RadCom

THE RADIO SOCIETY OF GREAT BRITAIN MEMBERS' MAGAZINE. WWW.RSGB.ORG

APRIL 2011
VOLUME 87
NUMBER 04

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Bumper review issue

World exclusive: Peter Hart previews the Icom IC-9100

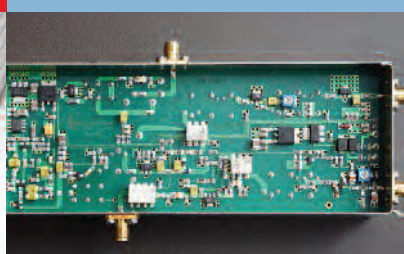
0411

Alpin 100
Kilowatt-plus linear

AnyTone AT-5189
4m mobile from MyDEL

Flex-1500
Software defined transceiver

Kuhne MKU 432 G2
70cm to 10m transverter



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KENWOOD Amazing TS-590S!

"equal to the best radios available, but at a fraction of the price"
says RadCom Review Jan. 2011.

160m - 6m with superb receiver inc. dual roofing filters, Auto ATU, 32 bit f/p DSP & USB PC connection. **£1369.95 D**

NEW TH-D72E JUST ARRIVED!

The very latest handheld from Kenwood is a dual bander with GPS, APRS and TNC capability. The TH-D72 has a built-in SiRF Star III GPS receiver and its antenna, so that you can enjoy various GPS functions with the radio stand-alone. You also can output its GPS data (NMEA-0183) to a PC through the USB port. You can even operate dual receive on the same band.

£426.95 D

TS-480 Transceiver GREAT PRICES!

TS-480SAT	HF-6m 100W with remote head & ATU	**£779 D**
TS-480HX	HF-6m with remote head and 200W!	**£879 D**

TS-2000 Series GREAT PRICES!

A great choice for everything in one box from HF-70cms!

TS-2000E	100W 6m/2m/70cm + DSP & ATU	**£1549 D**
TS-2000X	As Above + 23cm 10W	**£1799 D**

VHF Mobiles & Handhelds

TM-V71E	Dual band mobile with echo link	**£289.95 D**
TM-271E	2m FM with mighty 60W output	**£165.95 D**
TM-D710E	Dual band mobile 50W with APRS	**£445.95 D**
TH-F7E	2m/70cm 5W SMA +FREE Clip Mic	**£236.95 D**
TH-K2E	2m 5W 4-Key Keypad SMA + FREE Headset	**£163.95 D**
TH-K2ET	2m 5W 16-Key Keypad SMA + FREE Headset	**£172.95 D**
TH-K4E	70cm 5W SMA + FREE Headset	**£163.95 D**

ICOM

Thinking of buying an Icom Radio?
Then why not trade in that old "boat anchor" radio! We even take dead ones. Call us today and reduce your cost!

IC-7600 HF-6m 100W

Take a closer look!
This HF-6m transceiver is the successor to the IC-756 series. It takes features from the flagship IC-7800 and the more recent IC-7700, putting them into a package that brings the price within reach of many more hams. The central display is pure joy with its easy to read & informative screen.

+ FREE USB keyboard! **£3295 D**

IC-7800	Deluxe HF / 50MHz All-Mode 200W Transceiver	**£8995 D**
IC-7700	1.8-54MHz 200W with built-in PSK-31 + keyboard	**£5999 D**
IC-7000	160m-70cm 100W (hf) Mobile, portable or base station	**£1189 D**
IC-718	160m-10m 100W transceiver that brings HF to those on a budget	**£595 D**

IC-7200 HF-6m 100W

The IC-7200is a robust transceiver with some nice touches for the price. You get a 6kHz roofing filter and a receiver that goes from 30kHz - 60MHz! You even get DSP digital filtering! If you are looking for a great deal, this should be on your list. We love it.

£839.95 D

VHF Mobiles & Handhelds

^IC-E80D

IC-E80D	NEW 2m/70cm handheld + DStar & GPS	**£319.95 D**
IC-T70E	NEW Dual band 2m/70cm handheld	**£154.95 D**
IC-V80E	2m 5W handheld	**£99.95 D**
IC-E90	Triple band 6m/2m/70cm handheld	**£239.95 D**
IC-E92D	Dual band 2m/70cm handheld fitted D-Star	**£384.95 D**
ID-E880	NEW Dual 2m/70cm mobile + D-Star/GPS	**£439.96 D**
IC-E2820	Dual band 2m/70cm 50/50W mobile	**£489.96 D**
IC-E2820+	Dual band mobile fitted with D-Star	**£699.95 D**
IC-910H	Dual band 2m/70cm base station 12V	**£1295.95 D**
IC-910HX	Triple band base station 2m/70/23cm 12V	**£1549.95 D**

NEW ICOM IC-9100 ALL-ROUNDER

HF to 23cms Base Transceiver

*** As Reviewed In This Issue! ***

HF/6m/2m	100W
70cm	75W
23cm (option)	10W

Satellite Mode Operation:
Optional D-Star DV Mode.

In Stock Now! Call For Price

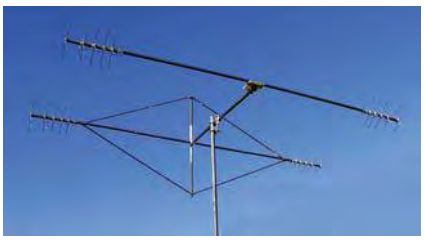
SD330 Mobile "Screwdriver"

DIAMOND ANTENNA

- *Length: Approx. 1.85m*
- *Weight: Approx. 1.1kg*
- *Frequency: 3.5-30MHz*
- *Max. Power Rating: 200W (SSB)*
- *Impedance: 50Ω*
- *SWR: Less than 2.0*
- *Connector: SO-239*
- *Type: 1/4 wave center loading*
- *Power Supply: DC 12V 100mA voltage & current*
- *Up-Down Time: approx. 50 sec. (3.5→30MHz), approx. 20 sec. (7→30MHz)*

£449.95 D

TGM Comms Compact Multi-Band Beam Antennas



If you have a small garden, then this is the answer. These compact beams will fit most locations. Auto switching, small size and easy to erect.

MQ-26SR £639.95 D
Bands: 10,12,15,17,20 Meters
Fwd. Gain 10m-6dBd,12m-5.8dBd, 15m-5.8.0 dBd, 17m-5.4dBd,20M-5.0 dBd.
Power Rating: 1200 Watts P.E.P
Feed 50 Ohm Coax.
Front to Back Ratio: 12 to 20 dBd
El. Length:11 Ft 9 inches Boom 4 1/2 Ft
Turning Radius: 6 Ft 8 inches
Wind Loading: 2.0 Sq. Ft. Survival: 75MPH

MQ-24SR £539.95 D
This antenna is similar but covers 6-10-15-20m.

B-245 £949.95 D
10-15-17-20-40m 2 el. 21ft el. 10ft Boom.

YouKits FROM CHINA

W&S Appointed sole distributors of the first YouKits HF Transceivers

HB-1A-MK3 5W Transceiver

HB-1A-MK3-40-20 40m / 20m Model
HB-1A-MK3-30-20 30m / 20m Model

Completely self-contained CW transceiver with LCD digital readout and great performance - Look at the Price!

£199.95 D

Provisional Specification:

40 & 20m or 40 & 40m (2 models)	Full band coverage
Tx: CW	**Rx:** SSB CW & AM
Filters	Crystal for CW & SSB
Keyer	Built-in
Power Out	3W dry cells 5W 13.8v
Memories	20 Channels
Volts	9 - 14V
Current	Tx 950mA max on Rx 55mA
Internal	8 x AA cells
External	13.8v
Tuning Steps	100kHz - 10Hz
Size	140 x 95 x 35 (mm)
Ready Built	

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

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Receiver 9kHz - 49.995MHz

"It out-performed my 100dB HP Spectrum Analyser"

Meet the new industry standard receiver for serious HF work. Just plug into your PC USB port for a new experience in sensitivity and dynamic range. No hardware design can match the way that signals are extracted, demodulated and both visually and audibly reproduced. Serious DXer or casual operator, you will be amazed. **£649.95 D**

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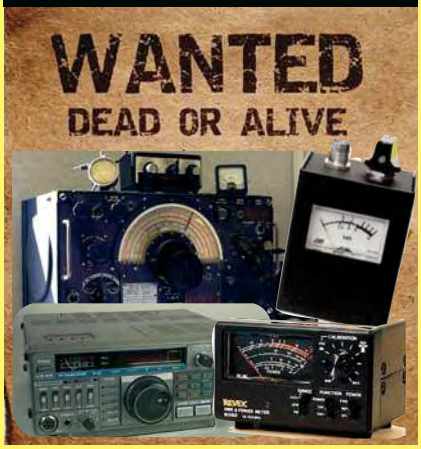

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or e-mail sales@wsplc.com

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VC-300D Antenna Tuner with Electronic PEP Meter & Dummy Load

Made under the MFJ Banner, these ATUs represent great value with an alternative finish. It covers 1.8 - 30MHz and handles 150w continuous and 300W PEP. It will match coax, balanced line and end fed wires. There is an antenna selector switch and cross needle power / VSWR meter. To the right of the meter is a digital bargraph that can be user calibrated to measure true PEP. External 12v needed for this feature.

£219.95 D

VEC-254

High quality classroom morse code oscillator that makes copy easier and more comfortable.

£102.95 D

VC-300DLP

Exactly the same as the VC-300D but without the digital PEP meter.

£184.95 D

TOKYO HY-POWER
HL-100BDX
Ideal Linear For Yaesu FT-817!

100W Linear Amp 3.5 - 50MHz. Great for FT-817!

This is a high performance linear amplifier that can be driven from 5 Watts (or 10W sitchable). Tx/Rx is by RF sensing or wired to PTT. Manual band switch or Auto with FT-817.

£559.95 D

We Are Officially The World's Largest MFJ Dealer!

MFJ-618
Received Audio Enhancer

Hearing Problem? Check this out!

There can be two types of receiver audio problems. The first is QRM and hetrodynes, the second is the human form where certain frequencies need to be adjusted to compensate. This unit deals with both! Accepts audio from two receivers and output in mono or stereo.

£219.95 D

Bonito Software
RadioCom-6

The All-in-One software for rig control (1 or 2 radios), DSP filtering and data decoding. This is the market leader for those who operate data modes. Check our web site.

£189.95 C

W2IHY USA
W2-EQPLUS

The famous **EQplus** gives you EQ (audio equalisation) control, high quality compression and noise reduction, for Big Signal you can be proud of. **£349.95 C**

W2-Edge This is a stand alone multi channel EQ that can also be used as an add-on to the EQplus. **£269.95 C**

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Grants Pass, Oregon

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SignaLink USB

* FCC Class B Certified
* Built-in Low-noise Sound Card
* Simple Installation and Setup
* Complete Radio Isolation
* USB Port Powered
* Works with virtually ALL Radios
* Uses Mic, Data, or Accy Port
* Supports virtually All Soundcards
* Digital and Voice Modes

SL-USB-13PDI	13 pin DIN for Icom	£94.95 C
SL-USB-13PDK	13 pin DIN for Kenwood	£94.95 C
SL-USB-5PD	5 pin DIN cable	£89.95 C
SL-USB-6PMD	16 pin mini DIN	£89.95 C
SL-USB-8PD	8 pin DIN cable	£89.95 C
SL-USB-8R	8 pin round mic cable	£89.95 C
SL-USB-NC	Unterminated radio cable	£89.95 C
SL-USB-RJ-11	Terminated RJ11 cable	£89.95 C
SL-USB-RJ-45	Terminated RJ-45 cable	£89.95 C

Microset MastHead Amplifiers

How much signal are you losing on the coax? More than you think! A masthead pre-amp eliminates that loss and adds a bit as well!

Imported by us direct from Italy

PR-145A	2m 100W pass 0.9dB 18dB gain	£121.95 C
PRH-145A	2m 500W pass 0.9db 20dB gain	£204.95 C
PR-430A	70cms 100W pass 1.2dB 16dB gain	£152.95 C
PRH-430A	70cms 500W pass 1.3dB 20dB gain	£234.95 C
PR-2B	2m/70cms dual band 100W pass	£224.95 C

HEIL SOUND
Bob Heil's Pro-Set-6

NEW

The new Pro-Set-6 headset offers a complete new way of operation with its comfortable headset and adjustable boom mic. giving hands-free operation. But why the Pro-Set 6?

Many of todays modern radios now have EQ (equalisation) controls which allows you to finely tune the mic. preamplifier audio response to match your voice and your method of working. Bob Heil recognises this and has designed a wide response mic. insert that gives you the freedom twiddle those knobs in your transceiver and adjust the response to suit your needs.

Pro-Set-6 £144.95 C
AD-1 Rig adaptor leads £18.95 C

Yaesu HF Linear Amplifier
Yaesu QUADRA Bargain!

1kW Solid State

This amplifier is in immaculate condition, and boxed. It has had very little use and comes just as it would from the factory. If you are looking for a solid state linear that gives 1kW with ease and quietly, this may be what you want. **SAVE £900** on new price!
ONE ONLY! **£3499 D**

Vibroplex Morse Keys

UK Distributors

V-CM
A compact straight key with super movement.
£59.95 C

V-CW
High quality iambic key in the style of Vibroplex
£149.95 C

Butternut Vertical Antennas

These antennas are extremely efficient and use no traps. The large, air-spaced coils are the secret, and resonant adjustments can be made at ground level.

HF-2V 80, 40m DX vertical. 9.75m, Easy erect. **£299.95 D**
HF-6V 80,40,30,20,15,10m self support 7.9m **£399.95 D**
HF-9V As HF-6V but adds 17,12 & 6m. 7.9m **£449.95 D**

Watson Cross Needle Meters

High quality, accurate VSWR meters with large, clear display featuring X-needle movements.

WCN-200 **£69.95 C**
* 1.8 - 160MHz * 0 - 30 / 300 / 3000W
* 600W max above 30MHz * 2x SO-239

WCN-400 **£69.95 C**
* 140 - 525MHz * 0 - 30 / 300 / 600W
* 2x SO-239

WCN-600 **£89.95 C**
** 1.8 - 525MHz * 0 - 30 / 300 / 3000W*
** 600W max above 30MHz * 2x SO-239*

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

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The Fabulous FT-DX5000

All prices subject to approx 2% Increase on 1st February

The FT-DX5000 Series HF/50 MHz 200 Watt Transceivers are a new Premium Class of Yaesu radios with 2 Independent Receivers plus many unique options and accessories designed to meet the Performance Requirements of even the most demanding serious Amateur Radio operator.

FT-DX5000	The basic 200W transceiver	**£4339.95 D**
FT-DX5000D	Adds SM-5000 SMP station Monitor	**£4795.95 D**
FT-DX5000MP	Adds above + 300Hz Roofing Filter	**£5295.95 D**

The most exciting radio this year. It embodies Yaesu's latest technology receiver performance and operating convenience very much at the forefront! This radio will carve a milestone in ham radio. Performance like this does not come cheap, but as an investment it is an absolute bargain. Available in three flavours, This new range embodies many features developed by Yaesu for their top range models - all with 200 Watts output! Features include:Internal PSU, Two independent receivers, Amazing 3rd order IP3, Sharp roofing filters, 32 bit floating point DSP, Variable Audio Filter, Separate IF out (9MHz), and a host of user friendly features and programmable functions.

The FT-2000

NEW LOW PRICE!

This radio needs no introduction. Covering 160m to 6m, it is the favourite of contesters and DXpeditions. Available as 100 Watt or 200 Watt version.

"When I switch my FT-2000 on I never cease to be amazed at what this radio offers in terms of value for money. I love the filtes and the variable IF - it always seems to be able to pull the weakest of signals out of the noise. For me it is both my DX machine and chat box - you guessed it, I love it."

FT-2000	100W 160m - 6m	Was ~~£2299.95~~	**NOW £1999.95 D**
FT-2000D	200W with AC PSU	Was ~~£2899.95~~	**NOW £2599.95 D**

Special Offers!

Add **MD-200** Desk Microphone for Under Half Price!	**Just £105**	RRP £234.95
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The FT-450D

NEW

* *300Hz CW Filter*
* *New Hand Mic*
* *New Main Dial & VFO Knobs*
* *Key Illumination*
* *Feet*

New and improved version of the FT-450AT.

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FT-450 £639.95 D

The FT-857D

FT-857D - Mobile transceiver or base station, this compact radio with detachable front panel. Up to 100 Watts output and coverage from 160m - 70cms, makes this a great buy. **£679.95 D**

The FT-950

The FT-950 is an advanced class base station transceiverinc 6m, 3 roofing filters and intennal ATU.

£1199.95 D

The FT-897D

Very compact portable transceiver 100W radio from 160m - 70cms. You can even run it at 20W from optional internal batteries. DSP & memory electronic keyer inc. Ideal one-man expedition radio. **£779.95 D**

VHF-UHF Mobiles & Handhelds

Exclusive Mobile Offer! Get a free extension cable kit with some mobile models!

^ FT-1900E

^ FT-7900E

^ FT-8900R

FTM-350E	SPECIAL PRICE 2m/70cm Mobile + Bluetooth GPS APRS		**£479.95 D**
FTM-10SE	50/40W 2m/70cms stereo FM Mobile		**£309.95 D**
FT-1900E	NEW 2m Mobile 65W		**£129.95 D**
FT-2900E	NEW 2m Mobile 75W		**£139.95 D**
FT-7900E	NEW 2m/70cm Dualband Mobile 50/45W	**+ FREE YSK-7800**	**£239.95 D**
FT-8800E	Dualband Mobile 50W / 30W		**£329.95 D**
FT-8900R	10/6/2m & 70cm Mobile	**+ FREE YSK-8900**	**£369.95 D**
VX-3E	2m / 70cm Handheld Wideband receive	**+ FREE Case**	**£159.95 D**
VX-7R	Waterproof dualband handy (silver / black)	**+ FREE Case**	**£289.95 C**
VX-6E	2m/70cms handy, 5W Wideband Receive	**+ FREE Case**	**£238.95 C**
FT-60E	2m/70cms, 5W handy Wideband Receive		**£179.95 C**

The FT-817ND

160m - 70cms with 2.5W on internal battery and 5W out when connected to external 12V. SSB CW FM AM - all in a diminutive portable package. Comes with VHF/UHF whip and charger. Switchable BNC (front) or SO-239 (rear).

£509.95 D

The VX-8 Handheld Series

VX-8DE Triple Band

The VX-8DE 5W Triple Bander offers Bluetooth Hands-Free Operation with GPS/APRS and Real RF-Dual Wideband Receive from 500kHz - 1GHz FM & AM. The next generation Amateur Hand-held transceiver from Yaesu, who has been introducing Leading-Edge Transceiver Technology for years. Shower proof and shock proof. **£369.95 C**

VX-8GE Dual Band

- *Smart Beaconing ™ Function: beacon timing is automatically adjusted to your traveling speed & location.*
- *Station List memories increased from 40 to 50.*
- *APRS Message memories increased from 20 to 30.*
- *DIGI-PATH route indication function .*
- *Head up compass display to the GPS Screen*

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RadCom

THE RADIO SOCIETY OF GREAT BRITAIN'S MEMBERS' MAGAZINE

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The new Icom IC-9100 HF-23cm all mode + D-STAR radio. Photo courtesy Icom UK.

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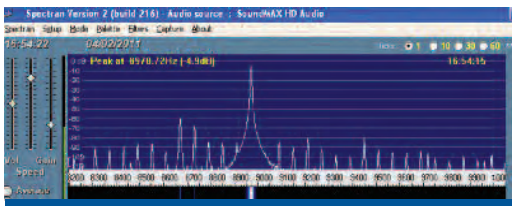

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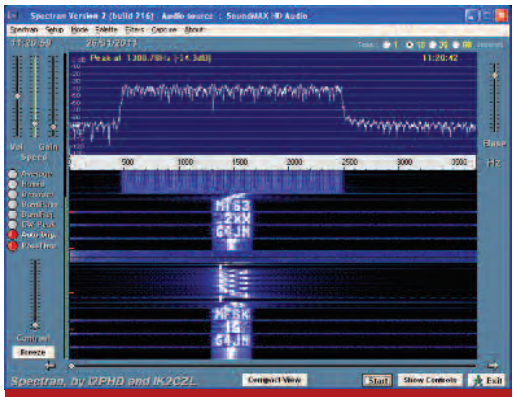

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RADIO SOCIETY OF GREAT BRITAIN

THE NATIONAL SOCIETY WHICH REPRESENTS UK RADIO AMATEURS

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Member society of the
International Amateur Radio Union

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K A Wilson, M1CNY - Region 3
H Scrivens, G0UGE - Region 4
Vaughan Ravenscroft, M0VRR - Region 5
M Harper, MW1MDH - Region 6
J Sneddon, MW0EQL - Region 7
P Lowrie, MI5JYK - Region 8
A Johnston, G8ROG - Region 9
G Keegan, G6DGK - Region 10
P Helliwell, G7SME - Region 11
Neil Whiteside, G4HUN - Region 12
J Stevenson, G0EJQ - Region 13

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

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Website: www.rsgb.org
Members Area: www.rsgb.org/membersonly
Log-in using your callsign in lower case as the user name, and your membership number without the leading zeros (see *RadCom* address label) as the password.

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

2011 AGM

Due to unforeseen circumstances it has proved necessary to defer the Society's AGM, which had been planned for Saturday 16 April 2011. This is for reasons outside the Society's control. The AGM will now take place on Saturday 14 May 2011 in Derby. The calling notice for the AGM is shown on this page.

QSL Matters

DESPATCHES. This month, Canada, Germany, Italy, Japan, Poland and Spain were sent 10kg boxes, with Colombia, Jordan, South Korea, Mongolia and Panama being sent 5kg or smaller packages.

QSL CARDS ARE DEAD? To misquote Mark Twain… "Reports of the death of QSL cards have been grossly exaggerated". We have been saying for some time that QSLing is on the increase. Our estimate is around 14%, partly we think due to discontentment with electronic alternatives, the increased use of computer logging and improving conditions.

Feedback tells us that more cards are being collected and that this column is playing a part in raising the profile of this aspect of the hobby.

Now comes confirmation from our sister bureau at the ARRL that their cards are up by around 16% and DXCC applications are up by around 13%.

QSL MANAGERS. G1 & G2 Manager Anthony, RS94177 tells us that following recent postal increases that he has some 250 envelopes with money value stamps that cannot be used. Some are quite old. Members are advised to use stamps marked, 'First' or 'Second' Class and not monetary values as the former will be honoured when prices change.

So, if you might have under-stamped envelopes, or still want those cards, or even if you don't, the message is clear; contact your hard working, volunteer manager – he/she is trying to help you!

Tony, G4ZIB added the small group of G4Y callsigns to his portfolio last year and is asking where all the Y's gone have? He has uncollected cards but few responses to his enquiries. If that includes you, please get in touch with tonyroberts1948@live.co.uk.

SILENT KEY. As we go to press, we are sorry to report that long time volunteer Peter Eames, M0AXD died recently. Our condolences have been sent to his family on behalf of users and the bureau. It is hoped to publish details of a new G0V manager shortly; in the meantime, please direct all queries to the bureau direct.

Calling Notice for the 2011 AGM

Formal Minutes of the 83rd Annual General Meeting of the Radio Society of Great Britain held on 17 April 2010 at the Bedford Swan Hotel, The Embankment, Bedford, MK40 1RW.

Resolution 1
To receive and, if approved, confirm the minutes of the 82nd Annual General Meeting
Proposed: Jim Stevenson, G0EJQ
Seconded: Mick Sanderson, M0IEO
The motion was carried with 2 abstentions.

Resolution 2
To appoint the auditors Sayer Vincent and to authorise the Board to fix their remuneration
Proposed: Dave Wilson, M0OBW
Seconded: Gwyn Williams, G4FKH
The motion was carried unanimously.

Notice for AGM 2011
Notice is hereby given that the 84th Annual General of the Radio Society of Great Britain will be held in the **Menzies Mickleover Court, Etwall Road, Mickleover, Derby DE3 0XX** on Saturday 14 May 2011 commencing at 12.00 for the transaction of the under mentioned business.

Agenda
To receive and, if approved, confirm the minutes of 83rd Annual General Meeting circulated to members, shown above (Resolution 1).

To receive and consider the accounts for the period 1 January to 31 December 2010, and the reports of the Board and Auditors that will appear in the May edition of *RadCom*.
To appoint Auditors Sayer Vincent and to authorise the Board to fix their remuneration (Resolution 2).

Notes
Doors will open from 11.00 until 11.45 for registration. Refreshments will be available. A Society bookstall will be open from 11.00 until 12.00 and again during lunch. The Society will make available for sale an audio tape recording of the proceedings. The use of private video recording equipment will not be permitted at the meeting. Members invited to attend and vote and the meeting may appoint a proxy to attend and, on a poll, vote on his or her behalf. Proxy forms will be included in the May *RadCom*. The proxy need not be a member of the Society, but is not allowed to speak at the meeting other than join in the demand for a poll.

By order of the Board
R R Thorogood, Honorary Company Secretary
13 March 2011

CONGRATULATIONS

To the following members whom our records show as having reached 50 or 60 years' continuous membership of the RSGB.

60 years

Mr R G Titterington	G3ORY
Mr DR Westbury	G3OXL
Mr ACL Coates	G3TVV
Mr R J Taylor	G4BEL

50 years

Shefford & District ARS	G3FJE
Mr E McFarland	G3GMM
Canon H R Davis	G3IUZ

Powditch Trophy

Ken Randall, G3RFH is one of the current holders of the Powditch Trophy, which was awarded for the highest score on 28MHz in the RSGB 21/28MHz contest in 2010. He is very keen to find out more about the history of the trophy and of the patron of the trophy. Any information can be e-mailed to radcom@rsgb.org.uk.

Honour Roll

In this year's Honour Roll, details of some club membership was accidentally omitted, for which we apologise. On 31 December 2010, the following clubs showed continuous membership of the RSGB for the durations listed.

74 Years	RAFARS
64 Years	S. Hampshire Int. Tele Society
63 Years	Yeovil ARC
	Manchester Wireless Society
62 Years	Wirral ARS
	Isle of Man ARS
61 Years	Spen Valley ARS
59 Years	Cambridge & District ARC
58 Years	Stockport RS
52 Years	Preston ARS
	Scarborough ARS
51 Years	Reigate ARS
	Guildford & DRS
50 Years	RNARS
	South Birmingham ARS

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.

Mr T W Dorricott, 2DS05
Mr D F Parker, 2E0DFP
Mr C Gordon, 2E0IIM
Mr J.McSorley, 2E0SFX
Mr L D Milburn, 2E0ZLM
Mr A L Hodges, 9V1TT
Mr J Kephart, AE5LD
Mr D H Cadd, G0UTY
Mr Ginsbury, G7LSL
Mr M Jarvill, G7SYC
Mr M Jackson, G8EOP
RJ Mundy, G8POP
Mr W Morris, GW1NBW
Mr J Kuhr, K2KHR
Mr C W Huntsinger, K3CWH
Mr J F Warner, K3EGR
Mr T Hall, K6MA
V Vassilev, LZ1JK
Mr S Pochojka, M0EAB
Mr J Hughes, M0JAH
Mr J Karlstad, M0JMS
Mr T Papadopoulos, M0SVA
Tamworth Radio Scouting Group, M0TSR
Mr C Wilson, M1OCN
Mr S Yates, M3LHZ
Mr K Lambert, M6AHU
Mr P Dawes, M6AHZ
Mr A J Barrett, M6AIV
Mr I McKean, M6CQB
Mr D Close, M6DCO
Mr J E Collier, M6EAE
Mr C Wilson, M6ECW
Ms I Adkin, M6IJA
Mr L Walkers, M6LPW
Ms M Pennington, M6MCP
Mr S M Carpenter, M6OZI
Mr P Gupta, M6PRI
Dr R J C Harkness, M6RHT
Mr R Watkinson, M6RSW
Miss C Howard, M6SQT
Mr S Richardson, M6SRR
Mr S D Oram, M6TMC
Mr W S Drimmie, M6XUP
Mr G W Aldridge, M6ZAG
Mr J H Richards, M6ZXZ
Mr W J Campbell, MI6WRM
Mr H Storie, MM0GWO
Mr J W Frame, MM1JWF
Ms A Martin, MW0KOP
Mr J M Stubbs, MW6CUB
Mr D Feigen, N2AMQ
Mr P Pavelka, OM6APP
Mr D Webb, RS207054
Mr K J Younger, RS207370
Mr K M Heyworth, RS207534
Mr A C Holmes, RS207657
Mr J Kingdon, RS207690
Mr JD Morley, RS207727
Mr R Di Calisto, RS207743
Mr T Low, RS207764
Mr P R Craig, RS207769
Mr M D Simpson, RS207770
Mr M Darwen, RS207773
South Humber Radio Emergency Comm Group, RS207787
Mr A P Zabrarsky, W1APZ
Mr P A Sonnier, W5WMU
Mr M R Kincaid, W7FKF

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

Mr B Goodwin, BRS46434
Mr M E Jenkin, G0DRN
Mr J J T Penney, G0LAG
Mr A K Dagnall, G0MNY
Mr D Mclaren, G0OLD
Mr J L Hubbard, G0RGG
Mr A Haydock, G0SVQ
Mr R D Warner, G1KTN
Mr D W Green, G4OTV
Mr S Welton, G7BXU
Mr R J Lincoln, G7EGN
Mr A E Stride, G7MYI
Mr J B Hardy, G8OCE
Mr A G Campbell, GM0WNR
Mr E Melby, LA5LT
Mr P R T Talbot, M0BHL
Mr T N Beaumont, M0CMF
Mr E P Rippon, M0EPR
Mr M A Furnivall, M6FAY
Mr S K A Lloyd, MW0BBU
Mr L B Stevens, N2TDN
Mr M Mogutov, RL3AA

Club of the Year

The Regional Winners of the Club of the Year award have been announced. All Regional winners will go forward to the National Club of the Year award, sponsored by Waters & Stanton plc, and the result will be announced at the AGM.

Region 1: Cockenzie & Port Seton Amateur Radio Club
Region 2: Caithness Amateur Radio Society

Photo shows Denny Morrison, GM1BAN and Club Chairman Les Thomas, GM0TKB holding the Trophy and the club's youngest member, Danny Morrison, MM3YHA, holding the Certificate. The award was presented at the club's 50th anniversary dinner in February at the Nethercliffe Hotel in Wick.

Region 3: Bolton Wireless Club
Region 4: Pontefract & District Amateur Radio Society
Region 5: Wythall Radio Club
Region 6: Meirion ARS – for the second year running
Region 7: No.1 Welsh Wing, ATC ARS
Region 8: Lough Erne ARC – for the second year
Region 9: Reading & District Amateur Radio Club
Region 10: Mid Sussex Amateur Radio Society

The photo shows Phil Godbold, G4UDU (centre) from Adur Communications (who sponsor the Region 10 trophy), presenting the shield to MSARS Chairman Alan Cragg, G8YKV (right) with Regional Manager Gavin Keegan, G6DGK on the left.

Region 11: Torbay Amateur Radio Society
Region 12: Essex CW ARC
Region 13: Lincoln Short Wave Club

International Marconi Day

In 2011, the 24th International Marconi Day will be held on Saturday 30 April. There are two awards associated with IMD, one for listeners and one for transmitting amateurs. The requirements for the various levels of award are on the International Marconi Day website, www.gb4imd.org.uk. The site also keeps a list of all the participating stations so you know which ones qualify for the awards.

The organisers have a tip for those transmitting amateurs working for the award – keep two logs for the day. One log should be your transmitting log containing your contacts made with the participating stations. The other is for other participating groups you hear that you fail to communicate with; it always happens. This will enable you to claim the listener's award, thereby achieving something for your efforts if you fail to work enough stations for your chosen transmitting award level.

Radio Reunion

There is a reunion of ex-members of the Radio Security Service on Sunday 17 April in the Mansion at Bletchley Park. It will include an illustrated lecture on how radio amateurs helped to win the war. More than a thousand amateur volunteers listened on the short wave bands, in secret in their own homes, for illicit signals in the UK. What they uncovered were the transmitters of the German Secret Service operating all over Europe and beyond. Beside penetrating the most secret aspects of the service they also learnt about spies sent here, some of whom were 'turned' to work under the supervision of radio amateurs, notably Ronnie Reed, G2RX. More can be learned at http://secretlisteners.org.

Exam Success

Salop Amateur Radio Society would like to congratulate two members for passing their Intermediate Exams. Dave Jones, whose new callsign is 2W0CPO and Matthew Saunders, who is now 2E0CET. The photograph shows Dave on the left and Matthew on the right.

Amateurs achieve sun-bounce on 23cm

Amateurs have bounced signals off the moon for years and there has even been a successful attempt to reflect amateur communications from Mars. But now, a group of Texas amateurs have succeeded in obtaining echoes of their signals from the surface of the sun. "One of the biggest problems was that we needed to make our hundred-foot dish non-reflective to sunlight, but still work with radio waves", said team leader Wayne, W9BRJ. "Our first attempts used a normal bright aluminium dish but when we pointed it at the sun we instantly vaporised the feedpoint". Another issue was the time taken for echoes to be detected – it takes about 16 minutes for radio signals to travel to the sun and back. "So we would make an adjustment, squirt out a signal and have time for a beer before looking for a bounce", Wayne added. The team used an ERP of 1.8 terawatts and a super-cooled preamplifier with a noise figure of less than -3.7dB to receive the very weak reflections. "It's amazing what you can do with good American engineering and a can-do attitude" said Wayne. Full details of the experiment are in this month's issue of QSX.

New 4m mobile

Nevada is now importing the Anytone AT5189D, a 4m FM mobile radio. The D version is supplied complete with a DTMF microphone and will sell for £149.95. The radio has a selectable output power of 5/10/25W and has CTCSS decode and encode along with a built in compander to reduce noise.

The Nevada 70MHz quarter wave mobile magnetic antenna to match the radio sells at £29.95. Full details at www.nevadaradio.co.uk.

NEWS IN BRIEF

- The 62nd annual International DX Convention will take place from 15 to 17 April in Visalia, California. There will be DXpedition presentations, technical sessions, traders, Contest Academy, a ladies tour and much more. Details at www.dxconvention.org.
- Reading & District Amateur Radio Club will be running another Intermediate Licence course from 18 April to 13 June. Send an e-mail to m0luv@radarc.org for more details.

Timor-Leste DXpedition

VK8NSB, VK8FNCY, 9M6DXX, 9M6XRO and MW0JRX will be operating from Timor-Leste (East Timor) between 16 and 26 September. The location will be Atauro Island, OC-232, 30km north of the capital, Dili. The group is working closely with the Timor-Leste licensing authority and the DXpedition callsign will be announced soon.

There will be three stations, two using full licensed power linear amplifiers and a third running 100W. Antennas will mainly be quarter-wave verticals and vertical dipoles, all located within a few metres of the ocean. For 160m an inverted-L will be used. Activity will be on all bands 160 - 10m using CW, SSB and RTTY.

Atauro Island was chosen in order to provide a quiet location, well away from the electrical noise of downtown Dili. The beach-front site will also allow the group to put up vertical antennas right by the ocean, providing additional low-angle gain. In addition, the island counts as OC-232 and is part of a very rare IOTA group, having being confirmed by only 18% of active IOTA participants.

Accommodation on Atauro Island is very basic and will be in beach huts with no mains electricity or running water. All power for the DXpedition will be provided using hired generators. As such, the group will be requesting donations. A website will be available soon and further details will be published on the website.

QSL via M0URX, direct (SAE plus 1 IRC/$2), via the bureau, or LoTW. Alternatively, QSLs may be requested using M0URX's OQRS form at www.m0urx.com/qsl-request-form.

GB200HNC

Denby Dale Amateur Radio Society will be operating GB200HNC from Tunnel End, Marsden, near Huddersfield over the weekend of 2 and 3 April. The event, organised by British Waterways, is to celebrate the 200th anniversary of the opening of Standedge Tunnel on 4 April 1811. The tunnel is the highest, longest and deepest canal tunnel in the UK, stretching for 5,029 metres through hard millstone grit. The event will be a real family weekend featuring tunnel 'legging', craft fayre, canal craft demonstrations and much more. The event will be open from 10am to 4pm each day and the station will be operating on all HF bands over the whole weekend. The station will be located on the first floor of the Visitor Centre in the Thomas Bourne room. The locator is IO93AO, which is WAB SE01. Full details from Richard, M0RBG by e-mail to m0rbg@talktalk.net or on 07976 220126.

NEW

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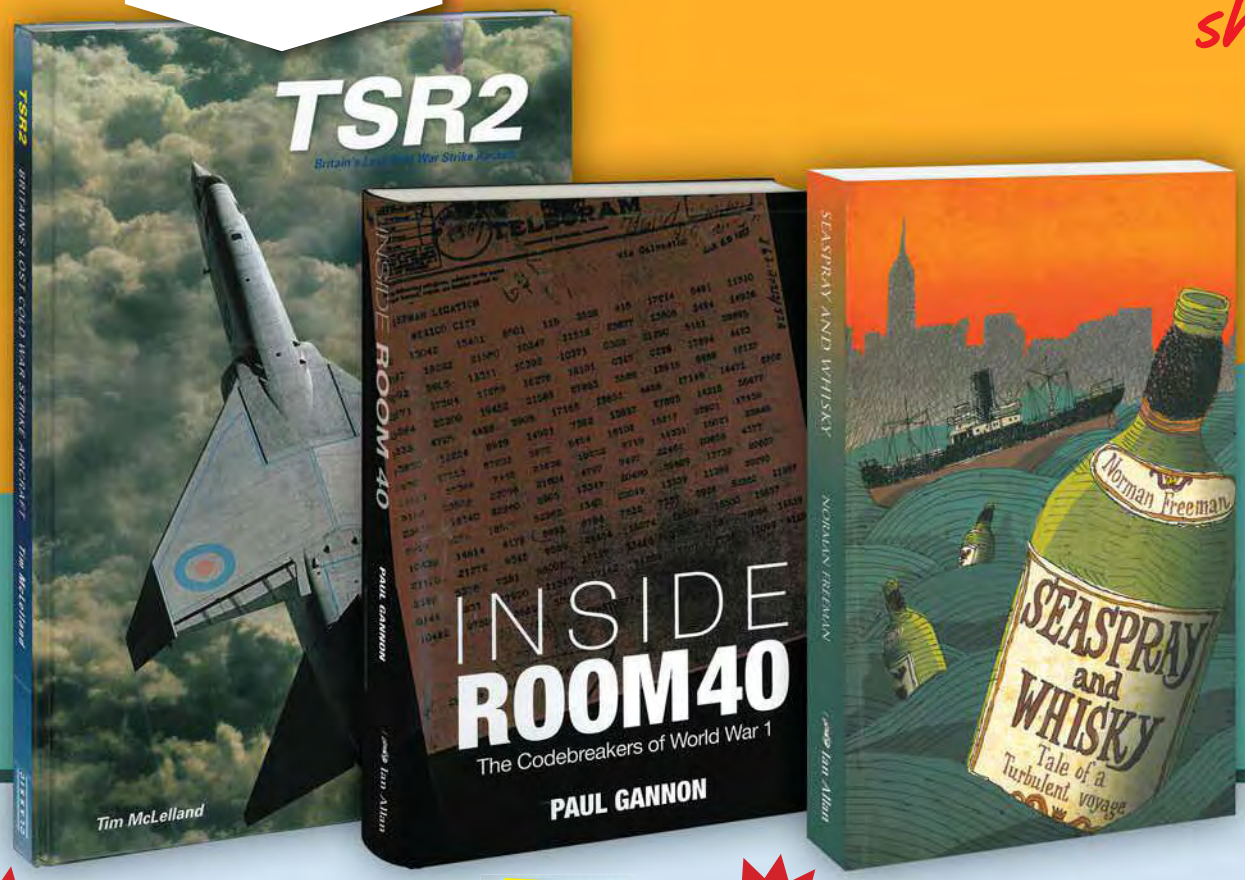

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By Tim McLelland

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Size 228x306mm, 128 pages, ISBN 9781-9065-3719-7

Non Members' Price £19.99 RSGB Members' Price £14.99

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The Code breakers of World War 1

By Paul Gannon

Many are familiar with the code breaking efforts of Bletchley Park during WWII however few are aware of the British code breaking efforts during WWI. *Inside Room 40* sets out to explain the activities of the British code breakers and their successes during the 1914-18 World War. For those who are unaware of the huge contribution made to the war effort by the code breakers of Room 40 this hardback book is a revelation. *Inside Room 40* provides a detailed and comprehensive view of this little known area of WWI history.

Hardback - Size 157x237mm, 294 pages, ISBN 9780-7110-3408-2

Non Members' Price £19.99 RSGB Members' Price £14.99

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Seaspray and Whisky

from £7.49

Reminiscences of a Tramp Ship Voyage

By Norman Freeman

This is the story of a radio officer's first transatlantic voyage on a laxly run, down-at-heel cargo vessel in the early 60s. Misled into signing on the 'Allenwell', he finds himself on a journey to New York, New Orleans and Houston with a motley collection of mariners. Within days of setting sail and despite appalling North Atlantic weather, the crew's attention was inevitably drawn to the consignment of VAT69 Whisky among the ship's cargo. Pilfering began and before long a number of the crew members were in a permanent stupor. This increased in scope and ambition as the voyage went on. Whilst the ship was being unloaded in New Orleans the whisky quickly became the currency that fuelled a riotous stay in port. With nearly 1000 bottles missing when the cargo was unloaded in Texas, it did not take long for the police and FBI to take a special interest. The return voyage to the UK is equally littered with tales including, a sting operation against one of the crew, the ship running out of alcohol and a raft of other adventures.

Seaspray and Whisky is an amusing, entertaining and poignant memoir of what it was like to be on board and the world of shipping where cargos were loaded by hand and weeks passed in port whilst this took place. This book is a great read and recommended for those looking for story with a little radio but far more in the way of laughs.

Size 198x128mm, 240 pages, ISBN 9780-7110-3532-4

Non Members' Price £9.99 RSGB Members' Price £7.49

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IMD Stations

For International Marconi Day on 30 April, the Howth Martello Radio Group will once again be participating as an award station, EI0MAR. They will be operating from the Martello Tower overlooking the East Pier in Howth. The tower now houses a vintage radio museum. In 1905 the British Post Office carried out wireless telegraphy experiments at the tower in Howth using Marconi equipment. Visitors are always welcome at the museum and the group hopes to see many visitors during the IMD event. Details at www.ei0mar.org.

The North Cork Radio Group will be active from the Marconi Signal Station at Mizen Head where Marconi sent many of his first test transmissions to America.

International Museums Weekends

The 2011 International Museums Weekend special event will once again be a double-weekend and will take place on 18 and 19 June as well as 25 and 26 June.

Radio amateurs are encouraged to participate in this event by setting up stations in their local museums. Harry, M1BYT, who is organising the event, asks that all those intending to take part should register their museum via e-mail to harry.m1byt@tiscali.co.uk. Full details of the event can be found on the International Museums Weekend website at www.ukradioamateur.co.uk/imw.

Arran DXpedition

From 2 to 7 April, the Macclesfield & District Amateur Radio Society will be operational from the Isle of Arran off the coast of Scotland. The Islands on the Air (IOTA) reference is EU-123. Four club members will be transmitting on the HF bands and making as many contacts across the UK, Europe and around the world as possible. The DXpedition team is Allan, G0JNJ, Adrian, M0PAI, Keith, G3VKF and Arthur, M0GWF. A special QSL card has been produced, which will be available to any radio amateurs who successfully make contact with the Macclesfield expedition station on Arran.

Mills on the Air

Back in 1996, the RSGB put out a request for any amateurs who might be interested in putting on a station at one of The Society for the Protection of Ancient Buildings' watermills or windmills. From this request developed the now popular Mills on the Air where on a weekend in May each year radio amateurs set up and operate stations in windmills and watermills all over the UK.

Jasmine Marshall, G4KFP, who was a member of Denby Dale Amateur Radio Society spotted the request and contacted SPAB, where they agreed to set up stations at six sites. This number quickly increased to over 30 as the word spread and soon DDARS were designing log books for the event and QSL cards, some even becoming collector's items. An award certificate was next on the list which would be presented to any station working 10 or more stations. By the second year the number of participating mills had increased to 132, including South Africa, Northern Ireland and the Irish Republic. After a few years the centrally designed QSL cards were replaced by stations designing their own cards illustrating the many beautiful mills and watermills used for the event.

After Jasmine, Brian, G0BFJ and then Tony, G4LLZ continued to coordinate the event and today Gerald, G3SDY has taken on the responsibility. The event continues to thrive some 15 years on with 32 stations or more taking part in 2010.

In 2011, Mills on the Air will take place on 14 and 15 May. To see all the stations taking part, or register your own station, see DDARS website, www.g4cdd.net. To claim a certificate for working 10 or more Mills on the Air stations send a minimum of £5, which will be donated in full to SPAB, together with your log, to Gerald, G3SDY. E-mail g3sdy@sky.com for details.

The SOC CW Bash

To commemorate the passing of one of its founding members, the Second Class Operators Club will be holding its first 'SOC CW Bash' on 2 April between 0000 and 2359UTC. Many people will remember Hank Kohl, K8DD (SOC #69) as one of the main engines behind QRP ARCI, a professional CW operator and a seasoned contester. So, as a fitting tribute, the SOC hopes to combine all aspects of Hank's talents and passions in one event.

Any operator can take part in the Bash and, although not a contest, the SOC will be issuing its very own special certificates for top scorers in both a QRO and QRP section. Full details of the event are at www.qsl.net/soc/k8dd_bash.htm.

Please submit your scores to Ryan, G5CL, by e-mail to RPike78088@btinternet.com by 16 April (if you solely use QRP, please note this clearly in your e-mail).

Exam Success

Basingstoke Amateur Radio Club is very pleased to announce Foundation and Intermediate exam successes in February. In the photo are, from left to right: Ramzi Hijjawi, M6RLH (now 2E0JYY), Matt Walker M6TTL (now 2E0VVC), William Beedon, 2E0MYO, Sam Harper, M6XST and Paul Summers, M6TUP (now 2E0TUP) proudly displaying their pass sheets.

BARC is celebrating its 50th year in 2011. Much has changed in the club since those days. Despite being a small club there are regular training courses producing Foundation, Intermediate and Advanced training courses throughout the year. The current Advanced course started in mid-February, almost immediately after the last Intermediate exam.

Later in the year they expect to announce successful Foundation exam passes for a 7 year old lady and an 8 year old boy. Will that be a youth record, they are wondering?

NEWS IN BRIEF

• DX-Hunter is a new iPhone App for DX enthusiasts by Michael Schneider, DJ1MS. The monitoring of DX clusters supports the hunt for new countries and/or band points. But if you are not at the transceiver or receiver when the searched-for DX station gets active you may miss it. DX-Hunter watches the world wide DX activities permanently and raises an alarm, as soon as a wanted/needed station appears on the bands. Bands covered are 160m - 10m, including 75m and 60m. DX Hunter can be purchased at Apple's AppStore for US $11.99.

School Centenary

Norfolk Amateur Radio Club is to run a special event station to celebrate the centenary of its home – the City of Norwich School (CNS) – on Saturday 2 April 2011. The station (the callsign GB1CNS has been applied for) will form part of the school's 100th anniversary celebrations. NARC has been based at the school in Eaton Road, Norwich, for the past three years and recently completed its new shack there, complete with antennas for HF, VHF and UHF. The station will be active on all bands and modes, including D-Star via the local repeater GB7NB and 2m via GB3NB. There will also be demonstrations of SSTV and data. The club will also be presenting an interactive display "It's a Wireless World" to show the history of radio to all visitors at the school's open day.

More MK Exam Success

After an intensive weekend of teaching, practicals and revision in January a group sat their Foundation exam. The candidates included five Air Cadets, of whom the youngest - Rhys Dale-Peerman - was just 8 years 9 months old. Rhys is the youngest candidate to be taught by Milton Keynes ARS. Congratulations to Rhys and the five Air Cadets.

Milton Keynes ARS recently held two more examination sessions where they had 15 passes – a 100% success rate. Congratulations to all of the successful examinees.

Four years ago Andrew, G8GNI took over as the MKARS Training Manager and decided to revamp the Foundation course. In that time the club has run 14 Foundation courses and had 109 passes. Frank, M0JSZ and Andrew have been running a revamped Intermediate course for just over 18 months now and have run two courses with 24 passes.

Overseas Visitors

Members of the Binche Radio Club in Belgium are planning to visit Bletchley Park and other locations in the UK that had associations with the Waddon MKVII (Paraset) supplied to WWII agents working in occupied territories. Their trip will be from 13 to 20 May and they are hoping to meet up with other amateur groups during their stay, especially other MkIII enthusiasts.

On Sunday 15th, they plan, with the help of the local radio club, to activate their MK IIIs with the callsign G/ON4WAR. Details at www.on7ry.be.

T32C

The container with all the radio equipment for the T32C DXpedition was filled to the brim and shipped on 27 February. There is a short (4 minute) video clip on the T32C.com website produced by Fred, G3SVK of the loading and shipping of the container. There are also some photographs in the picture gallery. There is also a tracking device attached to the container and it will be possible to follow its progress by selecting the 'Track the T32C Container' menu option on the website. The tracker uses a combination of GPS and GSM, which tend not to work too well from deep within the hold of a steel container ship, so updates will probably be infrequent.

Photo courtesy Ian, G3YBY.

Bill, M0TDW, operating on board SS *Shieldhall*, watched at the container ship left Southampton for Kiritimati.

NEWS IN BRIEF

• From April, the Horndean & District Amateur Radio Club will be changing its meeting venue and days. Meetings will now be on the 1st and 3rd Thursday each month at Anders Hall, off Milton Road, Waterlooville, Hants PO7 6AW. The first meeting at the new venue will be on 7 April for a natter night/social evening.

5MHz from Thorpe Camp Museum

M0HAZ and members of the Thorpe Camp Museum Amateur Radio Group will be active on 5MHz from the Museum on 30 April. It will be CW from 9am to 1pm then SSB until 5pm. They will use a callsign format like M0HAZ/A/TCM to identify that they are at /A at Thorpe Camp Museum and are hopeful of QSOs.

For more information please go to www.m0haz.btck.co.uk or phone 07956 654481.

British inland Waterways on the air

Since the news item in the February issue of *RadCom* there has been considerable interest in the Waterways on the air Weekend and forty amateurs are considering setting up stations. The event will be held on the weekend of the Inland Waterways Festival on 30 and 31 July with amateurs attempting to illuminate as many of the Inland Waterways as possible. The acronym for the event has been changed to BiWota to avoid confusion with Wainwrights on the Air (WOTA). The event will be run on similar lines to Railways on the Air and further details of plans will be posted on the website being set up at www.biwota.org. If you are interested in participating, please contact John Rogers, M0JAV on 07836 731544 or by e-mail to drm131@rsgb.org.uk. Many different types of station are proposed including special event stations at locations associated with historic water transport, boats, towpaths, lakes, reservoirs, rivers, docks, plus pedestrian and bicycle mobile. John is still hoping for a canoe or kayak to come forward.

ATC Intermediate Success

90 (Speke) Squadron Air Training Corp Amateur Radio Club recently held their first Intermediate exam. There were two candidates from the squadron; both were successful. The picture shows (from L-R) Bill Twemlow (Sqd CO) and Andrew McNeil, who now have the next stage of a Full licence in their sights.

YL International 2012, Adelaide

The YL International Meet 2012 will take place in Adelaide in May 2012. Those interested in attending, whether licensed or not, should check out the website www.ylinternational2012.com for full details. The plan is for delegates to arrive in Adelaide around 3 May. Over the next few days several tours and outings are planned that will culminate in a 7 or 9 day tour ending in either Alice Springs or Darwin. www.ylinternational2012.com has detailed, up-to-date information.

The Meet is open to YLs and their OMs. You don't have to be a member of any organisation or even licensed but should be interested in amateur radio. Most participants are active on air but that is not a requirement for attendance.

Eight Passes at CARS

All eight candidates were pleased when they all passed the 23rd Foundation Course at Chelmsford Amateur Radio Society. CARS runs a six week evening course including a mock exam to ensure candidates are well prepared for the final hurdle. Further information about CARS courses and teaching material is online at www.g0mwt.org.uk/training.

New Venue for BSEARS

Bury St Edmunds ARS has secured a new venue that will allow the club to get on the air more often. The club now has access to the Rougham Tower Museum radar radio room, located at the airfield that was home to the 94th bomb group during WWII and is now a working museum. The new venue will allow the club to provide practical experience on the air to newly licensed members using the clubs callsigns G2TO and G6BSE. The club website is at www.radioclubs.net/bsears.

Derby's GB1OOD

As part of their 100th anniversary celebrations, Derby & District ARS have been putting GB1OOD on the air from Derby's Silk Mill Museum of Industry and History. The Derby Wireless Club has existed continuously over 100 years without a break even during the wars. In 1954 it was incorporated within the Derby and District Amateur Radio Society. The GB1OOD special event operations will continue to throughout the Centenary year from different venues within Derby. Information of these is available on the Derby Wireless Club website (derbywirelessclub.org.uk) and under GB1OOD on QRZ.com.

Space Anniversary

On 12 April 1961, Yuri Gagarin made the first human flight in space. The ARISSat-1 satellite, presently still inside the ISS, will be turned on and use an external antenna on 12 April 2011 to celebrate the 50th anniversary of Yuri Gagarin's first manned space flight. The satellite transmits on 145.950MHz FM and should be fairly easy to receive. AMSAT will support this event and issue certificates to those stations reporting reception of the ARISSat-1 signals.

Yuri Gagarin practising Morse code with Valentina Tereshkova. Courtesy Andy Thomas, G0SFJ.

Licence Successes

Congratulations to three Macclesfield & District Amateur Radio Society members who have successfully joined the ranks of licensed radio amateurs. Tim Brown has gained the callsign M6AMX and Ted Beever has been issued with M6DOP. Edward Parrish requested a specific callsign – M6NSR – due to his other interest of railways and his association with the North Staffordshire Railway. Edward is also already very active in the Summits on the Air programme.

Antenna Manufacture

Aerial-Parts of Colchester is a new venture by John Lemay, G4ZTR. John has more than 30 years of contesting and expeditions experience and is applying this to aerial and mast construction and installation. The design and engineering of one-off solutions to individual problems can be carried out and enquiries are welcome. Aerial-Parts of Colchester has a website that includes a small online shop for the purchase of regular products – see www.aerial-parts.co.uk.

Intermediate Success

All nine candidates passed the Intermediate exam after a course run by Lough Erne Amateur Radio Club in the SHARE Centre, Co Fermanagh, Northern Ireland. This course began last November but was abandoned in the severe winter weather. It resumed over three very busy February weekends. These nine Intermediate successes represent a 35% progression to date from last year's 26 Foundation successes after two courses in 2010. The Club hopes yet more will follow. These new Intermediate licensees will each receive a congratulations certificate at the Lough Erne Pearl Anniversary Rally in SHARE on 17 April.

Pearl Anniversary

Lough Erne Amateur Radio Club asks anyone who was at the Club's first rally in April 1982, or others that followed in the next three decades, to contact the Club with memories and memorabilia. Cliff, GI4CZW was Secretary in 1982, when he sent news of the first rally to *Short Wave Magazine* and has gathered memorabilia down the years. More is welcome for a display at the thirtieth rally in the SHARE Centre on 17 April.

RSGB and IRTS will both attend this special pearl anniversary rally. There will be the usual displays by the Club's neighbours, West Tyrone Amateur Radio Club, and the Club's cousin, Mayo Radio Experimenters Network. More displays by amateur radio organisations are very welcome. Fermanagh Talking Newspaper will be there.

RSGB shop

Stealth Antennas

from £11.89

By Steve Nichols, G0KYA

Tiny postage stamp-size gardens, intolerant neighbours, planning permission problems, living in apartments: these are some of the challenges facing the modern radio amateur when trying to get on the air. *Stealth Antennas* offers clear practical advice to those who might have thought they were unable to put up a suitable antenna. If you are able to put up a 100ft tower and 6-element beam this book may not be for you. For the rest of us, *Stealth Antennas* should persuade anyone with an amateur radio licence that they can work the world without a beam, tower and linear amplifier.

Size 240x174mm, 208 pages, ISBN 9781-9050-8666-5

Non Members' Price £13.99 RSGB Members' Price £11.89

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Size 209x277mm, 224 pages, ISBN 9780-8725-9099-1

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ON4UN's Low Band DXing

from £29.74

By John Devoldere, ON4UN

25 Years of Low Band Success!

John Devoldere's highly popular book *ON4UN's Low Band DXing* has now been thoroughly updated with lots of new material. You will find many new highlights including a completely revised discussion on receiving antennas and how to greatly enhance their operational bandwidth. There is a new examination of phased arrays, with new concepts such as the hybrid-fed 4-square array and opposite-voltage feed system. You'll also find low-signal transformers for Beverages and other receive-only antennas, all analysed in great detail, along with effective common-mode filters. There are dozens of new propagation maps based on DX Atlas, as well as an in-depth analysis of the influence of sunspot cycles on 160-metre ducting. Readers will also find a new discussion of cutting edge technology including Software Defined Radio and the revolutionary LP-500 Digital Station Monitor.

ON4UN's Low Band DXing also includes a wide range of topics including chapters on Propagation, DXing on the Low Bands, Receiving and Transmitting Equipment, Antenna Design Software, Antennas: General, Terms, Definitions and The Feed Line and the Antenna. You will also find specific antenna chapters covering, Receiving Antennas, Dipoles, Vertical Antennas, Large Loop Antennas, Yagis and Quads. There are also chapters dedicated to Phased Arrays, Other Arrays, Low Band DXing from a Small Garden and From Low Band DXing to Contesting.

FREE CD

This book includes a CD-ROM with the entire book in a fully searchable PDF format as well as ON4UN's software (Windows XP only), antenna modelling files, photographs and more.

Size 210x274mm, 672 pages, ISBN 9780-8725-9856-0

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www.rsgbshop.org

Northern Cross Rally

After a lay off of one year due to the bad weather in 2010, The Northern Cross Rally took place at its former home at Thornes Park Athletics Stadium just on the outskirts of Wakefield on 13 February. After setting up the previous day, some familiar traders including LAM, Moonraker and Paul Pooley were there to support the first major rally in the North. Even newbies to the rally scene such as Vortex Antennas from Peterborough were there. Groups attending included the Five Towns Repeater Group, Denby Dale and South Yorkshire Repeater Group, and there was even entertainment from some French national gymnasts who were in the country training for the 2012 Olympics in London.

Around 350 people came through the door on the day, which meant that the attendance exceeded expectations considering last years sabbatical. A steady stream of interested parties also visited the Bring & Buy.

In 2012 the rally will be on 12 February at the same venue.

Chelmsford's 10th Intermediate Course

An Intermediate course, run by the Chelmsford Amateur Radio Society, will be held in the Danbury Village Hall near Chelmsford on Thursday evenings between 7 and 9pm from 17 March until 26 May. The exam will be on Thursday 2 June. The cost is £80, which covers the room hire, project materials, Intermediate licence manual and RSGB exam fee.

This will be CARS' 10th Intermediate course and it's the practical aspects such as learning to solder and building a simple radio that candidates seem to enjoy most. Those interested in attending should contact the training organiser Clive, G1EUC on 01245 224577 or e-mail training2011@g0mwt.org.uk.

Vodafone World of Difference

A member of the Radio Amateurs' Emergency Network has received two months' funding to examine how RAYNET could best use data communications to support police and other User Services. Howard Winter, G1BYY, a member of Mid-Herts RAYNET, made a successful application to the Vodafone World of Difference Scheme in November.

An increasing demand from User Services for RAYNET to provide data links has led many groups to experiment and train on a variety of digital systems. RAYNET members are now using the Automatic Packet Reporting System (APRS) to track vehicles responding to incidents in remote locations, transmitting photographs from the scenes of emergencies and sending data files back to Gold Control. A growing diversity of data modes is available for use by The Radio Amateurs' Emergency Network. Some claim to be 'designed' for emergency communications, while others have been adapted for that use. Groups across Britain have already undertaken quite complex investigations into a number of different data modes, but this work has been conducted largely in isolation. The Network's aim is to share best practice from what has already been learned.

Howard will spend two months undertaking his own research and experimentation, collating the work that has already been done by RAYNET Groups, comparing the experiences of members experimenting with data and in producing documents that will be available nationally.

Biggest Advanced Course Ever?

Steve Hartley, G0FUW and his co-tutors have been running radio classes in Bath for over ten years. They have also supported a number of students who could not physically make it to class through guided learning and e-mail support. Following 100% pass rate from three distance learners last year, Steve advertised the 'virtual' classes to run in parallel with this year's classroom based training in Bath. This has proved to be far more popular than Steve could have imagined and between the Scout HQ in Bath and various locations around the UK, France, Germany and Australia, there are now 26 students 'attending' classes on a weekly basis. Is this the biggest Advanced class ever?

Lewis, G4YTN and Dan, M0TGN are helping out with the e-support and result so far are encouraging. Enrolment to the classes is now closed but if the class of 2011 are as successful as the class of 2010 was, it will certainly be offered again next year.

Spalding Awards

At the recent AGM of the Spalding & District Amateur Radio Society, awards were issued to Paul, M0WAF for services to the club, Pete, M0GTR for the best newcomer, John, M1CDL for services as treasurer to the club and Graham, G8NWC constructors' trophy. In the photograph, from L-R are Paul, M0WAF, Pete, M0GTR, John, M1CDL and Graham, G8NWC (photo G1ZJP).

G4TPH Portable Magloop

Due to supplier complications the G4TPH Portable Magloop antennas have been totally re-designed, with several improvements over the original versions. The New ML-40 MKII now covers 40m through 15m, tuning bandspread is improved and power handling is now 35 watts with improved SWR. The ML-20 MKII has similar improvements. Bandspread tuning and the higher power handling is due to the new capacitors and improvements made to the inductive loading units. The ML-40 MKII and ML-20 MKII antennas now use 15mm rails instead of the 10mm rails used in the earlier models. Computer modelling indicates an increase in efficiency. Full details are available on the G4TPH website including SWR charts for each band.

Foundation Passes

The Chesham & District ARS recently held a Foundation course and exam session. Six candidates sat and passed the exam in February. The line up, from left to right, is Terry G0VFW (lead instructor), Alex Wong, Paul Jay, Ted Pritchard, Jason Grant, Warren Johnson, Lee Shearson and Phil, G8BLB (1st invigilator).

IOTA

More UK checkpoints needed to boost participation

One of the Columbretes Islands EU-069.

RECENT ACTIVITIES. The adventurous DXpedition by Cezar, CE9/VE3LYC and Johan, CE9/PA3EXX to the islands off Cape Horn was a great success, with the very rare Wollaston Islands (SA-031) and the unactivated Diego Ramirez Islands (SA-097) being put on the air during January. Full details are reported on their website at ce9iota.weebly.com and may be the subject of a separate *RadCom* article.

It is disappointing to see from their statistics how few different UK stations, 50-60 per island, feature in the CE9 logs compared with, say, Italian stations at around 260 per island. This brings into focus the relatively low level of participation by British stations in the IOTA programme. It contrasts poorly with the take-up in other countries, many with much smaller amateur populations. In fact, worldwide there has been a real surge, year after year, in active participation in the programme with impressive growth figures in submissions processed, cards checked and website registrations. In an attempt to address the UK's lacklustre contribution to this and to boost participation, the Committee is open to applications from UK island chasers – with a degree of experience in the programme – to act as local British checkpoints. Readers should contact G3KMA if they are interested in helping to get more British stations into the rankings.

The CE9 DXpedition now leaves just two unactivated island groups in South America: Pupuya Island off Chile and Escondida Island off Argentina. Maybe someone will tackle these in 2011.

Turning to another 'Horn' in a different part of the world, Craig, VK4LDX was expected to be active as VK4LDX/P from Horn Island (OC-138) around the middle of March on SSB and data modes. Horn is one of the Torres Strait Islands between Queensland and New Guinea and its old WW2 airbase now forms the airport for Thursday Island. Check his blog at http://vk4ldxoc138.blogspot.com for updates. This is a moderately rare group and one I visited some years ago in order to cross it off my wanted list. It is also the destination that drove me to take up CW after a lapse of many years when other guests at my hotel on Thursday Island complained about the noise from my SSB activities!

Depending on how quickly your *RadCom* arrives, the 4A4A expedition to Socorro Island (NA-030) may still be QRV when you read this. A joint Spanish-Mexican team was expecting to run three stations simultaneously from 3 to 20 March. QSL via EB7DX. Check www.revillagigedo2011.com for the latest information.

Laci, HA0NAR, was active as J5NAR/P from AF-093 around 21 to 23 February. QSL via his home callsign.

Take, JI3DST is expected to be active as JI3DST/JI6 from Kuchino-shima in the Tokara Islands (AS-049) until 20 March. He plans to operate SSB, CW, RTTY and PSK31 from two different locations on the island. QSL via his home callsign – he prefers people to use the bureau.

John, 9M6XRO and Steve, 9M6DXX operated as 9M6XRO/8 (CW) and 9M8Z/P (SSB) respectively from Pulau Satang Besar (OC-165), East Malaysia from 25 February until early UTC on the 28th. They ran two stations with linear amplifiers to a Hexbeam and verticals located on the ocean. QSL both calls via M0URX.

COMING SOON. Mike Crownover, AB5EB, is taking time off from his job as an A&E doctor to activate the Louisiana State East group (NA-089) on 16 and 17 April with Dave, AH6HY.

After his Horn Island trip, Craig, VK4LDX, is expected to visit Magnetic Island (OC-171) from 17 to 20 April. In this case check http://vk4ldxoc171.blogspot.com/ for the latest information.

EA3GHZ, EA5DTV, EA5EOR and EA5KA will be active as EG5CI from the Columbretes Islands (EU-069) from 7 to 10 April. QSL via EA5EOR. The web pages for the operation can be found at www.dxciting.com.

Jay, VY1JA should be active as VY0JA from Alert on Ellesmere Island (NA-008) in the Canadian High Arctic until about the end of March. He will operate mainly CW and digital modes. QSL via N3SL.

John, VE8EV and Gerry, VE8GER are planning an IOTA DXpedition to Tent Island (NA-193) and hope to use the callsign XK1T. They are targeting 5-7 days in late April over the Easter holidays with the final dates to be picked at the end of March in an attempt to avoid any forecast unsettled geomagnetic conditions, which would be a major problem at those latitudes. It will be a high-power/Yagi operation, mostly 20m SSB but with some CW. Check John's webpages at http://ve8ev.blogspot.com/ for updates.

The planned 1 to 5 February IOTA operation from Herne Island (AF-068) has been postponed until September. On 27 January the team was travelling to Dakhla in the deep south of Morocco, when a wheel broke and their car flipped over. Leo, I8LWL suffered a fractured shoulder and a slight head injury and was hospitalised in Marrakesh for a few days. Let's hope they have better luck next time.

Joni, YB9WZJ plans to take part in the IOTA Contest (30 and 31 July) as YB9WZJ/P from Doom Island (OC-239). QSL direct to his home callsign – or claim credit online at www.rsgbiota.org when he submits his contest log.

Sarah, NQ6K, works for NASA and may be on Devon Island (NA-009) in the Canadian High Arctic for 6 weeks from 15 June. Check her web notes at http://findatlantis.com/wiki/index.php/Devon_Island_2011_DXpedition for updates.

There are two groups heading up to the Isle of Arran (EU-123) this spring. First up from 2 to 7 April will be the Macclesfield and District ARS who will be active as GS4MWS/P on the HF bands. QSL via M0PAI. Hot on their heels during the first week of May will be the Camb-Hams, GS3PYE/P, who plan activity on HF, VHF, and UHF as well as from some of the Arran SOTAs.

Finally, there are rumours of some July activity from the rare Iony Island AS-069. I'm trying to find out a bit more on this one and will report in the next column if I am successful.

50TH BIRTHDAY PROGRAMME. IOTA will be 50 years old in 2014 so the Committee is working on a special activity programme and competition for the run-up period in 2012 and 2013. More details will appear later this year.

Cape Horn DXpedition L to R Sara (crew), Thomas (skipper), Johan, PA3EXX and Cezar, VE3LYC.

Adventures in optical communication

Part 2 – SSB via light

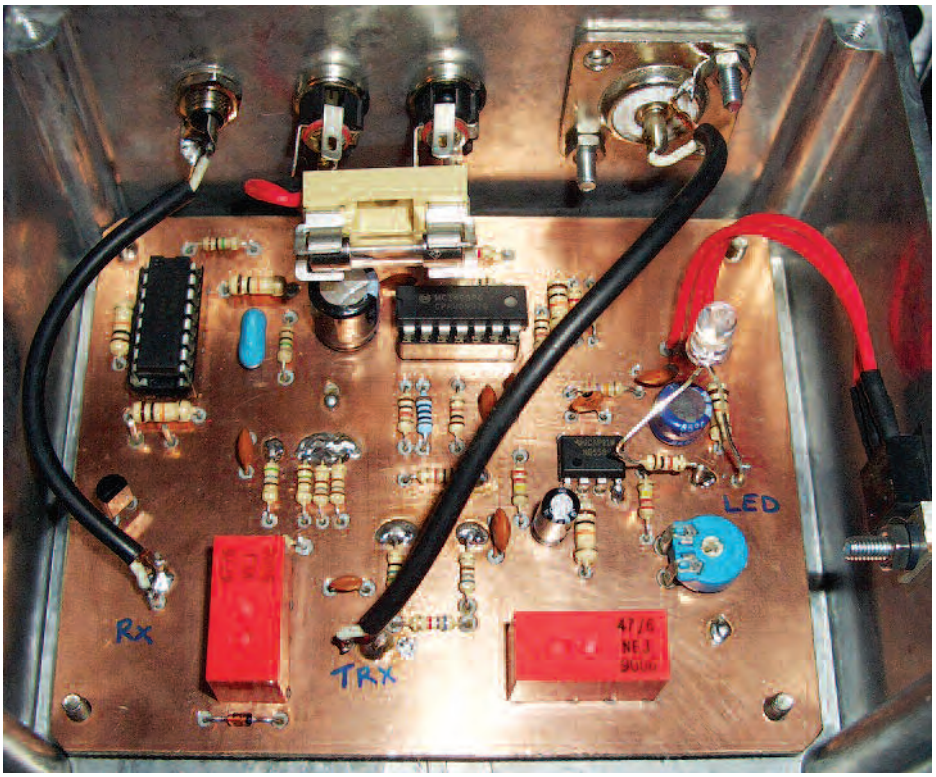


PHOTO 7: Linear transverter (built and photographed by Rob, M0DTS).

RECAP. Last month we looked at some simple CW and voice transmitting and receiving equipment capable of some tens of kilometers range on AM and FM. Then I wondered what advantage, if any, might be gained by going to SSB. This mode is paramount for long distance voice communication over most, if not all, amateur bands where it is allowed, so why not on light?

TRANSVERTER. The thought of building stand-alone systems for receive and transmit was eclipsed by one of those eureka moments: why not build a transverter? It occurred to me that I could use all of the gain and signal processing power of a small HF amateur radio transceiver such as my existing FT-817, converting the HF signals to light and vice versa. Actually, there was a bit more fun in it than simply that. Gordon, G8PNN, Brian, G8KPD and I have made a large number of transverters in the past, for every amateur band from 70cm up to 9cm. In addition, Gordon has a whole array of modern transverters up to 10GHz. The thought of him operating yet another in a long line of transverters was appealing.

Since we were already operating on 20kHz PWM AM and 25kHz FM, thoughts turned to the possibility of sending and receiving single sideband (or any other mode for that matter) on around the same frequency. Crystals for 3.58MHz (actually 3.579545MHz) are readily available, enabling the 80m band to be used for the intermediate frequency. We have ended up using 3.605MHz RF, thus producing or receiving an optical signal around 25kHz. It's sort of radio over light. It even looks and feels like you are operating a real radio when making optical contacts!

CIRCUIT DESCRIPTION. The transverter circuit is shown in **Figure 6**. A relay switches the HF transceiver between the Rx and Tx paths in the transverter (via resistive attenuators). The transmit attenuator reduces the 0.5W output from the transmitter to a few millivolts. This signal is mixed with the 3.58MHz local oscillator signal in the MC1496 balanced mixer to provide the 25kHz signal. This is amplified and low pass filtered by a NE3354 opamp (which also gets rid of the 7.2MHz mixer product) and then fed to the gate of a power MOSFET. The MOSFET has adjustable bias via R28 to set the quiescent gate voltage (and hence LED idling current). The LED and resistor are contained in a separate box (the transmit head, described later), mounted at the focus of a lens in a similar manner to the transmitters described last month.

On receive, the amplified 25kHz signal from a receive head (of which more later) is connected to the input of the mixer, which up-converts the signal to the 80m band thanks to the 3.58MHz local oscillator. The output of the mixer is switched to an attenuator to protect the HF transceiver's front end. (The attenuator also protects the mixer against inadvertent transmission into the mixer output if the PTT fails). The local oscillator can be heard at a low level on the HF receiver if you tune down to the region of 3.58MHz. It is not strong enough to de-sense the receiver if you keep at least 20kHz away from it.

This linear transverter is useable on any mode (although FM and SSB are best) and on a range of frequencies. 3.6MHz RF gives 20kHz optical; 3.65MHz gives 70kHz and so on. Lower frequencies should be better because they are less demanding of the electro-optical system. We have kept to frequencies around 3.605MHz (25kHz optical).

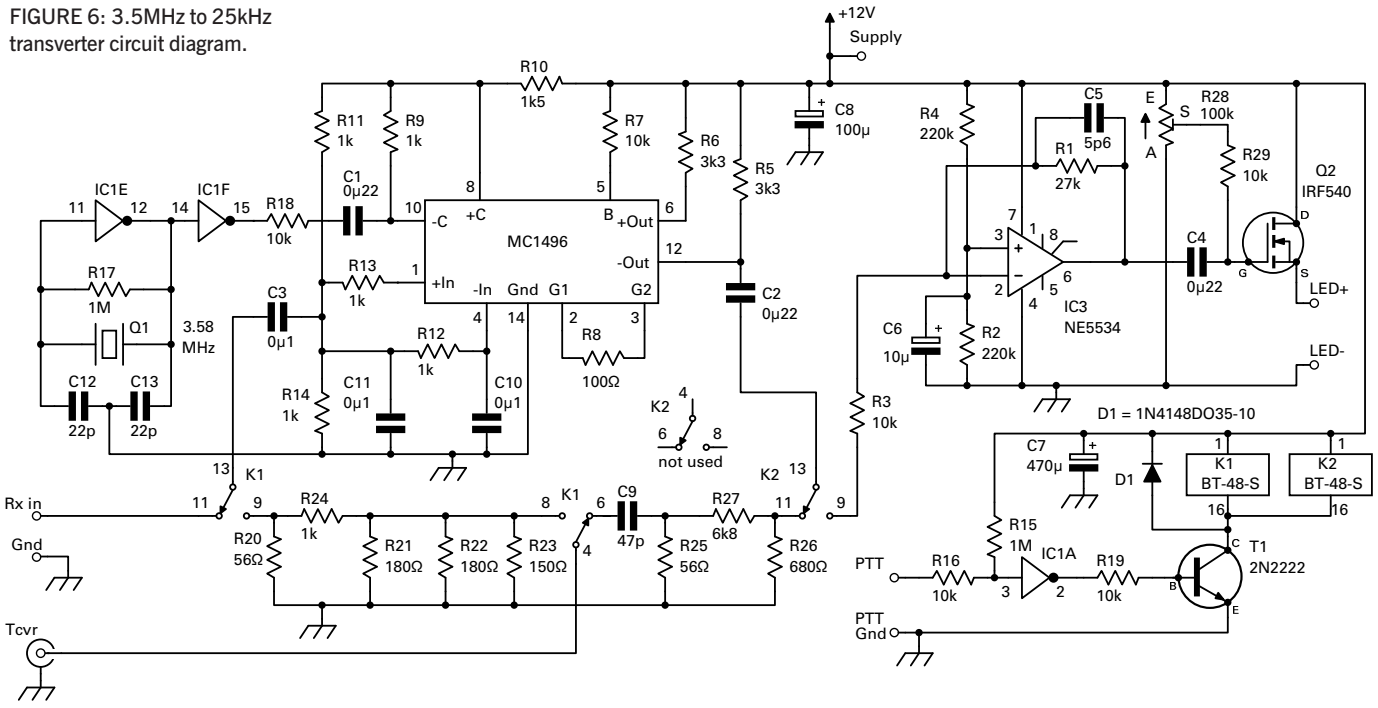
The prototype transcerter PCB and overlay are shown in **Figures 7** and **8**. Note that the board should be double sided – the top is a ground plane that doesn't require etching. After you drill the board, identify all the ground connections and mark them (a marker pen pressed against the holes will usually be visible form the other side). Then turn the board over and, using a hand-held drill bit of about 3mm, clear the copper around the non-earth holes (eg the diode in the foreground of **Photo 7**). When you populate the board, solder all earth connections on both sides of the board (eg the four resistors near the middle). This will result in a good quality of screening.

SETTING UP. Before connecting power for the first time, turn R28 so the wiper is on the negative side (fully anticlockwise if you're using my PCB). Check the board current consumption – it should be around 20mA at 12V. Connect the LED head and, while monitoring current drawn, turn up R28 until the supply current is about 100mA more than you started at, eg 120mA. This is akin to the bias setting on a conventional solid-state linear amplifier. It also gives adequate light for a distant receiver to line up on. Surprisingly, it is also left on when switched to receive, giving the distant station something to aim at.

OPERATING PRINCIPLE. It is easy to imagine what happens to an FM signal on transmit through the LED: the MOSFET is effectively in Class D and being driven hard, switching frequency modulated pulses to the LED at around 25kHz.

I had problems at first envisaging exactly

FIGURE 6: 3.5MHz to 25kHz transverter circuit diagram.



what was happening with a single sideband signal, as only half of it will be conducted by the LED. This must be a bit like putting a rectifier diode in series with your HF antenna! Only the positive half of the sideband signal gets converted into light (the LED is a diode after all). These half-signal pulses travel to the distant receiver. If you could pick this up directly, without a tuned circuit at signal frequency, it would sound like the most awful, overdriven distorted signal you have ever heard on 20m during a contest. But it does not sound distorted at all on an HF receiver because the tuned circuits in the receiver restore the waveform due to the flywheel action of a high Q tuned circuit. Actually, something similar happens inside a single device class B linear amplifier, where the transistor amplifies only the positive half of the signal and the negative half is generated by the tuned circuit, so a complete signal is created.

Unlike many other transverters, there is nothing to tune up or adjust other than the LED bias pot. Most of us who have built this have not even padded the crystal down to its design frequency (although there are spaces for capacitors on the board for this), just leaving it about 2kHz high. Do not exceed the LED current ratings. By monitoring the total transverter current, you can keep an eye on the average current through the LED. I have installed a 1A fuse in the power supply line and blown it several times on speech peaks.

My thanks to Rob, M0DTS who, in producing his version of my design, tidied up my circuits and photographed his version for this article.

TRANSMIT HEAD. The transmit head consists of a power LED and current limiting resistors mounted on and in a diecast box. **Figure 9** shows the circuit diagram. In normal use the QRO switch is left open. When using SSB it is possible to close the switch, which lets a lot more current flow through the LED on speech peaks. Do it at your own risk – it gives about one extra S-point and I've blown several LEDs this way. Trying it on FM or CW is almost certain to blow the LED. The LED is mounted on a 25mm square piece of 0.4mm fibreglass PCB on the base of the diecast box (**Figure 10**). Power LEDs get quite hot so it's important to use heatsink paste between the LED and the board and again between the board and the box, which acts as a heatsink. Do not use normal-thickness PCB! I put the two power resistors in the box and used a BNC socket for the drive connection. The box is mounted on a pipe-stop end with a central hole cut in it, then placed at the focus of a lens as described last month.

I used an Osram Golden Dragon LR W5SM HYJY-1 LED, RS part number 665-6189. It is quite important that you use this one because, although many others will work on transmit, next month I will explain how to make this particular LED also work as a photodiode on receive.

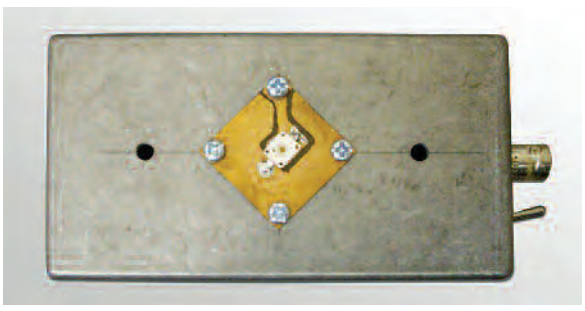


PHOTO 8: Power LED on transmit head.

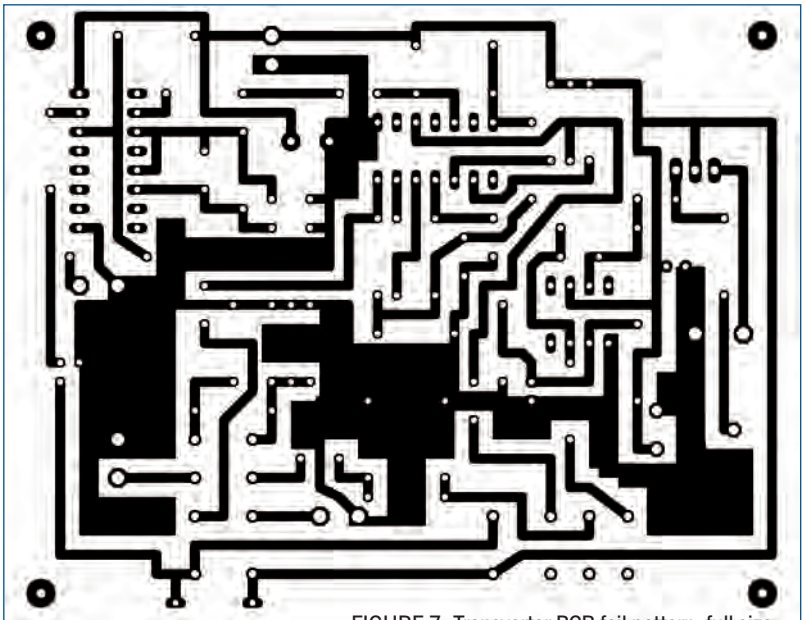


FIGURE 7: Transverter PCB foil pattern, full size.

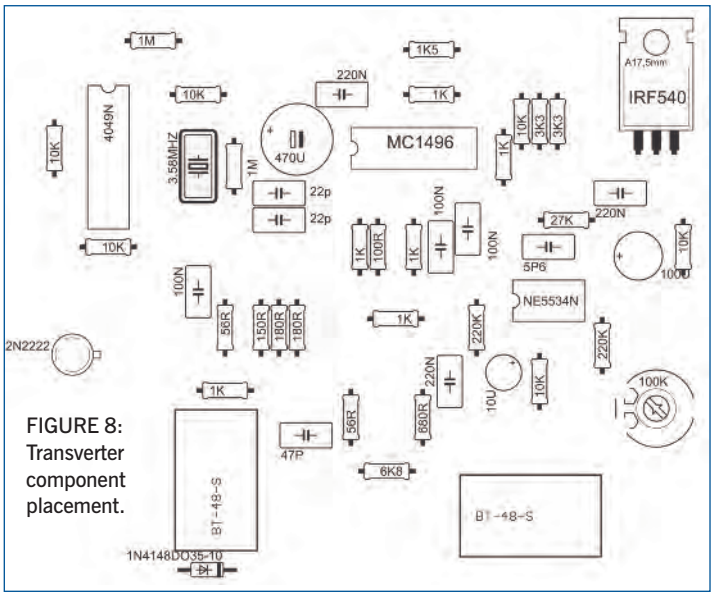


FIGURE 8: Transverter component placement.

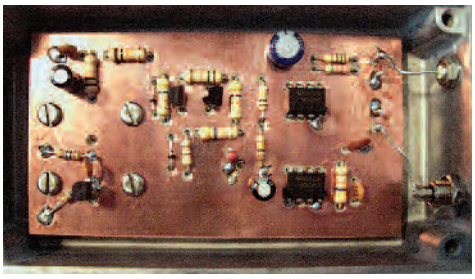


PHOTO 9: Receive head.

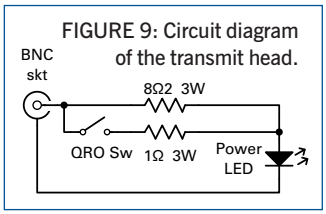


FIGURE 9: Circuit diagram of the transmit head.

will vastly increase its noise output so, while testing, I keep the head face down on the bench. Sliding it slowly to the edge of the bench instantly reveals when the tiniest amount of light enters because the noise level rises so much. You end up skulking around in the dark with this one! Without a lens, this head gives a noticeable increase in noise from moonlight and, with a lens, Jupiter and the brighter stars are easily detected.

LATEST AND BEST FRONT END. Figure 11 shows the best front end I have made to date (and there have been seven in all). It is closely based on a design by Clint Turner, KA7OEI that I found on his website. I have altered the first stage to be a reverse biased SFH2030 photodiode RC coupled to the gate of the FET. The relatively elaborate bias circuit is to make best use of the FET's low-noise performance. I also removed some of Clint's low pass filtering; the circuit now responds up to about 100kHz. T3 forms a cascade amplifier with the FET while T4 controls the FET drain current. The two low noise opamps provide further gain.

This circuit is so exquisitely sensitive that there is no alternative to a diecast box for shielding: even the power is fed down a shielded cable from the transverter. I use a 3.5mm stereo jack plug, socket and screened cable to bring power in and take the signal back to the transverter. The SFH2030 photodiode just peeps out of a 6mm diameter hole in the box. This is normally placed at the focus of a lens on a pipe end cap, drilled as before. Any daylight reaching the photodiode will vastly increase its noise output so, while testing, I keep the head face down on the bench. Sliding it slowly to the edge of the bench instantly reveals when the tiniest amount of light enters because the noise level rises so much. You end up skulking around in the dark with this one! Without a lens, this head gives a noticeable increase in noise from moonlight and, with a lens, Jupiter and the brighter stars are easily detected.

Photo 9 shows the completed receive head, with the PCB foil pattern and overlay in **Figures 12** and **13**. As with the transverter, the PCB is double sided for screening; use the same drilling technique.

Next month I will finish off the series with a desktop test beacon, my mammoth 20W outdoor beacon and the LED transceiver that I hinted at earlier.

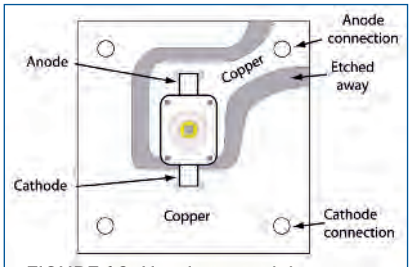
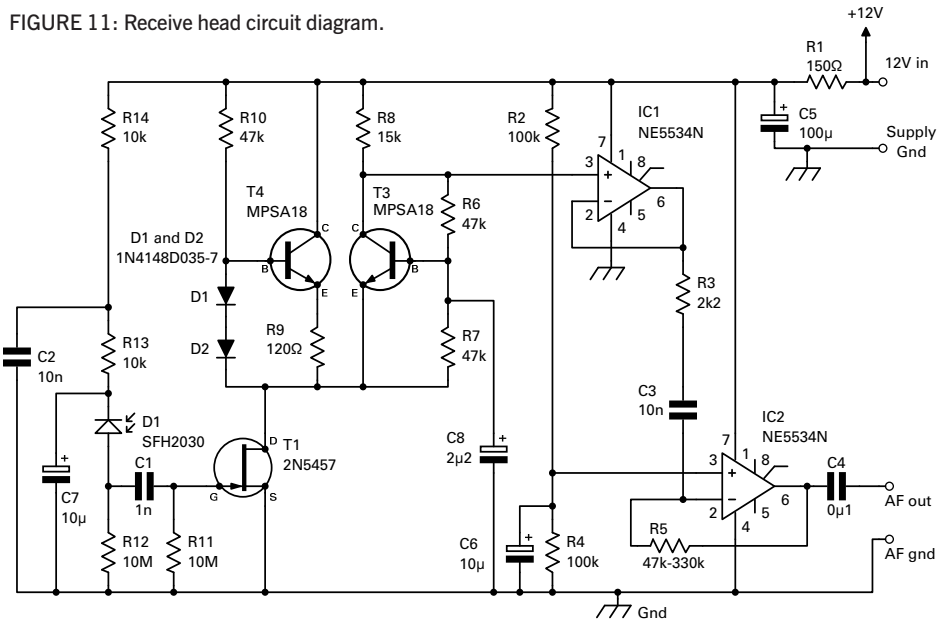


FIGURE 10: How I mounted the power LED.

FIGURE 11: Receive head circuit diagram.



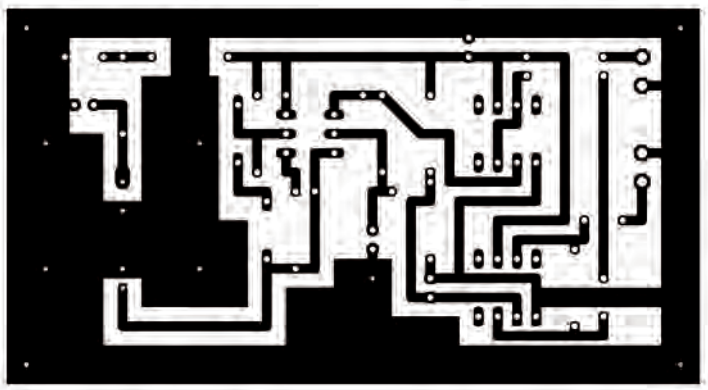


FIGURE 12: Receive head PCB foil pattern, full size.

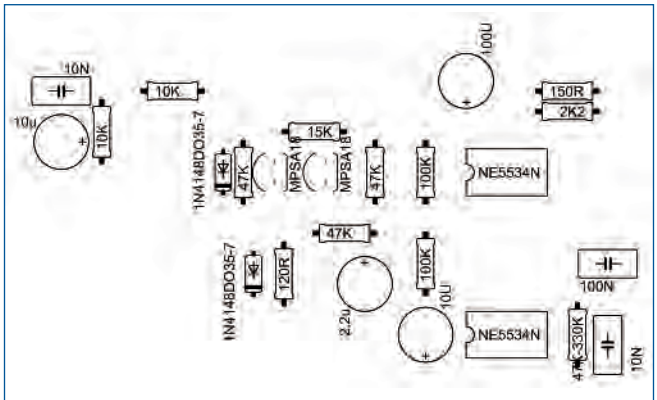


FIGURE 13: Receiver head component placement.

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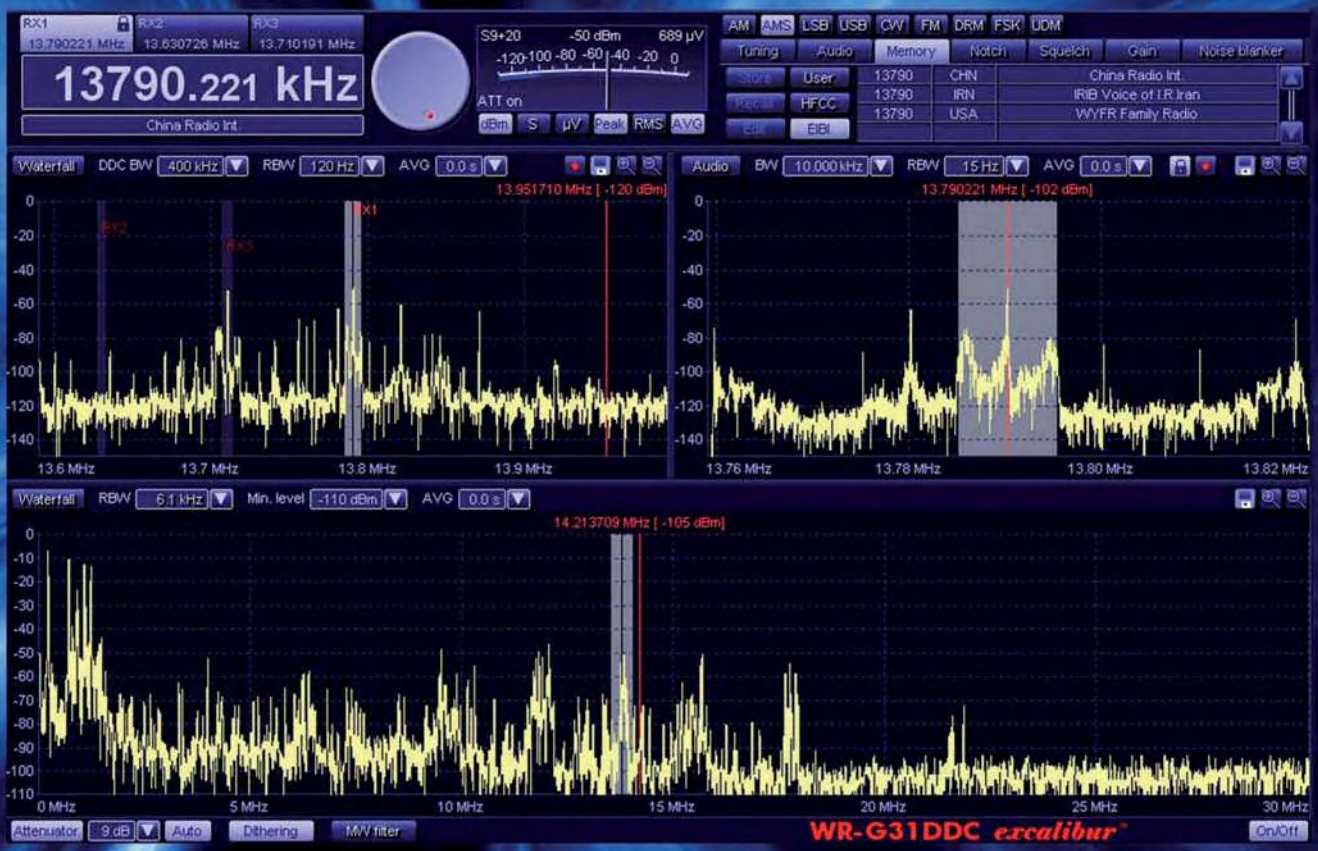

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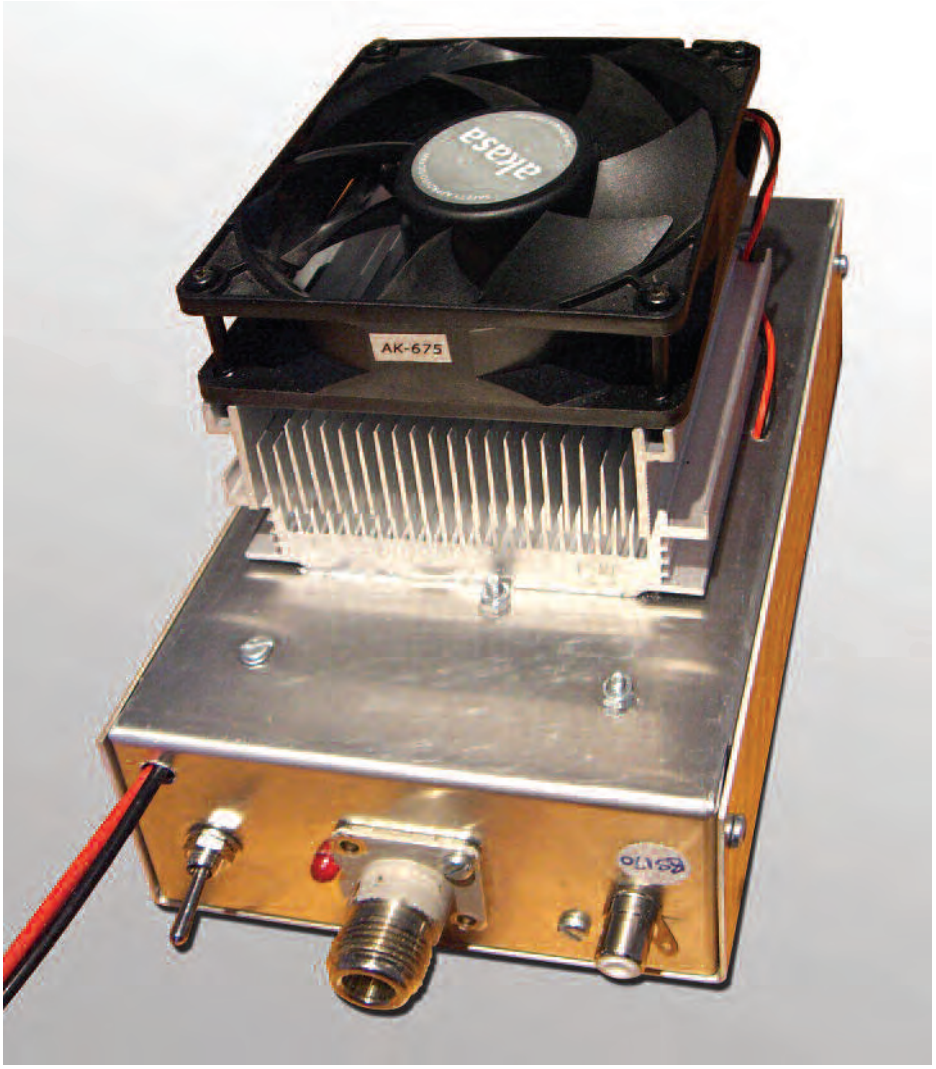


PHOTO 1: General view of the 50W 4m amplifier. The heatsink and fan were originally intended for a CPU (see text).

INTRODUCTION. This amplifier was created to raise the output power of the new 4m handhelds that have become recently available, such as the Wouxun KG-699E that was reviewed in last September's *RadCom*. It can, of course, be used with any other transceiver capable of 1 to 2 watts output. It is a linear amplifier so it can be used on all modes, not just FM.

OVERVIEW. This amplifier is based on an earlier design that I published on the Four Metres website **[1]**. That version required 15W of drive and gave 75W output. This version has an additional stage to increase the input sensitivity to a level compatible with handhelds set to medium power.

In order to keep things simple I decided to make the amplifier run from 13.8V, as most shacks are likely to have a PSU capable of producing the 8-10A that the amp requires.

DESIGN CONSIDERATIONS. The amplifier is based on two 2SC2879 HF transistors in series. The first acts as a driver for the second. It may seem to be a bit of a waste to use a power transistor as a driver but it does make design and construction a bit easier. The driver stage has a gain of around 9dB at 70MHz; the output stage manages 7 or 8dB. The circuit diagram is shown in **Figure 1** and a complete component list is in **Table 1**.

One of the problems in using any RF device is the interpretation of the manufacturer's impedance data. Also, in this case, as the data is for 30MHz and not 70MHz, certain assumptions need to be made to allow the matching networks to be designed.

The matching circuits for this amplifier are based on Motorola Application Note 267 by Frank Davis **[2]**. The matching sections have relatively high Q values of 8 whilst the output used a Q of 5. The tuning is not very critical.

There is little point in going through line by line on the matching procedure; however I will describe the process in general terms, which may aid the understanding of what and why this or that was done.

Broadly speaking there are four matching networks:

- Input
- Interstage
- Output
- Harmonic filter.

Before any of these can be synthesised you need to know the input impedance of the transistor and the output impedance – or, more correctly, the load impedance. As these values are power and frequency dependent it is necessary to estimate the values and work from there.

My best estimate for the input was between 1 and 2Ω, but at this stage I did not know the sign or magnitude of the reactive part. So, as far as the input was concerned, I chose a simple CCL network to match 50Ω to 1 or 2Ω with a Q of 8 from the tables.

The bias for the first stage was set at 75mA. The bias circuit is a temperature compensated emitter follower that sets and holds the DC working point. This uses a TIP31 medium power TO220 power transistor. Dissipation is not high, so it is heatsinked through the PCB.

The interstage network is a CCL format to go from a load 8-9Ω from the collector of the driver to an estimated $<1\Omega$ input of the output device. Again, it's not possible calculate the reactive part of the impedance but, in practice, the networks have enough slack in them to allow for this. This network was also set for Q of 8 and uses a PCB inductor of circa 15nH as part of the matching network. The output device bias was set for 100mA and uses the same bias circuit design as the driver.

The output network has a $Q=5$ and uses a double LCC network. The series capacitor of the first network is removed and replaced by an inductor, thus forming the first part of the second network. This network also uses a PCB inductor and matches from the $<<1\Omega$ impedance of the output device to the 50Ω of the harmonic filter.

The harmonic filter is a 7 element Chebyshev low pass with a chosen ripple of 0.25dB. The simulation software *Elsie*

calculates that this filter will attenuate the second harmonic by 60dB – and that is exactly what I measured (**Figure 2**) before fitting it to the amplifier. Insertion loss was measured at 0.55dB.

The filter was made using 18SWG coils and silver mica capacitors. If metal clad mica types are available then use these in preference.

RF SWITCHING. This is achieved using ordinary DPCO mains relays, activated using a simple RF sense circuit. Alternatively, you can use a PTT output from the rig (ground to transmit). The RF sense circuit has a switchable hang time for FM (short) or SSB (long). The measured losses on receive through the relays was 0.2dB.

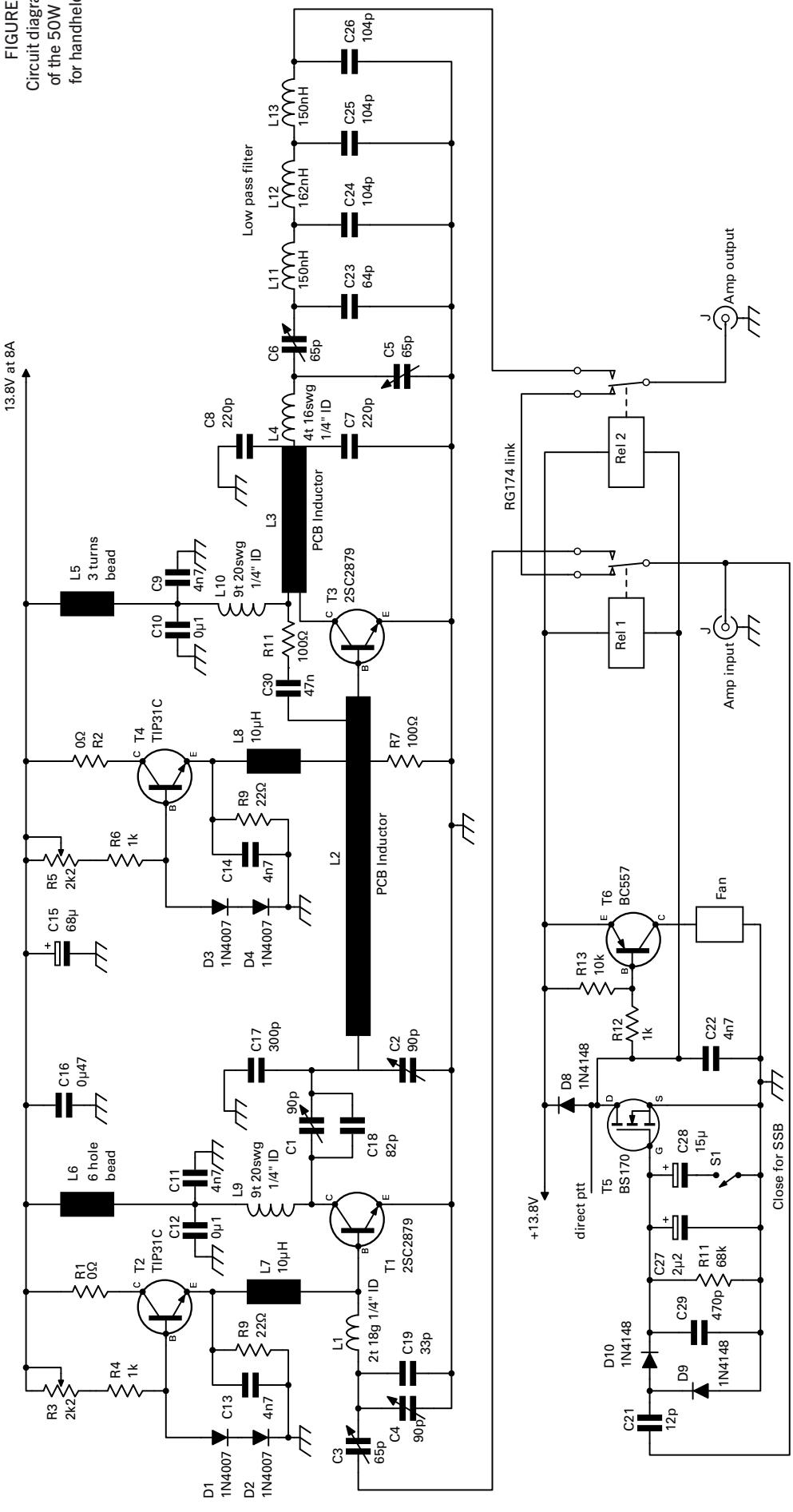
The output from the BC557 drives the fan on transmit only. I would suggest you retain this feature to ensure adequate cooling of the case and heatsink.

CONSTRUCTION. The amplifier is made dead-bug style on a piece of standard FR4 double sided PCB material 1.6mm thick, with dimensions of 5 3/4" x 3". The top copper is Veropinned to the bottom at strategic positions marked on the PCB template (**Figure 3**). After cutting the board to size you need to mark a line through the middle, parallel to the long axis. Next, mark the positions of the transistors. The middle track is made by cutting the copper away with a sharp modelling knife, then using a small (25 watt) soldering iron, heat the copper and pull it away with tweezers.

The +ve supply track is cut the same way, as are the two islands for the input and output capacitors to land on.

After this is done it is best to place the PCB inside the box and mark the mounting holes. I used an AB13 box from Maplin, which is 6" x 4" x 2". The PCB is spaced from the box using M3 nuts. The transistors are marked out and the mounting holes for them drilled. If you are planning to use a CPU fan-cooled heatsink (as in the prototype), this can also be marked and tapped to suit your choice of thread. I used a cooler for an INTEL P4 478 PGA CPU, acquired from Maplin. The screws for mounting the PA devices are used to hold the heatsink to the box.

FIGURE 1: Circuit diagram of the 50W PA for handhelds.



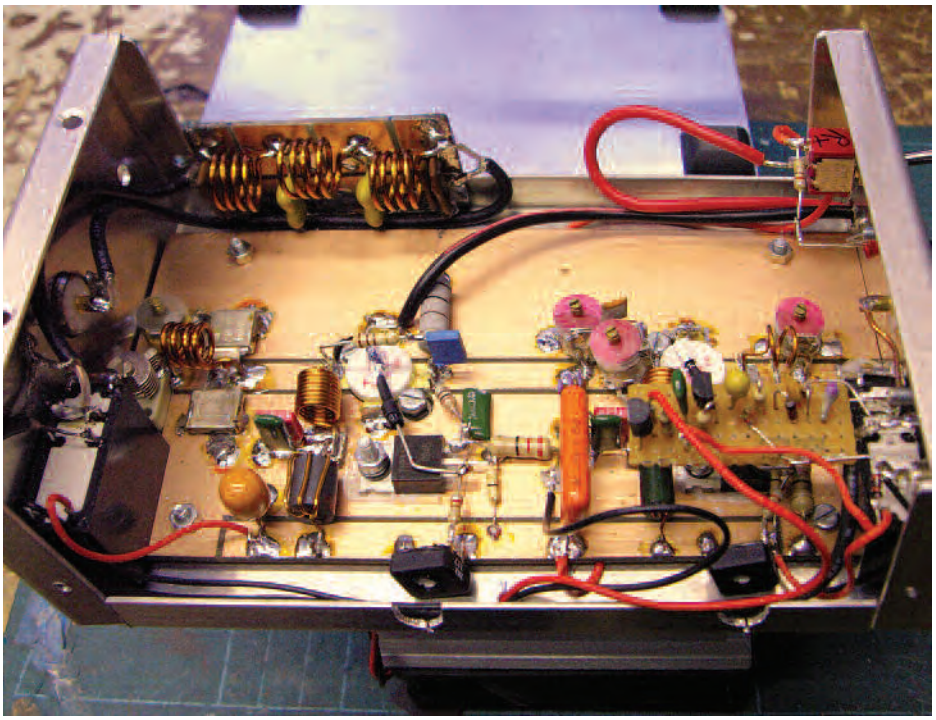


PHOTO 2: General view of the completed amplifier. The harmonic filter is at the back left and the RF sense & switch/fan control circuit is on the stripboard, front right.

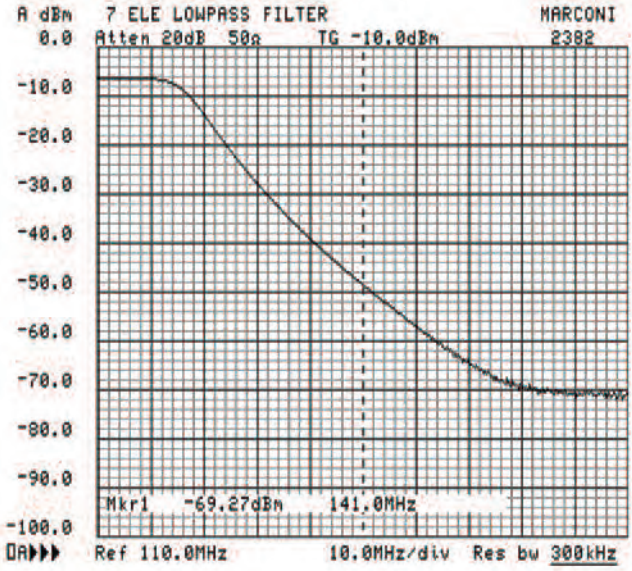


FIGURE 2: Measured response of the 7 element low pass filter.

The transistors can now be soldered to the PCB and then the whole lot removed from the box to allow construction.

The bias transistors should be fitted with insulation kits and checked for isolation. These devices are the tag board for construction as just about every thing else is connected to them. Check that the transistor mounting screw head is not thicker that the spacers under the PCB (which will equal the flange thickness of the RF devices).

There is no mandatory order of construction but starting from left to right seems reasonable. You will need to cut the main PCB track for the wound inductors and any variables as needed.

Two small pieces of PCB about 6mm square should be Super Glued to the main board to act as islands for the collector coil/chokes/decoupler junction. This is marked on the template as PCB island.

Note that R1 and R2 are shown as zero ohm resistors – these are what I used, but you can employ simple wire links if you prefer.

The temperature sensing diodes are best fitted last; the one in contact with the RF transistor needs some heatsink compound on it, as do the RF devices and the heatsink before final assembly.

When all is built, do NOT connect the base bias inductors as they will be connected after testing the bias transistors. This will ensure that when you switch on there is no sudden large current consumption.

At this stage the switching relays can be fitted. The precise arrangement will depend on the exact style of relay you chose to use but the normal 5A DPCO types will fit neatly against the box ends. I built the RF sense/fan control part of the circuit on a small piece of stripboard that can be seen in **Photo 2**. This photo, together with **Photo 3** (that shows an earlier, simpler prototype amplifier) should give a good idea of how I built the amplifier.

SETTING UP. To set up the amplifier you will require a current limited 13.8V supply. This can be as simple as a 10Ω resistor (of 10 to 25 watts) in series with your 13.8V PSU. Alternatively, if you have a proper current limited supply, set it to 13.8V, 1A.

After checking over for obvious mistakes, connect up the supply. The current drawn should be around 100mA. Write this figure down – you'll need it shortly.

Measure the voltage at the free ends of the bias inductors and set the pots to give about 0.65V. Warm one of the temperature sensing diodes and see that the corresponding voltage drops.

If all is well, the next stage is to set the bias for the two RF transistors. This is most easily achieved one at a time. Connect the free end of the driver bias inductor to the transistor base. Switch on the power and note the current drawn. Adjust the bias pot

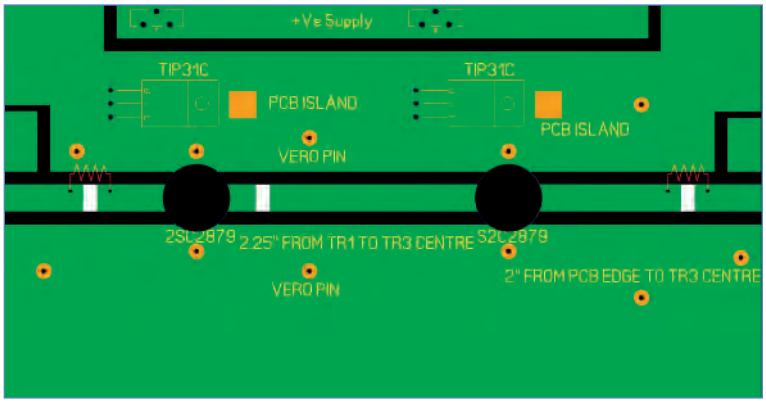


FIGURE 3: Details for marking up the amplifier PCB (see text) with guidance for major component locations. Material is double sided FR4 fibreglass,1.6mm thick. Not to scale. Note the positions of the 11 Veropins (orange circles) that should be soldered on both sides of the board.

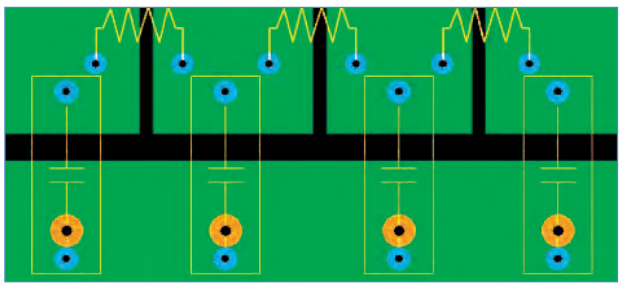


FIGURE 4: Details for marking up the LPF PCB (see text). L11-L13 are across the top and C23 to C26 along the bottom. Not to scale. Note the positions of the Veropins (orange circles) under each capacitor to link the top copper to the bottom.

TABLE 1: Component List

C1	90pF foil trimmer	C16	470nF polyester	C30	47nF	R8, R9	22R 1W
C2	90pF foil trimmer	C17	300pF ceramic plate (3 x 100pF in parallel)			R10	68k
C3	20pF Murata Red trimmer			D1-D4	IN4007	R11	100R 1W
C4	90pF foil trimmer	C18	82pF ceramic plate	D5-7	IN4148	L1	2T 18SWG, ¼" ID
C5	65pF Philips Yellow trimmer	C19	33pF ceramic plate	T2 &T4	TIP31C	L2	PCB
C6	65pF Air spaced trimmer	C20	47µF 10V electrolytic	T1 &T3	2SC2879/SD1487	L3	PCB
C7	220pF Unelco/Semco or 2 x100pF silver mica	C21	12pF ceramic plate	T5	BC547 or BS170	L4	4T 16SWG, ¼" ID
		C22	4n7 disc ceramic	T6	BC557	L5	3T 24SWG on large ferrite bead (~20µH)
C8	220pF Unelco/Semco or 2 x100pF silver mica	C23	2 x 27pF silver mica in // or 56pF	RL1 & 2	12V coil SPCO 5A mains relay, eg Farnell 9479953	L6	6 hole ferrite
						L7	10µH axial moulded choke
C9	4n7 mylar	C24	100pF silver mica			L8	10µH axial moulded choke
C10	100nF polyester	C25	100pF silver mica			L9	9T 20SWG, ¼" ID
C11	4n7 mylar	C26	2 x 27pF silver mica in // or 56pF	R1, R2	0Ω link	L10	9T 20SWG, ¼" ID
C12	100nF polyester			R3, R5	2k2 preset	L11	4T 18SWG, 3/8" ID, ~150nH
C13	4n7 mylar	C27	2µ2 10V tantalum	R4, R6	1k	L12	4T 18SWG, 3/8" ID, ~162nH
C14	4n7 mylar	C28	15µF 10V tantalum	R7	100R 2W	L13	4T 18SWG, 3/8" ID, ~150nH
C15	68µF 25V tantalum	C29	470pF disc ceramic				

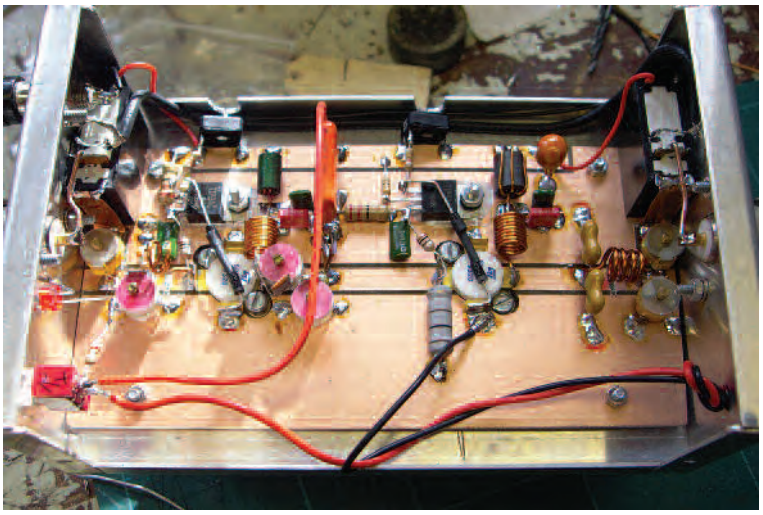


PHOTO 3: General view of an earlier prototype (see text).

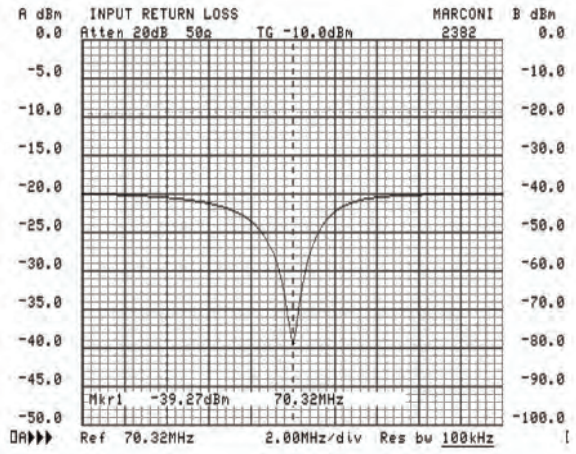


FIGURE 5: Input return loss at 19dB or a 1.25:1 SWR

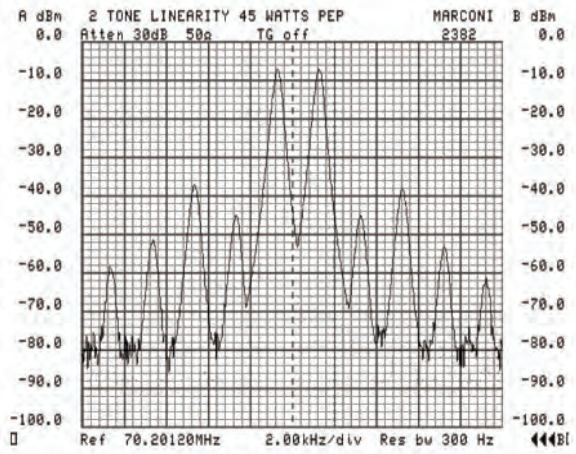


FIGURE 6: Two tone linearity at 45W PEP. The high 5th order products were present on the input signal and do not indicate a problem with the amplifier.

until the current draw is 75mA more than the figure you wrote down earlier – this means you've set the driver transistor bias to around 75mA. Turn off the power, disconnect the bias to the driver, then connect the bias to the output transistor. Turn on the power and adjust the bias pot until the current draw is 100mA more than the figure you wrote down earlier. Hey presto – the output transistor bias is now 100mA. Turn off the power and reconnect the bias to the driver transistor. Turn the amp back on and the current draw should be about 175mA more than the figure you recorded earlier.

You can now remove the current limit from the power supply.

Preset the output trimmers to about 40% mesh and the rest to about 75%. This gives a starting point for tuning. Connect a power meter and dummy load to the amplifier output. Apply about 1W of RF to the input and, moving from input to output, adjust all the trimmers for maximum RF output (about 50W). Pay attention to the output trimmers – the supply current will dip as the output increases. You should end up with about 9-10A consumption at 50 watts output.

If you plan on using more drive power, be careful not to overdo it. The heatsink becomes a limitation, as does heating in the output network. This can be minimised by using the Unelco/Semco metal clad mica capacitors. Alternatively, split the capacitors up into two pairs of 100pF silver mica types. Heat dissipation issues are less severe with SSB than FM or other 100% duty cycle modes.

The input circuit gives a pretty good match, as shown in **Figure 5**. The return loss of 19dB equates to an input VSWR of about 1.25:1. The 2nd harmonic output of the prototype was checked and found to be around -62dBc. The 3rd and higher order harmonics were too low for me to measure.

CONCLUSION. All in all this was a very successful project. The basic circuit has been built with several different (but similar spec) transistors such as the now hard-to-get SD1487. If you can't get hold of the specified transistors it's worthwhile trying alternatives, or at least e-mailing me for an opinion on alternatives.

WEBSEARCH

[1] www.70MHz.org
[2] Google "Motorola Application Note 267" or try http://tinyurl.com/RC-Apr-Amp

Icom IC-9100

First impressions of the latest HF to UHF transceiver

The Icom IC-9100 HF-VHF-UHF transceiver.

INTRODUCTION. Icom first unveiled plans for a new base station radio covering HF, VHF and UHF bands during the summer of 2009 and since then samples have been shown at various exhibitions and shows. It has been a long wait but the IC-9100 should soon be fully available. I was fortunate to obtain early access to a pre-production sample for a few days and this is my first impression of this comprehensive radio.

The IC-9100 is a fully-featured HF radio also covering 50, 144 and 430MHz. An optional internal module adds the 1.2GHz band. Dual receivers and duplex operation is provided on different band combinations together with full tracking satellite operation. Another optional module adds full D-STAR support.

THE BASICS. The IC-9100 is a well-proportioned, medium-sized base station radio requiring a 13.8V supply. At 11kg it is quite heavy for its size but inside it is densely packed with circuit boards, metal screens, substantial heatsinks and a diecast chassis.

There are four band groupings, each fitted with a separate antenna connector – HF+50MHz, 144MHz, 430MHz and 1.2GHz (if the module is fitted). There are two independent receivers, Main and Sub, each with a full set of similar features and functions. Each band group can be accessed from either receiver but not from both simultaneously. Hence HF can be allocated to one and any of the VHF/UHF bands to the other, or 2m on one and 70cm on the other etc. If the Sub receiver is turned off, all bands are available from the Main receiver. For general coverage receive the HF band tunes from 30kHz to 60MHz.

All the usual modes are provided including reverse sidebands on CW and data – and modes can be set independently for the two receivers. Digital Voice and Digital Repeater modes are supported with the D-STAR option fitted. The transmitter uses the Main receiver frequency only, not the Sub (except for satellite operation) but a single key press simply swaps the Main and Sub functions. Twin VFOs (A and B) are provided for both receivers and this allows split frequency transmit operation on the Main channel.

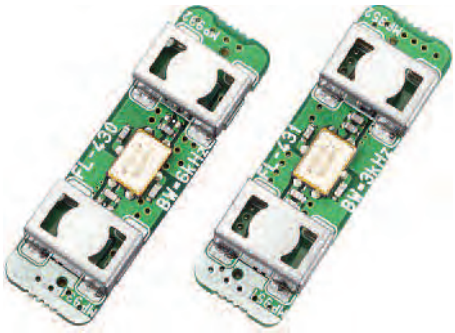
The transmitter provides 100W output on HF, 50MHz and 144MHz, 75W on 430MHz and 10W on 1.2GHz. The Sub receiver remains fully active whilst transmitting on the Main channel, allowing cross-band duplex operation.

RADIO DESIGN AND ARCHITECTURE. The radio uses four separate signal paths for the four different band groupings. On bands up to 430MHz the receiver uses a dual conversion superhet with image rejection first mixers as used in the IC-7800 and IC-7600. On HF +50MHz the first IF is 64.455MHz, with a 15kHz bandwidth roofing filter fitted as standard. 3kHz and 6kHz bandwidth filters are available as options and all three can be fitted and selected manually from the menu. On 144MHz the first IF is 10.85MHz and on 430MHz it is 71.25MHz. On 1.2GHz the receiver is triple conversion, the first two IFs being 243.95MHz and 10.95MHz respectively. In all cases the final IF is 36kHz, which directly feeds a DSP for all signal processing functions, channel filtering, notches, noise reduction etc. Two similar DSP units process two 36kHz chains separately to give the Main and Sub receivers similar features. Narrow roofing filters are only available for the HF+50MHz band.

Inside the box, the construction is fairly conventional, with the usual substantial diecast frame, integral fan blown heatsink areas for the separate power amplifier boards and a front-panel unit that hinges down. Both receiver outputs are routed to a single 7cm speaker mounted in the case top but separate outputs are available from dual external speaker sockets on the rear panel or through stereo headphone output.

FRONT AND REAR PANELS. The front panel layout is similar in concept to other Icom radios, in particular the IC-7600. A smooth operating, weighted tuning knob provides fine resolution tuning as well as fast navigation across the bands. Separate buttons select bands and modes, dedicated rotary controls are used for the main functions and easy to access pushbuttons for other features. A crisp and bright monochrome LCD panel dominates the panel with mode and context specific buttons along the bottom. The setup menu is fast to access and easy to use with plain language descriptions shown on the LCD. Overall the front panel is very well thought out, logical, friendly and easy to use.

On the rear panel two antenna sockets are available on HF/50MHz band, with single sockets for the other bands. There are no connections for external receive antenna or low-level RF output. DC power can be fed through the antenna sockets for the VHF and UHF bands for external preamplifiers and a range of accessory preamplifiers is available. The usual accessory sockets and linear amplifier control lines are provided and in addition



Optional 6kHz and 3kHz roofing filters for HF/6m.

The uncluttered IC-9100 rear panel.

there are two separate linear amplifier control lines that can be allocated to the band groupings in various combinations. A USB port provides control of the radio from a PC as well as passing audio, data and D-STAR DV mode data to and from the radio. The Icom CI-V remote control interface is also provided, requiring an external level converter for PC access. A GPS receiver can be connected using NMEA data format for displaying or transmitting location information in DV mode.

KEY FEATURES. Icom radios are generally packed with features and functions and the IC-9100 is no exception. Extensive channel filtering, PBT, twin peak RTTY filter, notches, noise reduction and noise blankers similar to other recent Icom HF transceivers are all included and available on all bands. A huge amount of memory space, scanning and a rather simple spectrum scan are also included. Although the radio has dual receivers, these can only operate on different band groups, not for simultaneously checking of A and B channels in split frequency HF operation. For split frequency operation an XFC button swaps A and B channels and, with quick split and selective locking of the receive channel enabled, it is quite easy to search a pileup for a suitable transmit channel. An auto ATU covers HF and 50MHz and a very comprehensive contest memory keyer is provided for CW. A RTTY decoder is included but as it displays a maximum of three lines of 18 characters it is more of a gimmick than a true operating aid.

Full facilities for repeater operation are provided including band stored offsets, a full range of analogue and digital access methods and selective squelches. A host of facilities are included with D-STAR operation for digital voice, repeater and data modes and together, with GPS, allows full position reporting, APRS and position tracking. Over 50 pages of the 200-page manual are devoted to these digital topics; far too much to cover here.

Full duplex satellite operation is supported where the uplink and downlink channels are on different band groups, typically 145, 435 and 1200MHz. Forward and reverse tracking of channels is supported and satellite memories provided to store the settings.

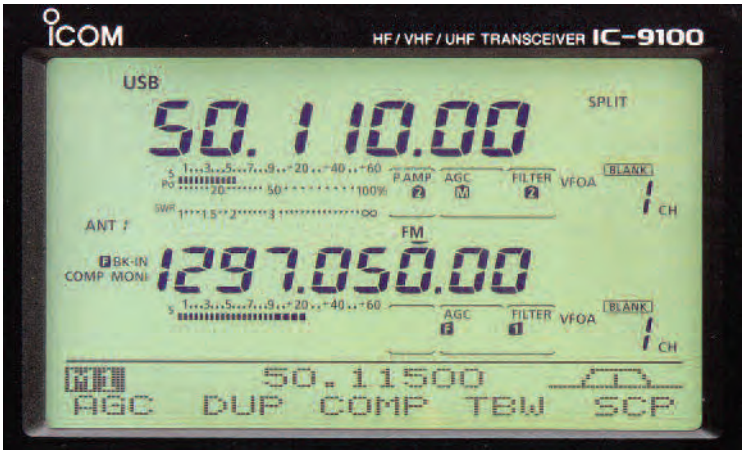
ON THE AIR PERFORMANCE. I found the IC-9100 straightforward to use with friendly ergonomics once the initial learning phase was grasped, particularly the logic behind the Main and Sub receiver settings. During the few days I had the radio there were a number of contests and I took the opportunity to check out the radio in the 144MHz Activity Contest, the March 144/432MHz Contest and ARRL SSB contest as well as working a number of DXpeditions on CW. Everything functioned well and I was very pleased with the results. Sensitivity on the VHF and UHF bands was good and the extra power compared with most radios helped with DX contacts. On HF no strong signal problems were observed and good audio quality reports were received. CW was well behaved on semi and full break-in, but a slight click was observed in the sidetone on initial characters. The armoury of filters and notches all functioned very well.

During the brief review period I did not have a chance to check out D-STAR or satellite operation.

I did not have time to carry out a full set of measurements – something I will do when the production model arrives shortly – but a brief check was made of some of the key figures. The transmit output power was well up to specification on all bands. Sensitivity was excellent, similar to the IC-7600 on the HF bands. Measured noise figures were 5dB on 144MHz and 432MHz and about 4dB on 1296MHz. Third order intercept on 14MHz appeared excellent, on a par with or even better than the IC-7600, but the measurement was compromised by reciprocal mixing noise even at 50kHz spacings. Reciprocal mixing noise was some 3dB to 6dB worse than the IC-7600 and closer to the IC-7000 or IC-7200. This is most likely to be the performance-limiting factor with strong signals, although I was using a pre-production model. Compared with 14MHz, reciprocal mixing was also some 6dB worse on 144MHz and 8-10dB worse on 432MHz, which might be an issue with nearby strong signals in contest conditions. These measurements will, no doubt, differ in production models and I look forward to running proper tests on one.

Overall, the IC-9100 is an excellent all-round solution for someone with wide ranging interests spanning HF to UHF and all modes of operation. I hope to carry out a full review later when the radio becomes fully available but in the mean time it looks to have been well worth waiting for.

My thanks to Icom UK for the loan of the pre-production radio.

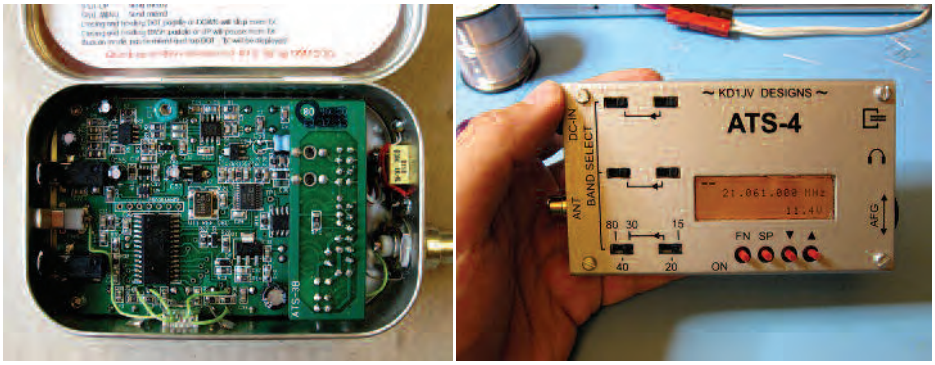


The monochrome display is clear and easy to read.

The optional UX-100 band unit gives 10W on 23cm.

QRP

Looking at more specialist QRP radios



Some examples of the ATS series of transceivers, the latest one on the right.

APPALACHIAN TRAIL RADIO. In my December 2010 column I discussed 'Trail Friendly Radios', a term first coined by Wayne Burdick, N6KR, for amateur radio transceivers that are not only suitable for portable operation but capable of being used by backpackers and hikers. My list of possible trail friendly radios evoked an e-mail response from Dave Robinson, G4FRE (WW2R) who currently lives in Texas. Dave wrote, "I was surprised in your review of QRP radios there was no mention of KD1JV's most recent radio, the ATS-4, see http://kd1jv.qrpradio.com/ATS4/ATS4.htm." I must confess that I knew of the ATS-4 but missed it out because it was no longer available. Steve Weber, KD1JV, has produced a whole series of very compact, but technically sophisticated, QRP transceiver kits that certainly fall into the 'Trail Friendly' category. The main problem is that the KD1JV kits sell out almost as quickly as they are produced. The ATS series of transceivers are in high demand. The designation ATS means Appalachian Trail Sprint. Operating QRP from the Appalachian Trail is a popular pursuit for many American QRP operators.

The Appalachian Trail (AT) is a formidable long distance hike of almost 2,200 miles (3,500km) through some of the most awe inspiring and remote woodlands and mountains in the eastern United States, from Springer Mountain in Georgia, to Mount Katahdin, in Maine. The Pennine Way, the UK's long distance hike, which passes close to my home, is a mere 267 miles (429km) and pales into insignificance alongside the Appalachian Trail. It is a real challenge to any walker. My chief source of knowledge about the Appalachian Trail is from Dennis Blanchard, K1YPP who I had the pleasure of meeting at the Dayton Hamvention last year. Dennis was trying to promote his book *Three Hundred Zeroes* and I offered him a little space on the G QRP Club stand at the Hamvention. *Three Hundred Zeroes* tells of Dennis' attempt at the trail complete with a small amateur radio station. The book captures what it is like to hike that trail for six months with a hammock and an amateur radio transceiver. In the middle of it all, Dennis had to take three hundred 'Zero Days' (non-hiking days) for a six-artery heart bypass operation. *Three Hundred Zeroes* is a good read especially for the radio amateur who also enjoys walking and the outdoors life. It is available from Amazon in hard copy or Kindle formats. I enjoyed it.

Back to the KD1JV ATS series of transceivers. It is a long story that I can only describe briefly. Steve Weber, KD1JV, is very well known amongst American QRPers for his innovative designs and kits. The ATS series transceivers began as viable multi-band CW transceivers that could fit into an Altoids mint tin. They caused quite a stir with 'QRP on the move' fans. To quote one review (from AB1DR), "What weighs an ounce, has full band tuning capabilities on 80, 40, 30 and 20 meters, 5 watts output with a 12 volt power supply, 2.5 watt output with 9 volts, fits into an Altoids tin, has a built in keyer, direct entry for desired frequency, RIT, frequency counter and much more? The answer is the ATS III, a mix of SMT technology and the vision and genius of KD1JV."

The latest kit offering from KD1JV is the ATS-4, described as a miniature 5 band CW rig with digital mode capabilities designed for 80, 40, 30, 20 and 17 or 15 metre operation in the field. It is tiny – according to the KD1JV site, about 1/3 larger than an Altoids tin at 4.9" wide, 2.7" deep and 1" tall. The ATS-4 features include a built-in Iambic A or B mode keyer with three message memories. The transceiver can convert Morse input via a paddle to transmit as PSK31. PSK31 and RTTY are possible using *Pocketdigi* software on a PC, laptop, netbook or PDA. The only real problem with the transceiver kit is getting hold of one. Currently the KD1JV website announces that they are 'sold out'. This is not unusual as I believe that he does limited runs of each of his kits but they are usually repeated, often with updates. So if you fancy building a surface mount (SMD) tiny multi-band transceiver, keep your eye on http://kd1jv.qrpradio.com.

CQ 2TT – TWO TRANSISTOR EVENING. The Two Transistor Evening (2TT) held at the end of last year was the brain child of Richard Newstead, G3CWI, well known for his 'Adventure Radio' exploits.

In Richard's own words, "I came up with the 2TT idea after reading some posts on an internet reflector suggesting that radio amateurs should always be looking to be at the cutting edge of RF electronics. That seemed to miss the point that the ingredients of enjoyment, simple craft skills and the wonder of radio communications are also essential parts of the hobby for many. Thus I came up with the idea of a two transistor evening. This would consist of two things: making a simple transmitter (ideally specially made for the event and made earlier that day) and then using the transmitter to make some contacts. I have noticed that a lot of cutting edge proponents never actually appear on the air! During the construction phase, I ended up getting sidetracked with some VXO experiments and nearly ran out of time to build the transmitter. In the end I used GM3OXX's FOXX transmitter design that I knew worked well. Curiously, he was calling CQ just below 3.560kHz while I was soldering. His influence was clearly powerful as the transmitter worked first time. I was able to disturb sufficient electrons to generate 800mW. Antenna changeover was a manual system and the radio was keyed with a Pattern 1056A key, which is usually an ornament in the sitting room.

"This rather crude arrangement brought back happy memories of days gone by, and knowing that others might have similar systems, I carefully listened around my crystal frequency for callers. Brian, GM4XQJ was first in the log, using a modified ONER transmitter. The next contact was Derek, G4ZGP, a local. Dieter, DL2BQD followed – he had been looking out for the 2TT participants. G4XUV and G3MCK followed. Best DX was a call from OM3TBG. None of this was particularly amazing and the whole thing had more in common with cutting corners than cutting edges. Still, it was all good fun. After the event I had several e-mails suggesting that another event would be welcome some time. Maybe!"

Homebrew

More power amplifiers and the LPF unit

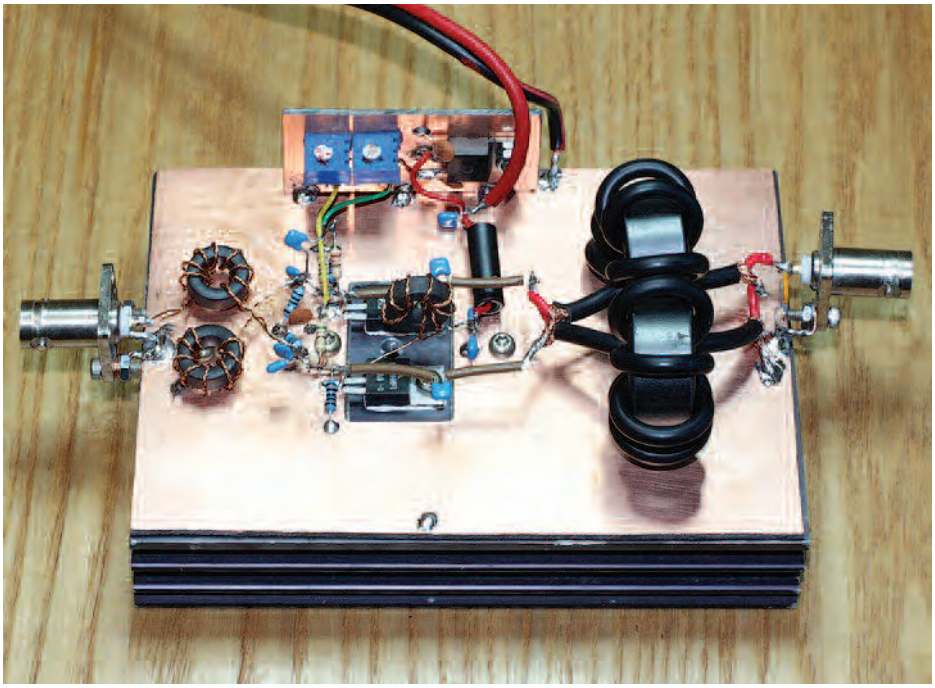


PHOTO 1: The 16W Class AB MOSFET amplifier.

EASIER COMPONENTS. The Class A power amplifier described last month uses a rare and exotic VHF dual transistor. It should be possible to substitute a well-matched pair of HF or VHF power transistors. Suitable devices will have a maximum dissipation rating of at least 50W each and f_T of several hundred MHz. CB PA transistors like the 2SC1969, 2SC1307, 2SC2312 and 2SC1945 should work at frequencies up to 30MHz, but they will probably run out of gain by 50MHz. These transistors are not rated for Class A operation, so you should reduce the standing current to about 250mA for each transistor, biasing the amplifier for Class AB operation.

This month's first project (**Photo 1**) is a broadband power amplifier based on a pair of Mitsubishi RD16HHF1 MOSFETs. These devices are used in the final stage of some of the more modern CB rigs. Unlike the power MOSFETS we have used in previous projects, they are designed to work with a 12-14V DC supply.

The RD16HHF1 is specified for HF RF power amplifier applications. The data sheet test circuit is for a 30MHz amplifier. Input impedance is specified as 20.02-j89.42 at 30MHz, 20W out, Vdd=12.5V. S21 (forward gain) parameters from the data sheet suggest that the device should have useful gain at frequencies up to the low to mid VHF region.

The amplifier output matching transformer (T3) has an impedance ratio of 1:4. When the output is terminated by a 50Ω load, the drain-to-drain load impedance is 12.5Ω, or 6.25Ω for each FET. With a 13.8V DC supply, the theoretical maximum output is $Vdd^2/2R = 13.8^2/12.8 = 15.2$W per transistor, or just over 30W for the push-pull pair. As with last month's bipolar transistor design, I will limit the drain voltage swing to an absolute maximum of ±10V. This allows a maximum output of $10^2/12.8 = 8$W *2 = 16W. The amplifier will be biased for Class AB operation. Standing current will be set at a relatively high 500mA per device, or 1A total. This keeps the gate voltage within the most linear part of the Vgs-Ids (gate voltage/drain current) curve, which typically falls between +4.7V and +7V. See **Figure 1**.

The input resistance and reactance of a MOSFET tends to vary with drive level and signal frequency. It is common practice to place a resistor of relatively low value in parallel with the input of MOSFET amplifiers. The resistor provides a constant load under all conditions and because of its low value, it tends to swamp the input resistance/reactance of the FET. This gives a better input match over a wide bandwidth. This arrangement leads to a loss of amplifier gain due to power dissipated as heat in the resistor. In the case where the resistor value is lower than the FET input impedance, more than half of the input power is lost and amplifier gain will be reduced by more than 3dB. As RF power FETs typically have MF/HF gain of more than 20dB, a gain loss of 3-6dB may be considered an acceptable tradeoff for greater bandwidth and improved input matching.

The input matching transformer (T1) is another 4:1 transmission line type. It is a smaller version of the output transformer, with the input/output connections reversed so that it presents an input impedance of 50Ω when the output is terminated in 12.5Ω. The FET input resistance of 20-odd ohms is shunted by a 10Ω resistor. This gives a resistance of about 6.66Ω (or 13.33Ω for the push-pull pair of devices). The 89Ω capacitive reactance (about 60pF at 30MHz) is effectively swamped by the low value of gate circuit resistance.

AMPLIFIER CONSTRUCTION. The amplifier schematic is shown in **Figure 2**. As usual with RF power amplifiers, most of the builders' effort is applied to the mechanical construction and thermal design. As it is just a single stage amplifier, the electrical circuit is very simple. To ensure that the amplifier is stable under all conditions and has maximum bandwidth, the builder should follow best HF/VHF practice. All leads should be as short and straight as possible. Decoupling capacitors should be soldered directly to the copper ground foil using short lead length of no more than a few mm. To ensure good circuit balance, the amplifier should have a physically symmetrical layout and the FETs should be well matched. At the very least, they should come from the same packing tube and have identical date and gain group codes.

The amplifier was built on a strip of PCB laminate. The heatsink was drilled and tapped using a 2.5mm drill and M3 tap to make the mounting holes for the PCB and transistors. **Figure 3** shows the mounting details. So far, I have drilled and tapped six holes, four for the PCB mounting screws and two for the MOSFET heatsink tabs. The PCB mounting screws are strategically placed along the centre line between the two transistors. Hole 1 is close to the RF input connector, 2 is within a few mm of the source leads, 3 is close to the drain supply decoupling capacitors

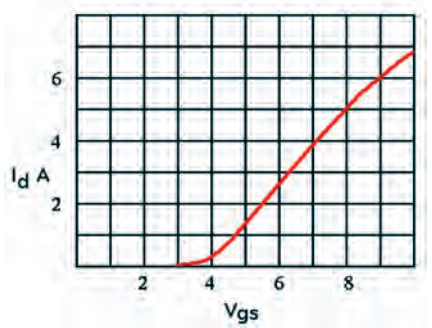


FIGURE 1: Vgs-Ids (gate voltage/drain current) curve for the RD16HHF1.

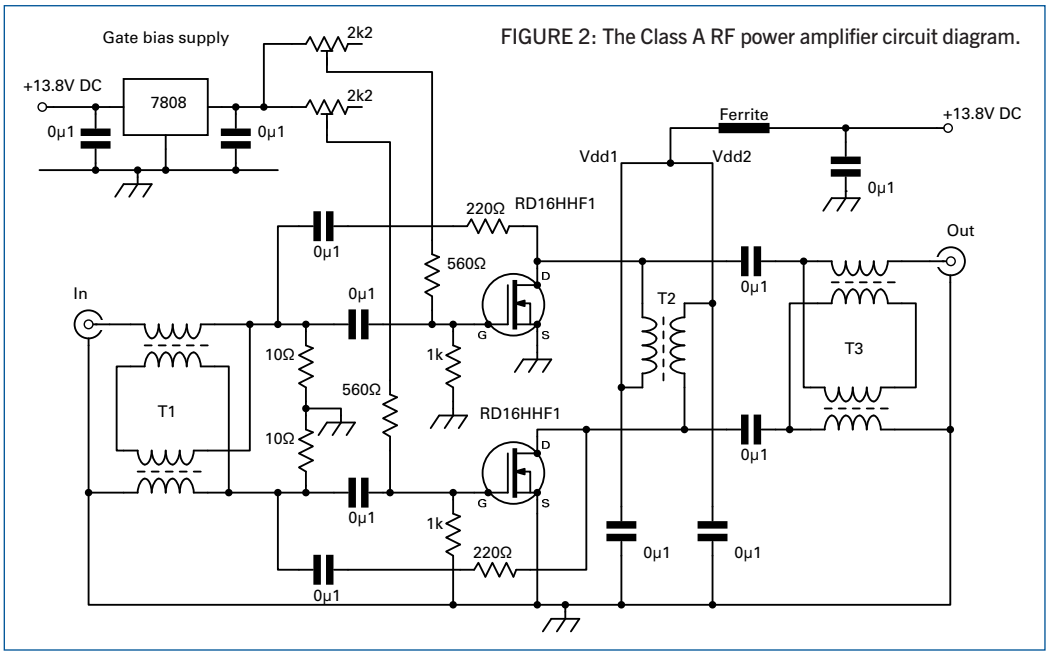


FIGURE 2: The Class A RF power amplifier circuit diagram.

PHOTO 2: How I used the new nibbler to cut a rectangular hole in the PCB so that the MOSFETS can be screwed to the heatsink.

and 4 is near the RF output connector.

Many years ago, I received a very useful gift of a sheet metal nibbling tool from master homebrewer Marty Beck, WB0ESV. I have been using this wonderful device for so long that I tend to take it for granted. Any time I needed to cut a rectangular hole for a panel meter or LCD display, I just drilled an 8-10mm hole in the panel and then used the nibbler to cut out the required shape. After twenty years of abuse, the nibbler has finally broken! Local tool shops don't stock this type of tool, so I had to go to an American eBay seller to get a replacement. **Photo 2** shows how the new nibbler was used to cut a rectangular hole in the PCB so that the MOSFETS can be screwed to the heatsink.

The input transformer T1 is made from two twisted pair transmission lines. Each line is 8 turns of 0.375mm enamelled copper wire, bifilar wound on a FT50-43 toroid core. T2 is 8 turns of 0.375mm twisted pair, bifilar wound on another FT50-43. The output matching transformer T3 is identical to the one in last month's amplifier project. It consists of two HEM3011 (Maplin N88AB) toroid cores, each wound with six turns of Maplin XR16 screened cable. The long ferrite sleeve on the drain supply lead is a HEM3021 (Maplin N98AB). All capacitors are ceramic types. Use good quality 100V (or more) capacitors for the negative feedback network and the drain decoupling capacitors. I used 0.6W rated 220Ω metal film resistors for the drain to gate feedback network. These get quite hot at full output. 2W metal film resistors should be used instead. The gate bias circuit is very simple. A 7808 regulator provides a stabilised 8V DC bias supply. The 2.2k bias adjustment pots form part of a simple potential divider, which includes the 560Ω and 1k resistor in the MOSFET gate circuit. One nice feature of the RD16HHF1 is that the drain terminal is not connected to the heatsink tab. This means that the FETs can be mounted directly on the heatsink without using an insulated mounting kit. The heatsink tab is connected to the source terminal, which is also connected to ground. Note that the RD16HHF1 pinout is different from most other TO220 packaged transistors. The connections are G-S-D and not the more common G-D-S configuration. See the data sheet for full details. Photo 1 shows the finished amplifier.

TESTING. The amplifier output should be terminated by a 50Ω dummy load. If possible, use a current limited 13.8V supply for the tests. If a current limited supply is not available, use a 2A fuse or a small value resistor (around 2Ω) in series with the positive DC supply lead. After checking all connections one last time, set the bias pots for minimum bias voltage (maximum resistance) and connect the DC supply to the amp. The current drawn from the supply should be close to zero. Adjust one of the bias pots for 250mA, then adjust the other until the total current draw is 500mA. Check the temperature of the transistor packages (they should be cool) to make sure they have a low thermal resistance to the heatsink. If all seems well, apply some RF to the input and check the output level using a power meter or oscilloscope. You should see a power gain of around 10dB. For high power tests, set the power supply current limit at several amps and/or remove the protective resistor or fuse from the supply lead. For final testing, the bias should be set at 500mA per FET, giving a total standing current of 1A.

I used the tracking generator of my spectrum analyser as a signal source. The low level amplifier (February 2011) was used to bring the tracking generator signal up to 200-300mW. This limits my initial power and bandwidth testing to just 2-3W output. **Photo 3** shows the measured gain at an output power of 2W.

Gain is remarkably flat at around 10dB

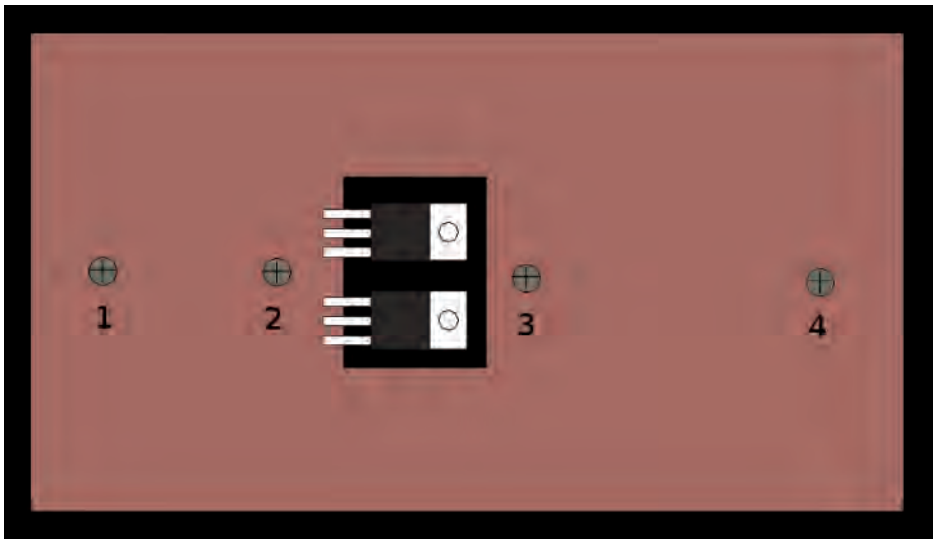


FIGURE 3: Mounting details for the amplifier board on the heatsink (see text).

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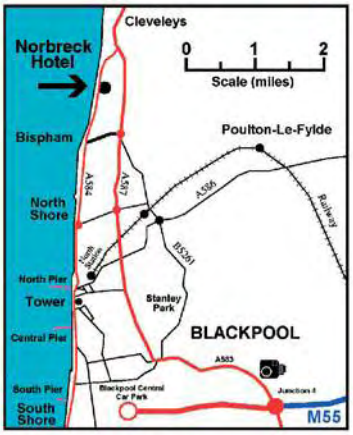

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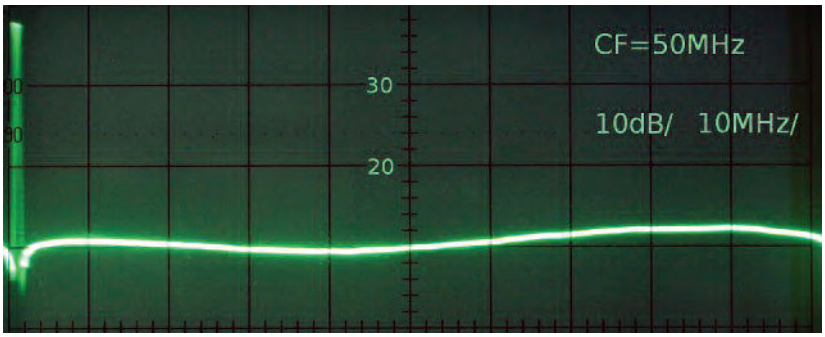

PHOTO 3: Measured gain of the amplifier at an output power of 2W.

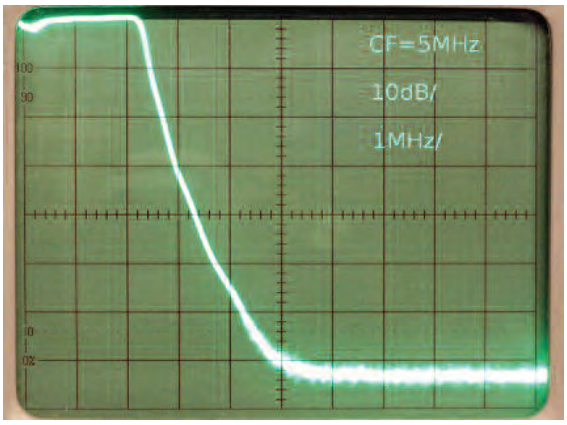

PHOTO 4: 160m low pass filter frequency response.

TABLE 1: Normalised component values for Fc = 1MHz, Z = 50Ω. C in pF, L in μH.

Filter type	C1	C2	C3	C4	L1	L2	L3
Butterworth	1417	5736	5736	1417	9.92	15.92	9.92
Chebyshev 0.1dB	3759.8	6673.9	6673.9	3759.8	11.32	12.52	11.32

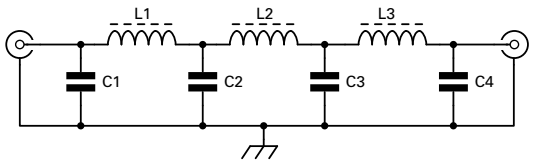

FIGURE 4: The 7th order PI low pass filter.

from 1.5MHz to 60MHz and actually increases to about 12dB in the 70-90MHz region before rolling off at 100MHz. This is by far the best results I have seen from a HF broadband PA. It seems these Mitsubishi MOSFETs are a lot better than the old generation of bipolar CB PA transistors. This PA should perform well from 160m-6m. The measurements suggest that 4m is also a distinct possibility at some time in the future…

As the current configuration of the HF transceiver project doesn't have enough power output to drive this new PA, I used the driver stage of my old homebrew rig for the high power tests. This 2SC2166 stage provided the necessary 1-2W to drive the new PA. My first test on 80m resulted in a 59+ report from Tony, GM7KFS in Argyll. Reports on the signal quality were very good. I used an output power of 10W for the on-air tests. Saturated output power into a dummy load was measured at just under 25W.

LOW PASS FILTER. The next stage in the transceiver project is the low pass filter (LPF) unit. As both of the PA units built so far are balanced push-pull circuits, even order harmonics (2nd, 4th etc) are quite well suppressed. In the case of the Class A amplifier, the second harmonic is already more than 40dB below the wanted output. A simple 5th order LPF would probably provide adequate harmonic suppression.

As the extra cost of building a 7th order filter is minimal, I will build a set of 7th order filters (7 reactive elements in each filter). There are a few options available: I could choose to build a Butterworth type of filter that would probably give adequate harmonic suppression or a Chebyshev type that will give greater harmonic suppression at a cost of slightly greater passband ripple and higher SWR at the filter input. A Chebyshev type filter with a very low passband ripple of 0.1dB or less is probably the best choice. A 7th order 0.1dB Chebyshev will have a maximum input/output SWR of 1.36:1, attenuation of 57.7dB at 2fc and 84.8dB at 3fc.

PI (parallel capacitor input) or T (series inductor input) low pass filters are both equally suitable for the job. A 7th order PI LPF will have three inductors and four capacitors. The T equivalent would have four inductors and three capacitors. As capacitors are generally smaller, lighter and cheaper than inductors, the PI type is more widely used. **Figure 4** shows a 7th order PI LPF. Normalised component values are shown in **Table 1** for a 1MHz filter with I/O impedance of 50Ω. To calculate suitable values for any frequency greater than 1MHz, simply divide the normalised value by the required filter cutoff frequency. If you want to design a filter for the 10m band, you would first choose a cutoff frequency a bit higher than 29.7MHz. About 31MHz would be ideal. Then, use the values from Table 1 to calculate the filter component values:

C1 = 3759.8/31 = 121pF,
C2 = 6673.9/31 = 215pF,
C3=C2, C4=C1,
L1 = 11.32/31 = 365nH,
L2 = 12.52/31 = 404nH.

FILTER CONSTRUCTION. The filters are built in the same manner as the filters in the BPF unit (February 2011). Each filter is built on a strip of PCB laminate. I used 10cm x 2.5cm strips of double sided PCB. Miniature relays (Maplin N17AW or similar) are used for filter switching. It is not necessary to build a filter for all of the HF bands. A filter with a cutoff frequency of 22MHz can be used to cover the 15m and 17m bands. A 31MHz cutoff will cover the 10m and 12m bands. Six filters are enough to cover the nine HF bands; a seventh filter will be needed if you want to cover 6m as well.

A cutoff frequency of 2.1MHz was chosen for the 160m filter. Calculated values for the components are 1790pF, 3178pF, 5.39μH and 5.96μH. Standard value 1800pF capacitors can be used for C1/C4. I used a parallel combination of 1000pF and 2200pF to make 3200pF for C2 and C3. If an accurate capacitance meter is available, you can hand pick capacitors within their tolerance range to get even closer to the required values. The inductors for the 160m filter and all of the filters below 10MHz were wound on T50-2 toroid cores. The AL value of 49 can be used to calculate the number of turns required. Remember that these cores have a specified accuracy of ±5%. The exact value of inductance also depends on how evenly the turns are spaced on the core and, to a lesser extent, the thickness of the wire used. Maybe I tend to bunch the windings at one

PHOTO 5: The completed toroids for the 6m low pass filter.

side of the core, but I usually find that my hand wound toroid inductors have slightly higher value than expected. 100×√(5.39/49) suggests 33 turns for L1 and L3. I found 32 turns was closer to the required value. 34.8 turns was calculated for L2; 34 turns was closest to 5.96μH on the inductance meter. I used 0.375mm enamelled wire for the 160m and 80m filter coils. Thicker wire can be used for the higher frequency bands where fewer turns will be required.

Measuring the filter performance with a signal generator and accurate power meter showed that the losses at 2MHz were unacceptably high, at around 2dB. Once again, cheap and nasty ceramic capacitors were found to be the cause. I had the same problem with the 160m filter in the BPF unit. It seems that physically small ceramic capacitors with high values around 1nF or more can be quite lossy at radio frequencies. After much swearing and digging in the junkbox, I eventually found some nice polystyrene capacitors with the correct values. Good quality mica capacitors should also be ideal for this circuit. If you are using ceramic capacitors, measure the filter losses carefully before you use the filter. Larger, ~10mm ceramic capacitors with a voltage rating of 100V or more should work very well in low pass filters. The rebuilt filter now shows insertion loss of less than 0.5dB and I/O return loss of 18-20dB (SWR<1.3:1), as you would expect from a filter of this type. **Photo 4** shows the response of the 160m LPF for frequencies from 0 to 10MHz.

Now that we have solved the problems at the LF end of the spectrum, we will now tackle the 6m filter. Once again, we will use a 0.1dB Chebyshev. For a cutoff frequency of 55MHz, the required component values are 68pF, 120pF, 206nH and 227nH. More by accident than design, the capacitor values are the standard E12 values of 68 and 120. I used ordinary ceramic disc capacitors and T50-6 toroid cores for the inductors. These cores have an AL value of 40. 100x√(0.206/40) suggests that 7 turns is about right. No matter how carefully I distributed the turns around the toroid, the measured inductance was always more than the required value. 7 turns gave an inductance of 220-230nH; a bit too much for L1/L3 but exactly right for L2.

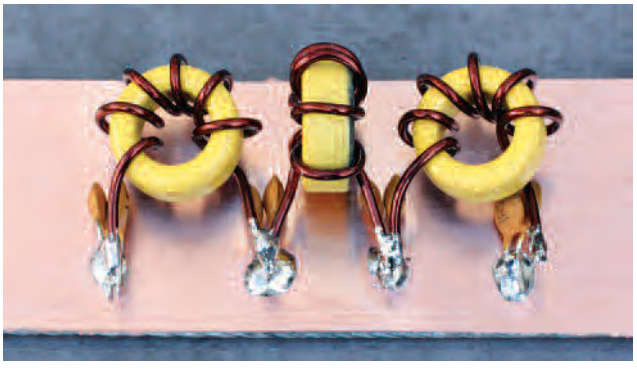

PHOTO 6: Completed 6m filter.

FIGURE 5: General arrangement of the low-pass filter switching.

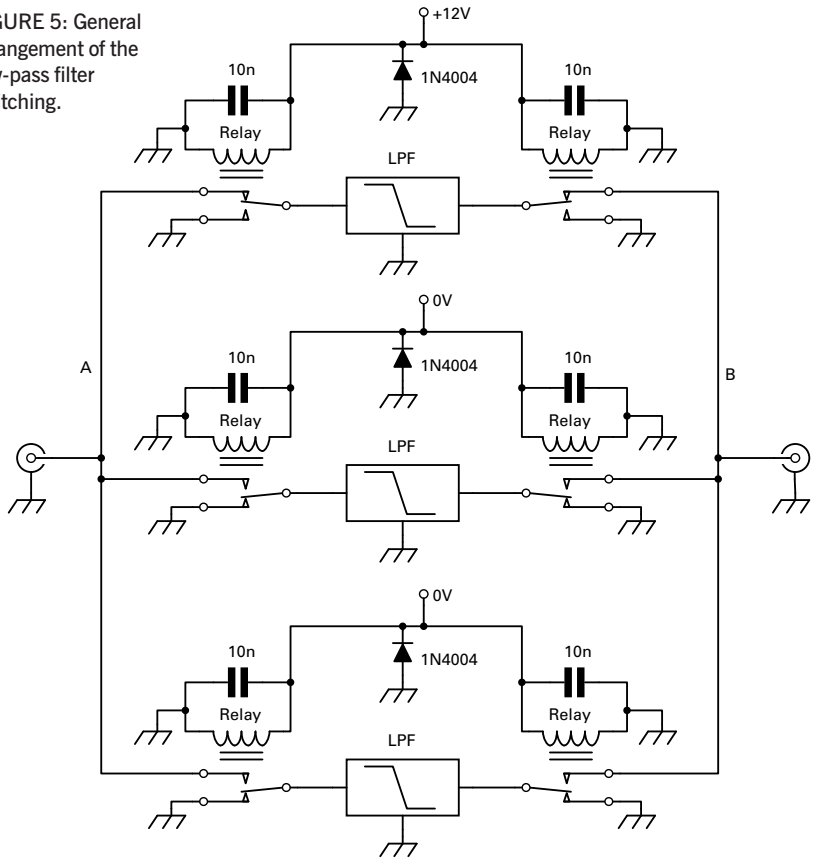

TABLE 2: Component values and construction information for the low pass filters.

Band	C1 and C4	C2 and C3	L1 and L3	L2
160m	1800	3200(1000 || 2200)	5.39 (32T T50-2)	5.96 (34T T50-2)
80m	940 (470 || 470)	1650 (1500 || 150)	2.83 (23T T50-2)	3.13 (24T T50-2)
40m	500 (470 || 27)	890 (560 || 330)	1.51 (17T T50-2)	1.67 (18T T50-2)
20m/30m	251 (220 || 27)	444 (220 || 220)	0.755 (13T T50-6)	0.835 (14T T50-6)
15m/17m	170.9 (150 || 22)	303 (150 || 150)	0.514 (11T T50-6)	0.569 (11T T50-6)*
10m/12m	120	220	0.365 (9T T50-6)	0.403 (9T T50-6)*
6m	68	120	0.206 (6T T50-6)*	0.227 (7T T50-6)

Notes: || means 'in parallel with'. * see text.

I eventually used 6 turns for L1 and L3. This resulted in a measured inductance which was too low. But by adjusting the turns spacing so that the coil occupies about 66% of the core circumference, I was able to achieve the required value. See **Photo 5** for close-up details of L1, L2 and L3 for the 6m filter. This technique is very useful for fine tuning the value of low value toroid inductors.

The insertion loss of the 6m LPF is less than 0.5dB. The filter response started to roll off at about 52MHz instead of the expected 55MHz. This is within the expected range of error. A couple of minutes spent tuning the values of L1 and L3 resulted in a perfect filter response. The assembled 6m filter is shown in **Photo 6**.

The only other filter that caused problems was the 10m filter. This showed a roll off frequency of just over 29MHz instead of the expected 31MHz. Testing the filter components showed that the 220pF capacitors used for C2 and C3 were actually just over 230pF. This is probably within the capacitor tolerance range, but it was just enough to de-tune the filter. Replacing these capacitors with new ones from another batch completely cured the problem.

I used 1mm wire for the 6m, 10m and 15/17m filters, 0.8mm wire for 20/30m and 40m ones. 0.375mm wire (Maplin YN86T) was used for the 80m and 160m filters. **Table 2** shows component values for all of the LPF modules. **Figure 5** shows the switching arrangements for the LPF unit. This is essentially the same as for the earlier BPF unit. Note that out-of-circuit filters are shorted to ground.

ERRATA. In last month's Figure 8, Q1 and Q2 should both be NPN.

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Antennas

Shorted turn inductance tuning and another look at loop antenna Faraday coupling loops

PHOTO 1: The experimental setup to measure the effects of a shorted turn, brass slug and ferrite rod on the inductance of a coil.

SHORTED TURN TUNING. Ted, G3IVH contacted me regarding a question I posed regarding how the tuning arrangement in Figure 4B of February Antennas (repeated here as **Figure 1B**) worked. This tuning method employs a shorted turn that can be positioned anywhere along the length of the coil. But how effective is it?

He constructed a coil 4½in (11.4cm) long and 1¾in (4.4cm) diameter on a ceramic former. The former had grooves for the winding, accepting 81 turns. It was thought to have been part of a roller coaster. The coil inductance measured 99.9μH. The shorted loop was moved along the coil in steps of ½in and the measured results are shown in **Table 1**.

I repeated the measurements using a coil 8.3cm long x 5.5cm diameter, which measured 135.7μH. The shorted turn comprised a loop of 14SWG wire with two layers of insulation to maintain a constant distance from the inductance wires as it was moved. The experimental setup is shown in **Photo 1**.

The coil former of my inductor was longer than the coil itself and I noticed that the shorted turn had some effect on the inductance when placed on the coil former around 3cm from the end of the coil (shown as –3cm in **Table 2**). As the shorted turn is moved closer to the inductance the μH value decreases but the greatest rate of change occurs when the shorted turn is moved over the first 3cm of the inductance. Note that there is very little inductance rate of change as the shorted turn is moved over the centre of the inductance. Table 2 shows the tuning range of the shorted turn method is over 30μH.

I tried adjusting the inductance by moving a brass slug in and out of the coil. The brass slug was made up of several lengths of brass rod fixed together with tape as shown in Photo 1, although it didn't fill up all the space within the diameter of the coil. The brass slug tuning method resulted in a tuning range of only 7μH. The effect of a ferrite rod of unknown pedigree, also shown in Photo 1, was also measured. This resulted in the much more dramatic tuning range of over 200μH.

For many years I have been experimenting with LF, first with 73kHz, then 136kHz and finally 501kHz. An e-mail LF reflector was created to exchange information and it is fortunate that within that group is a body of expertise that I occasionally draw on. I put the question of shorted turn tuning to the reflector and received the following comments:

Markus, DF6NM, found that the method worked very well. He goes on to say: "The nice thing is that you don't need the flexible connections for the rotating part (like a variometer) whereas the downsides may be less tuning range (and only 'up' in frequency because the loop decreases the inductance). There may also be a slight increase in losses. The wire loop can be replaced by a metal plate, but (at least for LF), a shorted multiturn coil made from RF litz wire would minimize induced losses".

DF6NM has also been experimenting at VLF (9kHz) and has tried rotating a ferrite plate, sandwiched between two copper sheets. In an orientation parallel to the magnetic field, the ferrite enhances inductance, whereas in the orthogonal position the eddy currents decrease it. The tuning arrangement finally ended up without the copper as sufficient tuning range was obtained with the ferrite alone. He notes: "The 90° turning range (compared to 180° for a traditional variometer) feels a bit unusual, but allows the use of a very simple mechanical arrangement comprising a string attached to one side of the plate".

John, W1TAG, tells me that it used to be common MW broadcast practice to use 'eddy current disks' comprising aluminium rings. In some cases, the ring was put inside the coil, with the ability to rotate it in and out of the plane of the turns. A simpler setup was to have it at one end, mounted on a threaded rod, allowing it to be moved along the axis of the coil. He goes on to say "I'm sure there were consequences for 'Q', but I don't recall any heating issues".

The coil in Figure 1B was suggested as a method of tuning a mobile antenna although I had never heard of anyone using it. So I was interested to receive the following from G4GVW. "Many years ago, when I did 160m mobile, I used an arrangement where the mobile antenna had a loading coil, which used a copper disc approximately 150% of the coil diameter.

TABLE 1: The effect of a shorted turn on a 99.9μH coil measured by G3IVH.

Position (cm)	Inductance (μH)
0	99.9
1.3	97.4
2.5	96.9
3.8	96.9
5.7	96.5
7.6	96.9
8.9	97.9
10.2	97.4
11.4	99.9

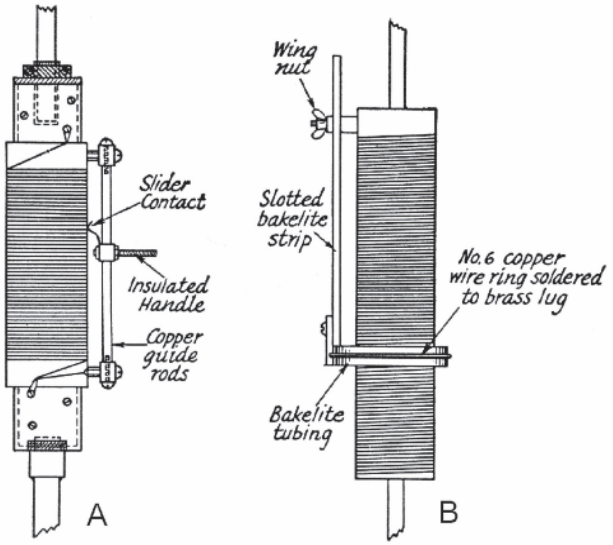

FIGURE 1: The shorted turn inductance tuning method (Figure 4B of February Antennas) repeated here as the subject for discussion in the text.

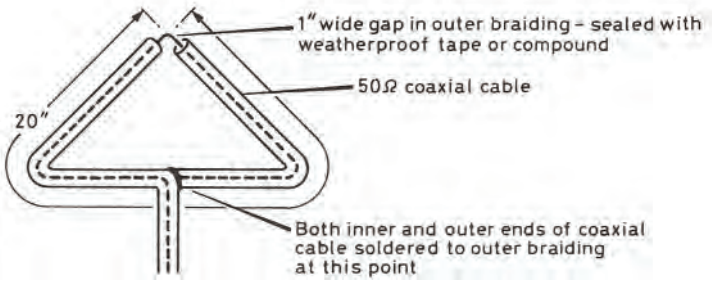

FIGURE 2: A transmitting loop antenna coupling loop from by G3KPV (*RadCom*, September 1983).

This was fixed to a centre boss that could be adjusted and locked along the whip with a screw at a point close to the coil. I used to puzzle over the difference between capacitive or 'shorted-turn' effects but in the end just accepted that it worked for whatever reasons. From memory I think the coil was about 5in diameter".

LOOPS LOSSES. Dave Penny, G3PEN e-mailed on the subject of small transmitting loop losses. He notes: "Regarding your recent article in *RadCom* on loop aerials (December 2010), I may be able to add something to the comments about the resistance of joints. I'm not sure where I read this, but I know that the skin resistance of solder is considerably higher than it is for pure copper and, at HF, the skin depth is very small. Consequently, if you make a joint in a copper pipe as is often done for water pipe usage, with a nice flow of solder beyond the actual copper join, the RF loss is increased – though by how much I haven't a clue because the RF has to flow through (over?) the solder surface.

"It is therefore considered important to clean off the surplus solder that is on the copper pipe, so that the only solder is that between the two pieces being joined, leaving polished copper right up to each side (edge) of the joining piece (if using plumber's sleeves) or to the single edge that shows if using a swaged joint (considered slightly better in fact, if made very tight). This gives an absolute minimum of solder surface across which the RF has to flow. Within the joint, I am not sure what is actually happening, as in theory all the RF current ought to be on the outside only – which perhaps makes the DC current tests for joint integrity somewhat dubious as regards a low loss at RF.

"I have been a little bit bothered by the various articles written over the past year or so in various publications, without this point being made, although it is only now that I have found time and energy to comment! Also, referring back to polishing the copper, again because skin resistance is so important, a very clean smooth surface for the entire loop, polished and then protected by a good-quality varnish, may be very worthwhile in the longer term."

The soldered joint problem could possibly be overcome using compression joints. These are a bit more expensive than soldered joint fittings. Furthermore they only seem to come in 90° angles and not 45°. This means that you could only make a square loop rather than a hexagonal using these items. An additional advantage of compression fittings is that a loop constructed using these can be dismantled for transportation or for moving through a hatch into a loft space. A square loop can be designed so that it can be fed at one corner with the capacitor at the other corner and orientated so that it fits into the apex of the roof inside a loft.

LOOP COUPLING. Alan Strong, G3WXI, noted my remarks regarding Faraday loop coupling in small transmitting loop antennas and says: "I read your comments with interest. I too was puzzled by the arrangement suggested by Robert, I1ARZ when I first read his February 1998 and subsequent articles. I wondered if the object may be to create a more balanced feed but in the absence of any definitive reference source I had to let the matter rest.

"A few days ago I dug out an unused AEA Isoloop still in its packaging, with a view to using it in my current experiments with WSPR, so the arrival on Friday of *RadCom* containing your piece was most timely. I had a problem with the Isoloop (which proved to be a faulty RF connector) and in the course of finding the fault I looked carefully at the coupling arrangement. That also does not appear to have any connection at the gap in the screen of the coax coupling loop. Furthermore I recently revisited a piece 'A Compact HF Antenna for Portable or Base Operation' by G3KPV (*RadCom*, September 1983) and that also does not show a connection in the gap". See **Figure 2**.

COMMUNICATION. I feel that I have to explain the changing e-mail addresses that have recently appeared in this column and apologise for any problems that you might have had trying to contact me. I was with UKONLINE for many years, in fact since the days of dial-up. In late November 2010 I received notification that the service had been bought out and the new owner was closing down the UKONLINE mail server. My e-mail address would cease to function. The new owner offered me generous terms to sign up with them and I was told that the transfer would be quick and painless. Because I wanted a simple and speedy solution to get the e-mail address into the Antennas column heading (bear in mind this column is written up to two months before it appears in print) I phoned straight away and asked to transfer. I put the promised new e-mail address in the January column. But by early January I hadn't heard anything from them so I started making enquiries. To cut a long story short, I changed service provider again and my e-mail address is now g3ldo@o2.co.uk. I haven't done anything about my web pages as yet. I was surprised to see that my website is still active but it is woefully out of date. Furthermore, I am now unable to update it so I am unsure what to do next. If you are interested just type G3LDO into Google and see if it is still active.

TABLE 2: The effect of a shorted turn on a 135.7μH coil measured by G3LDO. Position 0 is the end of the coil. The negative position number represents distance from the end of the coil.

Position (cm)	Inductance (μH)
-3	135.0
-2	134.2
-1	131.4
0	126.0
1	125.0
2	113.6
3	104.3
4	103.2
5	103.5

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Design Notes

More on programmable dividers

PHOTO 1: The finished PIC-based Low Frequency DDS Source.

VLF DDS. Design Notes for September 2010 showed a programmable divider using 74HC161 chips. Chris, G3XIZ, tried a three stage version for generating an 8.98kHz signal for his VLF experiments; dividing a 10MHz reference by 557 followed by a flip-flop for a square wave drive signal. He found that it didn't work as expected. An odd-shaped waveform was being delivered with what appeared to be a double pulse. After a bit of investigation we discovered that the feedback signal that reloads the counter with the user-programmed number has to be delayed. **Figure 1** shows how a resistor and capacitor can to be added to make the divider do its job properly. Chris used 470Ω and 100pF, for a delay of a few tens of nanoseconds in his version with HC series chips. In mine, using the faster ACT series chips, the resistor alone was sufficient along with stray capacitance to give an adequate delay. The reason the problem hadn't shown up before on my microwave transverter locking scheme was because I had selected a division ratio of 15 that only required the first stage to be pre-loaded. Experimentation after Chris reported the problem revealed all. Single stage versions for divisions of 2 to 16 do not require any additional delay.

This is all a bit odd. When I first used this circuit several decades ago with original TTL logic rather than the CMOS versions, the design worked fine as published. I can only assume that the higher speed and reduced gate delays of the CMOS process make short race hazard pulses more significant and upset the parallel load. All very strange!

PIC BASED AUDIO SOURCE. While pondering Chris' divider problems, thoughts led to other ways of generating low frequency signals accurately, and I started wondering if a direct digital synthesiser (DDS) routine could be made to work fast enough on a PIC controller to be useful and whether the output would be clean enough. The standard 'workhorse' device, the PIC16F628, contains a counter-timer that can be configured to generate an interrupt when it overflows. An interrupt, as its name suggests, is a routine that pauses whatever the processor is currently doing and sends it away to do something else; when complete, the processor returns to its original task – which, for the PIC, can just be sleeping. Interrupts are ideal for timing and digital signal processing tasks as their timing can be accurately controlled. Could a timer interrupt on a simple, low cost PIC device be made fast enough, while still allowing enough interrupt processing capability to actually generate a useful waveform? The task would be trivial for the higher specification DSPic devices, but these are more expensive and significantly more complicated to write the code for.

On the Microchip PIC range **[1]**, the counter timer can be run from the processor's internal clock signal which in turn is derived from the crystal or externally supplied oscillator. On the 16F family, the specification states this can be up to 20MHz, which is divided by four internally for a maximum processor clock of 5MHz. For LF and audio generation I wanted to be able to generate at least the range of frequencies that a PC soundcard can manage, which these days means a sampling rate of at least 48kHz would be required. For other reasons, covered later, a sampling rate closer to 100kHz would be desirable. I also wanted to be able to generate audio tones of virtually any arbitrary frequency, so a 32 bit DDS architecture was considered necessary.

A DDS is no more than a counter that is incremented by a fixed value for each clock input, rolls over when it reaches maximum and starts counting again. The counter value at each instant is used as the input to a sine lookup table. The value looked up from the table is sent to a digital to analogue converter (DAC) whose output, after filtering to remove clock and alias products **[2]** is the wanted waveform. The value by which the counter is incremented each time is related to the wanted output frequency as follows:

A counter of length 32 bits rolls over every 2^{32} counts, or each 4294967296 clocks. This defines the underlying resolution or step size for the DDS. For a 100kHz input clock it is therefore 100kHz / 2^{32} = 0.00002328Hz (23.3μHz) – fine enough for most purposes! The value by which the counter has to be incremented each time is then given by $N = F_{out} / F_{clock} * 2^{32}$ For an output of (almost) exactly 8.98kHz with a 100kHz clock, N is 8980/100000 * 2^{32} = 385688063 or, expressed in hexadecimal, 0x16FD21FF.

The PIC's internal clock can run at up to 5MHz, which is the rate at which instructions can be executed. If we want to generate a waveform by sampling at 100kHz, an absolute maximum of just 50 instructions can take place during each sampling instant. Several instructions are used up just processing the interrupt and forcing the timer-counter to divide by 50, without contributing to waveform generation. So is it possible using a PIC's internal 8 bit architecture to implement a 32 bit addition, table lookup and output to a D/A converter in less than about 40 clock cycles? Yes it is – just.

THE ALGORITHM. The registers in the PIC are 8 bits wide so four are concatenated into a 32-bit accumulator – we'll call these D3 through to D0. Four more registers, F3/2/1/0, hold the value N determining the frequency. For a single wanted tone these remain unaltered. Every interrupt cycle (at 100kHz for a 20MHz oscillator) the value in the F registers is added to the accumulated D3 – D0, which just overflows back to zero when its maximum count is reached. The most significant byte stored in D3 alone is then used as the address for the sine lookup table. The resulting 8 bit value is placed on the PIC's 8 bit parallel output Port B.

The 32 bit addition, table lookup and output can be managed in about 35 clock cycles within the interrupt service routine, leaving a small amount of spare capacity. The complete listing can be found at **[3]**.

DAC. Digital to analogue converter chips are readily available at low cost and an eight-bit one suitable for this project would be the venerable DAC08 device. But, as this chip consists of little more than a chain of resistors

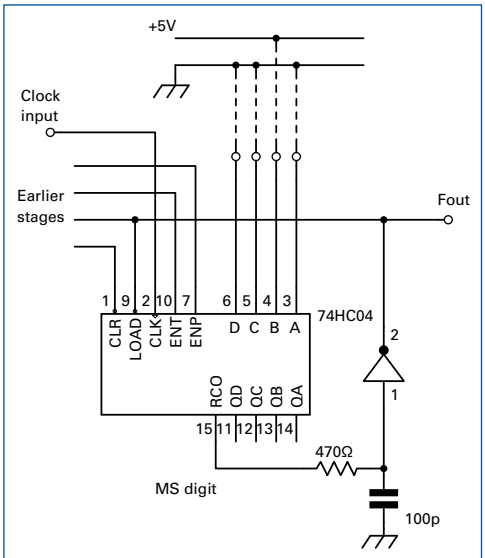

FIGURE 1: Modification needed to add a delay to the 74x161 programmable divider shown in September 2010 Design Notes to cure race pulses and resulting incorrect operation.

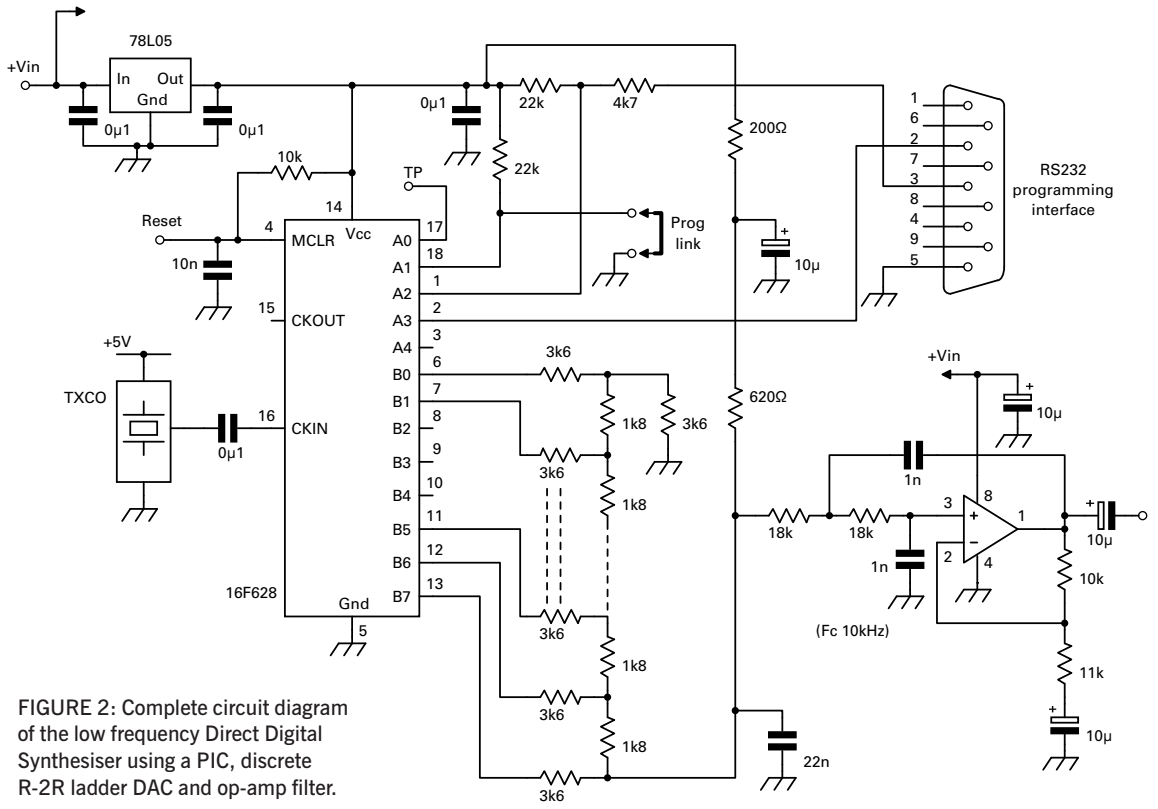

FIGURE 2: Complete circuit diagram of the low frequency Direct Digital Synthesiser using a PIC, discrete R-2R ladder DAC and op-amp filter.

and an input latch – and a latch is already present on the PIC – why not just use a chain of resistors? A ladder made up of resistor pairs in the ratio of 1:2 can be used to make a DAC of any reasonable length. The only proviso is that each drive signal, or individual connection of the input word, must switch between zero volts and a fixed reference and have a negligibly low output resistance when compared with the resistors making up the ladder. CMOS outputs, especially those on PIC devices, fulfil this requirement. They switch between 0V and Vcc (usually 5V) with about 10Ω of internal resistance. So the 8 bit Port B output from the PIC can directly drive the 16 1.8kΩ and 3.6kΩ resistors that make up the chain at even lower cost than a custom DAC.

AMPLITUDE RESOLUTION AND SPURII.

The restricted table-lookup capabilities of this baseline PIC family mean that tables with more than 256 entries and more than an 8 bit output word are complicated to arrange. Also, they would not fit into the limited amount of clock cycles I had allowed. However, for simple audio and VLF purposes, the 8-bit DDS table would probably be adequate. There is a rule of thumb for all DSP that says spurious and quantising noise levels will lie at roughly 6.N dB below full scale, where N is the number of bits. So, very crudely and approximately, an 8 bit lookup table ought to give about -48dBc spurs.

The DDS concept works best where output frequency is kept lower than a quarter of the clock. It cannot, in any case, ever go above half the clock rate due to the Nyquist sampling criteria [2], **[4]**. For a simple 8 bit table like this it is probably better to stay below one-sixth of the clock. (In any case, I wasn't interested in frequencies above 10kHz as these can come from an existing RF signal generator.)

OUTPUT FILTER.

The DAC output now has to be filtered to remove alias products and spurii above 10kHz. A single stage, third order opamp filter can do the job admirably. The R-2R ladder maintains a constant output impedance of R – which here is set at 1.8kΩ – whatever the output voltage. Biasing the output opamp filter and output levels ideally needs the output from the ladder to have its DC level raised and its 0-5V amplitude range attenuated. This is done by adding a 620Ω pull up resistor to 5V, via another 200Ω decoupled to prevent noise on the 5V rail appearing directly in the audio path. The result is an output impedance of 461Ω and a peak to peak waveform amplitude of 1.28V superimposed on a mean DC level of 3.44V. The first stage of filtering comes from the 22nF capacitor from between the output of the resistor ladder to ground for a first stage cutoff at 15.6kHz The opamp filter, whose values are taken from standard tables, has an underlying gain of 2.1 times. This results in an output of 2.7V peak-peak, or very close to 1V RMS.
The values shown give a cutoff at 10kHz, but a higher frequency would be possible by proportionally reducing the value of the two 1nF capacitors and/or the 18k resistors if some degradation in spurii at the upper frequency band is accepted.

RESULTS.

Photo 1 shows the generated and filtered waveform at 8.9kHz with its close-in spectrum in **Photo 2**. Spurii are typically -50 to -70dB individually, but, as with any DDS, their actual frequency and spread is unpredictable. All we can really give is an upper limit to their magnitude, and here they are comfortably below the -48dBc predicted from the 6.N dB rule-of-thumb. The relative power of all the spurii when combined over the full audio band probably do amount to about the expected value.

SOFTWARE.

The PIC code for the DDS to generate a single frequency can be found at [4]. The archive also contains a more complex version of the software with two stored frequencies that can be selected externally for Frequency Shift Keying, These can be updated under RS232 serial control with auto baud rate determination allowing for arbitrary choice of PIC clock. Full details are supplied in the accompanying documentation, including the PCB layout shown in **Photo 1**.

WEBSEARCH
[1] Microchip PIC range: www.microchip.com
[2] Data, RadCom August 2005
[3] PIC Software and documentation: www.g4jnt.com/PIC_DDS.zip
[4] http://en.wikipedia.org/wiki/Numerically-controlled_oscillator

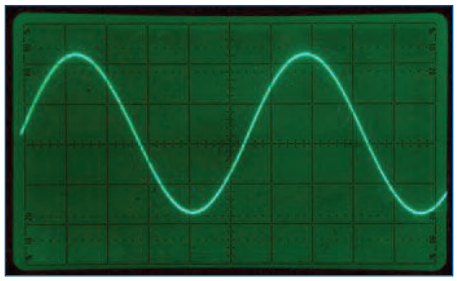

FIGURE 3: Oscillogram of the PIC DDS sinewave output.

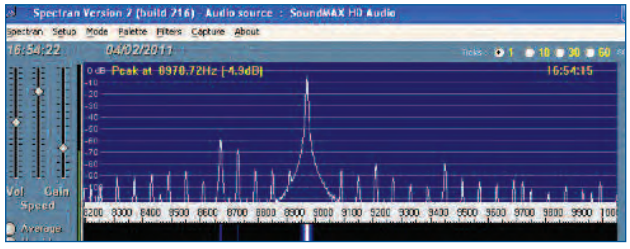

FIGURE 4: Spectrum of the PIC DDS sinewave output.

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Kuhne MKU 432 G2

High performance 70cm transverter for 28MHz IF

PHOTO 1: MKU 432 G2 transverter in its 'German silver' case.

INTRODUCTION. Kuhne Electronics (DB6NT) recently introduced a new 70cm (432-434MHz) transverter to their already comprehensive range. The MKU 432 G2 works with a 28 to 30MHz transceiver, features a high dynamic range receive converter and a low power, low distortion transmit converter. It is clear that the MKU 432 G2 is aimed at the high performance end of the VHF/UHF amateur market, since it will require a suitable power amplifier, masthead preamplifier and 10m transceiver to complete the system.

The transverter is housed in a 'German silver' box, 150 x 55 x 30mm. There are two SMA RF connectors on one end and an SMA IF connector on each of the long sides. There are two slide switches to select different intermediate frequency (IF) interface operating conditions. A transmit gain control is accessible through a hole in the top of the box; a plastic adjustment tool is provided. There are many transmit level options and the documentation includes recommended settings for a number of popular Elecraft, Flexradio, Icom, Yaesu and Kenwood HF transceivers.

Frequency stability is taken care of with a small active crystal heater that maintains the 101MHz crystal at 40°C. Kuhne claims very low phase noise performance from the crystal oscillator, resulting in good receiver reciprocal mixing performance and potentially low transmitter noise.

BRIEF CIRCUIT DESCRIPTION. Most transverters work in a similar way, taking the output from a transmitter and mixing it with a local oscillator (LO) to the wanted frequency. It is then filtered to ensure a clean output spectrum and amplified to the required output power. On receive, incoming signals are filtered and mixed down, using the same LO as for transmit. The rest of the transverter typically consists of switching, sequencing and signal monitoring stages. Great care has been taken with the MKU432 G2 to optimise each of the stages of the transverter in order to achieve the best possible performance.

A low noise two-stage Butler overtone crystal oscillator is employed, a configuration used in several other designs. This configuration has the virtue of reliable on-frequency operation and fairly respectable phase noise performance. The overtone crystal is held at a constant 40°C by a proprietary Kuhne Electronics QH40 crystal heater. A good quality ceramic piston trimmer is used to tune the crystal to 101.000MHz.

The output of the oscillator is buffered by a junction field effect transistor (FET) in common gate configuration for low input impedance. A bipolar transistor frequency quadrupler follows, its output tuned to 404MHz by a two-stage helical filter. Finally the 404MHz is amplified by a microwave monolithic integrated circuit (MMIC) to a level of approximately 50mW before being diode switched to either the transmit or receive high level diode ring mixers. Three voltage regulators ensure that the oscillator stages, QH40 and frequency multiplier and MMIC stages are protected from operating voltage changes.

Two IF connectors are provided, allowing for switching flexibility. The transverter can be configured for use with either a single IF connection for receive (28MHz IF out) or for separate transmit and receive connections to the HF radio (28MHz out for receive and 28MHz in for transmit).

A second switch inserts a low gain 28MHz MMIC amplifier into the transmit IF. When selected, this increases sensitivity to suit the low power transverter outputs from the popular Icom range of HF transceivers and the Yaesu FT-2000. A board-mounted potentiometer forms part of an adjustable transmit IF attenuator to permit fine

TABLE 1: Specifications and measured results for the review MKU 432 G2 transverter.

MKU432 G2	Manufacturer	Measured	Comments
Receiver			
Noise figure	1.1dB	1.1dB	Increased to 1.2dB after several minutes as the unit warmed up
Gain	24.5dB	24.8dB	
Output 3rd order intercept (OIP3)	+23dBm	+23.5dBm	-1.3dBm input third order intercept (IIP3)
Image rejection	Not specified	57dB	
Blocking	Not specified	-8dBm	For carrier at 390MHz (Tetra base station)
Input return loss	Not specified	5dB	Measured at -30dBm input
Frequency stability			
Switch on + 1 minute	Not specified	-220Hz	Reference frequency 404.000MHz
Ambient temperature 17.5°C			
Switch on +30 minutes	Not specified	-312Hz	
Switch on +40 minutes		-325Hz	With 10 minutes 50/50 Tx/Rx cycling
Oscillator phase noise at 10kHz	<-140dBc	Not measured	
Transmitter			
Output			
Saturated	>160mW	>160mW	160mW is +22dBm
3rd order IM at 50mW PEP out	-30dB	-39dB	33dB below either tone at 50mW PEP out
5th order IM at 50mW PEP out	Not specified	-50dB	44dB below either tone at 50mW PEP out
Harmonics			
2nd	>25dBc §	-13dBc	Measured at 70mW single carrier output
3rd	>25dBc §	-15dBc	
4th	>25dBc §	-24dBc	
Non harmonic			
Image		>-70dBc	
LO leakage		>-70dBc	
Current consumption	370mA typ.	365mA	

Notes: Single frequency measurements at 432.2MHz. Two-tone measurements with 50kHz tone (carrier) spacing. § carrier level not specified.

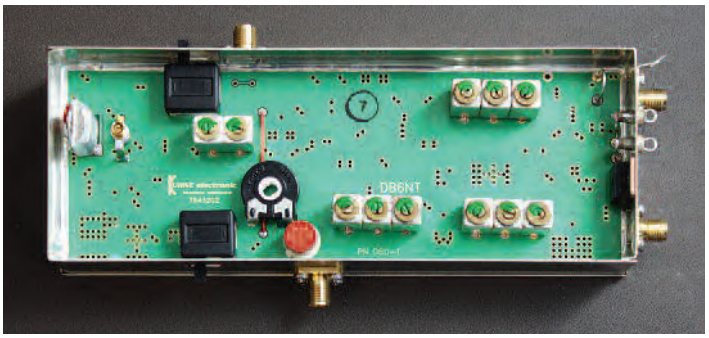

PHOTO 2: Top side view of the transverter showing the extensive filtering and the 101MHz crystal with its QH40 heater.

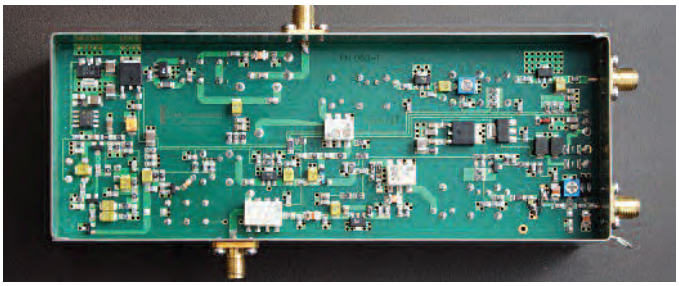

PHOTO 3: Component side view of the transverter PCB. The two mixers are the white rectangles near the centre of the board. The third, larger white component is the transmit IF amplifier bypass relay. The transmit output connector is on the lower left.

adjustment of the input level.

All three ports of the transmit ring mixer are connected via chip resistor attenuators to ensure a good match to the mixer. This improves intermodulation (IM) performance. The receive mixer LO and RF ports are similarly matched but a diplexer is used on the IF port, presumably to reduce the mixer's overall conversion loss and reduce the level of 404MHz conversion oscillator feedthrough.

Two 3-pole helical filters and two MMICs are used in the transmit converter path. The transmit power output is quoted as 70mW minimum with IM quoted as -30dB at 50mW peak envelope power (PEP). The test certificate that came with the review transverter shows 160mW saturated power output. This may seem very low but it is perfectly matched to the input requirements of modern power amplifier modules such as the Mitsubishi RA18H1213G. It also meets the drive requirement of Kuhne's 60W and 120W power amplifiers. There is no provision for output power monitoring.

It was not possible to determine what device has been used in the receive converter front end because it was covered with some form of conformal coating. However the circuitry suggests it is a low noise pseudomorphic high electron mobility transistor (P-HEMT) such as the ATF54143. These are an excellent choice for 432MHz receiver front ends as they are able to provide a low noise figure at the same time as high dynamic range. Active bias is used to maintain a constant high bias current with wide temperature changes. Back to back diodes across the input provide some protection again damage by high level signals.

A three stage helical filter ensures that only 432MHz in-band signals reach the mixer. The transmit and receive mixers are both Minicircuits ADE1H level 17 mixers (17dBm LO power). The receive mixer is followed by a MMIC post mixer amplifier. Overall receive converter gain is fixed at approximately 25dB.

Receive to transmit switching is a little unusual in that it is necessary to connect +12V to the transmit input (+12V TX) to change from receive to transmit. A P-channel MOSFET device switches off the receive supply whilst leaving the local oscillator chain powered up. There is no press to talk (PTT) input or facility to switch to transmit by applying a positive voltage over the IF connection, a method commonly used with 144MHz transceivers to switch microwave transverters.

Many modern multiband transceivers do not go below 5W, but there is no provision for attenuating high input levels. To be fair, many of these transceivers already include 70cm, so you would probably not use an external transverter.

The +12 volt transmit supply should ideally be supplied direct from the IF transceiver. In practice this may not be possible without resorting to the use of an external relay (or transistor/MOSFET) switch. The transverter documentation shows two possible configurations: one for the Kenwood TS-850, which has a suitable relay built in; the other for the Elecraft K3, showing how an external relay should be connected to provide +12V to the MKU432 G2 on transmit.

Finally, the separate transmit IF input incorporates a 50mA fuse to provide some measure of protection against accidentally applying too much RF to the transverter. Incidentally, I noticed a small matching capacitor across this input that is not shown on the supplied circuit schematic diagram. **Photos 1** and **2** show the top side of the transverter and the component side, respectively.

MEASUREMENTS. The results of my measurements on the MKU 432 G2 are shown in **Table 1**. These are shown alongside the manufacturer's claimed figures, where appropriate. Note that all such measurements are subject to some degree of measurement uncertainty. There can be small differences in results due to different measurement techniques or equipment calibration status. This should be borne in mind when comparing numbers in Table 1. Only the transverter output IM differs significantly and this may be attributed to a difference in specification interpretation.

Overall the MKU 432 G2 performed as the manufacturer claimed, with an outstanding receiver dynamic range. To put this in context, there are currently few HF transceivers with a 10 metre input third order intercept (IIP3) greater than the order output third intercept (OIP3) of the receive converter. With a transverter OIP3 of +23dBm the following HF transceiver would need to exhibit at least 6dB better (+29dBm) IIP3 to have minimal impact on the overall receiver system input intercept.

Assuming that the HF transceiver can achieve an IIP3 of +29dBm then the receiver system (MKU 432 G2 plus HF radio) will exhibit an IIP3 close to that of the transverter, ie -1.3dBm. This is an excellent figure that cannot be matched by any current multiband transceiver with 70cm capability.

With such a good IIP3, other aspects of the transverter become even more important. The use of the low phase noise (PN) Butler crystal controlled local oscillator will reduce problems from reciprocal mixing as far as the transverter is concerned, although lower PN in the following HF transceiver may be a limiting factor.

Although the manufacturer does not specify a figure for receiver blocking, this can be important for 432MHz receivers. The biggest problems often come from nearby Tetra (390MHz) digital base stations. There are many of these in the UK, so it is quite possible that you may have one close by. I felt it was worth measuring the blocking performance of the MKU 432 G2 receive converter when receiving a moderate level 432MHz in-band signal.

Two signal generators were combined. One was set to produce a signal at -60dBm at 432.2MHz. The level of this was observed at the MKU 432 G2 28MHz IF out using a spectrum analyser. The second generator was set to produce an unmodulated carrier at 395MHz. The level of the 395MHz carrier was slowly increased until the 28.2MHz carrier at the IF output was reduced in level by 3dB. The level of the 395MHz 'Tetra' carrier required to cause this level of blocking was -8dBm at the MKU 432 G2 receive converter input.

Once again, this is an excellent figure. The user should be aware that adding a preamplifier will degrade the overall receiver system dynamic range, including blocking, unless extra filtering is used. Use additional gain with care! The transmit converter easily met the claimed -30dB third order intermodulation specification at 50mW PEP output. Indeed, the margin was such that I wonder if the specification was actually for 3rd order IM measured with respect to either of the two tones? Fifth order IM was

measured at -53dB at 50mW PEP output. **Photo 4** shows the transmit converter output spectrum at 50mW PEP.

These are exceptionally good results and demonstrates how linear the transmit chain is. Any following power amplifier will almost certainly degrade the overall transmitter IM performance.

Saturated output was measured at over 160mW. I was nervous of damaging something at higher levels, but I suspect it might have reached 200mW. Above 70mW (single tone) the level of the harmonic output was quite poor. This is not unexpected and, if the transverter were used with an add-on high power amplifier, this would need a suitable low pass filter at the output.

The output non-harmonic spectrum was clean with both image and LO leakage well below 70dBc.

ON AIR PERFORMANCE. I took the opportunity to test the MKU432 G2 during the February RSGB 432MHz AFS contest. Lacking a suitable HF-only transceiver I used my Kenwood TS-2000X as the IF radio. The MKU 432 G2 was used only for receive as I didn't have time to interface it to my high gain 80W solid state power amplifier (SSPA). The antenna was my Wimo 23-ele Yagi at about 9m AGL.

The transverter was used without an additional preamplifier. During sixty minutes of casual listening, spread over a two hour period, I listed 26 stations heard. All of these were in the UK with the best at about 300km. No problems were experienced from a very strong local station, at about 9km. At a spacing of less than 5kHz a much weaker station remained perfectly readable. This says as much about the excellent quality of the signal from my neighbour's transmitter as about the transverter.

CONCLUSIONS. The MKU 432 G2 is an excellent transverter for the serious 70cm band operator. It was designed to be used as part of a system and, in order to achieve its full potential, it requires a suitably high performance HF transceiver. Using this transverter with many older designs of HF transceiver will waste transverter performance.

432MHz is a great amateur band and in recent months I have detected increasing numbers of users. Much of this is due to interest in the RSGB UKAC contest, held on the second Tuesday evening of each month, with lots of other weekend contests and a useful amount of enhanced propagation to make life interesting.

Increasing activity means more signals and QRM. The MKU 432 G2 and a good HF band transceiver (and antenna) will ensure that you will continue to hear weak stations even alongside strong, clean, transmissions from other amateurs.

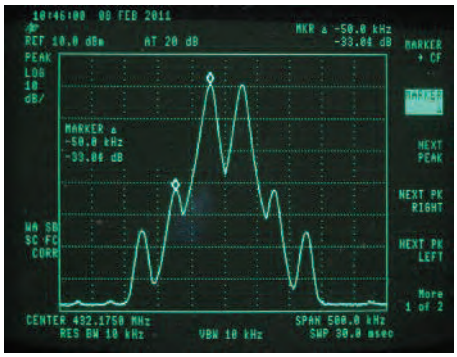

PHOTO 4: Spectrum of the MKU 432 G2 at 50mW PEP output (two tones, one each at 432.150MHz and 432.200MHz). Third order IM is 33dB below either of the two tones. Fifth order IM is 47dB below either of the two tones whilst 7th order IM is barely visible. Note that a 10dB attenuator is fitted between the transverter and the spectrum analyser. Each of the two tones is at +11dBm (12.5mW) at the transverter output. This is +17dBm PEP (50mW).

I would like to thank Kuhne Electronic for the loan of the review transverter. The MKU 432 G2 is available from Kuhne Electronic GmbH in Germany, www.kuhne-electronic.de and the current price is €425.

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Dualband Antenna
Hand Strap & Handbook

Wouxun KG-679E/2M 2m FM Handie

Also available for 70cm! See below.

- ✓ 5W RF output
- ✓ English voice guide to under 5W RF
- ✓ 144-146MHz 2m Amateur Band (136-174MHz capable)
- ✓ 8 groups scrambler
- ✓ Channel name edit available
- ✓ High/Low power can changeable by top key
- ✓ VOX (Level adjustable)
- ✓ DTMF encoding and DTMF decoding
- ✓ 105 groups D.C.S/50 groups CTCSS
- ✓ DCS/CTCSS of RX and TX can be set respectively
- ✓ Reverse frequency function
- ✓ Busy channel lockout
- ✓ Distant alarm
- ✓ NI (Caller ID)
- ✓ Multi scan mode (TO/CO/SE)
- ✓ Inspection, monitor, stun, kill and emergency alarm
- ✓ All calls, group calls and selective calls
- ✓ Calling ring and ring overtime auto answer
- ✓ Multi silent mode (QT/QTADT/QTXDT)
- ✓ Channel steps (5K/6.25K/10K/12.5K/25K)
- ✓ Wide/Narrow bandwidth selection (25KHz/12.5KHz)

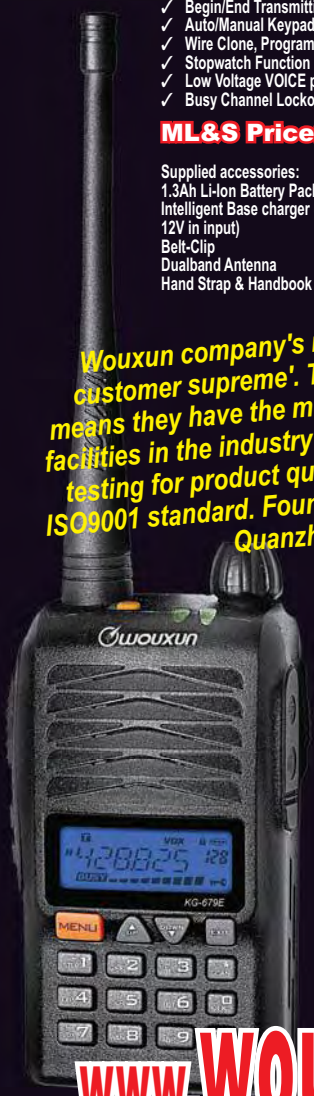
ML&S Prices:

KG 679E/2M..... £59.99
KG-679E/U 70cm
(400-470MHz)..... £59.99

or with Voice Scrambler KG-689E/U .. £69.99

Supplied accessories:
1.3Ah Li-Ion Battery pack (5W)
Intelligent Base Charger (110V-240V & 12V in input)
Belt-Clip
Dualband Antenna
Hand Strap
Handbook

Wouxun company's motto is 'Quality first, customer supreme'. To their customers this means they have the most advanced production facilities in the industry and do the most rigorous testing for product quality in order to meet the ISO9001 standard. Founded in 2000 and located in Quanzhou, China.



Wouxun KG-699E/4M 4m FM Handie

- ✓ 5W RF output
- ✓ English voice guide to under 5W RF
- ✓ 70-70.500MHz 4m Amatuer Band (66-88MHz capable)
- ✓ Dual display and standby modes
- ✓ 128 Memory Channels
- ✓ 8 Groups Scrambler
- ✓ Channel Name Edit Available
- ✓ High/Low Power can be changeable by Top Key
- ✓ VOX (Level Adjustable)
- ✓ DTMF Encoding and DTMF Decoding
- ✓ 105 Groups D.C.S/50 Groups CTCSS
- ✓ DCS/CTCSS of RX and TX can be set respectively
- ✓ Reverse FrequencyFunction
- ✓ Busy Channel Lockout
- ✓ Distant Alarm
- ✓ ANI (Caller ID)
- ✓ Multi Scan Mode (TO/CO/SE)
- ✓ Inspection, Monitor, Stun, Kill and Emergency Alarm
- ✓ All Calls, Group Calls and Selective Calls
- ✓ Calling Ring and Ring Overtime Auto Answer
- ✓ Multi Silent Mode (QT/QTADT/QTXDT)
- ✓ Channel Steps (5K/6.25K/10K/12.5K/25K)
- ✓ Wide/Narrow bandwidth Selection (25KHz/12.5KHz)

ML&S Price: £92.99

Supplied accessories:
1.3Ah Li-Ion Battery Pack (5W)
Intelligent Base Charger (110V-240V & 12V in input)
Belt-Clip
Dualband Antenna
Hand Strap
Handbook

www.WOUXUN.co.uk

Don't forget Wouxun have a complete range of Handies available for Commercial and Ham. Call for details.

WO/BLO-004 1700mAh Li-ion BatteryPack £19.99

WO/BAO-001 'AA' Battery Pack £9.99

WO/ELO-001 Eliminator £9.99

WO/CCO-001 Car charger £9.99

WO/SMO-001 Mic/Speaker £14.99

WO/PSO-110 Programming Software and USB Programming Cable £19.99

WO/CASE Leatherette case £9.99

WO/AAO-002 BNC Socket to SMA plug antenna adapter £4.99

WO/AAO-001 SO-239 socket to SMA plug antenna adapter £4.99

WO/CHO-004 110-234v AC & 13.8v DC spare charger (allows radio & spare battery to be charged at same time) £22.95

WO/CHO-006 Six-way charger £149.99

Full range of Nifty Equipment Manuals and Quick Reference Cards for Yaesu, Icom, Kenwood, Elecraft & Ten-Tec radios available from stock.

KENWOOD

AVAILABLE FROM STOCK
£1489.95

New TS-590S HF/6m Transceiver

FREE MC-60A DESK MIC worth £118!

Peter Hart says: "I found the radio friendly, intuitive & easy to use"

For further information see our website: www.hamradio.co.uk

TS-2000X

Flagship HF-23cm All Mode Base Station.

This really is a total shack in a box.

SPECIAL OFFER ONLY £1679.95

Kenwood HF Products

TS-480SAT	Remote head HF/6m 100W inc ATU Transceiver	£779.95
TS-480HX	200Watt version of above, no auto-ATU	£879.95
TS-2000E	100Watt all mode HF/2/6M with auto-ATU etc	£1439.95
TS-2000X	As above but fitted with 10Watts on 23cm (all mode)	£1779.95

Kenwood V/U Products

TH-F7E	The only 2/70 FM Handie with SSB/CW WB Receiver	£235.95
TM-V71E	First Class 2/70 FM Mobile with remote head	£299.95
TM-D710E	The only 2/70 FM Mobile/Base with APRS/TNC etc	£445.95

ICOM

IC-7000

Icom HF Products

IC-718	Basic HF Radio, 12V, 100W output	£539.95 (whilst stocks last)
IC-7200	Mr T's choice for tough HF/6M Operation	£837.39
IC-7000	Full DSP, TFT Screen, 100W HF/6m + 2/70	£1189.95
IC-7600	100W, Twin RX, Huge Display. No psu	£3299.95
IC-7700	Superb 200W HF/6M Base, PSU/ATU	OUR DEMO BOXED etc £4995
IC-7800	Icom's Flagship radio has gone up again	£Call! - we usually have immaculate used available.
IC-PW1Euro	1kW Fully automatic HF/6m Linear Amp	£Call!!

Icom Receivers

IC-R9500	Flagship Base Receiver, 50kHz-3335MHz	£Call!!

Icom V/U Products

IC-V80E	**NEW** 2m Handie 5W	£105.00
IC-T70E	**NEW** 2/70 Dual band Handie 5W, compact	£158.25
IC-E80D	**NEW** D-Star Handie 500kHz-1GHz, RX built in	£329.95
ID-E880E	**NEW** D-Star Mobile. D-Star as standard	£439.10
IC-E90	6/2/70 FM handie	£239.95
IC-E90/4m	6/4/2/70 version of this popular handie	£299.95
IC-E92ED	As above c/w D-Star fitted & splash–proof	£388.95
IC-E2820	Proper dual band, dual display, remote etc	£489.95
IC-E2820+D	Supplied with UT-123 D-Star board	£649.95 (whilst stocks last)
IC-910H	Multimode 2/70 Base Station	£1296.96
IC-910X	As above but with optional 23cm UX-910	£1549.95

NEW Icom IC-9100 All-Rounder HF through to 23cms Base Transceiver

Price: £TBA.
To arrive early April!

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

- HF/50MHz 144/430(440)MHz & 1200MHz coverage
- SSB, CW, RTTY, AM, FM & DV modes
- 100W on HF/50/144MHz, 75W on 430(440)MHz. 10W on 1200MHz
- 32-bit floating point DSP & 24-bit AD/DA converter
- Double superheterodyne with image rejection mixer
- Optional 3kHz/6kHz 1st IF (roofing) filters (for HF/50MHz bands)
- Satellite mode operation
- Optional D-STAR DV mode operation

Icom IC-7600 £3299.95

This new Mid-range HF base station from Icom has arguably the best screen for user interface in the business. Successor to the IC-756Pro3.

New! Solid State Amplifiers from RM!

BLA-1000. £2799.95

Flagship 1kW key down all mode HF Linear Amplifier with built in PSU.

Full range now in store. See web for details.

FACTORY APPOINTED DEALER for FLEX

The entire FLEX Range is now on demonstration in the ML&S Super Store!

Flex 1500 SDR	Low cost SDR Transceiver, connect via USB & you have 5W 160-6m!	£599.95
Flex 3000 with ATU	100 Watt SDR 160-6m with Auto ATU fitted.	£1299.95
Flex 5000A	Flagship 100W SDR Base 160-6m	£2495.95
Flex 5000A-ATU	Same as 5000A but built-in Auto ATU	£2795.95
Flex 5000A-ATU+Twin RX	as above but with second receiver	£3434.95

Software Defined Reciever

RFspace

ML&S are pleased to announce their appointment as distributor for RF Space Inc SDR-IQ™ Software Defined Radio, Spectrum Analyzer and Panoramic Adapter. Now available from stock.

IF-2000

IF Interface board for the FT2k & FT-950. £219.95
See http://www.hamradio.co.uk/acatalog/RF_Space.html for more details.
Both on DEMO at Chertsey.

Want to dabble in D-Star without the expense of a radio?

DV-AP-Dongle

The DV Access Point Dongle, (DVAP for short) by Internet Labs, provides a way to connect to the international D-Star network. The DVAP is used with a PC/Mac and an Internet connection. Unlike the DV Dongle, the new product allows amateur radio operators to walk away from the computer and transmit/receive D-Star voice and data using a two meter D-Star radio. Note that a D-Star radio is required to communicate with the DVAP and an Internet connection is required to communicate with the D-Star network. **NOW IN STOCK! £219.95.**

DV-Dongle

The DV Dongle connects to your PC or Apple Mac via a USB port and provides encoding and decoding of compressed audio using the DVSI AMBE2000 full duplex vocoder DSP chip. AMBE technology is used in all D-Star radios to provide efficient voice transmissions. It is also used in some HF digital protocols by vendors like AOR. The DVTool application used with the DV Dongle may be installed and run on Microsoft Windows XP/Vista, Mac OS X Leopard, or many flavors of Linux.

In stock, works with MAC or PC. Price Breakthrough! £169.95

See www.hamradio.co.uk for more details on all of these items ... and much, much more! E&OE

Open six days a week. Mon - Fri: 9.30am - 5.30pm Sat: 9.00am - 4.30pm

ML&S martin lynch & sons
The World's Favourite Ham Store

Outline House, 73 Guildford Street, Chertsey, Surrey KT16 9AS
Tel: 0345 2300 599
(Local Call Number) Tel: 01932 567 333 (Direct Dial Number)
Web: www.hamradio.co.uk
E-mail: sales@hamradio.co.uk

New! GAP Antennas Available from stock

Eagle-DX 6-Band, 40-10m 2kW	Only £325.95
Titan-DX 8-Band, 80-10m 2kW	Only £345.95
Voyager-DX 4-Band 160-20m, 2kW 45ft tall!	£385.95
Challenger-DX 8-Band 80—2m (no 17)	£295.95

Isotron!

Free Carriage if you quote RadCom when ordering

The most compact 1kW HF Antenna ever!

After 30 years of manufacture and Hot from the USA, these very clever compact antennas are available for all the HF bands. They are easy, quick and simple to install. Tunes & performs without radials or antenna tuners.

The full range can be viewed on our web-site and prices start from only £105 through to £265 for the "Combo's".

Mark, G8AWO showing off the assembled 10/15/20 & 40/80m Combo Isotron's before mounting on the roof at ML&S HQ.

AirNav Systems

The Most Trusted Name In Flight Tracking

The New RadarBox is now available from ML&S!

Radar Box-3D £489.00
Radar Box-Pro £399.00

There is more excitement amongst RadarBox users and potential users now that the 3D version of the RadarBox is now available. This radical software upgrade brings to life the RadarBox with superbly detailed Google Earth mapping overlay. This is a major advantage that puts RadarBox firmly on top of it's competitors. Just look at these crisp, clear screenshots with the pictures of the aircraft in 3D and their precise position shown on the map. RadarBox has always given the best graphics of any system, and this latest addition really underlines the superiority of RadarBox. Known as RADARBOX-3D this complete system is available from all good communications dealers around the world. There is also an upgrade disc available for all existing users of RADARBOX-PRO, order this upgrade as RADARBOX-UG. RADARBOX-PRO is still available for those users who want a radar decoder without Google Earth and 3D.

NEW AT ML&S

ML&S have installed three 42" Hi-Res monitors to demonstrate Virtual Radar and SDR receivers. When you are next passing Chertsey, pop in for a demonstration.

See web site for full specifications

HUSTLER

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

4-BTV	40/20/15/10m	£183.78
5-BTV	80/40/20/15/10m	£224.63
6-BTV	80/40/30/20/15/10m	£265.48

Mobile Range
200W or 1kW, both stocked. RM10 to RM-80 10M to 80m single-band whips. £24.95 to £56.95
The full mobile and base range and accessories available from stock, including the high power 1kW mobile range.

DX Engineering Products stocked at ML&S!

The DX Engineering DXE-AOK-17M kit adds 17 meter coverage to the Hustler BTV series of vertical antennas without giving up any existing band coverage. This kit will operate across the entire 17m band with an SWR of 1.5:1 or less.

No disassembly of the existing antenna is required, simply bolt this kit over the 10m trap, make some minimal tuning adjustments and you're on the air with an additional band..... **£71.44**

DXE-UT-8213 Coax Cable Stripper ONLY £45.99!

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

HF Linear Amplifiers

Yaesu VL-1000 Quadra	£4099.95
Icom IC-PW1Euro	£4145.95
Ameritron ALH-811HXCE	£919.95
Linear Amp Ranger 811HXCE	£1295.95
Linear Amp Ranger 572B	£1395.95
Linear Amp Challenger Mk1V	£2449.95

COMET

Comet SWR/Power Meter

CMX 2300	2 separate SWR/Power Meters in one box!	£153.21

Comet Antenna Tuner

CAT-300	300W Antenna Tuner	£194.08

Comet Wide-Band Vertical

NEW! Comet CHA 250BKII
80m to 6m with no ATU and no gaps..... £299.95

Comet Rotary Dipole

H-422	4 Band trapped dipole	£275.82

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
GP3	144/430 MHz 4.5 / 7.2dbi 1.78m	£69.95
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	£139.01

Comet Handy Antennas

BNC-750	BNC HF whip 7-50MHz TX/RX	£81.69
CH32	BNC 144/433/900Mhz 45mm	£20.39
CH-99	BNC Tel Whip 70-1000MHz 195-1135mm L	£20.38
CHF816	16 3.5/28/50MHz 74cmL 10W/Yaesu FT817	£51.03
RX5	144/430/900MHz 44cm L 8W SMA	£30.60
RX7	144/430/900MHz 44cm L 8W BNC	£30.60
SH95	144/430/1200MHz 37cm L 10W BNC	£30.60
SMA3	144/430/900MHz 25cm L 10W SMA	£25.50
SMA99	70-1000MHz 1.1mm max L Tele SMA	£17.32

Comet Duplexers

CF360A	28/50MHz w/leads SO239 - PL259/PL259	£40.82
CF416A	44/430MHz w/leads SO239 PL259/PL259	£35.71
CF416B	144/430MHz w/leads SO239 PL259/N male	£35.71
CF503C	50/144MHz Sockets SO239 - PL259/PL259	£45.93
CF530C	50/144MHz w/leads SO239 - PL259/PL259	£45.93
CF530A	50/430MHz w/lead PL259 SO239/SO239	£40.825
CF4160B	144/430MHz Sockets SO239 PL259/PL259	£33.66

Comet Triplexers

CFX431A	144/430/1200MHz N socket/PL259/N/N	£51.03
CFX514N	50/144/430/MHz SO239/PL259/PL259/N	£51.03

NISSEI

One of the oldest names in Ham Radio

Nissei	RX-103	1.6-60MHz, 20/200/2kW	£49.95
Nissei	RX-203	1.8-200MHz, 2/20/200W	£49.95
Nissei	RX-403	125-525MHz, 2/20/200W	£49.95
Nissei	RX-503	1.8-525MHz, 2/20/200W	£69.95

New Range to ML&S, HUGE DISPLAY, PEP & Average reading.

Nissei	TX-102	1.6-200MHz, 2/20/200W	£59.95
Nissei	TX-402	125-525MHz, 2/20/200W	£59.95
Nissei	TX-101A	1.6-60MHz, 20/200/2kW	£84.95
Nissei	TX-502	1.6-525MHz, 2/20/200W	£89.95

Microbit RRC-1258mkIIS

NEW

A complete remote control system for Amateur radio.
Microbit1258mkIIS: £399.95. Leads included.
www.hamradio.co.uk/rrc-1258.shtml

NEW VERSION OLD PRICE £399.95
A new version of the RRC-1258MkII which support Rigs with dual receivers is now available and will replace the existing RRC. Remote your rig anywhere in the world where you have an internet connection.

Base Antennas

X-30	2/70, 3/5.5dB, 1.3m Long	£69.95
X-50N	2/70, 4.5/7.2dB, 1.7m Long	£75.95
X-300	2/70, 6.5/9dB, 3.1m Long	£129.95
X-7000	2/70/23, 8.3/11.7/13.7dB 5m Long	£225.95
V-2000	6/2/70, 2.15/6.2/8.4dB, 2.5m Long	£109.95

Mobile Antennas

NR-770R	100W, 2/70, 3/5.5dB, .98m Long	£35.71
NR-770RSP	As above but spring loaded	£40.82
NR-7900	2/70, 3.2/6.4dB, 1.46m Long	£51.04

Duplexers/Triplexers

MX-72N	1.6-150/400-460MHz Duplexer	£45.94
MX-62M	1.6-56/140-470MHz Duplexer	£69.44
MX-610	HF/6+2+70 (for FT-8900)	£73.52
MX-2000	6/2/70 Triplexer	£85.78
MX-3000N		2/70/23 Triplexer

DIAMOND

Switches

CX-210A	2-way, SO-239 Die Cast	£47.98
CX-210N	2-way, N-Type, Die Cast	£74.54
CX-310A	3-way, SO-239, Die Cast	£83.74
CX-310N	3-way, N-Type, Die Cast	£109.28

SWR/PWR Meters

SX-100	1.6-60 MHz, 30W-300W-3KW	£132.78
SX-200	1.8-200 MHz, 5-20-200 Watts	£91.91
SX-1000	1.8-1300 MHz, 5-20-200 Watts	£230.87
SX-40C	144-470MHz X needle Mobile Meter	£88.85
SX-20C	3.5-150MHz X needle Mobile Meter	£88.85
SX-27P	COMPACT 144/430, 60W Portable Meter	£45.93

Huge selection of Diamond products always available ex-stock.

See www.hamradio.co.uk for more details on all of these items ... and much, much more! E&OE

MyDEL ML-5189

Only £148.95

With the massive increase in 4m activity thanks to the new Wouxun KG-699 4m handie, along comes this new 25W 4m mobile.

Why not add the new Wouxun KG-699E/4M Four Metre handie for only £90?

Includes FREE DTMF Mic

AS REVIEWED IN THIS MONTHS RADCOM

- Frequency: 70MHz - 4m Amateur band (66-88MHz)
- Output Power: 25W 250 channels, every channel can be named with 32 characters.
- CTCSS/DCS/DTMF/2Tone, 5 Tone decodes and encodes.
- Compander to reduce noise.
- ANI function (display missed calls) / PTT ID.
- Single call, group call, selective call and emergency

Accessories
Microphone - Mounting bracket - DC power cable with fuse holder - Hardware kits for bracket - QDM-01 Desktop MIC (option) - QHM04 DTMF MIC (option)

NEW Mini VNAPro
Now with Bluetooth!

Only £349.95

The new miniVNA PRO, the big brother of the well-known miniVNA, is an extraordinary and unique handheld vector network analyzer that makes available a multitude of new features and capabilities which are perfect for checking antennas and RF circuits for hams and commercial users.

MiniVNA original still available (without Bluetooth): £259.95

Tigertronics SL-USB

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

From only £99.95
Call to discuss your rig-to-cable requirements.

MyDEL POWER SUPPLIES

The neatest smartest looking desk top power supplies that money can buy. Ideal for powering any main rig or accessory requiring 13.8 Volts at up to 120 Amps.

New MyDel MP-30SW11

13.8V DC variable, metered, with rear facing terminals. Small, compact and very lightweight. **Only £84.95**

MP-925. £99.95
Linear PSU (Not Switch mode) 25-30Amps, 13.8V DC Variable, Metered with low current terminals for accessories. DC power supply.

MP-6A. £29.95
13.8V DC, 6A power supply.
Ideal for FT-817ND or most handhelds.

MP-8230 As used by CDXC. £69.95
13.8V DC, 25A power supply, switch mode.
Best Seller! NOW BACK IN STOCK!

MP-9626. £299.95
"The Brick"
120A, 13.8V DC power supply, switch mode.

MP-9600. £179.95
60A switch mode power supply.
Ideal for TS-480HX or other 200W output radio.

Alinco DM-330MW PSU. £99.95
The Alinco DM-330MW is a 30 AMP switch mode power supply. It is ideal for mobile/portable with its light weight and low noise.

Yaesu FP-1030A Linear PSU. £169.95
25-30Amp 13.8V fixed DC PSU, Twin meters, near silent running. 2 year Warranty

Yaesu Rotators
The best available at very special prices.

Only £319.95

G-450C The most popular medium duty rotator available today. ML&S always guarantee to have the largest stocks in the UK and of course the best prices. Cable extra.

G-550 Elevation rotator for satellite operation £299.95

G-5500 Heavy-Duty PC Controlled Vertical rotator for satellite and EME applications £589.95

G-650C Medium duty with higher brake torque than the G-450 ..... £359.95

G-1000DXC This new, high-performance rotator is ideal for heavy-duty applications. Its slim-line constructions is ideal for many crank-up tower installations. Rotation range: 450°, with presets £429.95

G-2800DXC Yaesu's top-of-the-line rotator is for extra-heavy-duty antenna installations. It includes Auto Slow Start and Auto Slow Stop features to avoid sharp jolts to the antenna array and tower. The G-2800A includes a mast clamp to simplify installation. Total rotation range: 450°, with presets £859.95

For the full range of the worlds most reliable Yaesu Rotator products, see our website.

WiNRADiO WR-G31DDC EXCALIBUR

A high-performance, low-cost, direct-sampling, software-defined, shortwave receiver with a frequency range from 9kHz to 50MHz.

£649.95

Perseus VLF-LF-HF Receiver

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

See Peter Hart's review in May 2010. "Currently my new No.1 in terms of close-in dynamic range"

ML&S are Sole Distributors for Perseus in the UK and Ireland NOW IN STOCK!

PERSEUS = Pretty Excellent Receiver for Software-Eager Unperceivable Signals
It features a 14 bit 80 MS/s analog-to-digital converter, a high-performance FPGA-based digital down-converter and a high-speed 480 Mbit/s USB2.0 PC interface.

MFJ Products

MFJ-16010	Random Wire ATU 160-10M	£69.95
MFJ-949E	Manual ATU metered, Dummy Load, 1.8-30MHz, 300W	£179.95
MFJ-901B	Manual Mini ATU 1.8-30MHz, 200W	£109.95
MFJ-971	Manual ATU metered, 1.8-30MHz, 200W	£118.95
MFJ-904H	Manual ATU, metered, inc balanced, 1.8-30MHz 150W	£149.95
MFJ-969	Manual Roller ATU Metered 1.8-54MHz, 300W	£209.95
MFJ-993B	Auto ATU Metered 1.8-30MHz, 300W	£249.95
MFJ-1786X	Magnetic Loop 10-30MHz, 150W	£429.95
MFJ-1788X	Magnetic Loop 7-22MHz, 150W	£469.95
MFJ-259B	Antenna Analyser 1.8-170MHz	£259.95
MFJ-269B	Antenna Analyser 1.8-450MHz	£349.95
MFJ-260C	Dummy Load 300W SO-239	£44.95

Lots more MFJ stocked! See web for details

See www.hamradio.co.uk for more details on all of these items ... and much, much more! E&OE

MyDEL AnyTone AT-5189

A user review of the 4m FM mobile transceiver

The radio arrives packaged neatly.

INTRODUCTION. 70MHz is rapidly expanding as an amateur allocation world wide as broadcasters and utility users move elsewhere within the radio spectrum. As a result, this has alerted major manufacturers to think again about producing a 70MHz facility in future radio design. Until now, the traditional way for getting on the air was for users to either build or convert a radio. Examples of suitable PMR transceivers are the Pye Ranger/ Europa and, in more recent times, the Ascom 550E and Phillips 1000.

The My-DEL AnyTone AT-5189 has been imported from China and has a frequency range of 68 - 88MHz. It boasts 250 memory channels and channel spacings of 25, 20 and 12.5kHz, however you can select frequency steps of 5, 6.25, 8.33, 10, 12.5, 20, 25, 30 and 50kHz.

When the rig arrived it was securely packaged within an illustrated box that also contained a microphone type QHM-02, a mounting bracket for either mobile or shelf fitting and a 12V DC cable. All AT-5189 sales now includes a DTMF microphone as standard. The cable is about 1.5m long and fitted with two 20A fuses, for which spares are supplied.

The operating manual is a 33 page booklet with good translation. The manufacturers provide a similar manual for their 70cm/2m models too. Unfortunately, it seems I ended up with the manual for the 70cm/2m model not the 4m model in the box. Not a problem, as many of the functions are similar, but it did mean I didn't have a technical spec to hand. This did not hinder me at all in understanding the functions and facilities, as the AT-5189 was easier to drive than some other radios I have used before.

The transceiver's dimensions are 160 (W) x 155 (H) x 40mm (D) in a wrap round metal case, so it's slightly larger than an FT-817.

BASIC FUNCTIONS. There is a multifunction capability, accessed through a simple orange coloured Function and Enter buttons. Switching on the AT-5189 is carried out by pressing the knob on the far left hand side of the front panel and a welcome message is displayed within a 16 bit two row dot matrix display with orange background.

The row of buttons from left to right on the front panel are FUNC, CALL, V/M, SCAN, ENTER.

FUNC: this orange button takes you to two sub menus. Shortcut operations allows access to channel edit, channel delete functions and background operations allows you to access Squelch and scan features.

CALL: transmit pre-stored DTMF/2 TONE signalling.

V/M: switches between frequency mode or channel mode.

SCAN: scans Freq/Ch or DTMF/CTSS codes and provides a Priority channel selected by the user, activated by pressing the up/down buttons on top of the hand mic or turning the knob on the front panel.

SQ/C: press and hold opens the squelch and release to silence the squelch. Squelch level is controlled from the menu for personal setting.

Above the row of buttons are 3 LEDs. As viewed left to right, green is the busy light that flashes when a signal is encountered. Red is illuminated when transmitting and yellow is the power lamp.

An 3.5mm jack socket is provided for an external speaker, so for a quick test I used the Kenwood SP30. The sound quality was very good. I used the internal speaker during on air tests.

The microphone supplied is the standard QHM-02 but a DTMF button microphone (QHM-4) is available as an optional extra. The 8 pin modular MIC socket on bottom left of the AT-5189 also doubles as an input for cloning the transceiver via PC programming optional cables. I wonder if a handsfree device could either be made, as the pins support +5V on pin 7 of the modular plug.

Antenna connection is by way of an SO239 two hole, panel mount, located on the rear left hand side.

PRACTICAL ASSESSMENT. Programming the radio was straightforward and the manual was easy to understand. But, as with all multifunction devices, it takes some time to configure the rig with its many submenus – in my case about four hours from opening the box to ready to test on air.

The sub menus are memory channels, repeater splits, RF power, wide/narrow band, reverse repeater, DTMF 2 tone, 5 tones and CTSS/DCS and compander mode.

Background operations are beep, time out timer, auto power off, busy channel lock out, DTMF, squelch setup, scan dwell time setup, LCD back light low/high, and current voltage display.

All functions are clearly shown on the display as you can see from the photographs.

ON THE AIR. The transmit side was first tested using a dummy load and three different SWR/ power meters were used for RF output measurement. The three levels shown on the display are low (5W), medium (15W) and high (25W). When I tested this on the power meters, my results were pretty close.

When I connected the radio to a homebrew dipole that I built especially for testing the AT-5189 it is worth noting that the SWR was near flat. Using the home made dipole at 10ft on a temporary pole, I received many good reports over eight hours' operation spread across two days. The front end appeared selective with no out of band breakthrough noted at all from nearby Fire service transmitters. The front end also appeared to be sensitive and better than the two ex-PMR sets I have for use on 4m.

The audio output from the 2W 8 ohm front panel speaker was a surprise. With so much level available it would be very easy to hear in a noisy mobile environment. The receive quality was quite good too, given it is a small speaker. The distortion figure given in the technical specification is ±5%.

Access to the volume control was by pressing

the Selector knob for about 2 seconds, which displays SET VOLUME on the dot matrix display. Turning the selector knob gives a selection of levels from 0 to 25. Being a little deaf in my left ear (where the rig was located on the desk) I selected 15, so anyone who is a little hard of hearing would find the radio plenty loud enough.

Frequency selection was either from the up or down buttons on the microphone or by the Selector knob.

On air reports suggested that the microphone audio quality was in par with what one would expect, with no distortion on my transmitted audio being noted. All the stations felt the audio quality was far better than my two ex-PMR sets.

One station noted my signal at 5/9 and looked at the bandwidth on his panoramic spectrum display and it was noted that the transmission was narrow in bandwidth and clean.

The heat sink on the AT-5189 extends on the underside of the radio and therefore it gets warm if laid on a flat surface, due to no air flow, so if you are going to use the radio in the shack for any length of time you would be advised to lift the radio clear of the desk. I still thought the dispersion of heat was actually good and it surprised me. I was transmitting for at least 3 minutes in one over after another (me waffling as usual!) and I kept an eye on the heat by placing my finger now and again on the rear heat sink (don't do this at home). Although warm, it was not hot to the touch.

Whilst in QSO the 'Compander function' was used. I had never heard of this function before, so this was a first. It is used to remove white noise or other noise from a weak signal, however I found it put a woolly edge on the chap's audio, switching it off solved the problem, I thought it was like a fixed setting DSP! I did not use the function again as most signals worked sounded in excess of 5/7 to 5/9 and the compander would only be selected on receiving very noisy or weak signals.

The AT-5189 has neither an S-meter nor even a bar graph meter, which is slightly disappointing to say the least, so I would say this could have been an easy addition within the roomy display.

CONCLUSION. This transceiver surprised me because I must admit to being sceptical about the anticipated build quality, but I have been delighted with the build quality, performance, ease of operation, good visual display and good AF output.

I feel that if the AT-5189 is to be used as a base station then, because of the heat sink is extending on the underside of the rig, clearance would be needed between the desk and the rig by use of the bracket or hang it from under a shelf to ensure good airflow.

When compared to the ex-PMR rigs I've used before on 4m, the AT-5189 offers many more facilities for flexibility and performance.

The 4m mobile can be used both mobile use and in the shack.

70.425MHz was programmed as Channel 01 and in alphameric identified as 'RSGBNEWS'.

It beat my other 4m rigs, including a handheld, hands down in both sensitivity and transmitted audio quality, which was a pleasant surprise. Ease of operation coupled with lots of audio output from a surprisingly small front mounted speaker gave me the impression it would be very well suited for mobile operation under all conditions.

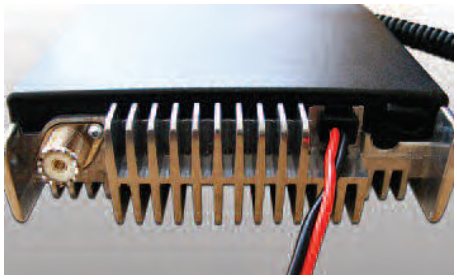
But the question is would I buy one? Yes I would! I think the sample model is a good choice for those starting out on 70MHz or those who want a dedicated 70MHz mobile installation. When you consider all the other countries now being given access to the Region 1 band allocation, many will be on FM at first.

There is always the possibility of half-duplex operation too. For example, if a German radio amateur transmitted on 69.950MHz (the allocated German calling frequency), it is possible for them to listen on 70.450MHz (the UK allocated calling frequency). A half duplex contact could take place thanks to the wide band receive with the AT-5189 and duplex function.

Overall, a competent smart, little rig and I enjoyed the opportunity to operate it. The only things I did not like were there was no signal strength meter, I would like a stand or rubber feet for shack use and I'd like a hands free facility for safer driving.

THANKS. Thanks to ML&S for the loan of the review model, which is priced £148.95, and to the following: Bolton Wireless Club members for their help: Ross, G6GVI, Laurie, G0MRL, Tony, 2E0UOG, John, 2E0CNJ, Barry, G3WIS, Bernard, G6TET and the invaluable reports from John, G0NAJ and Dave, M3CRV.

This shows the maximum RF power out into the dummy load.



The rear of the AT-5189 showing the position of the two hole SO239, heat sink and DC cable.

The image of the underside of the AT-5189 shows clearly the heat sink as it extends near to the whole underside of the AT-5189 with no stand or feet.

Flex-1500

HF-6m software defined transceiver

The Flex-1500 is tiny, as you can see when it is compared with an RSGB mug.

INTRODUCTION. The Flex-1500 is the latest software defined radio (SDR) transceiver from FlexRadio Systems. It offers a 0-5W output and a general coverage receiver that stretches from 10kHz to 60MHz. The manual warns that you may find images below 1.8MHz without additional filtering and this was indeed the case. It also has a 1mW RF output via a separate connector on the back for driving transverters.

My first reaction on being given the Flex-1500 in its box was how light it is. It weighs in at less than a kilogramme (2lbs). On opening the packaging I was even more surprised – it is tiny. Its 10.2 x 5.1 x 15.2cm dimensions give little clue as to what this little transceiver can actually do.

Anyone unfamiliar with SDR may need to be brought up to speed. The basics are that the radio handles the RF side of matters while your PC does the rest of the processing. The PC also provides the a control interface, all delivered via software. There isn't space in this feature to delve into the black art of SDR and it has been covered in previous *RadComs* anyway. Instead, I'll try and concentrate on the actual operation of the Flex-1500.

SETTING UP. The Flex-1500 needs a stabilised 12V supply capable of delivering 2A. It comes with a short power lead that isn't fused, although there is a warning about making sure you use a current-limited PSU. There is, however, a 3A fuse fitted inside, which also protects against reverse polarity.

Neither does it come supplied with a speaker, but Waters and Stanton now bundle a free microphone with a suitable RJ-45 plug. For the test I used the microphone from my own Yaesu FT-817, which worked perfectly without any rewiring, plus an external amplified computer speaker or headphones. It also has a BNC antenna socket on the back, but comes with an SO239 to BNC adaptor so that you can connect up PL259 plugs.

Before you can use the radio you need to hook it up to your computer and I suggest you read the instructions carefully before you proceed. But what sort of computer do you need?

The *PowerSDR* software needed to run the Flex-1500 is very powerful, but needs a speedy computer. Flex recommends that you use a modern PC with a multi-core processor from Intel or AMD. It also suggests that it should have a large (3MB or higher) L2 cache, 2-4GB of high clock rate DDR2 RAM and a good graphics card.

PowerSDR only runs on Windows PCs, but there are plans in the pipeline for a new version of its software, codenamed "Deep Impact", which will run on Windows, Linux and Mac OS X.

You can run *PowerSDR* on a modern Intel Mac, but you will need to install Apple's Bootcamp software and Microsoft Windows to run the machine as a PC. This does work, as I tested it on a 2.0GHz MacBook Pro.

If you are still wondering if your PC is capable of running PowerSDR, you are not alone. On the FlexRadio Yahoo group there are many discussions about PCs that will or won't run *PowerSDR* successfully.

I tested *PowerSDR* on a five year-old Toshiba laptop and, while it would receive, it would not transmit correctly. On a Dell Mini10 netbook running XP it was better and on the MacBook with a Dual Core 2GHz processor and 2GB of RAM and XP it was better still, but with the odd pop and crackle, despite reducing the audio buffer setting as low as I could.

I then used a brand new Toshiba Satellite laptop L650D with an Intel i3 triple core processor and Windows 7 and it worked perfectly on receive. In theory the Dell shouldn't have worked as it doesn't have a dual core processor, but many people are using netbooks with good results.

My advice is to get the best machine you can buy and get some advice first, but don't expect to run *PowerSDR* efficiently on that 10 year-old clunker computer you have at the back of the shack.

Having said that, during the testing period I heard from one G3 with a Flex-1500 that works fine on a 2.8GHz Pentium 4 with 1.2GB RAM that he bought for £40 on eBay.

For more information on computer compatibility join the FlexRadio Yahoo Group or see the FlexRadio website at www.flexradio.com.

The Flex-1500 connects to your PC with the supplied USB cable. It doesn't need Firewire or a high-end sound card like some of the earlier SDR receivers such as SoftRock.

Before you connect the radio you have to install the *PowerSDR* software. Once done you connect up the Flex-1500, switch it on and the PC attempts to install the required radio and 'Turboencabulator' drivers. I found that the XP PCs had trouble finding the drivers and I ended up locating them manually – they were in a sub-directory in the *PowerSDR* folder. The Windows 7 machine installed everything automatically.

Once that was done I could run the software, and press the start button to get the radio receiving. The first time you run *PowerSDR* it runs an optimisation routine. This only takes a few seconds.

PowerSDR. When you are up and running you are presented with the main *PowerSDR* screen – an incredibly comprehensive display that replicates the front panel of a modern transceiver. To run through all the facets of *PowerSDR* would take the entire magazine, but let me give you some highlights.

You choose a band by clicking on the appropriate button. You can then tune with your mouse wheel, by clicking and dragging or by mousing over the frequency display digits and using the mouse wheel again. You can choose the tuning steps, or move up and down as you wish in increments between 1MHz to 0.001kHz.

You can also input the frequency with your keyboard. Finally, you can right click and select yellow cross hairs that can then be used to click on any signal that you see on the bandscope.

The band selection buttons have three

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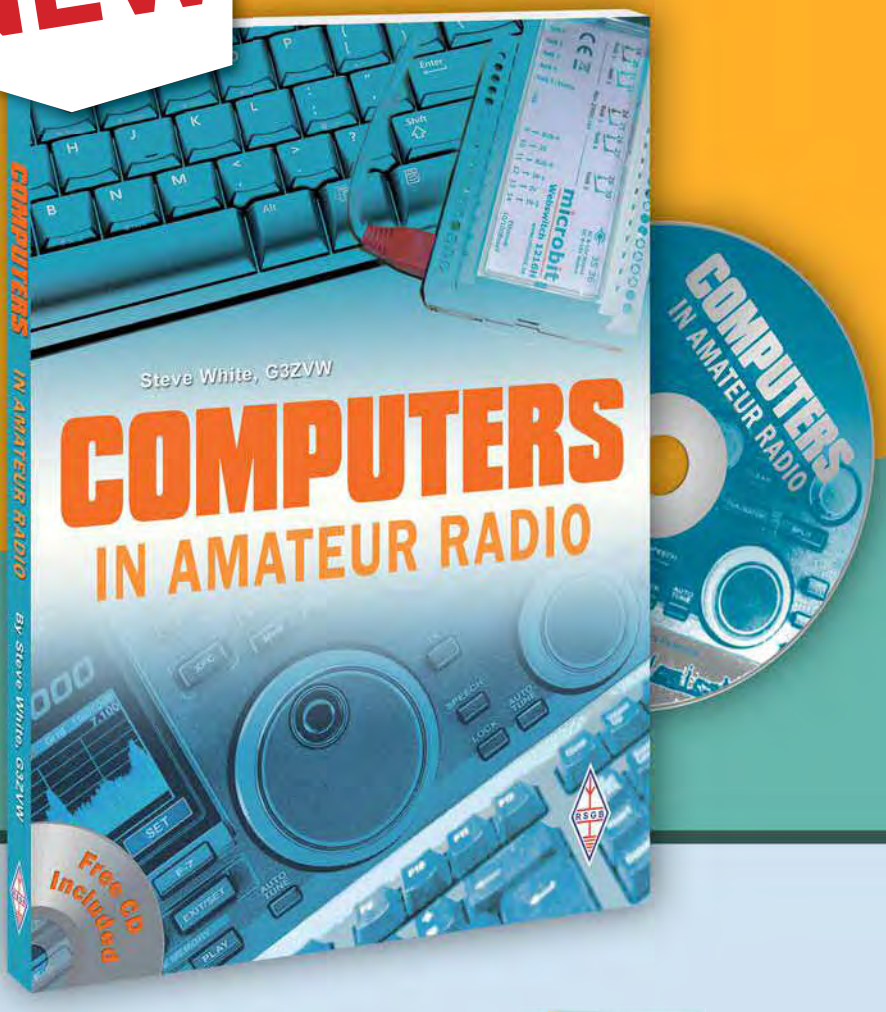

Computers in Amateur Radio

from £14.44

Steve White, G3ZVW

Radio amateurs have always been quick to embrace changes to their hobby to make operating easier or provide something extra. Computers are no exception and they have become essential tools to get the job done quicker and easier than ever before. But there is much that can be done with a computer and many are simply not aware of the huge potential they offer. *Computers in Amateur Radio* sets out to provide an insight into the wide range of amateur radio uses for the humble home computer.

Computers in Amateur Radio is intended to provide a practical guide to a wide range of amateur radio topics. Readers will find chapters dedicated to Software Defined Radio (SDR) alongside the more well understood topics such as data modes. You will also find chapters dedicated to computer modelling for Antennas, Propagation and even Terrain for HF. There is much more besides this to do with internet linking and a whole host of other internet activities. There is even a chapter dedicated to the Electromagnetic Compatibility of computers and information on avoiding or dealing with the interference they cause. Readers will find chapters dedicated to D-Star and APRS, both of which are still a mystery for many.

Where appropriate, *Computers in Amateur Radio* contains step-by-step guides to assist the first-timer in becoming familiar with an activity. For the more experienced there is great reference information and even basic fault-finding tips. *Computers in Amateur Radio* is a straightforward guide to the use of computers in the hobby and all will find something of value here.

Free CD
This book is supplied with a CD packed with over 500MB of software. You will find programs for logging, contests, mapping, Morse code training, APRS, RTTY, SSTV and a whole lot more.

Size 240x174mm, 208 pages, ISBN 9781-9050-8668-9

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The back of the unit has all the less commonly-used connections, including power and antenna. The microphone, Morse key, speaker/headphones and USB cable plug into the front.

stacking memories so that you can set these up at, say, the CW end, the data portion and the SSB parts of the band. The general coverage button has five stacking memories.

You also have an unlimited number of memories that can store the frequency, label, mode, filter, squelch and AGC settings.

In terms of filters, you can choose between 10 different widths from 1kHz–25Hz in CW mode or 5kHz-1kHz in SSB mode. If none of those work for you there are two user-definable filter settings.

You also have a three or 10-band equaliser that enables you to tweak the received and transmitted audio.

The display shows you 48kHz of your selected band and you can cycle between nine different views including a spectrum, panadaptor, scope, phase, waterfall, panafall and panascope. The latter two combine the panadaptor and waterfall/scope accordingly. You can also choose between peak and average displays.

You also have excellent audio DSP controls including noise reduction, notch filter, noise blanker, spur reduction and others. As you mouse over a control a pop-up tells you what it is, which helps enormously. There is a switchable squelch, adjustable AGC and pre-amp/attenuator – I found the pre-amp made a big difference on 10m.

Modes include LSB, USB, DSB, CW (lower), CW (upper), narrow FM, AM, Synchronous AM, Digital LSB, Digital USB, and DRM (Digital Radio Mondiale), although you need a separate software decoder for DRM.

It also includes a spectrum mode that lets you listen to the whole 48kHz bandwidth at once. This seemed odd until I tried it – I suddenly realised that you could listen to large portion of, say, the CW portion of 28 or 50MHz bands, spotting any signals that might appear. Very clever.

The RX meter can select between signal, signal average, and ADC left and right, which calculate the level in dBFS (decibel full scale) of the left and right I/Q inputs. The meter also displays the received signals in dBm as measured at the antenna port, which is more accurate than an S-meter reading.

The radio can also record 'off the air' signals – either the signal you are listening to or a whole 36kHz swathe of the band. Clicking the record button automatically starts an audio recording that is saved to your hard disk in .wav format when you press stop. This worked very well. You can also record your own transmission.

Recording the whole 36kHz passband was easy too – just go to the 'Wave' menu and select 'Record'. When you stop it gets saved with a label like 'LSB 7.165031MHz 25-01-2011 133005' so that you know exactly what it is you recorded.

When you 'play' this you can then tune around, listening to any of the signals that were recorded across the 36kHz passband.

I think the Flex-1500 and *PowerSDR* software are astonishingly powerful. As a receiver in itself it is a fantastic combination. I was able to listen to medium wave stations with the 12kHz filter that were almost of FM quality, short wave stations from around the world, VOLMET broadcasts, marine transmissions, beacons and much more.

But what you want to know is: how does it work as an amateur transceiver?

IN USE. For the first test I chose SSB. It pays to read the manual first before you attempt to use the Flex-1500 as a transmitter. You need to set up the drive, the mic gain and the compression (known as the compander) settings to suit your voice and microphone.

Given that the transmitter only puts out 5W you have to adopt a QRP mentality. Calling CQ might not always be best, but tailending and picking the loudest stations works well.

Nevertheless, despite the low power I was able to have QSOs on 80m with little difficulty. My first QSO was with Gary running GX4KPT/P during a Castles on the Air activation near Northampton. Gary helped me to tweak the TX audio settings and he said that it was very clear. Again, read the manual as it is important to get the mic gain set correctly and not terribly obvious how you do it. A 40m SSB contact with Hans, GM4SSA gave me a 56 report from Shetland with the report that the audio was very good. A contact with Rod, YT1E in Belgrade saw him amazed as he gave me a 59+5dB report as I ran just 5W to a loft-mounted dipole.

The receiver was every bit as sensitive as my main station transceiver and on 20m SSB I was pleased to hear John, ZL2JBR one morning, although with 5W I didn't have enough power to get back to him, unfortunately.

Monitoring my own audio revealed the delay or 'latency' that is a characteristic of SDR – my transmitted audio was a fraction of a second behind my voice.

This was even more evident when I switched to CW. The sidetone was very fractionally behind what I was sending, which made it very hard if not impossible to send Morse. The solution was to use my Winkey external keyer and use its sidetone. Others have reported this latency issue and it appeared on all of the computers I tested.

With the external keyer it was quite possible to have good QRP CW QSOs. You also get nine programmable Morse memories or macros, which helps when chasing DX and contesting. You can also operate split very easily.

My first contact was almost an accident as I was setting up the keyer speed and Gote, SM4CUQ in Falun, Sweden, came back to me for a short QSO. It was only after the contact that I realised that I was only running about one watt.

The radio has a noisy TX relay, which doesn't lend itself to full break-in. I preferred to set the break-in delay at about 700ms to stop the relay clicking out too quickly.

The Flex-1500's low power lends itself to CW and digital contacts quite nicely. I therefore installed *Digipan* to see how the radio worked on PSK31. It isn't immediately obvious how you configure *PowerSDR* to work with other software like Digipan. There are no 'leads' to plug into a data interface.

The answer is 'virtual audio cable' (VAC)

software that electronically couples the SDR's input and output to the data software. VAC doesn't come with the Flex-1500, but is available from http://software.muzychenko.net. It costs US$35.60 (£22.38) and there is a demo version available so that you can check that it works with your setup.

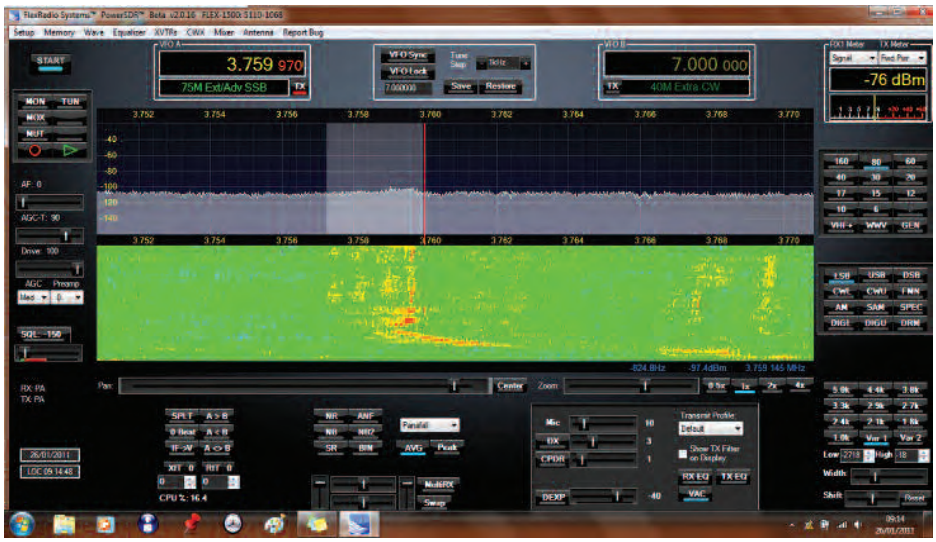
I installed the VAC demo and had *Digipan* decoding PSK31 from the Flex-1500, but felt that I needed more time to get it working correctly as the decode rate wasn't as successful as I would have liked. I didn't attempt transmitting.

Another aspect of using the Flex-1500 was the occasional pop, crackle and audio drop out with the lesser machines. Despite my CPU running at only about 37% capacity on the Intel Dual Core this was evident on some bands at times. On CW it occasional dropped a 'dit' or changed a 'dah' to a 'dit' when transmitting as well. Again, the *PowerSDR* Yahoo group shows that some people suffer from this while others don't – there isn't a definitive computer specification that gives perfect results. There were no such problems with the Toshiba with the i3 processor, with the CPU running at about 11-16% capacity.

Be prepared to read the manual and seek advice on the FlexRadio Yahoo user group and forum on the FlexRadio website at http://forums.flexradio.com to get the best out of the radio and your computer.

The Flex-1500 and *PowerSDR* software change the way you play amateur radio. Operating becomes more of a visual game, jumping on signals that appear on the display instead of tuning through the band (which you can still do if you wish). Using CW filters as narrow as 25Hz is suddenly a viable proposition too, with no filter ringing being evident.

I played with the radio for five days and still felt that I was only just scratching the surface. This is definitely not a 'fit and forget' radio. You need to take time to read the manual, optimise your setup and correspond with others to learn how to get the most out of it.



The PowerSDR software in action.

There is still the odd glitch – the *PowerSDR* software crashed when I was adjusting one of the TX delay parameters on the Windows 7 machine. Also, when listening to a station on 14.203MHz the panadaptor showed a mirror 'ghost' image of the station around 14.185MHz. I also ended up with my transmitted audio in my headphones and no amount of fiddling would switch it off – and no, the TX monitor was not switched on.

The *PowerSDR* software is constantly being updated. I was using version 2.0.16, which is still in Beta. A new version 2.0.17 is in the pipeline (probably available by the time you read this), which is said to sort out the CW latency problems.

CONCLUSION. In conclusion, the Flex-1500's receiver is excellent and is more than a match for a conventional radio. The panadaptor, waterfall, recording facilities and filtering alone make it a useful tool for SWLs. In fact, at £579.95 inc VAT (plus £10 UK courier delivery) it is roughly the same price as many other SDR receivers on the market.

What you are really getting is an excellent SDR receiver with a 5W QRP transmitter thrown in for free. If you are a QRP enthusiast who would like to experience SDR for the first time, the Flex-1500 is ideal. You could also plug it into a solid state linear to boost the output, although the FlexRadio Flex-3000 or -5000 might be a better choice.

If you are thinking of buying a Flex radio, make sure your computer is up to the job. On reflection my 2.0GHz Intel Dual Core machine struggled a little, but the more powerful i3 machine worked much better. Waters and Stanton say that they have found that most recent PCs will work well.

All in all the Flex-1500 is a fascinating little transceiver. My thanks to Waters and Stanton for the loan of the radio.

The HF Experts.

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Frequency Coverage: all Amateur Radio Bands 1.8-54 MHz
Power Output: 1000 Watts continuous, 1300 Watts PEP
Output Circuit: Pi-L Network
Output Impedance: 50 Ohm unbalanced
Input Circuit: Broadband with VSWR less than 1.3:1
Driving Power: 60 Watts (typical)
Harmonics: 1.8-29.7 MHz > 50dB / 50-54 MHz > 60dB
Intermodulation Distortion: > 35dB
RF Gain: 12.5-13dB
Primary power: 120,200,210,220,230 & 240VAC – 50/60Hz
Tube: Single 4CX800A (GU74B) forced air
Dimensions: (W x D x H) 430mm x 383mm x 190mm
Weight: 25 kg

What RadCom Says:

"The amplifier is superbly constructed on an anodised aluminium frame" - "with much silver plating in evidence" "Extensive circuitry is incorporated to monitor operation and protect the amplifier from a host of potentially damaging conditions" - "linearity of the amplifier is potentially better than most transceivers"

FLEX-1500 SDR HF Transceiver

£579.95 D

The Flex-1500 is the culmination of years of development by FlexRadio Systems of the USA. The task: to build an SDR (software defined radio) transceiver that is in a price bracket that enables every ham radio to be able to afford to enjoy the fun of SDR. The result is the Flex-1500 - a completer HF - 50MHz 5W transceiver. Use it as a receiver, use it as a QRP rig or use it to drive a linear amplifier (check out Tokyo High Power HL-100). Plug the USB lead into your PC, connect to 12v and fire up the supplied software. That's it! All modes HF - 6m.

Frequency Coverage: all Amateur Radio Bands 1.8-54 MHz
Power Output: 5 Watts
Output Impedance: 50 Ohm BNc unbalanced
Modes: SSB CW FM AM
Mic Input: Modular, Yaesu wired
Display: PC digital down to 1HZ
Receiver: 500kHz - 54MHz
Selectivity: Continuously variable down to 25Hz
Tranverter Out: 1mw (160 - 10m)
A/D D/A: 48kHz
Primary: External 13.8v @ 2A max.
Dimensions: (W x D x H) 102mm x 152mm x 51mm
Weight: 25 kg

The rear panel gives extensive connectivity: 10MHz ref. osc. input (optional), Serial port (optional) Transvert input and output sockets, Antenna socket, 13.8v DC input.

What RadCom Says:

"Excellent audio DSP" "I think the Flex-1500 and PowerSDR software are hearteningly powerful" "received signals in dBm more accurate than an S-meter" "The receiver is fantastic" "transmit audio very good"

"The Flex-1500 is a fantastic little transceiver"

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LF

Big Swiss signal rolls in

The big tower used by HE3OM.

BIG AERIAL. For the month of February, a group of Swiss amateurs received permission to operate from the decommissioned medium-wave broadcast station at Sottens, which used to be on 765kHz. For 136kHz they used the 125m reserve aerial tower that stands on insulators but is connected to ground via a static leak choke. This choke was of insufficient inductance for 136kHz but could not be disconnected for safety reasons. The team solved the problem by resonating the choke with a parallel capacitor. First they tried a combination of brown mica capacitors, which overheated with quite low power, before redeploying a huge variable capacitor from the old MW transmitter.

Once the problems with the transmitting system were ironed out and HE3OM was on the air, there were some receiver troubles to solve. Such a large tower brings in a lot of signals and overload was a serious problem, resulting in the team having difficulty in hearing many of the stations calling. A separate receive aerial had to be constructed.

This was a good opportunity for some transatlantic tests, so Toni, HB9ASB stayed late one evening to make a QSO with Jay, W1VD. The 136kHz signal from HE3OM was strong across the pond and both W1VD and K2ORS in Massachusetts reported good reception. Jay was able to make a cross-band contact with them on 40m but a two-way LF attempt failed due to too much QRM in Sottens.

Experiments have continued with many QSOs on 136kHz including RA3YO at 2350km, and the signals have even reached JA7NI in Japan! Although the ERP from the big tower is probably more than ten times our UK limit, it does show what is possible on 136 with a bit of luck and a following wind.

ARGENTINA TESTING ON 136. LU1DOW is now regularly on the air on 137.776kHz with a 500W valve transmitter and a 65ft high top-loaded vertical. He is sending just the letters 'LU' in QRSS 60 between 0200 and 0300 and welcomes any reports.

PORTABLE TESTS. Stefan, DK7FC was out with the kite again in January, first on 136kHz where his 100m vertical put out an excellent signal. Goodness knows what he would have achieved if he had been able to fly the intended 300m of wire, but that was ruled out due to strong winds.

In the event he received reports from many parts of Europe and made CW contacts with PA0A and DF6NM, and QRSS3 contacts with ES5AM, IK1HSS and F4DTL. During the contact with F4DTL his signal was recorded by 4X1RF in Haifa and later in the evening by W1VD in Connecticut.

A month later he was out again with the VLF setup and this time the kite was at its full height. Best DX was a report from Iceland where TF3HZ copied him at a distance of 2404km. With such a good signal being radiated on 8.97kHz, it gave others the chance of their first DX reception on the band. One of those who succeeded for the first time was Mike, G3XDV with a nice clear copy. All in all 23 stations reported reception of the VLF transmissions including G3KEV, G3WCD, G4WGT, M0BMU, G3XBM and G4AYT in the UK.

Stefan also listened for cross-band contacts and managed to work DF6NM who was on 136kHz using 3-second DFCW. The distance between them was 179km. During the QSO OK2BVG reported good reception of Stefan's 'fast' transmission.

AUSTRIAN VLF EXPERIMENTS CONTINUE. OE5ODL has been regularly transmitting on 8.97kHz, sometimes augmenting his inverted L aerial with up to 80m of balloon-supported wire to increase the ERP. His signals have been received by Jim, M0BMU, Paul Nicholson in Todmorden (1252km) and G3KEV at 1191km. After months of refining his system he eventually, and most impressively, reached 4X1RF in Haifa (2478km) and TF3HZ in Reykjavik (2766km).

Paul Nicholson also received a test which Ossi made on 6.47kHz with the balloon aerial.

FIRST QSO ON 8.97kHz? Roland, DL3NDR and Walter, DJ2LF had a contact in January using 300-second DFCW. This took quite a while and the distance is only 4km but a first is a first!

An earth-mode experiment by G3XBM and G6ALB over a distance of 3km took place a few days later.

VLF TESTS. G4WGT has been testing on 8.97kHz and G3XIZ now has his 150W TX up and running. Chris, G3XIZ has been copied about 20km away on just his 40m end-fed wire and hopes to improve ERP by adding a balloon just as OE5ODL does. Both stations are eagerly looking for reports. Test transmissions are usually at weekends and have to be cleared with the Met Office first. They are usually announced on the 'sub9khz' Yahoo group.

DUTCH STATIONS RETURN TO 600m. After a period of uncertainty the Dutch authorities have extended the 500kHz permits until 1 April by which time they hope to have a new frequency schedule in place.

WHAT'S A GRABBER? It's a computer running a spectral display program such as *Argo* or *Spectrum Lab* that regularly takes a snapshot (or grab) of the display and posts it to a website. This allows us to take a look at signals being received in QRS or DFCW in far distant places. 4X1RF's new 136kHz system shows several parts of the band and is a useful indicator of LF DX conditions. The stronger G stations such as G3KEV have regularly been seen there. To find it just search for '4X1RF grabber' and it'll be at the top of the results.

NEW BAND IN THE USA. The '600m group' of American experimenters have been given a new band of frequencies from 461 to 478kHz in addition to their current 495 to 510kHz allocation. This is effective immediately and runs until August 2015. It is not known whether this heralds the withdrawal of the pre-existing band but it has often been suggested that an allocation around this slightly lower frequency may be more likely to gain approval on a world-wide basis.

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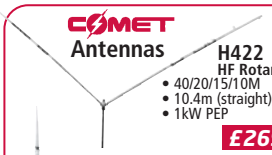

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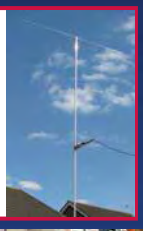

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HF

Conditions are improving and more activity has been heard on the bands

Propagation data from ClubLog (see text).

INCREASED ACTIVITY. Readers will no doubt have seen some of the recent press reports about increased solar activity and how it is all going to bring civilization as we know it to an untimely end. Over-hyped sensationalism I rather suspect, but it is indeed true that solar activity has taken a turn for the better, which has been reflected in HF propagation with some excellent openings on 10 and 12m to Asia, Australasia and North America (I take it as read that North-South propagation to Africa and South America is much more frequent, almost regardless of sunspot numbers). In the ARRL CW Contest, 15m was buzzing, with all US call areas being workable at reasonable strength during the afternoons. And John, G3LZQ reports hearing KH6 (Hawaii) via the long-path on both 12 and 10m, something which hasn't happened for many years.

The TJ9PF expedition was worked on all bands from the UK during February and ended with some 67,000 contacts, including 17,000 on RTTY, a new expedition record. S9DX were also very workable from the UK on all bands. And I wanted to make special mention of Bob, 5B4AGN (G3ZEM) who did an amazing job as T88ZM and KH0/G3ZEM. Although a one-man show, he seemed to be considerably easier to work from the UK than many of the multi-op efforts that have shown in the past from either of those remote islands. His 80m signals from T88 were particularly notable, almost certainly because he was able to secure a location right by the ocean. T30YA and T30OU (Kiribati) were somewhat more of a challenge, being a tougher path, but Clive, GM3POI notes a 15m contact at 2300, a quite remarkable band opening, especially as there was significant auroral activity at the time. The VP8ORK effort, which was in full swing when I wrote last month's column, ended with 63,643 contacts, of which I calculate that 1433 were with UK stations. Don, N1DG has put some excellent photos from the trip on his website.

KEEP UP TO DATE. Sadly, not all expeditions get announced in time to make it into this column, hence my frequent suggestion that readers should subscribe to a weekly (eg OPDX or 425 News, both free) or daily (Daily DX, $49 a year) e-mail bulletin. Anyway, by the time this appears, two significant DXpeditions should have been active during early March, notably 4A4A from Revilla Gigedo and VU4PB from the Andamans. The latter was scheduled to continue until 31 March, so may still be available when this hits your doormat. Also, Baldur, DJ6SI showed up for several days as TT8DX from Chad. The ex-French colonies in West Africa are often referred to as the 'terrible Ts' (TT, TL, TN, TR, TJ, TU, TY, TZ) as they are activated relatively infrequently, especially on the low bands, so it's nice to have had both TJ and TT active this past month. TU (Ivory Coast), which used to be probably the easiest of the lot, is likely to prove elusive for the time being, at least while the current political unrest continues.

DX NEWS. A 12 man international team is heading to Kanton Island, Central Kiribati this month. T31 ranks number 28 on The DX Magazine's 2010 'Most Wanted' list. The Telecommunication Authority of Kiribati (TAK) has issued the call T31A. The team plans to be on all bands, SSB, CW and RTTY starting 17 or 18 April until 28 April. They will set up two operating sites. QSL via W2IJ.

A group of five Italians will operate from Liberia (EL) from 31 March to 13 April. They plan three stations, 80 through 10, CW, SSB and RTTY. QSL via I2YSB.

A Brazilian team has announced plans for a DXpedition to Mayotte (FH) for 18 to 25 April. They will be using the special callsign TO2FH and plan to have three stations active simultaneously on 160 through 10, CW and SSB. QSL details will be posted on their qrz.com page.

PE1KL and PA2LS will sign 9G5LK from Ghana from 28 April to 6 May. They plan to operate on 80 through 10 SSB, PSK31 and RTTY. QSL to PA2LS.

Dov, 4Z4DX and his XYL Anat will sign 9N7DX and 9N7YL from Nepal from 13 to 30 April. Look for them on 20, 15 and 10, mostly CW, RTTY and PSK31. Dov plans to put together a bigger operation for November to mark his 60th birthday and 45 years in amateur radio. QSL both callsigns to 4Z4DX.

Tom, KC0W, who has operated in recent years as ZD7X and XU7XXX, is moving to Bangladesh for another of his famous, 'long-term DXpeditions', sometime between April and June. He will be "DXing from S2 land for at least one year with a 99% probability of some long-term DXing from Nepal after the Bangladesh operation is over". Tom says W3UR was "highly instrumental in getting me motivated to get on 160m from St Helena Island". Bernie "pestered him in a very good way" to get on Top Band. Given that good experience, Tom says he will make 160 and 80 top priorities from Bangladesh and Nepal.

Finally, don't forget the CQ WPX SSB Contest at the end of March (26/27th). Although it doesn't attract the same level of expedition activity as the CQWW events in the autumn, there are usually some interesting stations active and, if propagation continues to improve, it may be a chance to fill some new slots on 10 and 15m.

SOUTHERN SUDAN. Southern Sudan is due formally to declare its independence on 9 July. Two major DXpeditions have already been announced to run from that date. That said, quite a few unanswered questions remain. DXCC rules require more than simply a declaration of independence and there is always the risk that, as with Kosovo, the necessary international recognition is delayed. Hopefully, there will be clarity in good time. The ARRL will also have to decide whether the deleted country of Southern Sudan is reinstated or (more likely) a new entity is added to the DXCC list. Previously, Southern Sudan used the prefix ST0, though more recently this prefix has been used for special-event operations throughout Sudan. It may well be that the newly-minted Southern Sudan will ask the ITU for a new callsign prefix in due course (as happened, for example, with Bosnia, Slovenia and Macedonia).

60m REPORT (from G4TRA). 60m is the only HF allocation available to UK radio amateurs under an NoV that requires operators to implement their own agreed experiments. For the dedicated few that

carry out those experiments during darkness hours, this month has seen a fair amount of long distance activity. CU3BL has been active from Terceira Island in the Azores for the first time, working a number of UK stations. From the Caribbean, J79FF 'The Buddies in the Caribbean' (who specialise in 100 watt or less radios and the Buddipole portable antenna systems) are proving that you don't need big antennas for this band and VP5/KB8TXZ has also been heard after midnight.

Also putting good signals into the UK have been HP1AVS, UR7GG, LZ2DF and TI3/W7RI on a noise free 5.4035MHz. So if your experiments include late night assessment of the band when intra-UK signals are struggling in the noise, then listen out, for example, for V47JA, St Kitts, operational until 30 March. J38BF should also have been active earlier in the month, while N4SIA, operating as KG4AS from Guantanamo Bay and JX9VDA (Jan Mayen) were both loud in the UK.

As a PS from G3XTT, it is worth keeping an eye on 5.000MHz for the various time and frequency standard transmissions that operate there. A local club member who operates 5MHz was telling me that BPM (China) and WWVH (Hawaii) had been audible in the UK around UK sunset. Incidentally, while researching the WWVH beacon data, I ran across the website 'Your Remote SMeter' which has some useful links and information.

PIRATE ACTIVITY – NOT! Two eagle-eyed readers have pointed out that I clearly didn't have my brain in gear when writing the February column (no surprise there, it has to be said, though they were too polite to put it quite like that). W4MK had written that his call must have been pirated as he had been receiving cards for J6/W4MK (which he had never been) but in the adjacent column under G4TRA's 60m report there was mention of J6/K4MK (a valid operation). This was, as is so often the case in reported 'pirate' activity, actually a broken callsign, on this occasion seemingly due to a bad packet spot. Checking the DX Summit website I see that there were four packet spots for J6/W4MK back in December compared with lots of spots for J6/K4MK. The moral of the story is always to listen to what the DX station is signing rather than taking everything from the Cluster at face value.

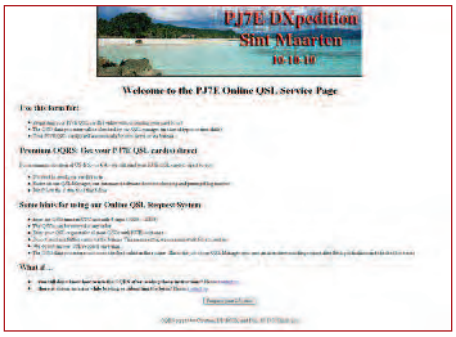
OQRS. Maybe I've been guilty of not paying attention, but there seems suddenly to be a flurry of expeditions offering an Online QSL Request Service (OQRS). This is true, for example, of the recent S9DX and VP8ORK activations, as well as several of the PJ expeditions late last year. An online request facility is not new, but what does appear to be recent is a standardised interface (I'm not sure who developed it) that allows QSO and address data to be entered online and a donation made (to cover printing and postage costs and maybe contribute to expedition costs) via PayPal or various other means. To my mind this is a development to be applauded. It saves the cost of mailing physical cards to the expedition's QSL manager, which will almost certainly be consigned to the recycle bin in due course, avoids the risk of cards and any dollars or IRCs going astray in the mail and ensures that any contribution is available in full to the expedition.

CLUBLOG. It's also noticeable that more and more expeditions are choosing to upload daily or thereabouts to G7VJR's ClubLog. I have mentioned ClubLog previously and Michael gave an excellent talk on the subject at last year's RSGB Convention (and will be repeating it this month at the Visalia Hamvention in California). The propagation data, based on actual QSO statistics are one of the most useful features while an expedition is in progress, as they give a very clear idea of the best time to make a contact on each band, based on contacts with one's own country. This saves wasting time on bands where propagation is unlikely to be favourable and allows you to focus on where the best opportunities lie. This innovative and useful piece of code was developed by Marios, 5B4WN/G0WWW.

CORRESPONDENCE AND TABLES. Peter, G3HQT has taken down his vertical and replaced it with an inverted vee supported at about 30ft by a SOTA fibreglass pole. Results have been encouraging, though at the time of writing Peter hadn't heard much on 12m. But on 30 he worked 5R8HL, 3B8/F6HMJ, 1A0KM, JW8HGA, S9DX, D44TBE, HS0ZBS, XT2RJA and TT8DX on CW plus TJ9PF on RTTY, while 17 CW produced TT8DX and PJ5NA.

Simon, M0VKY already has DXCC for the year, including VP8ORK on 15 and 20 and 1A0KM on 20 for two all-time new ones. In addition, 20 produced 9V1PC, YI1RZ, 8Q7AK and V85TX, while YB0MWM was worked on 17, 5R8PR and TJ3AY on 15 and V5/DJ2HD on 12, all SSB.

Peter, G4XEX says that this year's WARC band table has encouraged him to pay serious attention to those bands. Initially his half-size G5RV didn't want to play ball but some judicious trimming of the ends seems to have done the trick. Peter says of the WARC bands, "Although in the past I have occasionally wandered onto the 17 and 12m bands I have not, up to now, given them any serious attention. If I said that I worked on them once a month I would be exaggerating. Since getting into data a couple of years ago though, I have on occasions frequented the 30m band but not having a good antenna for 10MHz has resulted in me preferring to use 20m.



A typical OQRS facility (see text).

2010 TABLE
(starting 1/1/11, WARC bands and all-band)

Call	30m	17m	12m	ALL
G3HQT	88	37	3	
G4XEX	30	28	3	44
G4DXW	0	14	7	
M0VKY				101

However your decision to use the WARC bands this year gave me the impetus to get out there in the cold to trim my half size G5RV to make it easier to load up on the WARC bands. All in all I have had a very enjoyable month playing on the WARC bands. Much to my surprise 18MHz has proved to be the most interesting with a characteristic somewhat like 14MHz but with very deep QSB and a tendency to shut down very quickly. Its saving grace is that it is a whole lot quieter than 20m. 24MHz is much like 28MHz but appears to be open much more frequently. It's a shame that there are so few stations on it though".

Away from those bands, ZS8M answered Peter's CQ on 20m for an all-time new one, and the following day V85EX did exactly the same. It's always worth a CQ call! On a completely different subject Peter relates a rather unusual request resulting from a QSO with Ivan, OK4AZ. Ivan was trying to recreate a matching coil for a balcony antenna he had been told about during an on-air contact, but all he knew was that the coil had been wound around a can that had started life at Tesco, containing DelMonte Pineapple chunks, so needed to know the actual coil diameter. Peter duly obliged with the information, having embarrassed his wife during the weekly shop by producing a tape measure at the appropriate shelf!

I have included the table this month despite it being rather thin, in the hope that others will join in. But your e-mails certainly don't have to relate only to the WARC bands; any feedback on activity, contacts of interest, etc. is always welcome

WEBSEARCH

9N7DX: www.mdxc.org/9n7dx/
9G5LK: www.pe1kl-pa2ls.com/
ClubLog: www.clublog.org/
T31A: www.t31a.com
TO2FH: www.qrz.com/db/to2fh.
VP8ORK Photos: www.nookhill.com/n1dgvp8.html
Your Remote SMeter: www.smeter.net/

VHF/UHF

Some interesting propagation events during February

PHOTO 1: The 144MHz antenna system at the station of Kjell Jarl, SM7GVF.

PROPAGATION EVENTS. Although there were some interesting propagation events during February, it was nevertheless a generally poor period for making long distance contacts on the VHF and UHF bands. Your reports show that the 50MHz band was open briefly via the ionospheric modes of Aurora (Au), Auroral-E (Au-Es) and Sporadic-E (Es) but none of these openings amounted to very much. Meteor scatter (MS) contacts continued to be made on a daily basis even though there were no major showers during February and the sporadic meteor count was at a yearly minimum. No reports were received of trans-equatorial propagation (TEP) contacts being made from the UK although some stations in southern Europe did have some success. Activity on the 144MHz and 432MHz bands was predominantly via the troposphere with a few tropo openings being reported around the beginning of the month. Conditions over the Earth-Moon-Earth path seemed to be quite favourable during the period.

SOLAR ACTIVITY. The solar activity perked up somewhat during February with some large flares being reported during February. Unfortunately the media seemed to have had a field day hyping up the events but this is normal for the first flare activity of the new solar cycle. When the really good flares are unleashed in 12 months time it will go totally unreported!

During the middle of the month an X2-class flare was reported to have hurled a coronal mass ejection (CME) toward Earth. This was the first large eruption of Solar Cycle 24, the last being over four years ago in December 2006. Solar flares are classified according to their X-ray brightness, A, B, C, M and X. The smallest A and B-class flares are not noticeable on Earth and C-class flares are hardly of any consequence. M-class flares are medium-sized and can cause radio blackouts and small scale auroral propagation. X-class flares are big and can trigger planet-wide radio blackouts and much larger Au events. Each category of x-ray flares has nine subdivisions: C1-C9, M1-M9 and X1-X9. A brighter solar flare has a higher number, so an X5 solar flare is brighter than an X2 solar flare and can therefore cause more disruption. Geomagnetic storms and auroras are possible when a CME hits the Earth's magnetic field but the interplanetary magnetic field (Bz) must be of a negative polarity to couple directly into the magnetosphere.

CQ AURORA! Auroral back-scatter openings on the 50MHz band were reported on 1, 4, 5, 11 and 14 February, all were quite brief and of the 'Scottish' variety. This means that the openings were restricted to stations located in Scotland and northern England. Very soon these events will spread further south to encompass all of the UK. The openings on the 50MHz band mainly consisted of reception reports of the OY6BEC beacon (Faroe Islands, IP62). This beacon operates on 50.035MHz and should make an excellent auroral indicator for stations located further south in the UK. Only a few years ago you could use Band-1 television signals around 48-49MHz as indicators but these have all been phased out, being replaced by UHF digital transmissions. The auroral opening on 4 February between 1830-2100UTC was reasonably intense, extending up to the 144MHz band. The SK4MPI beacon (Sweden, JP70) on 144.412MHz also seems to be a good indicator of Au propagation as it was reported by a number of Scottish stations. The station of Kjell Jarl, SM7GVF (Sweden, JO77) was also heard making CW contacts into Scotland on 144.053MHz. His signal is often outstanding during Au openings and this not so surprising as he uses a large antenna system (see **Photo 1**) comprising 8 x 8-element I0JXX Yagis. On many occasions Kjell is the only DX stations that can be heard. It's all down to the antenna system and operator dedication.

A Sporadic-E opening between 1330-1500UTC was a precursor to the Au event on 14 February. This can often happen in the run up to and during solar maximum and is something you should be aware of. You just need to be alert for the mechanism that triggers these events and I'll be discussing this (and what Bz means) in more detail next month. During the 50MHz Es opening operators in southern England reported making CW contacts with the Latvian stations of YL2CA, YL2FZ and YL2TD. At the same time stations in Scotland were making SSB contacts with SP6NIC (Poland, JO81) and hearing the SR5FX and SR9FHA beacon stations. Three hours after this Es event had finished the Au opening commenced and after that had died out an Auroral-Es opening was reported around 2300UTC between Scotland and Finland. It's never over till it's over!

METEOR SCATTER. Meteor scatter contacts, particularly on the 50MHz band, were made on a daily basis throughout February even though there are no major showers during this period. It may be of interest to learn that daily sporadic meteors (ie meteors not associated with a particular shower) are not constant throughout the year. The February period is when the sporadic meteor count is at a yearly minimum so in theory the odds are stacked against you, particularly if 144MHz QSOs are to be attempted. So many MS stations migrate to a lower frequency band to enhance their chances of making a successful contact. Some of the 50MHz JT6M stations worked

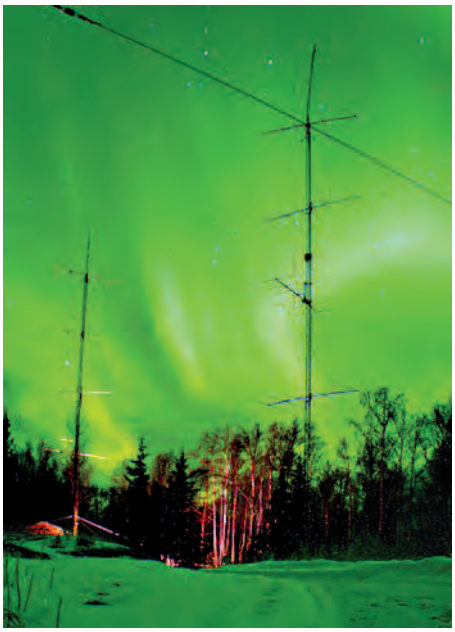


PHOTO 2: A recent aurora at the QTH of Kevin Forster, NL7Z.

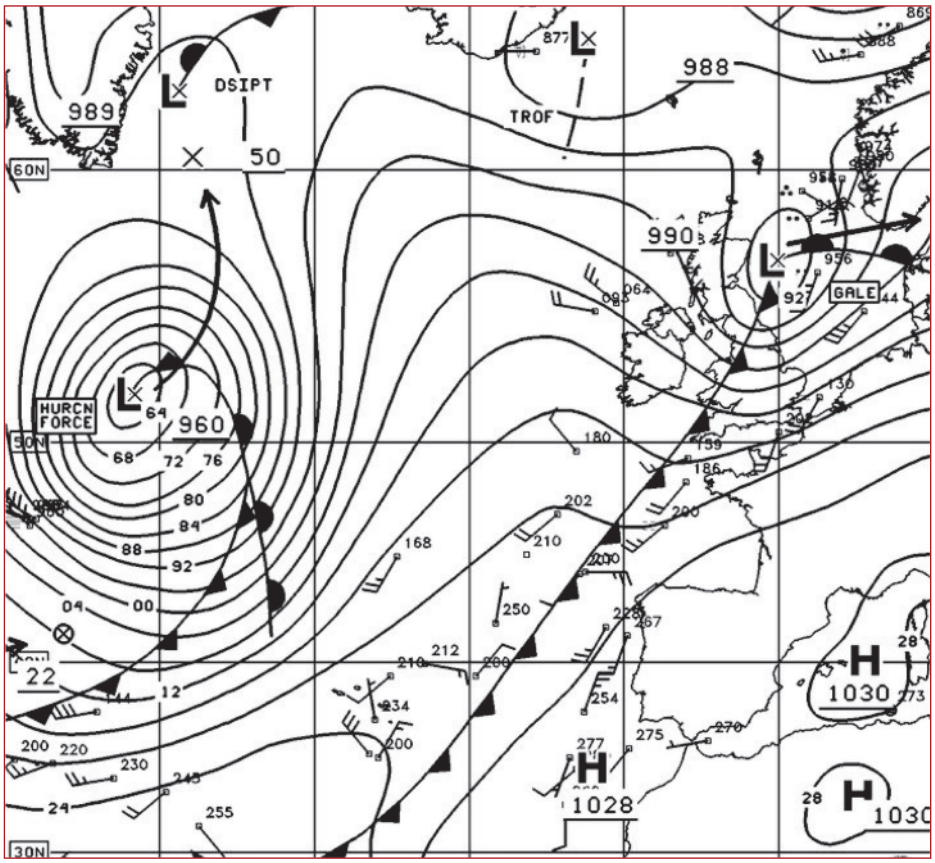


FIGURE 1: Tropo ducting between England and Spain.

from the UK in February included CT1EKD (Portugal), DL5WP (Germany), EA5/G3XGS (Spain), EA6CA (Balearic Islands), F4EZJ (France), HB9EFK (Switzerland), LA/OE9ICI (Norway), OE4VIE (Austria), ON5VW (Belgium), OZ3SR (Denmark), S57TW (Slovenia) and SC7C (Sweden).

TRANS-EQUATORIAL PROPAGATION. Last month I mentioned that TEP contacts will become more extensive during March. Perhaps I should not have said 'extensive' as the UK is not in the most favourable location for this mode. I suggested that you monitor the 50MHz band as often as you can and pay particular attention to the DX Cluster 'spots' of contacts being made between southern Europe and Africa. I have received no reports of TEP contacts being made from the UK during February but some stations in Gibraltar, Portugal and Spain did have some success. The ZD8VHF beacon (Ascension Island, IL22) operating on 50.032MHz featured in many reports being heard nearly every day between 2000-2300UTC. The station of Bruce Salt, ZD7VC (Saint Helena Island, IH74) was often heard in beacon mode on 50.007MHz and occasionally could be found on SSB around 50.120MHz. No contacts into southern Africa were reported but a slant path into South America was much more successful. The station of CT1HZE (Portugal) reports making SSB contacts with the Brazilian stations of PY2XB, PY4AQA, PP5XX and PP7JR between 2200-2330UTC. Keep a look out for auroral activity as this indicates an increase in solar activity. Often within two or three days the TEP path becomes more enhanced.

TROPO WEATHER. I often mention, as I did recently, that tropospheric conditions were poor and this was not really surprising as the weather was particularly inclement. Under normal circumstances enhanced tropo propagation is formed during periods of high pressure weather. That is when an anticyclonic system is above the UK and the barometer reads 'fair' or 'very dry'. The right conditions often occur in the summer and autumn months and can provide days of long distance tropo contacts. But surprisingly there are a few occasions when it can be blowing a gale with the rain lashing down and yet the 144MHz and 432MHz bands are in pretty good shape. How can this be?

A temperature inversion can actually occur when a cold front approaches an area of warmer air. Its passage is usually marked by cloud and precipitation, followed by a drop in temperature and humidity. Sometimes the air temperature increases with altitude instead of decreasing in temperature. It is at the boundary of this inversion that radio waves are 'trapped' by the refracting layer of air. In such circumstances the upper layer of air and the earth form the walls of a "duct" in which VHF signals can be guided in a similar way to that in a microwave waveguide. Ducting conditions usually vary over short time periods as opposed to an enhancement which is more stable. Ducts located behind cold fronts ('post-frontal ducts') are notoriously unstable as paths can even be interrupted by things such as heavy rain showers associated with the cold front itself. Always expect the unexpected from these types of ducts as sudden and rapid changes in signal strengths are quite common. Indeed some post-frontal ducts may only last less than 15 minutes.

The synoptic chart (see **Figure 1**) illustrates the situation in early February. Gale force winds had been lashing the UK and yet at the same time there was a good tropo opening to Spain and southern France in the direction along the cold front. Contacts on CW and SSB were made on the 144 and 432MHz bands with stations that included EA1CEZ, EA1DDU, EA1FBF, EA1FDI, EA1MX, EA1NQ, EA1UU, EB1YL, EA2AFR, EA2AWD, EA2CSI/P, EA2HRR, EA2LP, EA2TO/1 and EB2DJB/P, all up to 1000km distant.

Another similar opening occurred on 31 January and enabled contacts to be made on the 144 and 432MHz bands with stations in Germany and Poland. The tropo conditions had been reasonable from around 1200UTC through to 2100UTC with SSB contacts being made deep into Germany over paths of around 800-900km. At 2130UTC the tropo duct extended somewhat allowing contacts to be made with SP1JPQ (JO73), SP1MVG (JO74), SP2EEQ (JO94), SP2HPD (JO94), SP2MKO (JO93) and SP3VZY (JO82). One of the longer distance contacts made during the opening was between the stations of G4RRA (IO80) and SP2CNW (JO93), some 1518km. Not bad for a wet and windy day!

DEADLINES. Good luck and if you do hear or work any DX stations on the VHF or UHF bands or have any other news then please send your reports to g4asr@btinternet.com to reach me *before the end of each month*. Alternatively you can send letters to Yew Tree Cottage, Lower Maescoed, Herefordshire HR2 0HP.

GHz Bands

Lots of activity and *another* new record

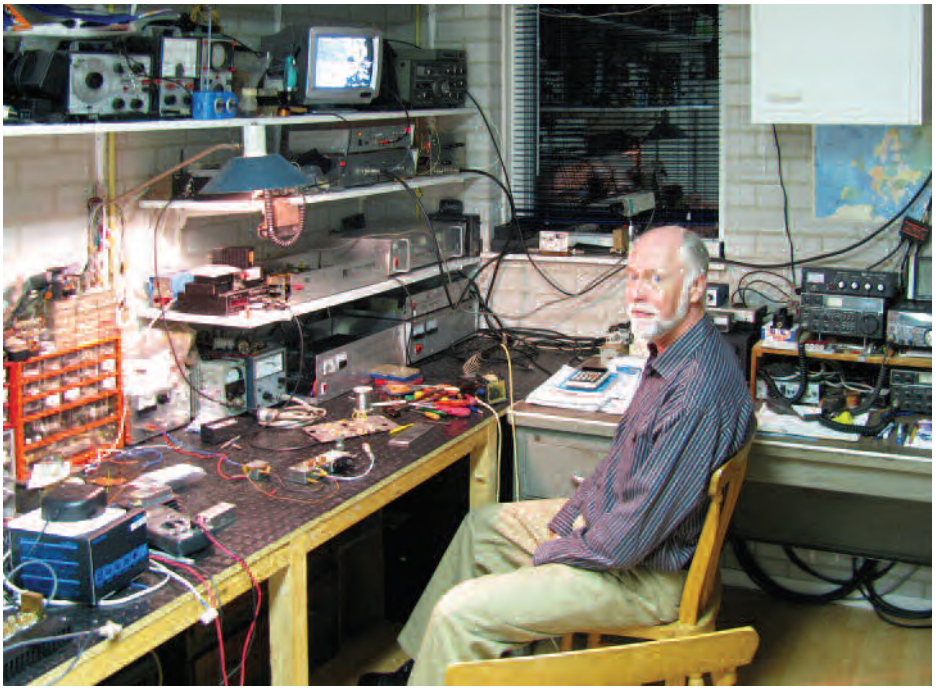


PHOTO 1: PH0V in his shack during a recent visit to the Dutch Heelweg Microwave meeting. Hans lives in Sint Pancras, near Alkmaar and is one of the PI7ALK beacon team.

2011 UKAC STARTS WELL. Now that we are into 2011, the 1.3GHz RSGB UK Activity Contest and the 2.3GHz And Up events are once again under way. There are a few rule changes since last year. 2.3GHz has been split from 1.3GHz, in line with the Nordic Activity Contest (NAC), where 2.3GHz and above has traditionally been run on the fourth Tuesday evening in the month. This change will allow entrants to focus on 1.3GHz on the third Tuesday. There was growing evidence that 2.3GHz activity was suffering because many operators felt they needed to concentrate on 1.3GHz, where the number of active stations has been steadily increasing. This move by the RSGB Contest committee is to be applauded.

The other significant change is to the scoring system. Whereas previously the total distance score was multiplied by the number of unique locators worked, irrespective of country, only UK locators are now allowed. This disadvantages those living in the south, west and east of the UK, who would normally expect to work a significant number of non-UK locators. A much less complicated scheme would be to do away with locator multipliers and score purely on distance at 1 point/km, as is done in the NAC and other contests.

JANUARY 2.3GHz AND UP UKAC. During the January Monday Microwave Activity Contest evening Ray, GM4CXM (IO75) had his first 2.3GHz QSO with Alan, GM0USI (IO76) at a distance of 7km. This was followed by an SSB contact with Tony, G4CBW (IO83) at 347km. Tests with Mike G0MJW (IO91) failed to produce a complete QSO, although reports of 41 were exchanged on SSB.

The following evening, during the 2.3GHz and up UKAC, Ray worked GM0USI/P, GM0UHC (IO85), GM4LBV (IO86), G4CBW (IO83) and finally managed a completed contact with G0MJW when it mattered.

Bob, M0DTF used 2.3GHz to good effect in the fourth Tuesday UKAC. He worked G4CBW, G8OHM (IO92), GW8ASD (IO83), G4MVU (IO83) and MW1FGQ (IO83). He heard but didn't work, G3VKV (IO81), G0MJW and G3DVV (IO91). An attempt with GM4CXM was unsuccessful. Due to some mechanical mast problems, he ended up with the transverter in the shack with 20m of FSJ4-50 coaxial cable feeding his 62-element homebrew Yagi. Bob believes that once the mechanical problems are solved he should be able to work Ray.

G0MJW commented on the 2.3GHz contact with Ray. He called it a marathon effort and his best DX on 2.3GHz to date. He thought conditions were down with all his contacts north west from Oxfordshire. He worked Tony, GW8ASD but it was difficult as Tony was running just 500mW. It was not possible to work John, G3XDY (JO02) on a path that is normally easy on 1.3GHz. Mike could not hear the GB3MHS 2.3GHz beacon, located close to John's QTH. Mike was running 10W, so it does show the potential of the 2.3GHz band to support long distance contacts even with modest power levels.

David, M0GHZ (IO91) found the 2.3GHz and up UKAC rather frustrating. He also felt conditions were very poor in some directions. What should have been a quick 2.3GHz SSB contact with Neil, G4BRK (IO91) took a long time on CW and he failed to hear G0MJW at all. He ran out of time whilst there were several more stations to work. He managed 2.5 QSOs on 9cm, but was unable to work G3XDY on 5.7GHz.

ANOTHER TROPO OPENING. Moving on to non-contest band activity, late January and early February produced yet more long distance tropospheric openings. Propagation was good on all bands to at least 24GHz and a new distance record was established on that band. More of that in the next section.

John, G3XDY sent in a report with details of how he found this opening. Conditions had been building during the day on the 31st but he was not able to get on until late on the Monday evening. Moving up from 432MHz netted him a QSO with DL5DWF (JO71) for a new square on 1.3GHz. On the 'KST chat OE5VRL/5 (JN78) reported hearing GB3MHL at 1012km. A sked was quickly established on 1.3GHz, resulting in reports of 59 both ways. They then QSYed up the bands, exchanging 56 reports on 2.3GHz and 55/53 on 5.7GHz. Nothing was heard, either way, on 10GHz.

On 5 February conditions again improved and by the morning of the 6th were in full swing. Coinciding with a French contest on 432/1296/2320MHz, John worked F4CWN (JN03) on 1.3GHz and then 2.3GHz. F5BUU and F1JRD in JN03 were then worked on 1.3GHz, followed by F6FHP (IN94) on 1.3 and 2.3GHz at 59 both ways. Later that evening various beacons from the Bordeaux area were heard on 1.3GHz and 2.3GHz. He worked F6CBC (IN94) and then F6FHP on 2.3GHz. The distance to F6FHP is over

FORTHCOMING MICROWAVE EVENTS 2011/2012

Martlesham Microwave Round Table meeting, 17 April 2011. Details: G3XDY, g3xdy@btinternet.com. Bookings: http://mmrt.homedns.org.

Swedish EME Meeting, 13-15 May 2011, Orebro, Sweden. Details: Lars Pettersson, www.sm4ive.com.

Microwave Update. Enfield, Connecticut, USA, 13-16 October 2011. Details: Bruce Wood, N2LIV, n2liv@arrl.net.

15th International EME Conference, Cambridge, UK, 16-19 August 2012. Details: www.eme2012.com.

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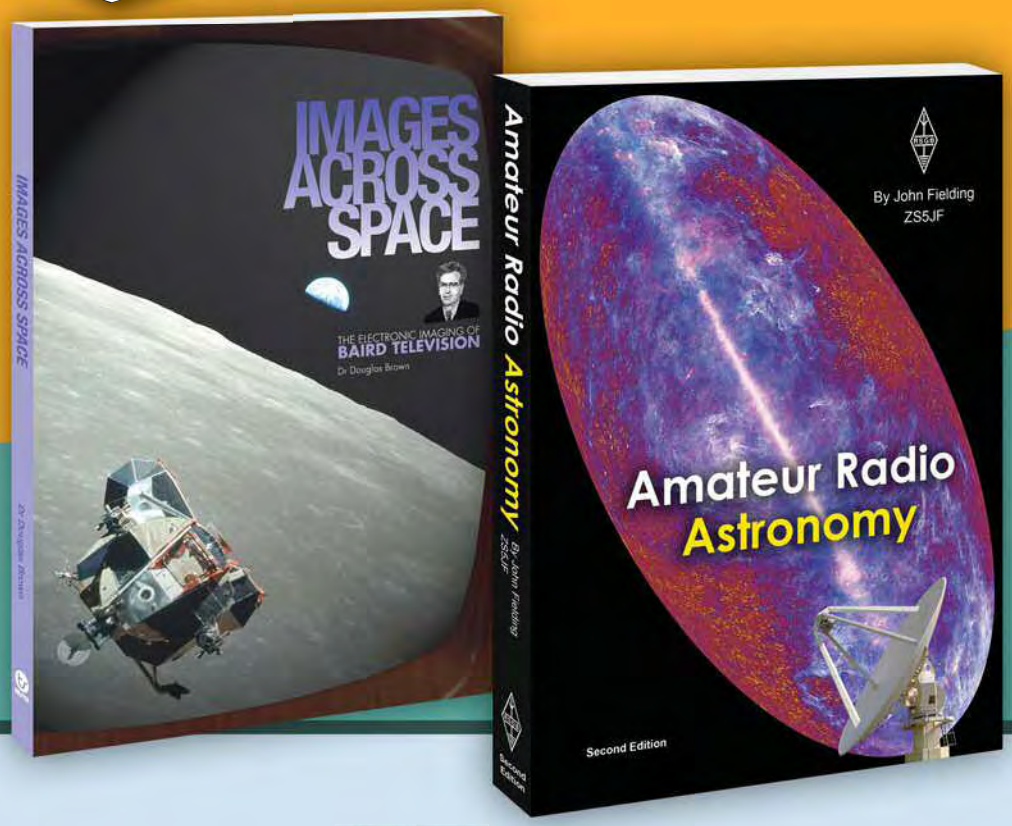

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By Dr. Douglas Brown

Written Dr. Douglas Brown a leading authority on TV *Images Across Space* provides a unique and fascinating insight into the pioneers of television and in particular to Scottish inventor John Logie Baird. From the initial concept of television though to the patent for 3D TV that far surpasses that offered to modern consumers, this book gives a fascinating insight into the man and his developments. Lavishly illustrated, *Images Across Space* not only provides the background to the development of TV but the story of the Baird Television Ltd. up to its demise and its continuation as Cinema Television Ltd.

There are many previously unpublished photographs that illustrate the level of sophistication practiced by the Baird Television Ltd. and revealing photographs of the Baird cathode-ray tube facility, laboratories in the Crystal Palace and Rotunda outbuilding, equipment installed at Alexandra Palace. The book reveals the implications of the devastating fire that spectacularly razed the Crystal Palace to the ground in 1936, taking with it the Baird facilities and an analysis of the television systems on trial for the BBC at Alexandra Palace. Readers will find this book a mine of fascinating material with even a comprehensive listing of the British patents of Baird and his associates at Baird/Cinema Television.

John Logie Baird is remembered as the inventor of the first working system of television but *Images Across Space* shows that there was much more to the story. A rare book of technical detail and an extraordinary story - thoroughly recommended reading.

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Amateur Radio Astronomy

from £14.44

By John Fielding, ZS5JF

For everyone interested in radio astronomy *Amateur Radio Astronomy* is a great source of material to expand your knowledge and also provides a practical guide to making and setting up your own equipment, through to the study of signals coming from space.

Updated and with over sixty extra pages than the previous edition, *Amateur Radio Astronomy* covers in depth the subject of receiving radio signals from outer space. Starting with a historical perspective of radio astronomy this book shows how much radio amateurs have contributed to the science of radio astronomy and how the average amateur can contribute in this area today. There are newly expanded details of the required parameters for the antenna and receiver and how to assemble a station. There are details of a 50MHz Meteor Radar system and lots of straight forward advice and practical information on putting together your own receiving station. Includes is a practical design for a 1420MHz "hydrogen line receiver", a frequency that the Search for Extra-Terrestrial Intelligence programme (SETI) is focused on. New material includes a chapter on Mechanical Systems and details of the Hart RAO KAT Demonstrator Antenna.

This book is the result of period of research stretching back over many years and a great balance between historical narrative and technical information. *Amateur Radio Astronomy* is not only 'a great read' but a practical reference for the application of radio technology in this fascinating topic.

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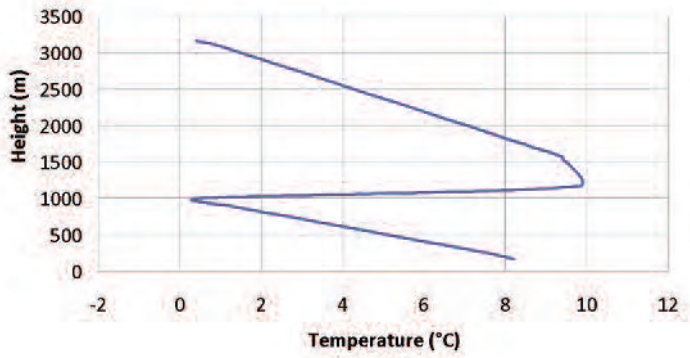

FIGURE 1: Thermal inversion as measured by radiosonde over Trappes, France, at midday on 6 February, during a tropospheric ducting event between the UK and France.

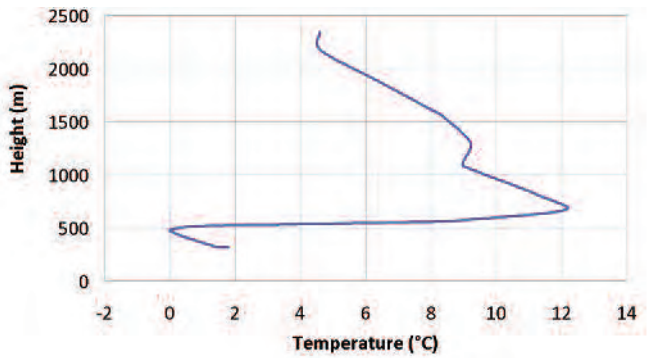

FIGURE 2: Thermal inversion over Stuttgart at midday on 7 February. Note the large change in temperature, more than 12°C, above the inversion. This occurs in a layer about 200m thick.

800km. Changing to 10GHz brought a good QSO with F6CBC at just over 800km with 57/58 reports. Next was F6CIS (IN94) on 2.3GHz at 59 followed by F5DQK near Paris with a report of 57 on 1.3GHz but weak on 2.3GHz. The final QSO of the evening was F8ALX (JN06) on 1.3GHz.

Looking at the Hepburn Index [1] web pages for 6 and 7 February, the reason for the opening is quite clear. A pronounced high pressure area lay across northern France and down into Spain. The upper edge covered southern England and just reached into East Anglia. Radiosonde data showed the presence of a thermal inversion above Herstmonceux and Trappes, reaching as low as 300m above Bordeaux Merignac at midday on the Monday. **Figure 1** shows a plot of the thermal inversion above Trappes, Northern France, at midday on 6 February.

NEW WORLD 24GHz TROPOSPHERIC DUCTING DISTANCE RECORD. Although by 7 February the opening had almost ended for G3XDY, propagation had obviously only moved east. DL7QY (JN59BD) worked F6DKW (JN18CS) on 24GHz for a new world distance tropo record for this band. The distance was 579km with reports of RST 529/529. The previous tropo record was held by WW2R and W5LUA at 542km.

The reason for the enhanced tropo duct seems to have been the intense thermal inversion in evidence over the German/French regions at the time. **Figure 2** shows the temperature profile above Stuttgart at midday on 7 February. Note the large change in temperature above the inversion, compared with Figure 1.

DL7QY used a 70cm homemade dish with 1W RF output whilst F6DKW used a 50cm dish with 1.5W RF output. Congratulations to both stations on this new record.

MOONBOUNCE (EME) ACTIVITY. Each year the big 432MHz and 1.3GHz EME stations get to demonstrate their potential by operating in the *DUBUS* [2] magazine SSB Activity Weekend. Activity is not limited to SSB only, as SSB to CW contacts also count. It is also an opportunity for the smaller stations to work in the SSB mode. This can be surprisingly effective as I know from personal experience with my small 2.3m diameter dish on 1.3GHz. This year the 1.3GHz section was held on Saturday 12 February with the 432MHz section the following day.

Peter, G3LTF was unable to operate on SSB due to a valve flashover problem but he did operate on CW and worked 16 stations SSB-CW, all with Q5 copy. He worked G4CCH, OK2DL, F2TU, OZ6OL, SM4IVE, LX1DB, UA3PTW, RA3AUB, SP7DCS, WA6PY, SP6JLW, VE6TA, K2UYH, K5AZU, N2UO, and F5SE/P. He also heard IZ1BPN on SSB and G4RGK, 9A5AA, S59DCD, DF3RU, VA7MM on CW. Peter has 300W at the dish feed point. He commented that conditions seemed good but that there were a disappointingly low number of USA stations on, possibly due to bad weather in the States.

OZ6OL managed to work 19 SSB stations including VK3UM, SM4IVE, HB9BBD, SP6JLW, F2TU, HB9MOON, OK2DL, RA3AUB, I5MPK, G4CCH, LX1DB, DF3RU, UA3PTW, F5SE/P, SV3AAF, DL6SH, IZ1BPN, N2UO and K2UYH, with G3LTF cross mode SSB to CW. Hans uses a 5m dish with 350W at the feed point.

WD5AGO heard LX1DB, OK2DL and two others, whose callsigns he just could not resolve, on SSB. Interestingly Tommy was using a 30" square circularly polarised horn. He promised more information on the horn at a later date.

From Aldo, IK3COJ comes a report that after twenty years of EME on 1.3GHz he decided to try the digital modes (JT65C) and he was truly impressed with the results. He acknowledges that CW is more rewarding in terms of the operator skills, but must give due consideration to the way that digital allows QSOs that would not otherwise be feasible. On the weekend of 12 and 13 February he had 16 JT65C QSOs. Eight of these were with stations not worked previously using CW. He also worked LU and GM for two new countries.

Aldo wishes to thank Joe Taylor, K1JT for having made WSJT available to the amateur community.

I have to agree with Aldo; not everyone is proficient at CW and, although CW skills improve with use, there is often still a limit to what is possible when dealing with the very weak and libration-distorted signals that are so often experienced using EME on 1.3GHz and above, especially when using small systems. The JT modulation scheme can renew enthusiasm for EME when the fatigue of CW starts to take effect.

SWEDISH SPRING EME MEETING. The Swedish EME meeting will be held in Örebro (JO79) from 13 to 15 May 2011. This promises to be an interesting meeting with a strong contingent of overseas visitors already on the attendees list. I am planning to go to the meeting and will bring you a report later in the year. In the meantime, you can obtain more details by contacting Lars Pettersson, SM4IVE. His web page URL, with meeting details, is www.sm4ive.com.

MARTLESHAM MICROWAVE ROUND TABLE MEETING. Just a reminder that the Martlesham Microwave Round Table (MMRT) meeting has moved from November to April. The next MMRT is scheduled for Sunday 17 April with a pre-meet session on the Saturday afternoon and a Microwave Dinner on the Saturday evening. The Saturday venue is the Cameo Hotel Ipswich (formerly the Elizabeth Copdock Hotel).

As usual the Sunday programme consists of talks, flea market, measurements and chatting. Amongst the speakers this year the organisers are pleased to welcome back Paul Wade, W1GHZ. They have a full and varied programme with talks that should suit everyone. Details, registration (free) and hotel/meal booking can be made from the MMRT web page http://mmrt.homedns.org.

WEBSEARCH

[1] Hepburn Index: www.dxinfocentre.com
[2] *DUBUS*: www.marsport.org.uk/dubus/index.htm

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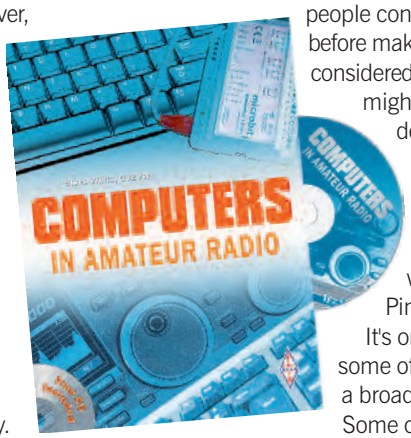
Book review

Computers and whisky – a heady mix!

Computers in Amateur Radio

By Steve White, G3ZVW

There is no doubt that the computer is becoming ubiquitous in shacks around the world. Whether it be as a replacement for the traditional log book or as the 'brain' of a software defined transceiver, computers are playing an increasing role in our radio activities. This book is a timely look across the whole spectrum of how computers can assist in the shack.



Although Steve White is listed as the author, he is ably assisted by many subject matter experts, who have contributed chapters on their area of proficiency. An example is the fascinating look at propagation modelling by Gwyn Williams, G4KFH – who also provides the propagation information for *RadCom*.

A large number of parameters go into choosing your computer – purpose, budget, memory, processor, graphics – but how many people consider the EMC implications before making a purchase? I had never considered, for instance, that a laptop might be a better choice than a desktop machine because it's likely to radiate less 'hash'. There's a whole chapter devoted to the EMC issues of computers, written by EMC guru John Pink, G8MM.

It's only possible to touch on some of the areas covered by a broad-based book like this. Some of the subjects that caught my eye include antenna modelling, SDR, terrain modelling, APRS, D-Star and logging software. Most of these subjects get a chapter to themselves and are written in a clear, comprehensive yet concise style.

Included with the book is a free CD containing a wide variety of radio-related software. Subjects include logging, modelling, digital modes, Morse and much, much more. The book's Appendix that lists the CD contents is 8 pages long!

Overall, this book is an excellent, contemporary look at the way computers can make your radio life easier or more productive. Its sheer breadth of coverage is thought-provoking in itself. I know I learned something from every chapter, some of which brought up subjects that I'd never before contemplated. Highly recommended.

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174 x 240mm, 208 pages
Published by RSGB
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Seaspray and Whisky – Tale of a turbulent voyage

By Norman Freeman

This book is the true story of a radio officer's first voyage across the Atlantic in a merchant ship in the early 60s. Whilst this might suggest a dull story of deciphering Morse code, there could be nothing further from the story this book portrays.

Set in the days before shipping containers, *Seaspray and Whisky* provides a highly amusing tale of the world of a lax, down at heel merchant vessel. Duped by the local Marconi office, the author ends up taking passage on the *Allenwell* and, after an altercation with a large rat in his cabin, settles into his first Atlantic crossing. Setting sail from Liverpool in December, the North Atlantic proved a stormy place and it is therefore a surprise to find that an enterprising crew were already pilfering a large quantity of VAT 69 whisky that formed part of the ship's cargo. Having stopped in New York, the subsequent journey into the warmer weather of the Gulf of Mexico encourages further whisky to be appropriated. By the time of arrival in New Orleans, many of the crew are in a permanent stupor and VAT69 quickly became the currency used by the crew in the bars and brothels of the city. With nearly 1000 bottles missing it is not long before the crime is discovered. With the scale of the theft apparent on arrival at Huston, the FBI becomes involved and much panic ensues amongst the crew. The return to New Orleans and onwards back to the UK via Tampa is equally filled with incident and humour. Observed from the radio room, this truly turbulent tale is set against a background of a Captain who won't talk to the First Mate and a Chief Engineer who hasn't been down to the engine room for years. The snapshots of a crew that is full of characters, who to one extent or another were soaked in whisky, proves fascinating.

Seaspray and Whisky tells this tale in an easy manner that really gives the flavour of what it was like to be on board and the world of shipping where cargos were loaded by hand and weeks passed in port whilst this took place. The three month voyage portrayed in this book is a good read and thoroughly recommended for those looking for story with a little radio but far more in the way of laughs.

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Alpin 100 HF + 6m linear amplifier

Alpin 100 linear amplifier.

INTRODUCTION. Alpin is a Bulgarian company largely unknown in the UK and a relative newcomer to the design and manufacture of linear amplifiers. The Alpin 100 is a valved design covering the bands from 1.8 to 50MHz and is marketed by Reimesch Kommunikationssysteme in Germany. Rated at 1300W PEP output on SSB or 1000W continuous output on CW and RTTY, it has been available for a number of years but only very recently has it been marketed outside of Germany. Waters and Stanton are now the UK agents for this amplifier.

FEATURES. The Alpin 100 is a self contained amplifier with the RF assembly and PSU in one box measuring 43cm wide by 19cm high by 38.3cm deep and weighing 26kg. It uses a single GU74B / 4CX800A valve in a fairly standard design to deliver its rated output with about 65W of drive and an on-load anode voltage of about 2.6kV.

The amplifier uses conventional tune, load and bandswitch controls and these are fitted with large knobs for ease of use. The primary mains power switch is located on the rear panel, which enables the control system. The amplifier power switch is located on the front panel together with an LCD that allows comprehensive monitoring of the various operating conditions of the amplifier.

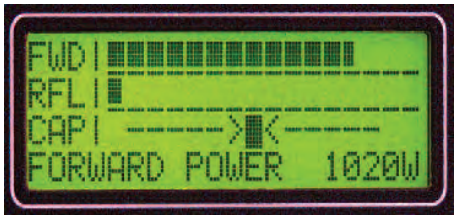
The amplifier is switched from the transceiver via a 'ground to transmit' line. Around 11mA current flows when this line is shorted to ground and the open-circuit voltage is +12V, although some early units, including the review sample, switched with higher voltages and currents. Transmit/receive switching is very fast and fully compatible with CW QSK operation. A key-out line is provided for sequence keying of the radio. If this is used the CW keyer keys the linear and the key-out line keys the radio. However with most modern radios this is not necessary.

A comprehensive protection and monitoring system is provided to protect the amplifier against excessive drive, incorrect tuning and fault conditions. Tuning Pi networks is a two-handed process as the tune and load controls interact. The adjustment needs to be performed quickly to avoid over-stressing the amplifier. A handy tuning aid allows simple and rapid tuning by indicating on the LCD the correct tuning point for the load control and whether to rotate this knob to the left or to the right. A 6dB attenuator is inserted automatically when the tuning point is far away from optimum and is removed when correctly set.

DESIGN AND CONSTRUCTION. The amplifier is similar in many respects to the well-established Acom 1000, also a Bulgarian company and design. The RF deck is virtually identical and a similar arrangement is used for the tuning aid and control, but a more substantial transformer and power supply allows the Alpin design to deliver a higher peak output power. The valve operates in grounded cathode with a cathode resistor to provide some RF negative feedback. The drive power is applied to a 50Ω resistor across the control grid and this provides a passive broadband match without any input bandswitching, yielding a low input VSWR across the whole frequency range. The amplifier uses a Pi-L output tuning network for good harmonic rejection and this will match into antenna VSWRs up to 3:1. Additional filtering ensures VHF harmonics are further reduced. This is particularly important with the second harmonic of 6m falling inside the FM broadcast band. A vacuum relay is used for antenna switching and this is very fast to operate, with a rubber mount to minimise noise.

A heavy-duty transformer dominates the power supply unit with mains voltage taps selectable in 10V increments and a step-start circuit to limit the inrush current. The transformer weighs 14.5kg and is removable to distribute the weight during transport. The power supply uses a voltage doubler to provide the anode supply and additional circuitry provides the supplies for the screen, control grid, heater, fans, relays etc. An electronic bias system (EBS) is used that reduces the quiescent anode current when the RF power level is low. This sliding-bias arrangement is used in some Ameritron amplifiers and helps to reduce dissipation on SSB and CW modes. The user manual describes how to enable and disable EBS but does not describe what it actually does. With EBS enabled the quiescent anode current is reduced from typically 175mA down to 45mA.

The amplifier is superbly constructed on an anodised aluminium frame with a wrap around case. Interlocks disconnect the AC power and short the HT to ground when the case is removed. A dividing screen separates the RF deck from the power supply and the control circuitry is located fully shielded behind the front panel. The output network components are substantially rated with much silver plating in evidence on the inductors and connecting straps, ceramic insulated tuning capacitors, ceramic bandswitch, inductors and chunky 'door-knob' ceramic capacitors. Full cabinet forced air cooling is provided with a centrifugal blower mounted internally on the side of the grid box and a second fan on the rear panel that is fitted with a dust filter. Air is drawn in through the rear panel, past the transformer and PSU circuitry, through the output tuning components and into the grid box. The air is then forced through the valve anode



LCD panel showing forward power.

via a rubber chimney, past the temperature sensor and vented out through the top of the case. The fans engage at a higher speed as the temperature rises.

PROTECTION AND CONTROL. Extensive circuitry is incorporated to monitor operation and protect the amplifier from a host of potentially damaging conditions. With this auto-protection system, sensors are incorporated to allow the control circuitry to monitor forward and reflected power, drive power, anode DC voltage and current, peak RF anode voltage, screen current, control grid current, control voltages and exhaust air temperature. From these measurements other parameters are computed, for example antenna VSWR, output power, relay closure and a novel arrangement to detect the presence of arcs. One line on the LCD shows the measured values, one at a time from eight selected by up/down buttons. Three further lines on the LCD show continuously the relative forward and reflected power in bargraph format and also the load capacitor tuning status.

Associated with these measurements are limit levels which, if exceeded, are flagged immediately onto the LCD and may operate trips. The first level of protection flashes warning messages when limits are getting close, eg 'drive too high' or 'overheating'. If these persist the amplifier switches to standby mode. More severe problems or hard faults will switch the amplifier to standby or power-off and display a fault code on the LCD. These codes are listed in the user manual.

PERFORMANCE. Measurements were made on the amplifier under CW and two-tone SSB conditions. As the linearity of the amplifier is potentially better than most transceivers, care must be taken to use a low distortion two-tone drive source. This was fabricated using two transceivers operating on CW with 5kHz frequency spacing coupled together with a high power hybrid coupler. This arrangement yielded around 80W PEP drive power with residual intermodulation products at -50dB or below.

The Alpin 100 delivered 1000 watts output on CW with 60 to 65 watts drive power on HF and 40W drive on 50MHz. The power displayed on the LCD was somewhat optimistic, reading about 10% high. The harmonic rejection was well within specification, better than 52dB at low frequencies rising to over 70dB on the higher bands and 50MHz. The input VSWR was 1.25:1 or better over the frequency range.

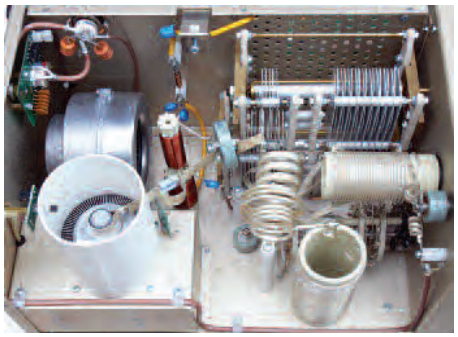
Two-tone distortion levels depend very much on tuning and loading but typically measured -35dB or better for 3rd order products up to 1.3kW PEP output and somewhat better for 5th order. These levels are relative to PEP output. The two-tone waveform was clean with minimal 50/100Hz hum modulation. The switching speed between receive and transmit was extremely fast, settling in under 3ms. The Gigavac vacuum relay used in the amplifier is specified at less than 6ms switching speed. Putting this into perspective, the dot length of a CW character at 40wpm is 31ms.

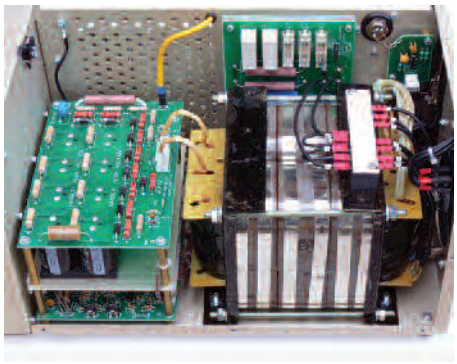
I used the amplifier over a period of several months including several HF and 6m contests and extended RTTY sessions. It performed very well and no problems were experienced. Tuning was well behaved but a little critical on some bands, notably 10 and 50MHz. The initial settings for the tuning controls given in the user manual were somewhat wide of the mark and you would be well advised to compile your own table based on the settings needed for your own antennas. I normally put small sticky labels on the front panel of my linears to show the settings for each band.

After switching on the amplifier, it takes 2.5 minutes for the valve to heat up before the amplifier is ready to use, the time counting down on the display. Being used to the instant availability of 3-500 valve linears, this can seem interminable if you are in a hurry. The blowers are fairly quiet in operation and should not be that obtrusive. The relays are quiet for normal use but become rather noticeable with full QSK.

A 20 page user manual is provided, also downloadable from the Reimesch website, and this covers installation and operation and has a simplified schematic diagram. It is adequate but could be more explicit in some of the descriptions.

Amplifier with case removed showing RF deck (left) and PSU (right).


RF deck.


Power supply unit.

CONCLUSIONS. The Alpin 100 is a well built and well protected amplifier delivering 1000W output (1300W PEP on SSB) on all HF bands and 50MHz from around 65W drive. Previously available only directly from Germany, it is now also available through Waters and Stanton for £2499 inc VAT.

WEBSEARCH
http://www.reimesch.de/alpin_en.html

EMC

Switch-mode power supplies are becoming more widespread and their RFI needs to be controlled

PHOTO 1: Two 12 volt switch-mode power supplies sold for CCTV security systems.

INTERFERENCE REPORTING. Now that the BBC deals with radio and TV interference reporting, there may be some confusion among radio amateurs about what goes to the BBC and what should still go to Ofcom.

- Reports of interference to broadcasting (radio, TV or HF) should go to the BBC
- Reports of interference to amateur radio reception should go to Ofcom.

At the time of writing (February), it may not be entirely clear from the Ofcom website how to register amateur interference cases, but it is hoped that this will be clarified.

MEETING WITH EUROPEAN COMMISSION. As mentioned in February 2011 EMC, the Society met with representatives of the European Commission in Brussels in mid-December to progress discussions on the proposal to introduce an EMC standard to govern emissions from PLA devices. The meeting lasted 90 minutes and there was a full and frank interchange of views covering two areas:

- The inadequacy of the proposed emission limits for proper protection of radio services
- The scope for national administrations to take action against PLA devices should such a standard be introduced.

It became clear that the EC does not assign the same importance to keeping the HF spectrum relatively noise-free as do users of the spectrum. The EC sees it as a trade-off between the demands of various interest groups, with HF spectrum users being given lower priority than the general public. However, the Commission understands the interference potential of PLA devices, but is looking for some form of standard that can act as a baseline for limiting extreme emissions.

Even though the HF amateur bands are notched-out in the emission spectrum of PLAs in the proposed standard, the Society remains opposed to legitimising high levels of emission elsewhere in the HF spectrum. Furthermore it is far from clear why a new standard will prevent levels of emissions that exceed the standard, as the current standard (EN55022) has been ignored by national administrations over the past few years. There seems little chance of national administrations taking action should any new standard be exceeded. Furthermore the mitigation measures proposed in the draft standard are unproven and doubtful.

However, the Society did establish that national administrations remain free to take action against PLA devices that cause harmful interference, and this is something that we shall be exploring with Ofcom.

Copies of correspondence relating to the meeting can be found on the RSGB website (See Websearch).

LED SPOTLIGHTS. Richard, G3ZGC sent a report via the RSGB EMC Committee web pages about some new spotlight LED arrays that are marked 'MK16 12V 3X2W 2700-3200K 30 DEGREES'. These consist of three LED clusters in one unit and are claimed to give off more light. Richard reports that these caused serious interference to a commercial nationwide VHF Packet radio network. A number of these were reported to be radiating over 50 yards and seriously affecting VHF reception in the area. It appears that these may have been counterfeit spotlights and not by a leading manufacturer.

This type of LED spotlight uses three 2W LEDs and is intended as an energy-efficient replacement for traditional 12V halogen spot lamps. The very high intensity LEDs typically run on 3.25 volts so the supply voltage is stepped down by a miniature switch-mode power supply built into the bulb. It seems that some manufacturers have taken care of EMC, but others may not have been so diligent.

The EMC Committee would be interested to receive any other reports of RFI from LED lighting.

EMC TESTING WITH POWER OFF? Broadband over Powerline (BPL) is an access PLT technology that is used in some locations in the US to provide broadband internet access via overhead electric power cables in residential areas. The US electrical power distribution network is completely different from the UK and the rest of Europe so the US form of BPL is unlikely ever to be adopted in the UK.

For many years the ARRL has been campaigning to protect the US amateur bands from interference from BPL. Meanwhile the IEEE EMC Society has been involved in an EMC standard for BPL but the ARRL reports that recently, the IEEE EMC Society Standards Development Committee (SDCom)

voted to withdraw as the co-sponsor of this standard. This is the IEEE Standard 1775-2010 for Power Line Communication Equipment - Electromagnetic Compatibility (EMC) Requirements - Testing and Measurement Methods. ARRL reports that the IEEE SDCom had concerns about the technical content of the standard.

According to an IEEE SDCom comments document, an area of concern is Clause 7.2.2.3.1 AC ports (conducted emissions). This clause states that the BPL signal shall be disabled before conducted emissions testing is done on the AC port, unless national regulation specifies that conducted limits apply to the carrier-current emissions. If accepted, this clause would allow manufacturers to get their products to pass EMC tests by testing them with the power turned off if national rules do not specifically mention that technology!

And no, this is not an April spoof: Google "IEEE SDCom 7.2.2.3.1".

CCTV SYSTEMS. Some homes and many shops and small businesses have closed-circuit TV security systems. A popular setup for small CCTV systems uses up to four cameras connected to a digital video recorder (DVR) that records four video signals simultaneously onto a hard disc drive. The video cameras are normally powered by 12V DC from a switch mode power supply unit (SMPSU). Some of the DVRs also run from 12V DC using a similar type of SMPSU.

In a wired CCTV system, the cameras are connected to the DVR via long video and DC power cables, which have the potential to radiate RFI from the SMPSU if it generates any – and some do. The author recently investigated a case where users of a scout hut found that FM stereo broadcast reception on a portable stereo system had been suffering interference since a CCTV security system had been installed. There were two different makes of 12V 3.8A SMPSU units, one to power the DVR and one for the three cameras. The SMPSU for the DVR was quiet in the 88 - 108MHz FM broadcast band but the SMPSU for the cameras caused significant levels of interference to reception of many FM stereo broadcast signals at a distance of 3m using a portable radio in another room. As the EN55022 Class B standard for radiated emissions specifies limits at a distance of 10m, this listening test does give any indication of whether or not the SMPSU may comply with EN55022 Class B radiated emission limits. Nevertheless, RF interference from an SMPSU around 100MHz is relatively unusual and only one of the two SMPSU did this.

The owner of the CCTV system purchased a replacement SMPSU for £10.99 including p&p from a company that sells through Amazon. The replacement was described as suitable for powering CCTV but it produced just as much RFI on FM broadcast reception as the original! The two noisy SMPSUs are shown in **Photo 1**. The original is on the left and the replacement on the right. They have a CE mark but neither has a manufacturer's name.

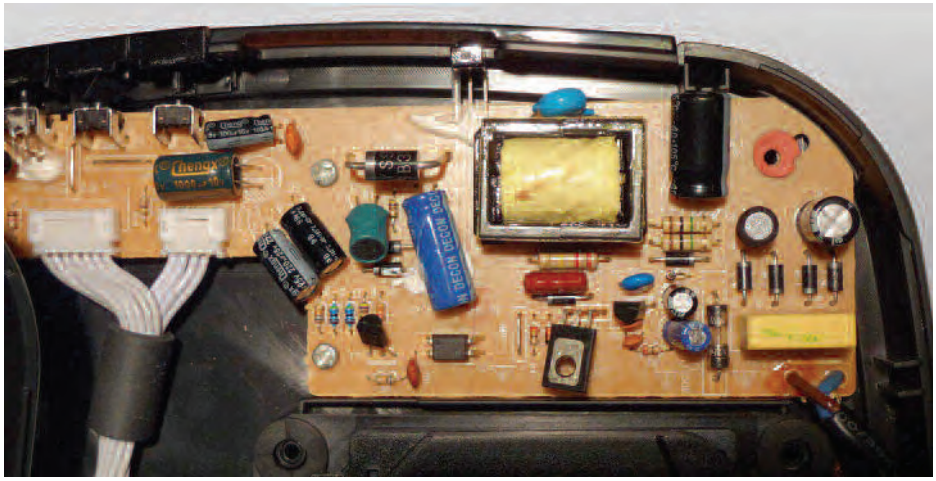


PHOTO 2: The switch-mode power supply in a low cost DVD player.

When searching for local sources of RFI in HF or VHF amateur bands, it is worth looking out for any houses, shops or small businesses with small CCTV cameras. If these are wired cameras, they are likely to be the 12V DC type that is powered remotely via long cables from a SMPSU that operates continuously. It seems that a type of SMPSU that generates RFI at VHF may be quite common in small CCTV systems.

DVD PLAYERS. Jan, G0BBL sent a report about how he helped a fellow radio amateur with a G2 callsign to trace a source of strong man-made interference, predominantly in the 3.5MHz band. The interference had started around Christmas 2010 and it made a daily sked with fellow radio amateurs difficult or impossible to maintain. Jan's G2 friend is 93 years old and partially sighted. Radio is his only hobby and means for keeping in touch with other radio.

The interference was broad band in nature with no distinct frequencies or changing pattern present. It did not vary when tuning across the 3.5 - 3.8MHz band. Interference is also present on the 7MHz amateur band but to a much lesser extent. A quick inspection with a spectrum analyser shows the interference covering a range of frequencies up to approx 7 - 8MHz with a peak at approx 5.5 - 6MHz.

The level of 3.5MHz interference on a Kenwood TS-570 was found to be S9 with preamp switched on and S7 with preamp switched off. When the TS-570 was powered from a 12 volt battery, there was no change in these interference levels, which showed that the interference was being picked up by the antenna rather than being mains-borne.

Jan concluded that taking into account the type of antenna and time of day, this interference was some 18 - 20dB higher than normal background noise on the 3.5MHz band. This noise masks the weaker signals.

A portable shortwave receiver in AM mode was used to locate the source of the interference. Reception was clear in the front and back garden but it increased rapidly near the house, especially near the satellite dish antenna mounted at the side of garage.

Jan switched off each electrical circuit in turn at the consumer unit and eventually found that the source was a DVD player, model no DVDTL01, located in the radio amateur's own house. It had been bought from a well known supermarket chain for around £15. The DVD Player was connected to a TV via a SCART cable and the TV was also connected to a satellite receiver with a coaxial feeder up to a satellite dish about 7 - 8m away from the radio amateur's 80 metre trap dipole antenna.

The DVD player has a switch mode power supply that is always running regardless of whether the unit is switched on or not. The only solution was to unplug it or to switch it off at the mains socket. This reduced the S-meter reading on the TS-570 to a level of S2-S3 level on most of the 3.5 - 3.8MHz band. This was considered to be a normal level of background noise on this band at around midday. Jan's friend successfully resumed this daily sked after the DVD player was removed from service.

Jan forwarded his report to the RSGB EMC committee for possible action and has made the DVD player available for EMC testing. The switch-mode power supply of this DVD player (see **Photo 2**) only has one inductive component on the mains side: the transformer. The mains bridge rectifier on the right has no inductor for RF interference filtering, so it will be interesting to see whether it complies with the relevant EMC standard.

WEBSEARCH

The RSGB and Ofcom – what is the PLA/PLT issue all about? – www.rsgb.org/plt

ARRL News Item, IEEE EMC Society Standards Development Committee Withdraws as Cosponsor of IEEE BPL EMC Standard – http://tinyurl.com/RC0411-EMC or www.arrl.org/news/ieee-emc-society-standards-development-committee-withdraws-as-cosponsor-of-ieee-bpl-emc-standard

Sport Radio

The changing face of RoPoCo and a look at the EU Sprints

PHOTO 1: Looking very happy in his shack, Steve Cole, GW4BLE.

CHANGING RoPoCo. For the past ten years there have been two RoPoCo contests, as indeed there still are, but this year RoPoCo 1 has been changed to an SSB event and is being held on a Sunday evening. RoPoCo 2 will continue be on CW and occupy its customary early Sunday morning slot in August.

In the recent past, participation in RoPoCo 1 has generally been in the 50s and RoPoCo 2 in the 40s. I wouldn't mind betting there will be somewhat greater support for RoPoCo 1 now it is on SSB in the evening and it wouldn't surprise me at all if some of those participants feel inclined to take part in RoPoCo 2 later in the year. At only 90 minutes duration each, neither RoPoCo constitutes a big commitment time-wise, it's mainly a question of getting your head around the rolling structure of giving each QSO partner the postcode you received in the previous QSO – even if you know it to contain a mistake! Incidentally, the convention is that the space in postcodes is not sent, making them a continuous string of five to seven characters. As a final point, I'd like to remind would-be entrants that the power limit for both RoPoCo events is now 100 watts.

EU SPRINTS. The qualifying events for the HF Championship were re-defined at the start of this year and now include several non-RSGB events. Four of those events are the EU Sprints (2 x CW and 2 x SSB). The Spring Sprints are held this month, so I thought it would be a good idea to ask someone who has taken part and done well in the past to tell us how he goes about maximising his score in these short, Europe-wide 3-band events. The obvious person to ask was Steve Cole, GW4BLE, who says; "The European sprint contests have never seen much support from contesters in the UK, however with the Sprints now part of the RSGB HF Championship that will hopefully change.

"Geographic location is extremely important to do well in this contest, with those at the extremes of the continent often being placed high on the leader board. But it's not all about winning; it's the taking part and having fun that really counts. The contest is held four times a year, with two CW events and two SSB. Readers will no doubt be familiar with the RSGB 80m Sprints. The basic rules and exchange are the same, but there can be subtle differences in operating strategy between the two.

"My sprint activity is primarily SSB, so I will endeavour to add a few pointers on how to operate the contest on phone, what's worked for me and one or two other tips. That said, they may well be equally applicable on CW.

"The bulk of activity in the contest comes from Europe (well, it is the European Sprint), so low angle radiation antennas aren't really necessary (although more on this later). In the final results, low power entrants are marked accordingly in the tables, so an amplifier isn't always necessary either, but if your aim is a higher placing in the results those extra few dB will indeed help. This is one reason why the European Sprint differs somewhat from the RSGB 80m version.

"In the RSGB Sprint, no-one runs more than 100 watts and there's generally a more level playing field antenna-wise. Notwithstanding the vagaries of 80m propagation (stalwarts of the 80m CCs will know what I mean), propagation on 20m can be more challenging. This is where the contest usually kicks off and is the bread and butter band for most participants.

The skip zone into Europe can vary tremendously during the contest with those placed at the extremities of the continent (Iberian peninsula or the Balkan states) often well placed to mop up the bulk of European participants. Here in the UK we can be more geographically challenged in that respect. Ironically, even though I enjoy the Sprint contest I'm not that well placed to work Europe on 20m from my location. There are however a couple of things I can do to increase my QSO tally. Let's think a bit out of the box here. It's not just European stations that make an appearance in the Sprints, a few stations from the Far East may appear and there are often USA QSO parties that run concurrently with the Sprint and stations there may well be a ready source of contacts. This is where having a beam at your disposal can help. Think backscatter too, because the odd European (and UK) station can also be worked that way. Here that extra power from an amp can also pay dividends.

"40m tends not to see much activity until further into the contest. The savvy operator will however keep one ear on the band (SO2R) from the start, but don't expect much action until the second hour. There is potential for growth here and even more so on the third band – 80m. Traditionally, stations worked here are those mainland Europeans already worked on the other bands, with a few of the UK 'usual suspects' thrown in for good measure, most (if not all) contacts being made in the last hour. However, given the additional support now anticipated from within the UK, the latter stages of the contest could see some frenetic inter-G activity!

"Remember, this is a sprint contest, not a stroll in the park, so we don't have too much time for pleasantries. We all make mistakes and fluff our lines at times, but the exchange is critical for the smooth running of the contest. Accuracy is paramount though, because there are potentially penalties for both the sender and receiver of the contest exchange. Be sure to log precisely what you receive! Just because you know GM3xxx's name is Jack, he might be signing 'Ed' or 'Bob' in the sprint. Be doubly careful on those European names too (fortunately the odd 'Elvis' or 'Marmaduke' are more often relegated to the RSGB Sprints!).

"If you are calling CQ, the preferred method of exchange would be:

CQ Sprint GW4BLE
(I am called by G4BUO, who says): G4BUO

RSGB HF EVENTS

Date	Event	Times (UTC)	Mode(s)	Band(s)	Exchange
Apr 3	RoPoCo 1 *	1900-2030	SSB	3.5	RS + full postcode received
Apr 4	80m Club Championships	1900-2030	CW	3.5	RST + SN
Apr 13	80m Club Championships	1900-2030	SSB	3.5	RS + SN
Apr 21	80m Club Championships	1900-2030	Data	3.5	RST + SN

RSGB VHF EVENTS

Date	Event	Times (UTC)	Mode(s)	Band(s)	Exchange
Apr 3	First 70MHz	0900-1200	All	70	RS(T) + SN + Locator
Apr 5	144MHz UKAC	1900-2130	All	144	RS(T) + SN + Locator
Apr 10	First 50MHz	0900-1200	All	50	RS(T) + SN + Locator + Postcode
Apr 12	432MHz UKAC	1900-2130	All	432	RS(T) + SN + Locator
Apr 19	1.3GHz UKAC	1900-2130	All	1.3	RS(T) + SN + Locator
Apr 26	50MHz UKAC	1900-2130	All	50	RS(T) + SN + Locator
Apr 26	SHF UKAC	1900-2130	All	2.3 & up	RS(T) + SN + Locator

BEST OF THE REST EVENTS

Date	Event	Times (UTC)	Mode(s)	Band(s)	Exchange (info)
Apr 3-4	SP DX	1500-1500	CW, SSB	1.8-28	RST + SN (SPs send Province code)
Apr 3-4	EA RTTY	1600-1600	RTTY	3.5-28	RST + SN (EAs send Province code)
Apr 9-10	Japan International DX	0700-1300	CW	1.8-28	RST + CQ Zone (JAs send Prefecture code)
Apr 9	EU Spring Sprint *	1600-2000	CW	3.5-14	Both callsigns + SN + Name (no RST)
Apr 16	EU Spring Sprint *	1600-2000	SSB	3.5-14	Both callsigns + SN + Name (no RS)
Apr 23-24	SP DX RTTY	1200-1200	RTTY	3.5-28	RST + SN (SPs send Province code)
Apr 25	IRTS 2m Counties	1300-1500	All	144	RS(T) + SN (EIs & GIs also send county)

*HF Championship event +VHF Championship event

(I reply and say): G4BUO GW4BLE 056 STEVE
(G4BUO responds and says): GW4BLE 083 DAVE G4BUO

"Anyone tuning onto the frequency would then know that the last callsign heard would indicate it to be that station's frequency. This, and other detail, is covered on the European Sprint website.

"Having the ability to run two radios (SO2R) can pay dividends, particularly late-on if a new station is worked and can be persuaded to move up or down a band. If the QSY is slick, it may be possible to move back to the original calling frequency if it hasn't been taken by another station. If you don't have a separate rig for another band or any other form of dual-band operating, don't forget most modern rigs have a second (in band) VFO and that can also be used to good effect.

"In conclusion, for the seasoned contester wishing to try something different or the new contester wishing to sharpen his skills, the EU Sprint contest can be great fun."

THIS MONTH'S EVENTS. On HF, we begin with the new RoPoCo SSB contest, which is being held on the evening of Sunday 3rd. On the very next day the first of the month's 80m Club Championship contests takes place on CW. The SSB and datamodes sessions of Club Championships follow on the 13th and 21st respectively.

Moving up the frequency spectrum, the first RSGB VHF event is the First 70MHz contest on Sunday 3rd. Although it doesn't attract a huge number of entries, this 3-hour contest traditionally enjoys strong support from portable stations, indeed 40% of last year's entrants signed /P. There are no multipliers in this event; it's purely a matter a trying to amass the biggest number of total kilometres worked. On the following Sunday, the 10th, the First 50MHz contest takes place. Once again it's a 3-hour event, but there the similarity ends, because in this one there are multipliers for countries, postcode areas (exchange just the first two letters) and locator squares. Tucked in between the two is the first of the month's UKACs, 2m on the 5th. It is followed by the 70cm UKAC on the 12th, 23cm on the 19th and 6m with SHF on the 26th.

PHOTO 2: The Country Winner certificate that GW4BLE received in the EU Sprint Contest 2006.

International events now and there are two major HF contests to choose between on the first weekend of the month. In the 24-hour EA RTTY, single-ops can make a single band or all-band entry, but multi-op stations can only make an all-band entry. If RTTY isn't your thing, the SP DX Contest also runs for 24 hours. In it there are numerous entry categories, mainly for single ops. Multipliers in this one are the 16 Polish provinces. On 9-10th the Japan International DX CW Contest takes place for 30 hours. There are categories for single-band high-power, single-band low-power, multi-op high-power all-band, and maritime mobile! Work Japanese stations only. The first of the year's four EU Sprint contests is the Spring CW leg on Saturday 9th. It's a 4-hour event with a rigid exchange structure of both callsigns, a serial number and your name (or nickname). With the same rules of engagement, the Spring EU Sprint SSB contest takes place the following Saturday, the 16th. In each case you'll have to engage in some band hopping to make the most of changing conditions. The penultimate contest of the month, that takes place for 24 hours on Easter weekend, is the SPDX RTTY. Send a report and serial number, but expect to receive a signal report and single-letter province code from SPs. The multipliers for this contest are continents, countries and provinces. Finally, the IRTS 2m Counties Contest takes place for two hours on Easter Monday. Exchange a report and serial number. Irish stations also give their county. In each of the five entry categories there are awards for the top station outside of EI. Although the outside-EI awards usually go to someone in GI, several categories often attract no entries at all from outside of EI, which looks like a clear opportunity for certificate hunters to get themselves some wallpaper.

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  CW 1.8-30 MHz: 0.25 µV
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Data

Data Mode Identification

SOUNDS LIKE... The number of datamodes in use has grown massively with many sub-modes and speeds. So how does an operator know which one is coming out of the speaker? A few, like PSK31, sound obvious, but even this has two flavours, Q and BPSK. It takes an experienced ear to tell the difference between the wide band parallel tone modes or the several multi-frequency types like MFSK16 and JT65.

To solve this identification problem, Patrick Lindecker, F6CTE, the author of the popular datamode package, *Multipsk,* introduced a robust identifier that is sent as a short burst before each data transmission. The receiving station detects this, with *Multipsk* automatically setting itself as soon as the identifier is detected. The signalling burst is referred to as the Reed Solomon Identifier (RSID) from the robust error correction scheme it uses. Each datamode supported by the scheme, along with its sub-variants, is allocated a unique reference number that is encoded with the error correction as a sequential burst of 15 tones each taken from a set of 16. The burst lasts for 1.4 seconds and has a bandwidth of 172Hz. At the decoding end, the software monitors the entire audio band for a valid tone set and can decode these anywhere they appear. The decoding software is then adjusted to match the data type identified in the burst. The decoder works out where it found the RSID sequence and therefore knows this is where the subsequent transmission will be centred. The centre of the demodulator passband is then set appropriately, to a precision of 2.7Hz. This is sufficient to allow all current modes to begin accurate decoding and is an excellent way to ensure 'fussy' signals like MFSK are properly tuned and decoded. **Figure 1** shows a spectrogram plot with the 15 sequential tones making up the identifier on the left hand side. There is then a short gap before the data, in this case RTTY, starts.

It is really quite impressive to play with. In the *Multipsk* operations menu, enable all the RSID options and tune into any amateur transmission using the facility. When a station starts sending, the burst will be heard and a short time after the software will show it has made its selection; the frequency marker / cursor will jump to the right point and decoding starts. The heavy error correction and low signal bandwidth of the RSID header means that in noisy or weak signal conditions it can still be properly decoded, even when signals are too poor for the data itself. Detection of the RSID signal is possible down to a S/N ratio of about -16dB, so its sensitivity is equal to or better than the majority of the digital modes themselves.

Multipsk is not the only software that supports RSID. At the present time, four other packages are compatible: *PocketDigi* by Vojtech, OK1IAK; *FDMDV* by Cesco, HB9TLK; *DM780* by Simon, HB9DRV and *FLDIGI* by Dave, W1HKJ.

Multipsk's inventor, Patrick, holds and maintains the master list of codes and works in conjunction with the other authors listed. New codes can be added by request once any new datamode is deemed to be valid and useful. Updates to the list are distributed on the DigitalRadio Yahoo group **[1]** at each change. A full description of RSID can be found at **[2]**.

VISUAL IDENTIFIER. The heavily coded RSID burst is not the only signal identification option. Some datamode packages also offer a visual identification. Here, the datamode type together with any subset is encoded into a Multitone Hell text pattern and transmitted as a visual image for viewing using a waterfall spectral display. Of course, this ID scheme cannot do any automatic setting, but it allows the casual listener to identify the signal type - even without any suitable decoding software. The position of the display in the audio passband again defines the centre of the subsequent transmission. Where both identifiers are enabled, the visual image is sent between the RSID burst and the data. Examples of this visual identifier can be seen in **Figure 2** where several different datamodes are selected in turn from *Multipsk*.

ROBUST PACKET. Richard, KE7XO and Tony, K2MO are part of a small group of operators using Robust Packet, a variable speed modem developed by SCS. It uses 8 BPSK/QPSK tones spaced 60Hz apart and has a bandwidth of 500Hz. The modulation type is similar to PACTOR-III minus 8 PSK tones. When connected to another station, it automatically adjusts to variations in HF conditions by switching speeds from 200bps to 600bps. Because of the compression techniques used, the 600bps mode can effectively run as fast as a 900 baud AFSK mode. The symbol rate stays constant at 50 bytes per second.

Performance-wise, it seems to do very well. Selective fading has little effect on throughput and, from the way it recovers from momentary dropouts, it would appear to handle static crashes well. Weak signal performance is good, decoding consistently with signals just above the noise.

It seems to have lot of potential and may offer possibilities as a high-speed ARQ chat mode. Transmit-to-receive changeover timing is not critical like it is with PACTOR so it would appear that a similar mode might be feasible for sound cards.

WEBSEARCH

[1] Yahoo Digital Radio Group
http://groups.yahoo.com/group/digitalradio/
[2] RSID details www.w1hkj.com/RSID_description.html

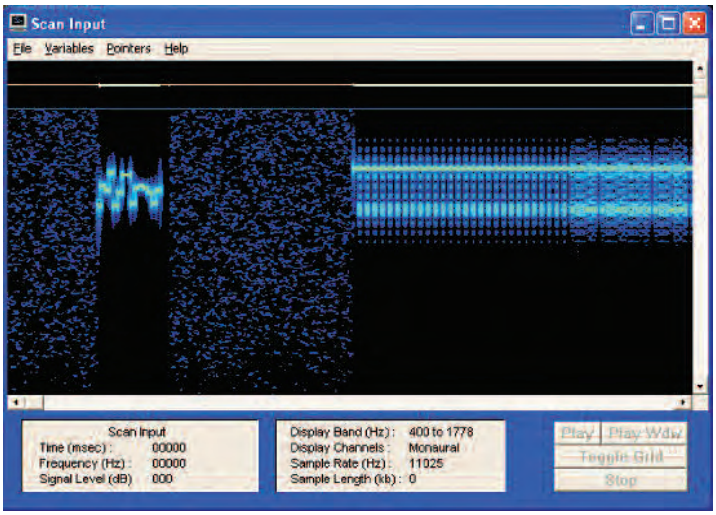

FIGURE 1: The RSID identifier shown in detail – 15 sequential tones, each taken from a choice of 16, followed by a gap then RTTY data.

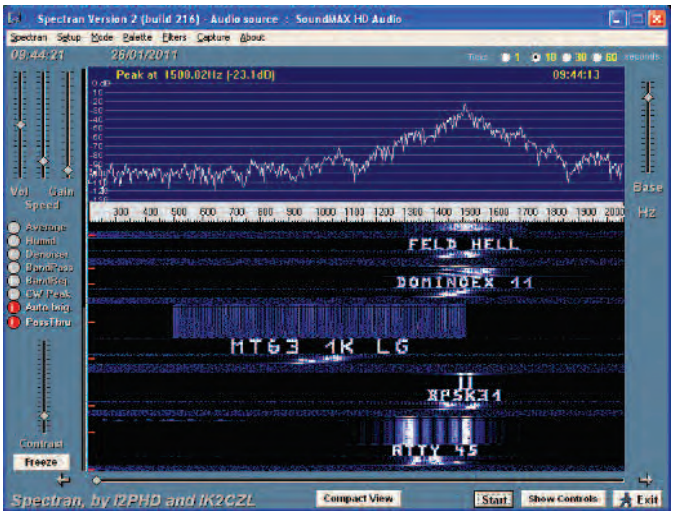

FIGURE 2: A selection of the Visual identifiers generated by the Multipsk software package

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Start Here

Getting started on VHF

A VHF array possibly compromised by nearby trees.

WHAT ARE THE VHF BANDS? A technical answer would be those between 30 and 300MHz but tuning across 50MHz during a Sporadic-E or F2 opening, or 144MHz during the peak of an intense meteor shower may lead you to feel those bands have more in common with 14MHz! Similarly, 432MHz sometimes has more in common with the 'traditional' VHF bands than the higher UHF bands. In this month's Start Here we set out to help you get started on the mysterious VHF bands.

LOCAL OR EXOTIC? The VHF (and higher) bands are primarily thought of as being for line-of-sight communications but they can support longer distances. This is one of the first decisions you may wish to make: whether you want to use the VHF bands for keeping in touch with nearby friends or to pursue more of a challenge and set your station up with the aim of making contacts further afield. This article splits naturally into two sections following this decision; by no means do you need to choose one or the other, particularly as nearly all modern radios contain features adequate to start out in either direction.

WHICH BAND(S) SHOULD I USE? In general, European amateurs have access to 50MHz (6m), 144MHz (2m) and 432MHz (70cm). Some, including the British, have an allocation at 70MHz (4m). Over in the USA they also have an allocation at 222MHz. While each of these bands can be utilised for nearby work, they tend to have distinct characteristics for longer distance contacts such as how often opportunities present themselves; the usual method of propagation also varies considerably.

LOCAL QSOs. There are many ways to have successful local QSOs on VHF. Perhaps the simplest way is by using a handheld, either contacting people directly or through a repeater to extend coverage. For those who desire more reliable and efficient communication, building a station at home or in a vehicle can offer higher power levels, better antennas and possibly more comfort while operating. Local communications are predominantly in FM and antennas are usually vertically polarised.

A typical home station may consist of a medium quality all mode amateur transceiver that covers a wide range of amateur bands including HF and VHF, or a more dedicated radio covering perhaps one or two of the VHF bands on FM only. Antennas are usually modest and discrete such as a 5/8th wave vertical mounted on a chimney or a ground plane antenna on a vehicle. Omnidirectional antennas allow pretty much all round coverage over a local area (terrain permitting) without having to switch or rotate antennas. Cable lengths are kept as short as possible because losses in coax increase as frequency increases. Most activity occurs in the FM portion of the bands, generally centred on a calling channel where initial contacts are made before QSYing to a clear frequency. It is worth finding out what repeaters are within range of your station even if you do not plan on using them so you can avoid QSYing to a repeater frequency and unwittingly causing interference.

QSOs FURTHER AFIELD. This is where it is possible for amateurs to experiment greatly but a lot depends on what you call 'further afield'. There are multiple propagation options open on VHF, although not all of them are always present.

Before you plunge into building a DX station it's worth taking a look at your surroundings and when you're able to operate. For instance, do you have a lot of tall trees within a few tens of metres of where your antennas might go? Are you in a built up area with lots of people watching television near by? How high is your shack in relation to the land for a few kilometres around you in all directions? Where are the likely centres of activity that you might want to contact?

Trees and other large amounts of foliage have a strong tendency at VHF to absorb a lot of precious signals. The amount of signal lost increases if there are more leaves and increases even more when they're wet! It's therefore worth considering if you can mount your antenna(s) high enough to avoid them, or orientate your antenna to have the best possible path in the direction you want to focus on contacting. Failing this, your best option is to compensate by enhancing other aspects of your station. Since VHF long distance contacts tend to be very weak signals, the bigger your antenna(s) the better and the more power you run the greater the chance of someone hearing you. With this in mind though, think about those who are around you – some televisions may suffer from breakthrough in the presence of even a clean high power VHF station so you may wish to think carefully before adding an amplifier or huge array. Planning issues may also need to be taken into account.

Finally, the relation of your shack to the lie of the land can be crucial to making DX contacts. The mainstay of VHF DX comes from tropospheric ducting or scattering; this involves signals arriving from pretty much the horizon. Thus if you have a hill in the direction that you wish to work in, you may well find that contacts are limited on that heading. Even a small rise of two or three degrees within a kilometre or so of your shack may block signals. The software *Radio Mobile* (see Websearch) provides a great way of visualising your horizon. Possible solutions include increasing the height of your antennas, going portable, using antennas that have a broader vertical beamwidth and operating via propagation modes that have a greater range of signal arrival angles, such as meteor scatter.

So what is the 'best' way to get started making contacts further afield? Signals are going to be weak in general so it's best to try and avoid losses. This means using the highest quality cable with appropriately fitted connectors and of the shortest length possible. It's not unheard of for a chimney mounted small Yagi to outperform a Yagi double the size that's at the top of a 60ft tower – because so much signal can be lost in the cabling before it reaches the radio. Since most modern radios that operate on the VHF bands are reasonably good at receiving weak signals, you can get started with a small horizontally polarised antenna such as a Yagi that has a boom length of maybe a couple of metres, mounted either on the rooftop or on a small tower, provided you use good coax such as Ecoflex instead of RG213 or RG58. Ideally you want to lose no more than 1dB of your signal (~25%) over the length of your coax for good weak signal work.

VHF DXing is an acquired taste and is something that you learn. There's not an out of the box solution for long distance contacts and each station evolves to suit the interests of the amateur. Plenty of good advice on how to improve your VHF station either by hardware, software or operating skills may be found on the Internet, a small selection of which are included in Websearch.

WEBSEARCH

www.cplus.org/rmw/english1.html
www.vhfdx.de
www.sm5bsz.com/
http://uksmg.org/news.php

Satellites, Microwa

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By Don Field, G3XTT

Not for nothing is 6 metres (50MHz) known to radio amateurs as the 'Magic Band'. One minute there may be no propagation at all, the next moment the band is full of big signals via Sporadic E. This book, written by well known DXer and 6m enthusiast Don Field, G3XTT, provides an ideal guide to this unique band. The *6 Metre Handbook* is full details of the equipment and antennas used. There is coverage of the basic operating on 'Six'. The practical guide to 6m propagation provides details of long-distance openings that just do not occur on any other frequency band even at the sunspot minimum. Even today these modes of propagation involved are not fully understood. There is even a chapter on the 4m (70MHz) band, which has some similarities with 'Six' but has its own unique characteristics. It is clear that the Magic Band can be both frustrating and highly rewarding, you need a good guide book to get the best out of 6m - the *6 Metre Handbook* is that book!

Size 240x174mm, 176 pages, ISBN 9781-9050-8647-4

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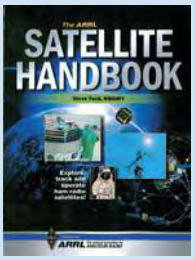

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The *ARRL Satellite Handbook* brings the thrill of satellite communications within your reach. Filled with understandable descriptions and illustrations, this book includes all the tools you need to participate in this exciting field. It's designed to give a broad introduction to the subject, while providing the practical fundamentals you need to explore, track and operate ham radio satellites on your own.

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aves & VHF/UHF books

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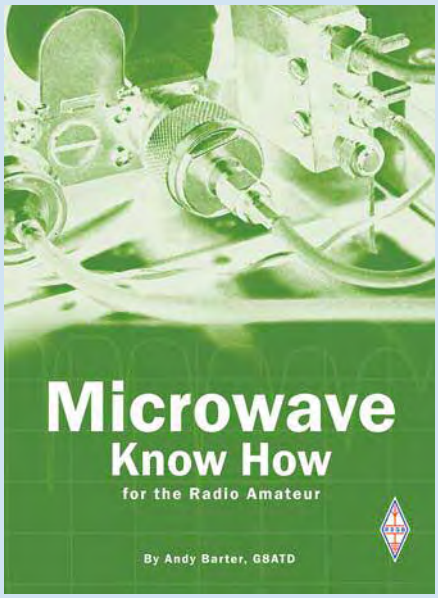

By Andy Barter, G8ATD

This book is a new compilation of articles aimed at those who are interested in building equipment for the amateur radio microwave bands. The designs in this book are from authors all around the world who are keen microwave constructors themselves.
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- Power amplifiers for 23cm and 10GHz
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If you are already active on the microwave bands or simply looking for interesting projects *Microwave Know How* will show you how easy it is to become more active using modern devices and equipment.

Size 174x240mm, 192 pages, ISBN 9781-9050-8656-6

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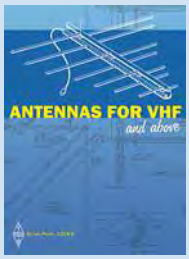

By Ian Poole, G3YWX

The VHF, UHF and microwave bands provide an exciting opportunity for experimentation with antennas. This book is a fascinating guide to what can be achieved in these bands. Antenna sizes at these frequencies mean that they do not occupy great amounts of space and most people can experiment with constructing their own antennas. *Antennas for VHF and above*, provides both the basic theory and constructional details for many antenna designs from dipoles to Yagis, and verticals to log-periodic antennas and parabolic reflectors. The reader is taken through the essentials in Ian's easy-to-understand fashion with details of the way the antenna works and the constructional information needed. The reader will also find helpful chapters covering measurements and installation techniques. This book is a mine of information for anyone wishing to understand or construct antennas for the VHF, UHF and microwave bands. Suitable for the newcomer or experienced hand.

Size 240x174mm, 144 pages
ISBN 9781-9050-8645-0

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Edited by Andy Barter, G8ATD

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International Microwave Handbook

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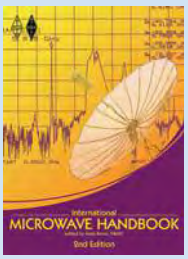

2nd Edition
Edited by Andy Barter, G8ATD

The microwave bands are a very popular part of the amateur radio spectrum. They provide the space to experiment with many of the modern modes of transmission and, with the availability of high performance components, kits and ready built units, there is opportunity for everyone to take advantage of these interesting bands. The fundamental principles used to design and construct equipment for the microwave bands are all covered. Techniques and devices lead the reader to understand the wide range of modern components and equipment available that can reasonably be used by radio amateurs. This second edition has been overhauled and updated to incorporate the many advances that have led to an easier and more cost effective entry onto the microwave bands. For those considering the move to the microwave bands or those already active, this book is the best guide to this exciting area of amateur radio.

Size 240x174mm, 544 pages
ISBN 9781-9050-8644-3

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AYR ARG
Tom Ferguson, GM1OST, 01292 532 088
6 AR apps for your phone
20 74th Annual General Meeting

BORDERS ARS
Danny, 2M0CDO, 01890 882850
8 Sporadic-E by Jim, GM4FVM

COCKENZIE & PORT SETON ARC
Bob, GM4UYZ, 01875 811 723
1 Normal club night
16 10 Pin Bowling Night

LIVINGSTON & DARS
Norman, 07740 946192, uk.groups.yahoo/group/ms0liv
6, 19 Club Evening
26 Morse code practice
112 Operating evening

WEST OF SCOTLAND (GLASGOW) ARS
Fred Coombes, 2M0BIN, 01415715512, www.wosars.org.uk
1, 8, 15, 22, 29 Presentations, guest speakers, raffle & quiz
6, 13, 20, 27 Solder group homebrew projects & licence training

2 SCOTLAND NORTH & NORTHERN ISLES

REGIONAL REP: DENNY MORRISON, GM1BAN, RM2@RSGB.ORG.UK

ABERDEEN ARS
Lewis, GM4AJR, 01224 575 663, www.radioclubs.net/aars
7 Junk sale
14 Morse practice & OTA
21 Construction & OTA
28 Video night

3 NORTH WEST

REGIONAL REP: KATH WILSON, M1CNY, RM3@RSGB.ORG.UK

BOLTON WIRELESS CLUB
boltonwireless@gmail.com
11 Kite antennas, Roger, G4ROJ
25 Closed (Bank holiday)

CHESTER & DARS
Barbara Green, 07957 870770, www.chesterdars.org.uk
5 AGM at Burley Hall
12 Committee meeting
13 Inter-branch quiz with W&DARC at Irby Cricket Club
19 Summits On The Air, Tom, M1EYP
26 Radio operations at Waverton Institute

MACCLESFIELD & DRS
Roger Bell, M0GMG, 0771 258 9163, gx4mws@gx4mws.com
2 Week-long activity, Isle of Arran DXpedition, GS4MWS/P
4 Sked with GS4MWS/P
11 Committee meeting

MID-CHESHIRE ARS
Peter Paul Fox, G8HAV, 01606 553401
6 Club project, G7DZX
13 Projects night
16 Sorting gear in garage store
20 First contact by G8NKX
27 On-air and activity night

SOUTH MANCHESTER R&CC
Ron, G3SVW, 0161 969 3999
7 IBM System/360, Dave, G4UGM
14 Tech book sale, Bill, G4NOL
21 Closed For Easter
25 Monthly technical forum
28 Pickaxe chip, Dave, G4UGM

THORNTON CLEVELEYS ARS
www.tcars.org.uk
4 Natter night / OTA
18 Auction, Mick, G4EZM
25 Closed (Bank holiday)

4 NORTH EAST

REGIONAL REP: HAROLD SCRIVENS, GOUGE, RM4@RSGB.ORG.UK

DENBY DALE RC
Richard, M0RBG, 07976 220126, m0rbg@talktalk.net
2 Weekend SES – Huddersfield Narrow Canal bicentenary
6 Annual surplus sale
20 PSUs (pt 2), Ian, G4LUG

EAST CLEVELAND ARC
Alistair, G4OLK, 01642 475 671, alistair.mackay@talk21.com
1 Radio components catalogues evening
8, 25 OTA
15 Technical forum
29 Radio magazines evening

GRIMSBY ARS
Cliff, G4YHP, 01472 328 830, g4yhp@gars.org.uk
3 RoPoCo SSB
4, 13, 21 RSGB 80m CC
7, 20, 30 Natter night
14 Tricks with coax cable, Dave, G3TBK
28 D-Star, Andy, G0VRM

HORNSEA ARC
Gordon MacNaught, G3WOV, 01377 240573, gmacnaughtwov@yahoo.co.uk
3 RoPoCo SSB
4 80m CC CW
6 Committee meeting
12 Activity plus 80m CC SSB
20 Foxhunt
21 80m CC Data
27 Talk by G3TLI

RIPON & DARS
Rob Hall, M0RBY, 0787 608 5631, www.ripon.org.uk
1 RF burns – a practical
7 Talk – operating /MM
14, 28 Club night, OTA
21 Stealth antennas talk

SHEFFIELD ARC
Peter Day, G3PHO, sarc@g3pho.org.uk
4 Social & RSGB 80m CC
11 DXpedition toBritish Virgin Is by Peter Day, VP2V/G3PHO
18 Quiz or video evening
25 Closed (bank holiday)

5 WEST MIDLANDS

REGIONAL REP: VAUGHAN RAVENSCROFT, M0VRR, RM5@RSGB.ORG.UK

CHELTENHAM ARA
Derek Thom, G3NKS, 01242 241099, chairman@caranet.co.uk
21 3 short talks

COVENTRY ARS
John, G8SEQ, 07958 777363
1 Planning expeditions by Chris Colclough, G1VDP
8 2nd round 2m DF Trophy
15 Committee forum & equipment sale
22 Quiz night
29 Radio workshop

GLOUCESTER AR&ES
Anne, 2E1GKY, 01452 548478 daytime, www.g4aym.org.uk
4 Construction competition
11 Operating of your own choice
18 VHF operating
25 Crickley Hill operating – bank holiday

MIDLAND ARS
Norman, G8BHE, QTHR, 01214 229 787
6 OTA & training classes
13 Committee meeting, training & Morse classes
17 Club visit to Kempton Park Rally
20 Planning meeting for 80th year in June, training classes
27 Laptop computers & training classes

SALOP ARS
www.salop-ars.org.uk
7 Calibration night, Ken, G8DIR
14, 28 Natter night
21 Demo: wiring RF connectors, Ken, G8DIR

SOLIHULL ARS
P T Gaskin, G8AYY, 0121 628 7383
21 Development of the superhet Rx, Bill Williams, G8AVX

SOUTH BIRMINGHAM RS
Don, 0121 458 1603, www.radioclubs.net/southbirmingham
1, 8, 15, 22, 29 Construction eve
4 OTA & field day planning
6 Lecture in main hall
7, 14, 21, 28 Training classes with Dave Murphy, G8OWL
11 Committee meeting
18 VHF field day planning, equipment & site
25 Closed (bank holiday)

STRATFORD UPON AVON DRS
G0CHO, 01608 664488, cousbey@theiet.org
11 How to dip your GDO, G3YVE
25 Informal

TELFORD & DARS
Mike, G3JKX, 01952 299 677, mjstreetg3jkx@blueyonder.co.uk
6 Committee meeting. HQ closed. Net on 3.675/144.6MHz
13 Video evening, with refreshments
20 1st 2m DF hunt (local)
27 History of telegraph keys, Roy, G4WPW et al

6 NORTH WALES

REGIONAL REP: MARK HARPER, MW1MDH, RM6@RSGB.ORG.UK

DRAGON ARC
Stewart Rolfe, GW0ETF, 07833 620733
4 Surplus sale
18 Planning for IMD

WREXHAM ARS
Patrick, 2W0HUU, 07947 701 927, www.wrexham-ars.co.uk
5 Charity auction
19 Antennas I have built & tried by Carl & John

7 SOUTH WALES

REGIONAL REP: JIMMY SNEDDON, MW0EQL, RM7@RSGB.ORG.UK

LLANELLI ARS
Craig, MW0MXT, 01269 845773, craig@mw0mxt.co.uk
4 On air night
11 Social evening & club raffle
18 AGM
25 Closed (bank holiday)

SWANSEA ARS
Nick Lewis, MW0JGE, 01792 402035
21 Visit to Maritime Rescue Coordination Centre, Swansea

8 NORTHERN IRELAND

REGIONAL REP: PETER LOWRIE, MI5JYK, RM8@RSGB.ORG.UK

BANGOR & DARC
Mike, GI4XSF, 028 4277 2383
7 Annual constructor's contest

GREENISLAND ELECTRONICS AMATEUR RADIO SOCIETY
Peter Lowrie, MI5JYK, mi5jyk@rsgb.org.uk
4 Talk on 10-FM by Peter, Mi5JYK
11 2m operational night

MID ULSTER ARC
cqmuarc@gmail.com
10 Monthly meeting

9 LONDON & THAMES VALLEY

REGIONAL REP: ALISON JOHNSTON, G8ROG, RM9@RSGB.ORG.UK

BURNHAM BEECHES RC
Dave, G4XDU, 01628 625 720
4 PW, Rob Mannion
18 The K3, John, G3PQA

CHESHAM & DARS
Terry, G0VFW, 01442 831 491, cdars.club@ntlworld.com
6 CW training session
13 Members forum
20 Designing aerials, Roger, G3MEH
27 Getting started on the air, mobile & portable; CW practice

COULSDON ATS
Steve Beal, G3WZK, secretary@catsradio.org
11 WSPR by Walter, G3JKV

CRAY VALLEY RS
Bob, M0MCV, 020 8265 7735 after 8pm
7 Amateur radio operating in France, Malcolm, G8MCA
21 AGM

DORKING & DRS
Garth, G3NPC, 01737 359472, www.ddrs.org.uk
26 PIC chips, Paul, G0ODP

ECHELFORD ARS
John, G4GSC, 01784 451898, jho_g4gsc@talktalk.net
14 AGM
28 Bring & Buy, CW practice

EDGWARE & DRS
Mike, G4RNW, 020 8950 0658, michael.stewart5@ntlworld.com
14 Solar cycles, John, G3SJE
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15 OTA
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READING & DARC
Pete, G8FRC, 01189 695 697
7 RF earths, counterpoises and artificial earths workshop
14 Spring junk sale
28 Martin Lynch raid

SHEFFORD & DARS
David, G8UOD, 01234 742 757, www.sadars.co.uk
7 What is AIS? by Don, G4LOO
14 Spring junk sale
21 80m SSB Contest @ Club
28 How not to design a boiler house by Paul, M0PSW

SOUTHGATE ARC
David Sharp, M0XDS, david.sharp1@tesco.net
13 Smith Charts, David, M0XDS

SURREY RADIO CONTACT CLUB
John, G3MCX, 020 8688 3322, john.g3mcx@btinternet.com
4 AGM

SUTTON & CHEAM RS
John, G0BWV, 020 8644 9945, info@scrs.org.uk
21 Junk box antennas, Martin, M1MRB & Denis, M0NDJ

WEY VALLEY ARG
www.weyvalleyarg.org.uk
1 Sierra Leone adventure, Roger Western, G3SXW
15 Club night

WIMBLEDON & DARS
Andrew Maish, G4ADM, 020 8335 3434
8 Surplus equipment sale

10 SOUTH & SOUTH EAST

REGIONAL REP: GAVIN KEEGAN, G6DGK, RM10@RSGB.ORG.UK

ANDOVER RAC
Martin, M0MWS, 07776 181646, www.arac.co.uk
5 Video night
17 Spring boot sale
19 Club night, satellites, workshop with M0MWS

BREDE STEAM ARS
Steve, 01424 720815, M0NUC@aol.com
2, 5, 12, 19, 26 At the shack

HARWELL ARS
Malcolm, G8NRP, 01235 524844, info@g3pia.org.uk
12 Contesting, Bryn, G4DEZ
26 Shack activity night

HASTINGS E&RC
Gordon, 01424 431 909, www.herc.uk.net
30 Spring auction at Scout Hall

HORNDEAN & DARC
Stuart, G0FYX, 023 9247 2846, www.hdarc.co.uk
7 Natter night/social evening
21 How aerials really work, Graham, G3XSD

HORSHAM ARC
www.harc.org.uk
7 Minimum antenna height, Mike Underhill, G3LHZ
28 Social, Limeburners Arms

MID-SUSSEX ARS
Peter, G4AKG, 01444 239371
1 Radio night and table top sale
8, 15 Radio night
22 Closed (Good Friday)
29 Surplus equipment sale

SOUTHDOWN ARS
John, G3DQY, 01424 424 319
4 ISWL, Arthur Kinson, G0KOC
6 Operating at Hailsham shack

SWINDON & DARC
Den, M0ACM, 07810 317750, www.sdarc.net
7 Activity night
14 DVD: Design of Linear Amplifiers – Peter Chadwick, G3RZP

WATERLOOVILLE ARC
Rich, G4IBW, 02392 680852, g4ibw1@ntlworld.com
29 Club quiz

WORTHING & DARC
Phil, G4UDU, 01903 816684
3 Breakfast meeting in Goring
6, 13 Discussion evening
20 Smart CCTV cameras, Dr Phil Birch
27 GX3WOR OTA

11 SOUTH WEST & CHANNEL ISLANDS

REGIONAL REP: PAM HELLIWELL, G7SME, RM11@RSGB.ORG.UK

BLACKMOOR VALE ARS
Tony, G0GFL, 01258 860741, www.radioclubs.net/bvars
3 BVARS ARDF, G0GFL
5 1st meeting at new club venue
12 AGM
19 HF OTA evaluation
26 Clansman by Peter, M0PDM

BRISTOL RSGB GROUP
Robin, G3TKF, 01225 420442
25 Meteor detection with GRAVES radar, Dr Dave Knight, G3YNH

CORNISH RADIO AMATEUR CLUB
Steve, G7VOH, 01209 844939, G7VOH@btinternet.com
6 Exam

MID SOMERSET ARC
Nick, M6NJB, 01749 346320, nick.bennett@midsarc.org.uk
12 SOTA expeditions, G4WSB

NORTH BRISTOL ARC
Dick, 01454 218362, www.nbarc.org.uk
1 Prep for South Glos rally
8 Field days, Ken, G4XCB
15 Construction evening
22 Closed (Good Friday). Net on 144.450MHz, 8pm
29 Operating evening

SALTASH & DARC
Brian, M0BHG, 01752 844321
1 Talk on the 4 square aerial

SOUTH BRISTOL ARC
Andrew Jenner, G7KNA, 07838 695471
7 Wine & cheese evening
14 VHF NFD first planning session
21 Films of Bristol with Adrian, 2E0JUW
28 OTA

TAUNTON & DARC
William, G3WNI, 01823 666 234, g3wni@btinternet.com
6 UK callsigns, Peter, G0EYR
20 Junk sale

THORNBURY & SOUTH GLOUCESTERSHIRE ARC
Tony, G0WMB, 01454 417048, tonytsgarc@btinternet.com
3 South Gloucestershire Rally
6 AGM
13, 27 OTA
20 Video night

TORBAY ARS
Dave, G6FSP, g6fsp@tars.org.uk
1, 8, 15 Natter night
22 Closed (Good Friday)
29 Auction night cancelled

WEST DEVON RC
Jules Cuddy, M1AGY, 01752 291588
12 The grid dip meter, M1AGY
26 Open evening

YEOVIL ARC
Steve Crask, G7AHP, steve@g7ahp.co.uk
7 Radio software, G6LLP
14 WSPR and JT65A, G7AHP
21 AGM

12 EAST & EAST ANGLIA

REGIONAL REP: NEIL WHITESIDE, G4HUN, RM12@RSGB.ORG.UK

BITTERN DX GROUP
Linda, G0AJJ, 01692 404154, secretary@bittern-dxers.org.uk
2 Annual dinner and prizegiving
14 Meet at Pinewood Park

BRAINTREE & DARS
John, M5AJB, 01787 460 947
4 RSGB visit from Neil, G4HUN
18 Construction contest

CAMBRIDGE & DARC
Ron, G3KBR, 01223 501712
8 Film: Basic Radio Measurements

CHELMSFORD ARS
Martyn, G1EFL, 01245 469 008, www.g0mwt.org.uk
5 Radio Caroline's Tx, Oliver Swain
12, 19, 26 Club net night
13 Committee meeting
30 IMD OTA, Sandford Mill

COLCHESTER RADIO AMATEURS
Kevan, 2E0WMG, 07766543784, kevan2e0wmg@live.co.uk
21 Quiz night with Clacton and Harwich clubs

FELIXTOWE & DARS
Paul, G4YQC, pjw@btinternet.com
4 The FUNcube, Jason, G7OCD
18 Microwave Round Table talk

HARLOW & DARS
RC WHITE, G0AGO, G0AGO@aol.com
1, 15, 29 General chat night
30 IMD special event station

ARWICH ARIG
Kevan, 2E0WMG, 07766 543784, kevan2e0wmg@live.co.uk
13 Loop fed array antennas, Justin, G0KSC

HAVERING & DARC
John, M0UKD, 07890222111, john@m0ukd.com
6 Busines meeting
13, 27 Informal evening
20 WSPR, Dave, M0TAZ

KING'S LYNN ARC
Ray, G3RSV, ral-g3rsv@supanet.com, www.klarc.org.uk
7, 14, 21, 28 Club night & 2m net

LOUGHTON & EPPING FOREST ARS
Marc Litchman, G0TOC, 020 8502 1645
2,3 Foundation course & exam
7, 21, 28 Club night at shack
14 Sporadic-E, Jim Bacon, G3YLA

NORFOLK ARC
Chris Danby, G0DWV, 01603 898678, cmdanby@btinternet.com
4 RSGB CC CW
6 AGM, Bright Sparks award
7 Visit to Orwell Observatory
13 Informal / construction / shack / Bright Sparks / RSGB CC SSB
20 Exciting DX comms, Don, G3XTT
21 RSGB CC Data
27 IOTA, Martin Atherton, G3ZAY
30 GB0CMS at Caister Lifeboat Station

SOUTH ESSEX ARS
Norman, M0FZW, 01268 692776, secretary@southessex-ars.co.uk
13 Sky at night, Bruce, G1JJS

WEST KENT ARS
Les, G6UBM, westkentars@googlemail.com
11 AGM, Bidborough Village Hall

13 EAST MIDLANDS

REGIONAL REP: JIM STEVENSON, G0EJQ, RM13@RSGB.ORG.UK

DERBY & DARS
Richard Buckby, radio@dadars.org.uk
5 Junk sale
12 Committee meeting

EAGLE RG
Terry, G0SWS, 01507 478590
12 Island contesting, Nick, G4FAL

FRISKNEY AND EAST LINCOLNSHIRE COMMS CLUB
Chris, M0MFP, 01507 442240
5 ATC by Billy

HINCKLEY ARS
John, M0JAV, 07836 731544, m0jav@lowgables.co.uk
6 Social evening
13 80m Club Calls SSB
20 RAYNET, Kevin Finn, M0KVN
27 Workshop

HUCKNALL ROLLS ROYCE ARC
Dave Wilde, G1YAI, 0844 4355593, secretary@hrrarc.com
1, 8, 15, 22 General club meeting
7 5 mile fox hunts

LINCOLN SHORT-WAVE CLUB
Pam Rose, G4STO, 01427 788356, pamelagrose@tiscali.co.uk
6, 16, 23, 30 In the shack
9 G5FZ OTA + natter night
13 First Aid for the Shack by SJA
20 G6COL OTA + natter night
27 Visit by RSGB President Dave Wilson, M0OBW

LOUGHBOROUGH & DARC
Chris, G1ETZ, 01509 504 319
5 OTA and IRLP
12 Concorde - from beginning to end, Loughborough University
19 Visit: Hermitage FM, Coalville
26 Practical evening

NUNSFIELD HOUSE ARG
Ken Frankcom, G3OCA, 01332 720976
1 Global warming - forum
8 Libraries forum with Rosina
15 Committee meeting/shack night
22 Good Friday shack night
29 Royal wedding!

WELLAND VALLEY ARS
Peter D Rivers, G4XEX, 01858 432105, 4xex@fsmail.net
18 AGM

HF F-Layer Propagation Predictions for April 2011

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	7.....778	87.....27888	.7.334568884	..77778887..	...788888...	....67777...	.....	.....
*** Asia								
Yakutsk	.....	.....2.	34.....46776	..665667433.	....66.....	.....	.....	.....
Tokyo	.....3..	.....68..	.....4..	.....	.....	.....	.....	.....
Singapore	.....22.	27872	.....265..	.....35...	.....55...	.....	.....	.....
Hyderabad	.....	1544	5654	.....455..	.....45...	.....4....	.....	.....
Tel Aviv	97.....3899	994....28999	..5....58873	...5445786..	....45567...	.....	.....	.....
*** Oceania								
Wellington	.....	.....	.....	.....	.....	.....	.....	.....
Well (ZL) (LP)	.....	.58.....5..	799.....987	779.....987	..6.....55.	.....	.....	.....
Perth	.....	.....676.	.....3665.	.....3...	.....	.....	.....	.....
Sydney	.....	.....477..	.....787..	.....3665..	.....	.....	.....	.....
Melbourne (LP)	.....	.499.....	78995.....2	778973....47	...96.....7.	...8.....6.	.....	.....
Honolulu	.....	.....	..43.....	....4.....	....3.....	.....	.....	.....
Honolulu (LP)	.....	.....	.....	.....6...	.....4...	.....4...	.....	.....
W. Samoa	.....	.....	...3.....	....443.....	....455.....	.....	.....	.....
*** Africa								
Mauritius	2.....222	7.....7887	6.....28887	68853	.....675..	.....66...	.....	.....
Johanesburg	.....	33.....565	77.....9999	69987	.....6...	.....5...	.....56...	.....4...
Ibadan	12.....11	77.....566	675.....3776	.47.....776.	..56..3677..	...7.5578...	.....78...	.....56...
Nairobi	4.....22	85.....3788	65.....3666	6665	..4....566..	.....4664..	....46667...	.....
Canary Isles	772.....777	877.....2888	8885...37888	648665568886	...99899997.	...8999999..	....567786..	.....556...
*** S. America								
Buenos Aires	.....	545.....3	768.....77	..4.....563	.....6..	.....5..	.....	.....
Rio de Janeiro	.....	556.....45	878.....888	4.5.....875	.....83.	.....37..	.....4..	.....
Lima	.....	434.....2	7665.....67	...5.....63	.....	.....	.....	.....
Caracas	.....	432.....4	8876.....88	..375....586	....7544575.	.....66667..	.....44..	.....
*** N. America								
Guatemala	.....	222.....	6455.....6	...4.....3.	.....	.....	.....	.....
New Orleans	23.....	665.....4	7465.....6	.....5.	.....	.....	.....	.....
Washington	44.....	777.....6	7676.....47	....4...3474	.....344..	.....54..	.....	.....
Quebec	67.....4	776.....57	...3.....375	....4..456..	.....	.....	.....	.....
Anchorage	.....	.....	..54.....45	.....3665.	.....6..	.....	.....	.....
Vancouver	.....	.2.....	.....	.....	.....3..	.....	.....	.....
San Francisco	.....	.....	.....	.....	.....	.....	.....	.....
San Fran (LP)	.....	.....	.....	.....	.....4....	.....5....	.....54...	.....4....

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 April, May and June are respectively (SIDC classical method – Waldmeier's standard) 33, 35 & 38 and (combined method) 58, 63 & 67. The provisional mean sunspot number for February 2011 was 29.4. The daily maximum / minimum numbers were 53 on 14 February and 9 on 6 & 7 February 2011.

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300 Hz Roofing Filter - Optional
±0.5ppm TXCO Included

FT DX 5000D
SM-5000 Station Monitor Included
300 Hz Roofing Filter Optional;
±0.5ppm TXCO Included.

FT DX 5000MP
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300 Hz Roofing Filter – Included
±0.05ppm OCXO – Included.

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FREE MEMBERS' ADS

Charges are waived for Members' Ads submitted by e-mail to memads@rsgb.org.uk. One ad per member per month; other important terms & conditions apply (see grey box on March page 89).

FOR SALE

ACOM 1011 HF amplifier. 6 months old, as new condition, £1,100 OVNO. Ameritron 811X HF amplifier, £450 ONO. Peter, G8CVF, 0151 3277169, peter@petlyn.co.uk (Merseyside).

BENDIX RA1B Rx, BC625 Tx, BC24A (SCR522) Rx, AM W/meter 1191A, WW2 amp chassis (VR91), AM Pwr Unit 619, Marconi CR300 Rx, Marconi Sig Gens 144H, 801A, AM RF units 25, 26, 27, Racal RA17L, Gammatron 54 device. C Young, 01637 875848, rcry100@yahoo.com (Newquay).

BUTTERNUT HF2V 80/40m vertical antenna, £150. Cushcraft 15-3CD 3-ele monoband 15m, £150. CUEDEE 10m 4-ele monobander H/D, £100. KLM KT-34A Triband 4-ele with balun, £175. HiGain 204BA 4-ele 20m monoband with BN86 balun. £250. All with instruction manuals. Vic, G3PJK, 01772 813857 (Preston, Lancs).

CFJ455K SSB FILTER (ex Yaesu FT847), £25. David Mellor, G7IRS, 01522 868218 (Swinderby, Lincoln).

CLARK 40ft SCAM12 telescopic pneumatic mast – I have two. Legs, guys, hand pump included, £460. Delivery possible. Ricky, MW6GWR, 01654 712350, radio@webshack.co.uk (Mid Wales Coast).

COLLECTOR'S PIECE or an outside shack? 1952 Commer Q4 Radio Repair Truck, fully equipped with LARKSPUR and other contemporary radios, test equipment and much more. £6,500 ono. Photos & info at http://web.me.com/oldplace/Commer_Q4. John Thompson, G3OKT, 01691 655907 (Oswestry).

COBWEBB 14-28MHz ANTENNA incl long length of RG213 coax, installed only 2 years, in pristine condition. Also winch with pulley and brackets + 20 foot alloy pole, incl full instructions, £200 the lot. Buyer to collect. Dave, M3KAX, 01977 612457 (Pontefract).

FT-767GX with 2m, 6m, SP767, MH-1/B8. FT-726R with 2m, 70cm, SP102, MH-1/B8. Kenwood h/h TH-78E 2m, 70cm. Kenwood AT2-30 ATU. Daiwa PS-30XM DC 30A PSU. Yaesu MD-1 desk mic. Various bits also as shack sale. Rob, G0HYR, 01827 57742, robert.deakin@talktalk.net (Tamworth).

ICOM PS-85 power supply, original packaging and in good condition, £95. Mosley TA33-Jr 3-ele HF tribander (20/15/10m), in good condition and with instructions, £50. David Lurcook, G4ERW, 07501 239762, david.lurcook@btinternet.com (Ashford, Kent).

ILL-HEALTH QRT SALE. IC-7400, approx 4 years old, little use, collection only, £740. TransMatch 160/10m, tuning aid fitted, no manual, £65. Kent straight key, built but unused, £50. Alinco PSU 5-15V, 25/30A, mint, £60. Collection/postage by arrangement. R Wiseman, G3PXV, 01526 833455, eric@g3pxv.wanadoo.co.uk (Ruskington).

INSTRUMENT / FLIGHT CASES. FSDXA is selling a large number of instrument (flight) cases. Proceeds will go to support the T32C DXpedition. For details go to the T32C On-Line shop at www.t32c.com. Neville, G3NUG, 01568 750560, g3nug@btinternet.com (cases are at Portsmouth).

KENWOOD TH-F7E dual band h/h, excellent condition, with box. Includes SC-52 case, SMC-33 speaker/mic and PG-3J cigarette lighter cable. A great radio for anyone at beginner or expert level. Cost for all items: £301.17, asking £210 inc p&p. André Ravary, M0RAV, 07584 376055 (Littlehampton).

LOWE HF-150 communications receiver. Complete with keypad and user manual. Very good condition. £99 including postage in UK. Ken Maxted, GM4JMU, 0141 639 5854 (QTHR, Glasgow).

MINT EXAMPLE of a Yaesu FT-1000MP. Less than 100 hours use since new, reserve radio seldom used. £795 or will swap for fine condition high quality amplifier, minimum 800W. Lee Jessup, MW0LDJ, 01873 831 392 after 7pm (Abergavenny).

PSU/CHARGER 50V 10A, high quality unit, £100. Marconi Marine Tx, 300W PEP, solid state, 24V, covers 160/80m, with spare driver and PA modules, £50. PSU/charger 24/28V 10-20A, uprated BARTG design, £50. Collect only. PWF Darragh, G3MNV, 01237 474564 (N Devon).

SILENT KEY SALE. TS830S HF xvr, CW filter, manual, power cable. Good condition. No fist mic but Shure desk mic. £325 ono, buyer toinspect / collect. DFC230 frequency controller with mic, manual, £80 ono. P&P extra. Reg, M0CJI, 01270 761224, m0cji@talktalk.net uk (Sandbach).

STANDARD 10.7m TENNAMAST mast in very good condition, complete with rotator cage, Emotator rotator and thrust bearing, £350. The mast is located at my old QTH in central Anglesey (buyer to remove). Tony, G4CZK, 07966 961793 (Berks).

SWR AND POWER METER, Avair AV-201, 1.8-160MHz, 5-1000W FSD. As new, £30. Dummy load Zetagi DL50, 50Ω, 50W, UHF sockets, little used, £12. RG213/U, unused, 10m, £12. Collect or postage at cost. Jack Edgecock, G1NZH, 01892 784128, golf1nzh@virginmedia.com (East Sussex).

YAESU FT-709 70cm FM h/h, £20. GB4 Electronics HF (IF) to VHF converter, 12V DC, £10. Comet CM430TM triple 5/8 mobile ant, £10. Heathkit Twoer, VHF regenerative base, 110/230VAC, £30. HF amp valves, tested, 4-250 x2, £30. 4-400 x2, £40. Ade Mann, G0KSB, 07970 689321 (Telford).

YAESU FT-736R 6m/2m/70cm, boxed, £595. YAESU MD-100 A8X mic, boxed, £95. DIAMOND GZV2500 25A PSU, boxed, £90. All VGC with manuals, all plus carriage. Graham, G3OHC, 01483 808419, g3ohc@uksmg.net (Guildford, not QTHR).

YAESU FT-901DM 100W xcvr, clean and GC, recently realigned, full output on all bands (not WARC). Used daily, a good robust rig for the newcomer. Includes hand mic, operator and service manuals. £320 + pp and insurance, prefer buyer collects. Garth Swanson, G3NPC, 01737 359472 (Tadworth, Surrey).

ZL SPECIAL 70cm beam, 7-ele, 11.5dBd, £30. SOTA beam with pole, 2m, 10.5dBi, £60. 6m 3-ele Trident beam £60. MFJ ATU 945 E 300 watts, never used, had it as spare, £99. F Sadler, M0CVS, 01629 823025 (Matlock).

WANTED

BC 221 FREQUENCY METER - original/good copy of Technical Manual TM-11-300 and Amendment TM-11-300 C1. Also The Royal Corps of Signals published by Helion & Co Ltd, 2003 in good condition. Both sent to UK Surrey address for reimbursement. Harry, 7Q7HK, handpk@mweb.co.zw (Zimbabwe).

CASH PAID for 1950s and 1960s RSGB callbooks. Condition not important but must be complete and readable with cover. Your postage costs covered. Tony, G6ZAC, 01483 503575, anthonyg6zac@hotmail.com (Guildford).

CIVIC TAPE RECORDER circuit. Reel-to-reel, two-track, three-speed, three valves. Incorporates Collaro Studio deck (I've got sheet for that). Marconiphone 287 radiogram external picture/photo. Five valves, early 1940s. Also Trader Service Sheet 39 for this set. Godfrey Manning, G4GLM, 0208 9585113 cgmm2@btinternet.com (Edgware).

DOES ANYONE HAVE a QSL card from G3LUN circa 1960's? Wanted for Regimental history. Please e-mail copy to mardon@cytanet.com.cy; it would be most appreciated. Donald S Radley, 5B4AGQ, 00357 26652975 (Pafos, Cyprus).

FLUKE 8024A LCD screen wanted. Ed Parker, M0DDG, 01270 780317 (Cheshire).

I AM TRYING TO FIND a table top cabinet for an RA17. Also required, a 19 x 72 inches rack. Joe, G4MGX, 01234 741330 (Bedfordshire).

MARCONI SPARK KEY wanted please. Looking for a Marconi Morse key on a wooden base labelled "Marconi's Wireless Telegraph Co Ltd". Please e-mail or telephone. John, G0RDO, 01626 206090, john@morsemad.com (Newton Abbot).

NORSTEL antenna mounting clamps in used serviceable condition. J Beam type 9075 half norstel. J Beam type 9077 swivel norstel. J Beam type 9078 fixed 90 degree norstel. Required for use by new contest group. Philip A Jones, GW4HAT, 01792 290770 (Swansea).

RADIONIC KIT NO. 4. Also home-brew transistor Rx using Denco plug-in coils, TRF or superhet, any condition. James Garvin, RS34064, 02825 644660 (Ballymena).

SB200 to add to my collection of restored (and still used) Heathkit equipment. Anything considered as I may be able to make one good one from two poor or incomplete examples. Bruce, G3WCE, 01692 538794, g3wce@grimblepoos.co.uk (North Walsham).

STANDARD C178A h/h VHF/UHF FM transceiver, with charger etc, in working condition. Ray, G4OWY, 0790 9383 475, g4owy6@gmail.com (Dorset).

SILENT KEYS

We regret to record the passing of the following members:

G0AQJ	Mr B James	22/1/11
G0DTF	Mr W E Williams	31/1/11
G0RJM	Mr A Jeffs	
G1ADS	Mr A Perkins	25/12/10
G3ADQ	Mr A W Walmsley	20/1/11
G3DOI	Mr G E Turvey	02/12/10
G3FYP	Mr P S Robson	3/2/11
G3IDC	Mr P E Johnstone	20/1/11
G3MRB	Mr T L W Puryer	12/12/10
G3TGR	Mr J J Woods	7/1/11
G4CA	Mr P A Wodehouse	29/01/11
G4JCC	Mr S P Richardson	3/2/11
G4MRR	Mr H V McEvoy	21/1/11
G4WQW	Mr P S Newberry	25/11/10
G4YXE	Mr E Brown	1/5/10
G4ZME	Mr E Collins	1/11
G6CJX	Mr P R Lamb	28/11/10
G6OXP	Mr D C Doody	2010
G8BXQ	Mr J Ridd	4/1/11
GM4WIE	Mr C G Holloway	26/1/11
GW0KLC	Mr S O Roberts	15/1/11
GW3FSW	Lt Cdr M I Wilks	14/1/11
GW4FLZ	Mr H D Fennah	
M0AXD	Mr P F J Eames	11/1/11
M0FKG	Mr J D M Bull	
MI6JBC	Mr Coey	

SPECIAL EVENT STATIONS FOR APRIL 2011

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.

Date	Callsign	Phonetics	Location	Bands	Keeper
01/04/2011	GB0MPA	N/A	Vale of Glamorgan	TLHV27	MW0DHF
	GB200HNC	Huddersfield Narrow Canal	Huddersfield	LH2	M0RBG
	GB1CNS	City Norwich School	Norwich	TLHV27	G7URP
	GB2LGR	Lima Golf Romeo	Langar	LH2	G4NRZ
02/04/2011	GB0SOE	Special Operations Executive	Tempsford Airfield	LH2	M0MAD
09/04/2011	GB2NOR	Norbeck	Lancashire	LH27	G0TAK
10/04/2011	GB8CC	Conisborough Castle	Doncaster	TLHV27	G0VXC
12/04/2011	GB4SWF	Speyside Whiskey Festival	Banffshire	L	GM3KHH
15/04/2011	GB4SG	St George's Day	Northampton	TLHV27	M0DOL
	GB0AVB	Artificial Voice Boxes	Co. Antrim	H	MI0RTX
16/04/2011	GB0GRA	Grantham Radio Amateurs	Grantham	TLHV27	M0JHW
22/04/2011	GB2SWF	Speyside Whiskey Festival	Moray	LH2	MM0SMD
	GB2M	Marconi	Isle of South Uist	TLH2	MM0CWJ
23/04/2011	GB5RST	Rockbeare Shutter Telegraph	Exeter	TLHV2	M0XIG
26/04/2011	GB4M	International Marconi Day	Northants	TLHV27	M0DOL
28/04/2011	GB2COB	Pothmadog COB	Porthmadog	TLHV27	MW0VTK
	GB1LBS	Liverpool Boat Show	Wirral	LH	M0BZZ
	GB0MBS	Marconi Beam Station	Dorchester	TLH	G7JIM
29/04/2011	GB1KW	Kate William	Kent	TLHV27	G0UXG
	GB4MBP	Marconi Bass Point	Cornwall	LH	G3MRT
	GB8MD	Marconi Day	Gwynedd	TLH	G3UKV
30/04/2011	GB4IMD	International Marconi Day	Perran-ar-worthal, Cornwall	H	G0FIC
	GB5FHC	Fraserburgh Heritage Centre	Fraserburgh	LH2	MM0JGP
	GB4MDI	Marconi Birthday	Vale of Glamorgan	TLHV27	MW0DHF
	GB0MGY	Call Sign of Titanic	Harlow	LHV27	G0BXL
	GB4MBC	Mike Bravo Charlie	Flatholm Channel	TLHV27	G1FKY
	GB2MT	Marconi Telegraphy	Chelmsford	LH	G8OQW
	GB5LT	Lutterell's Tower	Southampton	TLHV27	G4YVY
	GB4MHS	Museum of the History of Science	Oxford	LH2	M0DDT
	GB0CMS	Caister Marconi Station	Great Yarmouth	LHV2	G0KYA

WW2 RADIO EQUIPMENT and accessories required. I am looking for equipment that can be used for hands-on demonstrations at public events. Anything restorable considered, but especially WS19 plus power amp, WS22, WS52, C13, PCR Mk 3. Martyn Wright, G4RLF, 01722 743270, CQ@G4RLF.co.uk (Salisbury).

YAESU SP-6 to match FT-990, good condition and preferably boxed if possible. Steve, G0HMN, 01482 795646 after 5.30pm, carden15@carden15.karoo.co.uk (Hull).

RALLIES & EVENTS

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

3 APRIL – SOUTH GLOUCESTERSHIRE AMATEUR RADIO RALLY – Avon Scouts Activity Centre, Fernhill, Almondsbury BS32 4LX (junction of M4 & M5). OT 10.00, CP, DF, C. CBS, TI S22 (V44). Stan Goodwin, G0RYM, 07833 517370, gentryone@googlemail.com [www.avonscouts.org.uk/woodhousepark].

10 APRIL – CAMBRIDGESHIRE REPEATER GROUP ANNUAL RALLY – Foxton Village Hall, Hardman Road, Foxton, Cambridge CB22 6RN. TI S22, TS, B&B, C, DF, OT 10.00, £2. Contact Lawrence, M0LCM, 01223 654880, rally2011@cambridgerepeaters.net [www.cambridgerepeaters.net].

10 APRIL – NORTHERN AMATEUR RADIO SOCIETIES ASSOCIATION EXHIBITION (Blackpool rally) – Norbreck Castle Exhibition Centre, Blackpool FY2 9AA. 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.narsa.org.uk].

17 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].

17 APRIL – WEST LONDON RADIO & ELECTRONICS SHOW (Kempton Rally) – Kempton Park Racecourse, Staines Road East, Sunbury on Thames, Middlesex TW16 5AQ. TI, free CP, OT 9.50/10.00. TS, FM, B&B, SIG, C, DF, WIN, LEC. Details Paul, M0CJX, 0845 165 0351, info@radiofairs.co.uk [www.radiofairs.co.uk].

17 APRIL – LOUGH ERNE AMATEUR RADIO CLUB 30th ANNUAL RALLY – The Share Holiday Village, Lisnaskea, Co. Fermanagh BT92 0EQ N. Ireland. Access from Erne/Shannon Waterway. OT 11.30, CP, B&B, TS, LB, C, DF. Details Iain, 02866 326693, iain@learc.eu [www.lougherneradioclub.co.uk].

1 MAY – DAMBUSTERS HAMFEST – Thorpe Camp Visitor Centre, Coningsby, Lincs LN4 4PE. TI S22, GB3FR, £3, under 12 free (incl traders and their companions), free parking, Pitches free but size is limited if not pre-booked. RAF heritage centre on site. Overnight camping. C, OT 10.00, RSGB bookstall. tcrm@hotmail.co.uk [www.qsl.net/gb4tcm/dambusters.html].

2 MAY (Bank Holiday Monday) – DARTMOOR RADIO RALLY – Tavistock College, Crowndale Rd, Tavistock, Devon, PL19 8DD. OT 1030, £4 TS, B&B, raffle, TI S22 (V44), CP, DF, C, FAM. Peter, M1AYI, 01822 860277.

8 MAY – MAGNUM RADIO RALLY – Magnum Leisure Centre, Harbourside, Irvine, Ayrshire, KA12 8PP. Free CP, OT 10.30, £4. TS, B&B, SIG, WIN, C. Details Helen, MM0HLN, 0787 332 7597. [www.magnumrally.co.uk].

15 MAY – NATIONAL VINTAGE COMMUNICATIONS FAIR

20 - 22 MAY – DAYTON HAMVENTION®

22 MAY – MID ULSTER AMATEUR RADIO CLUB RALLY AND BOOT SALE

5 JUNE – NEWHAVEN FORT AMATEUR RADIO GROUP RALLY AND FORT OPEN DAY

5 JUNE – SPALDING & DARS ANNUAL RALLY

5 JUNE – 15TH RED ROSE QRP FESTIVAL

12 JUNE – 10th JUNCTION 28 QRP RALLY

12 JUNE – EAST SUFFOLK WIRELESS REVIVAL (Ipswich Radio Rally)

19 JUNE – NEWBURY RADIO RALLY & BOOT SALE

24 - 26 JUNE – HAMTRONIC SHOW, FRIEDRICHSHAFEN

26 JUNE – WEST OF ENGLAND RADIO RALLY

2 JULY – BANGOR AND DISTRICT ARS RALLY

SAT 2 JULY – 2nd STOCKPORT RALLY (formerly REDDISH RALLY)

10 JULY – CORNISH RAC 48th MOBILE RALLY

17 JULY – MCMICHAEL RALLY AND BOOT SALE

17 JULY – QRP IN THE COUNTRY

31 JULY – HORNCASTLE SUMMER RALLY

7 AUGUST – KING'S LYNN ARC RALLY & CAR BOOT

12 AUGUST – COCKENZIE & PORT SETON ARC 18th ANNUAL MINI-RALLY NIGHT

14 AUGUST – FLIGHT REFUELLING ARS HAMFEST

14 AUGUST – FRISKNEY & EAST LINCOLNSHIRE COMMUNICATIONS CLUB RALLY

21 AUGUST – RUGBY (PRINCETHORPE) ANNUAL RADIO RALLY

29 AUGUST – HUNTINGDONSHIRE ARS BANK HOLIDAY MONDAY RALLY

4 SEPTEMBER – TELFORD HAMFEST

18 SEPTEMBER – 21st GREAT NORTHERN HAMFEST

30 SEPTEMBER & 1 OCTOBER – NATIONAL HAMFEST – brought to you by the RSGB in association with the Lincoln Short Wave Club. George Stephenson Pavilion, 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 [www.nationalhamfest.org.uk].

7-9 OCTOBER – RSGB CONVENTION – Horwood House, Little Horwood, near Milton Keynes. Full convention programme with lectures for all interests and all levels of technicality [www.rsgb.org/rsgbconvention].

9 OCTOBER – AUTUMN MILITARIA & RADIO AMATEUR HANGAR SALE

16 OCTOBER – HORNSEA AMATEUR RADIO CLUB RALLY

23 OCTOBER – GALASHIELS AND DISTRICT ARS RADIO RALLY

29 & 30 OCTOBER – NORTH WALES RALLY

6 NOVEMBER – WEST LONDON RADIO & ELECTRONICS SHOW (Kempton Rally)

20 NOVEMBER – PLYMOUTH RADIO CLUB RALLY

4 DECEMBER – BISHOP AUCKLAND RADIO AMATEURS CLUB RALLY

5 FEBRUARY 2012 – 27th CANVEY RADIO & ELECTRONICS RALLY

This list shows all rallies and events we are aware of as at 4 March 2011. 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.

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WANTED

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MISCELLANEOUS

CALL IN ON THE UK 'GOOD NEWS' CHRISTIAN NETS! Every Sunday morning at 8am local on 3747kHz, 2pm on 3747 or 7147KHz (propagation) and 144.205 SSB at 3pm sharing Christian fellowship. Go to www.wacral.org for more information or contact G3XNX at 51 Alma Road, Brixham, South Devon, TQ5 8QR, Tel: 01803 854504 or derekg3xnx@talktalk.net

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MORSE CODE

Peter Martinez

In the January *RadCom*, Dave Bird, G6EJD draws attention to the clever way that Morse code is highly efficient because Samuel Morse chose to allocate shorter codes to the more-frequently-occurring letters. However, Dave's analysis seems to be based on minimising the number of elements in the code rather than the time taken to transmit Morse code as CW in which dashes take three times longer to send than dots.

Morse himself was probably trying to find the best code for use on landlines where a dot was (perhaps) transmitted as a pulse of current in one direction and a dash by a pulse of current in the opposite direction. For this application, Morse code is near-perfect, as Dave points out.

I thought it would be interesting to do some calculations, based on the letter frequency table that Dave showed in his article, to see how well Morse code performs for transmitting dots and dashes as we do on the air - that is, with dots of one unit duration and dashes of three units. This showed that Morse code needs an average of 6.07 units per letter. I then 're-designed' the code into the most efficient form, in the same way that Dave did when counting code-elements and the result is 3.3 units per letter.

If we include the 3-unit letter-space these figures come to 9.07 and 6.3 units respectively. This shows that Morse code, transmitted as CW, is certainly not ideal and could have been improved considerably if it had been designed specially for CW.

Incidently, Huffman is better-known for his work on codes that require no letter-space because they have the clever property that no short code appears at the start of any longer code. For example, if one of the 4-unit codes was 1001, then no codes longer than 4 units would ever start with 1001. The code tree that is used used to construct and decode Huffman codes is similar to the tree diagram that Dave showed in his article.

However Dave's tree is not a Huffman tree and Morse code is not a Huffman code.

SAFETY WARNING

Peter Garnett, G4LZJ

I have been licensed since the 1970s and consider myself to be quite competent on most aspects of running and building a radio system. An incident occurred three weeks ago that should not have done.

I have for many years used a G5RV antenna, one end of which is attached to my house gable end, the other being attached by halyards to a couple of butted scaffold poles to a height of 30 feet. During strong winds the halyard broke and the antenna came down. To get the antenna back up I needed to re-attach the halyard. I made several attempts to thread the halyard rope through the eye at the top of the pole.

Time was getting on so I decided to get to the top of the pole using a ladder. The pole was mounted on a stub welded to a plate on a steel tube sunk three feet into the ground. Stability was maintained by four guys at 90° to each other. I checked the base mount and the guys. All seemed in order.

I lashed the ladder to the pole. I climbed up the ladder to the top of the pole. As I was threading the halyard through the loop the pole started to slowly keel over. The whole system collapsed and I fell 25 feet, bouncing off and wrecking my greenhouse. I have no recollection of where I fell. After a few minutes I got up and continued to clear up the mess. I noticed my back and chest was hurting so decided to call it a day. I went into the house and my wife nearly fainted. As well as having hurt my back and chest I was covered in blood from a severe gash on my head. She rang my sons up and I was pressurised to go to hospital. The hospital immediately put me in a neck brace, glued my scalp together and I was kept in for several hours.

I am still not fully recovered but am improving fast and there should be no long term problems. I got no sympathy, nor do I deserve any. I should not have done what I did but that is now history. I am grateful to be alive I write this letter for one reason only. That reason is to highlight the dangers of working at elevations. I thought I had taken every precaution. The base fixing appeared to be sound, the guy ropes were new.

What went wrong? First, the pole and base plate was over thirty years old. The weld supporting the stub had corroded but was visually inaccessible, I made the assumption it would be OK. Second, although the guy ropes were new they were bought from a pound shop and were poorly made so could not stand the forces they were subjected to. Third, had I waited for assistance there would have been no need to climb the pole. More haste less speed comes to mind.

I am currently building a new antenna system and will be inconveniently off the air for several weeks. I ask all my fellow radio amateurs to consider what happened to me and to make sure that it doesn't happen to them; by the nature of what we do, working at height is commonplace.

QSL MATTERS

Keith, G8HXE.

I can beat the 19 year turnround on QSL cards that was reported by EA5FJF/G0JFM in QSL Matters in the February issue of *RadCom*.

Today I received a card from F6DFI for a QSO on 30 August 1985 - over 25 years ago! The outgoing card was definitely sent via the bureau but the return was eventually sent direct, with the comment, "I just received your QSL card after twenty five years, this is a record" written on it by Jacky, F6DFI.

It would be interesting to know the route taken to deliver that one!

MULTIBAND DIPOLES

Mike Parker, M0SAZ

Peter Dodd's article on multiband dipoles in the March issue was a great read. I myself have a multiband dipole of a commercially produced variety – the Alpha Delta DX-CC. I have been using it since the summer of last year and I really am impressed with how well it works all compass directions. Despite being forced to mount it in an East-to-West orientation, I have worked plenty of transatlantic stations and into Russia on plenty of occasions.

Alpha Delta's DX-CC is their mid-sized multiband dipole covering the 10, 15, 20, 40 and 80 metre bands. At a length of 82 feet, I just squeezed it into my small back garden. In the location I have mounted mine, the useable bandwidth of 80m is a little short of the whole band, but an internal ATU is all that's needed for the remainder. All other bands are well within acceptable SWR limits without any matching required.

I am sure those who like constructing can easily build their own multiband parallel dipole, but I would rather operate than build and all credit to Alpha Delta, the materials used and construction of this antenna does seem to be of high quality indeed. If you are looking for a multiband wire antenna, and want to be a bit more creative than a G5RV etc then I would certainly recommend antenna such as this – especially if you don't want to use an ATU, the multiband dipole is a credible option with some good results.

I have some images of the DX-CC at my QTH on my QRZ.com page.

INTERNET RADIO

Paul Thompson, GM6MEN

I read the letters from Paul, EI5DI and Sam, G4UQB and all the others previously, regarding radio amateurs making use of other communication media. I know that I will never convince them away from the conviction that such things are not real amateur radio, so I won't try. But I will make two points.

First, that the arguments they use are very familiar. They were heard 'back in the day', when military surplus equipment came on the market and amateurs were no longer obliged to build their own rigs. Then they were heard when repeaters

were first put on the air. Then once again when amateur satellites were launched. Now they are heard in reaction to internet linking and remote-control operation. In another ten years there will be something else to object to.

Second, judge for yourself whether technologies that couple amateur radio and the internet are 'killing the hobby'. I am the sysop for a 'gateway' on 2m. This is a fairly quiet area on VHF, but since the gateway has been open there has always been traffic. Paul and Sam may still raise objections – maybe that such activity keeps people away from direct RF-to-RF communicating – but they can't deny that RF activity around here has increased. Local users of the gateway, however, are not people who have abandoned RF-to-RF, they are people who also run HF and VHF stations. I'm included in that number – my main station is on HF. When they participate in the gateway traffic they are simply enjoying another small niche of the hobby.

In fact there are some licensed amateurs, like a gentleman I know of in Tokyo, for whom internet linking has been a lifeline. This particular amateur is flat-bound in a tiny apartment in a tower block. There is no room for HF antennas and too much electronic hash to even try to set up a station. The local repeaters are unusable. However, he has an old PC and uses it to connect to an internet linking system. Now, to Paul and Sam what he is doing might not be 'real amateur radio', but his voice is now heard on RF whereas before it was not. He can talk to other amateurs who are on the air at their end of the contact, whereas before he could talk to no one.

These technologies are not the end of civilisation as we know it.

ANTENNA QUERY

Ed Chicken MBE, G3BIK

In reply to the query from Bri, M6LZX in the February *RadCom* regarding the 'antenna' shown in his photograph. Well Bri, in its day, which was before the tranny and ferrite rod, they were known as 'aerials', and the type in question was popularly used for the house-hold reception of wireless broadcasts.

In fact, I actually have one in its original box, on the sides of which is printed

AERALITE TRAPEZE AERIAL
NEEDS NO MAST
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COMPLETE WITH 50ft INSULATED DOWNLEAD AND BRACKET COMPLETE WITH FITTINGS

It consists of a flat copper bar, 12 inches long x 1/2 inch wide x 3/16 inch thick, bristling with 3 inch x 1/8 inch round copper spikes on both of the flat sides and twisted along its length to form a spiral hedgehog. All very 'Imperial!' A porcelain bush at the lower end of the copper bar insulates the aerial from the fixing bracket. The 50ft downlead of insulated but un-shielded multi-stranded copper wire is bolted to the lower end of the copper hedgehog and the remote end of the downlead connected to the aerial terminal of the wireless set.

Maybe I could be forgiven for believing that the downlead contributed more to wireless reception than did the bristles?

John Wightman, ZL1AH ex G3AH

Doubtless M6LZX has had numerous replies to his query. It looks like a re-incarnation of what, in the 1930s, were peddled to the general public as providing a huge boost to the reception of medium/long wave broadcast stations. They were, of course, the electronic equivalent of snake oil because any signal pick-up was mainly from the single wire feed from the device to the receiver.

Another version had a 'shaving brush' at the top.

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PLEASE GIVE A REPORT

G8IDE

May I complain about the lack of pause between rag chew overs on fairly local nets. As an old G8, my interest is restoring vintage radios. Occasionally, I need a report. To just shout CQ CQ doesn't readily get a response if the audio is bad for example. But, a quick 'break please gentlemen' between rag chews does not produce any response. Even a remark like, 'there's a horse trying to get on the air' would be most welcome. I could them shut down and start fiddling with the audio. After all, radio amateurs were granted a licence to experiment, weren't they?

ADVENTURES IN OPTICAL COMMUNICATIONS

Colin, G3SBI

It came as a surprise that my letter in the Last Word on optical voice transmission should appear in the same issue of *RadCom* as 'Adventures in optical communications' presented by Stuart Wisher, G8CYW.

In 1973 the light link that was designed at Daresbury Laboratory was all digital and used analogue to digital converters (ADC) to digitise analogue input signals in a ±10 volt range and digital to analogue converters (DAC) to translate digital signals into an analogue voltage between +10 and -10 volts.

At the time it had only just become economically viable to take this design approach due to the American firm of Analog Devices manufacturing a low cost modular 12 bit ADC and DAC, the ADC12QZ and the DAC 12QZ. With the right sample and hold amplifier the ADC12QZ could do 20,000 conversions a second.

About the same time, Siliconix introduced a low cost low on resistance CMOS switch, the DG200. These were used to expand the number of channels to the ADC. The DG200 was also used as part of a simple sample and hold circuit to increase the number of DAC output channels. Individual channel values were held in a 16 word local memory that could also be accessed by the 5Mbit/s serial communication system for remote control.

From what I remember it worked out at around £20 a channel for eight analogue channels and less than this as you expanded the multiplexing. The high speed channel that could take speech was arranged by making every alternate conversion by the ADC go to the same channel so this channel was sampled 10,000 times a second. This had the necessary bandwidth to transmit good quality speech.

The thing to remember most about those days is that individual electronic engineers could make significant contributions in the applications of the emerging semiconductor technology that perhaps we now all take for granted today.

WHERE ARE YOU?

Peter, G0JKW

I was interested in the RSGB reply to the question "Where are you?" in The Last Word in March 2011 *RadCom*.

It has long been my belief that the wording of the licence application leads applicants to go 'details withheld'. Man is inherently lazy!

If the wording was 'Do you wish your name and mailing address to be withheld from the callbook, please tick the box', I am sure that the results would be significantly different. But perhaps it is not politically correct to have to tick a box to opt out!

Diamond
HF Antennas

W-735

Compact 80/40m dipole. Just 26m long. Internal ATU handles it with ease. A great way to get on these two bands.

£109.95 D

Terminated Folded Dipole. 2 - 30MHz 150W. Low SWR over whole range.

WD-330S Just 10m long yet covers the major HF spectrum. An internal ATU will easily handle this coax fed ant. **£239.95 D**

WD-330 25m long & will give good performance for its size. It covers all ham bands from 80m - 10m. Again, an internal ATU will handle it with ease. **£249.95 D**

Create
Rotators

RC5-1 Medium Duty Rotator

**Rotating torque: 6kg/m*
**Braking torque: 80kg/m*
**Mast size: 48-63mm*
**Vertical load 400kg*
**Horizontal load 800kg*
Rotation speed: 60-150sec/50Hz *Power: 230V AC 80VA *Weight: 5kg *Cable: 7-core cable (not supplied) *Requires MC-2 lower mast clamp if mounting on pole* **£569.95 D

RC5-3 **£719.95 D**
Same as above but with preset control.

We stock a full range of HyGain, Yaesu & Create rotators @ www.wsplc.com

bhi
DSP Audio

NEW NES10-2MK3

Speaker and programmable DSP unit. Offers dramatic noise reduction.

£112.95 C

NEIM-1031MKII **£142.95 C**
Noise Eliminating In-Line Module.

NEDSP-1061-KBD **£101.95 C**
Noise Eliminating DSP module for FT-817

NEDSP-1062-KBD **£106.95 C**
Noise Eliminating DSP module for speaker.

ANEM-MKII **£127.95 C**
In-Line "Noise Away" amplified DSP module.

DSPKR *Special Offer!* **£139.95 C**
Noise Eliminating DSP Ext. Speaker 10W.

DTNA - NOISE-AWAY **£154.95 C**
Amplified DSP Noise Cancelling Desk Speaker.

RADIOMATE **£89.95 C**
Compact keypad for Yaesu FT-817/857/897.

CAT-MATE **£50.95 C**
Electronic Y Splitter for Yaesu CAT Interface.

DV-Dongle 2 Models!

DV-DONGLE USB to your PC or Mac and work D-Star by accessing internet open D-Star repeaters worldwide. **£169.95 C**

NEW DV-ACCESS Access Point, similar to above but able to TX/Rx over short distance so that with 2m D-Star radio you can work through your PC. **£209.95 C**

Tonna
VHF/UHF Antennas

220505 **£118.95 D**
6m 5 element 10.1dBi gain 3.45m long
220809 **£79.95 D**
2m 9 element 13.1dBi gain 3.47m long
220909 **£74.95 D**
70cm 9 element 13dBi gain 1.24m long
220919 **£94.95 D**
70cm 19 element 16.2dBi gain 2.82m long
220623 **£77.95 D**
23cm 23 element 17.9dBi gain 1.75m long
220725 **£102.95 D**
13cm 25 element 18.3dBi gain 1.45m long

Buddipole
Portable HF Antennas

The most respected portable HF antenna system available. Available as a dipole or vertical system - packs down into a carry pack.

The secret of the system is the hi-q coil assemblies.

www.buddipole.com

W3-BP Dipole 40-2m 250W **£219.95 D**
W3-BP-DELUXE With mast kit **£419.95 D**
W3-BS Vertical 40-2m **£161.95 D**
W3-BS-DELUXE Vertical + clamps **£194.95 D**
W3-CTA Centre T mast clamp **£8.95 A**
W3-DKB Buddipole Carry Bag **£41.95 C**
W3-LBVK Low band vertical kit **£199.95 D**
W3-MBP Mini Buddipole **£239.95 D**
W3-MK Mounting Kit **£36.95 D**
W3-MWA-4 Military whips **£102.95 C**
W3-RAK Rotate arm kit **£39.95 C**

MFJ
Field Strength Meters

MFJ-801

Great for measuring RF levels & tuning antennas, particularly mobile and portable.

MFJ-801 is a compact hand-held model that covers 100kHz - 500MHz. **£32.95 A**

MFJ-802 has a larger meter and emplys a telescopic dipole to reduce affects of stray reflections **£55.95 A**

Diamond
Duplexers

These high quality units enable you to feed the output of 2 RF devices to 1 or 2 antennas from one device.

MX-62M This has 2 inputs, one for HF and the other for 6m - UHF and has 1 output. **£77.95 C**

MX-610 This has 2 inputs, one for HF & 6m and the other VHF-UHF, and has one output. **£79.95 C**

Watson
Power Supplies

Power-Mite-NF

Compact Cont. 22 Amp Switch Mode PSU variable voltage & noise offset.

£71.95 C

Power-Max-25-NF

Slightly larger than the Power-Mite and ideal companion for any 100W radio.

£89.95 C

Power-Max-45-NF

38 Amp cont, 45 Amp Peak, Switch Mode PSU with variable voltage, V/A meters, & noise offset.

£129.95 C

Power-Max-65-NF

65 Amp Low Noise power supply. Patented Noise Control that permits you to move any noise away from the operating frequency.

£239.95 D

For More Bargains - CLICK IT!

eBay

Go to www.wsplc.com then click on the link to our ebay shop.

Samlex
Power Supplies

SEC-1212

Switch mode PSU offers 10A of cont. current output & 12A peak. Ideal for low power, designed with RF in mind, it is totally noise free & utterly stable. ** Input 230V AC * Output 13.8V DC * Output current 10A cont (12A peak) * HF & VHF filtering* **£81.95 C**

SEC-1223 23A Cont S/Mode **£99.95 C**
SEC-1235 30A Cont S/Mode **£149.95 C**

DCI
Hi-Q VHF Bandpass Filters

Incredibly well designed bandpass filters for VHF & UHF with high attenuation outside ham bands.

DCI-145/435 2m & 70cms **£339.95 C**
DCI-435-10C 70cms **£259.95 C**

If you are wanting to squeeze the best possible signals out of your receiving set-up and avoid problems from strong out of band signals - this is the answer.

Avair
Power SWR Meters

Great Value Superb Performance!

All models have 12V backlight and include DC Cable.

AV-201 **£49.95 C**
1.8-160MHz, 5/20/200/1kW
AV-400 **£49.95 C**
140-525MHz 5/20/200/400W
AV-601 **£69.95 C**
1.8-160MHz / 140-525MHz
AV-1000 **£79.95 C**
1.8-160MHz, 430-450MHz, 800-930MHz, 1240-1300MHz. 5W, 20W, 200W, 400W.

Cross Needle Models - Even Lower Prices!

AV-20 **£39.95 C**
30W / 200W, 3.5-150MHz
AV-40 **£39.95 C**
15W, 0-150W, 144-470MHz

Watson
Dummy Loads

They feature high tolerance, air-cooled housings with extremely efficient heat ducting. This results in a realistic continuous power rating, together with an impressive VSWR curve.

DM-150PL **£34.95 C**
DC-1GHz PL-259 30W cont 100W 90 secs
DM-200N **£49.95 C**
DC-3GHz N-Type 35W cont 100W 2 mins

MFJ
RF Current Meters

If you are using an end fed wire, the only true way to make sure it is matched correctly is to adjust for max current flowing through the wire with an RF Current Meter.

All cover 1.8 - 30MHz

MFJ-834 0.3, 1 & 3 Amps **£85.95 C**
MFJ-834H 3, 10 & Amps **£92.95 C**
MFJ-835 Bal. line Xneedle 0.3-3A **£131.95 C**
MFJ-836 Combined VSWR & Ampmeter using cross needles 03., 1 & 3A **£141.95 C**
MFJ-836H As above but 3, 10 &30A **£ 152.95 C**

Miracle Antennas
Miracle-Whip

A tuneable telescopic whip covering 3.5 to 460MHz. Up to 25 Watts PEP, fiited with PL-259 plug. Great for FT-817 & IC-703 or any other QRP radio.

£122.95 C

Ducker **£112.95 C**
HF Mini ATU for helical whips

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

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AOR

AR-8200-MKIII

The famous scanner with the quality performance. 530kHz - 3GHz AM FM FMW & SSB. Inc batts, charger + cigar lead.

£469.95 D

AR-MINI

This amazing little radio covers 100kHz - 1.3GHz AM FM & WFM. 1000 memories, over 30 programmable features including CTCSS and DCS. Alphanumeric memories give meaningful channels and there is a builtin bar antenna covering 100kHz - 5MHz. Inc. NiMH pack and charger. FREE software database for PC loading via www.aorja.com.

£159.95 D

W&S are now approved suppliers to UK Government Departments

AR-ONE

This is a commercial grade comms receiver for monitoring. It has a detachable front panel for remote operation.

- *10kHz - 3.3GHz.*
- *10 VFOs*
- *High Intercept point*
- *Dual IF Outs.*
- *Two RS-232 ports*
- *Control head port*

£4499.95 D

AR-8600MKII Base/Portable

This base or portable station receiver covers 530kHz - 3GHz. All modes AM FM FMW & SSB with standard rotary tuning.

£669.95 D

AR-5001D

NEW

Widely regarded as one of the best for spectrum monitoring & follows in the foot steps of the AR-5000

- ** 40kHz - 3.15GHz*
- ** All Mode Reception*
- ** Digital Signal Processing*
- ** Monitor 3 Channels At Once!*
- ** SD Media Recorder*
- ** AF 12kHz IQ Output*
- ** Optional I/Q Board & Software*

£3395.95 D

AR-STV

NEW

This dual-band receiver scans & displays 1.2GHz & 2.4GHz wireless SSTV pictures. Fitted with 2.5" screen, it can store & time stamp pictures to download later via USB. Handles all common modes PAL NTSC etc. and can free scan between 900 - 2800MHz. NiMH cells and charger inc.

£799.95 D

TEN-TEC

Are You Driving A Sports Car?

Traditional ham radio equipment is comfortable, predictable and reliable. It gives you what you have learnt to expect and what most others drive. So meet TenTec, the "sports car" of the ham radio world that puts you right on the front of the grid! Move up a gear to real performance, speed of operation and breathtaking response. Big clear displays, ultra quiet reception, superb sensitivity & a front end that handles anything you can throw at it. Enjoy the power of a tough 100 Watt transmit section with audio that sets your signal ahead of the pack or throttle back right down to 5 Watts. The Ham Radio sports car is available now in four models.

Jupiter-538B

100W SSB CW AM FM 160m - 10m

Get a new experience in performance and innovation under the bonnet. 160m - 10m with 100 Watts output. The classic TenTec radio - it can even decode CW on the screen and send CW via a PC keyboard.

£1529 D **With internal ATU £1839**

Omni-VII-588

100W SSB CW AM FM 160m - 6m

Fire it up and you immediately know you are driving something different. The receiver is a delight and the transmitted audio is superb. Connect d to your home router with ethernet cable and you can remotely operate from anywhere in the world.

£2549 D **With internal ATU £2849**

NEW Eagle-599

The Eagle has landed. 160m-6m. A new design rom TenTec. small enough for portable or mobile with 3 IFs - the last being 0kHz DSP. We have just got the first batch of this exciting radio. It's TenTec's newest and has been getting rave reviews.

£1734 D

NEW VNA-6000 Network Analyser

This VNA network analyser covers the range 20kHz - 120MHz. Use it to test low power amplifiers, coax cable impedance, filters, antenna impedance, VSWR, transmission lines, measures forward/reverse gain and phase response of a circuit. In conjunction with your PC you get a graphic readout with absolute value. Windows software included.

£659.95 D

Check out: www.hf-transceivers.com

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The Mighty Flex-5000A!

The SDR-5000 is the most advanced transceiver ever built by Flex-Radio Systems. Not only does it have an amazing front end, it can also accomodate an additional fully independent receiver and a VHF-UHF transverter.

£2495.95 D

Flex-5000A-ATU includes a built-in automatic ATU. **£2795 D**

What Else Gives You So Much For So Little?

Flex-1500

£579.95 D

A single USB cable connects to your PC (or Mac with BootCamp). Switch on, boot up and you enter the world of SDR. Razor sharp variable filters, Panoramic live display, All modes and wideband receiver, and a new adventure BEGINS!!

- ** 160m - 6m All Modes Transceiver*
- ** 5 Watts Of Clean RF Power*
- ** USB Connection*
- ** Selectivity To 25Hz!*
- ** Use With Laptop For Easy Portable*

Flex-3000 100 Watts!!! HF - 6m

£1299.95 D

100Watts (down to approx1 Watt) of SSB, CW, FM and AM. About the size of a laptop! It is the go anywhere transceiver of today. This software defined radio offers cutting edge performance that takes advantage of the very latest technology. Built-in auto ATU.

Full Range In Stock!

Brief Specifications:

160 - 6m / 1-100 Watts / 1Hz frequency steps / Firewire connection / Yaesu modular mic input / Tx unwanted SSB suppression 65dB / Tx 3rd order IMD -31dB / Rx typical sensitivity -0.3uV / Rx MDS (pre-amp off -121dB / IP3 better than +26dBm / IMD 95dB @ 2kHz / SSB selectivity 2.39/2.54 kHz (6dB/60dB) / Selctivity variable down to 50Hz / Power 13.8V 25 Amp peak (1.5 Amp receiver).

Buying a Flex-1500?

When you look at what you get for your money, the Flex-1500 makes a lot of sense. **And until 30th April we are offering a FREE Heil adaptor lead of your choice plus a CD full of extras!** What else gives you so much for so little? And yes - We even offer part exchange deals - Yes! - even on dead radios!

Phone or Email us

FlexRadio is so simple to install and get going. Just slip in the PC Windows software disc provided (or download latest version) and follow the instructions. Connect your FlexRadio to a 13.8V source and run the supplied USB or firewire cable to your PC. Fire up the software and you are ready to go! The industy's best panoramic display, with instant "click-tune" on a signal for fast contest style operation. Enjoy 25Hz "no=ring" selectivity for CW or adjust both Rx and Tx bandwidth for that distincive SSB signal. There are hundreds of parameters you can adjust and store to make the radio personal to you. **This is ham radio HF at its cutting edge!**

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

The New Icom IC-9100

NOW AVAILABLE FROM STOCK

Peter Hart says:

"Overall the IC-9100 is an excellent all-round solution for someone with wide ranging interests spanning HF to UHF and all modes of operation"

The New Super Rig from Icom. HF through 23cm, D-Star & Satellite all from one box.
Available from your favourite Ham Store.
See Web or call for final prices and updates on this exciting new model.

AS PREVIEWED IN THIS MONTH'S RADCOM

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