, have created the 'Don Hilliard Technical Achievement Award'. The first recipient of this prestigious award was Paul Wade, W1GHZ, seen holding the award in **Photo 1**.

My thanks go to the NTMS for organising the Update and to our friends Steve and Dave for providing our transportation around the DFW area during our stay. Next year's MUD will be held in California.

GETTING STARTED IN MOON-BOUNCE

Part 5. Previously I have discussed antennas and polar mounts as well as describing some software programs that could be used to determine where the antenna needed to be pointed to find the moon (or other celestial body). This month I will be reviewing some methods of moving the dish to track the moon.

The azimuth / elevation (Az-El) mount requires two motor drives: one for each direction of movement. Small dishes, of up to maybe 2.5 – 3m diameter, can be moved by a low cost commercial drive such as the Yaesu G5500 **[1]** or the Spid RAS **[2]**. Both of these drives provide two-axis movement with a suitable rotator controller to control and indicate heading and elevation. However, these rotators are really meant for satellite operation with relatively lightweight Yagi type arrays. In general, the pointing accuracy of these drives is inadequate for EME operation, although perfectly adequate for most satellite work. The SPID RAS has a resolution of just 1° and, although this is quite adequate with a 2.5m diameter dish on 1.3, 2.3 and maybe 3.4GHz, it is not easily usable on the higher bands without replacing the supplied magnetic encoder. I am told (but have not had this confirmed) that the RAS can be fitted with an encoder capable of better than 0.5° resolution. An alternative to the SPID RAS is the larger BIG RAS. However, even this is

limited to 0.5° resolution and it is considerably more expensive than the RAS. It is claimed to be capable of moving a dish of up to 5m diameter.

Since the SPID uses a worm drive it has low backlash and 'infinite' resolution. Where higher resolution is required it is probably better to disable the supplied encoder and use an external encoder such as an optical wheel encoder or Austriamicrosystem **[3]** magnetic encoder with a third party tracking application. This should give entirely adequate tracking resolution. Accuracy and repeatability is a different story.

Many builders of big dish systems prefer to use ex-military or serious commercial / professional tracking systems. These can often be found on the surplus market at an acceptable price. But, they can be big and heavy and transportation can be costly. A good alternative is to fabricate your own drive using electric motors and anti-backlash chain drives. In the past surplus propeller pitch adjusting (prop pitch) and cowl gill motors were popular, although these have become much harder to find in recent years. One of the best kept secrets in EME is the web page of K7NV. Kurt may still be able to help **[4]** – see also Antennas, October 2009.

If you decide to use a polar mount and are looking for a single, low cost, rugged single axis drive then the ubiquitous linear screw jack is hard to beat. These are available in sizes from 6 inches (15cm) to 36 inches (98cm) and operate from supplies of from 12-36V. **Photo 2** shows a typical 12 inch jack. This is a very cost effective solution to moving a dish and the larger ones are surprisingly strong, being able to move quite large loads without stalling.

As the jack extends an in-built sensor generates a series of pulses. These are usually produced by rotating a round magnet past a small reed switch. This will provide one pulse output per rotation of the magnet. A typical 18 inch jack will provide over 1000 pulses over the 18 inch extension of the jack arm. The pulses can be counted to indicate the position of the jack arm, and hence the degree of rotation (or elevation) of the dish. A simple look-up chart is often used, where the count has been calibrated in terms of the angle to which the dish is pointed. The problem is that when the system is turned off, the pulse count is lost and it is therefore necessary to 'reset' the jack position at the start of each operating session. This can be overcome by using an indication system with the current count stored in flash memory. Some satellite set top box/positioners incorporate a similar system for storing the position of satellites. These can often be pressed into service as position indicators for EME.

Some older linear jacks use a potentiometer as the rotation position sensor, rather than a magnet and reed switch. These can be used with simple moving coil meter indications to indicate position and have the advantage of 'memorising' the current position of the dish since they do not reset when the power is switched off.

PHOTO 2: A typical linear jack as used for satellite TV positioning systems.

PHOTO 3: The base of VK5MC's dish showing the concrete track on which the wheels run.

No review of dish movements would be complete without mentioning hydraulic motors and rams (jacks). These motors and jacks provide the power necessary to move the larger amateur dishes in both azimuth and elevation. Chris Skeer, VK5MC, uses a hydraulic motor to rotate his 9.8m dish. **Photo 3** shows the base of Chris' dish with its circular concrete runway on which four wheels move and carry the dish mount. The motor is under the aluminium cover above the right hand wheel in this photo. Chris also uses a pair of hydraulic jacks to elevate his dish.

INPUT TO GHz BANDS. Input for the column is welcome at all times. However, band activity reports should be sent as soon after the event as possible. I generally start to compile the column around the end of each month. My contact details are at the top of the page.

FORTHCOMING MICROWAVE EVENTS - 2010

Heelweg Microwave meeting
Westendorp, Netherlands, 23 January 2010. Details at www.pamicrowaves.nl/website.

EME Conference, Dallas, Texas, 12 – 14 August 2010. Details at www.ntms.org.

UK 2010 Microwave Round Table events.

Rutherford Appleton Laboratories (RAL), 17 and 18 April

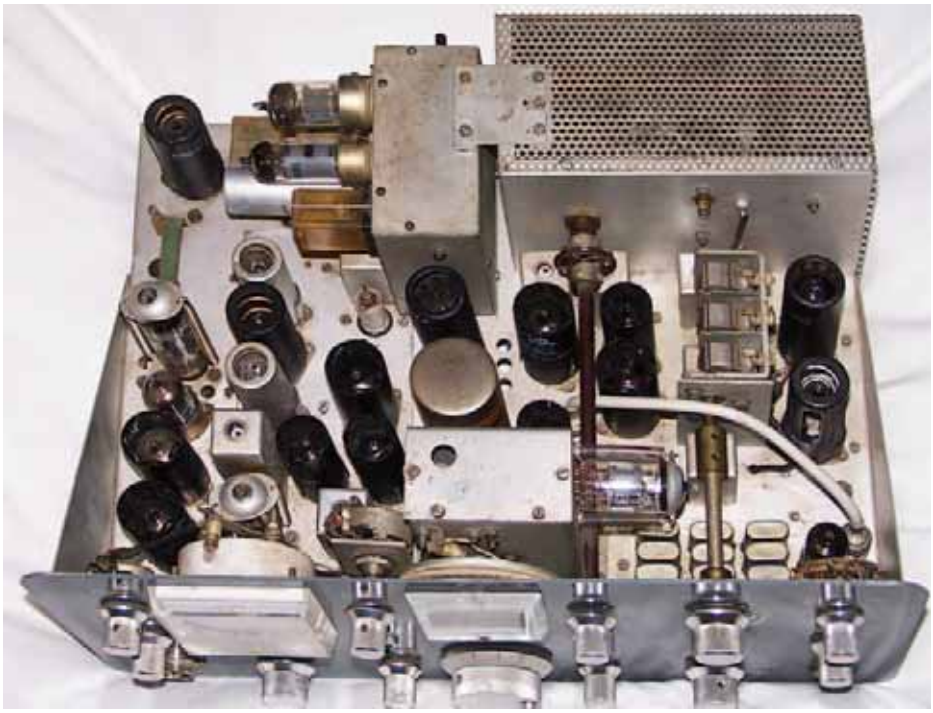
Finningley, 10 and 11 July Crawley

September (provisional) Martlesham (Adastral Park),13 and 14 November

WEBSEARCH

[1] Yaesu: www.yaesu.co.uk / www.yaesu.com
[2] Spid RAS: www.spid-uk.co.uk
[3] Austriamicrosyetems: www.austriamicrosystems.com/eng/Products/Magnetic-Encoders
[4] Prop pitch motors: www.k7nv.com

A Classic Rig – The KW2000 series



Inside the KW2000. Photo courtesy G3PIJ.

HISTORY. KW Electronics was started in the 1950s by Rowley Shears BEM, G8KW and Ken Ellis, G5KW. For some time, they sold trap dipoles, Geloso equipment and other smaller items but, in 1957, they announced the KW Vanguard, initially as a kit. This was a 50 watt AM/CW transmitter using a Geloso VFO, a 6146 PA stage and push pull 6L6s in the modulator. Initially located in Wilmington in Kent, they moved to Heath Street, Dartford in the summer of 1959 – a location that was to serve for 16 years as the head office, despatch, sales and development offices.

KW announced the UK's first commercial SSB transmitter, the KW Viscount, at the November 1958 RSGB Radio Communications Exhibition. But this proved to be a false start, with the design using the phasing method. The move to the filter method came with the employment in the summer of 1959 of Fred Hill, G3EVV – Fred had previously gained experience of SSB using homebrew equipment on 2m. Fred designed the Viceroy SSB transmitter using a filter with B7G mounted crystals at 435kHz: the design went through a number of iterations. For some years, separate receivers and transmitters were common, although the Collins KWM2 SSB transceiver was shown at the RSGB Exhibition in the autumn of 1959.

It was at the RSGB Radio Communications Exhibition in London at the end of October 1963 that the KW 2000 was announced – the first relatively low cost SSB transceiver in the UK. The design was in some ways inspired by the KWM2, with 200kHz wide bands: one big difference was that the KW2000 covered 160m. The cabinet design had a great similarity to the Collins, but the turned, polished, aluminium knobs were very much a KW innovation.

KW INNOVATION. A number of what were unusual construction techniques were used: coils were wound directly on the dust iron cores, connected in series and tap selected to get the required inductance for each band. The selectivity was achieved by the use of a Kokusai mechanical filter at 455kHz and, originally, the carrier crystals were B7G glass mounted types – later models moved to the metal HC-6/U type as a cost reduction measure. Of course, nobody at that stage ever envisaged – or worried about – the fact that after some 30 or 40 years, the foam in the filters supporting the resonators would dry out and the filters thus cease to work!

The PA stage was a single 6146 and the output power around 40 or 50 watts. The KW2000 proved an immediate success, both commercially and in its acceptance by the amateur community. Enquiries for commercial versions rapidly led to the development of the KW2000C, a 4-channel crystal controlled transceiver, while a demand for higher power was satisfied by adding a second 6146 to give somewhere around 100 watts output depending on band. Thus the KW2000A version appeared, with a dark blue-grey coloured front panel (the colour scheme varied somewhat: early models had a very light, almost cream front panel) as well as the highly successful KW2000CA.

One function that was included from the word go was the inclusion of IRT – Incremental Receiver Tuning. This could be selected to be receiver tuning, transmitter tuning or both. Provision for connecting a Q multiplier for CW was provided and even a DC power supply for operation from 12 volts – power supplies were always separate. However, the draw on transmit was in the order of 25 amps. The popularity of the rig was such that, at times, there were queues at Dartford on a Saturday morning to collect them and pay cash!

EVOLUTION. Production requirements led to the renting of premises in Crayford for the production of the whole range of KW equipments, leaving room at Dartford for the expansion of the development facilities. The transceivers evolved – the KW2000B, which was a somewhat modernised version, and the KW2000E, which moved to having coverage in 500kHz bands. There was a version with digital readout, the KW2000D, of which only two were ever produced. This design suffered from being designed just at the wrong time: the cost of programmable up/down counters in TTL (the only viable logic family at that time) was such that it was cheaper to mix the VFO with a 3.2MHz crystal to drive the counter chain. By the time it was ready for production, the price of TTL had fallen to the point where it was cheaper to use the programmable up/down counters! Also, by this stage, Japanese competition at lower prices was beginning to bite.

The style became known as the G line – an obvious 'take' from the Collins S line – and included in the series were the KW600 linear amplifier (one 572B, 600 watts input) and the KW1000, running 1kW input to a pair of 572B valves, both in matching cabinets. There were the 'C' variants of these as well, which proved rather more popular in some quarters than the Collins 30L1 with which they were somewhat equivalent, mainly because it was only necessary to change a channel switch.

Additionally, the loudspeaker and power supply was in a matching cabinet, and two models of antenna coupler/dummy load/SWR/power meter (KW107 for lower powers, KW109 for use with the KW1000 linear) in the same size cabinet. Another not so popular piece in the line was the KW108 monitor 'scope, which was all solid state except for the CRT.

Top - KW77 receiver, bottom - KW2000D, one of only two ever made. From the RSGB museum collection. Photo: G1MFG.

The final variant was a completely different beast – the KW2000CAT. This was a 4 channel crystal controlled transceiver, with a pair of 6146Bs in the PA, driven by a 12BY7A. The rest of the circuitry was solid state, with fairly extensive use of the Plessey SL600 series. The PA circuit also used toroidal inductors: the IF was 1.4MHz, using 8 pole crystal filters. For operation above 15MHz, there was an option of adding a crystal filter at signal frequency on receive to obtain better image rejection. This transceiver entered production after KW Electronics had been taken over by the Decca Navigator Company. Initially called KW-Decca, it soon became Decca Communications: eventually being absorbed by Racal after Decca ran into financial difficulties.

STILL IN USE. The KW2000 series was very successful. It introduced the SSB transceiver to the British amateur at a relatively low cost – and at a time when the US competition was relatively expensive. The commercial variants were very profitable, but by the mid 1970s, the performance of the amateur band models was not really competitive with products from companies such as Drake and Swan in the US. One failing of all KW equipment was that it was never designed with CW operation as anything other than an afterthought. However, examples of the series can still be found on the air, with new filters substituted for the old failed Kokusai filters and there is an active KW_Radios Yahoo group on the web. A number of members of the Vintage and Military Amateur Radio Society (VMARS) also run these fine old transceivers on the air. While not having the performance of modern rigs, they are, at least while valve stocks last, maintainable!

Rowland Shears BEM, G8KW 1919 – 2009

Rowland George Shears BEM, was born in North London on 4 Sept 1919. In his teenage years he developed a keen interest in radio communications, building his own receivers and transmitters. He was issued the call sign G8KW in 1936 at the age of 17. Volunteering for the Army in 1939 he joined the Royal Signals as a Signalman. He was posted to Egypt and stationed just outside Cairo where he was tasked with setting up transmitting stations. But as a radio enthusiast he spent the nights tuning around the wavelengths on his own receiver. It was whilst doing this that he picked up unusual transmissions in German that eventually turned out to from Panzer tanks on the Russian front thousands of miles away. This remarkable breakthrough got him noticed by the army hierarchy and he was promptly transferred to Special Intelligence. He was involved in a number of important counter-intelligence operations in Egypt and Crete.

After four years overseas, Rowley returned to England briefly before being sent to Germany as part of the Allied Government, the Control Commission for Germany. His main responsibilities were to set up communications links and to re-establish the public broadcasting network throughout the country. His first task was to rebuild the broadcasting station at Cologne that had been destroyed by retreating troops. Becoming fluent in German, one of his own initiatives was to seek permission from the authorities on behalf of the German amateur radio enthusiasts for them to be re-issued with transmitting licences. This was forthcoming and he helped set up the German Amateur Radio Club, DARC, of which his German friends made him honorary member Number 1! Whilst in Germany he rose to the rank of Major at the age of 27, making him the youngest Major in the Signals.

In the early '50s he set up KW Electronics as a small concern designing and producing radio equipment such as the KW Vanguard and other such well known names. As the demand grew he moved to larger premises in Dartford, Kent, manufacturing both amateur and professional communications equipment. Radio enthusiasts from all over the world were entertained there, ranging from customers wanting to collect their own 'KW' kit to Nigerian chiefs, Saudi Princes and King Hussein of Jordan, who was also a keen operator. The company always had a very strong and loyal 'KW' following and, after several changes along the way, ended with a smaller operation in Chatham from where Rowley retired at the age of 70.

Obviously, radios were an important part of Rowley's life, not only in business, but also as his lifelong hobby. As a result, he had friends across the world and met many of them on his travels – both on business and holidays! He held licences in many countries and was a prominent member of the RSGB, joining in 1934. In 1990 he attended a ceremony in New York to be inaugurated as a Fellow of the Radio Club of America for services to the radio communications industry. He made many contributions to enhancing radio and antenna design, and to signal propagation, writing papers on the subject.

Rowley passed away peacefully on 17 November 2009 at the age of 90.

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YAESU

Yaesu Japan announce the **new Yaesu FT-dx5000** HF & 6 Metre Base Transceiver. Pitched between the FT-2000 & the FTdx9000D.
For more details see www.HamRadio.co.uk

NEW PRODUCT FROM YAESU!

Yaesu FT-450 HF Base Transceiver with & without ATU. HF & 6m Full DSP

FT-450 shown with optional Bail Stand.

The Yaesu FT-450 is a major new HF & 6m transceiver offering full a 400MHz IF DSP design at a very low price. Available with or without internal ATU, this new rig offers serious performance for those who are not bothered about the upper V/U bands.

Yaesu FT-450 without ATU: £589.95
Yaesu FT-450AT with ATU: £639.95

Options:

MyDEL MP-8230 23Amp PSU	£69.95
Stand-FT450 Bail Stand	£19.95
ATU-450 Optional internal ATU	£159.95
MMB-90 Mobile Bracket	£18.95
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MH-36E8J DTMF Mic	£69.95
MD-100 Desk Mic	£149.95
MD-200A8X Super Deluxe Desk Mic	£199.95
YH-77STA Headphones	£54.95
MLS-200 High Power weatherproof speaker	£27.95
ATAS-120A Fully Auto Mobile 7.50MHz Antenna	£239.95

FT-2000 HF Base Transceiver

The Yaesu FT-2000 with PEP "Performance Enhancement Program" Upgrade.

It follows in the tradition of the venerable FT-1000 series, and incorporates an amazing number of advanced features from the FT-9000 series. Covering 160 through 6 meters, with an internal PSU.
The receiver front-end includes VRF (Variable RF Tuning) preselector which works in conjunction with a bank of fixed bandpass filters. This provides a front-line defense against strong out of band signals. The result is improved dynamic range and a higher intercept point than other designs. The First IF roofing filters (3/6/15 kHz) increase dynamic range in crowded band conditions.

The FT-2000 & FT-2000D (200W version) are available from ML&S.

- The Yaesu FT-2000 was the best selling HF Base Transceiver in 2007.
- The Yaesu FT-2000 was the ONLY radio used on the 3B7C St Brandon Island during 2007.
- There were NO FAILURES during 18 days of continuous 24 hour operation during 3B7C.
- ML&S sold more FT-2000's than any other dealer in the UK.
- ML&S always has the FT-2000 on permanent demo with large stocks of the 100 & 200 versions.
- Peter Hart said: "SON OF FT-1000MP, aimed at the serious DX and contest operator".

FT-2000: £1869.95 FT-2000D: £2375.95

Available from stock and on permanent demo in our showroom

FT-950 HF Base Transceiver

Yaesu's "Midship Radio"

All FT-950s supplied by ML&S are latest PEP factory versions!

Only £1099 Available from stock

Many of you grabbed the new Yaesu FT-950 HF & 6M from us at the end of November. Once again Yaesu identified a position in the market and hit it spot on. When Peter Hart said it was "An eye catching radio with some very nice features" and "it represents extremely good value" he wasn't kidding. If you don't need dual receive or internal PSU like its Dad, (the FT-2000) then check out the FT-950.

Holiday SPECIAL!

Yaesu VX-170

Mil-Spec 5W 2m Handie with NMHy Battery & Charger £79.99!

NEW Yaesu VX-3E. ML&S £138.95
Micro Handie 2/70 with scanner. Complete with Li-ion battery, charger & antenna.

Yaesu FT-60R. ML&S £142.95
Latest twin band handie complete and ready to go.

Yaesu VX-6R. ML&S £199.95
Yet another 2/70 handie from Yaesu.

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The UKs best selling Triple Band Handie.

Yaesu FT-7800E. NOW ONLY £199.95
Bar make the tea it'll give you 2m/70cm @50W/40W. FREE YSK-7800 Remote Kit!

Yaesu FTM-10R. ML&S £239 A small compact dual band 2m/70cm transceiver with high power output of 50W on 2m and 40W on 70cm, (adjustable power levels of 50/40W, 20/20W, 5/5W). Receive range from 0.5–1.8MHz, 76–108MHz, 137–222MHz and 300–999MHz.

Yaesu FT-8800. ML&S £289.95
Similar to the FT-7800 but can receive on 2 & 70 simultaneously.

Yaesu FT-8900. ML&S £329.95
High-power FM on 10m, 6m, 2m & 70cm. When your local repeater is busy, slip onto 10m & work DX!

FT-1802. ML&S £109.95
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High Power version of the FT-897. Use as a transportable, (20W) or as a base/mobile (100W)
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Yaesu FT-857D
The Ultimate HF Mobile Installation!
Plus ATAS-120D 40m-70cm Auto Antenna
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Yaesu FT-817ND
The world's only all-band portable transceiver.
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Latest 6/2/70 Handie with optional Bluetooth, APRS & GPS

Yaesu VX-8E

COOL Holiday Bargains

Buy a Yaesu VX-8E, the FGPS-2 GPS & MH-74 Mic for only £419.95!

VX-8E Accessories

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Maldol MMG-SM Minimag Quality, stable, Maldol miniature magnetic mount.	£19.53
Yaesu BH-1 Stereo Bluetooth Headset	£131.95
Yaesu BH-2 Bluetooth Headset	£120.95
Yaesu BU-1 Internal Bluetooth Unit	£80.95
Yaesu CD-40 Charger Cradle for BH-1/BH-2	£9.95
Yaesu CD-41 Rapid Charger Requires NC-86U	£16.95
Yaesu CN-3 SMA to BNC Adaptor	£7.95
Yaesu CSC-93 Soft Case	£14.95
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Yaesu CT-134 Cloning Cable	£35.95
Yaesu CT-136 GPS Antenna adapter for FGPS-2	£26.94
Yaesu E-DC-5B DC Cable with Cigarette Plug	£28.95
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Yaesu FEP-4 Earpiece for BH-1 Bluetooth Headset	£15.95
Yaesu FGPS-2 GPS Unit Requires CT-136 or MH-74A7A	£69.95
Yaesu FNB-101LI 7.4V 1100mAh Lithium Ion Battery	£44.95
Yaesu FNB-102LI 7.4V 1800mAh Lithium Ion Battery	£59.95
Yaesu MH-74A7A Waterproof Speaker Microphone	£42.95
Yaesu NC-85U AC Charger for BH-1/BH-2	£21.95
Yaesu NC-86U AC Charger for VX-8	£9.95
Yaesu VX-8E (Quick Reference Card) Laminated three-page foldout, the size of a credit card for easy carrying in a wallet or purse	£4.99
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Don't be fooled by its mobile radio sized dimensions. The IC-7000 really is a spin-off of the IC-756Pro111 together with all the additional bands (2/70) that the IC-706mk11G has to offer.

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HF through to 23cms Base Transceiver

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V/UHF Satellite + HF/50MHz bands + D-STAR DV mode

- HF/50MHz 144/430(440)MHz & 1200MHz coverage
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Seen it cheaper? Call Martin direct!

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TS-2000E

Kenwood HF Products

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Kenwood V/U Products

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New! Alinco DJ-G7E

"As used by Howard, G6LVB"
Unique 2/70/23cm Handie.
Ideal for hand-held Satellite operation.

Brand new model from Alinco, the DJ G7 looks sure to be a winner, at last we have a handheld transceiver with a great new choice of bands, it has always been hard and very expensive to try and find a 23cms handheld, but the Alinco G7 operates on 23cms along with 70cms, and also 2m band, so it is great value for money, I can remember many moons ago nearly paying this price for a 23cms only handheld !!! Full duplex operation, and a host of features are going to make the G7 the big hit of 2009, we have limited stocks and many advance orders to process, so don't miss out on this great new radio and order yours now.

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Alpha Delta are a USA Manufacturer of high quality coax switches, lightning (surge) protectors and the best wire antennas money can buy.

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AD-ATT3G50/HP	0MHz to 3GHz (2kW) surge protector. N-Female Connector.	£48.89
AD-ATT3G50U	0MHz to 500MHz (200W) surge protector. SO-239 Connector	£39.10
AD-ATT3G50U/HP	0MHz to 500MHz (2kW) surge protector. SO-239 Connector	£43.99
End Insulators	Dog Bones. They are extremely rugged, UV and RF resistant	£1.50
Delta-DX-A	160m, 80m and 40m 1/4 twin slope trap antenna. This antenna combines the tremendous DX firepower of the 1/4-wave slope with the wide bandwidth of the 1/2-wave dipole. One leg is 67ft long and the other is 55ft long	£78.25
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Delta-DX-EE	40m, 20m, 15m, 10m dipole, it can be used on 30m, 17m, 12m with an ATU. This antenna is not trapped, and has an overall length of 40ft	£117.39
Delta-DX-LB	160m - 80m, and 40m Low Band dipole. This antenna performance and 2:1 VSWR bandwidth depends on the height and surrounding objects; overall length is 100ft.	£117.40
DX-LB-PLUS	160m, 80m, 40m and 20m - 10m Low Band dipole. This antenna performance and 2:1 VSWR bandwidth depends on the height and surrounding objects; overall length is 100ft.	£158.99
DX-Series	Full-size utilized monoband dipole. These dipoles are using the Delta-C Centre Insulator with built-in Arc-Purge Surge Suppressor. **DX-20:** 20m Monoband Dipole at 33ft long **DX-40:** 40m Monoband Dipole at 66ft long **DX-80:** 80m Monoband Dipole at 133ft long	£43.99
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Hardware Kit	contains the following: 1x Dipole Centre 2x Dog Bones 1x Surge Protection Block	£27.35
Delta-SEP	Replacement/spare Arc-Plug™ Static Electricity Protector. This unit is usually attached to the back of the Alpha Delta Centre T Balun	£12.67

Super Antennas USA

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MP-1 80m-10M Portable Antenna supplied complete with tripod & 80m coil.....Only £155.85

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AT-4K (2.5kW)Antenna Tuner.....**£735.94**
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DL-1500 (1.5KW).....**£109.95**
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Hustler Antennas

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

4-BTV	40/20/15/10m	£178.95
5-BTV	80/40/20/15/10m	£218.95
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17-BTV-S	17m add on for 5-BTV or 6-BTV	£53.95

Mobile Range
200W or 1kW, both stocked. RM10 to RM-80
10M to 80m single-band whips.....£24.95 to £56.95

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

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Comet Rotary Dipole
H422 4 Band trapped dipole £269.95

Comet HF/VHF/UHF Base Antennas

CWA1000	80,40,20,15,10 trapped dipole	£99.95
GP1	144/430 MHz 3.0 / 6.0dbi 1.25m	£59.95
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GP6	144/430 MHz 6.5 / 9.0dbi 3.07m	£99.95
GP9	144/430 MHz 8.5 / 11.9dbi 5.15m	£139.95
GP15N	50/144/430 MHz 3/6.2/8.6dbi 2.42m	£99.95
GP98	144/430/1200 MHz 2.94m long	£139.95
VA250	Compact HF antenna 3.5 - 70 MHz	£299.95

Comet Handy Antennas

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CHF816	16 3.5/28/50MHz 74cmL 10W/Yaesu FT817	£49.95
RX5	144/430/900MHz 44cm L 8W SMA	£29.95
RX7	144/430/900MHz 44cm L 8W BNC	£29.95
SH95	144/430/1200MHz 37cm L 10W BNC	£29.95
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CF530C	50/144MHz w/leads SO239 - PL259/PL259	£44.95
CF530A	50/430MHz w/lead PL259 SO239/SO239	£39.95
CF4160B	144/430MHz Sockets SO239 PL259/PL259	£32.95

Comet Triplexers

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CFX514N	50/144/430/MHz SO239/PL259/PL259/N	£49.95

DIAMOND

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X-30	2/70, 3/5.5dB, 1.3m Long	£49.95
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Mobile Antennas

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NR-770RSP	As above but spring loaded	£39.95
NR-7900	2/70, 3.2/6.4dB, 1.46m Long	£49.95

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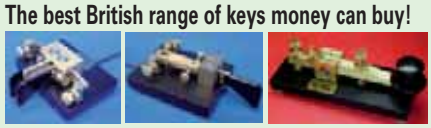

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ATV

So what is a P5 ATV signal?

P5 SIGNALS. Last time we touched upon ATV signal reporting, introducing P-grades. Although P-grades may appear to be a bit arbitrary, the examples here provide a good visual representation of what you may see, a description and the appropriate P-grade.

Not all receivers and video monitors or televisions respond to signals in quite the same way. Sometimes vertical hold and colour can be lost and pictures may 'pull' horizontally. White or black horizontal rain-like streaks ('sparklies') may occur as the signal weakens depending on transmitter and receiver frequency accuracy, receiver PLL and AFC characteristics. A few tens of kHz can make quite a difference. Some features can be due to incorrect transmitter video pre-emphasis and deviation setting. For ATV, the peak deviation of the transmitter should not exceed 3.5MHz. With a very good receiver, a P0 FM signal may be relatively steady (synchronised) and almost 'ghost like' – a picture, but not really recognisable.

DIGITAL ATV ACTIVITY

G8ADM writes: the following stations are known to be pioneering digital ATV on 70cm. Most operation is on 436.0MHz at 2MS/s, with varying FEC. Talkback is 144.750MHz FM.

Call	Name	Location
Rx & Tx equipped		
M0DTS	Rob	Yarm, Co. Durham
GW3JGA	John	Prestatyn, N Wales
G4CPE	Arthur	Sundon, Beds
G6MNJ	Paul	Pimlico, Herts
G8ASI	Mike	Pimlico, Herts
G8ADM	Dave	Harrow, NW London
G8GTZ	Noel	Basingstoke, Hants
G8LES	Mike	Alton, Hants
G3PYB	Peter	Portsmouth, Hants
Rx only at present		
G3KKD	Ian	Stow Cum Quy, Cambs
G8XTW	Phil	Leigton B. Beds
M0SAT	Dave	Watford, Herts
G7RZF	Russell	Watford, Herts
G4BID	Bill	Yately, Hants

P-GRADE AND RECEIVED SIGNAL STRENGTH. The P-grade can also be presented as typical signal strength levels in dBm (dB relative to a milliwatt). There is a direct mathematical relationship between the receiver bandwidth and the minimum strength of signal that can be received. A simple 'rule of thumb' statement that saves getting into involved calculations is that the noise floor in dBm is equal to –174dBm for a bandwidth of 1Hz (search for 'noise floor' on the web for more info).

A typical ATV receiver bandwidth of 16MHz (16,000,000Hz) is, when expressed as a dB (power) ratio, 72dB 'up' on 1Hz. Taking this from the –174dBm we started with, it gives us an ATV receiver noise floor of –102dBm. So the actual received signal strengths for each P-grade are as follows:

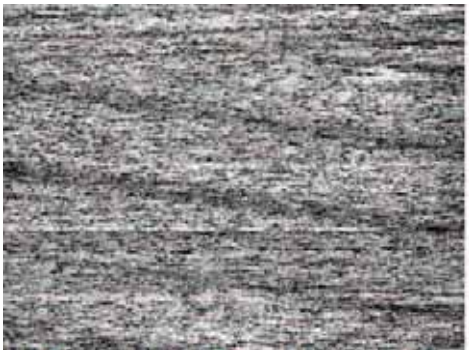
P0: –101dBm (signal ~1dB above noise)
P1: –92dBm (signal ~10dB above noise)
P2: –83dBm (~19dB)
P3: –74dBm (~28dB)
P4: –65dBm (~37dB)
P5: –56dBm and above
(signal to noise 46dB plus)

A signal to noise ratio of 45dB or greater is considered to be approaching 'studio quality'. This would be the best signal you could wish to receive with your equipment.

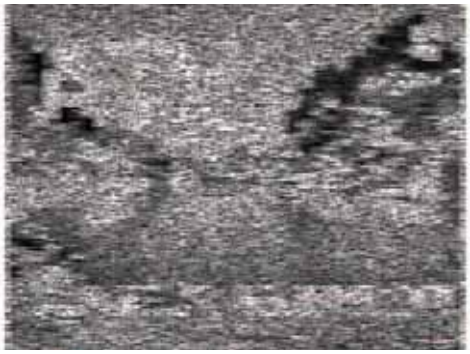
You may have noticed that the difference between P-grades corresponds to a 9dB change rather than the 6dB (sometimes 3dB) for S-points with a voice communications receiver.

GOING DIGITAL. For digital television there is a 'D0 to D5' scale, but it is not often used. This is probably because the D-scale assumes that the digital receiver does not have the typical 'weak signal' picture blanking facility. You usually get a 'closed circuit', high quality picture then, as the signal reduces, a slightly broken up or 'frozen' picture, followed by just a blue or black screen. This is characteristic of the so-called 'digital cliff', where signals are near-perfect but then suddenly vanish as the rising noise defeats the error-correcting algorithms.

Next time I hope to include the subject of setting the transmitter deviation along with the associated emphasis and de-emphasis requirements and include some simple technical tips based on reader requests.



P0 Total noise, may see sync bars.



P1 High noise, visible weak signal.

P2 High noise, 'fair' picture & fair detail.

P3 Noise visible, good picture, recognisable detail.

P4 Slight noise, very good picture, good detail.

P5 No visible noise, 'closed circuit' quality.

Start Here

What type of antenna for what band?

INTRODUCTION. Welcome to a new series of *RadCom* articles aimed at making topics more accessible to all amateurs. This doesn't mean that the content will be 'dumbed down'. Instead, we hope to present material in a way that allows you to easily understand and apply them to other aspects of amateur radio.

To help make this happen, we're following the style known in the US as 'Elmering', where someone with more experience explains topics to someone with less. Two authors, Jonathan Constable, M5FUN and Tatiana McArthur, MM6TAT, write each article. Tatiana gained her Foundation licence in February 2009 and enjoys contesting and DXing. Jonathan has been licensed since April 1998. His interests cover many aspects of amateur radio, though he has focused on 144MHz DX and station design in the past few years.

In this first article, we aim to give an overview of the types of antennas commonly found across the amateur bands and explain why these antennas are so regularly used. We hope this column will help you bridge the gap to the more technical parts of amateur radio. We welcome any comments and suggestions.

LF (80 & 160m AND BELOW). On lower frequencies, the physical size of the wavelength makes it hard for most amateurs to have full-size aerials. The most common antennas found are versions of dipoles which, when suspended ideally at least 10 metres above the ground, radiate fairly efficiently. For people who can't fit a full-size dipole into their garden, alternatives often involve traps. Traps are a way of either permitting one antenna to effectively be used on multiple bands or also used to make the antenna seem electrically longer to your radio. In other words, it makes the antenna think it's bigger than it really is, thus working better on the lower frequencies and helps it to radiate your power more efficiently.

For those whose antenna space is limited, even for trapped antennas, verticals are often used. A typical vertical consists of a $^1/_4\lambda$ pole supported on the ground, to which the centre of the coax is connected. The coax braid is normally connected via an earth stake driven deep into the ground and radials are often used to improve the conductivity of the surrounding ground to increase efficiency. An example is shown in **Figure 1**, and this subject is described in more detail in this month's Antennas.

Finally, a long length of wire (as long as possible) can be used with an antenna matching unit, which allows the radio to believe that is it transmitting into a nearly perfect aerial rather than just a long wire. This enables many amateurs to get on the air, but it is not necessarily the most efficient antenna.

HF (40/30/20/17/15/12/10m). On HF, most amateurs with a reasonably large amount of space favour a Yagi. These vary between relatively small two or three element versions to larger five or six element Yagis, as shown in **Figure 2**. These become progressively uncommon as you decrease in frequency because the physical size of the antenna becomes unmanageable. Where space is limited or large towers are unavailable, tri-band antennas are often used. These work on three different bands, typically 10, 15 and 20m. They have slightly lower performance than single band (monoband) Yagis. HF Yagis typically have broad directivity and a significant difference in signal between the front and back of the beam, otherwise known as a good front to back ratio. However, they don't generally have the directivity associated with VHF Yagis (except at some exceptionally large stations).

For amateurs without towers or on the lower HF frequencies, wire antennas or verticals are common alternatives. These antennas are similar to those described in the LF section; however, since the frequencies are higher, these antennas are physically smaller and are therefore easier to fit into most amateur's gardens or rooftops. Further, it's usually unnecessary to use coils or traps since full size antennas take up less space.

VHF (6/4/2m). As frequency increases above 30MHz, the ionosphere plays less of a role in the day-to-day propagation of signals. This leads to a difference between antennas used for localised contacts and those used for reliable contacts further afield.

FM contacts tend to be traditionally fairly local and even made while mobile. These contacts normally use a form of vertical such as a $^1/_4\lambda$ or

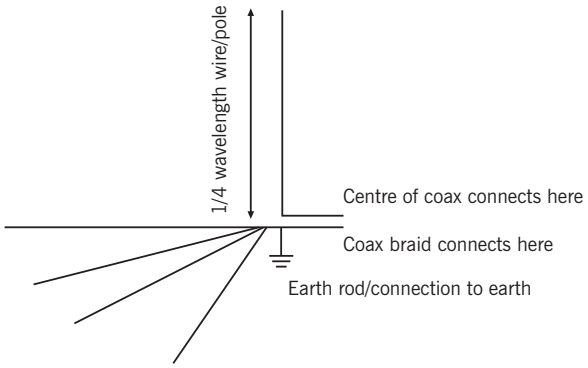


FIGURE 1: Basic quarter wave vertical. The radial mat should extend all the way around the base of the antenna.

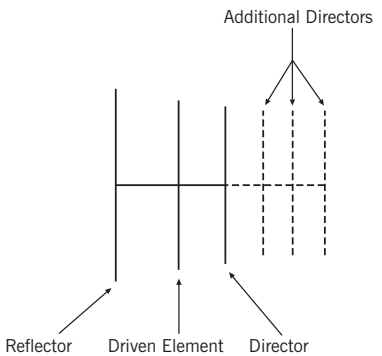


FIGURE 2: Three element Yagi. With suitable adjustments to the design, an arbitrary number of extra elements can be added to the front to increase directivity.

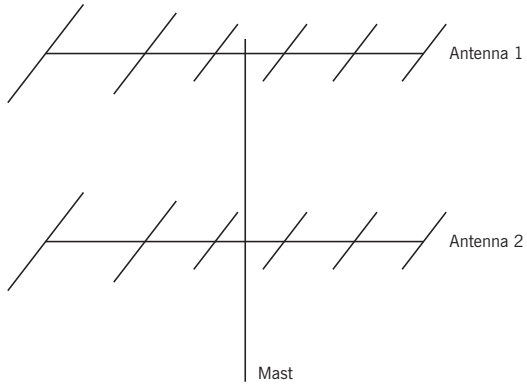


FIGURE 3: Stacked antennas increase the directivity without narrowing the 'beam' width by altering the vertical extent of the radiation pattern.

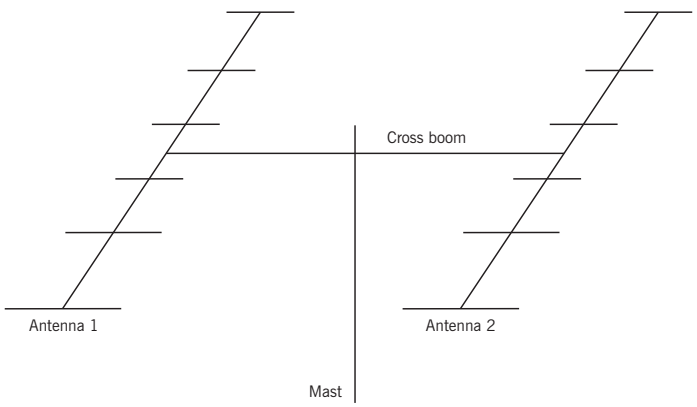


FIGURE 4: Bayed antennas narrow the 'beam' width to increase directivity but require pointing more accurately.

5/8λ vertical. This has the advantage of an omnidirectional radiation pattern, allowing you to have good coverage of your local area with a small aerial. Contacts further away can be made with these setups by use of repeaters. Favourable conditions, such as when an area of high pressure is overhead, may lead to your signal being 'ducted' to stations much further away.

On the other hand, it's possible to contact stations around 500km away using SSB and a medium sized Yagi. At VHF, Yagis are much smaller and more efficient, since it is possible to build them at least a wavelength long. This means they can have more directionality and consequently can make contacts further away. A significant disadvantage of directionality is that you may not hear stations calling who are not in the main direction of the Yagi. To counter this, a rotator is desirable to maximise signal strengths from different stations.

Sometimes, even at VHF, it isn't practical to build a longer Yagi. Stacking two identical antennas above each other (**Figure 3**) can bring up to a 3dB improvement in gain without making the antenna more directional. Baying two identical antennas (stacking side by side, as shown in **Figure 4**) can also give up to a 3dB improvement but this time at the expense of making the antenna system much more directional. It is worth noting that to get another 3dB improvement, you have to double the antenna system again. This is why large contest stations often stack four or eight medium sized Yagis; they have a larger gain without making the antenna system highly directional.

UHF (432MHz AND ABOVE). UHF is similar in many ways to VHF except that signals are normally not quite as strong as a comparable station on VHF. For local work, mainly on FM, omnidirectional antennas such as verticals are common, as is the use of repeaters. Similarly, for longer distance contacts, Yagis are often used and may be stacked or bayed more easily than at VHF because they are smaller and therefore present less of a challenge. However, losses within coax cables and connectors increase with frequency, thus the more efficient stations use the shortest possible lengths of low loss cables in order to maximise both transmitted and received signals. Even with low loss cable, connector losses can be significant and can cause diminishing returns from stacking and baying. An alternative at microwave frequencies (13cm and higher) is a dish antenna. Dish gain is proportional to size and there is no stacking or baying required.

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Whether you're testing a radio or calling CQ, this handy little box will save your vocal cords.

The digital recorder makes a smart addition to any shack.

INTRODUCTION. This device was conceived through a need to apply an audio signal into a SSB QRP transmitter I was developing. One can always talk into a microphone; however, one then needs to use headphones to eliminate audio feedback. The problem is that you hear yourself whether the section you are playing with is functioning or not, because your voice comes via the 'short path' through the Eustachian tubes. An obvious solution is to persuade one's better half to count to ten in a repetitive fashion into the microphone in an adjacent room. My personal experience of this has not been especially good (her interest in radio is somewhat less than mine). So, I needed a device that would replace my girlfriend – no, that's wrong! I needed a device that would conveniently play back a recorded voice.

When I finally got my QRP transmitter functioning, I also discovered that it was possible to spend long – even very long – periods calling CQ. So the digital recorder got a relay added to turn on the final amplifier stages and it became a 'CQ box'. I really liked the device, so I adapted it to record from and play to my Yaesu FT-840. It can be adapted to other radios very easily.

The recorder has just two functions: it records and it plays back. Along with a loudspeaker for monitoring, the playback is fed into a transceiver that is turned to the transmit mode. When the message is finished the transceiver is switched back to receive. The record function is either from a line input or from an electret microphone built into the

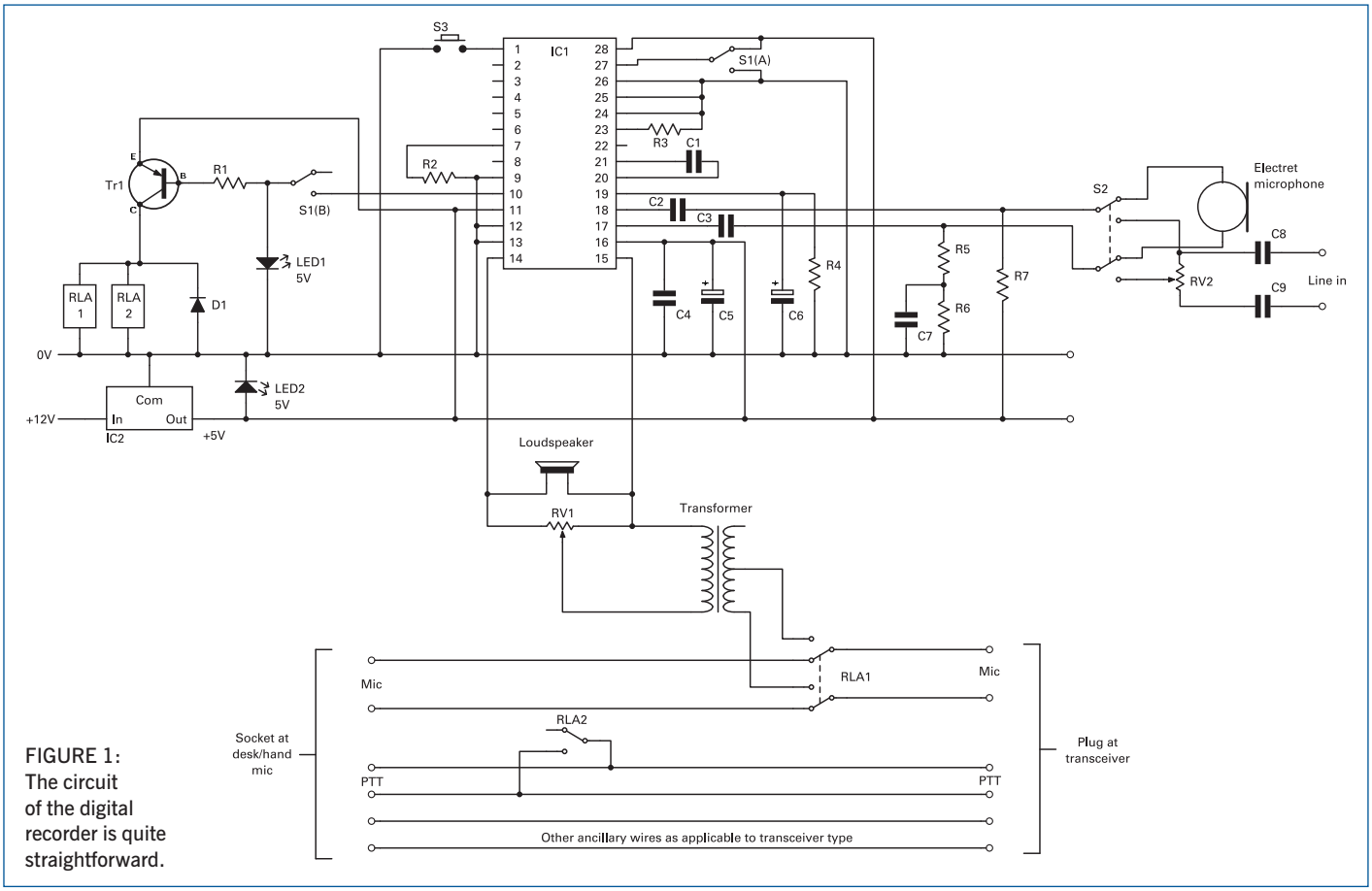

FIGURE 1: The circuit of the digital recorder is quite straightforward.

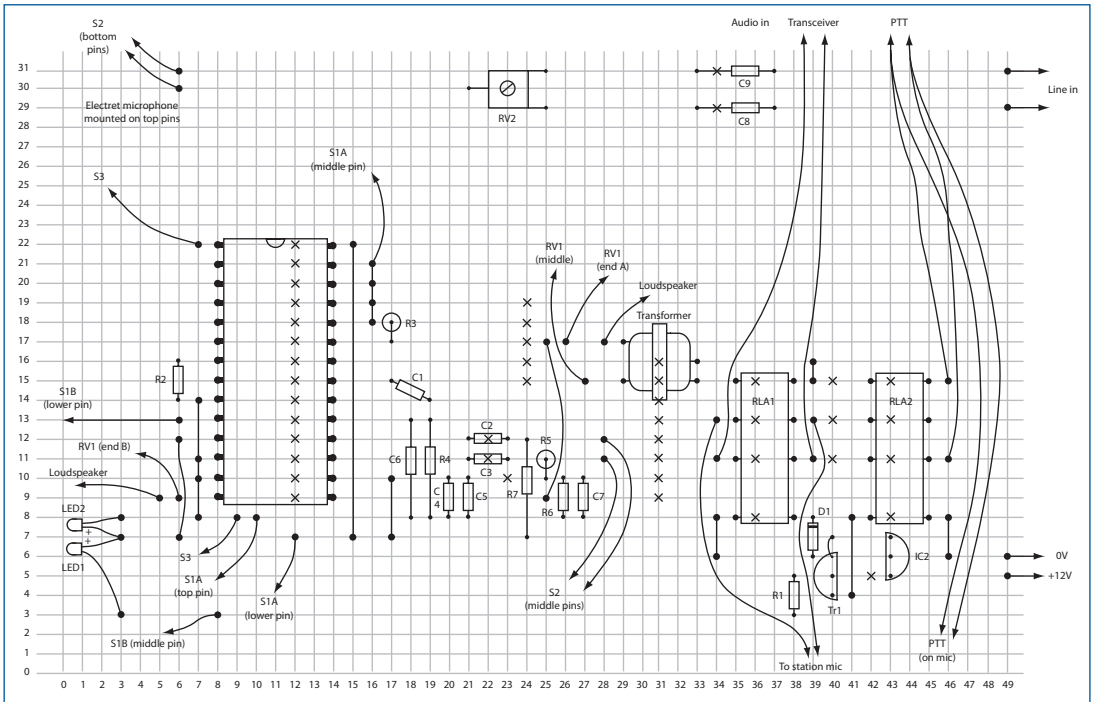

FIGURE 2: The parts layout is fairly simple. X marks track breaks. See also the internal photograph for more guidance.

cabinet. Using the built in microphone, a CQ message can be recorded for transmission – this saves one's voice when calling for long periods. Another use is for recording someone else's transmission to play it back to them. In my experience of homebrew QRP operating, radio amateurs can be very 'kind' when you ask them about your audio quality. Using this device they can have it played back to them to judge for themselves.

CIRCUIT DESCRIPTION. Refer to **Figure 1**. IC1 (HK828) is the heart of this device. It consists of a complete record-playback system on a chip and many of the peripheral component values have been derived from its data sheet. S1 selects between record and playback modes, S2 switches between the line input and electret mic. S3 triggers recording or playback (according to the position of S1).

R2 defines the sampling speed and hence controls the quality of the recording and its duration. Quality is inversely proportional to length. The value of 39kΩ produces a record time of approximately 45 seconds, along with faithful audio reproduction. This is certainly long enough to record even the most undisciplined of CQ calls or to record somebody else's audio to play back to them.

The electret mic requires DC bias, which is provided by R5, R6 and R7. C2 and C3 block this DC from the inputs to IC1, while C8 and C9 prevent it from appearing on the line input.

When the device is operating in record or play mode, pin 10 goes to 0V. When S1(B) is in the playback position, TR1 activates RLA1 and RLA2. The contacts of RLA1 switch the playback audio into the transceiver's MIC lines, and RLA2 activates the PTT. D1 protects the transistor from the back-EMF from the relays, thus prolonging its life beyond the first activation.

LEDs 1 and 2 are specified as 5V (internal resistor) types for convenience. These could be substituted for standard LEDs using a series resistor of 270Ω.

An initial look at the circuit diagram might raise the questions – why use two relays and why use the transformer? The answer is that I like to isolate pieces of equipment as much as possible. In the event of a malfunction of the home-made device, I really do not want any risk of placing a DC voltage into the microphone plug of my expensive radio. So, by all means omit the transformer and only use one relay but, as my mother would say to me when I was very young, 'do not come crying to me if it all goes horribly wrong'.

I have made no attempt to suggest connections for wiring the microphone sockets and plugs as a search on the internet has given me the impression that there are many possibilities. So anyone attempting this project will have to either find their transceiver's circuit diagram or trace the socket from their microphone. Any ancillary wires from the microphone need to be connected straight through the recorder.

CONSTRUCTION NOTES. As seen in the photos, my recorder was made on strip board approximately 100mm by 130mm for convenience. There is nothing particularly challenging about the construction. Note that X on the overlay diagram (**Figure 2**) indicates a track break, usually accomplished most easily by a hand-held drill bit.

Continued on page 60

PARTS LIST

RESISTORS

R1	5.6kΩ
R2	39kΩ
R3	100kΩ
R4	220kΩ
R5, R7	4.7kΩ
R6	1kΩ
RV1	4.7kΩ potentiometer
RV2	4.7kΩ preset

CAPACITORS

C1-C4, C8, C9	0.1μF
C5	22μF
C6	4.7μF 16V
C7	22μF 16V

SEMICONDUCTORS

IC1	HK-828 voice record / playback IC, available from www.jaycarelectronics.co.uk (part no ZZ8200) and other sources
IC2	78L05
TR1	BC559
D1	1N4148
LED1	5V red
LED2	5V green

MISCELLANEOUS

S1, S2	DPDT miniature toggle switch
S3	SPST push (on) switch
RLA1, RLA2	DPDT 5V miniature relay

Electret microphone insert

Transformer – miniature audio output transformer 20kΩ primary, 2 x 1kΩ secondary (eg Maplin HX28D)

Connectors appropriate to microphone and transceiver – 2 plugs and 2 sockets (to make patch lead)

Phono socket (insulated, if using metal enclosure)

Phono patch lead

2.5mm DC power socket

Plastic or metal case – recommended minimum size 125mm x 165mm x 35mm (larger makes construction easier).

28 pin DIL socket

2 x 16 pin DIL sockets for the relays

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In Practice

Duelling VSWR meters?

Two free-standing VSWR meters, with two more built into the equipment behind.

Q: My two VSWR meters don't agree, and both readings vary with the length of cable downstream. Which meter is correct?
A: Neither of them! VSWR meters may look simple, but there are many reasons why they may not give accurate results. The reading on a 'VSWR' meter is only a mathematical equivalent value, because the instrument is sensing the 'standing waves' in a very indirect way. In reality, a VSWR meter consists of a small amount of hardware and a large lump of transmission line theory, held together by assumptions about how the hardware should be behaving. The problem is, not all of those assumptions are true. So, let's define what the 'truth' is, for the purposes of this article.

A real-life VSWR sensor tells you something about the impedance that is directly attached to its output connector – the one farthest away from the RF signal source, often labelled 'Load' or 'Antenna'. This connector is called the 'reference plane' for the impedance measurement, and is where you would connect an accurate 50Ω load for initial calibration adjustments. When you connect some unknown impedance at that same reference plane, the VSWR reading will be a calculated equivalent value which is valid for a system reference impedance of 50Ω. So whenever I say 'true VSWR', I mean the correct mathematical equivalent value that should be measured and displayed, if there were no errors due to the hardware. But those errors are never far away, and that is why nobody's VSWR meter will ever tell the whole truth - except, very occasionally, by accident.

NOT GUILTY. The search for errors becomes far easier if we can eliminate some factors that are definitely not involved. True VSWR depends only on the value of the complex impedance that is connected at the reference plane. It does not depend on the RF signal level, the transmitter output impedance or anything at all upstream of the reference plane. These are solid certainties, so any appearance to the contrary points to a hardware error in the VSWR sensor.

If the VSWR meter is connected to a length of transmission line ending in a load such as an antenna, the feedpoint impedance of the antenna will be transformed backward along the line to become the unknown impedance that the meter 'sees' at its reference plane. This will depend on only three variables: the terminating impedance Z_{LOAD}; the characteristic impedance of the line, Z_{LINE}; and the amount of signal attenuation along that length of line.

The VSWR does not depend on the actual length of line, except for a small effect due to line attenuation. If you increase the length of the line by a relatively small amount (so that the difference in line attenuation is very small) you will certainly change the transformed impedance, in a cyclic pattern that repeats itself every electrical half-wavelength along the line; but all those different impedance values share the same value of VSWR, so the reading of your VSWR meter should not change. If you make a much larger change in the length of the line, so that the effects of attenuation become noticeable, you should still only see a small change and it should only ever be in the expected direction: increasing the line length should cause the VSWR reading to decrease; shortening it will increase the reading. Once again, any appearance to the contrary points to a hardware error, most likely in the VSWR sensor [1]. So let's see why these problems are so common.

INACCURACY OF VSWR SENSORS. All VSWR sensors work by sampling the voltage and the current on the centre conductor of the coaxial line. At HF, VHF and UHF, these samples should ideally be taken at exactly the same point on the line, although that is never quite achievable in practice [2]. **Figure 1** shows four different ways to obtain these samples. The voltage sample is labelled E_V, while the current sample is allowed to flow through a resistor to develop a proportional voltage which we'll call E_I. The sensor is designed and constructed so that when an accurate 50Ω calibration load is connected to the reference plane, E_V and E_I will be exactly equal in magnitude and exactly 180° different in phase. We're also hoping for this to remain true over a wide range of frequencies.

Figure 1a is the familiar Bruene bridge configuration, widely used for HF VSWR meters. Its defining feature is the toroidal transformer T1 for sampling the line current, although there are several variants on the potential divider for sampling the voltage. **Figure 1b** shows an important variant that uses a transformer T2 for voltage sampling, with the same turns ratio as the current transformer T1. **Figure 1c** shows why we often call this instrument a 'VSWR bridge', for even a standard Wheatstone bridge can be thought of as sampling the voltage and current in the unknown arm of the bridge. **Figure 1d** shows how the same analysis can be applied to VSWR sensors that use a small pickup loop to sample the voltage and current simultaneously. Current is sampled by coupling with the magnetic field inside the coaxial line, while the line voltage is sampled from the electric field by capacitive coupling between the line and the pickup loop.

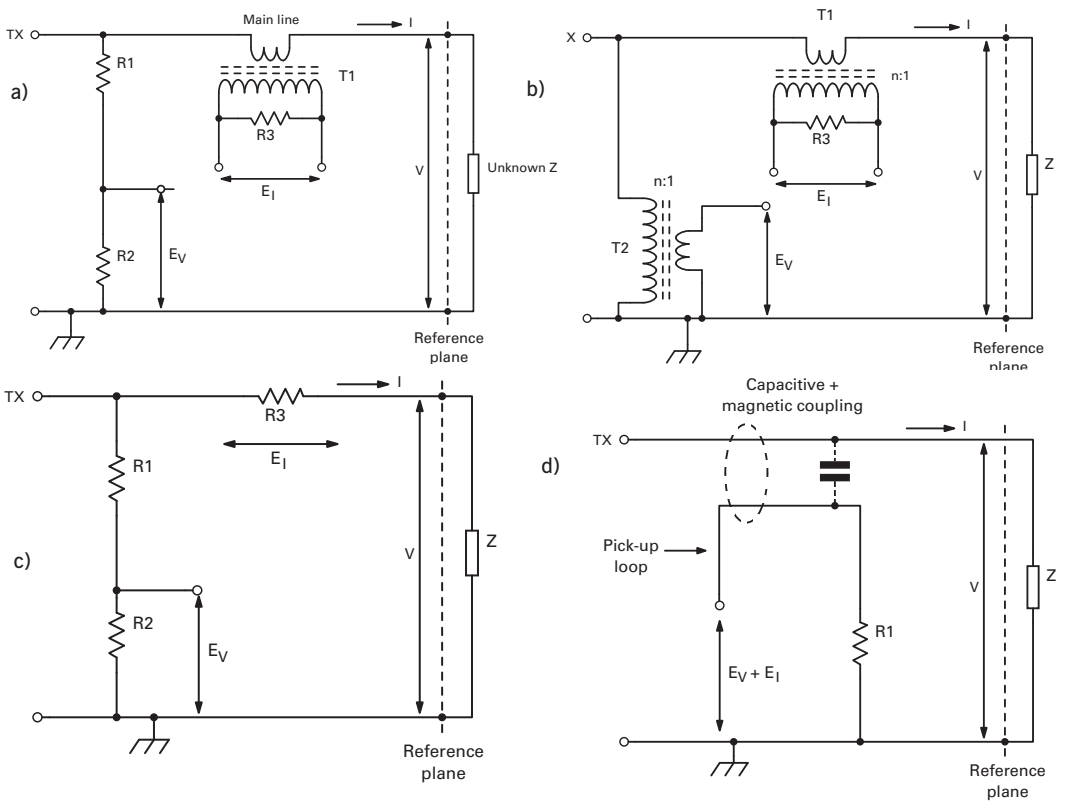


FIGURE 1: Four different kinds of VSWR sensor – see text.

Photo 1 shows the pickup loop in one of the interchangeable elements for a Bird model 43 directional wattmeter, also shown in the lead photograph. The loop is the stepped wire coming downward from the resistor on the left (R1 in Figure 1a). Behind the loop, a short diagonal sprig of wire adjusts the capacitive coupling.

All the sensors in Figure 1 produce two separate signals, E_V and E_I. **Figure 2** shows what happens next, based on Figure 1a. The 'Forward/Reflected' switch SW1 allows us to reverse the phase of E_I relative to E_V. In the 'Forward' position, E_V and E_I add in phase to give a V_{FWD} signal which is then rectified and displayed on the meter. When SW1 is reversed, E_V and E_I subtract to give us the 'Reflected' signal V_{REF}. A DPDT switch like SW1 isn't very practical because it is unlikely to give an accurate 180° phase reversal at RF, and many VSWR meters get around this by using two sensors in a mirror-image configuration… but there will always be some small differences between the pair of sensors, so once again there will be errors. The pickup loop in Figure 1d and Photo 1 achieves its phase reversal in a different way by physically rotating the whole loop through 180°, which reverses the phase of E_I but doesn't alter the phase of the capacitive coupling. You can find out more about the internal workings of VSWR meters from the September 2002 column, downloadable from **[3]**, but further details aren't needed for this article. We have already seen enough to appreciate where errors can arise.

The weak point in all kinds of VSWR sensors is the assumption that E_V and E_I will always have exactly the right relationships, in both magnitude and phase, at all frequencies within the sensor's operating range; and that this will never be affected by the magnitude or phase angle of the unknown impedance connected at the reference plane. Of course that assumption is never quite correct, and it causes errors to pop up in some bewildering ways. The February 2007 column examined this problem using the alternative concept of directivity, which you can think of as unwanted 'leakage' of the V_{FWD} signal into the V_{REF} signal **[4]**. All VSWR sensors suffer from directivity problems, and the size of the errors can vary dramatically with the phase angle of the impedance whose VSWR you're trying to measure. Even a good general-purpose VSWR sensor may have a directivity of only about 25dB: in broad terms this means that none of its VSWR readings below about 1.1:1 can be trusted. Depending on the phase angle of the unknown impedance, the same VSWR meter could be reading either high or low, with no clue to the size of the error or even its direction. And if even a 'good' VSWR meter can be so misleading, imagine what the rest are like!

OTHER ERRORS. Directivity is by no means the only hardware error. Another very common error is due to the diode detector. If the V_{REF} signal is very small, it may not be large enough to overcome the threshold voltage of the diode, so the meter will indicate a lower 'Reflected' reading than it should. In other words, low VSWRs look extra-low. A good test is to increase the power level: this won't affect the true VSWR, but if the indicated VSWR increases you know what the problem is.

Poor shielding is often mentioned as another source of inaccurate VSWR readings. It is certainly a possibility, but is often confused with a quite different effect which I'll come to in a moment. You'll recall that the interior of a coaxial line is kept private from the outside world by the skin effect, which prevents RF currents from flowing either inward or outward through the shield. It's easy enough to imagine that a break in the shielding could allow RF current to get inside the VSWR sensor and interfere with the internal signals (E_V and E_I, V_{FWD} and V_{REF}), adding or subtracting in unpredictable ways. However, this requires two things to go wrong: a substantial break in the shielding (RF currents won't readily flow through small gaps) and also a substantial amount of RF current on the outside surfaces of your feedline, VSWR meter and transmitter… which really shouldn't be there.

That brings us to the related problem, which isn't the fault of the VSWR meter at all. If you do have substantial common-mode current on the outside of your feedline (the 'I3' current in the December 2009 column) then inserting a feedline choke can cause a genuine change in the VSWR. But a feedline choke doesn't affect the inside of the coax… so how did it change the VSWR? Well, before you installed the feedline choke, the outside of your coax was carrying RF current, which meant it was behaving as part of your antenna system. With the choke in place, that unwanted current I3 is mostly suppressed and your antenna is now behaving as intended. But 'before' and 'after' are actually two quite

PHOTO 1: The pickup loop inside a Bird wattmeter element (like Figure 1d).

different antennas – one includes the outer surface of the feedline, the other doesn't. These two different antennas will have two different values of feedpoint impedance and VSWR. In most cases, this genuine difference in VSWR due to the changes at the far end of the feedline will override any errors due to 'poor shielding' in the VSWR meter.

On the other hand, don't overlook the possibility of major shielding faults. For example, a break in the shield of a DC connecting cable from a remote VSWR sensor could leave the whole instrument very vulnerable to external RF currents. Also, many amateur stations are limping along with unsuspected breaks in the shield connections of PL259 plugs. If that occurs, don't expect your VSWR meter to make much sense until such major faults have been found and fixed.

SO RELAX. Having seen all the different kinds of errors that VSWR meters can suffer from, you can now see why it isn't realistic to expect precise agreement between different instruments. In particular, don't worry if the VSWR readings from your transceiver or power amplifier are different from better external instruments. The main function of these built-in sensors is to protect the PA by keeping an eye on the load impedance at the output socket. The PA is fairly tolerant about this so the internal VSWR sensor doesn't need to be especially accurate.

Sadly, the price of a VSWR meter isn't always a good guide to its accuracy. If you own a VSWR meter whose only good features are the case and the display, why not replace the internals with something better? It makes a nice little homebrew project and the 'In Practice' website can point you to some good designs.

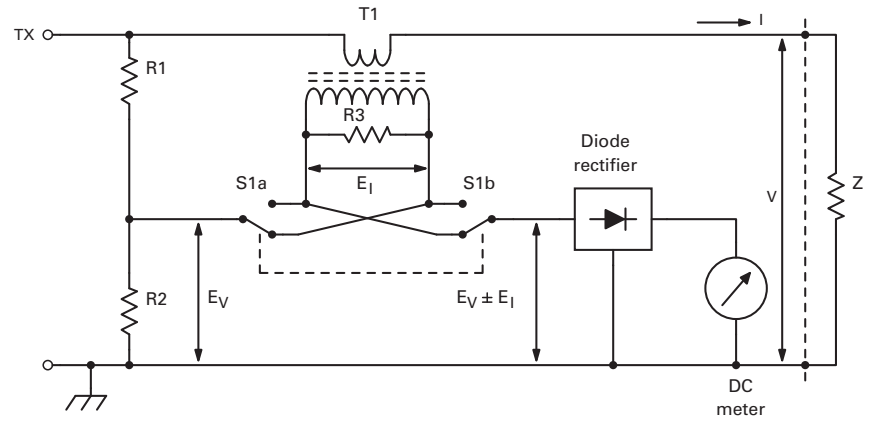


FIGURE 2: Forward and reflected signals are separated by reversing the phase of E_I.

NOTES AND REFERENCES

[1] Another possible cause of VSWR variations with line length is that the characteristic impedance of real-life '50Ω coax' is not exactly 50Ω, but it's often impossible to separate that from errors in the VSWR meter itself.

[2] At UHF and above, VSWR sensors more often use 'distributed coupling' along some length of line, but the principles are similar – and so too are the errors.

[3] Please follow this month's links from the 'In Practice' website: http://tinyurl.com/inpractice.

[4] The value of the directivity concept is that it highlights the errors of a VSWR sensor; and the directivity can be measured without access to the sensor's internal signals. On the other hand, E_V and E_I give us a clearer view of how the sensor is intended to work.

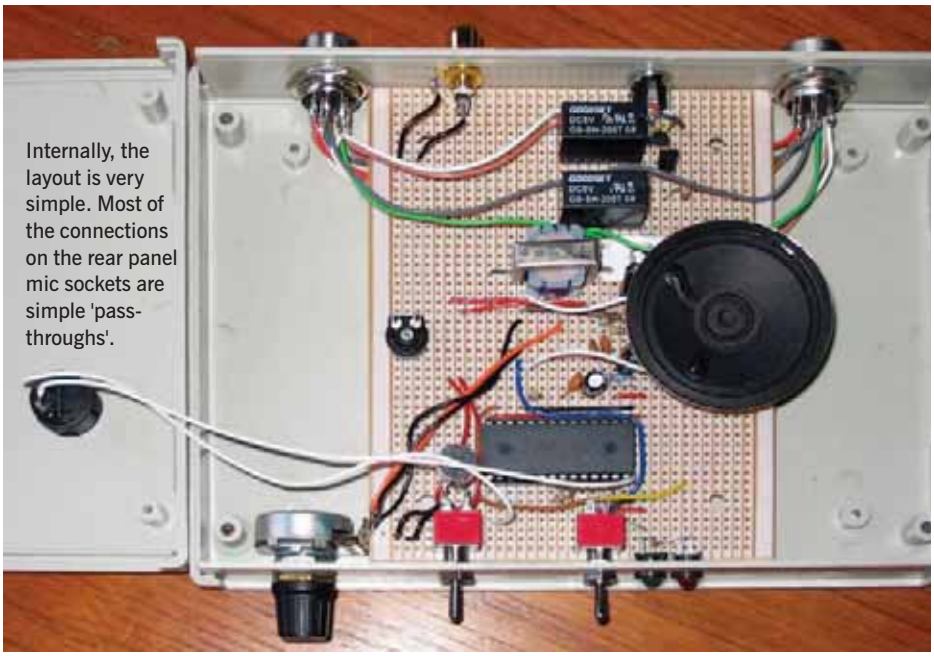
ANDY TWORT, 2M0OSK ♦ E-MAIL: 2M0OSK@GOOGLEMAIL.COM TECHNICAL FEATURE

Continued from page 55

As there is a lot of wiring, check and double check, go away, have a coffee and check again, before committing the circuit board to an enclosure because, in my experience, de-soldering a whole load of cables to fault find can be somewhat disheartening. If using a metal enclosure, insulate the line input from the cabinet. For the short links I usually use just a piece of wire below the board (which is why they are not visible in the photos).

SETTING UP. It is recommended that the first 'power up' is carried out with the recorder disconnected from the transceiver. This will enable a check of the record and playback functions to be made. When initiating playback mode the relays should be heard to click. Whilst it probably sounds as though I belong to the 'if it could go wrong it will' school of thought, one suggestion I have is to check the outlet with a voltmeter just to really make sure that there is no DC voltage on any pins (this could for example happen as a result of not fully cutting through the copper strip between the relays and IC1). When you're certain that the device is functioning correctly it should be connected to the transceiver and the following should be carried out:

1. Set the mic gain on the transceiver to its usual place.
2. Record a voice with the electret mic.
3. Transmit this (into a dummy load) and adjust the gain on the recorder to a satisfactory level.
4. Record a transmission from a line input.
5. Transmit this (again into a dummy load) whilst observing the transmitter's output.
6. Repeat stages 4 and 5 as necessary adjusting RV2 to achieve appropriate output level (without altering the gain of the recorder).
7. In use no more adjustments should be necessary.



Internally, the layout is very simple. Most of the connections on the rear panel mic sockets are simple 'pass-throughs'.

OPERATING INSTRUCTIONS. Simply select an input mode (either line or mic), select record, press and hold the start button and recording begins. At the end of the recording simply release the button. An audible beep will be heard at each end of the recording. To transmit this message select play and press the start button. When it has finished it can be repeated by simply pressing the start button again.

Short Circuits

It may be old but the LM317 is a very versatile voltage regulator

VARIABLE REGULATOR, FIXED VOLTS. When we want a fixed voltage regulator, most of us turn to the venerable and much-loved family of 78xx series such as the 7805 for a 5V output. But instead of having to keep a range of chips for different voltages, how about a simple to use three-pin adjustable device whose voltage can be set to any value you like with two resistors, permits higher input voltages than the 78xx family and has appreciably lower noise and ripple on its output? And what if it offers possibilities for interlocks to other power supplies where damage might occur if they fail – for instance, monitoring the negative gate supply to a power GaAsFET? There is such a device – the LM317 – and it has been around for a long time. It's mostly ignored by amateurs, but not by the pros!

The most popular standard device comes in the TO220 package shown in **Figure 1**. It is rated at about 1A to 2A, depending on the manufacturer. There are also 100mA wire-ended and SMT versions and a few higher power versions. It is interesting that 'LM317' is so well established that it actually covers many devices of different current ratings and package. Browse the Farnell online catalogue **[1]** and you'll see some 140 'hits' on LM317. Note that on the TO220 packaged device the tab is connected to the output and will need an insulating kit, unlike the 78xx series where the tab is grounded.

The circuit of **Figure 2** shows how the voltage output is set by the ratio of two resistors feeding back to the adjust pin. One thing becomes immediately obvious – the device has no ground connection. We'll come back to that later, because it allows for some rather interesting circuit configurations!

The reference voltage that the divided-down output is compared with is defined between the V_{out} and Adj (adjust) pins and is equal to 1.25 volts. So the potential divider is upside down, and V_{out} is given by

$$V_{out} = 1.25 \times (1 + R2/R1).$$

If R2 is replaced by a potentiometer there is even a linear relationship, as V_{out} is proportional to R2 plus an offset of 1.25V. A small bias current of typically 50μA flows out of the Adj pin and, for critical applications, this should be taken into account when calculating the feedback resistor values. The data sheet states that this current is constant with temperature so that it will not affect the voltage regulation stability. The complete equation for calculating output voltage is actually:

$$V_{out} = 1.25 \times (1 + R2 / R1) + 50\mu A \times R2$$

R1 is chosen to be about 120Ω. In this case, to a rough approximation, $V_{out} = 1.25 + R2/100$ (where R2 is expressed in Ω). With this value of R1, the output quiescent current is 10mA and the 50μA I_{adj} becomes insignificant.

Note how the two decoupling capacitors are connected; unlike the 78xx voltage regulator family, they are not compulsory. C1 is required if the regulator is located an appreciable distance from the power supply filter. The output capacitor, C2 is not needed for stability; however it does improve transient response. It may also help if removing output high frequency noise is particularly important. Do not, repeat not, connect the capacitors across the device pins from V_{out} or V_{in} to Adj. Doing this destroys the feedback transient response and lets any noise or ripple on the input direct through to the output. Always connect any additional filtering capacitors from the relevant pin to ground.

The LM1117 is a low dropout variant and in addition to the variable type is also available in fixed versions for 1.8, 2.5, 2.85, 3.3 and 5V. These are all based around the same chip, but with R2 of the appropriate value fitted internally. For negative voltages the LM337 family is used in the same way.

Full data sheets are available for all these devices from **[1]**. The circuit configuration allows for some different and less well known power supply techniques...

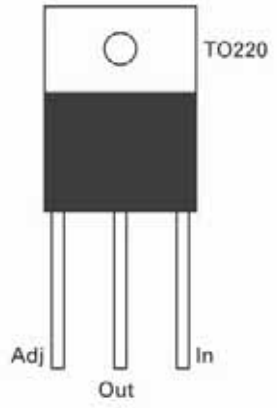


FIGURE 1: The LM317 TO-220 package. Note that the tab is connected to the output.

HIGH VOLTAGES. If you have a 50V supply rail (as used in many high power FET RF amplifier stages) and need to drop this to a lower value, 78xx regulators are useless. They typically have a maximum input voltage rating around 30V, irrespective of the output voltage. This here is where the LM317 comes into its own. Not having a ground connection, it is the voltage *across* the device – the difference between input and output – that is the limiting factor. This is 40V or even higher, depending on manufacturer. So now we can drop directly from 50 to 12V in one go, rather than being forced to use additional dropper resistors, Zeners or emitter followers, as occasionally seen in some designs. In fact, there is nothing to stop you from using an LM317 to generate a stabilised 320V rail from a 340V input (like directly rectified mains) – except safety, tolerances and smoothing ripple on input voltage: the 40V differential must not be exceeded. I am *not* suggesting that you *actually try* bridge rectifying the mains for a HV power supply – that would be *very* dangerous.

If you really do need to drop more than 40V across the regulator, then the circuit of **Figure 3** can be used. This shares the total voltage drop with a power transistor used as a pre-regulator. The voltage divider made up of the two resistors Rx ensures that approximately half of the total voltage drop appears across each. The value of Rx should be chosen to be a compromise between excessive power dissipation and being able to supply enough base current for the transistor at minimum voltage drop. This circuit was used in a bench power supply designed to be continuously variable from 1.2 to 75V.

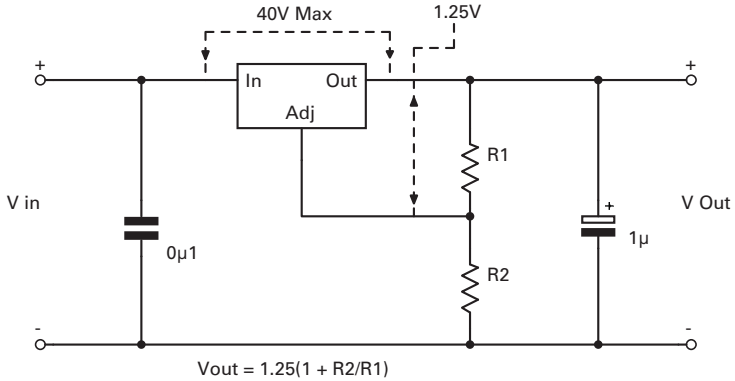


FIGURE 2: Basic LM317 application circuit.

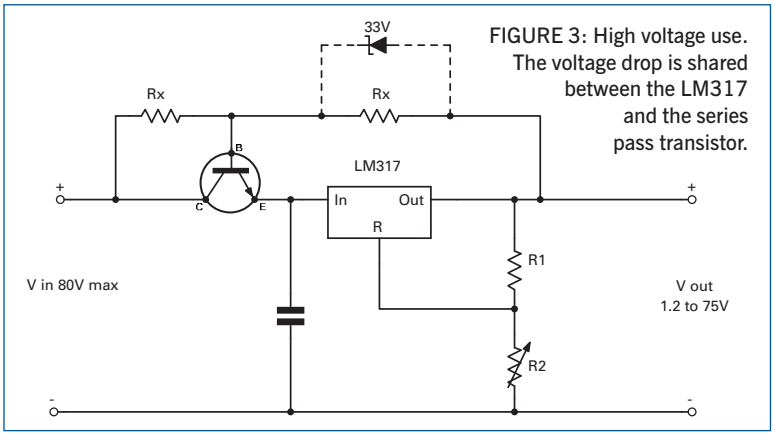


FIGURE 3: High voltage use. The voltage drop is shared between the LM317 and the series pass transistor.

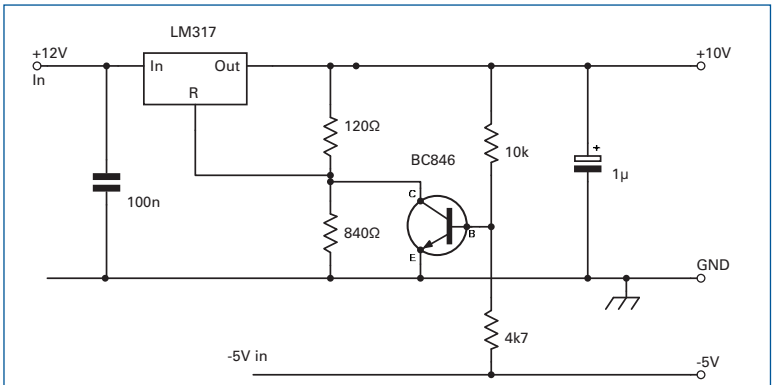


FIGURE 4: Protecting GaAsFETs from missing bias supplies. The 10V rail is inactive unless the -5V supply is present.

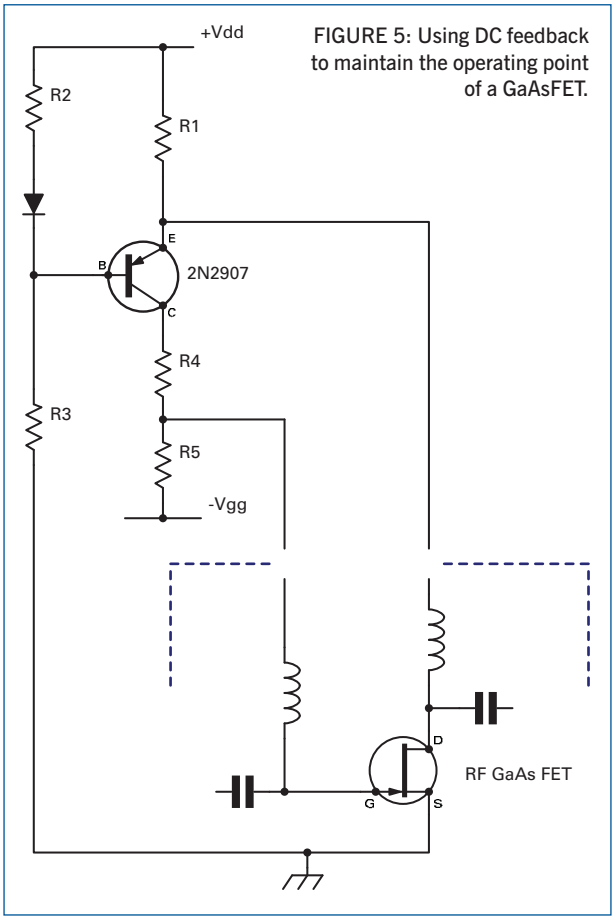


FIGURE 5: Using DC feedback to maintain the operating point of a GaAsFET.

Two or more pre-regulators can be connected in series for a continuously variable supply for hundreds of volts. As an alternative, the second sharing resistor could be replaced with a 33V Zener diode to force no more than this across the regulator, ensuring the series transistors mops up all of the remaining voltage drop. This latter solution may be of greater value as high voltage power transistors are readily available.

INTERLOCKED NEGATIVE RAIL. Power GaAsFETs usually require a negative voltage bias voltage on their gate to set the correct drain current. At zero gate bias voltage the device draws maximum drain current, appearing as a very low resistance across the positive Vdd supply. Unless current-limited to a value the device can cope with, this is usually enough to destroy the (often expensive) RF amplifier FET. The negative voltage in amateur applications often comes from a small switched capacitor voltage inverter like the LM7660. Usually supplied from a regulated +5V input, this chip generates a –5V output at the few milliamps needed for biasing the FET. The switch mode nature of these voltage inverters means that output ripple is present and has to be well filtered - usually by slugging the output with a big electrolytic capacitor. And guess what a big capacitor on a current limited supply does? Yes, it causes a delay of several tens or hundreds of milliseconds before the negative voltage appears. Just long enough for the big expensive FET device(s) to draw excessive current and become overloaded for the duration, leading to a shortening or ending of their life. With an LM317 regulator or one of its high power cousins as the drain voltage regulator as shown in **Figure 4**, an interlock can be formed that prevents full positive voltage appearing before the negative rail. The transistor across R2 is kept turned on until sufficient negative volts appear to bias it off, whereupon Vdd can rise to its full regulated value. Since the transistor turns on at a base voltage of around 0.6V (which is near enough to zero volts), R3 and R4 can have values that are in the ratio of the positive voltage to the minimum safe negative voltage. For example if the GaAs devices are safe with more than –4V on the gate bias supply and the drain supply is +8V then values of R3 = 8.2k and R4 = 3.9k will be near enough. For critical applications a more rigorous calculation of the potential divider values might be needed, taking the 0.6V base turn-on voltage fully into account, but this approximation is usually good enough.

GaAsFET BIASING. And while we're on the subject of biasing GaAsFETs... The majority of amateur designs for RF amplifiers using GaAsFETs usually set the device's bias current by adjusting the gate voltage with a preset pot supplied from a negative voltage rail that is often poorly regulated, such as that described above. This is probably OK for most purposes, particularly if the user is nearby at all times to periodically do a heath check, but for remote unattended operation like at masthead or for beacon use (and especially with exotic and expensive high power microwave devices) a better arrangement really ought to be used to cater for voltage change and drift of device parameters with temperature.

The circuit of **Figure 5** shows how DC feedback can be incorporated into the biasing of a GaAsFET to maintain drain current automatically, independent of temperature and negative rail changes. The voltage drop across a low value resistor in the drain is monitored and compared with a reference derived from the positive supply voltage. Any change is amplified and fed back to the gate to compensate for the change and maintain a constant drain current. The diode in the bias chain compensates for the base-emitter voltage drop in the PNP transistor. The drain current Id is then

$$Id = Vdd / R1 \times R2 / (R2+R3)$$

The only proviso is that the positive supply be stabilised. But we are using an LM317 family device here to do just that, aren't we?!

This circuit, or a similar one, can be found in most commercial GaAsFET RF power amplifiers. Even silicon D-MOSFETS for lower frequencies that operate with a positive gate bias might benefit from a similar protection / stabilisation arrangement.

REFERENCES

[1] www.Farnell.co.uk

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Count on us!

RSGB Convention 2009

The Contest University had a full room for the first lecture of the day.

OVERVIEW. From the comments received both during the event and since, it seems that everyone enjoyed the whole experience, be it the wide choice of lectures with five full streams on Saturday and four on Sunday, or just being able to sit down with a cup of coffee and chat. The weekend had something for everyone and the inclusion of the VHF and Up stream certainly added to the whole experience.

As usual, it was possible to take the full suite of UK licence exams at the Convention: this year there was one taker for the Foundation, two for the Intermediate and 12 for the Advanced. I'm pleased to report that we had 100% pass rate at Foundation and Intermediate and 8 passes at the Advanced level. It was also possible to take the US exams and this year seven Technician exam papers were taken with seven passes, seven General with four passes and seven Extra exam papers with five passes. Eleven candidates were served with 10 new licences or achieved upgrades, Technician – 3, General – 2 and Extra – 5. There should be a special mention of one young man, James Fuller, who did his RCE Advanced exam and then went along and passed all three US exams to obtain his Extra class licence.

DXCC card checking statistics for the Convention were 64 Apps/5,806 QSOs, 14 new award applications (6 were first-time ever), 58 endorsement applications and 24 applications containing LoTW elements. Special thanks to the card checkers for their time; Carl Luetzelschwab, K9LA, Vicky Luetzelschwab, AE6YL, Rob Ferguson, GM3YTS, Fred Handscombe, G4BWP, Jim Kellaway, G3RTE and Lionel Parker, G5LP.

Planning has already started for the 2010 Convention so now is the time to put your request in if there is something you'd like to see at next year's event. If you'd like to help put the event together we'd very much like to hear from you. In either case drop a line to m0obw@rsgb.org.uk.

IOTA (BY MARTIN ATHERTON, G3ZAY). The Saturday morning IOTA session drew a packed audience. It started with a talk by Tom Heritage, M0TJH on the Cambridge University Wireless Society's ZD8UW trip to Ascension Island – a quite civilised DXpedition on the scale of what was to follow. Roger Balister, G3KMA gave a talk on the 'Secrets of the IOTA Database' showing just how much participants' submissions revealed about themselves in terms of preferred method of operation and contacts made. There followed an illustrated talk by Derek Cox, G3KHZ on his recent P29NI DXpedition to a rare Papua New Guinea island group. The overriding message to emerge was his team's careful attention to sharing the experience of the DXpedition with the local island community, making them feel the excitement enjoyed by the visitors.

Mike McGirr, K9AJ's presentation on his K9AJ/VY0 operation from Thomson Island in north Hudson Bay showed the rigours of operating in conditions that were a long way from five star comfort. This was then taken to extremes by Yuri Sushkin, N3QQ and Yuri Zaruba, UA9OBA with their talk on the Russian Robinson Club's recent operations as KL7DX and KL7RRC from the Aleutians and their video KL7DX - the Second Discovery of Alaska. The DXpedition went ahead in the most arduous conditions with an active volcano erupting within a few miles of their site, at times, depositing volumes of ash all over them! Yuri Zaruba's husky rally cry of "Greetings from Russia" rang in our ears throughout the weekend!

TECHNICAL (BY LESLIE BUTTERFIELDS, G0CIB). The Technical Stream at this year's Convention had a varied and comprehensive program of presentations, including ATUs, power supplies, WSPR, beacons and antennas.

Past President Peter Chadwick, G3RZP, spoke to a packed audience – not only was every seat taken, more than 15 had to stand at the edges just to hear the lecture! He spoke on the subject of antenna tuner units and their construction. The talk was not only highly informative but was given in Peter's unique style, which was highly appreciated by those there. It was also the subject over dinner on one table on Saturday evening where the various ideas that Peter had put forward were discussed and at least one diner planned to try out some of the ideas at home.

Well known *RadCom* columnist Ian White, GM3SEK, spoke on the subject of practical high voltage power supplies. This included such design factors as the correct choice of components and, importantly, how to work with high voltages safely.

Steve Nichols, G0KYA, a well known columnist from the Propagation Studies Committee, spoke on the subject of WSPR

The G5RP trophy was awarded to James Thresher, 2E0YOM by Ian White, GM3SEK (left) one of the founders of the award.

Neville Cheadle, G3NUG received his plaque for being inducted into the CQ DX Hall of Fame.

Awards in recognition of outstanding DXpeditions were awarded to Derek Cox, G3KHZ and Yuri Zaruba & Yuri Sushkin from the Russian Robinson Club.

(Weak Signal Propagation Reporting). The presentation is available on his blog spot [1]. Steve also gave a talk on HF propagation and led the HF propagation workshop as part of the Contest University stream.

I gave a talk on the International Beacon project, with a basic overview of how the beacon network works, how to use it, software and hardware availability, historical background and where to get more information on the subject of beacons.

It was also good to have a 'new face' on the technical scene, Justin Johnson, G0KSC, who gave a presentation on The Loop Fed Array Yagi – its benefits explained for VHF user. More details of Justin's work in this area can be found at [2].

Undoubtedly one of the highlights of the weekend was Bill Meara of Solder Smoke fame. Unfortunately, Bill was unable to attend in person and a Skype link was set up by Brian, G8OSN, which worked well. In case of problems on the day, a back up video podcast was prepared and this is available in three parts on YouTube [3]. Bill's Soldersmoke podcasts are available from [4].

VHF AND UP (BY NEIL ACKERLEY, G3RIR). Thanks to all the presenters who gave their time in providing a really excellent set of lectures for the first VHF and Up stream. It would be invidious to single out one lecture as a highlight but the organisers (if not the attendees) were pleased to see standing room only for some of the lectures.

Surely at least some of the attendees are inspired to try some more VHF QSOs via Sporadic-E and will be keen to help the research that G3YLA and G7RAU are undertaking, trying to make Sporadic-E predictable! Others will want to try VHF contesting and DXpeditioning in St Kilda or SOTA style. On a much more technical note, we can't wait to see the fruition of the SDR transceiver for microwaves without transverters and perhaps some of us will rebuild our high power supplies, this time properly. Others will be inspired to try a new band after hearing the 4m talk from a dyed-in-the-wool HFer and we are now convinced DXCC at microwave is just round the corner.

On Sunday, we managed to make a complete QSO with KB8RQ on 2m via moonbounce running just 80W to a single 17-ele Yagi.

The VHF and Up stream presentations are available on Yahoo Groups [5], which also provides a forum for discussion of the stream and a place where you can tell us what you'd like to see next year.

CONTEST UNIVERSITY UK (BY MARK HAYNES, M0DXR). The Icom UK sponsored 2009 Contest University UK programme lived up to expectations in seeing an even higher level of interest to the 2008 event. CTU UK occupied two of the presentation streams delivering a wide range of contesting related topics covering everything from beginner tips through to advanced tactics for the experienced contester. The event hosted 14 of some of the UK's top contest operators, as well as USA's very own Tim Duffy, K3LR, via video link.

Sessions were divided between Multi-Sessions in the morning, which consisted of presentations and Short-Groups in the afternoon, a more informal type discussion. Icom UK provided packs containing copies of all presentations and supporting material, which were distributed to all attendees together with a CD-ROM containing this material and more in soft copy. The sessions were generally very popular – this year, with slightly larger rooms, we were able to ensure most people had seats, although many of the lectures were still standing room only! Using the registers, we recorded that 245 unique participants took part in attending Contest University UK, and 80 qualified for receiving the certificate (for attending at least four of any of the sessions).

I would like to thank the CTU UK Professors: G0MTN, K3LR, G0KYA, G3UFY, G4BUO, G3BJ, G4IRN, G3LDI, G4TSH, G6PZ, G3XTT, MM0BQI, GM3WOJ, G3SXW, G4PIQ, and last but by no means least, my wife, Gemma, 2E0WPX for doing a lot of the running around on the day and preparing the certificates (not bad considering she was 20 weeks pregnant with our first child!).

Many thanks also go to the CTU UK sponsor Icom UK. Marketing Manager, Ian Lockyer and his team have provided wonderful support to a programme that is receiving growing interest on a global scale. We will assess the evaluation forms completed by attendees to ensure that the programme improves to cater for as many needs as possible going forward.

OPERATING & DXING. The operating & DXing stream carried on where IOTA finished and had two of the most attended talks. On Saturday Bob Allphin, K4UEE, packed the largest of the lecture rooms with his talk on the K5D DXpedition to Desecheo Island. A very experienced DXpeditioner, since retiring ten years ago to pursue DXpeditioning more or less full time, he has participated in seven major DXpeditions that have made over 750,000 QSOs. His amateur radio CV is long and impressive, with awards and world records for contests and DXpeditons. Over the weekend he gave

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Terry Chipperfield, G3VFC presented a cheque for £600 from G3YCN's estate to the RCF, which was received by the RSGB General Manager, Peter Kirby.

Prize winners of the Icom IC-7000 and Yaesu FT-450, generously donated by Icom UK and Martin Lynch & Sons with Yaesu UK. The raffle raised over £1500 for the RSGB HF Fund, which is used to sponsor DXpeditions.

two talks and showed the new DVD that had just been finished.

Bob described Desecheo as 'so rare, so near yet so far'. The project started in 2002 with the objective of finding a long term solution to dealing with the US Fish and Wildlife Service who maintain such locations as Desecheo. The island was on the list of most wanted locations – 6th overall, 3rd in Europe and 2nd in Asia – and the Fish & Wildlife service were continually being asked for permission to operate from there.

This group said that their DXpedition would remove the island from the most wanted list for several years if they were allowed to run their ideal operation. The US F&WS put the idea out to tender and around 7 groups put bids in. Bob feels that it was their 272 page proposal that won the day!

His talk described the trials and successes of the trip and the video showing why they needed to use helicopters to get on and off the island was very dramatic. With around 116,000 QSOs during the 14 days, it should be some time before K5D is in the top ten of the most wanted list again.

Another DXpedition talk that was very popular was the VP8YL Falkland Island YL DXpedition presentation by Liz Jones, M0ACL/VP8YLB. This was a very different operation, it was more low key with less experienced DXpedition operators, although it proved to be just as successful in its own way. In fact the ladies involved have gone on to become ever more involved with amateur radio since the DXpedition.

Liz described the trip from the journey to the Falklands – and that's not easy – to the stations that were set up and operated. To have an all lady DXpedition is unusual but proved very popular with pile ups whenever they were on the air. Perhaps this will encourage other lady radio amateurs to try something different. A write up of the YL Falklands DXpedition appeared in the July 2009 *RadCom*.

The Five Star DXers Association are planning to undertake a major DXpedition to the Pacific in October 2011. This will last for four weeks and a major effort will be made to contact UK and European DXers. The RSGB has agreed to sponsor a youngster to join the team. We will be holding a competition to identify a suitable candidate; details will be published shortly.

PRESENTATIONS. The Gala Dinner on Saturday evening saw the traditional presentation of two awards. The G5RP trophy was awarded to James Thresher, 2E0YOM and it was great that Ian White, GM3SEK, one of the 'incorrigibles' who founded and donated the award was on hand to present the award to James. The ROTAB trophy was presented to Don Beattie, G3BJ. Earlier in the year Neville Cheadle, G3NUG, was inducted into the CQ DX Hall of Fame and the Gala dinner was a great opportunity to formally present Neville with his plaque.

Terry Chipperfield, G3VFC presented a cheque for £600 from G3YCN's estate to the RCF, which was received by the RSGB General Manager, Peter Kirby. Ted, G3YCN died in January 2009, leaving a mountain of bits and pieces that could be a good starting point for many junkboxes – or as a top-up for others. In fact there were several sheds and workshops full of bits and pieces. He had been an RSGB member for 62 years having first become interested in radio whilst at Tonbridge School. For his National Service he joined the Royal Signals and trained wireless mechanics at Catterick. His passion for the hobby was immense.

Much of the collection was listed and offered by e-mail via Members' Ads in *RadCom* but there was a great deal left to pick over. So Terry, G3VFC and John, G3PAG decided to help Ted's widow, Nigella, organise an 'old fashioned rally' and encouraged amateurs from far and wide to come and fill up their boots with the components, books and equipment from a bygone era.

The site chosen for the sale was in Detling, Kent, within sight of GB3KN (which was in Ted's charge since 1984). Talk-in was on that repeater in tribute to his work as he had overseen the move of the repeater to its present site. Ted had rebuilt GB3KN more than once during his time as repeater manager and both his standard of construction and documentation showed his dedication to the hobby and his attention to detail.

The day was very successful and a total of £1200 was raised. Nigella Kent generously donated this money to the Radio Communications Foundation and the Royal Signals Benevolent Fund.

When the cheque was presented, Peter Kirby read a message from Nigella, "Amateur radio gave G3YCN so much pleasure and enjoyment. Please accept the enclosed donation so that others can be introduced to this wonderful hobby."

On the Friday after the Convention a local amateur Jeff, G4HIZ, showed his newly homebrewed dual-band SHF transceiver to MARTS members. It had been built onto two pieces of thick aluminium sheet he'd cut from a scrap 19in panel, one of them bearing the name Marconi (name of the firm, not the man) he'd bought at the rally. "A bit of Ted here..." he said. A fitting tribute to a generous and passionate amateur.

At the Gala dinner, Peter Kirby also paid tribute to Dave Stockley, Chairman of Icom UK, for their continued support in the amateur radio hobby. As well as sponsoring the RSGB Convention, Icom UK have renewed their sponsorship of the IOTA programme for another three years.

THANKS. Many thanks to all those that helped make the event a success, all the presenters for their great presentations, Icom UK and Martin Lynch & Sons for sponsoring the event, the behind the scenes staff at RSGB and NICE, the Shefford club for the loan of the mast and antennas, Ian, G4FSU for putting a great programme together with the IOTA guys, Neil, G3RIR and Reg, G8VHI but most of all those of you that attended either as delegates or day visitors. We hope to see you in 2010.

WEBSEARCH

[1] www.g0kya.blogspot.com
[2] www.g0ksc.co.uk
[3] www.youtube.com/user/M0HBR#p/u
[4] www.soldersmoke.com
[5] http://groups.yahoo.com/group/rsgbconventionvhfandup

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The International Amateur Radio Union

RadCom talks to the IARU President, Tim Ellam, VE6SH/G4HUA

BACKGROUND. The International Amateur Radio Union was formed in 1925 and in the early years spent most of the time encouraging the development of national societies in as many countries as possible and representing the interests of radio amateurs at international conferences. As competition for the radio spectrum became a more aggressive, the IARU realised that international lobbying was essential to the continued success of amateur radio. To this day, the IARU continues with the aim of representing radio amateurs at international level and protecting their part of the spectrum so that the hobby will continue to flourish.

PRESIDENT. Tim Ellam, VE6SH/G4HUA took up the position of IARU President in May 2009. *RadCom* had the chance to speak to him shortly after he took up the post to find out more about how he became involved in amateur radio and, in particular, what made him interested in the administration.

Tim emigrated to Canada from England when he was 12 years old. The school he went to at 15 had copies of *Short Wave Magazine*, which he picked up and read. At that time, in Canada, you had to be 16 before you could be licensed so he had to wait before he could sit the course, which took around 6 months to complete. There was no radio club at that school to encourage the pupils in the hobby.

At his next school there were several people who were interested in amateur radio and one friend's father was licensed. But as it took so long to get a licence, many of those interested gave up. The interest in the administration came later.

Tim was on a hitch hiking tour of Europe with a friend – also licensed – and they decided they wanted to operate from 4U1ITU in Geneva. This was about two months before one of the World Radiocommunications Conferences held in Geneva. Having talked their way into the station, there was only one operating position available and his friend quickly laid claim to that. Tim had the opportunity to talk to the station manager who explained how amateurs could influence regulations and spectrum allocation, which Tim found extraordinary. This sparked his interest and when he got back to Canada and finished Law School he got involved with his national society (holding a number of executive positions), then the IARU and is now starting a five year term as President. He has previously represented Canada on the Region 2 Executive and served a five-year term as Vice President.

Tim sat the RAE in 1978 and received his British call G4HUA. Whilst he lives in Canada, Tim regularly visits the UK for work purposes. As well as being a barrister in Canada practising Intellectual Property litigation with a Canadian multinational law firm, he is also qualified as a solicitor advocate in this country.

IARU President Tim Ellam, VE6SH/G4HUA with ITU Secretary General Dr Hamadoun I. Touré, HB9EHT.

What does the IARU do and why do you think this is important?

The IARU is made up of approximately 165 member societies. The job of the IARU is really to represent the interests of all international amateurs to various international bodies for spectrum allocation, the International Telecommunications Union and various regional telecommunication offices. To do that we try and advance an agenda that will enhance the amateur services, whether that is increased spectrum or protecting our existing spectrum.

I think the primary job of the IARU is preserving the existing use of the spectrum. We have not had any major threats recently, in fact we've had significant achievements if you look at WRC. We've got two new bands and have managed to expand the phone band on 40m. We've staved off potential issues which could encroach on our existing spectrum so I think that is a major achievement.

I think we're going to face some new threats from other users of who may find their areas of the spectrum under threat. Fortunately, the amateur service is, for the most part, held in high esteem internationally and certainly within the ITU. The amateur services do good work in emergency situations and the IARU spends a lot of time within the ITU Development Bureau explaining the role we play – for example emergency communications.

Most countries realise the role that amateurs can play in an emergency situation. Some countries that have experienced difficulties such as Thailand and the US see the value of amateur radio. They are very supportive of the amateur service and the plans we have for the spectrum. We get a lot of support from these countries when policy is being discussed. Within the ITU, if you ask what amateurs do, the ITU will say that amateur radio delivers competent emergency communications. That helps us when it comes to defending the spectrum. There are countries that are not supportive of amateur radio. Part of our role at the IARU is to educate people within the administration of the ITU to show what we do. We organise amateur radio administrative courses where we set up in a region and countries within that region have the opportunity to learn about amateur radio, how it works and emergency communications. We ran a course in Senegal in 2008, which a lot of the West African countries attended. It was an opportunity for them to understand more about amateur radio. The ITU supports the IARU by providing fellowships to allow people from developing countries to attend. Plans are to run similar courses in the Gulf States and Laos for 2010.

How is the IARU funded?

The IARU was founded in 1925 and the setup is that one member society is designated as the International Secretariat – right now that's the ARRL. The IARU is split into three regions;

1 is Europe and Africa, 2 the Americas and 3 the Rest of the World. All three Regions have their own structure and some of the dues from their member societies go up to the Administrative Council. The rest of the funding comes from the International Secretariat. So every individual member of any of the member societies – like the RSGB – is helping towards the work of the IARU.

To represent the amateur services as best we can, the IARU relies on volunteers who've got experience with these international bodies and with the right technical background. Their expenses are paid for from a conservative budget! For example, I recently attended a meeting of the ITU Radiocommunication Bureau which addresses issues facing the amateur services. We have volunteers attending these meetings from Canada, England (Colin Thomas from RSGB), the USA and Japan. We worked together for two weeks to develop input documents for amateur issues which we hope will be considered at the next WRC.

How does the IARU deal with issues such as PLT?

Obviously PLT is something that is going to affect all amateurs so we deal with that by trying to make sure there's a common position and enough technical support for this. The common position is then relayed to the six regional telecommunications organisations and the ITU. The IARU is able to develop a position on matters such as PLT and is able to send that technical information out to the smaller societies so they can work internally with their own administrations to advance the position. It's really a two-way street to try and develop a global policy and communicate that policy out to the regional organisations. The IARU is able to supply information if there are technical questions that arise. Smaller societies should be able to call on the IARU to say that they need technical assistance with this specific topic and we should be able to help them.

How does the IARU change things?

The IARU doesn't have a vote; it's an observer at these meetings. There are meetings going on regarding issues that will be discussed at WRC-11 – planning starts immediately after each one is over. The IARU can submit a position on behalf of the amateur service but it has to get the support of an administration to accept or adapt the position the IARU is taking. That process starts months, if not years in advance.

WRC isn't just a case of turning up every four years. There's a whole lot of work in between. One of the things we're working on now is a roaming licence to allow amateurs to operate in other countries without further formalities. This exists to some extent with the CEPT countries but there are still a lot of countries outside this agreement. It's not a quick process.

Compared to other organisations that lobby for their interests – broadcasters and internet societies – we find that amateurs are held in high esteem because we have been around for so long and we know what we are talking about so we can put together good technical submissions that are understood and defendable.

On of the challenges we face is that a number of our volunteers have expressed a willingness to continue for a few more years but, eventually, they want to retire! So we have to find some new people who can take their positions. This can be difficult as there are time demands and we do need people with the appropriate technical backgrounds.

RadCom regularly carries details of IARU meetings attended by UK volunteers and GB2RS reports on IARU Region 1 news.

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All the latest on competitive radio

Roger Western, G3SXW, who has formed a discussion group of UK contesters to help shape the future of CQWW contests.

CQWW. Roger Western, G3SXW, the International Advisor for the UK on the CQWW Committee, has assembled a small group of UK-based contesters as a discussion group. Such groups are being organised in several countries. As Roger says; "Even the biggest world-wide contest is not perfect and further changes will be needed in addition to those recently implemented. What we need is a two-way flow of opinions, so my task is to summarise the views of UK contesters to present to the CQWWC." One of the previous topics of discussion amongst the CQWWC – repeated on the UK Contesting forum immediately after October's CQWW SSB Contest – is that of some stations (predominantly in South East Europe) to be unfeasibly strong for European power limits and to simply open up on a frequency and blast everyone clear. It is hoped that pressure and site inspections can help to combat this problem.

OS AND 0S. In my October 2009 column, under the title 'Logging Accuracy', I wrote about a club that had lost a significant percentage of their score in a UKAC for logging inaccuracies, mainly by confusing letter O's with number 0's. Eddi Ramm, DK3UZ, wrote to say; "Radio Communication should get it right here and set a good example by always slashing zeros.

"There is a very good reason not to use a computer during contests, and it is a case of honour and sportsmanship. You yourself said logging with a computer makes the second operator redundant. This means someone using a computer in a contest for logging and checklogging really is a multi-operator station.

"There is a deep satisfaction and a solid sense of accomplishment to be had from having run a contest by oneself instead of having had it run by a machine."

Whilst I would certainly say that Eddi is entitled to his viewpoint and to take part in events without a computer, I can't say that I agree with it. To me a computer is not an 'operator', it simply facilitates operation. Moreover, it would be hard to imagine that today's level of contest participation would be maintained if computers were not allowed.

CHECK YOUR ENTRY. A few months ago the Contest Committee was contacted by the disgruntled entrant of an event because his entry wasn't included in the results table. The reason his entry wasn't included is that his log was not received. This is an object lesson in making sure that when you upload a contest log, you go through the entire procedure. Make sure that you receive a message from the robot, informing you that your log has been received (if you don't, it wasn't) and then check the received entries on the web site to confirm that your callsign is in the list. As an aside, in VHF events a lot of people then add an entry to the claimed scores page, but adjudicators don't check these to make sure that entries have been received.

Another check that some might like to consider, if not using a proprietary contest logging software package, is to make sure that your log contains not only all the required information, but in the right order! Specifically, there have been instances of people transposing the sent and received signal reports and serial numbers when using the online log generator. Adjudicators can – and often do – sort out the mess or request resubmission, but there is no actual requirement for them to do so.

RSGB MEMBERSHIP. Although it doesn't apply to every contest organised by RSGB, the majority of them require people to be a member of the Society if they want to submit an entry. At one time it was pretty much taken on trust that if someone submitted an entry he/she was a member, but computers have made it simple to check. Recently several entrants to RSGB events have found themselves on the receiving end of e-mails from adjudicators, asking them to confirm that they (or some of the operators of their station) are members, because entries are now checked against the membership database. In some instances there is a very innocent explanation (eg someone has more than one callsign and didn't use the one that's on the database), but in other instances entries have been transferred to checklog status (which are always welcome) or someone very quickly joining the Society.

Whilst the majority of *RadCom* readers are members of the Society, it is still worth including this reminder because the magazine gets passed around at clubs and is loaned, so many non-members also get to read it.

SELF-SPOTTING AND CHEERLEADING. During SSB Field Day in September it was apparent that some participants were being spotted on the DX cluster by UK stations rather more than they ought to be. A member of the Contest Committee took it upon himself to study and quantify this – and most revealing it was too. One participant was spotted 27 times during the event – 25 of those times by people who live in the immediate vicinity!

Whilst this is not necessarily a direct infringement of the rules (those people could have been at home, not directly involved with the contest station and simply a bit over zealous), it is certainly not in the spirit of the contest. It is by any measure though a misuse of the DX cluster, which is supposed to be for spotting DX (and hearing your local club station from a couple of miles away hardly constitutes DX).

Of course, we all know that self-spotting and cheerleading is nothing new. It has happened in the past and in numerous events, but it seems worth reminding everyone that cheerleading could result in an entrant being penalised and self-spotting is a complete no-no.

THIS MONTH'S EVENTS. As the New Year begins, so do two of the Society's major contesting series, one on HF and one on VHF.

In terms of RSGB HF events, January is an 80m spectacular. Activity begins on Monday 4th, with the first of the 2010 series of the 80m Club Championships. Since the launch of Club Champs in 2004 it has gone from strength to strength and is hotly contested.

If you are a member of a club that hasn't taken part before, why not make 2010 the year that you break your duck? With 10W and 100W categories (no QRO allowed), and socially acceptable 90-minute operating sessions, it is quite straightforward for many to partake. People operate as individuals, but all the scores made by members of a club are added together to build the overall results table – and there's no limit to the number of members who can join in. The same applies to the SSB and data legs of Club Champs that take place on Wednesday 13th and Thursday 21st respectively.

A few words of caution though… January evenings can be very difficult for inter-UK propagation on 80m, with very long skip, so don't be surprised or deterred if you find it easy to work stations at the opposite end of

RSGB HF EVENTS

Date	Event	Times (UTC)	Mode(s)	Band(s)	Exchange
Jan 4	80m Club Championships	2000-2130	CW	3.5	RST + SN
Jan 10	CW AFS	1400-1800	CW	3.5	RST + SN
Jan 13	80m Club Championships	2000-2130	SSB	3.5	RS + SN
Jan 16	SSB AFS	1400-1800	SSB	3.5	RS + SN
Jan 21	80m Club Championships	2000-2130	Data	3.5	RST + SN

RSGB VHF EVENTS

Date	Event	Times (UTC)	Mode(s)	Band(s)	Exchange
Jan 5	144MHz UKAC & Club Championship	2000-2230	All	144	RS(T) + SN + Locator
Jan 12	432MHz UKAC	2000-2230	All	432	RS(T) + SN + Locator
Jan 19	UHF UKAC	2000-2230	All	1.3/2.3	RS(T) + SN + Locator
Jan 26	50MHz UKAC	2000-2230	All	50	RS(T) + SN + Locator

BEST OF THE REST EVENTS

Date	Event	Times (UTC)	Mode(s)	Band(s)	Exchange (info)
Jan 2-3	ARRL RTTY Roundup	1800-2359	Data	3.5-28	RST+ SN (Ws send State, VEs Province)
Jan 2	*EUCW 160m CW Party*	*2000-2300*	*CW*	*1.8*	*See test*
Jan 3	*EUCW 160m CW Party*	*0400-0700*	*CW*	*1.8*	*See text*
Jan 16-17	HA DX Contest	1200-1200	CW, SSB	1.8-28	RS(T) + SN (HAs send 2-letter County code)
Jan 23-24	BARTG RTTY Sprint	1200-1200	RTTY	3.5-28	SN
Jan 29-31	CQ WW 160m DX	2200-2200	CW	1.8	RST +CQ Zone (Ws send State, VEs Province)

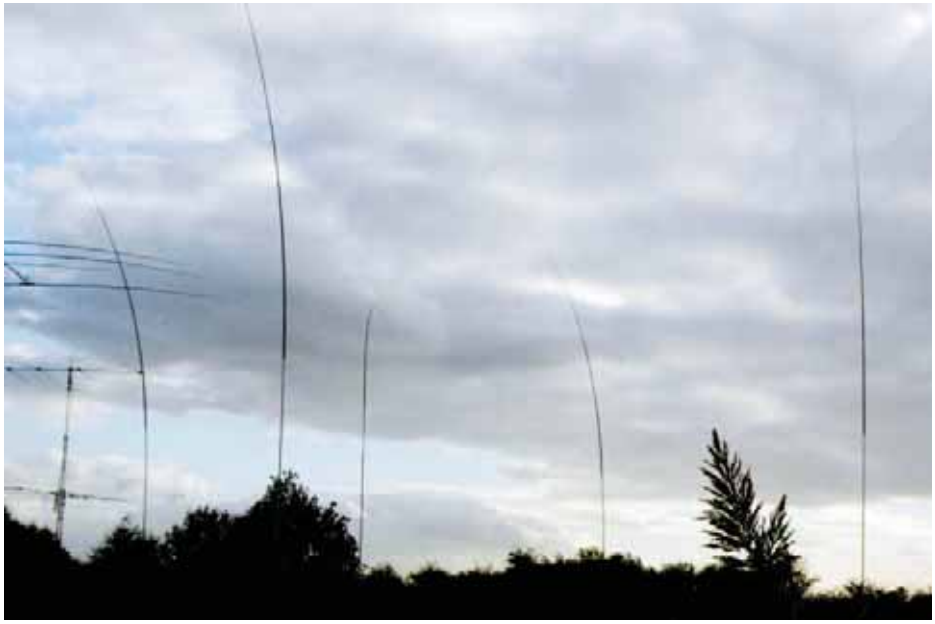
Italics indicate that provisional information only was available at the time of writing.

the country but impossible to work stations not far from you. It sometimes happens that in January the northern GMs wipe the floor with the rest of us, but as the seasons change so does propagation and those further south get the advantage.

There'll be a great deal of activity on 80m on Sunday 10th, when CW AFS takes place. This is also a team contest, but with a maximum of four stations per team (although it's perfectly alright for a club to enter more than one team). For newcomers and the less proficient, frequencies around 3580kHz are reserved for slower speed contacts. As a general rule, the lower you go in the allocated band (3510-3590kHz), the faster the Morse gets. If you give CW AFS a try for the first time and think it's busy, just wait until you experience SSB AFS on Saturday 16th. The allocated band (3600-3750kHz) will be absolutely packed.

Moving on to VHF/UHF, activity in the UKACs has rocketed since they were introduced and I predict the new series that starts this month is also going to be hotly contested. The 5th (2m) 12th (70cm) 19th (UHF) and 26th (6m) are the dates this month. Late last year, G4CLA conducted an online 'user survey' into the timing of the UKACs, because earlier start times had been suggested by some participants. The results of the survey showed no clear mandate for change, so for 2010 the start times will remain 2000 local.

Internationally, the New Year starts with the slightly inappropriately named ARRL RTTY Roundup. Inappropriate because any data mode can be used to make QSOs. There's a maximum operating time of 24 hours out of 30 hours, sections for High Power and Low Power, and Single Op and Multi Op stations. On the same weekend there's the EUCW 160m CW Party, which is split across two 3-hour sessions. There are five different classes of entry. If you are a member of a club affiliated to the European CW Association (FOC, FISTS and G-QRP are the only ones in the UK), send RST + name + club + membership number, otherwise send RST + name + 'NM' (for non member).



A big array for a serious contest station, G6PZ. From left to right, the elements half way up just in shot is a 4 element SteppIR MonstIR 30 Thru 6 Meters. The stacked pair is 4 over 4 element SteppIR's 20 thru 6 Meters. Next there's a Titanex HD 160 v Top Band vertical with Spiderbeam top - 85ft with top loading wires. Finally 4 quarter wave elements for the 80m four square aerial.

On 16-17 January the HA DX Contest takes place on CW and SSB. There are numerous categories and, according to the rules, "every contest participant gets a certification, which will be available for download on the contest home page after publishing the final result".

The BARTG RTTY Sprint takes place on 23-24 January. In this event BARTG have done away with exchanging what I see as a largely meaningless signal report, making the contest exchange really short – just a serial number. There are categories for Single Op All Band, Single Op Expert, Multi Op and SWL, and multipliers for working continents and DXCC countries.

The final event of the month is the CQ WW 160m DX Contest on 29-31 January. There are categories for various power levels and Single Op and Multi Op stations. Outside of North America, send RST and CQ Zone (the UK is 14). Americans send RST and two-letter State code. Canadians send RST and three-letter Province code. Rather like the ARRL 160m Contest that I wrote about in December, there will be a lot of top-notch stations and very capable operators around in this. The owner of even a modest station (100W and a long wire) stands a chance of making a few QSOs across The Pond. Equip yourself with a linear and a vertical or inverted-L antenna with a good earth system and you'll increase your chances enormously. Having said that, I have known weekends with poor propagation, so DX is not guaranteed.

ARDF

Organising an ARDF event for the first time

Sorting out the loan receivers for 144MHz at Hay Wood. Foreground from the left: David, G3ZOI, Andrew, G4KWQ, Michael, M6MDD. To the rear: Peter, M1TNT and Dave, M0BKH.

EASIER THAN YOU THINK. The January issue of *RadCom* seems a good time to write about one of the issues facing any club or group who develop an interest in amateur radio direction finding (ARDF), which is solving the problem of organising an event. Like many things in life it often appears to be a difficult thing to do but once done it all appears to be a lot easier than you thought initially.

First of all, here is a list of the key things that have to be sorted out:

- Getting permission to use a suitable area
- Obtaining a map of the area with a copy for every competitor
- Sourcing suitable transmitters if your club or group do not have a full set
- Planning the event and the associated paperwork
- Advertising the event beyond the boundaries of your own club or group

LOCATION. There are two ways of approaching the problem of finding an area and an associated map:

The first is to make contact with the local Orienteering Club **[1]** to see if they are running an event at which you might be able to offer a 'Radio Orienteering' course. The RSGB has liaised with the British Orienteering Federation (BOF) Development Committee over this issue and gained their support but Orienteering Clubs are rather like the societies affiliated to the RSGB in that they are independent and do not necessarily follow the advice from BOF. The co-operation with orienteering clubs is a two way street. ARDF attracts competitors from both a radio background and from an orienteering background. Many radio amateurs who participate in ARDF have joined their local orienteering club in order to participate in local orienteering events and improve their map reading skills. At the 2008 British ARDF Championships, 80% of the people who crossed the start line were full members of BOF and all were either licensed radio amateurs or members of the RSGB.

The local orienteering club is usually agreeable to letting you have sufficient blank maps of the area (the term 'blank map' meaning a copy of the map that is not overprinted with an orienteering course). They will also take care of getting permission from the landowner, arranging suitable car parking and organising some loos. In return, the ARDF organiser should expect to hand over a substantial part of the entrance fee charged. As some sort of rough guide, the orienteering club should benefit by at least £4 per ARDF competitor. An additional incentive for the orienteering club is that the Radio O event will attract new competitors from much further afield than is usual.

The second approach is to get the permission of the landowner and source the maps yourself. This often works well with a Country Park when the Head Ranger may be empowered to give permission. Most Country Parks have been mapped for orienteering and the Park is likely to have copies of the map. Sometimes they have blank maps as well as those overprinted with the permanent orienteering course and this is exactly what is required for ARDF. This is better financially since the expenses come down to the cost of the maps plus a donation, if the County Park is run by a trust.

EQUIPMENT. The final piece of the jigsaw is equipment. Things have moved on a lot since IARU-style ARDF started in the UK in 2002. There are many complete sets of equipment throughout England. Scotland can muster a complete set of six 3.5MHz transmitters and a certain number of 144MHz transmitters too. An ARDF course comprises five transmitters operating in sequence on one frequency and a beacon transmitter sending continuously on a second frequency. Get in touch with the RSGB ARDF Committee **[2]** who will be able to give contact details for the owners of equipment in your area. It may be necessary to purchase some orienteering control markers and needle punches **[3]** if these cannot be borrowed locally.

THE EVENT. If this is to be a first event then it is best not to be over-ambitious and to run a competition on just one band. This means that the transmitters can be deployed early on the day of the event and then the organiser(s) can return to the registration area to meet the competitors and run the start/finish. For a small event, a co-located start and finish is to be recommended since it makes the whole thing a lot easier to run.

With a copy of the map, visit the area and plan the locations of the transmitters. The rules require that transmitters are separated by at least 400 metres and are more than 400 metres from the finish. The IARU rules also require that the transmitters should be 750 metres from the start but in small UK wooded areas, this can have the effect of 'sterilising' far too much of the area as far as transmitter placement is concerned. It is common practice to reduce this distance to 400m. Try to position the transmitters in parts of the area in which it is relatively easy to move about. This enables the competitors to manoeuvre freely in the vicinity of the hidden transmitters. If possible set some sort of 'challenge' as far as deciding the sequence in which the transmitters should be visited. Don't just place them in a simple 'ring' around the area. Try to see the course through the eyes and ears of a competitor.

It is necessary to liaise with the planner of the orienteering courses at this stage since it is very undesirable to have ARDF transmitters sited less than 100m from an orienteering control. This will cause confusion amongst the orienteering competitors and one should not irritate one's hosts. It is a requirement that orienteering controls are placed on a mapped feature but this is not necessary for ARDF transmitters. ARDF can make good use of featureless runnable blocks of forest that are unsuitable for orienteering controls. In addition, if an issue does arise then the ARDF transmitter can be moved literally at the last minute since there is nothing marked on the map related to its location. The nearby orienteering control is marked with a circle on the map that has been pre-printed for the orienteering course and cannot be moved.

WEBSEARCH

[1] www.britishorienteering.org.uk
[2] www.ardf.btinternet.co.uk/index.html
[3] www.ultrasport.co.uk

All Digital Transceiver part 3

In this third and final part we look at the mechanics of transmission and timing issues.

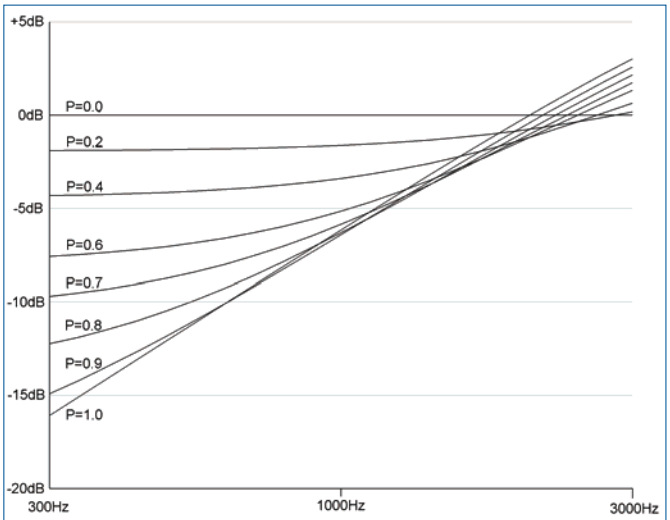


FIGURE 1: Pre-emphasis response curves.

INTRODUCTION. In this final part we cover the transmitter software, from the microphone input to the point where the digital data output from the computer is fed along the USB cable to the RF unit for upconversion to the transmit frequency. The last paragraphs describe how the various digital parts of the project synchronise to each other and to other digital systems.

But first, a topic left over from the earlier parts. In the RF unit there is a step-attenuator between the receive antenna input and the ADC, which has 16 x 1.5dB steps controlled from the computer via the USB. The ADC has an auxiliary 'overload' output pin, arranged to light a LED on the board. In an analogue receiver the distortion products increase smoothly with input level so we keep the gain low but just high enough to hear the antenna noise. There is no such 'smooth' distortion in a digital receiver so we keep the gain high but just below the overload point. In the early work it was clear that even if the overload LED flashed occasionally, there was no sign of distortion in the receiver output. This gave us an idea for an automatic process to set the attenuator to the optimum point. This involved adding logic to the RF unit that counts the number of times the ADC overloads. A process in the computer uses this result to adjust the attenuator up or down to keep the overload count somewhere between zero and the level at which distortion appears. This process is quite unobtrusive in normal use but the attenuator can also be controlled manually.

SPEECH PROCESSING. The microphone input would normally come from a sound card, either plugged into the computer or built into it. The frequency response of this input will be flat but for communication purposes a rising response is often preferred. Special microphones are available that achieve this but we can do it in DSP very easily. If we subtract a chosen fraction (P) of the previous input sample from the current sample, the result is a frequency response that is flat when P=0.0 and rises at 6dB/octave when P=1.00. **Figure 1** shows the response of this process, plotted over a range of values of P. Good reports have been received with P=0.6, using a 'flat' microphone.

To cater for variations in microphone level, an automatic gain control is included. The same 'divide by the peak' process, used in the receiver AGC, is employed but with a much longer time-constant.

Human speech is quite 'peaky' and it's not easy to handle it efficiently with practical transmitters. However, clipping the peaks can be an unsatisfactory way to improve the 'talk-power', introducing significant audible distortion. Also, in the case of an SSB transmission, the clipped audio waveform from such a clipper does not produce a clipped SSB envelope, so most of the benefit of clipping is lost. A variety of techniques have evolved over the years to overcome these problems, but in the analogue world these techniques can be expensive and usually involve processing the modulated SSB signal rather than the speech itself. In this DSP design, a much simpler solution is proposed that does process the speech itself and is therefore usable for other modulation methods, not just SSB.

If we form a control signal from the instantaneous magnitude of the audio input and divide the input by this if it exceeds a threshold level, the result will be the same as if we hard-clip the audio. This isn't a solution as it stands but if we could ensure that the control signal contained no components at the signal frequency or its harmonics, this would guarantee that the controlled output was free of harmonic distortion. In part 2 we used Pythagoras' theorem to form the envelope of a received I/Q signal to ensure that the input signal didn't appear in the output of the AM demodulator, and this is exactly what we need here. If the microphone audio was available in I/Q form, we could make a signal-frequency-free magnitude detector and use it to make a harmonic-free clipper.

There is a DSP function called a Hilbert transform that, for our purposes, is a broadband 90° phase shift network. With a sine wave input, the output is a cosine wave. Such a device can be used to convert an audio waveform into I/Q form. If we label the input to the Hilbert transform as 'I', then its output can be labelled 'Q'. Calculating the square-root of the sum of the squares of I and Q will give us the control signal we need. The finished DSP speech processor then consists of a Hilbert transform block (a kind of all-pass delay-line filter), the 'hypotenuse' calculation, and a division operation. Apart from a low-frequency limitation related to the length of the delay line, this gives us a broadband, harmonic-free clipper. The flowchart of a speech processor using this technique is shown in **Figure 2**. Note that since the Hilbert transform introduces a delay to the 'Q' signal, an equal delay is applied to the 'I' signal by tapping halfway along the delay line. Good results can be obtained with about 14 – 20dB of clipping. **Figure 3** shows a comparison between a conventional clipper (in red, shown inverted for clarity) and this speech processor. The input, in both cases, is a sine wave rising linearly to twice the clipper threshold.

THE MODULATION PROCESSES. In the earlier parts of this article, the concept of a zero intermediate frequency signal was introduced for the receive path. The same concept applies to the transmit path but we don't need a wide bandwidth or a high dynamic range. We can manage with a sample rate of 12kHz and 16-bit signed digital data for the I and Q signals. The job of the transmit software is to transform the microphone audio to zero-IF I/Q data with the chosen modulation and send this along the USB cable to the RF unit, from where it

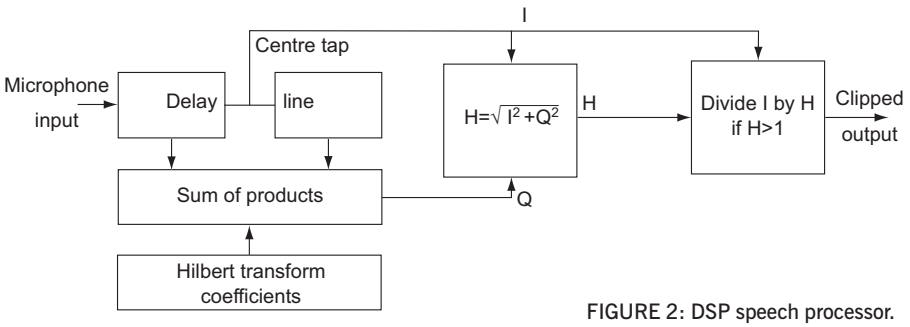


FIGURE 2: DSP speech processor.

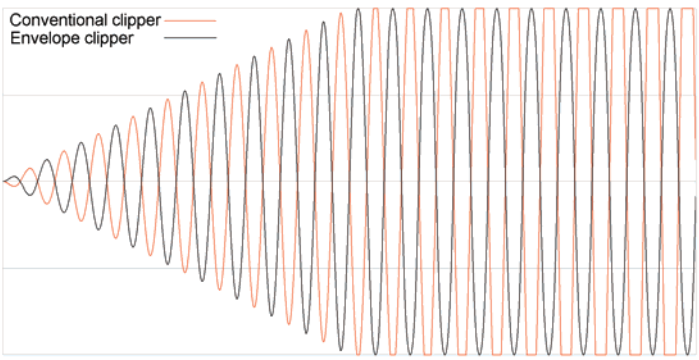


FIGURE 3: Comparing conventional and harmonic-free envelope clippers.

will be up-converted to become a band of modulated RF centred on the chosen 'dial' frequency.

The SSB modulation process needed to convert the microphone audio to I/Q form is essentially the reverse of the receiver process outlined in part 2. In the transmit version, which is similar to the DSP phasing generator described in **[1]**, the audio input is fed along a tapped delay line. Two sum-of-product processes implement a pair of 300 – 3000Hz bandpass filters with identical amplitude responses but phase responses that differ by 90°. One filter output becomes the I-channel signal to be fed to the RF unit and the other becomes the Q-channel. When combined in the RF unit, one sideband adds and the other cancels, in the same way as in a traditional phasing-type SSB generator.

For AM and FM we must remember that the audio path up to this point is broadband, so the first item on the agenda is a 3kHz low-pass filter. In a traditional transmitter this would be preceded by a clipper to guard against overmodulation, but the speech processor already described does this better, so an overmodulation clipper is not needed. To generate AM we just scale the signal to swing over the range 0.0 to +1.0, and that becomes the I-channel output to the RF unit. The Q-channel stays at zero. The final transmitter output will be an AM modulated carrier at a fixed phase on the centre frequency.

For FM modulation, the standard 750μs pre-emphasis is applied first followed by the speech processor and the low-pass filter. The signal is scaled so that the clipped peaks are equal to the desired deviation divided by the samplerate. To convert from frequency to phase, we sum this, on each sample, into a 'cycle accumulator', discarding whole cycles and keeping only the fractional part. This is multiplied by 2π to give the desired carrier phase Φ in radians. To generate a carrier at this phase as a zero-IF signal, we form $I=\cos(\Phi)$ and $Q=\sin(\Phi)$ and these go straight to the RF unit as an I/Q pair. The final transmitter output will be a constant-amplitude carrier swinging either side of the centre frequency.

In part 2 we described how CW reception was arranged so that the centre of the received passband was exactly on the dial frequency. To ensure that the transmitted CW frequency is the same, we need to generate our software CW signal in the centre of our zero IF. A keyed DC signal followed by a key-click filter feeds straight to the I channel. CW enthusiasts would probably expect to have a key-jack provided, but so far only a software Morse keyboard sender has been used.

SYNCHRONISING THE ADT HARDWARE TO THE COMPUTER.

The ADT hardware is configured so that the computer 'thinks' it's a USB soundcard. The USB specifications define that all data passing along the bus is timed from a 1kHz clock supplied from the computer. A conventional USB sound card will typically derive its sample rate timing from this clock by means of a phase locked loop, but in our application we really want to use the clock in the ADT hardware to generate the timing for the whole system. Our clock is far more accurate and stable than anything else in the computer.

A conventional USB sound card handles 48kHz input by sending exactly 48 samples down the USB on every 1kHz clock pulse. Because there may be a tolerance offset between the ADT sample-clock and the USB clock, the USB chip on the ADT board may need to send 47 or 49 occasionally. The USB specification handles this without problems. The data arriving in the software is thus in blocks of uneven size, but every sample from the ADT board is delivered to the software.

In the transmit direction the same process occurs, with the number of samples per USB clock cycle being modified from the nominal figure (12), but in this case it's the ADT hardware that has to decide how many samples it wants the *computer* to send on each clock pulse. The USB specification defines a 'flow-control' signal to do this, which the USB chip on the ADT board sends. Again, the data arrives at the ADT board in blocks of uneven size but every sample from the software is transmitted on time.

SYNCHRONISING THE SOFTWARE TO THE SOUNDCARD.

A standard computer sound card input consists of an analogue to digital converter (ADC), which is clocked by a hardware timer that determines the rate at which digital samples are captured and sent to the associated software. The operating system and the application software process this data, for example to record incoming audio to a file. Although the software may well handle the data in blocks or buffers, the mean rate at which it must do so is ultimately set by the hardware. A computer sound card output likewise has a digital-to-analogue converter (DAC), also clocked by a hardware timer, and any software that is 'playing-back' an audio signal, for example from a file, must feed data to the DAC at the rate set by the hardware.

This works fine for simple record-to-file and playback-from-file tasks, and even audio pass-through applications will work successfully without data overflow or underflow if we know that the ADC and DAC clocks are derived from the same source and will not drift relative to each other.

Our receiver is effectively a 'pass-through' process but with different clocks, one in the ADT hardware and the other in the speaker soundcard. There will inevitably be a tolerance error between these two and we do not have the ability to lock one of them to the other. We must solve this one somehow or risk corruption of the speaker audio.

The solution involves re-sampling the audio data stream as it comes from our software (at a sample rate of precisely 12kHz, derived from the ADT hardware), re-timing it to the actual sample rate of the speaker soundcard. To visualise how this is done, imagine first that we just want to delay an incoming audio stream by a fixed fraction of a sample interval, to feed an output at the same sample rate. Instead of simply copying the delayed input sample across to the output, we will do a linear interpolation between the preceding and following input sample values. For example, if we choose the output to be one-third of the way along the input sample interval, we add 2/3 of the

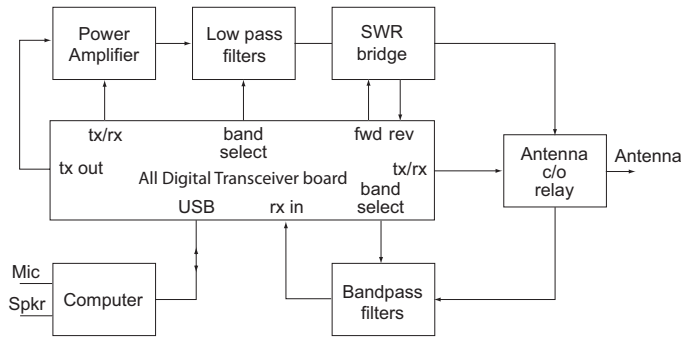


FIGURE 4: Block diagram of a complete transceiver based on the ADT.

preceding sample to 1/3 of the following one. Now imagine that we want to vary the delay fraction between zero and one. We just vary the proportions of the two adjacent input samples that we use to calculate the desired output value.

Now suppose we move the chosen output sample point continuously in one direction, and continuously update the interpolation equation as the chosen output point slides between and through the input samples. The output will always be a smoothly interpolated version of the input but at the offset sample rate. To finish the job we need to know in which direction to move the interpolation point and how fast to move it. This is done by examining the state of the output sound card buffer, sliding the chosen output point one way or the other in response to the amount of data in the buffer, aiming to keep this buffer approximately half full.

This simple linear interpolation introduces a slight modulation of the high-frequency response as the interpolation point varies but this can be corrected by calculating the output value from a run of 3 input samples instead of 2.

A similar synchronisation problem exists in the transmit direction, since the microphone audio comes from the computer sound card and the transmit data is clocked by the hardware in the ADT board. Another retiming process deals with this by monitoring the state of the microphone input sound card buffer and adjusting the rate at which microphone samples are converted to transmitter samples.

SYNCHRONISING BETWEEN OUR SOFTWARE AND OTHER SOFTWARE.

The above retiming process is sufficient for listening to speech and CW, but we might want to feed the audio output to some other software, for example to demodulate some digital data or analyse the received spectrum. If we were to do this with a conventional analogue receiver, we would do it with an audio cable from the auxiliary output of the receiver to a sound card input.
We could do the same here but somehow it doesn't seem right to be linking two digital audio programs with an analogue interface.

One popular way of linking two digital audio programs in this way is to use a software device known as a virtual audio cable (VAC). Such a device behaves like a sound card output linked digitally to a sound card input, but there is no physical hardware and the signal path is entirely digital. In use, one program will be run with a VAC selected as its output, and the other program is run with the other end of the VAC selected as its input. Since all such programs must derive their timing from the selected soundcard, the VAC software *itself* must supply this timing to both ends. This is derived from a hardware timer in the computer. The tolerance error of this timer doesn't cause any problem where a VAC is used to link a playback-from-file program to a record-to-file program – the data is transferred accurately even if it takes slightly more or less time to transfer it.

If we route the output of the ADT receive software to one end of a VAC instead of to a speaker, the tolerance error of the VAC timer is handled by the retiming process already described, but the program on the other end of the VAC will experience the VAC timer tolerance error. For example, a frequency-measuring program would not read modulation tone frequencies accurately. This also means errors in the data rates of digimode programs. Some digimode programs have the ability to calibrate-out the sample rate tolerance error, and in a lot of cases the error may not be so bad that it causes trouble, but it's worth discussing here because there is a better way. Since the clock in the digital receiver is the same one that determines the accuracy of the RF frequencies, and this is by far the most accurate source in the entire chain, it's worth trying to maintain this accuracy throughout the chain. The virtual audio cable method will not do this.

What is needed is a 'virtual' sound card interface in the digital radio software itself, which although it doesn't exist physically as a soundcard, behaves like one. The 'other' software should 'plug into' the digital radio software 'soundcard' rather than having both programs plug into a virtual back-to-back connector. We have created such an interface, which installs into Windows as a device driver, and streams audio to and from our software when it's running. The 'virtual sample rate' of this interface is determined by the digital radio software, in turn determined by the digital radio hardware, not by the rather less accurate crystal in the computer sound card, nor by the timer used by a virtual audio cable device. The virtual sound card also has a matching output port which handles the corresponding transmit-from-software function. The end-user will simply run his favourite digimode program, select our virtual sound card instead of a real one, and be confident that the frequencies and data rates within the program will be accurate.

With the data streams accurately timed from the ADT board right through the entire software path, time and frequency calculations in the software will be as accurate as the reference oscillator in the ADT. This opens up interesting possibilities which would be very difficult to engineer in an analogue design. For example, with the ADT board driven from an external frequency standard locked to a GPS-based source, it's possible to receive a broadcast frequency-standard signal, display it on a software-referenced phase display such as a Lissajous figure, and hold it rock-steady for ever. Transmissions from an ADT driven by a software source will likewise be as stable as the reference input.

CONCLUSION.

Figure 4 shows how a complete transceiver could be constructed using an ADT board. At G3PLX, most of the RF parts were rescued from an old analogue transceiver.

This series of articles has described the authors' all-digital transceiver project, which we have worked on for about three years now. The results are very encouraging and we are sure that the all-digital approach has a place in amateur radio but it does mean learning some new tricks. In these articles we have thrown out some of the traditional analogue signal-processing ideas, such as the superhet and the AGC loop and introduced new ones, in particular the concept of the I/Q signal path. We have also highlighted some of the aspects of the digital approach for which there are no equivalents in the analogue world, such as synchronisation of the data streams. We are both continuing the development of the all-digital approach, but we hope that others may pick up some of these ideas and carry them forward.

APOLOGIES AND THANKS.

In part 1 we expressed the hope that ready-built ADT boards could be made available at a reasonable cost for amateur use, but this has not yet been possible.

In Part 2 there was a typographical error half way down the middle column on page 28. The formula should have read I*cos(2*π*F*t) +Q*sin(2*π*F*t). The π character became corrupted in the production process.

Thanks are due to Andrew Senior, G0TJZ for helpful comments during the preparation of all three parts of this article.

REFERENCE

[1] A digital SSB phasing network, Peter Martinez, G3PLX, RadCom June 2004 p 84.

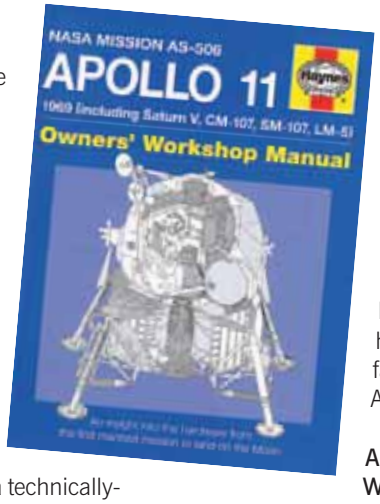
Book review

A look back at our favourites from last year

Apollo 11 Haynes Owners' Workshop Manual

by Christopher Riley and Phil Dolling

Haynes are well known for their meticulous manuals for motor vehicles. If you want to know how to change the engine core plugs in a 1974 Cortina then you naturally reach for your Haynes manual. Well, now you can do the same for that Apollo 11 lunar lander you've had mouldering away in the garage since 1969! Celebrating 40 years since Neil Armstrong stepped onto the Moon, the Haynes Manual for Apollo 11 includes the Saturn V booster and several other parts applicable to the '1969 model'. Wow.



This book is actually a technically-inclined look at the history of Apollo 11. It has some fascinating technical content, supported by detailed line drawings and photographs, but it also contains a lot of human interest material as well. Not only is there information about the crew but you will also find things on some of the tens of thousands of individuals who collaborated to put Armstrong and Aldrin on the moon.

I really enjoyed this book. I'm just old enough to remember the moon landings first time round, but was young enough at the time that I just took it all in my stride. The Haynes Manual brings home to me just what a fantastic undertaking the Apollo program was.

Apollo 11 Haynes Owners' Workshop Manual
ISBN 978 1 84425 683 9
196 pages, 212 x 276mm
Non members' price £17.99
Members' price £15.29

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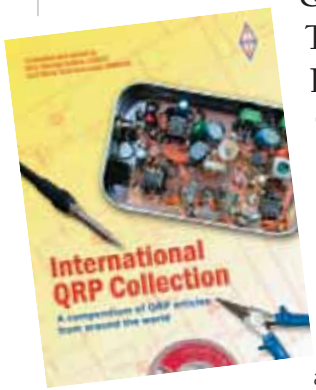

This volume quite simply contains the best QRP projects and articles from Europe, Africa, North & South America, Asia and Oceania. There are contributions from *RadCom, SPRAT, QST, Break In* and many other sources.

In addition to projects of varying complexity to suit any ability and pocket, there are a lot of invaluable little hints and kinks. It's not just electronic construction and electronic theory. QRP bicycle mobile? Check. 80m backpack mobile? Yes. SOTA? Naturally. There are even reviews of popular bits of QRP equipment.

Overall, this is a scrapbook that draws on the very best QRP articles, in English, from around the world. The reproduction quality is excellent, unlike some other books of a similar nature, with very clear drawings and properly typeset text. It has something for everyone and will enhance anyone's bookshelf, QRPer or not.

ISBN: 9781-9050-8655-9, 176 pages
Non members' price £12.99
Members' price £11.04

RSGB Radio Communication Handbook

10th edition edited by Mike Dennison, G3XDV and John Fielding, ZS5JF

The big event in any publishing year is the release of a new RSGB Radio Communication Handbook and this year saw the 10th edition of this invaluable book. In this latest, extensive revision, it has grown to some 864 pages, plus several additional chapters on the bonus CD (which also contains a searchable and printable pdf version of the book plus amateur radio software and the support files for the SDR chapter).

Some chapters have received a major update and The Great Outdoors is completely new. Using amateur radio outdoors, whether it's taking part in SOTA activities, DXpeditions or backpacking, is an area of amateur radio that has seen huge growth in recent years. One of the most important factors of using your radio outdoors is reliability of the station – there's not much point in putting the station together at your chosen location only to find it doesn't work! Just about everything you could need to know is covered in this chapter and it will probably encourage you to 'get out there' and have a go.

The Software Defined Radio chapter has also had a major revision as it's an area of amateur radio that has developed rapidly in recent years. Probably the biggest advantage of SDR is that it lets you see radio signals and not just one at a time, but all those that are present in a reasonable chunk of an amateur band, says the authors. They then proceed to describe how SDR works and the advantages of the system, how you can emulate it using your home computer and using some of the SDR projects that are on the market today.

Surface mount components have also made inroads into amateur radio construction projects and the Handbook takes this into account in the chapters that deal with components and construction, making this a valuable and up-to-date reference book. With 26 chapters and two appendices this is a huge resource that will provide every amateur with the information they are looking for whether it's on power supplies or antennas, components or test equipment.

ISBN: 9781-9050-8654-2
864 pages
Non Members' price £29.99
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SSB Field Day 2009

M0XXT/P – James, M0YOM operating.

A HARDY BREED. It's surprising how hardy most contesters are when it comes to Field Days. Their 'soapbox' comments usually contain some horrendous stories of foul weather and misfortune. However in SSB Field Day 2009 it seems that, with one or two notable exceptions, things went fairly smoothly. The weather was kind to most except in Scotland where there was heavy rain during the set-up period. Unfortunately, propagation conditions didn't match the weather with sunspots still a rarity and solar cycle 24 eagerly awaited.

SSB Field Days take place on the first weekend of September and are organised by the national societies of many countries in IARU Region 1, which comprises Europe, Africa and some of Asia. The timing of the contest is the same throughout, but the rules differ slightly across the region. The RSGB scoring system includes DXCC multipliers, which encourages stations to hunt for DX and new countries in order to increase their total score. In the Open Section this year it was multipliers that really made the difference in determining the winner.

In the UK, over 220 operators and many helpers from 45 clubs set out for the fields. For many this was an opportunity to create and operate a high performance station that would not be achievable at home due to lack of space, equipment or concerns about interference. Some clubs, like Lowestoft, G3JRM/P, used the occasion as a social event as well as a contest. Their Saturday barbeque was so good that they decided to do it again on the Sunday. For some clubs it was an opportunity to introduce newer licensees to contesting. In fact, 31 out of the 220 listed operators held either Foundation or Intermediate licences. This year there were a few hardy single operator entries. For example, the Three As Contest Group, GI0AAA/P, station was set up by Ian, G3WVG, who travelled to Rathlin Island and operated from his hire car using an Icom 706 in the glove box.

PROPAGATION. As previously mentioned, the sunspot minimum took its toll. Only five stations had more than 10 QSOs on the 10m band. Luckily there was a short opening early on Sunday morning on 15m, which boosted scores on that band. So once again 20m was the highest scoring band for most with quite a few stations from Japan, China, Korea, Indonesia and the Middle East being worked. Some found it a problem that the All Asia contest coincided with Field Day. But it can also provide a source of DX QSOs and multipliers. Just remember to give your age for their contest as well as a serial number for ours and it will satisfy everyone. However, trying to work non-Asian stations who are calling 'CQ All Asia' can be a waste of time, as they will seldom be interested in working stations outside Asia. The 40m band yielded good scores and healthy multiplier counts with DX from North and South America, and a few ZLs during the morning grey line. The fallback for those late evening and early hours when the HF bands were closed was the 80m band.

RESULTS. In the Open Section, the winners and runners up were the same as last year. The margin was extremely narrow for first place where it was difficult to separate Cray Valley RS, G3RCV/P and East Notts CG, G3TBK/P. In the end the Northumbria Trophy goes to G3RCV/P who, with a higher Multiplier total and slightly better logging accuracy, overcame their rivals who had more QSOs. Third place, once again, goes to the Double X-Ray Firm, M0XXT/P.

In the Restricted Section, site selection seems to have played an important role in the results. Bristol CG, G6YB/P, take first place and the G3PSH Memorial Trophy. They were using a long doublet antenna running along the top of the escarpment at Bath race course. In second place was single operator entrant Adrian Rees, MW1LCR/P, who achieved the highest score of either section on 15 and 10m from an excellent site in North Wales. Granta CG, M0CAM/P, was in third place using 'an 80ft rotatable monster doublet'.

LOGS. The objective was to announce provisional results at the RSGB Convention on 11 October, which this year was just three weeks after the closing date for entries. As in previous years, it was important to receive logs from the other IARU societies in order to cross-check a good proportion of the QSOs in our UK logs. Introduction of the RSGB's splendid new log submission system this year really helped. As logs are verified and acknowledged as they are submitted, it was possible to get all the logs reformatted and out to the other European adjudicators the day after our closing date. As a result, there was a very timely response, yielding 380 logs from Germany, Italy, Belgium, Switzerland, Netherlands and Russia by the end of September. This allowed a good 60% of all QSOs to be verified directly with other logs. Thankfully, software does most of the checking, but about 1700 QSOs were manually checked and results tabulated in time for the Convention.

The quality of logging seems to be steadily improving. The most common error was /P missing, but it was clear some logs had been typed up from an unclear paper log with 0 transcribed to O, 2 to Z, 5 to S, etc. It's always worth a quick check through for typos of this kind.

SOAPBOX. I would like to thank entrants who took the time to include details of antennas and equipment in the SOAPBOX lines of their log. It allows us to report on preferences and trends in these articles. For example:

Hadley Wood CG, M0HWC/P, *noted that they used a "new Flex3000 for the first time. SteppIR beam 40m vertical and 80m folded dipole. Very slow start but the pace picked up after a couple of hours. All operators enjoyed S&P and the excellent filters of the Flex3000. Not our best effort but an enjoyable contest nonetheless."*

Granta CG, M0CAM/P, *reported having "refined the 'big-knob/little-knob' operation on the FT2000 so that the spotter could make Q's instead of just passing them to the run op. This makes the spotter's job much more inclusive and interesting. Creates the odd argument about who gets the transmitter though!"*

Two clubs dedicated their entry to members who are sadly now silent key:

Lincoln SWC, G5FZ/P, *"Contest Result dedicated to our friend Colin, G3MUL (silent key)"*

Basingstoke ARC, G8JYN/P, *"In memory of Alan Stables, G8FMH who passed away a*

G3WOR/P – We remembered the lights! Photo courtesy André Ravary, M0RAV.

G3WOR/P the Team. L to R: G3REP, G4LKW, M0KEL, M0SFG, M0RDV, G4UDU, seated L to R: 2E0TET, G4FNL. Photo courtesy André Ravary, M0RAV.

couple of weeks ago, a gentleman and a gentle man much admired within the club and a great loss."

And finally, some highlights and lowlights...

Sheffield ARC,G2AS/P. *"... it was a most enjoyable weekend especially as we had 19 helpers to set up and 14 to take down! The lack of rain (for a change) was also a help!"*

West Kent ARS, G1WKS/P. *"The first NFD for the club in many years. Great fun had by all on the team. We will be back next year bigger and better."*

Worthing & District ARC, G3WOR/P, *"joined forces with a neighbouring club and ended up with 11 Ops! We used this contest as a base to build up our experience."*

Worcester RAA, M0ZOO/P, *"First time from a new spot. Great location but awful weekend. 2 ops went home early due to illness and contest manager broke his arm"*

Scarborough ARS, G4BP/P, *"our new contesters Intermediate licence holders enjoyed the experience and hopefully will be back next year, which was one of the objects of the contest for this club"*

York RC, G4YRC/P, *"Decided to take part 48h before the event. Highlight was the lunch cooked over an open fire"*

Norfolk ARC, G8QR/P, *"A very enjoyable 24 hours, used contest to introduce new operators to contesting. They proved that it is not necessary to be a diehard contester to turn out good results, many thanks to 2E0GOL, M6BWA, 2E0DRT, 2E0YFO, M6JZU, M0PUD and M0HUG for joining our team. May they stay with us for the CC's next year."*

Many thanks to all who entered and to those who sent in check logs. See you in September 2010, hopefully with a few sunspots present this time.

Open Section

Pos	Group	Call	Qs	Ms	Qs	Ms	Qs	Ms	Qs	Ms	Qs	Ms	QSOs	Points	Mults	Total
			----3.5-----		------7------		-----14-----		-----21-----		----28-----					
1	Cray Valley RS	G3RCV/P	274	25	346	39	507	60	44	28	17	10	1188	4385	162	710370
2	East Notts CG	G3TBK/P	366	29	430	37	465	54	40	22	12	6	1313	4696	148	695008
3	DoubleX-Ray Firm	M0XXT/P	304	28	379	40	243	48	30	12	8	5	964	3714	133	493962
4	Buchan CG	MM0AOQ/P	212	19	438	30	436	47	21	14	1	1	1108	3995	111	443445
5	Oxford & DARS	G8PX/P	260	22	276	39	255	46	44	17	2	2	837	3216	126	405216
6	Bittern DX Group	G6IPU/P	402	25	454	38	96	25	21	11	6	2	979	3564	101	359964
7	Norfolk ARC	G8QR/P	304	22	299	32	216	44	26	12	0	0	845	3131	110	344410
8	Sheffield ARC	G2AS/P	302	24	341	27	174	42	25	12	1	1	843	3230	106	342380
9	Hadley Wood CG	M0HWC/P	253	21	223	26	190	41	23	16	11	3	700	2776	107	297032
10	Wisbech AR & EC	M5ARC/P	325	23	262	31	149	33	18	10	2	2	756	2883	99	285417
11	Lincoln SWC	G5FZ/P	317	23	285	30	204	34	0	0	0	0	806	2922	87	254214
12	Hornsea ARC	G5GX/P	212	16	289	27	125	32	22	16	3	2	651	2583	93	240219
13	Stockport RS	G3LX/P	193	16	271	29	221	29	23	11	2	2	710	2754	87	239598
14	Worcester RAA	M0ZOO/P	63	7	133	19	343	50	26	18	11	4	576	2152	98	210896
15	Blackwood & DARS	GW6GW/P	153	13	226	24	137	35	19	13	4	4	539	2200	89	195800
16	Northampton RC	G3GWB/P	215	20	160	22	71	28	24	15	0	0	470	2018	85	171530
17	S. Derbys & Ashby Wolds ARG	G0SRC/P	137	15	161	22	103	29	15	7	0	0	416	1631	73	119063
18	Macclesfield & DRS	G4MWS/P	141	13	195	22	49	22	12	8	5	1	402	1718	66	113388
19	Clifton ARS	G3GHN/P	167	19	69	17	61	29	13	9	0	0	310	1249	74	92426
20	Havering & DARC	G4HRC/P	256	15	183	23	19	10	2	2	1	1	461	1732	51	88332
21	Darenth Valley RS	G0KDV/P	34	9	9	7	327	38	10	7	0	0	380	1307	61	79727
22	York RC	G4YRC/P	14	4	17	6	10	9	0	0	0	0	41	186	19	3534

Restricted Section

Pos	Group	Call	Qs	Ms	Qs	Ms	Qs	Ms	Qs	Ms	Qs	Ms	QSOs	Points	Mults	Total
			----3.5-----		------7------		-----14-----		-----21-----		-----28-----					
1	Bristol CG	G6YB/P	243	23	337	35	308	46	34	18	7	6	929	3571	128	457088
2	Blaenau Dwr [1 op]	MW1LCR/P	214	25	350	35	251	43	48	17	26	7	889	3334	127	423418
3	Granta CG	M0CAM/P	233	22	209	34	102	35	35	15	8	3	587	2476	109	269884
4	[single op]	M0UTD/P	155	12	183	24	201	39	37	15	5	2	581	2256	92	207552
5	Reading & DARC	G3ULT/P	326	21	223	28	52	21	16	8	4	2	621	2569	80	205520
6	Worthing & District ARC	G3WOR/P	257	22	162	25	57	24	21	11	1	1	498	2096	83	173968
7	RAFARS	G8FC/P	137	13	163	31	43	21	11	7	2	2	356	1610	74	119140
8	Scarborough ARS	G4BP/P	266	18	165	20	36	19	2	2	0	0	469	1941	59	114519
9	Lowestoft District & Pye ARC	G3JRM/P	292	17	117	20	42	20	12	8	5	2	468	1700	67	113900
10	Kilmarnock & Loudoun ARC	MM0KLR/P	73	10	330	26	43	21	3	3	0	0	449	1841	60	110460
11	Three As CG [1 op G3WVG]	GI0AAA/P	96	9	165	15	101	30	0	0	0	0	362	1538	54	83052
12	Chesham & DARS	G3MDG/P	201	18	163	15	32	16	0	0	0	0	396	1619	49	79331
13	Worthing Radio Events Group	M0REG/P	203	17	95	17	34	20	0	0	1	1	333	1384	55	76120
14	West Kent ARS	G1WKS/P	165	15	64	14	65	23	3	3	3	2	300	1293	57	73701
15	Basingstoke ARC	G8JYN/P	112	12	62	20	46	20	0	0	0	0	220	1014	52	52728
16	[1 op]	G4DPF/P	108	12	31	10	69	30	0	0	0	0	208	938	52	48776
17	Echelford ARS [1 op G0VDZ]	G3UES/P	53	10	106	16	34	17	1	1	1	1	195	829	45	37305
18	Stourbridge & DARS	G6OI/P	111	11	49	9	26	15	8	6	0	0	194	898	41	36818
19	Aberdeen ARS	GM3BSQ/P	75	11	112	13	13	9	1	1	2	1	203	892	35	31220
20	Dragon ARC	GW4TTA/P	83	9	92	16	17	8	0	0	0	0	192	906	33	29898
21	Poldhu ARS	G3MPD/P	36	7	130	13	41	17	0	0	0	0	207	804	37	29748
22	Dudley & DARS	M0RSD/P	110	11	79	12	6	4	0	0	0	0	195	867	27	23409
23	Kidderminster & DARS	G6KRC/P	27	8	72	10	26	13	0	0	0	0	125	574	31	17794
24	Reading & DARC B [1 op G3VMY]	G3AKF/P	23	5	43	12	16	12	1	1	1	1	84	391	31	12121
25	Bolton Wireless Club	G0BWC/P	29	6	14	2	17	8	0	0	0	0	60	258	16	4128

Checklogs gratefully received from: G3TXF, G3VAO, G3VQO, G6CSY, G7RTI, GA4GRC/P, M0RYB, M5ALG, MA0BQI/P, MA0DXH, MU0GSY, 9A2QF, AB2TC/VE3, DK1ROB, EB2DJB/P, HA7PL, HA8ZE, HG8C, K3ZO, SO9G, TA1HZ, YO7DEK.
Also thanks to the IARU Region 1 national societies for sharing the logs they received. These have been used for checking purposes.

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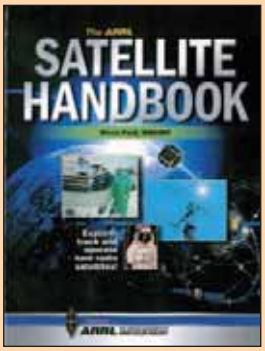

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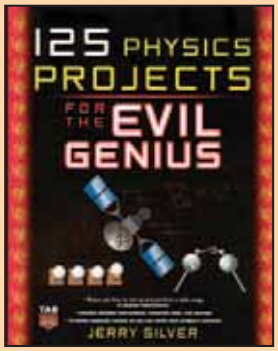

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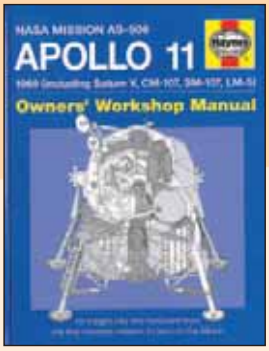

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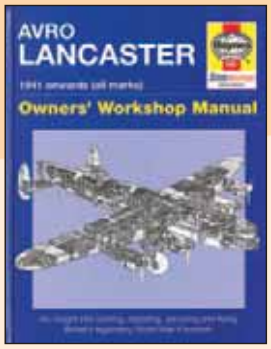

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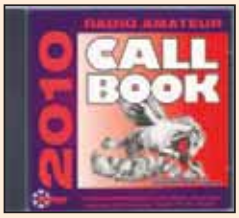

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Getting listed here and on GB2RS is easy. E-mail details of your meetings as early as possible to GB2RS@RSGB.org.uk and we'll do the rest. We need to know your club name, RSGB Region number, contact name & phone number, date of meeting and detail of meeting. Example: South Bristol ARS, Region 11, Len, G4RZY, 01275 834 282, 29 October, On the Air. It's that simple. The deadline for the February *RadCom* is 23 December and for the March edition it's 1 February. For GB2RS, the deadline is 10am on the Tuesday for the week of broadcast.

1 SCOTLAND SOUTH & WESTERN ISLES

REGIONAL REP: GORDON HUNTER, GM3ULP, GM3ULP@RSGB.ORG.UK

AYR ARG
Charlie, MM0GNS, 01563 551704, cgnstewart@hotmail.com
3 HF operating
6 Use of meters
17 Visiting talk
20 Project construction

LIVINGSTON & DARS
Norman, 07740 946192, uk.groups.yahoo/group/ms0liv
5, 19 Club evening
12 Operating evening
26 Morse Code practice

LOTHIANS RS
Andy Sinclair, lrs_secretary@moosedata.com
11, 25, 27 Talk
13 Video evening by Peter, GM4DTH

PAISLEY (YMCA) ARC
Bill Anderson, 2M0BZZ, 01505 613633, bill@3bis.co.uk
10, 13, 24, 27 Training

2 SCOTLAND NORTH & NORTHERN ISLES

REGIONAL REP: DENNY MORRISON, GM1BAN, GM1BAN@RSGB.ORG.UK

ABERDEEN ARS
Lewis, GM4AJR, 01224 575 663, www.aars.freeserve.co.uk
7 Junk sale

GLENROTHES & DRC
Dave Francis, 01383 823878, or www.gdarc.org.uk
6 First meeting of New Year
13, 20 Glass jewellery by Lillian followed by bread tasting

MORAY FIRTH ARS
Jim, MM0SMD, 01340 820 134, nicol123@btinternet.com
7 Quiz night

3 NORTH WEST

REGIONAL REP: KATH WILSON, M1CNY, M1CNY@RSGB.ORG.UK

CHESTER & DRS
Barbara Green on 0151 339 9183, www.chesterdars.org.uk
5 AGM
19 Construction contestants
26 Radio operating & club archives

SOUTH CHESHIRE ARS
Chris Wiseman, G0RDK, 01782 773185
7, 21 No meeting, net on S14
14 Grand shack tidy up
28 EGM to fine-tune Constitution

SOUTH MANCHESTER R & CC
Ron, G3SVW, 0161 969 3999
7 AIM antenna analyser by Bill, G4SVR
14 Quiz by John, G6ISA
21 Open night
22 Annual dinner
25 Technical Forum
28 Analogue computers by Dave, G4UGM

THORNTON CLEVELEYS ARS
John Foster, 2E0EZY, 01253 399377
4 No Meeting
11 Natter Night
18 Planning permission Ken, G3RFH
25 Air radio by Mick, G4EZM

4 NORTH EAST

REGIONAL REP: HAROLD SCRIVENS, GOUGE, GOUGE@RSGB.ORG.UK

ANGEL OF THE NORTH ARC
Nancy, G7UUR, 0191 477 0036, nancybone2001@yahoo.co.uk
4 OTA, Morse class. Advanced course continues
11 E-mail clinic by Dr Steve Townsley
18, 25 OTA, Advanced course continues

HORNSEA ARC
Gordon MacNaught, G3WOV, 01377 240573
6 CW training and more
13 Magazine night
20 Annual dinner
27 T1154 transmitter by Ken, G4KCF

OTLEY ARS
Paul, 2E0PAK, 07768 996370, m6wat@pekae.co.uk
5, 19 Shack night
12 Members presentation
26 50MHz UKAC + tech chatter (Village Hall)

SHEFFIELD ARC
Trevor Wood, M0TWS, trevorwood6@yahoo.co.uk
4 Social night & subs renewal
11 Using computers in the shack, Peter, G3PHO
18 SSTV by Trevor, M0TWS
25 Intro to Sport Radio by Peter, G3PHO

WAKEFIELD & DRS
Ken, 2E0SSQ, 07900 563117
7 First meeting of New Year

5 WEST MIDLANDS

REGIONAL REP: TREVOR BAILEY, M0KMB, M0KMB@RSGB.ORG.UK

BROMSGROVE & DARC
Chris, M0BQE, 01905 776 869, m0bqe@hotmail.com
8 Special event review
15 Committee meeting
22 Remote operation - discussion
29 Project night

CHELTENHAM ARA
Derek Thom, G3NKS, 01242 241099, g3nks@blueyonder.co.uk
21 Video evening at NEW VENUE, Brizen Youth Centre

COVENTRY ARS
John, G8SEQ, 07958 777363
1 2m DF 10am, no eve. meeting
8 Bring your Christmas presents
15 Annual dinner
22 Video night
29 Quiz night

GLOUCESTER AR & ES
Anne, 2E1GKY, 01452 548478, daytime, www.g4aym.org.uk
4 Talk on D-Star by Simon Collings of CARA
11 Operating club equipment
18 DF hunt
25 Informal evening

MIDLAND ARS
Norman, G8BHE, QTHR, 01214 229 787
6 General meeting, training classes
13 OTA & training classes
20 Laptop computer evening
27 Planning evening & training classes

SOUTH BIRMINGHAM RADIO SOCIETY
Don, 0121 458 1603
1 No meeting
4, 25 OTA
6 Hot spuds & Christmas leftovers
8, 15, 22 Construction evening
11 Contest planning
18 Committee meeting
29 Rally planning evening

SUTTON COLDFIELD ARS
Robert Bird, spirit.guide@hotmail.co.uk
11 First meeting of the New Year

TELFORD & DARS
Mike, G3JKX, 01952 299 677, mjstreetg3jkx@blueyonder.co.uk
1 9am New Year's Day net 144.6MHz±
6 Open house / HF OTA / committee
13 Transceiver functions explained
20 Share a circuit! Bring your favourite
27 Make a DF antenna for 2m

6 NORTH WALES

REGIONAL REP: MARK HARPER, MW1MDH, MW1MDH@RSGB.ORG.UK

DRAGON ARC
Stewart Rolfe, GW0ETF, 01248 362229
4 Discussion night & prep for RSGB AFS Contests
18 Video evening

MEIRION ARS
John, MW0VTK, 07868 738016, meirionars.multiply.com
14 AGM

PORTHMADOG & DARS
Glyn, MW5CAD, 01286 830078
21 Natter Night, 8pm start

7 SOUTH WALES

REGIONAL REP: JIMMY SNEDDON, MW0EQL, MW0EQL@RSGB.ORG.UK

SWANSEA ARS
Nick Lewis, MW0JGE, 01792 402035
21 Joint meeting with IET. Amateur radio is out of this world by Ken Eaton, GW1FKY

8 NORTHERN IRELAND

REGIONAL REP: PETER LOWRIE, MI5JYK, MI5JYK@RSGB.ORG.UK

BANGOR & DARC
Mike, GI4XSF, 028 4277 2383
7 Annual quiz

9 LONDON & THAMES VALLEY

REGIONAL REP: ALISON JOHNSTON, G8ROG, G8ROG@RSGB.ORG.UK

AYLESBURY VALE RS
Roger, G3MEH, 01442 826 651
13 Annual dinner

COULSDON ATS
Andy, G8JAC, g8jac@btinternet.com
11 Annual dinner at the Rubbing House.

CRYSTAL PALACE R & EC
Bob, G3OOU, 01737 552 170
8 EGM & history of power supplies pt. 2

DORKING & DRS
Garth, G3NPC, 01737 359472, garth@swansons.org.uk
26 AGM and British Vintage Wireless Society video

EDGWARE & DRS
Mike, G4RNW, 020 8950 0658, michael.stewart5@ntlworld.com
14 AGM
27 Pay your subs

MILTON KEYNES ARS
www.mkars.org.uk
4, 18 Shack open night
11 New Year Quiz Night
25 General chat night

NEWBURY & DARS
Richard, G3ZGC, 01635 46241, richard.jolliffe@vodafone.com
27 Surplus equipment sale

RADIO SOCIETY OF HARROW
Linda, G7RJL, 020 8386 8586, www.g3efx.org.uk
8 Round table discussion
22 LEDs: humble indicators to shining beacons

READING & DARC
Pete, G8FRC, 01189 695 697
14 HV power distribution to railways by Richard, G0FFL
28 Cinema sound systems by Graham Creasy

SHEFFORD & DARS
David, G8UOD, 01234 742 757, www.sadars.co.uk
7 Welcome back
14 Club project
21 Construction contest
28 Holy Island DXpedition

SURREY RADIO CONTACT CLUB
Ray, G4FFY, 020 8644 7589
4 Club talk
18 Fix-it and natter night

SUTTON & CHEAM RS
John, G0BWV, 020 8644 9945, info@scrs.org.uk
21 D-Star by Chris Howard, M6HUD

WEY VALLEY ARG
www.weyvalleyarg.org.uk
1, 15 Club night

WIMBLEDON & DARS
Jim, M0CON, 020 8874 7456,
www.gx3wim.org.uk
8 Your Christmas & New Year activities
29 Bletchley Park & the Gunpowder mills by Len Stuart

10 SOUTH & SOUTH EAST

REGIONAL REP: GAVIN KEEGAN, G6DGK, G6DGK@RSGB.ORG.UK

ANDOVER RAC
Martin, M0MWS, 07776181646,
www.arac.co.uk
19 Why SDR? talk

FARNBOROUGH & DRS
Derek, G3OFA,
mail@farnboroughradio.org.uk,
www.farnboroughradio.org.uk,
13 EMC by G3KND
27 Imaging technology by Julian, 2E0XPJ

HASTINGS E & RC
Gordon, 01424 431 909,
gordon@gsweet.fsnet.co.uk
www.herc.uk.net
24 Club lunch
27 Old radios
27 D-Star

HORNDEAN & DARC
Stuart, G0FYX, 023 9247 2846,
www.hdarc.co.uk
5 Natter night / social evening
26 Quiz evening (other clubs invited, teams of 4)

HORSHAM ARC
www.harc.org.uk
7 Goubau Lines and Small Aerials by Mike, G3LHZ
21 Social

LYMINGTON ARS
Keith, M0LCC,
m0lccandg8mzf@googlemail.com
1 No meeting

MID-SUSSEX ARS
Sue, G6YPY, 01273 845 103,
sue@figgerit.co.uk
1 Closed
8, 15 Radio night
22 5MHz & NVIS, Chris Saunders
29 Radio night and table top sale

SOUTHDOWN ARS
John, G3DQY, 01424 424 319
4 AGM at Chaseley
6 Operating at Hailsham shack
7, 21 Natter Night
14 Development of the Morse key by Dennis, G3LLZ
28 Talk

WORTHING & DARC
Roy, G4GPX, 01903 753 893
6 Planning radio operating in 2010
13 Fixing Things - adhesives, solders and brazing by Norman, M0EBI
20 Club dinner at Sussex Potter
27 GX3WOR OTA & discussions

11 SOUTH WEST & CHANNEL ISLANDS

REGIONAL REP: PAM HELLIWELL, G7SME, G7SME@RSGB.ORG.UK

APPLEDORE & DARC
Brian Jewell, M0BRB,
01237 473251
18 SSTV Talk

BLACKMORE VALE ARS
Tony G0GFL, 01258 860741
5 VHF evening in the club shack
12 The Magnetron by Chuck, G0MDK
19 HF evening in the shack
26 Radio discussion

CORNISH RADIO AMATEUR CLUB
Steve, G7VOH, 01209 844939,
g7voh@btinternet.com
4 Committee meeting
6 Main meeting
11 Computer Section meeting

EXMOUTH ARC
Mike, G1GZG, 01395 274172
6 FSTV and SSTV demo
20 Operating & mystery night

SOUTH BRISTOL ARC
Len, G4RZY, 01275 834 282
7 Computers & broadband by Luke, M3VHV
14 Club archives with Muriel, G4YZR
21 Echolink operation by David, G7PKJ
28 OTA

TAUNTON & DARC
William, G3WNI, 01823 666 234,
g3wni@btinternet.com
6 Debate on RSGB AFS contest led by Peter, G0EYR
13, 27 Operating club station & Morse class
20 DX operating experiences by Rob, G0WSC & Kelvin, M0AID

THORNBURY & SOUTH GLOUCESTERSHIRE ARC
Tony, G0WMB, 01454 417048,
tonytsgarc@sky.com
6 Slide show on Egypt by Stan, G0RYM
13, 27 OTA
20 Video night

YEOVIL ARC
Steve Crask, G7AHP,
steve@g7ahp.co.uk
7 Committee meeting & OTA
14 Test equipment by Bob, G7LNJ
21 Junk sale
28 PICs by Steve, G7AHP

12 EAST & EAST ANGLIA

REGIONAL REP: PHILLIP BROOKS, G4NZQ, G4NZQ@RSGB.ORG.UK

BARKING R&ES
Bill Chewter, billchewter@lineone.net
28 Talk by Mark Francis of Waters and Stanton

BITTERN DX GROUP
Linda, G0AJJ, 01692 404154,
secretary@bittern-dxers.org.uk
14 Informal - all welcome.
28 Major event planning & training

CHELMSFORD ARS
Martyn, G1EFL, 01245 469 008,
www.g0mwt.org.uk
5 East London Line talk by Mark, M0IEO
12, 19, 26 Club net night
13 Committee meeting - Danbury
14 Foundation Course starts

DOVER RC
Brian, G4SAU,
g4sau@darc.org.uk
6 Natter & operating evening
13 Gadget Night - Show off your Christmas gadgets!
17 Dover Radio Rally

20 Natter and operating night, committee meeting
27 Radio scanning presentation by Matt, M1CMN

KING'S LYNN ARC
Ray, G3RSV,
ral-g3rsv@supanet.com,
www.klarc.org.uk
7, 14, 21, 28 Club night and 2m club net

LOWESTOFT & DISTRICT PYE ARC
Phil, G0JSG, 01502585448,
phillip.holden@virgin.net
7, 21, 28 Club night at shack
14 Annual dinner at the Trowel & Hammer

NORFOLK ARC
Chris Danby, G0DWV,
01603 419204,
cmdanby@btinternet.com
6 RTTY contesting for beginners by Roger, G3LDI
13 Informal / construction / workshop
20 Propagation by Pat Gowen, G3IOR
27 Informal / construction / workshop / Bright Sparks

PETERBOROUGH & DARC
David Howlett, M0VTG,
padarc@tesco.net
27 AGM

SOUTH ESSEX ARS
Norman, M0FZW,
01268 692776,
secretary@southessex-ars.co.uk
13 Canvey Rally final planning & preparation

13 EAST MIDLANDS

REGIONAL REP: JIM STEVENSON, G0EJQ, G0EJQ@RSGB.ORG.UK

EAGLE RG
Terry, G0SWS, 01507 478590
12 Best HF aerial for my small garden?

LINCOLN SW CLUB
Pam Rose, G4STO,
01427 788356,
pamelagrose@tiscali.co.uk
6, 20 Shack activity & natter night
13 AGM – Village Hall
24 Big Australian Breakfast SES at the Lawn, Lincoln
27 Aerials that work and some that don't by Bill, G3XZF

LOUGHBOROUGH & DARC
Chris, G1ETZ, 01509 504 319
5 Practical evening and welcome back
12 Bring along something Bakelite
19 Video evening 'Space'
25 Bring a Morse keys

SOUTH NOTTS ARC
Terry, M0RIA,
www.radioclubs.net/snarc
5 2m Contest
6 Knots and hitches by M0BWY
13 AGM (members only)
20 RAYNET talk
27 Moon watch plus pie & peas

HELPLINES

IMPORTANT NOTICE

RESPONDENTS ARE ADVISED NOT TO SEND ORIGINAL DOCUMENTS, BUT TO COPY THEM AND SEND THE COPIES.

Helplines is a free service that can be used to ask other members for help on amateur radio related matters. Items for inclusion can be sent by post to RSGB HQ or preferably by e-mail to radcom@rsgb.org.uk.

• Can anyone help me find the original OZ7BO electronic keyer circuit. This used a 6SN7 double triode with two GPO Type 3000 relays. I think it was published in the RSGB magazine a good many years ago, say 1950. I have a very old fashioned home brew TX using all valves on 500kHz, bit of an archive job, and would like to use a matching electronic keyer. Would be happy to purchase any reprint available with that information. John Tuke, GM3BST, QTHR.

• Wanted any help - maintenance/ user information on the Redifon Mel DU600 unit. Has anyone this available and if so, all expenses will be met. G3GKI, QTHR or e-mail v.kershaw@btinternet.com.

• Can any one help out? I'm looking for circuit or manual for a Heathkit service oscilloscope model OS2. If you can help I'm in the call book and I'm happy to pay any costs - M0BRE.

• I am trying to find out something about the amateur radio and related activity of CHL Askham, G6TT, who lived in Liverpool from about 1920 until his death in 1986. During World War 1 he served in the Royal Flying Corps in France as a Wireless Operator. In 1933 Colin Henry Littlewood Askham was a co-founder and the first Vice-President of the British Interplanetary Society, which was set up in Liverpool and then transferred its headquarters to London. In the first issue of the British Interplanetary Society Journal, in 1934, a pen-portrait said that "He is known all over the world as G6TT, and at the moment is engaged in a series of experiments with ultra-short wireless waves." One of his international contacts was a George S Felber, WA1X, in New York.

Colin also gave his name to Littlewoods Pools, and worked with the Pools company and Littlewoods Mail Order as the PA to John Moores until he retired. In the 1950s he was a Director of Everton Football Club.

I was told that there was reference to him in an issue of the *Radio Bygones* Magazine, possibly in 1999, but I have not been able to obtain a copy in any form. I would be pleased to receive any information about Colin Askham. Thank you, Professor Martyn Roebuck, martynroebuck@mac.com (Edinburgh).

HF F-Layer, Propagation Predictions for January 2010

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	884....77888	7372..688688	...76788....	...88883....	...7999.....	....997.....	....77.....	.....
*** Asia								
Yakutsk	47766	7..55.387867	...76.....	.....	.....	.....	.....	.....
Tokyo	......33222.	...66477434.	.....	.....	.....	.....	.....	.....
Singapore	.......2111.	786525	......53....	......5.....	.....65.....	.....4.....	.....	.....
Hyderabad	.....	33332	.......5....	......44....	......3.....	.....	.....	.....
Tel Aviv	995....68999	978....99989	...2..58....	...76675....	...4887.....	....665.....	.....	.....
*** Oceania								
Wellington	.....	....78873...	....6763....	....464.....	.....6.....	.....	.....	.....
Well (ZL) (LP)	.....	.....	.....	.....	.....	.....	.....	.....
Perth	.....	......47434.	......77....	......73....	.....	.....	.....	.....
Sydney	.....	.....67522..	....5883....	....777.....	.....	.....	.....	.....
Melbourne (LP)	.....	..288.....	.4.89.....	....95.....	....9.....	....8.....	.....	.....
Honolulu	....2..2....	...25555....	.....4.....	.....	.....	.....	.....	.....
Honolulu (LP)	.....	.....	.....	.....	.....	.....	.....	.....
W. Samoa	....1.....	....7672....	....776.....	....45.....	.....	.....	.....	.....
*** Africa								
Mauritius	3.......1223	7......67777	3......76545	.......7....	.....	.....	.....	.....
Johanesburg	89.......799	99......9999	56.....58877	.......764..	.......5....	.....	.....	.....
Ibadan	22.......222	776.....6677	7.4.....7777	...5...673..	...76667....	...47677....	....776.....	.....
Nairobi	4.......1443	87.....58888	46656	.......6....	...3..56....	...5446.....	.....	.....
Canary Isles	9992....8889	99982..69999	88.72..68.87	....6567....	....4544....	.....	.....	.....
*** S. America								
Buenos Aires	7767.......5	8979......78	24.6.....	.....	.....	.....	.....	.....
Rio de Janeiro	7778......27	9979.....689	35.6.....433	.....	.....	.....	.....	.....
Lima	2212.....	5625......25	.2.....	.....	.....	.....	.....	.....
Caracas	555........3	7837......77	35.85....533	....53..5...	.....656....	.....766....	.....	.....
*** N. America								
Guatemala	2322.....	56.66......4	....6.....	.....	.....	.....	.....	.....
New Orleans	3332.......2	66.62.....46	....3.....	.....4...	.....	.....	.....	.....
Washington	3453......24	77.73.....77	.....6..	.....4456...	......45....	......54....	.....	.....
Quebec	6664......65	35.63....642	.....66..	.....6677...	......66....	......64....	.....	.....
Anchorage	8884....2..2	88.877788888	.....6...	.....	.....	.....	.....	.....
Vancouver	.....	3..2.....	.....	.....	.....	.....	.....	.....
San Francisco	.....	.....	.....	.....	.....	.....	.....	.....
San Fran (LP)	.....	.....	.....	.....	.....5....	.....	.....	.....

KEY: Each number in the table represents the expected circuit reliability, eg '1' represents reliability between 1 and 19% of days, '2' between 20 and 30% of days, etc. No signal is expected when a '.' is shown. **Black** is shown when the signal strength is expected to be low to very low, **blue** when it is expected to be fair and **red** when it is expected to be strong. 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 January, February and March are respectively (SIDC classical method – Waldmeier's standard) 7, 8, 9 and (combined method) 19, 21, 25. The provisional mean sunspot number for September 2009 was 4.2. The daily maximum / minimum numbers were 17 on 19 November and 0 on 1 – 4, 7 – 8, 12, 17 & 23 – 30 November.

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- Bandpass filters manual and auto
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2000	160-6	2000W o/p	Manual tune	TBA

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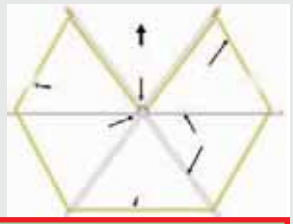

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FOR SALE

AMATEUR RADIO FROM FRANCE! Fully equipped self-catering Gite, sleeps 3-5, located in SW France (Chatente Maritime) 1km from beach near the Ile D'Oleron (S of La Rochelle), including use of radio shack/workshop

(not transceivers – bring your own HF rig) and aerials – Versatower, Carolina Windom, and VHF whip. Long garden for experimental antennae – come and try it! Excellent sea path to west/southwest (S America, S Atlantic), also all Europe. Gite has TV (inc satellite), DVD, VHS, stereo, computer on broadband ADSL. Available all year, prices on application – call Tim & Monica Cherry, 0033 5 46854480 or email Robert.cherry@wanadoo.fr.

EDDYSTONE EA12 RECEIVER excellent condition, serviced by manufacturer. £200. Buyer collects. Brian, 2E0BGD, 01225 426091 (Bath).

EDDYSTONES EA12, 730/4, 840C; RA17; HROs; KW Vanguard; Codar AT5; ATU components; lots more. Having a clearout. E-mail or SAE for list. G3VFO QTHR, 01435 882245 / 07712 526440, e-mail terry.hart@btinternet.com (Burwash, East Sussex).

ICOM RECEIVER IC-775DSP in mint condition £1000 for quick sale. Geoff, G4AYH, 07989 606376 (Leeds).

K2 BITS – KAT2 AUTO ATU; KBT2 internal battery fittings; manual (photocopy); top panel with K102 board. £80 the lot plus postage. John, G3GTJ 01963 240319 (Somerset).

KENT SINGLE PADDLE KEY, excellent condition, hardly used. £60. Phil, G8CYU, 01242 519866 (Cheltenham).

SILVER YAESU VX-7R tri band handheld £180 ono inc postage. Dave Penny, G6ZSN, 01823 335421, e-mail member@dpenny.fsnet.co.uk (Taunton).

SK SALE: ICOM IC-756 with HM-36 mic £799. Kenwood PS-30 mains PSU £75. Icom IC-E90 6m / 4m / 2m / 70cm 5W handheld as new in box, unused, £199. Daiwa CN-101L cross-needle SWR & power meter 15 / 150 / 1500W, 1.8–150MHz, in box as new, £60. Diamond SX200 SWR/power meter £50. MFJ-259B 1.8–170MHz antenna analyser £150. Thurlby Thandar TG230 sweep/function generator 2Hz–2MHz £150. Hameg HM203-2 2-channel digital storage oscilloscope with probes £80. SEM Trans Z match £50. Global GDO MKII 6 bands 1.5–250MHz, as new, in box £60. Palomar R-X noise bridge 1–100MHz £100. TTI EB2025ST triple PSU 5V @ 1A, 2X 0–20V @ 250mA £40. Timewave DSP-599zx DSP AF filer & noise reducer £180. Diamond DL30A 50Ω 15W dummy load £15. Peak Atlas component analyser, 2 units, one for semiconductors, other LCR, as new in box £80. CATOPTO-IFMKII data modes computer interface £30. Academy PG012 handheld DMM £15. Prices negotiable, collect or carriage extra. Phil, G3TCU, 01483 423272, e-mail prg@mssl.ucl.ac.uk (Godalming).

YAESU FT-767GX HF ALL MODE 100W transceiver with 6m & 2m modules. Mains powered with internal ATU. Excellent condition, with hand mic, £450. Yaesu FT-757GX HF all mode 100W transceiver. Good condition, with hand mic, £250. Buyer collects on both. Martin Rhodes, 01789 740073 (Stratford-Upon-Avon).

YAESU FT847 PLUS FC20 AUTO ATU boxed, excellent condition, £999. Yaesu silver triple band VX-5R hand held transceiver, boxed, VGC, £100. MFJ 259 HF/VHF SWR analyser £100. Acton signal generator CG6/1 £20. Tandy 'Archer' rotator £25. Mike, G8OBK, QTHR, 0161 439 2021 (Stockport).

YAESU MD200 DESK MIC, original packaging and instruction leaflet. Bought new £230 on 16/6/09, only £99 + £10 P&P. John, M6BBB, 01652 632038 (Barton Upon Humber).

WANTED

APRIL 1999 EDITION OF RADCOM MAGAZINE. Codar PR30 preselector. Crystal microphone for Codar ATS transmitter. Pete Rowe, G3JSP, QTHR, 01262 671884 (Bridlington).

G2DAF RECEIVER. G3MDQ QTHR, 01395 444121.

G3FEV would like to thank those members who replied to his request for a Yaesu handbook. Unfortunately he was hospitalised at the same time and so far has not been able to thank everyone personally – this will be attended to in due course. G3FEV, 01706 211339.

MORSE KEYS WANTED PLEASE. Avid collector seeks straight keys, bug keys etc. In particular Marconi. Please ring or e-mail John, G0RDO, on 01626 206090, e-mail john@morsemad.co.uk (Newton Abbot).

PARTS, PARTICULARLY TRANSFORMERS, to keep my DX100U working. Also looking for SB200 linear, SB3000 series receiver and KW77 receiver. Bruce, G3WCE, 01692 538794, e-mail G3WCE@grimblepoos.co.uk (North Walsham).

SILENT KEY CLEAROUT or just not needed. I collect QSL cards for their historic interest, preferably from periods before 1970. Please don't throw them away. I can collect or arrange collection. Tony, G4UZN, 01132 693892 (Leeds). E-mail: AQuest1263@btinternet.com.

RALLIES & EVENTS

Members of the RSGB Regional Teams will be at the rallies in January that are marked with a diamond.

17 JANUARY - **RED ROSE WINTER RALLY** - Lowton Civic Centre WA3 2AH, just off the A580 East Lancs Road. TI-S22, OT 10am, free CP, TS, B&B, SIG, LB, C, DF, RSGB Bookstall. Further details from Steve on 01942 888900 [www.wmrc.org.uk].

17 JANUARY - **DOVER AMATEUR RADIO CLUB RALLY** - Whitfield Village Hall, Dover CT16 3LY. TI via GB3KS. Details at www.DARC.org.uk.

31 JANUARY - **HORNCASTLE WINTER RALLY** - Horncastle Youth Centre, Lincolnshire LN9 6DZ. 10am/10.30am, £1.50, DF, C, free CP. Tony, G3ZPU, 01507 527835, G3ZPU@yahoo.co.uk.

7 FEBRUARY - **25TH CANVEY RADIO & ELECTRONICS RALLY** - 'The Paddocks', Long Road, Canvey Island, Essex SS8 0JA (southern end of A130). Free CP, OT 10.30, £2, C, DF, TS. Dave, G4UVJ, 01268 697978 (evenings). [www.southessex.ars.btinternet.co.uk].

14 FEBRUARY - **HARWELL RADIO AND COMPUTING RALLY** - Didcot Leisure Centre, Mereland Road, Didcot OX11 8AY. TI S22 (V44), free CP, £2 (u12 free), OT 10.15/ 10.30. TS, SIG, LB, C, DF. Details on 01235 816379, e-mail ann.stevens@btinternet.com, [www.g3pia.org.uk].

14 FEBRUARY - **NORTHERN CROSS RALLY** - Ossett School, Storrs Hill Road, Ossett, West Yorkshire WF5 0DG. OT 10.15/10.30, £3, TI. www.northerncrossrally.org.

21 FEBRUARY - **RADIO-ACTIVE RALLY** - Civic Hall, Nantwich, Cheshire CW5 5DG. CP, OT 10.30, TS, B&B, C. Simon Chettle G8ATB, 01270 841506, e-mail info@radioactiveshow.co.uk [www.midcars.org].

21 FEBRUARY - **SWANSEA ARS RALLY** - Afan Lido (Aquadome), Aberavon seafront, Port Talbot, SA12 6QW, 1 mile from M4 J41. OT 10.30, £1.50/50p, free CP, TS, B&B, SIG, C. Details Roger, GW4HSH, 01792 404422.

28 FEBRUARY - **RAINHAM RADIO RALLY** - Rainham School for Girls, Derwent Way, Rainham, Gillingham, Kent ME8 0BX. Trevor, G6YLW, 0771 7678 795.

7 MARCH - **BOURNEMOUTH RADIO SOCIETY 21ST ANNUAL SALE** - Kinson Community Centre, Pelhams Park, Millhams Road, Kinson, Bournemouth BH10 7LH. CP, OT 09.30, admission £1.50, TS, SIG, C, DF, Junk Sale. Contact John, G0HAT, 07719 700 771 [www.brswebsite.org.uk].

SILENT KEYS

We regret to record the passing of the following members:

Mr P C Prosser, G4TVZ	17/8/2009
Mr O Karlsson, SM6PU	2/2009
Cdr L R Borley, G4LIK	31/10/2009
Mr D C Reynolds, 2E0DCR	13/10/2009
Mr J McAvoy, MM6JAP	1/11/2009
Mr F Lord, G4YWK	8/11/2009
Mr G W F Ashford, G2AOZ	29/10/2009
Mr D J Davies, MW3AFO	16/11/2009
Mr G W F Ashford, G2AOZ	21/9/2009
Mr P Homer, G4BXT	22/7/2009
Mr M J Walker, G3TLZ	18/11/2009
Mr D E Brocklesby, G7RLH	22/9/2009
Mr J Stevens, G3UFW	2/11/2009
Mr K A Ballance, G3KNB	10/11/2009
Mr R J Davis, M1FDV	
Mr K J Ottrey, G3ECS	27/8/2009
Mr C T Nock, 2E1AMT	23/10/2009

7 MARCH - **EXETER RADIO & ELECTRONICS RALLY** - America Hall, De la Rue Way, Pinhoe, Exeter, EX4 8PW. OT 10.30 (10.15), £2, TS, B&B, C, TI. Contact Pete, G3ZVI, 07714 198374, e-mail g3zvi@yahoo.co.uk.

13 MARCH - **DUTCH NATIONAL RADIO FLEA MARKET** - "Autotron", Rosmalen ('s-Hertogenbosch, just off A59 motorway). OT 9.00. TS, FM, €6. TI PI4SHB, 145.250MHz. Details +31 6 1356 1325, e-mail info@radiovlooienmarkt.nl, [www.radiovlooienmarkt.nl].

20 MARCH - **LAGAN VALLEY ARS RALLY** - The Village Centre, 7 Ballynahinch Road, Hillsborough. OT 11.30, TS, CP, C. Contact Jim, GI0DVU, 02892 662270, e-mail jim.henry@ntlworld.com.

21 MARCH - **25TH WYTHALL RC RADIO AND COMPUTER RALLY** - Woodrush Sports Centre, Shawhurst Lane, Hollywood, nr Birmingham B47 5JW on the A435, 2mi from J3 M42. OT 10-3, £1.50, TS, C, B&B, CP, TI S22 (V44). Contact Chris, G0EYO, 07710 412 819 or g0eyo@blueyonder.co.uk or www.wrcrally.co.uk.

21 MARCH - **CALLINGTON AMATEUR RADIO SOCIETY RALLY** - Callington Community College, Launceston Road, Callington, Cornwall PL17 7DR. TI, CP, OT 10am, £2.00, TS, B&B, C, DF, WIN. Contact Chris G7UDX, 07973418371, email g7udz@mac.com.

28 MARCH - **SPRING MILITARIA & ELECTRONICS & RADIO AMATEUR HANGAR SALE** - Hack Green secret Nuclear Bunker, Nantwich, Cheshire, CW58AP. 10am, £2.50. Contact Rod Siebert, 01270 623353 or coldwatr@hackgreen.co.uk [www.hackgreen.co.uk].

11 APRIL - **NORTHERN AMATEUR RADIO SOCIETIES ASSOCIATION EXHIBITION** - Norbreck Castle Exhibition Centre, Blackpool. TI, CP, TS, B&B, SIG, MT, LB, C, DF, RSGB Book Stand. OT 10:45/11:00. Dave, M0OBW, 01270 761 608 dwilson@btinternet.com [www.g1gyc.demon.co.uk/narsa].

11 APRIL - **LOUGH ERNE AMATEUR RADIO CLUB ANNUAL RALLY** - The Share Holiday Village, Lisnaskea, Co. Fermanagh BT92 0EQ N. Ireland. Access from Erne/Shannon Waterway. OT 12 noon, CP, B&B, TS, LB, C, DF. Details Iain 028 66326693, E-mail gibbjgbb@aol.com (www.loughernerradioclub.co.uk)

24 APRIL - **4TH CHESTERFIELD AMATEUR RADIO RALLY** - Hasland Village Hall, Eastwood Park, Hasland S41 0AY (M1 j29/30). TI S22 (V44) & GB3EE. OT 10am,

This list shows all rallies and events we are aware of as at 1 December 2009. If your rally or event is not listed, TELL US ABOUT IT! Send an e-mail to GB2RS@RSGB.org.uk and your event will appear here and on GB2RS. It's free! Guidelines for submissions: Please let us know your event details as early as possible. If you submit by e–mail (to GB2RS@RSGB.org.uk) then we suggest you set your e–mail program to request a 'read' receipt so you can be sure we've seen the details.

TI Talk-In; CP Car Park; £ Admission; OT Opening time – time for disabled visitors appears first, (eg 10.30/11am); TS Trade Stands; FM Flea Market; CBS Car Boot Sale; B&B Bring and Buy; A Auction; SIG Special Interest Groups; MT Morse tests; MA Foundation Morse Assessments; LB Licensed Bar; C Catering; DF Disabled Facilities; WIN prize draw, raffle; LEC Lectures/Seminars; FAM Family attractions; CS Camp Site.

TS, C. Details by e-mail to rally@chesterfieldrally.com [www.chesterfieldrally.com].

25 APRIL - **ANDOVER RADIO AMATEUR CLUB BOOT SALE** - Wildhern Village Hall and Playing field SP11 0JE (North of Andover) just off the A343. TI S22, CP, £1.50, C, DF. Vendors £6 per boot/table, £8 inside the hall. Details Martin, M0MWS, 01980-612070 [www.arac.org.uk].

25 APRIL - **26TH YEOVIL QRP CONVENTION** - Digby Hall, Hound St, Sherborne, Dorset. Digby Hall adjoins the central shopping car parking. TI S22 (V44), CP, OT 09.30. LEC, TS, B&B, C, DF. Robert, 01935 706715 e-mail robert.farey@btinternet.com [www.yeovil-arc.com].

3 MAY - **DARTMOOR RADIO RALLY** - Tavistock College, Crowndale Rd, Tavistock, Devon, PL19 8DD. OT 1015/1030. TS, B&B, TI S22 (V44), CP, DF, C, FAM. Details Peter, M1AYI, 01822 860277.

14 – 16 MAY - **DAYTON HAMVENTION®** - Hara Arena, Dayton, Ohio, USA. 3 day pass $20/$25 on door. CP, TS, FM, SIG, DF, LEC, C, CBS, WIN. [www.hamvention.org].

6 JUNE - **SPALDING & DARS ANNUAL RALLY** - The Sir John Gleed Technology School, Halmer Gardens, Spalding, Lincs, PE11 2EF. TI S22 (V44), free CP. OT 10.00, TS, C, CBS. John, G4NBR, 0794 630 2815, Graham, G8NWC, 0794 776 4481, e-mail rally-secretary@sdars.org.uk [www.sdars.org.uk].

20 JUNE - **NEWBURY RADIO RALLY AND BOOT SALE** - Newbury Showground, next to M4 J13. Big display area of amateur radio stations, exhibitions, special groups, clubs and societies. TI S22 (V44), free CP, OT 9.00, £2, TS, C, DF, FM, SIG. Sellers have access from 8am and pitches cost £10. Details from rally@nadars.org.uk [www.nadars.org.uk].

25 – 27 JUNE - **HAMTRONIC SHOW, FRIEDRICHSHAFEN** - Messe Friedrichshafen, Germany. TS, FM, CP, SIG, LB, C, DF, LEC, CS. Large RSGB bookstall. [www.hamradio-friedrichshafen.de/html/en].

27 JUNE - **WEST OF ENGLAND RADIO RALLY** - "Cheese & Grain", Bridge Street, Frome, Somerset BA11 1BE. TS, RSGB Books, C, CP, DIS. Contact Shaun, G8VPG, 01225 873 098, e-mail rallymanager@westrally.org.uk [www.westrally.org.uk].

8 AUGUST - **FLIGHT REFUELLING ARS HAMFEST** - Cobham Sports and Social Club Ground, Merley, Nr. Wimborne, Dorset BH21 3AA. Details Mike, M0MJS, 01202 883 479, e-mail hamfest@frars.org.uk [www.frars.org.uk].

15 AUGUST - **FRISKNEY & EAST LINCOLNSHIRE COMMUNICATIONS CLUB RALLY** - The Frisknet Village Hall, Church Road, Friskney, Lincs. 6.5 miles south of Skegness. OT 1000 to 1430, £1.50, CP, C, WIN, TI S22, DIS. Details Bren, 2E0BDS, 01754 820204, e-mail felcc@btinternet.com. [www.felcc.webs.com].

5 SEPTEMBER - **TELFORD HAMFEST** - Enginuity Technology Centre, Coalbrookdale, Telford TF8 7DU. OT 10:30. TI S22 & GB3TF 433.200MHz. TS, SIG, discounted admission to Enginuity Centre. Details from Martyn, G3UKV, 01952 255416 [www.telfordhamfest.co.uk].

CONGRATULATIONS

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

60 years

Mr L M Airey	G3GEJ
Mr AJ Gibbs	VK6PG
Mr J G Houghton	G1KEP
Mr RT Palmer	G3YJJ
Mr W E Waring	G3GGS

50 years

South Birmingham RS	G3OHM
Mr PS Downham	G3WIB
Mr R H Joll	G3OSY
Mr P E Judkins	G3OMJ
Mr J E Kasser	G3ZCZ
Mr GAS Lander	HB9AJU
Mr W J McClintock	G3VPK
Mr A Richards	GW3SFC
Dr A J Shepherd	G3RKK

13 – 18 SEPTEMBER - **THE 15TH WORLD ARDF CHAMPIONSHIPS** - Opatija, Croatia. www.ardf2010.com.

19 SEPTEMBER - **HORNSEA AMATEUR RADIO CLUB RALLY** - Floral Hall, 7 The Esplanade, Hornsea, East Yorks HU18 1NQ. OT 10.30am, CP, TS, B&B, SIG RSGB, RAFARS, LB, C, DF, WIN. Details from Rick, M0CZR by e-mail to R106221@aol.com or Duncan, G3TLI at g3tli@hotmail.co.uk. [www.hornseaarc.co.uk].

26 SEPTEMBER - NEW DATE - **GREAT NORTHERN HAMFEST** - Metrodome Leisure Complex, Barnsley S71 1AN. OT 11.00, DF, TS, SIG, B&B. Details Ernie, G4LUE, 01226 716339.

1 & 2 OCTOBER - **NATIONAL HAMFEST** - brought to you by the RSGB in association with the Lincoln Short Wave Club. George Stephenson Pavillion, Newark and Nottinghamshire Showground, Lincoln Road, Winthorpe, Newark NG24 2NY (close to junction of A1/A46/A17). TS, B&B, CB, C, SIG, Morse proficiency tests on demand, RSGB Bookstall, RSGB Services & Committees, DF, FM.

3 OCTOBER - **AUTUMN MILITARIA & ELECTRONICS & RADIO AMATEUR HANGAR SALE** - Hack Green secret Nuclear Bunker, Nantwich, Cheshire, CW5 8AL. 10am, £2.50. Contact Rod Siebert, 01270 623353 or coldwatr@hackgreen.co.uk [www.hackgreen.co.uk].

8 – 10 OCTOBER - **RSGB CONVENTION** - Full convention programme with lectures for all interests and all levels of technicality. www.rsgb.org/rsgbconvention.

30 & 31 OCTOBER - **NORTH WALES RALLY** - John Bright School, Llandudno. TS, RSGB Bookstall, CP. Details from Liz Cabban, GW0ETU on 01690 710257 or e-mail lizcabban@vodafoneemail.co.uk

SPECIAL EVENT STATIONS FOR JANUARY 2010

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 are kindly provided by Ofcom.

Please note that the QSL Bureau sub-manager for all special event station callsigns (GBxAAAA-GBxZZZ) has recently changed and is now Mrs Davina Williams, M0LXT, 20 Neale Close, Wollaston, Northamptonshire, NN29 7UT, e-mail QSLTREK@hotmail.co.uk, web site www.gb-special-event-qsl-status.webs.com. Will organisers of special event stations please ensure that they lodge plenty of envelopes with M0XLT?

Date	Callsign	Phonetics	Location	Bands	Keeper
01/01/2010	GB0BTC	Belfast Titanic City	Belfast, N.I.	LH	GI0VAB
	GB50RNARS	50 Royal Navy ARS	various until 31/12/10	TLHV27	G3LIK
	GB1RAF	Royal Air Force	Various during 2010	LHV27	G4DQP
	GB2MOP	Museum Of Power	Tanygroes, Ceredigion	LH	GW7EUL
22/01/2010	GB4RNLI	Royal National Lifeboat Institute	Scarborough	LH27	G3YZR
	GB4VK	VK = AR callsign prefix for Australia	Lincoln	LH	G3XZF

RSGB MEMBERS' ADVERTISEMENTS

RSGB members wishing to place an advertisement in this section by post should use the official form printed in RadCom each month and send it to 'Memads', RadCom, RSGB, 3 Abbey Court, Fraser Road, Priory Business Park, Bedford MK44 3WH. No acknowledgement will be sent. Ads not clearly worded, or which do not comply with these conditions will be returned. If an ad is cancelled no refund will be due. An advertisement longer than 60 words will be charged pro rata.

The RSGB believes that it is inappropriate for members trading in whatever way in radio equipment to place members' advertisements. We therefore regret that we are unable to take such advertisements, although we do welcome these in the 'Classified' advertising section of RadCom. The editor reserves the right to refuse any advertisement for any reason. In such matters, the editor's decision is final.

The RSGB accepts no responsibility for errors or omissions, or for the quality of goods for sale or exchange. Each advertisement must be accompanied by the correct remittance, as a credit card payment, cheque or postal order made payable to the Radio Society of Great Britain.

Please note that because this is a subsidised service to members, no correspondence can be entered into. Members may submit one photograph of equipment being sold / wanted at an additional cost of £5.00. This must be a .jpg or .gif file and the file name must be included on the Order Form. The photograph may be e-mailed to radcom@rsgb.org.uk or sent on a floppy disk or CD.

Licensed members are asked to use their callsigns and QTHR, provided their addresses in the current edition of the RSGB Yearbook are correct. RS members will have to provide their names and addresses or telephone numbers. Please include your town and phone number in the free boxes provided to assist readers. Advertisements will be placed in the first available edition. Please do not send Members' Advertisements to Danby Advertising (advertising agents). The closing date for copy is the first day of the month prior to publication, eg the deadline for the May issue is 1 April.

Warning: Members are advised to ensure that the equipment they intend to purchase is not subject to a current hire purchase agreement. The 'purchase' of goods legally owned by a finance company could result in the 'purchaser' losing both the goods and the cash paid. Members' Ads also appear on the members-only website: www.rsgb.org/membersonly/membersads

The Members' Ads order form is published below. If members do not wish to cut the form out of the magazine, photocopies will be accepted, as will recent copies of the form from previous months. As a last resort, members may also send in their advertisements on separate sheets of paper, but if you choose to do this, you must supply an accurate word count and, of course the correct fee in the normal way.

RSGB MEMBERS' ADS ORDER FORM

Application form for one For Sale, Exchange or Wanted advertisement. Do not mix classifications on this form; separate applications must be made.

Please ensure you read and understand the conditions of acceptance of these subsidised Members' Advertisements, printed at the top of the Members' Ads page of RadCom

☐ I enclose a cheque/PO for £ ☐☐.☐☐ p

☐ Please charge to my credit card

Number ☐☐☐☐ ☐☐☐☐ ☐☐☐☐ ☐☐☐☐ ☐☐☐☐

Expiry date ☐☐☐☐

Issue number (Switch only) ☐☐

Name

Signed

Date

Section: ☐ FOR SALE ☐ EXCHANGE ☐ WANTED

RATES: UP TO 20 WORDS £5.50; 21-40, £6.50; 41-60, £7.50
PHOTO (jpg or gif only) ADD £5.00

Free entries

Photo file name (if applicable)

_____ .jpg/gif

Town

E-mail

Phone

CLASSIFIED ADS

Classified advertisements 58p per word (VAT inc.) minimum 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.

Copy to: Chris Danby G0DWV, Danby Advertising, 299 Reepham Road, Hellesdon, Norwich, NR6 5AD Tel: 0870 904 7377 Fax: 0870 904 7378 E-mail: adsales@rsgb.org.uk

Payment to: RSGB, 3 Abbey Court, Priory Business Park, Bedford, MK44 3WH

FOR SALE

ISOLATED DATA INTERFACES for PSK31-SSTV-RTTY-CW-FSK-WSJT etc. ALL PREVIOUS MODELS STILL AVAILABLE, See RSGB Reviews SEPT 09 RADCOM. NEW ISOTERM TRAVELLER KIT AVAILABLE. PAYPAL REGISTERED. www.g3liv.co.uk johnny@melvin.com 0191 2843028

FIBREGLASS TUBE High strength tube, square box, rod, and other sections all from stock in 6m lengths. Engineered Compositions, Chester. Tel: 01244 676000 e. barbara@engineered-composites.co.uk www.engineered-composites.co.uk

PROGRAMMING CABLES for Icom, Motorola, Kenwood, Vertex, Yaesu, Alinco, HYT, Entel, Simoco, Tait, and many other brands at www.radioarena.co.uk Tel. 0845 0942245 info@radioarena.co.uk

GENUS VIZO – 1GB Personal Media Player MP3 & MP4 Video, was £99.95 – clearance special £6.95 Nevada www.nevadaradio.co.uk

ALINCO, ICOM, YAESU, accessories, batteries, cases, microphones and filters, we carry large stocks call 023 9231 3090 or visit www.nevadaradio.co.uk

THIS EQUIPMENT WAS CHERISHED and maintained by my late Father, Harry Dam (G3DAM). Offers are invited on the following items:-Heathkit HL2200 linear amplifier Heathkit HM2103 RF load meter (x2) Icom HF transceiver 756, MJF Versa tuner MFJ969B, Yaesu HF transceiver FT1000MP For further information please call 07710 233676 or email pinpointms@hotmail.com

AERIALS

G4TPH PORTABLE MAGLOOPS QRP & QRO models available Full details at: www.g4tph.com

GROUNDBREAKING PERFORMANCE! New pricing, new band coverage, new compact, innovative design. "That'll be the I-PRO!" www.proantennas.co.uk 01489-789960

M0CVO ANTENNAS HF, VHF and UHF Antennas, fixed or portable Full details at: http://www.m0cvoantennas.webs.com

PORTABLE 2M ANTENNAS from £24.95. The choice of experts. Ideal for SOTA! Details www.sotabeams.co.uk Telephone 01625-425700.

WIRELESS LAN ANTENNAS – 2.4GHz Dipole with Corner reflector, originally £44.95 now £14.95 each, Nevada Telephone: 023 92 313090

CARDS & DESIGN

QSLers 100 full colour cards £24 including Design and Postage, 1000 full colour cards £75 inc Postage, m0dol Chris 24 Westridge, Northampton nn27ra

QSL FACTORY: top quality colour QSL cards. www.qslfactory.com

LOW COST AND HIGH QUALITY QSL cards by LZ1JZ QSL PRINT http://www.LZ1JZ.com

MISCELLANEOUS

CALL IN ON THE 'GOOD NEWS' - CHRISTIAN NETS! Every Sunday morning at 8am on 3747kHz and around 7047 and 144.205 at 3pm, sharing Christian fellowship over the air. For brochure on WACRAL write to 51 Alma Road, Brixham,South Devon, TQ5 8QR, Tel:01803 854504 or derekg3xnx@talktalk.net

ACCOMMODATION NORTH COAST SCOTLAND. Self catering, B&B, camping. Discounts for licensed amateurs. GM4JYB Tel: 01847 851774. Web: www.dunnethead.iberacal.com Email: briansparks@dunnethead.co.uk

EQUIPMENT

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PLANNING SUCCESS

Ian, M0IAA

I just thought I'd write to tell you briefly about my experience with planning for a 40ft trellis tower and beam. I hope it will inspire others to have a go and not be put off by the lengthy and bureaucratic process. Mine was retrospective and I had an almost 50/50 split of support and objections including the Parish and the local council, but despite living in a nice residential area and surrounded on all side by bungalows, it was passed yesterday and to say I'm over the moon is an understatement. Most of my friends admitted later they didn't think it would pass. All I can say is thanks to everyone who supported me, including Len Paget and the other people from the RSGB planning team. I've definitely got a smile back on my face and looking forward to working lots of DX. So don't wait, get that application in for that aerial you've always dreamed of!

SAVING GRACE

Ryan Pike, G5CL

In May 2008, I was involved in a nasty accident, leaving me with a spinal injury which has resulted in a lack of feeling in one leg and my right hand. Having been unable to work since then and with limited mobility, my days could have been consigned to tedium if it were not for the many amateurs around the world, especially in this country, who have occupied my time on the key.

After the family has gone to work and school at 7.30am each day, I consign myself to the shack and see how many people I can have a chat with using only QRP power levels from my humble equipment. Each day I log many QSOs all of which occupy my time and take away vast hours of boredom, which would literally drive me spare if I did not have this hobby. I have also been amazed at the amount of DX that you can work with paltry power levels – providing your antenna if efficient, don't be afraid and join that pile up, as it really is remarkable when you can break through the QRO stations to someone over 5000 miles away!

My thanks to all of those people – especially those of the G QRP club – who really have given me a new lease of life in pretty poor and painful times (even though my CW might be a bit shaky at times!).

CONTESTS

Gordon Brown, G3MZV

The Sport Radio article in December 2009 *RadCom* suggests growth in the number of stations participating in UKAC events. It would be much more informative if the article gave actual figures for events but it didn't so I had to do my own research. Briefly looking through results from UKAC HF events for the past three years (2006, 7 & 8) show the number of UK stations participating fairly static. The number of overseas stations participating may well produce figures suggested in the article but surely we should be more concerned with the number of UK participants.

Since the UK maximum power level increased from 150 watts I have entered no RSGB events because my 100 watts is not competitive. Many overseas organisations have low power sections, normally up to 100 watts, and that is where I can compete on equal terms.

For a newly licensed amateur to enter his/her first contest and see how their 100W stands up against kW linears is so discouraging I doubt if they want to continue. Yes there are many kW plus linears available in the UK – how many of the users of these stick to the UK limit of 400W? One must surely wonder why people spend so much on linears that are capable of running three or four times the legal limit when many hundreds of pounds can be saved by buying something more modest and legal.

CQWW

Trev Harris, G2KF

Having spoken today to Rex, ZL4IV, he commented that during the weekend of the CQ WW contest, he and a great number of ZL and VK stations were only working a few of the huge number of people who entered this contest. Rex told me the only way he could hear and be heard was to beam south away from the activity to null the huge levels of QRM. Only the very few were smart enough to catch on to what was happening.

If only more people were to have thought about VK/ZL over the old timer path (ZS) during daylight, the points gained would have been huge. Calling for hours from ZL/VK could not break into the QRM levels, even though signals were 59+10dB and more on receive. Maybe next year with this information from ZL4IV lessons will be learnt and a great many points gained by all.

SUNDAY NET

Colin Ashman, M3JCA

It is with sadness that I have to write this letter to say sorry to all the SWLs that listen to the Sunday morning net that I run on 80m. There are most weeks over 20 stations that join the net from all over the UK and Ireland. We have to put up with contest stations, tuners and whistlers but this morning when I was running the finals two German Stations started transmitting on the same frequency, I held the net up and asked them politely to QSY, they just laughed and started playing an organ, dit dit dit dah, dit dit dit dah, every time I called in the next station. At the end of the net I called the station in Germany and asked him to explain his behaviour, he said that they were transmitting from a club station and wanted to use the frequency to transmit their news.

I told him that his behaviour was a disgrace to amateur radio and that as a club station he should know better, with that he laughed and carried on.

May I ask through your pages that at this time of the year, let us all remember that radio is a great hobby, no one owns a particular frequency. Ask everyone to listen before they transmit and ask yourself, is what I am about to do, going to upset a fellow radio amateur?

May I wish you all a very Happy New Year.

INTERFERENCE

Jonathan Kempster, MIBS, M5AEO

Congratulations to the RSGB on taking action against Ofcom's stance on PLA interference. This technology is the greatest threat to amateur radio in recent years. The RSGB is doing exactly what it is there for and this action alone justifies my membership subscription as far as I'm concerned.

John Randall, M0ELS

I am surprised to see that some people are having problem with QRM and Ofcom. I had reason last week to call on Ofcom to investigate some QRM that has appeared across the whole HF spectrum, right into the microwave bands as well as the aircraft, MW, LW and FM bands. Being mainly a microwave operator, the QRM has put an end to any chance of EME work on 23cm.

Ofcom have been very helpful and after a phone call and filling in the online complaints form, I had several calls back and a date set for a visit by their engineer. By the time this goes to print, it should all be dusted and fixed.

If you are interested, a pdf and an audio file are on the Members Only section of the website for others to see and hear this QRM.

SOURCE OF INSPIRATION

Mike, M0AZE

Congratulations to all at *RadCom*, it is remains an important life line of information to us members and is a constant source of inspiration. It proves that the hobby has interests to satisfy most; aerials, power supplies, IOTA, with an even sprinkling of the most technical of topics. In last month's issue there is a Last Word on Happy Backpacking, what a way to combine the great outdoors with the hobby (contest or not). It also proves that you do not have to spend money on the latest and greatest to get out and about.

My fellow hams are a constant source of inspiration and they impart information freely for no personal gain. I have been interested in working /P and obtained a QRP set and oh what delight. Visiting an local high spot near my home QTH (Barr Beacon, north of Birmingham) I met a few like minded hams who shared their experiences and knowledge with me and opened my eyes to how much fun portable working can be. I am well down the road of collecting materials from the recent National Hamfest and I intend to spend the winter months building some additional portable aerials so I can operate on more bands with my 2.5 watts.

Thank you all at *RadCom* and more importantly thanks to all those contributors

who take the time and effort to impart their knowledge in the hope that someone somewhere might be interested. I am.

THE COMPUTER - THE AUTHORITY

Alan Levett, G8HCJ

Some 80 or so years ago saw the death (I had hoped) of 'The Authority' in the electronics industry with the discovery of Negative Resistance in tetrode valves. 'Authority' was not consulted as to the existence of Negative Resistance and would no doubt have pronounced it as 'misinterpretation of readings' or 'Fraudulent'. Instead, word spread and experimenters started creating oscillators, etc based upon Negative Resistance.

In December's *RadCom*, Peter Dodd, writing in Antennas, relates how he was taken to task by an 'Authority' over published test results of an aerial design of his, insisting that the results were meaningless because the computer said so!

Over 40 years ago, I was taught that a computer was a super-moronic device (and isn't it just!), doing exactly what it was told to do and not what you thought you had told it to do - the term GIGO (Garbage In Garbage Out) was instilled into me. And that is exactly what Peter Dodds' correspondent had not taken on board - that the program he was using did exactly what its author had told it to do. Unfortunately, the computer is becoming Holy; The Authority; when it is only as good as the programmer.

For the most trusted measurements of aerial performance, the distant assistant and a couple of watts cannot be beaten; also a reference to Antennex may be helpful. For a solo DIY method, see F C Judd, G2BCX, in Out of Thin Air - Test Set.

GERMAN CALLSIGNS

Eddi, DK3UZ

Further to Norbert's, DL6VN letter I'd like to stress the fact that DOKs are never used for identification. They are but another piece of information passed along like signal report, location, name and so on.

VOLUNTARY INTERCEPTORS

Bob King, G3ASE

I believe there are some of our members who are unaware of the vital part radio amateurs played, using their specialist skills assisting in the successful outcome of the 1939-1946 war. A better account would be harder to find than in *RadCom* November 1946 page 38.

For those who have lost their copy I may say briefly that we exposed and controlled, through wireless, the German Abwehr (the secret intelligence services including the Gestapo communications). We managed the wireless control of the double agents used to mislead the enemy especially on D-Day. Perhaps the most remarkable activity was that nearly 2,000 radio amateurs were intercepting the German secret services, in their own homes in the midst of their families yet no questions were asked and no one but the amateur concerned knew that anything unusual was going on.

They were known as Voluntary Interceptors (VIs) and the coded messages were sent to Bletchley Park for deciphering. Many went on to serve full-time in the Radio Security Service as I did for five years after one year as a VI.

Those surviving have been recognised, belatedly, with a badge, a commemoration medal and a thank you from the Prime Minister.

EXCELLENT DESIGN

Bruce Sutherland, M0CVP

Congratulations to Kim Meyern for the excellent cover picture for the December *RadCom*. A deceptively simple but elegant design. What a pity this design wasn't made available to members as a Christmas card. Maybe next year?

QSL CARDS

Colin Ranson, G8LBS

After reading QSL Bureau News in November *RadCom* with reference to the G8AAA - G8ZZZ series I decided to take a quick look at Dave Helliwell's website and make sure I still had enough envelopes with him. Thankfully I still had a couple with him but I was appalled at the huge number of cards awaiting envelopes from G8 callsigns who had either forgotten to submit enough envelopes and postage or had probably never ever done so.

G6FSP and the other QSL Bureau volunteers do a wonderful job and I would like to personally thank them. I would urge G8's and others to get their SAEs into their respective managers and collect their cards, after all, as the column said… you do not have to be an RSGB member to receive cards. Just a reminder perhaps that a C5 envelope with a first class stamp (39p) will get you quite few cards returned, remembering that it will be no more than 100grams in weight and no more than 5mm thick.

Name & Address Withheld

Have you noticed that the number of QSL cards received from the RSGB bureau seems to have increased lately? I have just received 170 cards; these take a long time to reply to. To be honest most of these cards are unwanted, they only end up in the shoebox. I seem to be getting QSL request from some operators for each and every QSO.

Why do some need all these cards? I only need one card from each station; this must be creating a lot of work and expense for the bureau.

One reason may be the increased use of label printing software; this seems to encourage the printing of all QSOs in the log. While I would like to continue use of the bureau for DX cards I cannot, it seems it is all or nothing!

CHANGES, CHANGES, CHANGES

John B Tuke, GM3BST

When I first put my hand to a Morse key in earnest, on what was at that time a good sized passenger liner, the other end of the line was keying a rotary spark transmitter on 600 metres. Now I see it is suggested that on this frequency we should use WSPR. Are we just not going a little bit away from the point of communicating on this band?

Amateur radio has always been about communication between individuals or groups of people whatever frequency might be in use. At first the purpose of the communication was between the ship and the harbour master, to improve arrival in dock. As the efficiency and range of the equipment improved it was used for all types of traffic between land and sea and served its purpose well. But it was essentially between people.

600 metres is very much an archaic band – here in UK we have been permitted to use it for amateur communication, a facility which is by no means being granted universally. It is much the same position as an old building which has been 'listed'. For one reason or another, that building is considered to be a valuable part of our heritage and as such you are not allowed to alter the external (and sometimes the internal) structure and appearance.

For so many years and is so many critical instances 600m has been used to pass vital information from one individual to another and now we are seeing the suggestion that digital systems might be employed instead of the Morse code, some of which do not require human assistance to complete the contact.

We have 3kHz to play about with. Certainly digital systems occupy very little space, and this would seem to be in their favour. RTTY and PSK do at least require someone at each end but other systems such as WSPR are largely automatic. We have to consider that Morse code may well in time die out almost completely – if 600m was CW only, it would keep alive an old system that served well for a very long period.

OK, I am old, reactionary, 'past it' and should be consigned to the recycle bin, I know all that. But surely there is a case for a 'listed building' type band where communication is only by Morse and between individual people. Many of us get frustrated on the telephone with the auto voice that keeps telling us to 'press one for this' and 'press two for something else'.

Let's consider keeping something alive reminiscent of earlier days. We have preserved railways, vintage car societies etc, why not a preserved communication band?

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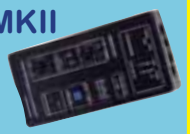

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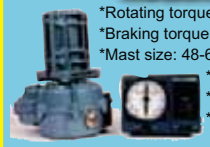

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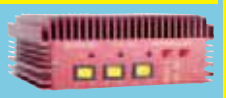

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The World's Biggest Selling Virtual Radar System

- Full 3D Google Maps integration – since 2007!
- Now includes Real-Time Data feed, no five minute delay
- Monitor ACARS and Mode-S / ADS-B in one small compact unit
- Now with built-in Airband and FM receiver controlled via your PC
- Easy to install
- Connect to laptop/desktop PC running XP or Vista
- Powerful SBS-1 BaseStation software included
- Package includes all necessary components to connect to your PC
- Small form factor – only 130mm x 95mm x 25mm
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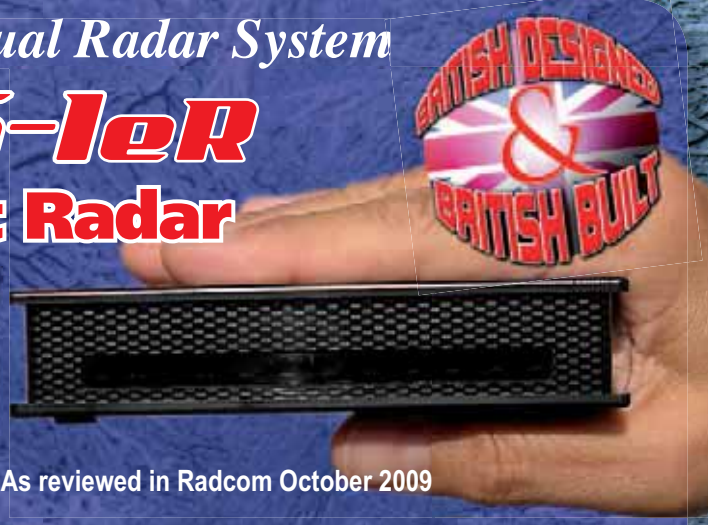
- Better than 3dB increase in sensitivity than original SBS-1
- Up to 20% more aircraft viewable on screen**
- Ethernet built-in as standard
- RS-232 Interface built-in for external receiver control
- Ultra low current consumption, less than 100mA via USB, 200mA with Ethernet enabled

* Real Time Virtual Radar ** Under multiple test conditions

SBS-1eR Pocket Radar

Now includes built-in Airband & FM!

£469.95



As reviewed in Radcom October 2009

The Fourth Generation of the World's best selling Real Time Virtual Radar, (by a massive margin) was officially announced by Kinetic on May the 11th, 2009. Identical in looks, size and shape to its predecessor, the new "er" prefix offers the user a BUILT-IN AIR BAND RECEIVER with additional FM Band (76-108MHz) coverage, controlled via your PC. The only distinguishing alterations to the new SBS-1er is an additional SMA antenna socket on the rear panel for the built in high performance receiver and the loss of the Ethernet power switch which is now automatic.Supplied complete with antenna and BaseStation Virtual Radar software. The SBS-1eR Pocket Radar allows you to track ADS-B aircraft on a PC- simulated radar screen and identifies and displays Mode-S equipped aircraft.

VENTUS G730 GPS-LOGGER

This USB memory stick sized unit is a fascinating pocket device with multiple commercial and personal uses for individual movement tracking. It's very light, extremely easy to use and logs your route automatically. It also adds your GPS location to digital pictures. It presents the route you have taken in 3D via Google Earth™ on your PC and it can export in different formats.

An example:

At the start of your walk, car or cycle ride turn on the G730 and when you finish your journey, turn it off. Once home plug the G730 into your PC, open the software, click on two icons and the route and pictures you have taken are viewed on Google earth/maps.

The G730 records your speed, altitude, distance etc., even showing how long you have stopped for during your journey. You can even use your digital images taken on route for future reference. How good is that!

Accuracy is to within 5 metres and you get up to 18 hours continuous use after a 2 hour charge via your USB port on your PC. Use the MyDEL VENTUS GPS-logger for cycling, rambling, jogging, skiing, trekking, sailing etc.

VENTUS WX-831

Introducing the next level of professional weather stations

This new much improved wireless Weather Station is built to a very high standard and even includes O-Ring seals on battery compartments that are mounted externally. The quality of external hardware is built to last for years and really moves the game on when it comes to "Professional Weather Stations"

RRP £169.95.
Introductory offer of only £99.95.
Options: Additional wireless temperature monitors: £24.95. PSU to run the WX-831 from 240V: £19.95

Specifications
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Bar charts
Trend indicators
Dew Point
Heat Index
In/Out Temperature
Radio Controlled clock
Humidity
Calendar
Alarm
Blue backlight
Extra channels for additional sensors

ONLY £99.95

Mini VNA PC Controlled Antenna Analyser

The mRS miniVNA is a compact 100kHz to 180MHz antenna analyser interface that is operated via a PC powered by a single USB connection. You can see at a glance where the antenna is resonant, what the SWR and the return loss is. The best (minimal) SWR frequency is automatically found and displayed. An optional internal RS232 connection is also available.

E&EO