RadCom

RADIO SOCIETY OF GREAT BRITAIN ◆ WORKING FOR THE FUTURE OF AMATEUR RADIO

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£4.95

Peter Hart reviews the new Yaesu FTDX3000 transceiver

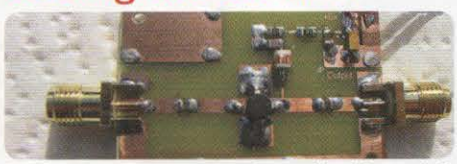
AMSAT-UK FUNcube-1 launch

We take you through the nail-biting tension and celebrations after the successful UK educational satellite launch

View from the top

Combining radio with two-wheeled fitness in the first SOTA international cycling weekend

Getting started in...



Surface mount construction, with this useful RF amplifier project you can build from a kit

WATERS & STANTON

Orderline 01702 206835

Online Catalogue www.wsplc.com

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SATURDAY 14TH DECEMBER 9AM - 5:30PM

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Let's Do A Deal!

WATERS & STANTON

It's A Great Day Out
Get That Radio For Christmas

YAESU
Choice of the World's top DX'ers

The NEW FT-DX3000 Transceiver -- IN STOCK!

Price Down!

£2399

SAVE £150 - While Stocks Last!

PX Deals

Dual roofing filters, DSP IF filtering, large colour LCD screen, RTTY and PSK31 mode. Spectrum scope, bandscope and data. Super front end combined with down conversion to 9MHz . IF output and USB interface comes as standard. And of course you get a built-in automatic ATU. IN STOCK -

Peter Haart Review in RadCom:
"There is little I could find fault with."

FREE DELIVERY
24 Month Wtty.

FT950
HF & 6m 100W

Save £195

30kHz - 56MHz Rx, Auto ATU, triple conversion Rx with 3 roofing filters, 32 bit floating point DSP, Tx variable bandwidth and Mic EQ adjust, and much more! A really great transceiver for base station use. One of our most popular radios. **£1099.95c**

FTDX-1200 HF & 6m Transceiver

- 160 - 6m
- 5 - 100W
- Colour TFT Screen
- Auto ATU
- SpectrumScope
- 3 x Roofing Filters

PX Deals **£1,399**

This is Yaesu's newest radio and has already got a great following. It features a triple conversion receiver with three roofing filters and a full colour TFT screen with comprehensive display.

FT-60E + FREE ACCESSORIES!
2m/70cm Dualband 5W Handie

Choose either a QS-112Y4 Speaker Mic or WEP-501Y4 Earpiece/Boom Mic.
+ THESE GOODIES
1x WCN-3 Adaptor (worth £4.95)
1x LBNP-BK Log Book (worth £5.95)
1x WSC-3 Soft Case (worth £12.95)
1x Exclusive Yaesu Cap (worth £19.95)

£129.95b Plus £50 Worth of FREE Extras

Heil Winner

Heil headsets are the favourite for DXpeditions and contest operators. The mic. inserts are designed for ham radio by one of the world's most famous ham operators, Bob Heil. Bob is not only a ham operator, but a renowned audio engineer and has spent most of his life, designing microphones for both hams and some of the world's top recording artists. Bob understands the individual needs of these two quite different classes of users. But the end result has to be the same; superb articulation. And that is what you get with Bob's designs. No compromise and a microphone designed precisely for the task in hand,

Pro-Set ELITE
Large dual headphones boom mic. with HC-6 element and Heil Phase Reversal
£179.95

AD-1 Cable set for any radio **£19.95**

Pro-Set ELITE IC ICOM Version
Supplied with matching vable **£189.95**

The NEW RigBlaster Advantage

WEST MOUNTAIN RADIO

Other Models

RigBlaster Pro **£269.95**

Everything you want. The most advanced model from west Mountain. Built in rig control £

RigBlaster Plus II **£159.95**

Plug and Play USB port for connection to PC and power. Great performance at a realistic price.

RigBlaster Plug & Play **£109.95**

Here is a great way to enjoy data at abudget price. Plug and play is the name of the game here!

Features
Internal sound card generates audio completely independently from PC's sound card
Single plug and play USB cable connection to PC - no power supply needed
Automatically mutes mic audio while transmitting digital modes
Includes Instant Setup Connectors and cables for microphone configuration
Front panel mounted transmit and receive audio controls with VOX delay control
Rig control interfaces for CAT, CI-V or DB9 on radio
High speed (50 wpm) CW keying output for keyboard CW and RTTY software

Supplied with plug and play USB cable interface
USB provides positive PTT, CW/FSK keying, CAT/CI-V rig control and sound card
Microsoft® certified USB drivers are automatically installed from Windows Update
Powered through USB cable, no wall supply needed

*When ordering, please check if you need an RPA adaptor lead for your radio - **£9.95 each***

SignalLink USB

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 Accessory Port
Supports virtually All Sound Card Digital and Voice Modes

£99.95b

It's our most popular Digital interface with USB cable of your choice to connect to your radio. If you have not yet tried the digital modes, this could be the perfect introduction.

The HM-12 Can Change Your Signal

Just £69.95

It all starts at the microphone and if your audio does not have good articulation, then your signal will not be as distinctive, clear or as punchy as it could be. The HM-12 has been designed to work with all the modern HF transceivers. It can transform your audio. Ready made lead terminated with mic plug of your choice **CC-1 £35.95**

WATSON

All models fitted with "NF" Noise Remove Function

Power Mite-NF

£79.95c
- Output Voltage Variable: 4.0V - 16V
- Output Current: 22A Continuous, 25A Peak
- Output Voltage Regulation: Less than 1%
- Red Trip Warning LED, Green Power LED

Power Max-45 NF

£129.95c
- Output Voltage Variable: 4.0V - 16V
- Output Curvrent: 40A Continuous, 45A Peak
- Output Voltage Regulation: Less than 1%

Power Max-65 NF

£239.95d
- Output Voltage Variable: 4.0V - 16V
- Output Current: 60A Continuous, 65A Peak
- Output Voltage Regulation: Less than 1%

Win Free Radio

FT1DE 2m/70cms Handy

We are offering this brand new transceiver as a prize for all Yaesu customers. Just buy any Yaesu radio from us and send the warranty card back to us. The offer applies to purchases from 1st October until 31st December.

WORTH £429 Don't Miss Out!

TOKYO HY-POWER HL-100BDX

100W All Mode Amplifier 3.5 -50MHz

A very compact 100W amplifier that is ideal for low power transceivers such as the FT-817. It requires 6W or 12W input for full output (Switch selected) and PTT can be via RF sensing. The amplifier uses switched band pass fitters. **£599.95 c**

AMERITRON Value Amplifier

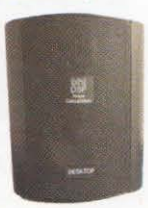
AL-811XCE 600W SSB CW

This popular amplifier will give your signal a real boost. 160m to 10m with low cost 811 tubes means easy maintenance. Has built in PSU. Just connect and talk! **£949.95**

bhi DeskTop

Noise reduction products

NEW



- High Quality Desk Speaker
- 4" Bass % 1" Tweeter
- 10W output
- bhi DSP Noise cancelling unit
- Side DSP controls
- Accepts stereo or mono input
- Feed with line or speaker levels
- Requires 12v - lead included
- Hear the difference

Maybe you are not realising the full potential of your receiver? This DeskTop unit is a great station addition. **£179.95**

NEX-10-2 mk II

- Noise Cancelling speaker
- 9 - 35dB reduction
- 8 levels of processing
- Bypass switch
- Easy connects to any receiver
- No need to open up receiver
- 12v DC operation

A great asset to any receiver or transceiver. Hear the signal and not the noise! Makes copy so much easier. **£99.95b**

YAESU

FTM-400DE **NEW**

The New Dual Bander 2m & 70cms 50W Digital / FM

High visibility colour screen with bandscope, altitude and navigational screens. Enjoy both digital and FM. Available now! **£549.95c**

Free Extras

IC-R6

This scanner covers 100kHz-1309MHz. Receives FM WFM & AM and comes with AC charge and NiMH batteries £179.95c

PLUS £50 of FREE Accssories

ICOM Cap	worth £19.95
ICOM Mug	worth ££7.95
WAT-999 Earpiece	worth £9.95
WSC-3 Belt case	worth £12.95

VX-8GE
2m/70cm Handy

Save £60

The VX-8GE APRS/GPS provides an economical opportunity to obtain a handheld dedicated to APRS on 144 & 430 MHz. This model allows users to acquire a VX-8 series radio without having to pay for many of the VX-8DE features that may not be of value for their active APRS operation

Was ~~£349.95~~ Now **£289.95c**

Carriage Charges: A=£4, B=£5, C=£8.50, D=£11

Fast Same Day Despatch! Orders Received Before 3pm

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ELECRAFT®

WATERS & STANTON HOCKLEY & GLERNROTHES

Apache-Labs SDR Station

FREE REFRESHMENTS
DISCOUNTS ON THE DAY

KENWOOD TS-990S 160m - 6m Transceiver - In

RadCom: "Performance Second to None" - "performed impeccably on strong and weak signals" - "transmit audio is excellent"

PART EXCHANGE WELCOME

PHONE OR EMAIL US FOR A REALLY GREAT DEAL.

£5999.95d

The TS-990s 160-6m 200W transceiver is the product of many months of work carried our by the Kenwood engineers, and has resulted in a radio that is surely right at top of current radio technology. Its comprehensive colour display forms the centre of the design. The large heavy flywheel drive is a joy to use and underlines the mechanical superiority of the TS-990s.

WATSON End Fed Half Waves

NEW

We are pleased to introduce the new Watson range of End Fed Half-Wave Antennas. An easy way, and most convenient antenna system for both home and portable application. These are purpose built single band resonant antennas for optimum performance.

WREF-10	10m (5m long) halfwave SO-239	£62.95c
WRED-12	12m (6m long) halfwave SO-239	£64.95c
WREF-15	15M (7m long) halfwave SO-239	£66.95c
WREF-17	17M (8m long) halfwave SO-239	£66.95c
WREF-20	20M (10m long) halfwave SO-239	£69.95c
WREF-30	30M (15m long) halfwave SO-239	£73.95c
WREF-40	40M (20m long) halfwave SO-239	£86.95c
WREF-60*	60M (30m long) halfwave SJ239	£134.95c
WREF-80*	80M (40m long) halfwave SO-239	£151.95c

*These antennas are suppled with coax choke for optimum matching.

An end fed half wave antenna has a few advantages apart from the convenience of end feeding. It acts just like a dipole and has a predictable radiation pattern. It can be erected as a sloper which gives it some directional gain. It can also be run up the side of fibre glass mast to act as a vertical dipole. Used as a vertical, the ground connection no longer becomes a major issue and the angle of radiation is lower than for a quarter wave, making it ideal for DX performance.

YAESU

FT-252 2m Handy £79.95

144-146MHz
Rx 139-174MHz
Loud 800mW Audio
Tx 5W, 2W and 500mW
CTCSS & DCS Tx & Rx
9 DTMF Auto Dial Memories
1Ah Li-ion Battery & Charger

FT-450D HF-6m 100W

Price Down!

One of the most popular HF transceivers with built in ATU at a new incredible price. Don't miss out! £719.95

Handheld Transceivers

IC-E92D

Dual band 2m/70cm waterproof fitted D-Star. Rugged radio. The IC-E92D is a waterproof dual band transceiver. The IC-E92D is ideal for D-STAR enthusiasts, active amateurs who are fans of outdoor pursuits or organisations that are looking for a simple GPS position reporting system. £387.95d

VX-3E	2m / 70cm Handy Wideband receive	£129.95c
VX-6E	2m/70cms handy, Wideband Receive	£179.95c
VX-7R	Triple band handy silver/black	£299.95c
VX-8DE	6/2m/70cm Upgraded APRS	£369.95c
IC-E80D	2m/70cm D-Star GPS ready	£329.95c
TH-F7E	2m/70cm + wide receive inc. SSB	£236.95c
TH-D72E	2m/70cm GPS & TNC + SiRF	£426.95c
TG-UV2	2m/70cm with CTCSS DCS	£84.95d
KG-UV6D	2m/ 70cm 5W/4W SMA	£94.95d

NEW

ID-51E 2m/70cm

- Dual Bander
- Rx. two simultaneously
- D-STAR DV
- Integrated PS
- AM/FM Broadcast Rx.
- Submersible Construction
- Voice Memory recorder
- MicroSD Card Slot
- 1304 Memory Channels
- Rapid Charge DC Power Jack

TS-590s 160-6m Transceiver

Kenwood has won the admiration of the radio press and hams all over the world. It is probably one of the best transceivers that Kenwood have ever produced. The best dynamic range in its class, digital IF, narrow roofing filters and auto ATU. Also FREE PC control program that can be downloaded. Exceptional value.

IN STOCK £PHONE FOR DEAL

IC-9100 HF - UHF Transceiver

The Icom IC-9100 is ideal for the operator who is looking for a complete high performance radio that covers HF - UHF in one box. It offers 100 Watts output on all bands up to 2m, whilst on 70cms you get a healthy 75 Watts. An internal auto ATU is included which covers HF plus 50MHz. IN STOCK £2899.95 D

KENWOOD TS-2000 160-23cm *

A base station that does everything. All modes, 160-2m 100W, 70cms 50W and 23cm (option) 10W. This fine radio has stood the test of time. £1549.95c

ICOM

ICOM IC-9100 160m - 23cn*

The latest all mode DC to light radio from ICOM. 160-2m 100W, 70cms 75W and 23cm (ption) 10W. £2899

IC-7600 HF Transceiver HF - 6m

Dual DSP and three roofing filters. 3 , 6 & 15kHz
Double conversion superhet - super image rejection
Display 5.8" with ultra wide viewing angle.
Real time specryum scope - USB for flash card or keyboard. 104dB dynamic range for great receiver performance
IN STOCK £3299.95 D

CHECK OUT OUR NEW WEB SITE

ICOM

IC-7100 HF - 7-cm £1249.95c

Includes 4m

- HF, 6m, 2m, 70cm Multi-band, All-mode
- DSTAR DV Mode • Intuitive Touch Screen Display
- Easy-to-see, Easy-to-use Slant Top Controller
- Built-In SD Card Slot & USB • Built-In Speaker
- Dual DSP deliver great processing performance
- Built-in RTTY demodulator and decoder
- Voice recording and playback functions
- Optional RS-BA1 IP remote control software

AR-8600MKII Base/Portable

This base or portable station receiver covers 530kHz - 3GHz. All modes AM FM FMW & SSB with standard rotary tuning. The ideal general coverage station receiver. Every Ham radio station needs a means of monitoring the signal that is being transmitted. We think that this is the one. £699.95

NEW

FG-01 MkII Antenna Analyser

The new FG-101 antenna analyser that covers up to 72MHz with larger screen and will include a matching AC charger and PSU. This highly portable unit features dual impedance and VSWR traces with colour screen. £239 b

Fast Antenna Adjustments

Mobiles

TM-281E

Latest 2m FM 65W mobile. Superbly built £169.95 D

FT-8800E

Dualband Mobile 50W / 30W Great Value £284.95 D

FT-2900E

75 Watt 2m 3W Audio, CTCSS, DTMF mic & "WIRES" internet. £142.95 D

FT-7900E

2m/70cms mobile 50/40W CTCSS, DTMF, internet, wide Rx £219.95 D

FT-8900R

Quad band 10/6/2m/70cm FM 50W (70cm 35W) £329.95 D

FTM-10E

2m/70cms Blue Tooth & built-in mic. £324.95 D

ID-E880

50 Watt Dual band 2m/70cm with D-Star and airband receive. £439.95 D

TM-D710E

50 Watts 2m/70cms with APRS £445.95 D

FTM-350AE

2m/70cm Mobile Bluetooth GPS APRS £399.95 D

TM-V71E

2m/70cm Mobile with Echo Link £299.95 £259 D

Add A Quality Dash-Board Speaker!

SP-160

* 8 Ohms * Power rating 1.5W * 3m of lead with 3.5mm jack * Size 97 x 67 x 27mm * Weight £9.95b

SP-180A

6W Amplified Speaker 6W * Gain and on/off control * 12V DC cigar plug, bracket, audio lead with3.5mm plug. £20.95b

HF - UHF Compacts - One Box! GREAT PRICES

YAESU

FT-897D base or portable. This 1.8 - 440MHz transceiver is great value. 1.8 - 50MHz 100W 2m 50W 70cm 20W. £749.95d

FT-857D The great value mobile or base HF-6m 100W, 2m 50W 70cm 20W. £679.95d

WATSON HF-VHF Mobile Whips

MultiRanger 9 £49.95c

- 80 - 2m non WARC
- Impedance: 50 Ohms
- Power Capacity: 120 Watts
- Connector: (PL-259)
- Length: 1.9m Max

MultiRanger 2000 £69.95c

This antenna is the same as the MultiRanger 9 but adds the WARC bands of 30m, 17m and 12m, 200Watts

HF on a BUDGET!

YAESU

FT-450D Has extra IF filter & an Auto ATU built in. 100W 160m - 6m with 3 IF filters 300Hz, 500Hz & 2.4kHz. £789.95d

IC-718 SSB CW 100W from 160m-10m. You won't find a more cost effective HF radio! £594.95d

ICOM

ICOM

IC-7200 this 100 Watt radio covers 160m-6m and includes digital IF filters. £839.95d

KENWOOD

TS-480SAT A very HF popular wtransceiver giving 100 Watts from 160 - 6m and includes auto ATU. £779.95d

Carriage Charges: A-£4, B-£5, C-£8.50, D-£11

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FORCE 12 — Force 12 Choose Waters & Stanton!

We are Pleased to Announce That we are UK Resellers for Force 12 Antennas

New Multi-Bander!

- Wind Rating 125MPH!
- Power rated to 2kw plus!
- XR4 just 3.6m long and 25 Kilos!
- XR6 just 3.8m long and 30 Kilos!
- 4 band XR4 – 20/15/10/6 : £995.00 GB
- 6 band XR6 – 20/17/15/12/10/6 : £1095.00 GB
- Longest element 11.5m (8.9m for compact version)

The new Force 12 Antenna designs bring to you robust construction and carefully computer modelled designs. Theperformance figures are derived from accurate computer calculations and not generated in the advertising department.
If you are looking for a compact antenna that will both last and perform, then take a closer look.

XR3 HF Yagi 6 Element Gain 6-7.5dB
Covering 10-15-20m Gain 6-7dB
Rated 5KW Boom Length 3.1m
This is one of the most compact HF Yagis with full size element. A version is available with capacity hats for reduced 20m element length.
£899.95

XR4 HF Yagi 8 Element Gain 6-7.5dB
Covering 6-10-15-20m
Rated 5KW Boom Length 3.6m
The XR4 adds the popular 6m band and provides a compact 4 Band design. A version is available with capacity hats for reduced 20m element length.
£99.95

XR6 HF Yagi 11 Element Gain 6-7.5dB
Covering 6-10-12-15-17-20m
Rated 5KW Boom Length 3.8m
The XR6 offers 6 bands in a very small space. A version is available with capacity hats for reduced 20m element length. **£1,099.95**

MFJ

MFJ-266 HF-UHF Antenna Analyser

Covers HF, VHF, plus UHF amateur & commercial frequencies with digital precision. Also displays SWR, Complex Impedance, & Impedance magnitude simultaneously - all on the same easy-to-read LCD screen. Use it to measure Capacitance, Inductance, Field Strength, Frequency & generate test signals. Fine tune stubs, analyse coax, test baluns & RF transformers, and perform many other important RF-related tasks around the shack **£329.95 c**

MFJ-269 HF-UHF Antenna Analyser

* Freq Coverage 1.8-170, 415-450MHz
* Frequency Counter * LCD readout
* SWR & impedance or SWR Bargraph
* Coaxial loss meter * VSWR Meter
* Signal Generator * Freq Counter) **£389.95c**

MFJ-259B HF-VHF Antenna Analyser

* Frequency Coverage 1.8-170MHz
* Frequency Counter * LCD readout
* SWR & impedance or SWR Bargraph
* VSWR Meter * Signal Generator
* Frequency Counter

~~£289.95~~ ~~£249.95c C~~

MFJ-912 4:1 Balanced Line Balun

The famous W9INN 4:1 1.5kW balun is for feeding ladder line via coax cable. Two large insulators for ladder line and SO-239 for coax. loss. **£76.95c**

MFJ-945E 300W 1.8-50MHz Coax ATU

The small 8W x 2H x 6D inch black aluminum cabinet uses little room. The Cross-Needle meter shows SWR, forward and reflected power -- at a glance £134.95c

MFJ-971 1.8-30MHz Portable ATU

The MFJ-971 is ideal for portable work and as well as dual ranges of 30W and 300W, it is possible by changing an internal jumper to convert to QRP 6W or 30W FSD. Wire, coax or balanced. **£119.95c**

MFJ-941E 1.8-30MHz 300W ATU

Here is amazing value. A cross needle meter, antenna selector switch, and the ability to match wire, coax and balanced feed. This makes a great base station tuner capable of up to 300W and has internal 4:1 balun. 12v illumination **£119.95c**

MFJ-949E 300W 1.8-30MHz ATU + Load

More Hams use the MFJ-949E ATU than any other model. Match any antenna. Wires, coax, balanced, plus 8-way antenna switch Large 3" cross needle and internal dummy load. ~~£199.95~~ ~~£179.95c~~

MFJ-16010 200W Wire Tuner

The MFJ-16010 is a variable L-network random wire antenna tuner designed to match the low output impedance of your transmitter to the high impedance of a random wire. Covers 3.5 - 30MHz. **£65.95c**

MFJ-901B

The MFJ-901B is MFJs small and most affordable 200 Watt PEP Versa Tuner. Its designed to match virtually any transmitter (up to 200 Watts and can match coax and end fed antennas. **£104.95c**

MFJ-986 1.5kW 1.8-30MHz ATU

Differential-T Tuner uses a differential capacitor making tuning easier. Broadband coverage ends constant re-tuning. A rugged roller inductor atu that handles 1500 Watts PEP SSB power and covers 1.8 - 30 MHz continuously. **£359.95c**

MFJ-989D 1.5kW ATU

New and improved! The world's most popular legal limit antenna tuner just got better -- with no increase in price! You get better efficiency, lower losses, and a new true peak-reading meter. Easily handles full 1500 Watts SSB/CW, 1.8 to 30 MHz. **£399.95c**

MFJ-962D 1.6kW ATU

The compact MFJ-962D handles 1500 Watts PEP SSB amplifier input power (800 Watts PEP SSB amplifier output power). Its perfect for Ameritrons best selling 800 Watt AL-811H or 600 Watt AL-811 amplifiers! **£399c**

Tiny Tuner MFJ-902B

Tiny 4 1/2 x 2 1/4 x 3 inch tuner handles full 150 Watts! Covers 80-6 Meters, has tuner bypass switch, tunes nearly anything! Wire or coax. **£104.95c**

MFJ-267 1.5kW Power Meter & Load

1.5 kW Dry Dummy Load has built-in precision, true peak-reading SWR/Wattmeter switchable to external antenna! Up to 650MHz **£169.95c**

MFJ-250X 2kW Dummy Load

The MFJ-250X VersaLoad KW Wet Dummy Load lets you tune up fast! You can run 1KW CW or 2 KW PEP for 10 minutes. Or run ½ KW CW or 1 KW PEP for 20 minutes. Requires oil **£59.95c**

MFJ-260C 300W Dummy Load

Every station should have a dummy load for testing and adjustment purposes. This one is our top seller and is available with SO-239 (C) or N (N) type sockets. It will handle up to 300W of power. **£45.95c**

MFJ-925 for IC-7000 & FT-857

MFJ-925 IntelliTuner™ specifically complements todays compact HF transceivers, such as the IC-706MKIIG, IC-7000, FT-857D, DX-70TH and TS-505. Operates from 2 - 200W **£174.95c**

MFJ-991B 300W Auto ATU

Dualual power level Tuner -- Select 300 Watt SSB/CW and match 6-1600 Ohm antennas Or select 150 Watt SSB/CW and match extra wide-range 6-3200 Ohms. New 10,000 VirtualAntennaTM Memories. Like MFJ-993B, less digital LCD, audio SWR meter/audio feedback, antenna switch or 4:1 current balun. **£214.95c**

MFJ-998RT 1.5kW 1.8 - 30MHz

Weather-tight ABS plastic cabinet top with a stainless steel bottom. Send DC/RF down the coaxial line. Has MFJ's InstantRecall to see if that requency has been used before. If so, tuning is instantaneous. Measures 13 3/4W x 6 3/4H x 17 1/2D inches. It's the true fit and forget Auto ATU for those using linear amplifiers. **£779.95d**

MFJ-994BRT 600W Remote ATY

Ragchewing, contesting or DXing, your MFJ is learning! to operate in milliseconds! We've made this tuner to suit the UK market, so that those with linear amplifiers can enjoy the benefit of auto ATU. Includes coax DC feed. **£449.95d**

MFJ-926B 200W Remote ATY

MFJ-926B Automatic Antenna Tuner covers the entire HF band and will match a random wire or coax-fed antenna 1.8 - 30 MHz at a full 200 Watts SSB/CW. Matches impedances 6-1600 Ohms (SWR up to 32:1). **£299.95d**

MFJ-993RT 300W Remote ATU

The Remote unit is mounted in a durable hard plastic case. Covers 1.8 to 30 MHz, has heavy duty 16 Amp / 1000 Volt relays and a highly efficient L-network. It also includes the MFJ-4117 **£329.95d**

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Contents

RadCom

THE RADIO SOCIETY OF GREAT BRITAIN'S MEMBERS' MAGAZINE

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The online *RadCom* is at www.rsgb.org/news/radcom/

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And now for something completely different…

2013 has been a wonderful Centenary year for the RSGB. There is no doubt that G100RSGB caught the imagination of many Members whether as operators or trying to work the myriad of different locations on as many bands as possible. There were other successful events as well with the 5 July Centenary Day at Bletchley Park being the highlight. It was sad that our Patron was not able to be with us but, with such wonderful weather, all those attending had a great time especially the youngsters from the local schools with the ARDF and construction opportunities. The culmination of the day was the Centenary Dinner where our after dinner speaker was Peter Cochrane who is licensed as G3RVC. Peter entertained but equally provoked 'out of the box' thinking.

Peter has written an article, the first part of which is in this edition of *RadCom*, which expands on his talk. His intent is to make everyone THINK. Some of you may not agree with what he has written but that is good – consider why you don't agree! Also remember that, one hundred years ago, radio amateurs were doing things that the authorities considered 'impossible', hence being given all that bandwidth (in the HF/LF spectrum). We should remember that our current licence in clause 1 includes the words 'conducting technical investigations' – if you were asked, could you explain when you last did that and what it was?

In his 1952 Presidential address, Dud Charman, G6CJ, stated, "*In 50 years' time, amateurs will still do the things we do today – but with an apparatus beyond our ken, using words, languages and a depth of interest which make our present efforts seem primitive*". I think that is still true today and one of the reasons for publishing Peter's article is to make everyone think about where our hobby is going.

Don't get me wrong, there are many aspects to the hobby and everyone should enjoy their own particular interests but remember our heritage and what our predecessors were doing – should we be doing some of the same?

We need to attract new people into the hobby and aim for a 'thriving hobby' rather than a 'surviving hobby'. Early experimenters were not prepared to be told 'it can't be done' – we should be thinking 'I wonder if we could…'.

In his December editorial, our President said that he decided a year ago to try some new things in amateur radio as part of his celebration of the Centenary. Maybe the rest of us, provoked by Peter Cochrane's article should consider 2014 the year when we will try something new. It doesn't have to be ultra technical – for some trying a new digital mode would be a major step. For others trying a new band, maybe on VHF or microwaves would be worth considering. For the really technical people, then how about experimenting above 275GHz where we are discussing with Ofcom additional frequency allocations?

You don't have to do any of this but I do hope that Peter's article will get you thinking and I am sure that there will be lots of 'letters to the editor'! If that happens then that is good news for the hobby as we need to encourage wider thinking.

All the best for 2014 and please do write/e-mail/post your different achievements to encourage others.

Graham Murchie, G4FSG
RSGB Board Chairman

RSGB Elections

2014 vacancies exist for RSGB President (2 year term), an Elected Director (3 year term) and Regional Managers for Regions 1, 2, 4, 5, 6, 10 and 12. Candidates for the role of President will require the supporting signatures of 25 RSGB Corporate Members – see Candidate Pack for details. The role of Elected Director will require 10 supporting signatures and for Regional Managers 10 Corporate Members residing in the Region. Details were printed on page 10 of the December *RadCom*. Paperwork can be downloaded from the RSGB website (www.rsgb.org.uk/candidatepack) or by post from RSGB HQ. Competed papers must be returned to RSGB HQ by noon on 1 February 2014.

Club of the Year

There is still time to enter this year's National Club of the Year competition, kindly sponsored by Waters & Stanton. As 2013 was the RSGB's Centenary year, the focus of the Club of the Year competition will be how clubs have contributed to and used the opportunities that this has presented.

The competition is open to all RSGB affiliated clubs and groups. Clubs are free to provide a submission using a format of their choice but please observe the Conditions of Entry that can be found on the RSGB website.

Entries must be for club activities undertaken from 1 January 2013 to 31 December 2013 and all entries must be received by your Regional Manager no later than midnight on 31 January 2014.

The first stage is the Regional competition where entries will be judged and ranked by a Regional Manager from outside of the Region to ensure impartiality. The winners will be announced in *RadCom*. The top three Regions will go forward to the RSGB Board for the National competition and these will be awarded at the 2014 AGM. Entries or part entries may be used for RSGB promotional purposes and articles on the winning entries will appear in *RadCom* after the winners have been announced.

Previous General Manager

The Board is pleased to be able to report to Members that the debt owed to the Society by its previous General Manager, who left the Society in early 2011, has been repaid in full, together with statutory interest and the Society's court fees.

This will be reflected in the 2013 accounts as a write-back of the provision taken against the debt in the 2011 accounts. Details will be in the annual report and accounts which will be published in time for the AGM in 2014.

The Board expresses its thanks to the Society team that has brought about the recovery of this debt and now regards the matter as closed. No further comment will be made.

CONGRATULATIONS

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

50 years

Mr D N Davison	G3VFX
Mr D J Munro	GM3TCM
Mr K Rothwell	G8EAP

AMSAT Celebrates Success with FUNcube-1

Early on Thursday 21 November, the cream of UK amateur satellite enthusiasts gathered at the RSGB National Radio Centre for the launch of the first UK designed and built amateur satellite, FUNcube-1. AMSAT had fitted out the GB3RS shack as a satellite control room for the event and tension mounted steadily as the count went down from T-10 to liftoff at 0710UTC. A jerky video simulation from the launch site in Yasny, Russia showed the converted Soviet-era Dnepr missile rocketing for the skies; then came a nail-biting wait for confirmation that the launch vehicle had reached its 400-plus mile high orbit and the 32 (!) satellites on board had deployed. Suddenly the announcement came: "We're in space!".

Shortly after separation, the satellite neared South Africa and a great cheer went up as the FUNcube-1 internet 'data warehouse' showed the first signals being received by ZS1LS at 0737GMT, less than one minute after the transmitter switched itself on. This was a remarkable achievement as the satellite was in 'safe mode', transmitting under 30mW on its 2m downlink. As soon as the signals had been confirmed, an official request was lodged for FUNcube-1 to receive the designation AMSAT-OSCAR (AO) 73. Then the champagne corks popped and the team celebrated in style. But there was still work to be done.

The first orbit went well to the east of Britain and had a peak elevation of only 3° from Bletchley Park. Some weak signals were received in the control room but stations in Switzerland and elsewhere in Europe reported 'strong' signals. Telemetry showed that the satellite was healthy and a high-level meeting was rapidly convened to decide whether to try sending a command on the next pass, which would be at a very much higher and more useable elevation. The verdict was affirmative – but then the choice had to be made whether to send a dummy command just to see if it could hear us, or a live command to do something useful. It would all depend on the health of the satellite. Meanwhile, the uplink transmitter was prepared and double-checked. And then we waited for the bird to come up over the horizon.

The FUNcube-1 team celebrate the successful launch, deployment and first command of the satellite.

The satellite pass progressed from east to west and telemetry received from further south – including from Khartoum – looked positive. By this time signal reports had been received from amateurs in around a dozen countries. At a little after 10.23 the distinctive FUNcube-1 signals started coming out of the noise on the FUNcube Dongle-based ground station waterfall display and were audible on the monitor loudspeaker. The telemetry decodes were checked against the nominal figures and showed performance even better than the design team had hoped for. Two minutes of conflab later Wouter, PA3WEG, turned on the ground station transmitter and sent the command to switch FUNcube-1 to its high power (300mW) 'Education' mode. Moments later the satellite responded with an S9-plus-thunderstorm-strength signal, closely followed by a *huge* cheer from the assembled engineering team: arms were waved, seats were thumped and hands were shaken as years of painstaking toil bore spectacular fruit. A short video clip of the moment the command was sent – and the excitement immediately afterwards – can be seen at http://youtu.be/AhCj1D2Sg78. During the celebrations, designer Howard Long, G6LVB quietly slipped out to the car park. He returned with a huge grin, clutching his handheld – he had heard his satellite on a rubber duck, well enough to decode the telemetry! FUNcube-1 was easily strong enough to meet its educational goal of being receivable by a FUNcube Dongle attached to a dipole outside a classroom window.

During daylight (school) hours FUNcube-1 – now also officially known as AO-73 – will transmit high power telemetry and greetings messages; outside of these times it will operate as a linear 70cm to 2m linear transponder for SSB/CW operation by amateurs with the telemetry at low power. Full details of the project and current operating schedules can be found at http://funcube.org.uk/.

Giles Read, G1MFG

IARU Region 1 Conference Call for Inputs

The next step in a three-year cycle occurs in 2014 when the IARU Region 1 Conference is held in Varna-Albena in Bulgaria. Whilst the meeting itself is not until September 2014, the timeline requires that any paper must be submitted by Member Societies, such as RSGB, to the organisers by end of March. There is currently an opportunity for amateurs to raise potential topics via RSGB (or ideally submit a short abstract), so that they can be developed and reviewed in time.

Matters may be raised regarding HF (Committee C4), VHF/Microwave (C5), or more general matters (Committee C3). Typical topics might involve operating procedures, technical developments, band plans, or IARU contest rules. More specialist Working Groups also cover EMC etc. Papers can include specific recommendations, or be for information only.

In a change from previous years UK amateurs may discuss these matters and propose topics using the same Discussion Board system used for Consultations and Litmus Tests. This replaces a pair of UK Yahoo groups. Later in 2014, when full papers are available, they will again be used for gathering views.

Further information and additional links are on the RSGB website on our Consultation pages at http://rsgb.org/consultations.

QSL Matters

COMPUTER PRINTED CARDS. There's no doubt that computer logging offers many benefits but you only get out what you put in. We frequently encounter impossible callsigns due to typing error. Printed labels are often so crammed with information that the destination callsign becomes small and hard to decipher, without magnification. Not so bad for 2 or 3, but 2,000-3,000 in a single pack makes sorting slow and hard on the eyes. Some members turn each labelled card through 180° to even the stack. Frustratingly, our sorters have to turn each one back to find the destination. The most frustrating of all is the DX prefix for a common call eg YB/G3UGF. Wrongly placed this mean this card might make a fruitless trip to Indonesia, or never reach its true destination. It's all a case of how you enter the data. Some programs have an option to turn the prefix into a suffix with a single keystroke – has yours?

GW/MW/2W. Sub-manager Lloyd Thomas, 2WOLLT has managed one of our largest QSL sub groups with more than 500,000 cards per annum, for some time. Lloyd has decided that it's time for him to step down. This growing workload will be allocated into two groups, GW and a combined MW/2W group. We are now seeking two active sub managers, ideally from the sub-groups they wish to represent with time, space and a working knowledge of Excel spreadsheets to take on these groups. Interested? E-mail qsl@rsgb.org.uk for more details.

SUB MANAGER NEWS UPDATES. G7 manager Chris Flanagan, G7NRO has now received member's envelopes from his predecessor and is busy clearing his latest delivery from the bureau.

GOP call holders can now forward envelopes to the new GO combined series manager Nigel Roberts, G4KZZ, who now has cards.

GON and G3A-D call holders are reminded that as retiring manager Ted Allen, G3DRN is currently indisposed, replacement envelopes urgently need to be sent to the new managers listed on the RSGB website.

FINALLY. Please remember all outgoing cards should be sent to PO Box 5, Halifax, England HX1 9JR.

Expertise at the IARU

IARU Region 1 is attempting to identify volunteers to act as experts/consultants on its behalf. With existing volunteers becoming older and a number of volunteers retiring from this work it means that Region 1 could soon reach a point where we cannot be effectively represented. If you are interested in this role, please contact Graham Coomber, G0NBI at graham.coomber@rsgb.org.uk.

Centenary Legacy

The RSGB Board is looking to build on the success of the RSGB Centenary and is examining several projects. It plans to run an annual construction competition at the annual RSGB Convention and build on the number of DIY club talks in the Dip into the Archives collection. Additionally, the Board is looking at ways to build on the success of the G100RSGB callsign that received such support from both the Membership and the amateur population worldwide.

The Board would like to thank John Gould, G3WKL for all his work on the various Centenary projects.

Litmus Results

The RSGB is attending a meeting with Ofcom in early December to discuss the initial outcomes of the Litmus tests on Ofcom's licence review topics. The five topics were:

- Embedding the Progressive Licence concept
- Regional Secondary Locator
- Single callsign per station
- Airborne use
- Remote operating

The results of these consultations can be seen on the website (http://rsgb.org/main/rsgb-consultations/active-consultations/ofcom-consultations/licence-review-preparation/).

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 R Atkinson	G0SWB
Mr K R Johnson	G4WBO
Mr B H Beestin	G8STR
Mr B Banks	M0DZG
Mr D Capon	M0GVI
Mr J A Glover	M0JGR
Thanet REC	M0TFC
Mr D Colver	M0WMX
Mr D Goodwin	M3WKF
Mr G Kyte	M6DQA
Mr R E Blackwell	M6DQC
Mr J Wynne	M6DSU
Mr S Merritt	M6FYZ
Mr D Camp	M6NBD
Mr J P Anderson	M6RHJ
Mr M J Fairbairn	M6SEU
Mr P Bolton	M6SYN
Mr J Dow	MM6DQY
Miss T Craig	MM6LTC
Mr J Maxwell	MW0HLW
Mr J Clarke	MW0JHC
Mr A Minton	MW6NYE
Mr M Orbell	RS214026
Mr T Collins	RS214379
Mr R Bryan	RS214555
Miss Laura Knapman	RS214718
Mr F Zuniga	RS214726
Mr P Pearson	RS214766
Mr P Morris	RS214772
Salford University ARS	RS214831
Mr K Killingback	RS214834
Mr S Harris	RS214837
Mr R Limbrick	RS214852
Mr O Hafner	RS214854
Mr P Freeman	RS214858
Mr M P Brady	RS214863
Mr M Stirling	RS214875
Mr G Sommers	RS214886
M Arthanari	RS214894
Mr N Snowden	RS214910
Mr M Ayre	RS214923
Mr A Jones	RS214938
Mr B Shanon	RS214951
Mr D Pugh	RS214952
Mr T Thackray	RS214956
Mr N Cully	RS214960
Mr E Schryer	VE3VCA
Mr T Bendtsen	VE5MX
Mr L Rizio	VK3EI
Mr M N Coulter	W1RF
Mr R Beason	W4YKF
Mr A Carden	2E0POB
Mr G Jones	2W0GLH
Mr K Jenkins	2W1ADO

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

Mr B Croskey	AH0U
Mr A D Wilkinson	EI2HWB
Mr R K Titmuss	G0AWY
Mr T D Fox	G0BJP
Mr J M Allison	G0BTP
Mr L Marsland	G0DBE
Mr D J Goodison	G0LUH
Mr E W Williams	G0ULL
Dr W J Rothwell	G0VDE
Mr C E Mortimer	G0WBC
Mr B F Wall	G1EUA
Mr S D Karpasitis	G1SDK
Mr D R Paice	G3MXK
Mr D A Darwood	G3YKO
Mr R J Godfrey	G4NCN
Mr P W Fry	G4SBF
Mr M J Conder	G6NCF
Mr M R Collins	G6TVX
Mr D Thomalla	G7GGM
Mr N Wootton	G7LPY
Mr M A Wallace	G8FRL
Mr I Gower	G8VHG
Mr E G Hughes	G10BDX
Mr R B Wallace	GM0AOF
Mr S T MacDonald	GM0HUU
Mr I M Macdonald	GM7JED
Mr J Jesson	KC2VGL
Mr G F Griffiths	M1DJC
Mr M Vinquart	ON4TU
Mr G P Shepherd	RS210591
Mr T J Emerson	W4TJE
Mr R V Booth	W7VPV
Mr A Teed	2E0LWT

Centenary Matters

CENTENARY STATION. Yes, this is still ongoing and as this edition reaches you we will be about half-way through the station's operation in Northern Ireland. I am sure that the amateurs in the Province will do us all proud and end the year on a high point. At this point I should remind all that this will be your last opportunity to make some contacts with the Centenary station, as well as other stations, to finalise your points for the Centenary Award. There is no specific time to submit your application and checklist to John, G3LZQ, RSGB Awards Manager, but all scoring contacts need to be made during 2013.

As I draft this piece we are nearing the end of the station doing its rounds in Southern Scotland and the Western Isles. Some of the earlier operations took advantage of the long-awaited improvements on the HF bands, as well as some great radio locations – and, of course, operators! John, GM1BSG of the Stirling & District ARS commented, "Only 2,300 or so contacts, wish we could have done more on CW and RTTY but we ran out of time as operators were limited." From the West of Scotland ARS, Kenny, MM0ZUN wrote, "We managed to encourage some members that haven't been to our shack in years to come out for it which was good", and the comment from Jason, GM7VSB, our Regional Manager, was "I operated the call on the 14th for a few hours and I have to admit I wasn't ready for the 'wall of noise' on 80m after the first cluster spot."

A full report will feature next month, but Ian, GM3SEK sent me a short report of the Wigtownshire ARC's weekend operation from the Mull of Galloway lighthouse, where the 25 club members and 3 guest operators contacted close to 2,500 stations in a full 48 hours of operating on most bands between 80m and 70cm using a mix of SSB, CW, RTTY and FM. Ian commented, "This is the sort of radio location most of us can only dream about, so we were very fortunate to have the support and cooperation of the Mull of Galloway Trust who now own the site."

The GM100RSGB operation from the Mull of Galloway lighthouse. Photo MM0LGR.

JOINT MEETING WITH THE IET. A brief reminder for those who live away from London or who missed the live video-streaming of the event that the video can be downloaded from the BATC website as well as a link from the RSGB website.

John Gould, G3WKL

WEBSEARCH

Joint IET/RSGB meeting: http://rsgb.org/main/about-us/rsgb-centenary-2013/ietrsgb-joint-meeting/

REGION 8: NORTHERN IRELAND, GI100RSGB – REMAINING SCHEDULE

12 - 13 Dec	Foyle & DARC
14 – 16 Dec	Greenisland Electronics & ARS
17 – 18 Dec	Lagan Valley ARS
19 Dec	Marconi Radio Group
20 Dec	Lagan Valley ARS
21 – 22 Dec	MI0MSR
23 – 24 Dec	Hilltop RG
25 – 26 Dec	MI0WJC
27 – 29 Dec	Grey Point Fort ARS
30 Dec	CASHOTA
31 Dec	GI0AZB
23 – 24 Dec	Hilltop RG
25 – 26 Dec	MI0WJC
27 – 29 Dec	Grey Point Fort ARS
30 Dec	CASHOTA
31 Dec	GI0AZB

News

2014 Bath Buildathon

The next Bath Buildathon is to be held on 4 January. The aim of the event is to encourage newcomers to have a go at homebrewing radio equipment under the watchful eye of some experienced radio constructors.

The kit chosen is the 20m PSK Centenary Receiver that was developed for the RSGB Centenary Day (see September 2013 *RadCom*). The receiver was specifically designed for the newcomer so you can be confident that you will go home with a working 20m PSK receiver.

The Buildathon is planned to run from 9am to 5pm. All necessary tools, soldering and test equipment will be available to everyone to use on the day. The cost of the day will be £25 to include the cost of the kit, room hire, use of tools, tea, coffee, biscuits, etc. You just need to bring yourself and a packed lunch. Places will be limited to ensure that everyone gets good mentoring from one of the local tutors so interested parties are advised to book early.

For further details, please contact Steve Hartley, G0FUW by e-mail to G0FUW@tiscali.co.uk.

CDXC DX Marathon

The 2014 CDXC DX Marathon Challenge starts at 0001 on 1 January and runs to 2359 on 31 December 2014. The aim of the Challenge and its awards are to promote DXing activity during the year and to promote the uploading of logs to *Club Log* (which leads to better statistical information for us all).

Scoring in the CDXC DX Marathon Challenge is based on the number of DXCC entities worked during the year, regardless of band, mode, or number of times worked. In order to both promote uploading QSO data to *Club Log* and to promote an atmosphere of competition, *Club Log* uploads will be required at least four times, including the final upload at the end of the year – but will be encouraged to be more frequent. The closing date for final uploads is midnight 5 January 2015.

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Edited by Mike Browne, G3DIH

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Yaesu FTDX3000D HF & 50MHz transceiver

A new HF and VHF transceiver

The front panel of the Yaesu FTDX3000 features a crisp and colourful display.

INTRODUCTION. Yaesu has recently been updating its mid-range HF transceiver models, adopting a fresh new styling with a crisp eye-catching display and enhancements to performance and functions. The result is two new models. The latest release is the FTDX1200, pitched more towards the economy price bracket and I will be reviewing this shortly. This review focuses on the FTDX3000, the more up-market of the two models, adopting a high performance down-conversion receiver based strongly on the FTDX5000.

BASIC FUNCTIONS. The FTDX3000 is a mid-sized 13.8V operated radio containing a single receiver. Measuring 365 (w) x 115 (h) x 312mm (d) and weighing 10kg, it is similar in size and weight to the earlier FT-950. The receiver tunes continuously from 30kHz to 56MHz and the transmitter is enabled only within the amateur allocations specific to each appropriate country at 100W maximum output power. Individual buttons select the bands except 60m with a band memory storing the last three combinations of frequency, mode and bandwidth settings for each press of the band key. 5MHz transmit frequencies (UK compatible) are hard programmed into seven consecutive memory locations but only in USB mode. US frequencies are stored into US supplied models. A single button scrolls through the usual modes with a long press to select alternate sidebands on SSB, CW, RTTY and PSK (data).

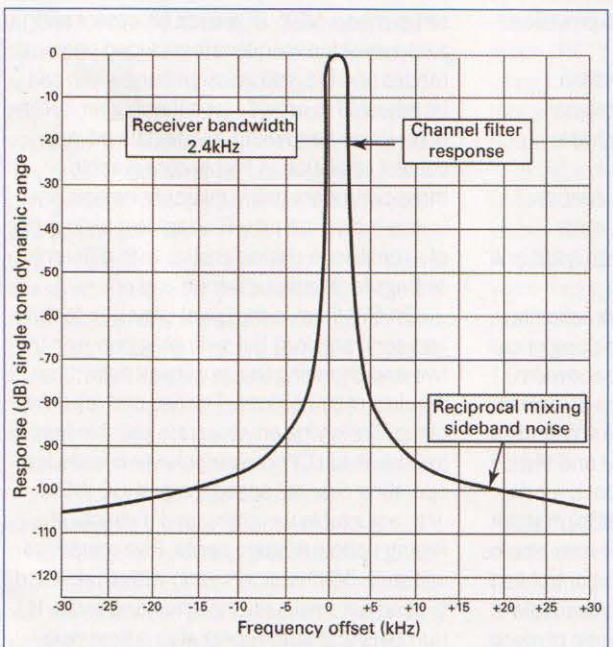


FIGURE 1: Overall composite selectivity curve.

Operation of the radio and use of the front panel controls is subtly different from the normal style of the Yaesu user interface. With fewer individual physical controls allowing better visibility and less cramped layout, the display is central to how the radio is used. Frequently accessed functions have dedicated illuminated buttons along one side of the display with settings shown in a pseudo block signal flow format. Other functions use on-display buttons that are accessed and selected by four navigation keys in a similar fashion to many types of handheld controllers such as TV remotes and phones. IF filtering functions of width, shift, contour and notch have dedicated rotary controls with separate graphical portrayals of their filtering function on the display and the numerical value is held for three seconds after the function has been adjusted. The display also shows a multifunction meter in analogue or bargraph formats, spectrum display for the scope function and readouts for the RTTY, PSK and CW decoders.

Other functions are accessed via the menu system – some 196 items – fairly easy to scroll via the navigation keys with each function well described in plain language on the display. Some functions that normally have dedicated controls have been relegated to the menu system to simplify control layout. Transmit power, for example, can only be adjusted via the menu with multiple button presses and this is a major inconvenience if you use a linear amplifier that needs to have the transmit power adjusted when changing bands. Many linears do not provide ALC feedback and in any case it is not good practice to rely too heavily on ALC to cut back the power. However, a front panel pushbutton labelled CS (Custom Selection) provides a one-touch access to any specific menu item and transmit power is an obvious candidate.

The 4.3-inch main display uses full colour TFT LCD technology, which is particularly crisp, bright and colourful with an excellent viewing angle and so much better to view under bright lighting than the vacuum fluorescent displays used in most previous Yaesu models. A second smaller display, equally bright, is located directly above the main tuning knob and shows VFO-A frequency and mode. The VFO-B frequency is shown simultaneously on the main display at all times.

Moving round to the rear panel, there are three antenna sockets that can be freely assigned according to band or one can be used for a receive only antenna. There are key jacks on both the front and rear panels and these may be configured independently for various internal or external keying options. A standard 8-pin microphone socket is located on the front panel and an MH-31 hand microphone is provided with the unit. Mini-DIN connectors provide dedicated interfaces to controllers or soundcard for datamodes, external auto ATU and Yaesu rotator control. A bank of eight phono jacks provides for control of linear or accessories, a wideband IF output for external spectrum monitoring, PTT, antenna output to external receiver and 13.8V for accessories. There is a line level audio input/output jack, a connector for the FH-2 keypad but no low level RF output for transverters.

A 15-pin D connector provides full control for auto band changing accessories such as the VL-1000 linear. This includes binary coded band data output and the TX REQ line.

January 2014 • RadCom
Peter Hart, G3SJX • e-mail: peter@g3sjx.freeserve.co.uk

When grounded this line puts out a mode-independent tuning signal for tuning linears and ATUs. With the FTDX5000 it is available from a separate socket and I have a switch connected that sits conveniently adjacent to the radio. The FTDX3000 accommodates the Yaesu μ-tune front end filters but not the DMU (data management unit) accessory. A 9-pin D connector CAT interface allows PC serial port control and in addition a USB interface also allows audio and data to be transferred to and from the PC and to install firmware upgrades. Further information and USB port drivers are available from the Yaesu website together with details on installing firmware upgrades when released via the website.

The usual comprehensive Yaesu manual is included and a set of circuit diagrams. Information on programming aspects for computer control is available in a separate manual downloadable from the Yaesu website.

RADIO DESIGN AND ARCHITECTURE.

The receiver signal flow in the FTDX3000 is similar to the main receiver in the FTDX5000, adopting a down-conversion double superhet architecture with a first IF of 9MHz and a second IF of 30kHz (24kHz on AM and FM) to feed directly the DSP for all further signal processing. There are five selectable roofing filters at the first IF with bandwidths of 300Hz, 600Hz and 3kHz using high-grade crystal filters, and 6kHz and 15kHz using monolithic ceramic filters. The 300Hz filter is an optional extra and rather pricey. A 32-bit DSP is used to provide all IF channel filtering, demodulation, noise reduction, audio processing and AGC functions.

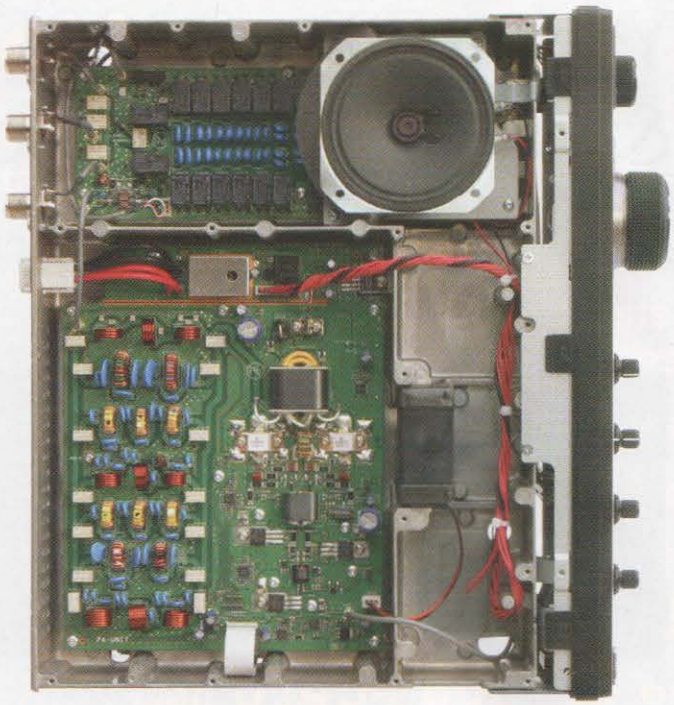
The receiver front-end has two switchable bipolar RF preamplifiers for nominally 10dB or 17dB gain, a straight mixer feed (IPO) for best strong signal performance, and three levels of input attenuation. There are 15 input bandpass filters covering the total frequency range of the receiver and an IC first mixer. The frequency synthesiser uses a PLL/DDS combination with five VCOs to cover the tuning range and a 0.5ppm TCXO reference to ensure excellent frequency accuracy and stability.

The transmit signal generated by the DSP is mixed through the 9MHz IF and further mixed to an IF at 89MHz before conversion to final frequency. This stage of up-conversion reduces problems due to unwanted mixer products. The final amplifier delivers 100W from a pair of RD100HHF1 MOS FETs.

The radio is solidly constructed in typical Yaesu style with the usual substantial diecast frame on which the circuit boards are mounted together with a shielding plate and a wrap-around case. Extendable front feet tilt the front panel to improve operating ease and a carrying handle is fitted to the side. A reasonably sized 9cm speaker fits in the case top. An internal fan cools the unit and only operates when the temperature rises. The speed increases with temperature but is very quiet in operation.

RECEIVE FEATURES.

The radio is fitted with an excellent tuning drive, 50mm diameter with weighted flywheel action and adjustable drag. With 1000 steps per revolution and 10Hz steps it combines precise tuning with fast frequency navigation. 1Hz and 5Hz steps are also selectable with 100Hz on AM and FM. A FAST button increases all these rates by a factor of 10. A separate smaller tuning knob sets the frequency of VFO B for split frequency operation. This knob also provides RIT/XIT tuning, memory channel selection and 1MHz stepping to access general coverage frequencies. The remote keypad provides 100kHz steps; the radio can also be tuned from the microphone or the frequency can be entered directly through the band keys, which double as a numeric keypad. The radio provides the usual Yaesu Quick Split feature and TXW for quick monitoring and tuning the transmit frequency during split frequency operation.



The Tx PA, output filter and ATU boards are under the top cover.

There are 99 regular memory channels that also store virtually every receiver setting and not just frequency. A further nine memory channels hold programmable scan limits, and the usual scan facilities are provided. Another seven hold 60m channels and a further five provide the normal quick access memory bank feature. Up to six memory groups can be set up and the memories are easy to scroll and view on the display but there is no provision for labelling.

The receiver front end configuration may be optimised to suit different signal level environments with two switchable preamplifiers, three levels of signal attenuation, RF gain and squelch controls. Three AGC speeds are selectable, each programmable over wide limits with a flat or a sloped response.

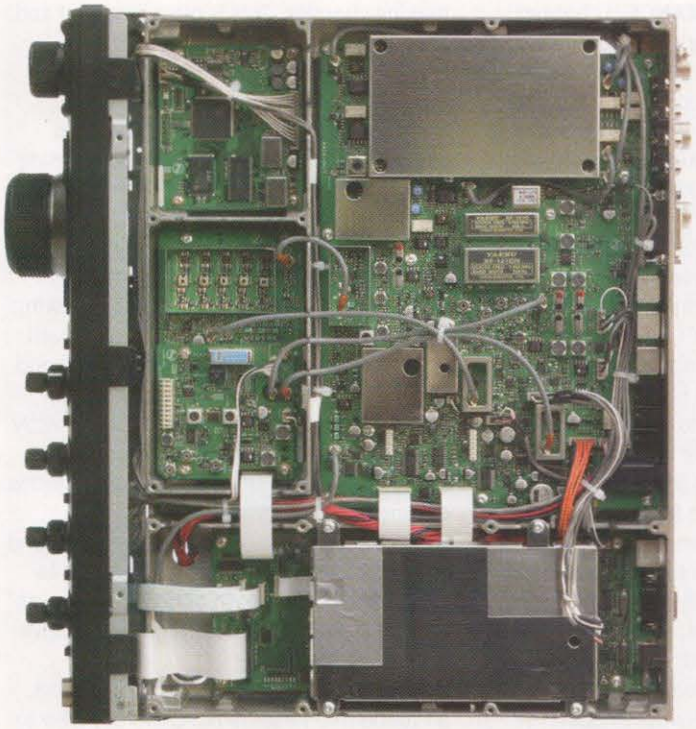
Roofing filters are selected automatically according to channel bandwidth setting or can be set manually. The IF channel bandwidth is adjustable over wide limits, from 200Hz to 4kHz on SSB, 50Hz to 2.4kHz on CW and data modes, 6kHz or 9kHz on AM and 9kHz or 16kHz on FM. Two values for each mode are selectable at the push of a button, normal or wide and the overall filter shape may also be tailored. There is the usual IF shift control and the Yaesu Contour filtering system available on all modes. On CW, a narrow audio peaking filter is provided with its centre frequency adjustable around the pitch frequency. The IF noise blanker removes either short or long duration pulses and the levels are adjustable via the set-up menu. A tuneable IF notch is provided, a digital auto notch and digital noise reduction with 15 different digital noise reduction algorithms. Finally, the low and high frequency round-off points for the receiver audio are separately adjustable for each mode.

Correct tuning of the receiver into CW signals is helped by the CW tuning display and an auto-tune / spot button will automatically fine-tune the receiver to give the correct pitch.

TRANSMIT FEATURES.

The transmitter contains a 100W power amplifier reducible down to about 5W but, as stated earlier, the power level can only be adjusted from the setup menu. VOX, IF speech processor and a transmission monitor are provided on voice modes and the transmission bandwidth can be adjusted to provide for either higher fidelity or for lower bandwidth, higher talk power, contest operation. A highly configurable three-band parametric microphone equaliser is also included that will adapt to a wide range of microphone characteristics with different settings for the processor on and off.

On CW there is the usual provision for full and semi break-in but switching between the two and changing the drop-back delay time requires menu access. The rise and fall times of the CW keying envelope are settable from 1 to 6ms. A full CW message keyer is included, operating over the speed range 4-60 WPM with adjustable weighting and a variety of keying paddle arrangements. Five memories will store 50 characters each with a provision to send automatically incrementing serial numbers and auto-repeat after a time delay in beacon mode. The message stores use the FH-2 remote keypad and are programmed



The main RF and signal processing boards are under the bottom cover.

either using the keying paddle or in text from front panel controls or via the remote keypad.

The radio includes a built-in auto ATU operating only on transmit over the bands 1.8 to 50MHz and will tune antennas with up to 3:1 VSWR. 100 memories store tuning settings to enable rapid and accurate reselection. A fresh tune takes up to about 8 seconds with the usual clatter of relays while it is tuning. Metering on transmit indicates power output, ALC, VSWR, compression level, PA current or supply voltage. FM operation allows for separately configured shifts for 28MHz and 50Mz repeaters and includes a CTCSS tone encoder/decoder.

ADDITIONAL FEATURES. Yaesu has, until recently, lagged behind the market in providing spectrum scans and data decoders as part of their radios. However, all has now changed and the FTDX3000 includes these as standard. The area in the lower part of the display is configured to provide either a spectrum scan or a text display area for the RTTY, PSK and CW decoders. The area is rather small so with the spectrum display the amplitude range is rather squashed, but a full-screen mode is also provided following a recent software upgrade. Similarly for the data modes, only 3 lines of text can be displayed but this can be scrolled to view the last 10 lines of received text. One line of transmit buffer storage is also displayed.

The spectrum scope functions simultaneously with the receiver and is much faster in operation than the SM-5000 provided with the FTDX5000. In FIX mode it will scan between two fixed points, separately programmable for each band. In CENTRE mode it will scan either side of the receive frequency with selections from ±20kHz to ±1MHz. Single scans or continuous scanning can be performed and up to ten scans can be memorised, perhaps to compare propagation over a period of time. Receive and transmit frequencies are shown as markers on the display. The amplitude displayed range is 80dB but this is crammed into just 1cm height of the display. The sensitivity is somewhat limited as also is the frequency resolution but it has its uses. The scope screen can also show the audio spectrum from the receiver either as a straight spectrum scan or as a waterfall. This AF-FFT function is also part of the data decoder function, where it is used as the tuning indicator.

On RTTY, PSK and CW modes, separate data decoders are built in, displaying three lines of text at 35 characters per line. RTTY supports 170, 200, 425 and 850Hz shifts with low or high tones normal or reversed. FSK interfacing is accommodated as well as audio lines for AFSK. The PSK decoder supports PSK31 in either BPSK or QPSK formats with a selection of tone frequencies. There is no provision to connect a keyboard so transmission in general relies on external units, typically a PC via a soundcard or by USB, which is supported by the radio. However, five messages can be stored per mode (RTTY, PSK and CW) and transmitted using the FH-2 keypad, enabling simple rubber stamp QSOs on these modes. A general purpose data mode is also accommodated.

A digital voice memory option is available, DVS-6, and installs easily inside the radio. Useful for SSB contest operation, there are five stores each holding up to 20 seconds of voice messages. The FH-2 remote keypad again provides access to these messages. It is also possible to store continuously the last 15 seconds of incoming receiver audio for later playback. Surprisingly, this can be done without the need to have the DVS-6 option installed.

MEASUREMENTS. The full set of measurements is given in the table. The receiver is very sensitive, similar for all roofing filters, and is flat across the frequency range down to about 500kHz. Below 200kHz sensitivity reduces primarily due to noise increase and is down by 15dB at 136kHz and 25db at 100kHz. The preamplifiers operate over the whole range. The S-meter calibration is very similar to all Yaesu models, FT-2000 and later, closely following 3dB per S-unit and very linear up to at least S9+40dB. Broadly similar results are achieved on all modes and roofing filters.

Rejection of the 9MHz IF was around 80 to 100dB on most bands except on 7MHz and 10MHz where it reduced to around 50dB. The first mixer image rejection was better than 70dB and other spurious responses better than 100dB. Close-in responses due to synthesiser spurs seen on the FTDX5000 are non-existent with the FTDX3000, a very clean result. The AGC characteristic was very clean, a fast attack time with no 'hole' seen in many DSP implementations and a decay time reasonably close to the menu set figures.

The strong signal performance of the front end is top-class with third order intercept and intermodulation limited dynamic range figures at wide spacings similar to and in some cases better than the FTDX5000. Closer in, reciprocal mixing (RM) predominates and prevented measurement at my normal 10dB s/n measurement condition. However, measuring at slightly higher levels where the intermodulation product generated is about 6dB below the AGC threshold enabled the close-in figures shown in the table to be obtained. This shows that the intermodulation performance holds well down towards the skirts of the roofing filters but degrades by 35dB or so inside the filter bandwidth. However for all practical purposes RM noise is the limiting factor for close-in dynamic range. Blocking due to front end overload is likely to be very good but again could not be measured due to RM noise resulting in AGC action and reducing gain. Inband intermodulation and audio distortion figures were very good for signal levels below S9+20dB, reducing at higher levels. Second order and wideband third order products were very well suppressed.

The reciprocal mixing figures are very typical of a mid-range radio. Compared to other Yaesu models, it is somewhat better than the FT-2000, similar to the FT-950 and although significantly worse than the FTDX5000 close-in, rather better than the FTDX5000 further out beyond 20kHz. Although RM noise is the limiting factor on close-in dynamic range this is as much a result of the excellent intermodulation performance as the RM noise itself. Note that if comparing figures, my earlier reviews quote noise in 2.4kHz bandwidth whereas more recent reviews quote in 500Hz, resulting in a 6dB higher dynamic range figure. dBC/Hz figures are of course bandwidth independent.

RM noise limited measurement of the IF filters down to about –70dB and the results comparing the different shape characteristics are shown in the table. **Figure 1** shows the overall composite selectivity curve.

On transmit, two-tone distortion products

were fairly typical for a 12V operated power amplifier and harmonics and other spurii were very low. Distortion degraded very markedly with overdrive, so keep well within the lower part of the ALC zone. Surprisingly, the processor added no extra distortion. CW rise and fall shapes were reasonable, with negligible character shortening at 40wpm in both full and semi break-in modes. No first character shortening or overshoot at low powers was observed, a good clean result. AM transmit was clean with low distortion. Transmit/receive switching times are acceptable with adequate sequencing to allow linear switching. The delay is adjustable via the menu.

Transmit noise appears to be an issue with more and more radios these days. Although the close-in noise is fairly typical, a lower level would be desirable. However, the wideband noise plateaus at a rather high level, likely to be a problem with co-sited multiband operations such as special events, DXpeditions and multi-transmitter contest stations unless extra filters are used. The noise plateau predominates at greater than 5kHz spacing from the transmit signal and is independent of transmit power even with zero RF output. This suggests it is due to amplifier noise, whereas close-in it is due to noise from the frequency synthesiser.

ON THE AIR PERFORMANCE. I checked out the radio under a variety of conditions including a spell of activity in the CQWW SSB contest. It performed very well; I could find little to fault. It coped well with crowded conditions and with weak signals on bands such as 50MHz. The audio quality was good, broadcast AM performance was good and LF reception was clean with no spurii or strange noises. The filters and notches functioned well and settings are clearly indicated on the display. I did not experience situations where phase noise was a problem.

The controls are well proportioned and laid out, generally easy to use with good ergonomics and the clear information-packed display is one of the radio's key benefits. However, some functions require display navigation or menu access, which requires multiple button presses, but to be fair these are generally the functions that need less frequent access. There are exceptions such as power setting already mentioned and digital noise reduction. DNR is a function that always needs level tweaking and doing this via the menu is very cumbersome. Menu scrolling is quite fast but the highlighted line is not particularly clear and would benefit from attention in a future software upgrade. It is also necessary to press the SELECT key before and after making changes. This is often forgotten and the new settings are then not stored.

Split frequency operation in DX pileups using TXW to search for a transmit frequency and the use of twin VFOs was straightforward and nearly as good as using twin receivers.

The RTTY and PSK decoders worked well enough but are very limited in their display capacity and the tuning indicators are very small. Although basic rubber stamp QSOs are possible, external controllers will invariably be used. The CW decoder I found very critical and only really functioned on computer sent messages with timing exactly right. The spectrum display can be helpful but is really rather small and limited in terms of sensitivity and resolution.

On transmit, the audio sounded good and reports were favourable. The CW break-in characteristic was clean although there was a slight thump on the return back to receive.

CONCLUSIONS. The FTDx3000 is a good all-round mid range radio. Generally easy to use and with a good overall performance, it is priced at around £2399.

ACKNOWLEDGEMENTS. I would like to express my gratitude to Yaesu UK for the loan of this radio.

Yaesu FTDX3000 Measured Performance

Receiver measurements

	SENSITIVITY SSB 10dBs+n:n			INPUT FOR S9		
FREQUENCY	IPO	PREAMP 1	PREAMP 2	IPO	PREAMP 1	PREAMP 2
1.8MHz	0.45μV (-114dBm)	0.11μV (-126dBm)	0.09μV (-128dBm)	125μV	32μV	13μV
3.5MHz	0.5μV (-113dBm)	0.13μV (-125dBm)	0.1μV (-127dBm)	110μV	28μV	11μV
7MHz	0.45μV (-114dBm)	0.11μV (-126dBm)	0.09μV (-128dBm)	110μV	28μV	11μV
10MHz	0.5μV (-113dBm)	0.13μV (-125dBm)	0.1μV (-127dBm)	125μV	32μV	13μV
14MHz	0.5μV (-113dBm)	0.13μV (-125dBm)	0.09μV (-128dBm)	125μV	32μV	13μV
18MHz	0.56μV (-112dBm)	0.14μV (-124dBm)	0.11μV (-126dBm)	125μV	32μV	13μV
21MHz	0.56μV (-112dBm)	0.14μV (-124dBm)	0.11μV (-126dBm)	125μV	32μV	13μV
24MHz	0.63μV (-111dBm)	0.16μV (-123dBm)	0.13μV (-125dBm)	125μV	32μV	13μV
28MHz	0.7μV (-110dBm)	0.18μV (-122dBm)	0.11μV (-126dBm)	125μV	32μV	13μV
50MHz	0.5μV (-113dBm)	0.13μV (-125dBm)	0.1μV (-127dBm)	90μV	22μV	10μV

AM sensitivity (28MHz) Preamp1: 1.0μV for 10dBs+n:n at 30% mod depth
FM sensitivity (28MHz) Preamp 1: 0.3μV for 12dB SINAD 3kHz pk deviation

AGC threshold Preamp1: 1.4μV
100dB above AGC threshold for <1dB audio output increase
AGC attack time: approx 1ms

AGC decay time: approx as specified
Max audio at 1% distortion: 2.1W into 4 ohm
Inband intermodulation products: -50dB at S9+20dB or less

S-READING (7MHz)	PREAMP 1
S1	2.2μV
S3	4μV
S5	7μV
S7	14μV
S9	28μV
S9+20	280μV
S9+40	2.8mV
S9+60	18mV

	BANDWIDTH			
BANDWIDTH/ROOF SET TO	SHARP -6dB	SHARP -60dB	SOFT -6dB	SOFT -60dB
2.4kHz/3kHz roof				
Steep	2542Hz	3487Hz	2396Hz	3343Hz
Medium	2591Hz	3630Hz	2376Hz	3602Hz
Gentle	2706Hz	4027Hz	2341Hz	4101Hz
500Hz/600Hz roof				
Steep	525Hz	740Hz	497Hz	786Hz
Medium	534Hz	849Hz	492Hz	816Hz
Gentle	552Hz	948Hz	488Hz	959Hz

INTERMODULATION (50kHz TONE SPACING) 2400Hz bandwidth 3kHz roof USB

	IPO		PREAMP 1		PREAMP 2	
Frequency	3rd order intercept	2 tone dynamic range	3rd order intercept	2 tone dynamic range	3rd order intercept	2 tone dynamic range
1.8MHz	+30dBm	103dB	+20dBm	104dB	+12dBm	100dB
3.5MHz	+37dBm	107dB	+25dBm	107dB	+17dBm	103dB
7MHz	+37dBm	107dB	+25dBm	107dB	+16dBm	103dB
14MHz	+36dBm	106dB	+24dBm	106dB	+16dBm	103dB
21MHz	+36dBm	105dB	+24dBm	105dB	+15dBm	101dB
28MHz	+38dBm	105dB	+26.5dBm	106dB	+18dBm	103dB
50MHz	+31dBm	103dB	+18dBm	103dB	+14dBm	101dB

CLOSE-IN INTERMODULATION ON 7MHz BAND 500Hz bandwidth CW IPO

	6kHz ROOFING		3kHz ROOFING		600Hz ROOFING		300Hz ROOFING	
Spacing	3rd order intercept	2 tone dyn range	3rd order intercept	2 tone dyn range	3rd order intercept	2 tone dyn range	3rd order intercept	2 tone dyn range
1kHz	-18dBm	73dB	-15dBm	76dB	noise	noise	noise	noise
2kHz	-17dBm	74dB	-5dBm	82dB	+23.5dBm	102dB	+37dBm	111dB
3kHz	-15dBm	75dB	+10dBm	93dB	+29.5dBm	106dB	+37dBm	111dB
5kHz	-6.5dBm	81dB	+20dBm	99dB	+37dBm	111dB	+37dBm	111dB
10kHz	+20dBm	99dB	+30dBm	106dB	+37dBm	111dB	+37dBm	111dB
20kHz	+37dBm	110dB	+36dBm	110dB	+37dBm	111dB	+37dBm	111dB
50kHz	+37dBm	110dB	+36dBm	110dB	+37dBm	111dB	+37dBm	111dB

FREQUENCY OFFSET	RECIPROCAL MIXING DYNAMIC RANGE 500Hz BW 7MHz	21MHz	TRANSMIT NOISE 7MHz 100W O/P
1kHz	78dB (-105dBC/Hz)	not meas	-98dBC/Hz
2kHz	87dB (-114dBC/Hz)	81dB (-108dBC/Hz)	-108dBC/Hz
3kHz	92dB (-119dBC/Hz)	87dB (-114dBC/Hz)	-113dBC/Hz
5kHz	98dB (-125dBC/Hz)	94dB (-121dBC/Hz)	-117dBC/Hz
10kHz	104dB (-131dBC/Hz)	101dB (-128dBC/Hz)	-118dBC/Hz
15kHz	108dB (-135dBC/Hz)	104dB (-131dBC/Hz)	-118dBC/Hz
20kHz	110dB (-137dBC/Hz)	107dB (-134dBC/Hz)	-118dBC/Hz
30kHz	112dB (-139dBC/Hz)	110dB (-137dBC/Hz)	-118dBC/Hz
50kHz	113dB (-140dBC/Hz)	112dB (-139dBC/Hz)	-118dBC/Hz
100kHz	114dB (-141dBC/Hz)	114dB (-141dBC/Hz)	-118dBC/Hz
200kHz	114dB (-141dBC/Hz)	115dB (-142dBC/Hz)	-118dBC/Hz

Transmitter measurements

FREQUENCY	CW POWER OUTPUT	HARMONICS	INTERMODULATION PRODUCTS 3rd order	5th order
1.8 Hz	103W	-65dB	-30dB	-43dB
3.5MHz	105W	-65dB	-33dB	-44dB
7MHz	104W	<-75dB	-35dB	-40dB
10MHz	105W	<-75dB	-38dB	-40dB
14MHz	105W	-72dB	-26dB	-40dB
18MHz	106W	-67dB	-40dB	-40dB
21MHz	106W	<-75dB	-40dB	-40dB
24MHz	105W	-70dB	-31dB	-34dB
28MHz	105W	<-75dB	-20dB	-33dB
50MHz	104W	-68dB	-28dB	-43dB

Intermodulation product levels are quoted with respect to PEP.

Microphone input sensitivity: 0.5mV for full output
FM deviation: 2.5kHz narrow / 8kHz wide
Data Mode SSB T/R switch speed: mute-Tx 36ms, Tx-mute 3ms, mute-Rx 35ms, Rx-mute 1ms

NOTE:
All signal input voltages given as PD across antenna terminal. Unless stated otherwise, all measurements made on USB with receiver preamp switched out (IPO), 2.4kHz IF bandwidth and 3kHz roofing filter.

January 2014 • RadCom
Eamon Skelton, EI9GQ • e-mail: hbradio@eircom.net

Homebrew

IF filters for the LF/MF transceiver project

TRANSCEIVER ARCHITECTURE. The new LF/MF rig will be a superhet transceiver of fairly conventional design. The basic architecture will be an up-conversion type with RF coverage from LF to around 4MHz and an IF in the 10MHz range. The main selectivity will be provided by crystal IF filters. The up-conversion scheme offers some flexibility in the choice of IF. The large difference between the RF and IF frequencies makes this arrangement relatively immune to the most common causes of spurious responses such as IF breakthrough and unwanted IF image signals.

I will be using a home made crystal filter with a centre frequency just below 10MHz. As the choice of IF is not particularly critical, it should be possible to use any desired IF in the 9-12MHz range. Either home made or commercially made filters can be used. Surplus IF filters are sometimes available with centre frequencies of 9MHz, 9.785MHz or 10.7MHz. Home made filters are often built using standard off-the-shelf crystal frequencies like 10MHz, 10.24MHz or 12MHz.

The IF filter is one of the key components in a superhet receiver or transmitter. In most designs, receive selectivity, opposite sideband suppression and the bandwidth (BW) of transmitted signals are almost entirely determined by the performance of the IF filter. Several different types of IF filter are commonly used. Older broadcast radio and television receivers used conventional LC tuned circuits to achieve IF selectivity. In many cases, adequate selectivity could only be achieved by using a cascade of several tuned amplifiers. The modern trend is to place most of or all of the IF selectivity in a single block. This effectively separates the functions of the IF filter and the IF amplifier. A modern IF filter will consist of a metal or plastic package that contains several resonators. There are several types of resonator in common use. These include quartz crystals, ceramic resonators and electro-mechanical resonators. Of these, the quartz crystal filter is most commonly used in high performance filters for narrow bandwidth modes like SSB and CW.

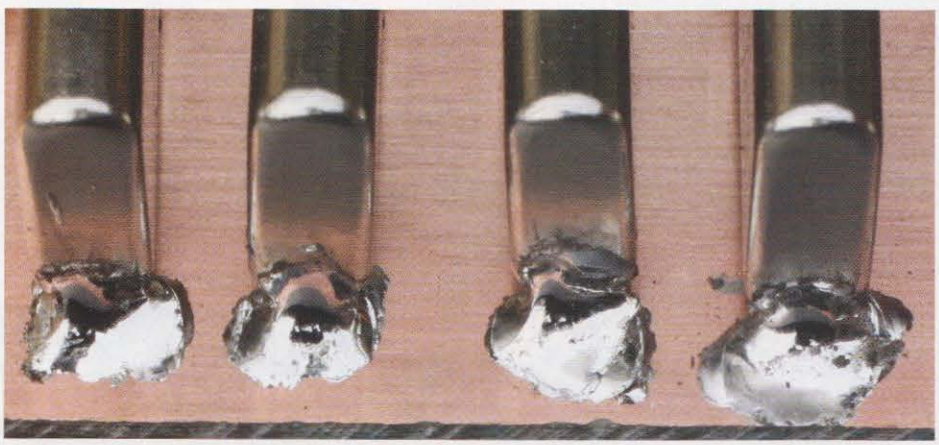


PHOTO 1: How the crystals were soldered to the PCB to reduce strays.

THE CRYSTAL LADDER FILTER. There are a vast number of different filter configurations. For RF band pass filters (BPF), the most common types are based on LC resonators that are wired as either parallel or series resonant circuits. For each type, there are several possible arrangements for inter-resonator and I/O coupling. Perhaps the most common arrangement is based on parallel resonant LC circuits with series capacitive coupling between each resonator. Many of the BPFs from our previous projects have used this configuration. It is also possible to use series resonant circuits with shunt capacitive coupling between each resonator as shown in **Figure 1**. As a general rule, the value of the shunt coupling capacitors (Ck) will be large compared to the capacitors in the resonators. Bandwicth and I/O impedance are inversely proportional to the value of the shunt capacitors.

Quartz crystals tend to behave like a series resonant LC circuit. **Figure 2** shows a simplified model of a crystal. Lm is motional inductance and Cm is motional capacitance. These are equivalent to L and C in a conventional LC circuit. Crystals can have very high Q values and very extreme values for Lm and particularly for Cm, which is usually measured in fF (femtofarads, thousandths of a picofarad). The lower part of Figure 2 shows a more accurate model of a crystal that includes loss resistance Rm and the parallel capacitance of the capacitor mounting plates Cp.

The crystal ladder filter is the most popular configuration for home made IF filters. One big advantage of the crystal ladder filter is that it is possible to make complex filters using several identical crystals. This makes it much easier to source suitable crystals. Batches of identical crystals are readily available from many sources. However, you shouldn't take it for granted that all of the crystals in a batch will be absolutely identical. Even when the crystals are from the same manufacturing batch and are all marked with the same frequency, there may be significant variations between them. Although it is a time-consuming and tedious job, it is well worth the time and effort to measure and sort your crystals carefully before you start building the filter. The crystals should be sorted into groups that are closely matched for resonant frequency. Any crystals with frequencies well removed from the average may be used in the USB/LSB

PHOTO 2: The completed 8th order SSB filter.

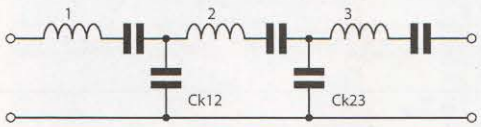


FIGURE 1: Series resonant filter circuit using shunt capacitive coupling between resonators.

carrier oscillators where the frequency offset may actually be an advantage. If possible, it is a good idea to calculate Lm and Cm values for each individual crystal. Even crystals with the same resonant frequency may have quite different parameters, particularly with very cheap crystals typically used for CPU clock oscillators.

There are several methods of measuring and calculating crystal motional parameters. The G3UUR method uses a frequency counter to measure the frequency of a crystal oscillator. Two measurements are performed, one with a capacitor of known value in series with the crystal, the other with this capacitor shorted out by a switch. The difference between these two frequencies gives an accurate indication of the crystal motional parameters. My test oscillator is shown in **Figure 3**. This oscillator was originally described in the February 2013 Homebrew. Cs is a 25pF silvered mica capacitor with a measured value of 25.4pF. The capacitor shorting switch is a pair of PCB header pins and a standard 0.1in jumper. This keeps stray reactances to an absolute minimum.

Dishal crystal filter design software was described in a *QEX* article **[1]** by Horst Steder, DJ6EV and Jack Hardcastle, G3JIR. *Dishal* offers a quick and easy way of calculating component values for several types of crystal ladder filter. It also has a few useful tools like a built-in calculator for the G3UUR method of crystal measurement. *Dishal* and a treasure trove of excellent crystal filter articles by G3JIR can be found on the Warrington Amateur Radio Club website **[2]**.

Whether they were home or commercially made, most of the SSB filters used in my previous projects have had an optimum input/output (I/O) impedance of several hundred ohms. The I/O impedance of a typical ladder filter tends to be proportional to bandwidth, ie narrow BW equals low impedance and calls for large shunt capacitor values. For narrow filter BW suitable for CW, it is usually quite easy to design a filter for I/O impedance of 50Ω. This is very convenient when it comes to testing the filter or when interfacing it with other stages in a construction project. As it was not practical to design a 50Ω SSB filter, I decided to design the CW filter for 50Ω I/O and the SSB filter for 200Ω I/O so that it can easily be interfaced to 50Ω using simple 1:4 matching transformers, as shown in **Figure 4**.

I used the test oscillator to measure a batch of 100 10MHz crystals that were bought on eBay for just £1, or a penny per crystal. These turned out to be very good quality crystals with high Q and low loss resistance. The parameters calculated by *Dishal* were used to design an 8th order SSB filter with a 3dB bandwidth of 3kHz. I have learned from experience that real world filters usually end up having a slightly narrower bandwidth than the more ideal square-shouldered filters seen in computer simulations. A few minutes tinkering with *Dishal* allowed me to fine tune the design for an I/O impedance of 200Ω by making small adjustments to the passband ripple figure. For BW=3kHz and ripple=0.428dB, the optimum I/O impedance is exactly 200Ω. The schematic of the SSB filter is shown in **Figure 5**. A *QUCS* simulation of the filter is shown in **Figure 6**. It is not that difficult to create a *QUCS* model of a crystal filter, but it is slightly tedious because of the large number of components involved. My *QUCS* files are available to anyone that wishes to use them as a template for modelling their own filters. **Figure 7** shows my model of the SSB filter. Note that the component values are chosen to match my individual crystals. 10MHz crystals from another batch may have quite different characteristics so it will be necessary to measure them and calculate suitable component values using *Dishal*.

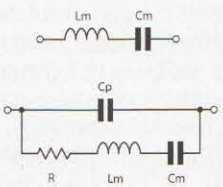


FIGURE 2: Simplified model of a crystal (see text).

CONSTRUCTION. The filters were built on a strip of PCB laminate. The top corner of each crystal was tinned with solder so that the crystals could be soldered directly to the PCB ground foil. **Photo 1** shows how the crystals are mounted. Soldering each crystal to ground reduces the possibility of unexpected behaviour due to stray capacitance between neighbouring crystals. This method of mounting also makes a mechanically strong and stable structure. The finished SSB filter is shown in **Photo 2**. The crystals were measured and carefully matched for resonance to within ±50Hz. This was easy to do with this particular batch of crystals. All capacitors are standard

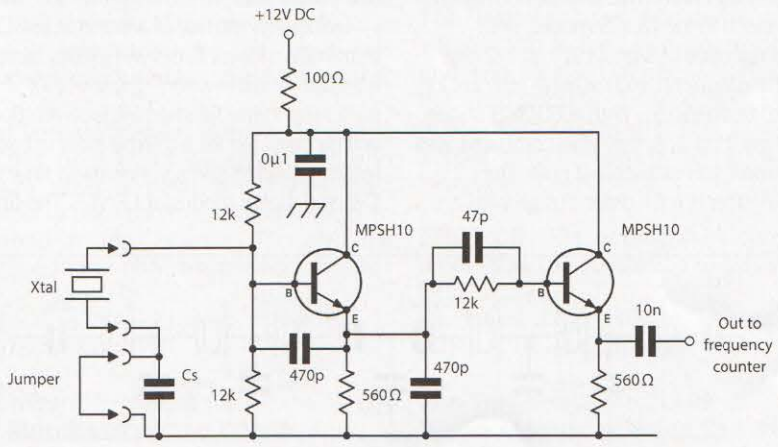


FIGURE 3: Crystal test oscillator circuit (from February 2013).

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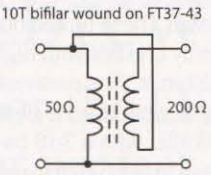

FIGURE 4: 4:1 transformer to match 200Ω SSB filter to 50Ω.

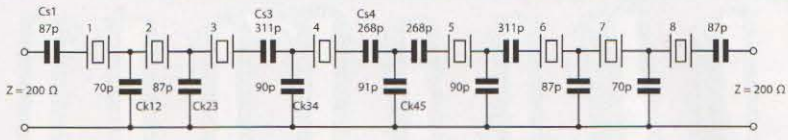

FIGURE 5: SSB filter circuit. The crystals should be a matched set for best performance (see text).

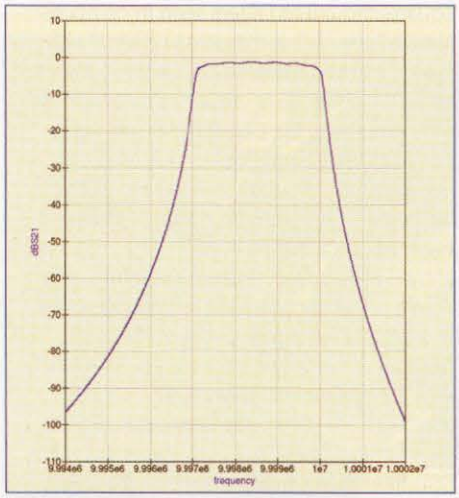

FIGURE 6: *QUCS* simulation of the SSB filter response.

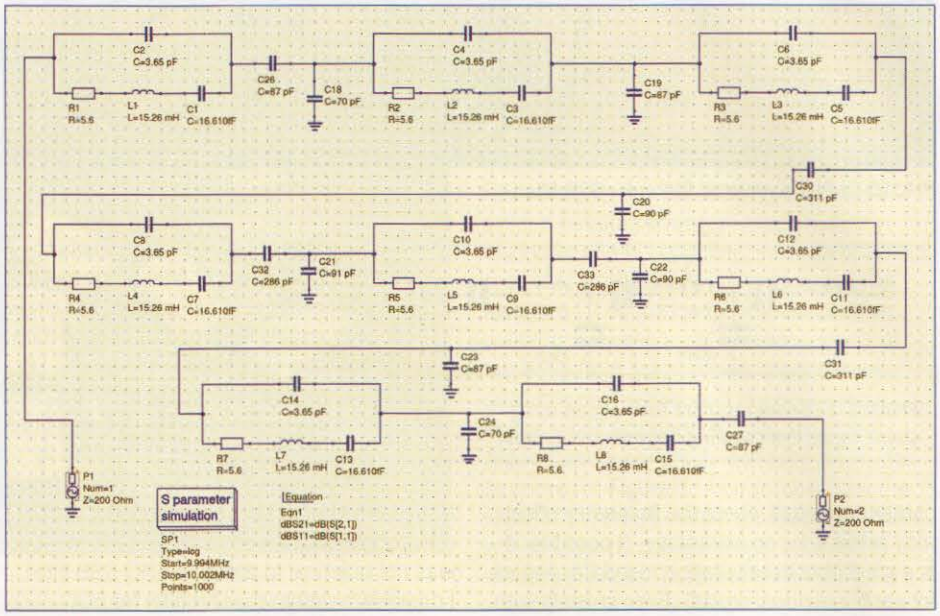

FIGURE 7: *QUCS* model of my SSB crystal filter.

disc ceramic types. Some were made from parallel pairs of standard value capacitors, eg 220pf+47pf = 267pf. Others values were achieved by hand-picking capacitors for values within their tolerance range, for example the 70pF shunt capacitors are 68pF devices that actually measured exactly 70pF.

TESTING. The SSB filter was tested using a pair of 1:4 transformers as described earlier. For the initial tests, I used a DDS based signal generator (Homebrew, March 2010) and a digital oscilloscope to measure filter bandwidth and loss. As expected, the -3dB BW was measured at just under 2.8kHz, which is less than the specified 3kHz. Ripple is less than 1dB across most of the passband. Insertion loss at the centre of the passband was a very respectable 3.25dB. The oscilloscope was replaced by a spectrum analyser to measure stopband attenuation. The filter performance was very close to the *QUCS* model, with 60-80dB rejection of signals at just 1-2kHz outside the passband and extreme attenuation at all other frequencies. With a 60/3dB shape factor of less than 1.8, this filter compares well with commercially available 8 pole filters.

The CW filter is a 6th order design with an I/O impedance of 50Ω, bandwidth of 728Hz and passband ripple of 0.2dB. As with the previous design, these values were 'tweaked' to achieve the desired 50Ω I/O impedance.

The filter schematic is shown in **Figure 8**. This approach worked very well for my two filters. However, there are alternative means of achieving the required I/O matching. *Dishal* has a tool for designing LC I/O matching networks for your crystal filters so that any arbitrary I/O impedance value can be matched to your external circuit. The performance of the CW filter is also close to the QUCS model (see **Figure 9**). Despite the smaller number of crystals, the narrower bandwidth (higher Q) of the CW filter leads to an insertion loss of around 5dB. This is tolerably close to the loss of the SSB filter.

Hopefully, the use of a standard 50Ω termination for all filters will greatly simplify filter bandwidth switching and Rx/Tx switching in the finished transceiver. Space will be provided for a third IF filter in case I feel the need to add a very narrow filter for CW and digital modes at LF/VLF. The finished project will also have some filtering in the audio stages.

Next month we will continue with the LF / MF transceiver project.

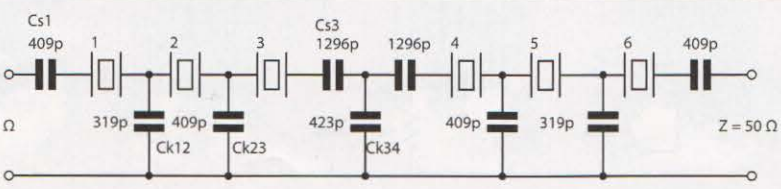

FIGURE 8: CW filter circuit diagram. Again, the crystals need to be closely matched.

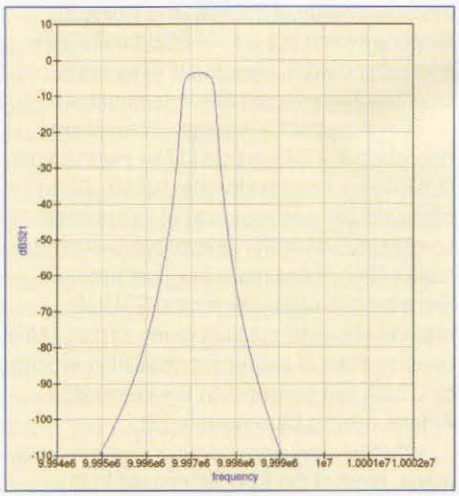

FIGURE 9: *QUCS* simulation of the CW filter response.

WEBSEARCH

[1] Crystal Ladder Filters for All, Horst Steder, DJ6EV and Jack A Hardcastle, G3JIR, *QEX* Nov-Dec 2009

[2] *Dishal* software and article archive: www.warc.org.uk/proj_xtalfilter.php

FURTHER READING

A Unified Approach to the Design of Crystal Ladder Filters, Wes Hayward, W7ZOI, *QST*, May 1982

Homebrew, *RadCom* March-April 2006

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Haynes Raspberry Pi Owners' Workshop Manual

A practical guide to the revolutionary small computer

By: Gray Girling

If you are not familiar with the Raspberry Pi computer, the *Haynes Raspberry Pi Manual* is the perfect introduction. The Raspberry Pi is a revolutionary, fully functioning small computer that can be purchased for a few pounds. Packed with possibilities this book provides a simple and straightforward guide to getting started with Raspberry Pi.

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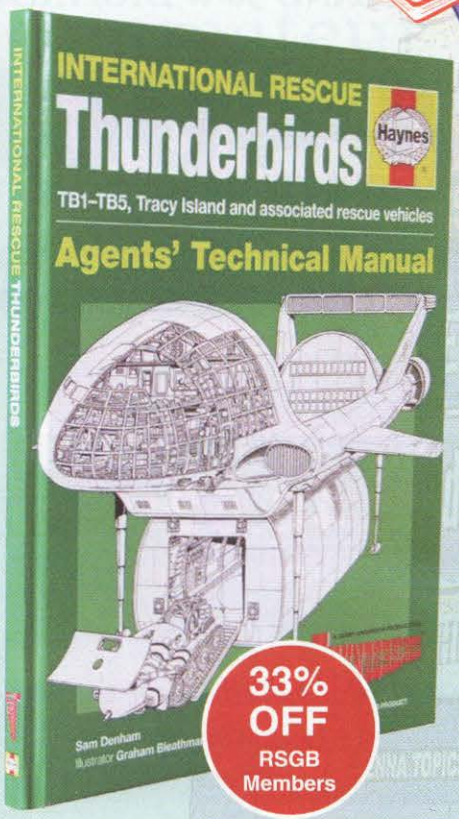

International Rescue Thunderbirds Haynes Manual

by Sam Denham

Those familiar with the traditional "Haynes Manual" will recognise that this Hardback book is an inventive, informative and entertaining guide to the world's foremost rescue organisation. For those who aren't familiar with the Haynes approach this book features cutaway drawings, detailed diagrams, colour illustrations and photographs of the Thunderbirds TV series. It provides the ultimate insight into the secrets of the fabulous International Rescue team, including in-depth examinations of the Thunderbirds craft and other vehicles.

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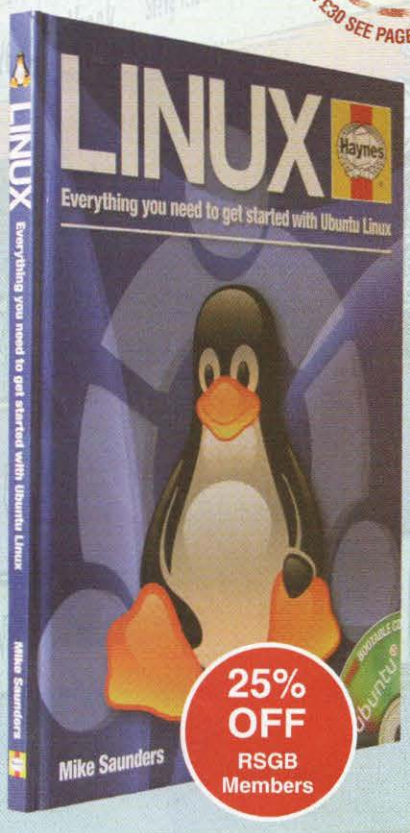

Haynes Linux Manual

Everything you need to get started with Ubuntu Linux

By: Mike Saunders

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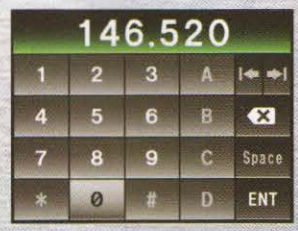

Frequency Direct Input Screen

Smart Navigation Screen

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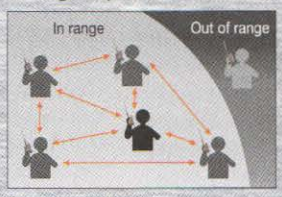
- Backtrack function that starts navigation facing a registered point.

Digital Group Monitor (GM) Function

- Automatically checks whether members registered to a group are within the communication range.



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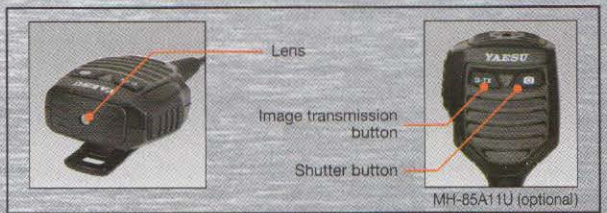

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One future for amateur radio?

Part one of an extrapolation on the after dinner talk given at the RSGB Centenary Celebration Dinner in July 2013

GENESIS. At the age of 11 years old, my introduction to the world of electronics and technology began with the construction of a Morse lamp and continued on to a thorough investigation of batteries, lights, switches, volts, amps and watts. Although I was relatively clueless, I was reasonably successful in getting things to work and rapidly migrated to a crystal set and spark transmitter. A period of trying to repair old radios was followed by stripping down of one chassis after another for valuable parts.

By the age of 15 I was exploiting WWII military surplus equipment purchased by the crate on the back of delivering daily newspapers. I had also learned Morse code, built a few crude transmitters, and gained the callsign G3RVC. More importantly, I was becoming 'green fingered', capable of repairing radios and TVs and was also employed in an electrical shop every Saturday. Here I worked for parts, for knowledge, wisdom, and the help of a kindly amateur of extended years.

I avidly read books and magazines on everything electronic, built hi-fi equipment, radio controlled aircraft, receivers and transmitters with whatever components came to hand. But I knew that I understood virtually nothing. So I enrolled at night school, got a job with the GPO Telephones (now BT) and entered industry without a single academic qualification. The next 5 years saw my understanding and skills accelerate as a qualified technician in telephone exchanges, repeater and microwave radio stations. I was also an amateur with ambitions to push the boundaries of what was possible.

At age 19 I decided to design and build my own hybrid transistor-valve HF SSB transceiver. As I recall the AF115/6/7 transistors had an f_t of ~120MHz, whilst the 6VC driver and 2 x QQV06-40A PA tubes were an engineering challenge. Did it all work? Oh yes! It was a masterpiece of ignorance and design plagiarism, and perhaps saw me at a peak of what I was capable of without a fuller education. But I moved up to 2m, built a couple of rigs and became increasingly frustrated at my lack of deep knowledge, test equipment, and the wasted hours getting the seemingly simple to work.

Almost by accident I stumbled into university having realised that my amateur apprenticeship was over and I needed to get professional, get deep into the technology, and grasp a fuller understanding. And so 5 years at Trent Polytechnic in Nottingham was followed by a further 5 years at Essex University studying engineering, telecommunications, digital transmission, optical and complex systems. During this time I was engaged by BT Labs at Martlesham Heath where I enjoyed an augmented and very different education designing circuits, systems and networks, building test equipment and writing software. I assumed increasing levels of responsibility and understanding to eventually leave in 2000 after being Head of Research and CTO.

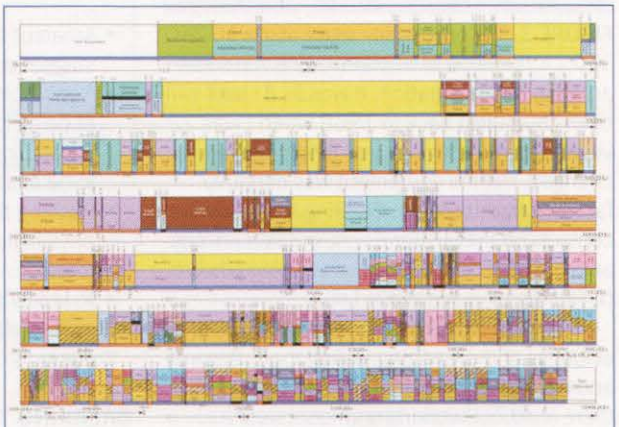

FIGURE 1: Ofcom frequency allocations for the UK.

Throughout all this I was educated, trained, nurtured and worked with some of the most brilliant minds on the planet distributed throughout the developed world and, as I progressed, I gained a wider view and a more holistic stance. In all of this, amateur radio was my springboard into knowledge, a career and an education that still goes on today. I have also found that this path, this training and my green fingeredness is also common to many of my peer group in industry. We came into the field playing and ended up as capable professionals, and the key element was curiosity, enquiry, experimentation, pushing the boundary of what might be possible, and daring to challenge established wisdoms and practices.

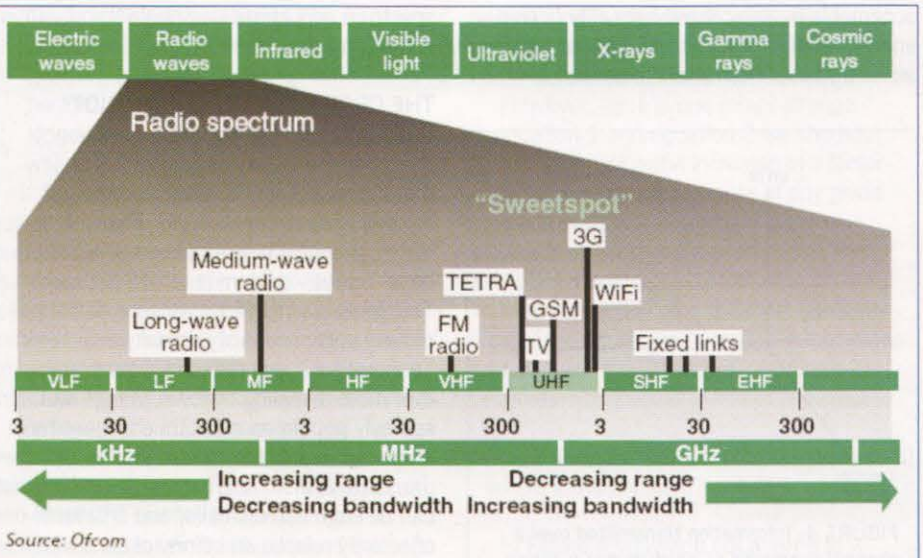

FIGURE 2: The mostly and unoccupied EM spectrum.

AWAKENING. At 22 years old I closed down my shack, sold and/or gave away everything to do with amateur radio. I needed to focus, I needed to concentrate. I was the kid in class with the worst possible education and was going to have to work hard. So I was out of the amateur world, possibly for good, but every few years I would look in on a friend, pick up a magazine, scan the bands and have a listen. Most recently I visited the RSGB National Radio Centre at Bletchley Park as a guest and after dinner speaker at the Centenary Dinner.

To say the least it was an interesting day and another increment in my perception of

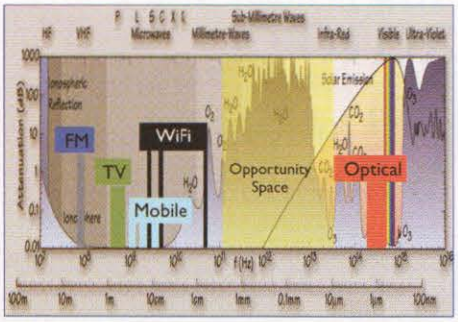

FIGURE 3: The opportunity space above 30GHz.

amateur radio migration. It was as if I had been catapulted back to 1968 when I was 22 years old. The activities and language hadn't changed, but the equipment was certainly far more sophisticated. Chatting to distant contacts on the HF bands using SSB and Yagi antenna. Yep, that's what I was doing when I pulled the plug and moved on.

Sadly, there was no 'homebrew' kit in evidence and everything looked manufactured and expensive, even the antennas. I know there are those working on moonbounce, satellite, ~60GHz, optical free space and new modulation and coding systems, because I meet them in the USA and UK, but they are very much in the minority. But even these groups appear to be on the 'back foot' compared to industry and academia, and worst of all they continue on the near-insane quest of getting more and more information into narrower and narrower bands over longer and longer distances. Haven't they heard that bandwidth is free and distance is now irrelevant?

Amateur radio has a wonderful and valuable history of innovation, exploration and leading the field. Daring to go where the professionals very often would not, but I would suggest that it has largely lost that thread and is being 'dumbed down' to no more than CB radio on afterburners. What does it now take to get an amateur licence? Technical understanding no longer seems to be necessary or indeed the Morse test. For sure buying expensive kit and talking to people in distant lands via whatever mechanism is fun, but there has to be more. The mobile phone, internet, VOIP and Skype actually provide far better and more reliable alternatives if that is all you want to do, and there is no mystery in HF, VHF, SHF, FM, DSB, SSB et al!

The membership of the amateur fraternity is getting visibly older fast and the hobby is failing to attract the young. If we lose the desire to explore, if we lose the young, it is only a matter of time before we lose the hobby and then we will have lost a potentially valuable training ground. Any place, space, and community where people can engage, play, learn and augment there education with practical experiences in areas hard to come by in academia and industry should be coveted. Alarmingly, I now meet newly graduated radio engineers who know nothing of Maxwell's equations, propagation, antennas, intermodulation distortion, or information theory. Their expertise lies in the direction of coding and protocols, and what lies below them in the technology stack is taken as a given. Someone else 'does' and understands the hardware – don't they?

So my central thesis for what you are about to read is as follows:

- Amateur radio is on a trajectory to total stagnation
- A valuable training ground is in danger of being lost
- The exploratory nature of the hobby has to be resurrected
- Pushing the boundary of what is physically possible is vital to the amateur future
- To boldly go where others have not been, or fear to go, is a fundamental amateur credo.

BREAKING THE STASIS. Telegraphy, telephony, broadcast radio and TV, microwave radio, satellite and digital systems have a development and migration path spanning >100 years that remains essentially analogue. Systems and network rationale still labours under the old thinking that bandwidth use should be minimised, distance is the ultimate challenge, connectivity and time are big commercial opportunities. Wrong on all counts! Even our digital systems look like their analogue forbears disguised by 2, 3, 4... 256... discrete signal states instead of a signal continuum.

So let's start by taking an entirely different perspective by pretending that there was no radio past and we only just discovered electromagnetic propagation. Would we invoke a 'band structure' to allocate channels and bandwidth limits? I think not! That technology sprang from the need to create acceptable degrees of orthogonality (signal energy separation if you will) around 1915 as we transited from spark to oscillator,

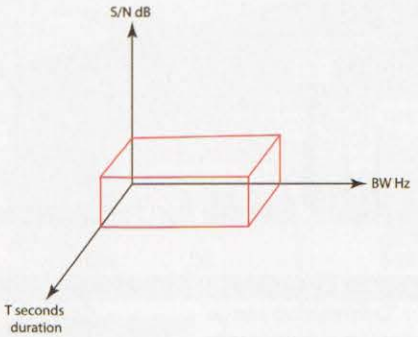

FIGURE 4: Information transmitted over a channel expressed as a volumetric function of S/N, BW and Time.

from Morse key to microphone, from wire to wireless.

What might we do instead? How about achieving signal separation by the use of codes? And how about spreading energy across the entire radio spectrum and operating under the thermal noise instead of concentrating energy in narrow bands with the subsequent interference, intermodulation and non-linear design problems? And how about using 'just enough energy to communicate' rather than 10, 100 or even 1000 fold more than absolutely necessary? Digital can do all this and much more if we abandon the old ways, the old thinking, and dare to embrace the new technologies, opportunities and thinking.

EXISTENCE THEOREM. In 1976 I attended a NATO workshop where INTELSAT revealed that they had noticed the noise floor on all their analogue satellite transponders progressively creeping up above the thermal and cosmic base level. Someone, or some organisation, was hijacking their satellites and communicating for free courtesy of their open 20MHz bandwidth transponder channels. They didn't know who, how, or where from! But a good guess would have been some government agency, using spread spectrum, for embassies and/or military purposes.

At the time, spread spectrum equipment and information coding systems demanded computing power that might consume a room. It had all been in use by the military since about 1947 and had remained on the 'secret list' for decades but, in 1979, it was in the open and being studied throughout academia. Today, spread spectrum is used for mobile phones and data communications on a routine basis, but it is confined to relatively narrow band (analogue bands) and a lot of the spread and capacity advantage is lost. In addition, the inevitable guard bands between operators, co-located devices and limited spectrum allocations don't help the situation either.

THE CROWDED SPECTRUM – NOT!
Looking at the FCC and Ofcom frequency allocations, it is very easy to gain the view that the radio spectrum is over used and bandwidth is in short supply, **Figure 1**. In reality, the most dense radio locations we have – cities – seldom reach 17% usage. The detail is amplified if we analyse 'bits moved' versus capacity actually available. Then we get a very different picture that is ever more revealing by town, village and sparsely populated areas. In short, we have an abundance of bandwidth that remains unused! We also have cellular structures that can be engineered smaller and smaller to effectively release an infinity of bandwidth.

Abandoning band and channel structure and moving to an 'available by energy density

model' would go a long way to solving this problem, especially when we add a cognitive and configuration programmable element too. The scale of the opportunity to hand is made obvious in **Figures 2** and **3**. But there is much more! The world has migrated from a few hundred big transmitters with thousand of receivers operating over vast distances to billions of transmitters operating over short distances spanning a few metres to a kilometre or two. For example; the last count I found that my household owned over 85 transmitters spanning car keys, remote controls, door bells, mobile, pads, laptops, Wi-Fi hubs, hearing aids and more.

Today, we have 6 billion people with mobile phones; around 4 billion with access to a PC and 2 billion with access to at least 2 or 3 mobile and computing devices. Then, of course, we have 'The Internet of Things' building fast with a forecast 50 – 200 billion devices expected to enter the market over the next decade and, of course, an ever expanding number of Cloud networks. The outcome over next decade or two is obvious – more and more signal space (bandwidth) will be demanded and short distance operations will dominate.

So it really is time for us to think and act differently. Where does amateur radio fit in, where will it be making a contribution and will it be able to hang on to valuable bands in a mobile and machine dominated future? In short; where is the value, the exploration and the contribution?

THE INFORMATION SPACE. At this point it is worth standing back and asking what it is we are actually trying to do, and I would posit the following:

- *"Our mission is the maximal exploitation of the Electromagnetic Spectrum to the advantage of Man and Machine for the purposes of communication, sensing, manipulation, and processing*
- *"And in doing this we should be prepared to exploit the 'spectrum space' to best advantage including performance, sustainability and longevity."*

In the arena of telecommunications, networking and information this boils down to enabling and supporting the maximal number of entities to communicate and work reliably with a given quality of service and minimum interference, at the lowest possible cost in terms of money, energy, time and materials.

Fortunately, our forebears include people like Claud E Shannon (American mathematician, engineer and cryptographer) and Ralph V L Hartley (engineer and electronics researcher), who derived the fundamentals of information theory during WWII. This culminated in a classic paper

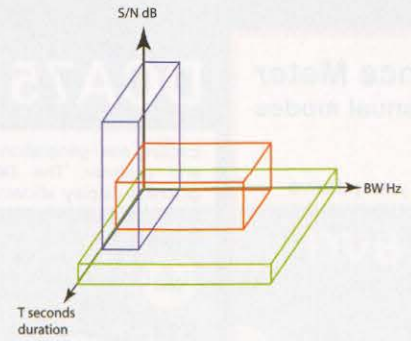

FIGURE 5: The same information transmitted over a channel in three different modes using S/N, BW and T and variable factors.

published by Shannon in 1948 whilst at Bell Labs where he used an entirely entropic descriptor. Here the upper bound capacity of any channel of a given bandwidth 'B' subject to additive noise power 'N' and signal power 'S' is given by:

$$C = B \log_2(1 + S/N) \qquad \text{(equation 1)}$$

where:

C = channel capacity in bit/s
B = bandwidth in Hz
S = average received signal power over the bandwidth in watts
N = average noise or interference power over the bandwidth in watts
S/N = linear signal to noise ratio or carrier to noise ratio for Gaussian noise

In any given time period the information transfer via the channel is simply stated as:

$$I = BT \log_2(1 + S/N) \qquad \text{(equation 2)}$$

It is worth noting that all this has since been extended way beyond the assumed Gaussian channels and white noise to include more general situations embracing all the known culprits of interference and channel/signal degradation. But for our purposes equation 2 is sufficient to communicate the principles of our argument.

However, there is one minor change to equation 1 and equation 2 we should, record, and that is the inclusion of a factor 'k' to account for the nuances of any given practical system – ie practical systems are never as good as the theoretical! The formulaic modification is trivial but a useful 'reminder of reality' and the most generally form of the equations quoted in publications and discussions. Therefore, (equation 2) becomes

$$C = B.T \log_2(1 + k.S/N) \qquad \text{(equation 3)}$$

where k is a constant.

In **Figure 4** we graph equation 3 to reveal its most important characteristics, but in doing so we have taken a number of justifiable engineering liberties. In order of operation we have:

1 Assumed that $k.S/N >> 1$ so $\log_2(1 + k.S/N) \sim \log_2(k.S/N)$
2 We have the applied a conversion from log base 2 to log base 10
3 We have then multiplied by 10 to achieve a dB descriptor
4 Finally, we apply a factor K to take care of the transformation above and the loss of k

Hence our approximation to equation 3 looks like this:

$$C \sim B.T.K.S/N_{dB} \qquad \text{(equation 4)}$$

Whilst this is a 'gross approximation and distortion of the truth' in the general case, and should be remembered as being such, it is a powerful way of understanding many of the basics we are trying to exercise on the journey of our general mission.

What we now see is information as a volumetric quality with axes B, T and K.S/N, and we can trade these quantities to advantage as depicted in **Figure 5**. This being the case opens the book on spread spectrum and the trade-off between the variables to hand. That is; we can drive down power by expending bandwidth and or time and vice versa.

For data transmission we enjoy the freedom of data speed up or slow down – ie 'T' is a variable, but for the real time communication of speech, vision or artificial reality etc, then time is real and option T cannot be easily exercised.

At this point we can contemplate turning the established norms upside down and instead of conserving bandwidth by trying to squeeze more and more information down narrower and narrower pipes (channels if you will), let's do the opposite. For example; human speech might be transmitted over a radio channel of 2.5kHz at a S/N of 30dB, but suppose we spread the speech energy over 25MHz? Then we would only need a S/N of 0dB. And should we spread over 2.5GHz, a S/N of -30dB would suffice. So we are now operating at or well under the thermal noise level and invisible to all other users.

We have now outlined the core of our argument. Bands and channels are man made and not the diktat of some deity or even fundamental to the laws of physics. It has all been a pure engineering convenience; we arrived here because it was all possible with the technology of the time. In Part 2 we will examine the technology and some of the understanding available today that says there is an alternative, a new and better way, and one in which the amateur radio fraternity not only need to engage, they have the opportunity to take a lead position, to bravely go where no...

ATV

70cm DATV

PHOTO 1. The DTX1 Encoder/modulator.

THE ATV DX BAND. Amateur TV started in the late 1940s on the 432MHz band. These analogue AM signals used a wide bandwidth and one transmission filled up the whole of 70cm. As the band became busier in the 1960s most ATV transmissions migrated to the 23cm and higher bands where more bandwidth is available. Modulation was changed to FM and a single channel used 16MHz of bandwidth.

During the 1990s the satellite broadcasters started using digital TV transmissions in DVB-S format and this led to the availability of surplus digital transmission equipment. DVB-S uses MPEG II video compression that considerably reduces the transmission bandwidth and it is possible to transmit a broadcast quality signal in a bandwidth of 2MHz or less.

So now it was possible to think about using the 430 to 440MHz 70cm band again. There is plenty of room for a 2MHz wide ATV transmission. The advantage of 70cm is that it is possible to cover greater distances as there is less attenuation from trees and other objects. Contacts over a 600km path are common during lift conditions. The modulation used is quadrature phase shift keying (QPSK) and it is possible to receive very weak signals using this mode. Contacts over a reasonably clear 100km path using less than 1W of transmitter power are not uncommon. As a comparison, it would be quite difficult to do this on SSB voice!

HOW TO TRANSMIT DIGITAL TV. One way is to find a surplus encoder/modulator from the broadcast industry, often available cheaply on eBay or directly from friends in the industry. Most of these will take a regular video input and generate an output on 70MHz. Some will tune up to 140MHz. To get on 70cm a frequency converter is required and conventional 70cm transverters are often modified for this purpose. The output of the transverter is then fed to the antenna via a power amplifier. PAs using FETs such as LDMOS are best because they have good linearity and generate less distortion and less out of band noise than many bipolar designs.

Another approach is to buy a purpose designed encoder/modulator. The output of these typically tune from 150MHz to 2GHz, therefore the output can be tuned directly to 437MHz. Because of the wide band nature of these devices it is advisable to feed the PA via a band pass filter. Prices vary from between £200 and £1000. Typical examples are the DTX1 (only available to BATC members) [1], AGAF and SR Systems products [2] and the Track Communications (G8YTZ) digital TV exciter [3].

Various amateur groups have developed encoder/modulators for home construction that are used with a computer for the video compression. The most popular are DigiLite and DATV Express. Parts for DigiLite are available from the BATC shop and further information on these can be found in the BATC Forum [4].

FUTURE DEVELOPMENTS. Alternative digital transmission systems have been developed and equipment is slowly becoming available. DVB-S2 is a more efficient satellite transmission system that squeezes more data into a given bandwidth. DVB-T is the system used for terrestrial broadcasting. The domestic version uses 8MHz of channel bandwidth, no good for amateur use, but narrow band versions are becoming available. These require special receivers. DVB-T is better at compensating for multipath and for mobile operation.

HOW TO RECEIVE DIGITAL ATV. The simplest way of receiving DVB-S transmissions is to use a free to air satellite receiver. These are available from a multitude of shops and sources on the web. Prices vary from £10 to £50. The BigSat Golden 1 receiver is currently a very popular mid-priced choice; search on the web for a good deal.

All these receivers tune from 950 to 2150MHz so a converter is required to change the 70cm input frequency to this band. Fortunately surplus converters are available from the cable television market for around £5 and they are also stocked by the BATC shop. In addition a decent Yagi antenna and mast head preamplifier are required. Because the 70cm band is so full of signals it is advisable to have a bandpass filter between the antenna and preamplifier.

PACKET IDENTIFIERS. Digital television is transmitted in a sequence of packets, just like packet radio but with more complex modulation methods. So one packet contains the video signal, another packet contains the audio signal, still more for teletext and/or subtitles if used and for receiver control. Each packet is identified by a packet identifier, PID, at the start of the packet. These PIDs are set up on the control panel of the transmitter. When a signal is stored in a receiver memory some receivers will only lock on to signals that have the same PIDs as the original signal that the receiver was tuned to. So to help overcome this problem the BATC proposes that we all use the same PIDs as follows:

- Video PID: 256 (all in decimal)
- Audio PID: 257
- PMT PID: 4095

The BigSat receivers and most ex-broadcast receivers do not have this problem and they will receive transmissions with any PIDs. On 70cm a symbol rate of 2 mega symbols per second or less is used. Forward error correction (FEC) ratio is not critical because most receivers will auto detect it.

70cm DATV can be great fun. If you are interested in amateur television I strongly recommend that you try it.

INTERNATIONAL SPACE STATION. The ISS 13cm digital ATV transmitter has now been installed on the *Columbus* module. Test transmissions are expected to start soon. The situation is rapidly changing and announcements are made at [5]. You will be able to watch the transmissions via the BATC streaming facility [6]. Select Members Streams and click on ISS1 to ISS5. The ISS can be tracked using a 1.2m dish and tracking equipment. If you plan to do this, please let me know to the e-mail address at the top of the page.

Finally, if you have any ATV questions or news please also e-mail me.

WEBSEARCH

[1] BATC DTX1: www.batc.org.uk/shop/
[2] www.von-info.ch/hb9afo/datv_e.htm
[3] http://g8ytz.com
[4] www.batc.org.uk/forum/
[5] http://amsat-uk.org/satellites/
[6] www.batc.tv

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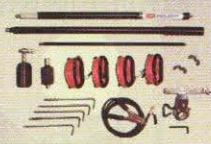

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The bhi 10W DESKTOP

A DSP noise cancellation loudspeaker

BACKGROUND. bhi Ltd has made quite a name for itself in the communications industry with its innovative noise cancelling DSP products that aim to remove unwanted background noise and interference from noisy communication channels. Founded in 2002, bhi now has a worldwide distribution network in 17 countries. It also offers a design service to help customers integrate its DSP noise cancellation technology into their own products. Products are manufactured in the UK and overseas under the ISO9001 quality standard and bhi's UK manufacturing facility in West Sussex has modern electronic assembly and tests areas with a fully-equipped machine shop.

LATEST PRODUCT. Its latest product is the 10 watt (peak) DESKTOP loudspeaker that promises to remove QRM, QRN, hiss, hash, noise and interference to leave clear speech.

The fitted digital signal processor (DSP) processes the incoming signal and differentiates speech from noise. The unwanted noise and interference is then attenuated to leave only the speech. The speaker will work with most radios, transceivers, receivers and SDR radios and comprises a four-inch bass driver and a one inch tweeter unit with an amplified bhi DSP noise cancelling unit. It has rotary controls on the side of the speaker that control both the volume and the level of noise cancellation or filter level.

It can be connected to a stereo line-level audio input signal, or to a standard speaker level audio signal from an extension speaker socket. There is also a 3.5mm headphone socket below the controls that can accept either a mono or stereo plug.

FEEDBACK. Graham Somerville at bhi told me that they listen to feedback from customers and as a result added the stereo line level input feature for more modern radios and receivers, like the SDR radios from Flex and the Elecraft KX3, which also has line level out. They actually did some work with a local amateur who helped with the design using his Flex-1500 SDR radio.

DETAIL. It comes with a 1.2 metre audio cable with a moulded 3.5mm jack plug for the speaker audio input, as well as a one metre 2.1mm fused DC power lead and a user manual.

The DESKTOP requires a 12 to 18 volt DC power supply and consumes 10mA on standby and 125mA when active (no signal). Peak current consumption is said to be 2.5A peak when used at full blast.

The audio output response is stated as being 50Hz to 4.3kHz and the volume control is stepped, rather than being continuous, offering 16 different levels. There are also eight levels of DSP noise reduction, plus an 'off' position, selected using a digital rotary encoder, just like the volume control. The manufacturers say that the speaker is mainly designed for speech signals and is not really suitable for music.

ON TEST. When I took the speaker out of its packing box, I was first struck with how meaty it is. It actually weighs in at 1.65kg and feels like a very sturdy unit. It actually makes a very attractive station accessory with its satin black finish. The unit is 200(h) x 150(d) x 160(w) mm in size and has a bracket that allows you to secure it to a wall or shelf. The hefty bracket actually acts as the third 'tripod' foot when the unit is standing upright.

So how do you use it? Once connected to the audio output socket of your radio and a suitable power supply you can turn it on. The LED behind the grille illuminates either green or red and turning the Volume control clockwise or anticlockwise will increase or decrease the volume level.

At the same time you will hear a low frequency audio 'blip' through the speaker when the volume control (which is mounted on the side) is turned, which will vary in volume as you rotate the volume level control knob. To turn the speaker on or off you just press the volume button. When switching back on the speaker will go to the last stored setting.

There are four volume level settings for the 'blips' – off, low, medium and high. The instructions explain how you can set these.

Pressing the Filter Level control knob switches the DSP noise cancelling filter on and off – a red LED indicates filter 'off', and a green LED filter 'on'. The filter level is changed by turning the filter level control knob clockwise or anticlockwise, with the eight different filter levels indicated by eight different frequency tones.

The lowest tone indicates the lowest filter level and the highest tone indicates the maximum filter level. The DESKTOP actually offers 9dB to 35dB of noise reduction and 4dB to 65dB of tone reduction.

It also has a built in sleep mode feature, whereby it goes into standby mode when there is no signal present after about one hour. In this mode, the speaker only draws a small amount of current (approx 10mA). The speaker is woken up if a signal is received.

It also has audio input overload protection for both the line level and speaker level inputs. If the signal peaks go over the limits set out in the specification, the LED will

change red and flash three times. If the audio level is constantly above the overload threshold, it will flash continuously.

IN USE. So how well does it work? I started off using the DESKTOP on 40m (7MHz) SSB with the DSP switched off. In this mode it worked very well as an extension speaker, outperforming my existing external speaker in terms of both the quality of the audio and the frequency response. It offers a nicely-rounded response with both rich mid tones and a touch of bass. If you are looking for a good amplified external speaker and work a lot of SSB then the speaker would be a good investment, even without the DSP. To be honest it made listening to SSB a pleasure.

But what about the DSP? Pressing the Filter Level button (ensuring that it was set to its lowest level) there was an immediate reduction in noise. I had to switch backwards and forwards between 'On' and 'Off' to confirm just how good this was. A 40m band noise 'roar' became a much more acceptable slight background sizzle. At this lowest setting there were no signs of any DSP artefacts.

Increasing the DSP to level three improved the signal to noise ratio even further without any sign of 'gurgling', often associated with DSP. At level 5 there was the beginning of some audio processing effects, but these were not intrusive at all. Levels seven and eight showed significant muffling, but it was nowhere near as bad as the DSP noise reduction fitted into my main radio, which always sounds like a bath emptying if the knob is rotated more than about 20 degrees!

I was interested to see how the unit fared when I plugged my headphones in (a 3.5mm stereo socket is provided on the side). Once again the DSP worked well – exactly the way it did with the main speaker.

The rear connectors on the bhi DESKTOP speaker.

At this point it struck me that the unit could appeal to contesters who may spend hours listening to a noisy band and to special event operators who need an amplified speaker for public demonstrations. On full volume it is much louder than a rig can manage on its own.

The DESKTOP is really optimised for SSB – using it on CW does reduce the noise, but can distort the signal. To be fair, bhi did not design the speaker with CW in mind.

A final test was to see how the speaker performed when listening to music on medium wave (many of our readers are also avid short wave listeners). With the DSP switched off it was an excellent monitor speaker – the DSP shouldn't really be used with music.

CONCLUSION. So, overall, I was pleasantly surprised by the bhi DESKTOP. I have sometimes been a little sceptical about DSP noise cancellation, but this really does reduce noise very effectively without any annoying and distracting DSP artefacts like gurgling and digital-like sounds, at least on levels one to four/five.

If you are a keen phone operator it would make a very useful and attractive shack accessory with the ability to use DSP via the headphone socket too.

The DESKTOP speaker costs £179.95 and is available from bhi at www.bhi-ltd.com, telephone 01444 870 333, or from any of its authorised dealers. My thanks to bhi for the loan of the speaker for this review.

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Sam Jewell, G4DDK • e-mail: jewell@btinternet.com

Getting started in high frequency SMT construction

There's no need to be concerned about surface mount technology

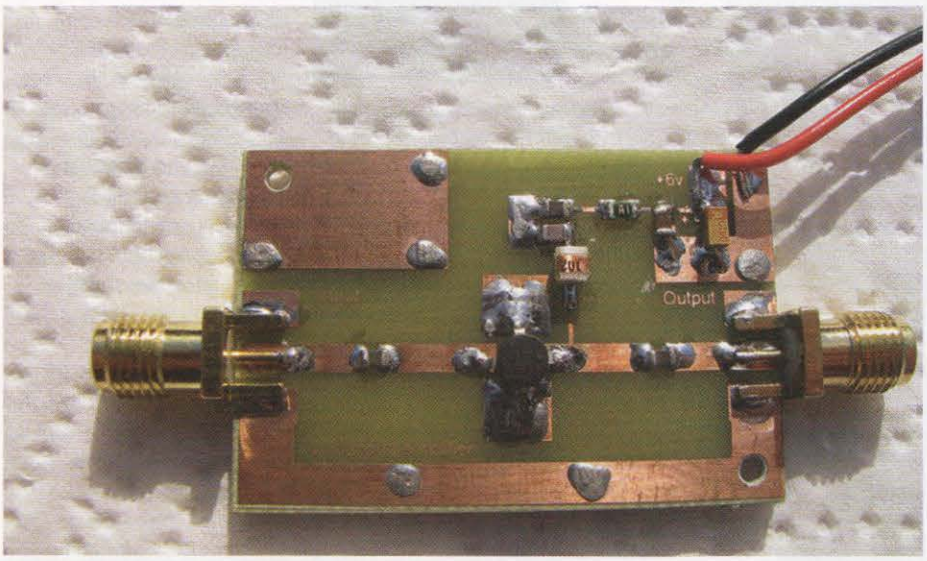

PHOTO 1: Prototype MAV-11BSM wideband amplifier.

INTRODUCTION. A wideband amplifier that covers from 10MHz to over 1GHz is a useful 'building block' for many HF and VHF projects. The amplifier has applications in receivers, transmitters and test equipment and, with a little thought, many other uses will become apparent. Some typical uses are listed at the end of the article.

Since the intention is to introduce readers to surface mount technology (SMT) for HF construction projects, the very smallest sizes of SMT parts (also known as SMD or surface mount devices) have been avoided and moderately sized 0805 components have been used. 0805 components (also known as 2012) are easy to work with using stainless steel tweezers and a soldering iron with a fine point. 0805 is the size of the component in 1/1000ths of an inch and 2012 is the metric equivalent – 2mm x 1.25mm. The latest SMT components are now so small (0.4 x 0.2mm) they can only be described as 'fairy dust' and really need specialist techniques to solder them onto a printed circuit board (PCB).

Traditional point to point tag strip and PCB with leaded component construction has largely been consigned to the past except for a few specialist areas. I don't think that any modern amateur radio equipment is now produced using anything other than SMT techniques. It makes sense for anyone starting out to build amateur radio HF circuit projects to now use a PCB and SMD components. In just a few years it may only be possible to buy SMD components, so now is a good time to start.

The PCB can use either SMA edge connectors as shown or short lengths (pigtails) of very flexible coaxial cable, with or without connectors, in order to get the signal into and out of the amplifier.

AN HF BROADBAND AMPLIFIER. In choosing a suitable HF project for this article care was taken to choose a circuit configuration that was easy to build, known to be reproducible and likely to prove useful around the shack. The design that was chosen uses a readily available bipolar transistor amplifier integrated circuit and off-the-shelf passive components. The PCB has been specially designed for this circuit but it could be used with a variety of other integrated circuit amplifiers if required. There is a complete kit available for those who are new to this type of technology, so you can build with confidence.

Whilst there are many integrated circuit RF amplifiers to choose from, the MAV-11 or MSA-11 is a proven device with excellent RF characteristics such as moderate noise figure and gain, wide bandwidth and high dynamic range.

It is packaged in a very amateur radio friendly format. That means it is easy to use. The four connections (in, out and two ground/common) are easy to solder to and you don't need any special soldering tools. The actual device used is the MAV-11BSM from Mini-Circuits UK [1]. This is an SMD

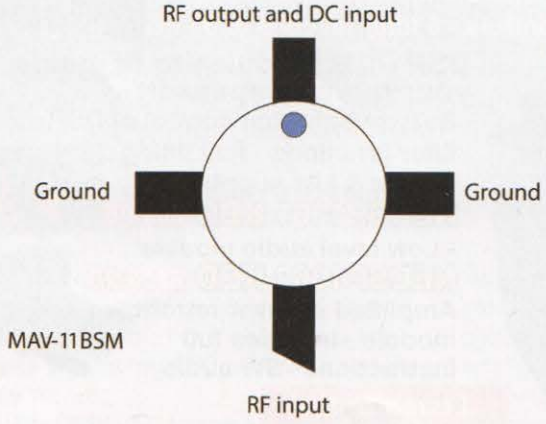

FIGURE 1: Pin out connections for the MAV-11BSM.

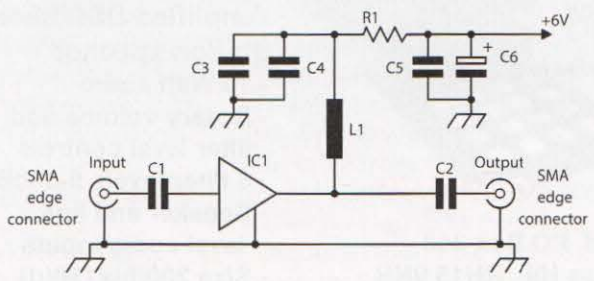

FIGURE 2: Schematic circuit diagram for the wideband amplifier.

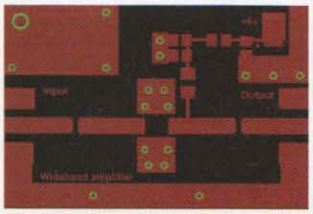

FIGURE 3: PCB mask for the wideband amplifier shown full size (40mm x 26mm).

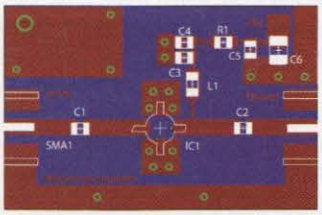

FIGURE 4: Component overlay for the wideband amplifier.

version of the MAV-11 and the package designation is RRR137.

The MAV-11 *amplifier* is powered from a 6V supply at a current of approximately 60mA. A higher supply voltage can be used but a larger value dropper resistor, or a voltage regulator, must be used. Other devices may require other supply voltages. **Table 1** shows the main parameters for the MAV-11BSM. On the face of it the device would not appear to be particularly suited to HF and the lower VHF bands. However, experience has shown that the MAV-11 series of devices do work well at HF and are quite stable below 50MHz in this circuit arrangement.

MAV-11BSM. The MAV11 is an integrated circuit wideband amplifier using a Darlington circuit configuration. This type of device is known as a MMIC or Monolithic Microwave Integrated Circuit. There are scores of MMIC types available, all at low to moderate cost, but the MAV-11 is particularly easy to use and is readily available. However, the supplier only guarantees this device from 50MHz to 1GHz. In practice it is perfectly useable as a gain device down to 10MHz and up to over 2GHz!

The pin out for the MAV-11BSM is shown in **Figure 1**.

CIRCUIT DESCRIPTION. The schematic circuit diagram of the described amplifier is shown in Figure 2. The MAV-11BSM is designated as IC1.

Table 2 is the associated component list for the wideband amplifier.

C1 and C2 are coupling capacitors. Their purpose is to block any external DC on the amplifier input or output from upsetting the internal bias of IC1. The value of these two capacitors is not critical but they should have a low capacitive reactance at the lowest amplifier operating frequency. As the amplifier has a nominal 50Ω input and output impedance C1 and C2 were chosen to be 10nF (10,000pF).

From

$$XC = 1/2 * \pi * F * c$$

The reactance of 10nF at 10MHz is just 1.6Ω. This is a good compromise value capacitor as higher value capacitors may have a self resonant frequency (SRF) below the lowest required frequency at which the amplifier is required to work. Self resonance may lead to unpredictable performance close to the self resonant frequency.

The supply voltage required by IC1 is +5.5V at 60mA. This is 'simply' applied to the output connection of IC1. But, if no further precautions were taken then the output signal from IC1 would simply disappear up the supply line and then to ground via C3 and C4, resulting in no output. This is prevented by inserting a small inductor (L1) in series with the supply to IC1. The inductive reactance of this inductor (also known as a choke) should ideally be several times larger than the output load impedance presented to the amplifier at the lowest amplifier operating frequency, if it is to have little effect on the output level. In this case the load impedance is 50Ω.

The chosen inductance value for L1 is 1μH (1000nH) and its inductive reactance is approximately 68Ω, given by

$$Xl = 2 * \pi * f * L$$

Ideally the reactance of the inductor should be greater than this but all inductors exhibit an SRF. The inter-winding capacitance of the inductor resonates with the inductance value to form a parallel resonant circuit. The impedance of this will be many times higher than the inductive capacitance and may lead to unwanted changes in the frequency response of the amplifier. It may also cause instability. The chosen inductor has an SRF of over 300MHz and hardly affects the frequency response.

Since the inductive reactance is comparable with the amplifier load impedance some signal will inevitably 'disappear' through L1. This must be returned to ground to ensure stable operation. C3 is chosen to have a low capacitive reactance at the lowest frequency of operation. A capacitor of 10nF between the top (supply end) of L1 to ground will present a reactance of 1.6Ω at 10MHz to the signal returning to ground. As this capacitor may well have a self resonance below the highest amplifier operating frequency a 100pF capacitor, C4, is connected across it to ensure a low capacitive reactance at the top end of the frequency range. There is nothing critical about these values and they could be varied by ±50% without any adverse effects on the circuit's operation.

The MAV-11BSM is rated at 5.5V for normal operation. A useful test facility can be built into the amplifier by adding a 10Ω resistor (R1) in series with L1. By measuring the voltage drop across R1 the current taken by the amplifier is easily measured without disturbing the RF operation of the circuit. 60mA flowing through 10Ω will give a voltage drop of 0.6V, reducing the voltage at the output of IC1 to 5.4V. There is also a small additional voltage drop across L1 due to its internal resistance. As this is less than 1Ω it can safely be ignored.

On the 6V supply side of R1 there are two more capacitors from the supply to common ground. C5 and C6 are chosen to ensure that any low frequency components of the input signal, finding their way through L1 and R1, are shunted to ground and do not enter the supply. In practice, the most likely source of these low frequency components is from intermodulation between two or more input signals with a small frequency separation, but with frequencies within the frequency range of the amplifier. This is an effective method of improving the amplifier's third order (and higher) intermodulation performance. Typical values here are 1μF and 10 to 100nF in parallel. Again, the values are not too critical. C6 is a tantalum capacitor and a small size A or B case has been chosen for this part. Its voltage rating should be 10V or

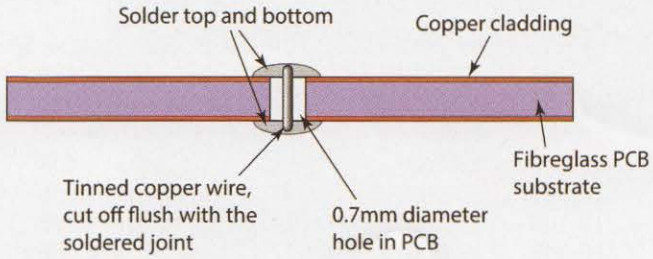

FIGURE 5: Through-board wires for grounding.

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greater. It must be soldered to the PCB with its positive (marked) end to the +6V input pad.

There is another component in the amplifier that has not yet been described. This is the PCB on which the amplifier is built.

PRINTED CIRCUIT BOARD. It is possible to make this amplifier without using a PCB, using direct point to point wiring. However you will quickly find that connecting SMD components together in this way can lead to reliability problems and it can be difficult to substitute components. Using a PCB is a much better way to build the circuit assembly.

A simple PCB has been designed specifically for this amplifier. The PCB is 40mm x 26mm and is etched on a 1.6mm thick fibreglass double sided PCB. The amplifier PCB mask is shown full size in **Figure 3**.

For HF construction a double sided or two layer (copper both sides of the board) PCB has many advantages. It will provide a good ground area for stability and screening and the circuit can be properly terminated using a feature of PCB called microstrip. Basically microstrip is a narrow strip of copper etched onto the upper surface of the board with a continuous area of copper below the strip, separated from it by the insulated board material. By carefully selecting the board material, thickness, copper thickness and width of the etched line any impedance from about 10Ω to over 100Ω can be fabricated. In this case we want to produce a 50Ω line. With 1.6mm thick fibreglass board and '1oz' (35μm thick) copper, a line width of 2.5mm will produce an impedance close to the desired 50Ω.

Breaks in the 50Ω transmission line are left so that C1 and C2 can be soldered into place. Likewise, IC1 is accommodated by leaving a gap where its input and output leads can be soldered. Pads and thinner tracks are left for interconnecting L1, C3, C4, R1, C5 and C6 as well as for the supply connection. Note the orientation of IC1. The index dot on the top of the package denotes the output. Not shown on the component overlay is that IC1 input lead has a 'slash' end.

Each component has a number of 'pads' on the PCB, where the component is soldered. Most of the pads are spaced for 0805 size parts, the exceptions are IC1, which uses the RRR137 pad layout, L1, which has been laid out for a 1008 size part and C6 which is laid out for an 'A' size tantalum capacitor package.

Figure 4 shows the component overlay for the amplifier.

It is important that a good electrical connection is made from the large area of copper ground-plane under the board to the pads where the ground connections to IC1 and the ground ends of C3, 4, 5,and 6 are to be connected. In a commercial PCB this would be done by using plated through hole (PTH) technology to ensure a very low inductance path. In an amateur made PCB this cannot easily be done so small diameter holes are drilled in the PCB and short lengths of tinned copper wire are inserted and then soldered on both sides of the PCB. So that the board still looks tidy it is usual to drill holes of about 0.6 to 0.8mm and no bigger, for this purpose.

CONSTRUCTION OF THE AMPLIFIER. A soldering iron with a fine bit should be used to solder the SMD parts to the PCB. Small diameter solder (leaded or unleaded – I still prefer leaded) of around 0.25 to 0.3mm diameter is a must. Larger diameter solder will make a mess of the PCB as it will be found to melt into 'blobs' that are larger than the components you are trying to solder!

A complete kit of the PCB and components is available from the RSGB shop [2] but if you have made your own PCB, start by drilling the holes (I used a 0.7mm drill bit at very high speed to achieve a clean cut) and then solder ground wires as shown in **Figure 5**. Do not use too much solder; just enough to cover the hole is sufficient. Cut off excess wire close the copper using a small pair of side cutters.

A useful tip is that if you use small diameter wires and don't use an excessive amount of solder then before any components are fitted to the board it can be squeezed gently between the aluminium jaws of your vice. This will cause the inevitable jagged wire ends to flatten slightly (don't tighten the vice too much) and it looks much cleaner.

Solder the small passive components (C1-6, L1 and R1) to the PCB followed by IC1. There are several techniques for soldering down SMD parts. My favourite technique, used over many years, is to first solder a *small* blob of solder to one of each of the component pads. Then, holding the SMD part gently in a pair of stainless steel tweezers, place the component and hold it flat whilst soldering down the end of the component to the pad with the solder blob. Then solder the other end of the component to its pad. You can always come back and lightly re-solder the first end, if needed. However, beware of the component 'tomb-stoning'. This is where it is not soldered flat to the board and when the soldering iron is removed, the meniscus layer of the hot solder drags one end of the component off the board. Make sure that the solder joint has solidified before letting go with the tweezers. It is not necessary, or usual, to glue the SMD to the PCB before soldering in this type of project.

Advice on solder, soldering irons and PCB manufacture is beyond the scope of

TABLE 1: Electrical specifications for the MAV-11BSM.

Parameter	Typical value	Units
Gain @ 100MHz	12.7	dB
Gain @ 1GHz	11.3	dB
Gain @ 2GHz	9.5	dB
Noise figure @ 1GHz	4.4	dB
Output power at 1dB compression @ 1GHz	+18dBm	

Mini-Circuits specifications for the MAV-11BSM at 25°C and 60mA Vcc =5.5V

TABLE 2: Component list for the wideband amplifier.

Component	Value	Package
IC1	MAV-11BSM	RRR137
R1	10Ω	0805 SMD
L1	1μH	080
C1, C2, C3,	10nF	0805
C4	100pF	0805
C5	100nF	0805
C6	1μF 10V Wkg Tantalum	CASE type 'A'
SMA1, SMA 2	SMA Edge connector	

TABLE 3: Results of measurements on the wideband amplifier.

Frequency	Gain	I/P Return loss	O/P Return loss	Noise figure	P1dB (+dBm)
10MHz	14.7dB	2.5dB	7.7dB	6.5dB	18
30MHz	13.8dB	9.8dB	19.1dB	3.9dB	18
50MHz	13dB	15dB	28.3dB	4.5dB	18
70MHz	12.7dB	18.2dB	31dB	4.4dB	18
144MHz	12.5dB	25.8dB	37dB	4.3dB	18
432MHz	12.1dB	27dB	24.3dB	4.2dB	18
1296MHz	10.3dB	12.8dB	17.4dB	4.5dB	18
2000MHz	8.5dB	11.9dB	37.8dB	not measured	not measured

this article.

If you are going to use SMA edge connectors, as specified and recommended, solder these into place next. Coaxial pigtails can also be used in lieu of connectors. If pigtails are used the ends of the pigtails should be prepared and soldered to the PCB with the braid soldered to the ground plane copper adjacent to the SMA connector position, with the coaxial cable inner soldered to the input and output tracks, respectively. Teflon™ (PTFE) cable is the best type to use for these coaxial leads as the dielectric will not melt and distort when heat is applied when soldering the braid to the copper ground plane.

TESTING THE COMPLETED AMPLIFIER.

Visually inspect your completed amplifier. If you have an eye loupe, closely examine each SMD solder joint. Re-solder if a bad joint is suspected. Having done that, *inspect it again*!

Connect a thin black insulated wire to the ground connection point on the topside of the PCB next to the output connector or pigtail. Connect a red insulated wire to the +6V pad on the top side of the PCB.

Connect a 6V supply. Do not exceed 6V. Check the voltage drop across R1. It should be approximately 0.6V if the amplifier is taking the correct current. If the voltage is significantly different you may have a fault and this should be found and rectified before progressing.

If all is well, turn the amplifier off and connect a receiver tuned to, say, 28 or 50MHz to the output and an antenna to the input. Turn the amplifier back on. **Do not key the transmitter on**. The receiver noise level should increase noticeably and any signals will be much stronger than they were previously. Of course if you have a lab full of test equipment you can do a more thorough set of tests.

A useful tip is to watch for C1 and C2 becoming accidently cracked during assembly, due to board flexing. In particular, if C1 cracks you will get an increase in noise level, as described, but only a very low level of signal will get through to IC1 to be amplified.

Table 3 shows the results of measurements on the prototype wideband amplifier.

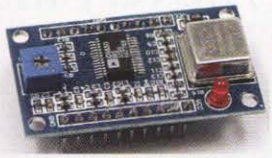
CONCLUSIONS.

This article has shown how you can build a simple broadband amplifier using SMT parts and a PCB, with a high degree of success.

WHAT TO DO WITH YOUR KIT.

A wideband gain block such as this HF amplifier has lots of uses in the shack so I'll run through a few of those here. Perhaps the most obvious is to use it as straight forward RF amplifier between the antenna and receiver to boost received signals. This can be very useful for simple receivers that may be lacking in sensitivity but beware of doing this to an already sensitive receiver as you may cause overload from out-of-band signals. This often shows as an increase in band noise but with the wanted signal staying the same or deteriorating when the amplifier is switched in. Despite this caution, used with care, some additional gain can be very useful for many receivers.

When building a homebrew transmitter, a wideband gain block can be really helpful to bring a weak VFO signal up to a more usable level. You could even cascade a couple of these amplifier where appropriate. The amplifier in this project is rated to provide up to 60mW (+18dBm) output, which is often plenty to drive the PA. For the experimenter, the gain block has many uses in the construction of test equipment. A lot of amateurs use the Analog Devices AD9850/1 direct digital synthesiser (DDS) modules at the heart of their test equipment.



These versatile, programmable oscillator modules can be bought for £3-£4 on eBay and work extremely well. The only snag is the low output level from the filtered sine wave output. One solution could be to use this HF amplifier to boost the signal to a more usable value. A similar problem arises when driving measurement bridges and the high output capabilities of this HF amp could be just what's required.

Some other uses include:

- Post mixer low noise, high dynamic range amplifier
- low noise HF preselector amplifier
- High dynamic range TV preamplifier (needs UHF filter for best results)
- Wideband amplifier to increase the sensitivity of an HF to UHF frequency counter
- Local oscillator amplifier
- Wideband amplifier for use with FUNcube Dongle receiver
- 'Trunk' amplifier for use with long coaxial cable runs to overcome cable loss.

REFERENCES

[1] www.minicircuits.com

[2] A complete kit of the PCB and components is available from www.rsgbshop.org. The price for Members is £16.99 and non Members £19.99.

January 2014 • RadCom
Peter Dodd, G3LDO • e-mail: g3ldo@o2.co.uk

Antennas

The very first antenna

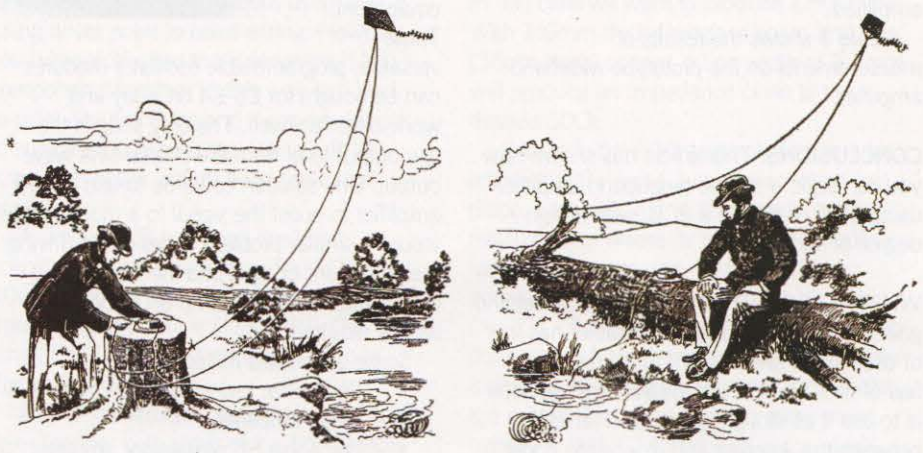


FIGURE 1: Copies of drawings, which appeared in the patent papers of Mahlon Loomis. Left, creating a spark by touching the static electricity charged kite wire to earth. Right, observing received electrical impulses using a galvanometer.

SK. The year 2013 was not a particularly happy one for me. Two close relatives passed away and two radio amateur friends became silent keys. One of these friends was Bert Weller, WD8KBW of Columbus, Ohio. We became known to each other because of a letter he wrote pointing out a couple of errors in an article I had written for *QEX* [1] and suggesting corrections. This resulted in Bert and myself becoming close friends resulting in 25 years of correspondence and a couple of visits to the USA.

Among this correspondence was a packet of information compiled by Joel T Corum, K1AON, regarding a Dr Mahlon Loomis. I had the pleasure of meeting Joel at Dayton (**Photo 1**) some years previously while researching his Toroidal Helix antenna patent [2].

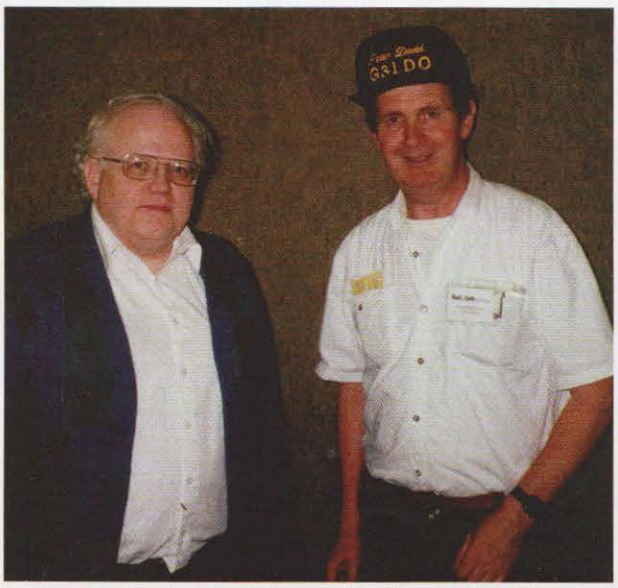


PHOTO 1: My meeting with Joel T Corum, K1AON at Dayton in 1994.

THE VERY FIRST ANTENNA. Dr Mahon Loomis was a dentist who lived in the USA between 1826 and 1886. He first became interested in electricity while attending a series of lectures in 1854 by Professor Joseph Lovering at Lowell Institute (now part of MIT) in Boston. By means of kites carrying metal wire, Loomis observed that electrical charges could be obtained from the atmosphere but was disappointed that this natural source of electricity would not replace batteries to power other electrical experiments as he had hoped. But what he did notice was that whenever a kite wire was sent aloft in one region the spark created when the wire was touched to earth could be detected using another kite wire and a galvanometer some distance away.

On Thursday 21 July 1864, Dr Loomis sketched and described the first complete aerial wireless communication system (**Figure 1**). It consisted of an elevated wire supported by a kite (which Loomis described as an 'aerial'), a spark gap keying arrangement, a receiving device and an earth connection.

The implications of this discovery were not lost on Dr Mahon Loomis and he realised that telegraphy without wires was a distinct possibility. After much experimental work at the expense of neglecting his family and dental practice, he gave a public demonstration of his telegraph without wires system.

In 1866 Loomis, in the presence of scientists, set up two stations on peaks in the Blue Ridge mountains of Virginia, some 17 miles apart and about 2,000ft high. From each station a kite was flown on a 600ft long copper wire. Each kite carried a 15in square of copper gauze connected to its wire, and earth connections were made by laying a coil of copper wire in wet ground.

The operators of each party were provided with telescopes so that each could sight the other's station. Three connections were made at the transmitting station at half-minute intervals, and the galvanometer needle at the receiving station was seen to deflect at these precise times. After an interval of 5 minutes, the procedure was reversed and duplicates of the signals were received at the former sending station. No telegraph key was used, the connections being made by hand.

There were some problems with the communication system on some occasions. It would only work if both kite wires were the same length and there were some days when the system would just not work at all. I guess that this inconsistency would be due to the varying electrostatic charge in the atmosphere and that the test would only work provided this electrostatic charge was substantial.

OFFICIAL SUPPORT. Letters Patent No 129971 were granted to Loomis on 30 July 1872 by the United States Patent Office. It bears the title "Improvements in Telegraphing". In his specification he claimed to use "natural electricity for signalling without wires by using the earth as one conductor and the continuous electrical element far above the earth's surface as the other".

Loomis seems to have had more than his share of ill fortune. In 1869 he succeeded in getting the backing of a group of Boston business men, but the great financial collapse known as 'Black Friday' ruined the venture.

Considerable government aid had been given to Samuel Morse and other line telegraph pioneers, and Loomis decided to apply to Congress for financial assistance. In 1873 a Bill was finally passed, incorporating Loomis Aerial Telegraph Company, and Loomis had asked for a grant of $50,000 in order to bring his system to a state of commercial viability, but this came to nothing. As a result he lived his final years in Terra Alta, West Virginia, a sad and forgotten man. He died there in 1886; his gravestone is shown in **Photo 2**.

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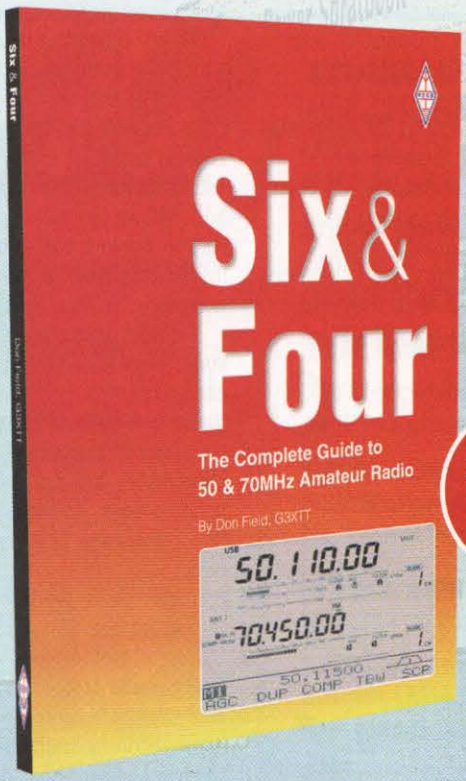

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Six & Four

The Complete Guide to 50 & 70MHz Amateur Radio

By Don Field, G3XTT

Six Metres (50MHz) – the 'Magic Band' – has always been 'different'. It sometimes behaves as an HF band, with world-wide propagation, but at other times acts more like a VHF band, enjoying the benefits of Sporadic - E, meteor scatter and other occasional propagation modes. Because it has so many facets, 6m is both a challenge and an enigma and it draws amateurs from both the VHF and HF worlds. Six & Four is the complete guide to this fascinating band and the similar Four Metre (70MHz) band.

Six & Four is based on the hugely popular 6 Metre Handbook, which is credited by some with doing much to popularise the 50MHz band. This book has moved on and is intended as a handbook for both the 6m and 4m bands. It includes a host of new material on the 4m band and the 6m material has been extensively rewritten to bring it fully up to date. There are details of the new equipment that has become available, especially by way of software-defined radios. There have also been some significant advances made in antenna design and EME ('moonbounce') activity has increased. There are new challenges, made possible by technological developments such as the WSJT and capabilities for remote operation have come on apace. And there are many ways to stay abreast of band openings and activity, through smart phones and other technologies. Six & Four covers all this and a lot besides.

Six & Four is essential, especially those who want to try something new and different. There's something for everyone, from the beginner who has never been on 6m or 4m, to those who might already have 200+ countries confirmed on 6m!

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January 2014 • RadCom
Peter Dodd, G3LDO • e-mail: g3ldo@o2.co.uk

EXPERIMENTAL VERIFICATION. Among the packet of information mentioned earlier and forwarded to me was a paper by Joel T Corum, K1AON, regarding Dr Loomis **[3]**. The second part of this paper was devoted to the 'Replication and Experimental Validation of Loomis's RF Discoveries'.

K1AON, with a team of helpers, carried out eight experimental tests, which were performed in 1992 at Thornton, New Hampshire. He used a large helium balloon to support 525ft of copper wire that was controlled using an insulated winch. The earth comprised a 6ft ground stake.

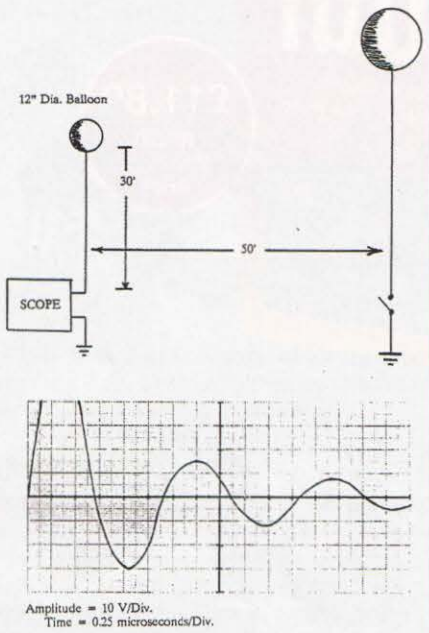

FIGURE 2: Observation of the radiated waveform. When the switch is tapped shut, the ringing signal is seen on the oscilloscope.

To my mind the most important test was the transmitted waveform. K1AON notes "For this test we flew a second 12in diameter balloon separated from the Loomis aerial by 50ft. We connected an oscilloscope to the base of the short aerial and, letting the atmospheric field charge up the Loomis transmitter, we keyed the transmitting aerial and watched the waveform on the scope".

Instead of the exponential discharge of static electricity that could reasonably have been expected, what was actually seen was a damped *sinusoidal* waveform.

K1AON comments, "The structure behaves as a Tesla coil after the primary spark breaks. There is an RF ring-up time (the coherence time) and an RF ring-down waveform. The ring-down period corresponds roughly to a 714kHz wave (the measured resonance of the aerial).

The waveform is shown as a sketch in **Figure 2**. Note that the initial pulse was several hundred volts in the first 0.2 microseconds, then died down as a well behaved exponential damped sinusoid".

POSTSCRIPT. This sending of signals without wires (wireless) was achieved before Marconi was born and many years before the classical experiments of Hertz. At that time electrical science was still in its infancy and knowledge was confined to academic circles where it could be understood. Clark Maxwell had just published his famous paper on the dynamical theory of the electro-magnetic field, postulating the existence of radio waves, but it is most unlikely that Loomis would have even heard of it. The events and dates shown in **Table 1** puts this in some perspective.

This month's column has been compiled mainly from documents listed below in References and Further Reading. A search on the internet for Mahlon Loomis will reveal very much more.

TABLE 1: Electrical chronology relevant to Loomis (from [2]).

1752	Benjamin Franklin proposes 'The Philadelphia Experiment', invents lightning rods, identifies + and - electricity, invents the parallel plate glass-dielectric capacitor, anticipates the 'ionosphere' and proposes drawing down 'electric fire' to power machines.
1800	Volta invents the primary battery.
1801	Young's experiments support Huygen's wave theory of light.
1819	Oersted discovers compass needles are deflected by current.
1820	Ampere invents solenoidal coil.
1826	**Loomis born**; Ohm's Law.
1831	Faraday and Henry discover electromagnetic induction.
1832	Morse creates a telegraph based on Henry's electromagnet.
1844	Morse demonstrates the electromagnetic telegraph to Congress.
1849	Fizeau measures speed of light.
1853	William Thompson (later Lord Kelvin) formulates and solves the second order differential equation for the oscillatory discharge of a capacitor through a spark gap into a lossy inductor (the classical underdamped RLC circuit).
1853-4	**Loomis attends electrical lectures at Lowell Institute.**
1864	**Loomis discovers wireless aerial telegraphy.**
1864	Maxwell predicts electromagnetic radiation.
1866	**Loomis demonstrates two-way wireless telegraphic communication over 17 mile path.**
1872	**Loomis 1872 Wireless Telegraphy Patent issues.**
1873	**Loomis Telegraph Act signed by President U S Grant**; Maxwell's treatise published.
1876	Bell invents telephone.
1878	**Loomis reports 2-way aerial telephony over a 20 mile path.**
1881	**Loomis addresses Franklin Institute on wireless aerial communication and atmospheric power**; Tesla arrives in US.
1886	**Loomis buried at Terra Alta, WV.**
1887	Hertz reports experiments verifying Maxwell's theory.

REFERENCES

[1] Measurement of Antenna Impedance, Dodd & Lloyd, *QEX*, November 1987

[2] The Toroidal Helix Antenna, TT, *Radio Communication*, October 1983

[3] *Dr Mahlon Loomis, Terra Alta's Neglected Discoverer of RF Communication*, Joel T Corum

FURTHER READING

The legendary Dr Mahon Loomis, The first radio amateur? R F Farley, G3SSK, *Radio Communication*, February 1985

A 100 page engineering report: http://nedyn.com/Symp2010_CORUM-12.pdf

A power point presentation (Philadelphia, 2010) http://nedyn.com/loomis/Franklin-Loomis-Tesla3.pdf

A presentation at for the AAPT (American Association of Physics Teachers, 2006): http://nedyn.com/aapt_loomis.html

Power Point Presentation presented at the AAPT Summer Meeting, Syracuse University, July 24, 2006 http://nedyn.com/loomis.ppt

A collection of Loomis references: http://nedyn.com/aapt_loomis.html

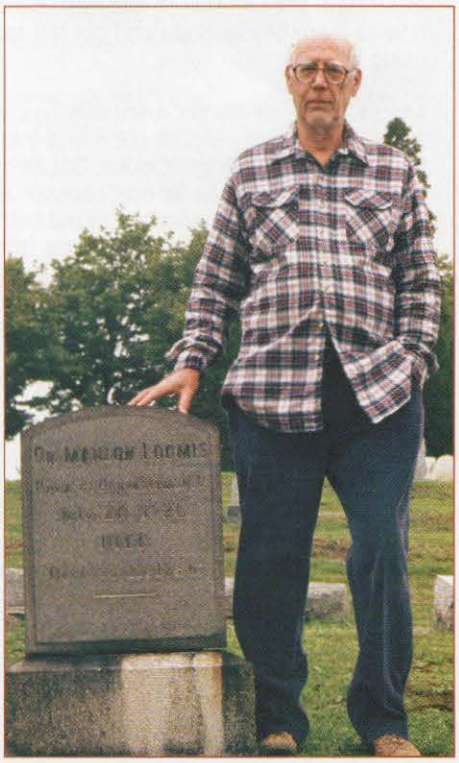

PHOTO 2: Bert Weller, WD8KBW, by the grave of Mahlon Loomis at Terra Alta, West Virginia. The headstone inscription, eroded by over 125 years of weather exposure, reads "Dr Mahlon Loomis, Born Oppenheim NY July 20, 1826 – Died October 13 1886".

Design Notes

Direct digital synthesis and high frequencies

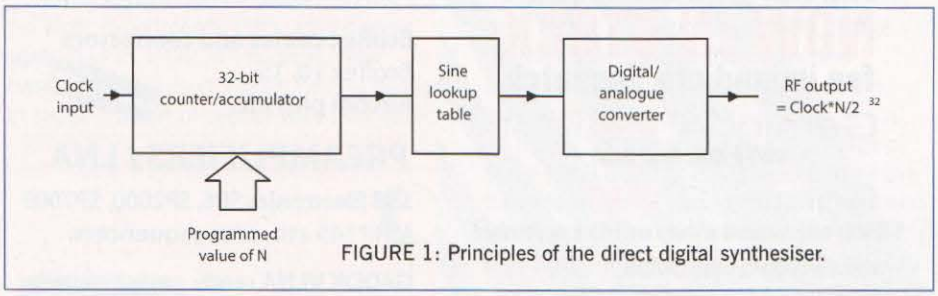

FIGURE 1: Principles of the direct digital synthesiser.

SIMPLE LOW POWER TRANSMITTER. Is there nothing those Raspberry Pi experimenters won't try their hand at? Basic details of using one of these low cost computers modules as a broadcast FM transmitter can be found at **[1]**. A clock signal at around 100MHz is wobbled in frequency to generate FM from audio fed in. At the moment it only uses 6-bit audio (so would sound a little 'rough'), but it's early days...

USING DDS DEVICES AT HIGH FREQUENCY. The direct digital synthesiser (DDS) is now ubiquitous in many amateur designs for providing a near-continuously tuneable frequency source in the HF to lower VHF region. The latest generation devices can be clocked at 1GHz so can generate RF with fine tuning resolution up to around 300MHz. These top-end chips are exotic and expensive but low cost DDS devices, such as the AD9850 module described in this column in February 2013, are readily available for use in the HF region. With a maximum clock input of 120MHz, RF can be generated at up to 40MHz. DDS operation has been described many times before, so we won't go into it here, but a basic DDS chip is summarised in **Figure 1**. The output frequency is given by $RF_{OUT} = F_{CLOCK} * N / 2^{32}$. This means that for a 120MHz input, the output can be set to a resolution of about 0.03Hz.

When we want to go higher in frequency it may be tempting to just pass the DDS output into a frequency multiplier chain as in **Figure 2** – after all, that is what we have done for years to generate stable UHF and microwave signals from crystal sources. The snag is that a DDS is not absolutely clean. It contains an unpredictable set of close-in sidebands and spurious signals. These may be separated by only a few kilohertz, or even just few hundreds or tens Hz from the wanted carrier. It all depends on the actual value of N for the desired output frequency. With the low cost AD9850 DDS they are guaranteed by design to be no worse than about 50dB down. (The more exotic ones offer -60 to -90dBc spurious levels). This level of spurii may be perfectly acceptable when the DDS is used at its fundamental, but problems come when we attempt to pass that through a frequency multiplier. When a frequency is multiplied up, any spurii present on the source go up in level as the square of the multiplication factor. So for a times 3 multiplication, those -50dBc spurii have gone up by 3 x 3 times, or nearly 10dB worse. If we wanted to generate, say, a 2.3GHz signal from a DDS operating at 36MHz, using an x64 multiplier, those -50dBc spurii will now have increased by $10.LOG(64^2) = 36dB$, for a resulting spurious level of -14dBc. Totally unacceptable! OK, so -50dBc may be a worst case but even if the input spurii are at -70dBc, the output level is still a rather poor -34dBc. And close-in spurii don't move further out due to the multiplication process, they just stay close in and increase in number due to intermodulation in the highly non linear multiplier stages. And -34dB is very audible on a strong signal.

In cases where the output frequency does not have to shift very far – such as when the DDS is used to generate frequency shift modulation, for example for one of the WSJT modes on a beacon signal – the DDS output change is over a narrow enough range that a crystal filter may be used to clean up and remove close-in spurii. However, we now have to choose a suitable frequency generated by the DDS where a filter can be made from crystals that are readily available and allows a feasible frequency multiplier. Then, to top that, the frequency generated by the DDS has to have close-in spurii that are far enough spaced away from the carrier to actually be removed by a crystal filter. Spacings of a few hundred Hz even up to a couple of kHz are still unacceptable.

A phase locked loop (PLL) multiplier on the DDS output as shown in **Figure 3** allows greater flexibility in choice of initial drive frequency. Any arbitrary multiplication can be chosen by suitable choice of N/R ratio. Furthermore, it is sometimes possible to make the PLL loop bandwidth low enough so that if the close-in spurii are far enough spaced, the PLL itself could do the filtering. Even if this alone is insufficient, there is enough flexibility with multiplication ratio to allow a drive frequency to be selected to match readily available crystals and allow a simple filter to be constructed, while at the same time minimising, or at least controlling, the close-in spurii.

The 2.32GHz beacon GB3SCS uses this technique, with an AD9852 chip clocked at 40MHz (internally multiplied from a 10MHz reference input) generating a signal at approximately 2.46MHz. This allowed a simple crystal filter to be constructed based around off the shelf 2.4576MHz crystals designed for baud rate generators. The first attempt used a 2MHz crystal (mainly to keep the numbers simple) but it was impossible to remove close-in spurii. A DDS producing close to but not exactly an integer sub multiple of the clock is one of the worst culprits for close-in sidebands. Here a drive of 1.999746MHz from a 40MHz clock, followed by times 1160.4 in the PLL (N/R = 5803/5) was very bad news, with only -30dBc close-in sidebands. Moving to 2.4576MHz x 5666 / 6 gave an acceptable level of spurii. It is not perfect; some very weak close-in spurii can still be heard at roughly 10kHz spacing on GB3SCS, but they are somewhere in the region of 60dB down. (More on GB3SCS and the rest of the Bell Hill beacons can be found at **[2]**).

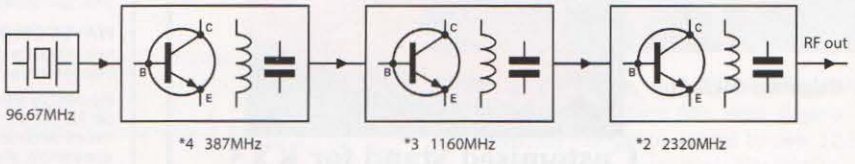

FIGURE 2: A conventional crystal oscillator and multiplier chain generating a 2.32GHz signal.

THE REVERSE DDS. Many existing legacy beacons and microwave RF sources already exist, based around a crystal oscillator source. Typically operating in the region of 90 to 120MHz, the oscillator drives a chain of multipliers and filters to get to the final output. When users want to update these to add high stability frequency locking and data modes, there is another elegant solution using a DDS that can be retrofitted, still keeping most of the existing RF hardware. The Reverse DDS (RDDS) can result in one of the cleanest signals in terms of close-in spurii and phase noise. The concept is shown in **Figure 4**. And it becomes clear that the DDS is effectively operated 'backwards'. The crystal oscillator forming the heart of the RF source is modified to make it voltage tuneable over a small range, typically a few hundred Hz. An output from this 100MHz signal is tapped off, amplified and used as the clock input to the DDS. The DDS is then programmed with a suitable value of N so that when the crystal is oscillating at the correct submultiple of the wanted RF, the output from the DDS is at exactly 10MHz. This 10MHz output is fed into one input of a phase comparator where it is compared with a reference input. The voltage output from the phase comparator is filtered and fed back to control and lock the exact frequency of the crystal oscillator, forming a PLL.

The overall result is a non integer multiplication of the 10MHz input signal to 100MHz or thereabouts, then up to the final RF. The beauty of this scheme is that only minor modifications are needed to existing legacy RF hardware – to make the crystal oscillator voltage tuneable, and tapping off a portion of the oscillator signal. The rest is standalone hardware that can be added separately.

Since the DDS is now effectively used backwards, the calculation of the value to program into the DDS is somewhat more complicated.

DDS output=(RF_{OUT}) / (RF Mult.) x NDDS/2^{32} = (F_{REF}). Rearranging:

NDDS = 2^{32} x F_{REF} x Mult. / RF_{OUT}

Note that to get a slight increase in output frequency, N has to be reduced.

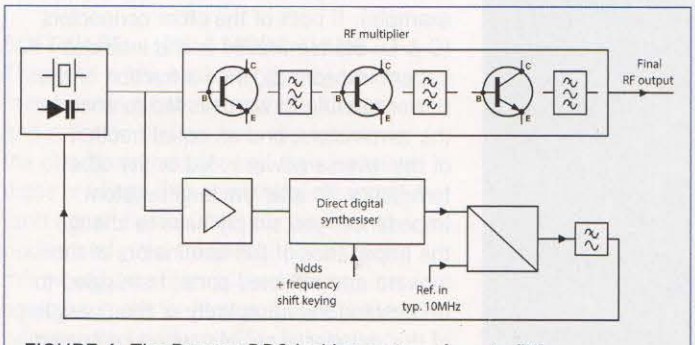

FIGURE 4: The Reverse DDS locking system, for retrofitting to existing crystal oscillator / RF multiplier chains.

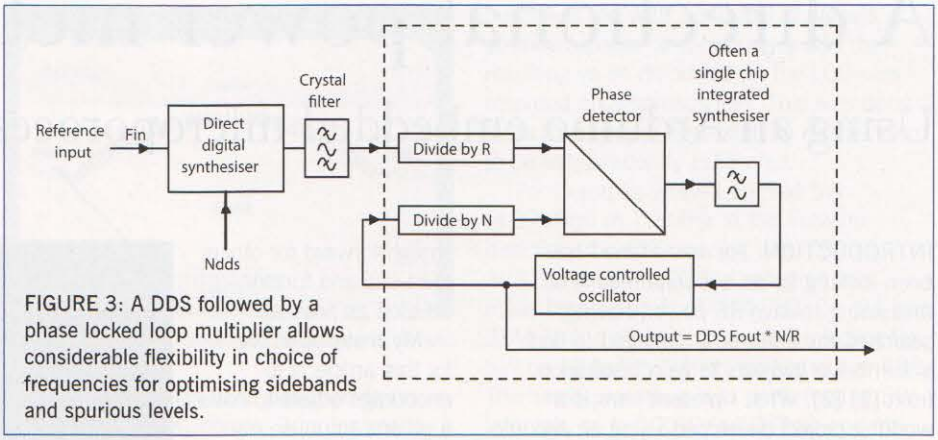

FIGURE 3: A DDS followed by a phase locked loop multiplier allows considerable flexibility in choice of frequencies for optimising sidebands and spurious levels.

The following example is for GB3SCX on 10368.905MHz with x96 RF multiplication from a crystal running at 108.01984MHz. This drives an AD9850 DDS that generates 10MHz to lock to the reference.

N = 2^{32} x 10MHz x 96 / 10368.905MHz = 397647447.3...

Only the integer part of this calculated value for N can be programmed into the DDS, and results in a minor frequency setting error. This means GB3SCS actually runs 6.85Hz higher than its nominal carrier frequency. Hardly significant!

With a bit of calculus **[3]** we can see that changing the value of N by one shifts the frequency by about 26Hz so any arbitrary wanted frequency can be set to within 13Hz. This is more than adequate resolution to generate the tone spacing of 315Hz needed for the JT4G modulation. The four tones for this mode are generated by reprogramming the DDS in real time. The speed of the PLL within the RDDS is more than fast enough to follow the 4.375 frequency changes per second needed for this mode. For retrofitting to microwave beacons, G4NNS and G8ACE have made a kit available for the complete RDDS system. See **[4]** for details.

A BIT MORE ON PROTECTING RIGS WITH DC SUPPLIES. John Everingham, G4TRN sent in this cautionary tale. "Thanks for your comments on polarity protection in the latest *RadCom*. (And no mention of the 'Idiot Diode'!). You may be interested in my experience. I had to release of lot of the smoke from my FT-817 following a power supply accident that did not involve reverse polarity.

"High DC current got passed along the negative line from the chassis through the bifilar choke back to the PSU from a QRO rig connected to the same PSU and ATU. Some of the DC went via the coax and the FT-817 supply lead. (The FT817 was switched off). The bifilar choke got burned out and shorted the 12V supply. Repairing the burnt tracks and rewinding the choke was an interesting job... There were lessons to be learned. I now only connect small rigs to a separate low power PSU and I fuse the negative power line when it does not connect directly to the chassis of a unit".

IS YOUR ANTENNA FLOATING? G4TRN continues, "While on the topic of earthing I have another other observation to make, the result of bitter experience. The often published ¼ wave coax balun used to feed a 300Ω folded element with coax should have the common sheath connected to the boom and so to the dipole. It is not immediately apparent that if it is not connected to the boom (as in RSGB diagrams) there is no DC path across the end of the coax, despite the folded element. A static build up blew the front end of my IC-202 many years ago. A quick fix (after fitting a new BF981) was to tack a 10k resistor across the feeder. It is worthwhile doing this for mobile whips too." Apparently, the original IC-202 input stage has a peculiar bit of circuitry whereby the antenna input is not properly grounded, so static build-up (or perhaps lightning transients) can pop the input device. The moral is, always ensure your antenna feeders are connected properly to give a DC path to the mast at the top end.

WEBSEARCH

[1] Raspberry Pi as an FM transmitter: http://hackaday.com/2012/12/10/transmit-fm-using-raspberry-pi-and-no-additional-hardware/

[2] Bell Hill Microwave Beacons: www.scrbg.org. These are also described in *RadCom* September 2006.

[3] Differentiate the equation for N with respect to FOUT to get

dN / dFOUT = -2^{32} x Fref / $FOUT^2$ x Mult.

Plug in values of 10MHz and 10368MHz to get -0.038 N / Hz or -26Hz / N

[4] Reverse DDS kit for beacons: www.microwaves.dsl.pipex.com/

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A directional power meter

Using an Arduino embedded microporocessor board

INTRODUCTION. For some time I have been looking for an accurate means of measuring relative RF power; having searched the internet, I managed to find a number of projects to gain inspiration from [1] [2]. What I present here is a working project developed using an Arduino embedded microprocessor board. My primary objective from the publication of the design is to encourage others to have a go at writing embedded software and to use this as a starter project for that journey. **Photo 1** shows the finished front panel.

PHOTO 1: General view of the Arduino power meter.

ARDUINO – WHAT'S THAT, THEN?

Arduino is an open-source electronics prototyping platform based on flexible, easy-to-use hardware and software. It is intended for artists, designers, hobbyists, and anyone interested in creating interactive objects or environments. There is a free interactive development environment (IDE) to develop code; programming the board is a simple case of connecting the board to a PC via a USB cable. Because the software development is undertaken in C and there are huge amounts of library code and online examples already available, for the most part, all of the 'tricky' aspects of writing embedded software are already available out of the box or available to copy from elsewhere.

All this results in code that is easily human readable and therefore as straightforward for others to re-use and further develop as possible.

My main objective for this article is to encourage others to have a go and to utilise my code as a starting point for their own unique development; this is not intended to be a fully detailed constructional article.

There are a number of different Arduino development boards available, suppliers include Maplin and boards can also be found on eBay. I have used the Mega2560 board in the past and happened to have one here; hence this board features in the power meter.

A detailed overview of Arduino can be found at the Arduino project website www.arduino.cc.

PROJECT OVERVIEW. Having looked into a number of alternative designs, I had decided that I wanted to base the design on the Analog Devices AD8307 logarithmic amplifier. This device offers a really neat way of translating an RF sample into a DC voltage – logarithmically. There are plenty of designs to be found on the internet using this device, so there is nothing very original in this part of the project. However, combining this with my favourite means of embedded software development, Arduino, was a perfect place to start something new.

Figure 1 shows a block diagram of the design. A directional coupler samples the forward and reverse power from the RF line. The forward and reverse signals are each passed to AD8307 logarithmic amplifiers and then to a sample and hold circuit. The signals are then digitised by the Arduino, which performs calculations to drive the LCD and also provides an analogue drive to the meter via a buffer amplifier.

DIRECTIONAL COUPLER. The first requirement for my power meter was a directional coupler. I had looked many times at a project in [3]. This project presents a simple directional coupler and some complex analogue electronics that are stated to compensate for nonlinearity of the diodes used to convert the RF to DC.

The simplicity of the design of the directional coupler in this project interested me and, by doing some more research [4], I was able to understand the workings of this simple design a little more. The directional coupler design is presented in **Figure 2**.

To explain the operation of the directional coupler, the connections to the coupler are best considered as two pairs. Imagine a signal is passed into connector A and out of the other connector of the same pair, B, into some unknown impedance load (an antenna, for example). If both of the other connectors (C & D) are terminated in the intended system impedance, then a fraction of the power passing forwards is fed to one of the terminators, and an equal fraction of the reverse power is fed to the other terminator. To alter the target system impedance, you simply have to change the impedance of the terminators of the forward and reflected ports. I struggled to understand the complexity of the operation of this coupler especially when compared to the simplicity of its design – sometimes simple can also be rather complex!

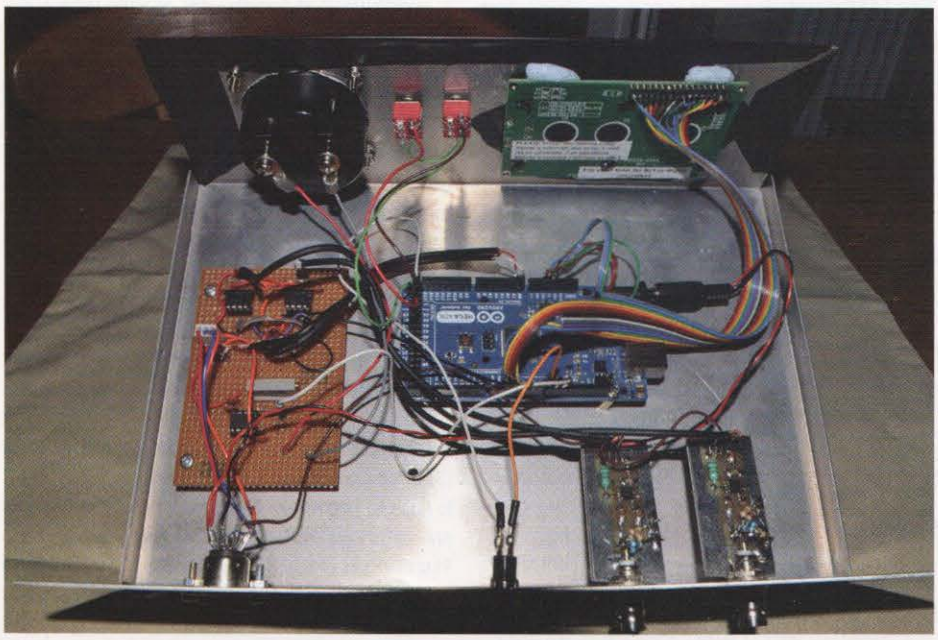

PHOTO 2: Project case interior. The RF boards are at the bottom right.

ELECTRONICS. The circuit diagram of the signal processing and display parts of the power meter are shown in **Figure 3**. The hardware consists of four main parts: two identical RF boards, a DC signal processing board and an Arduino.

The RF boards process the RF from the Forward and Reflected ports of the directional coupler. In each RF board we have a 30dB pad (attenuator) followed by the AD8307 logarithmic amplifier **[5]**. The value of R4 (52.3Ω) is derived from the Analog Devices datasheet. The input impedance of the AD8307 is quoted as being 1100Ω in parallel with 1.4pF. This impedance is paralleled with the external 52.3Ω resistor resulting in a termination impedance for the 30dB pad of 49.9Ω. The attenuation needed at the input to the AD8307 was decided upon once I had the directional coupler functional and the likely range of values from its output ports was known and understood. The AD8307 logarithmic amplifier converts a low level RF signal into a voltage proportional to the logarithm of the signal power.

Next is a sample and hold device. The LF398 is a well tried and tested sample and hold amplifier; this will allow the output of the AD8307 to be held by the microcontroller whilst it reads the output values. The outputs of both the forward and reflected channels are held simultaneously in separate LF398s, thus allowing the sequential reading of the forward and reflected channels to be undertaken with the absolute pair of readings at the time of the hold. Given the Arduino processor speed this may not be absolutely necessary but I included these components as I had some to hand; experimentation is encouraged here! The Arduino uses one of its digital outputs to hold the sample hold pin 8 of the LF398 high or low to select sample or hold of the AD8307 voltage output. The operation of the Arduino is discussed later.

A simple operational amplifier circuit based on IC5 takes a pulse width modulated (PWM) output from the microcontroller and drives an analogue meter. The electronics are completed by the addition of a HD44780 compatible LCD display directly connected to the Arduino.

SOFTWARE – IT'S A MODE THING. There are a few basic things any power meter needs to do: sample the forward and reflected powers from the feeder via the directional coupler and then translate those readings into something meaningful (and hopefully accurate) for the user to understand. In a traditional power meter this would be accomplished through an analogue meter or meters, but here the primary display is an LCD. This power meter is no different to any other in one aspect – the meter needs to be calibrated.

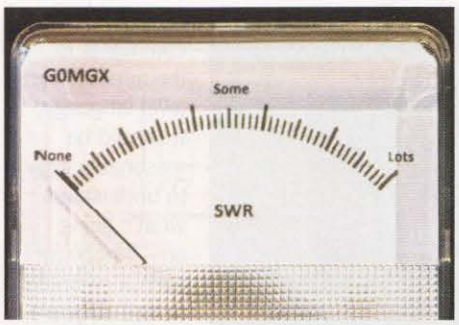

PHOTO 3: Meter – labelled with tongue in cheek.

So the software has been designed to run in one of two modes; normal Running mode and Calibrate mode.

CALIBRATE MODE. On power up the software checks to see if a push switch connected to pin 8 of the Arduino is HIGH (my switch is push to break, thus removing the ground connection or LOW state from the pin when pushed – the pin is tied HIGH in software). If the pin is high then the software enters Calibrate mode. Calibrate mode drives the analogue meter to what the software considers to be full scale to allow the setting of the adjustment pot on the output of the meter driver electronics. The software also continuously loops round reading the two analogue inputs being used by the Arduino for forward and reverse power and then displays the resulting integer values from the on-board analogue to digital converters on the LCD. In Calibrate mode no mathematics are applied to the values read from the analogue to digital converter outputs; the raw values are displayed unmodified.

To calibrate the meter, each of the two ports was fed with a number of signals of known power and frequency and the resulting value displayed on the LCD was recorded on a spreadsheet. This was done for both channels separately to enable them to be independently calibrated.

For example, when I applied 5W (+37dBm) at 1.8MHz in the Forward direction, the ADC reading was 790. At 3.5MHz it was 791; I repeated this measurement at 7, 10, 14, 18, 21, 24 and 28MHz and derived an average reading for 5W on all bands, which worked out at 788. The same procedure was performed at 5W intervals up to 100W (+50dBm) and the results plotted.

For clarity of understanding, the value 790 was the integer value from the analogue to digital converter output when a 5W signal at 1.8MHz was applied to the forward RF board. Once all the calibration points were taken, the average value of all readings for each known power level was plotted such that I had the average integer value from the analogue to digital converter (Dadc) on the x-axis and the power in dBm on the y-axis. This graph is shown in **Figure 4**.

Using the trend line tools within Excel, the slope of the line has been solved such that from any known Dadc value, we can calculate the power in dBm of this channel by:

Power dBm = (Alpha.Dadc) + Beta

where Alpha = 0.0948

and Beta = – 37.652

from the equation on the graph.

These constants Alpha and Beta were derived separately for both the forward and reflected power channels and are defined in

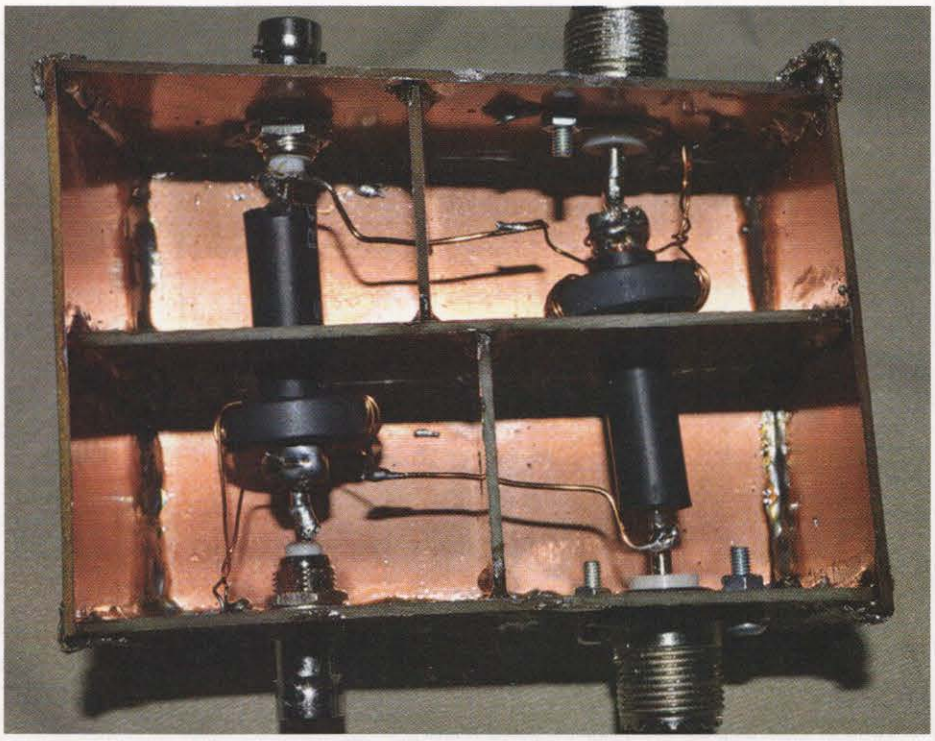

PHOTO 4: Directional coupler construction.

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PHOTO 5: Close-up of the LCD showing a VSWR of 1.4:1.

the code to allow the calculation of power from value read from each of the two analogue to digital converters in use. My constants are declared in the code as:

```
float Forward_Alpha = 0.0948;
float Forward_Beta = -37.658;
float Reflected_Alpha = 0.0931;
float Reflected_Beta = -35.413;
```

NORMAL RUNNING MODE. When the software starts without the Calibrate switch being pressed, the software enters normal running mode. In the normal running mode there is a fairly simple sequence of events which are repeated ad infinitum:

- Read the ADC values;
- Calculate the power from the ADC values;
- Calculate the SWR;
- Set the SWR meter;
- Display the necessary text and numbers on the LDC screen.

I would encourage you to take a look at the source code as I have tried to include extensive comments to the already high level language. It should be reasonably easy to understand what's going on – I hope for even a complete novice software developer.

PUTTING IT ALL TOGETHER. The two RF boards were built 'dead bug' style on some copper board; these were mounted directly on two BNC connectors on the back of the project enclosure and included the 30dB pads.

The outputs of the RF circuits were fed to two sample/hold circuits that were built on a piece of Veroboard along with the TL082 and associated components. This plus the Arduino Mega2560 board were mounted inside the box and the interconnections made (albeit rather scruffily!). The inside of the project case is shown in **Photo 2** (note the trusty Blu Tack holding the LCD in place).

As the front panel meter was intended to be a tuning indicator and not an accurate indication of SWR (which is calculated and displayed on the LCD), I created a slightly humorous scale for my meter – see **Photo 3**.

DIRECTIONAL COUPLER. I constructed the directional coupler using double sided copper board as the basis for the box. The toroids are Amidon FT-82-67s each with 31 turns of enamelled copper wire (ECW) covering about 70% of the toroid. The toroids are simply slid over RG-213, which is only grounded AT ONE END. One pair of SO-239 sockets are included for the RF and Load connectors and a pair of BNC connectors for the forward and reverse sample ports. The directional coupler is shown in **Photo 4**. My construction leaves a lot to be desired; ideally the coupler should probably be smaller than my example. Once finished a final copper clad board was added as a top and the unit RF sealed as best I could. The forward and reflected ports are coupled to the main enclosure using short 50Ω coax cables with BNC plugs at both ends.

POWER REQUIREMENTS. The power meter requires four power rails; +12, -12, +5 and +9V. The +5V supply is for the AD8307 boards, ±12V is for the sample and hold devices and the +9V line is for the Arduino board. I made a simple regulated power supply in a separate case to provide these four voltages and connected them to the main enclosure using a 5 pin DIN to 5 pin DIN cable I had lying around.

DISPLAYING THE RESULTS. My power meter is configured to display the forward and reflected power in dBm or dBW plus the power in watts and the SWR; the power values are rounded before display. Additionally the status of the two switches is shown to indicate if the meter is displaying

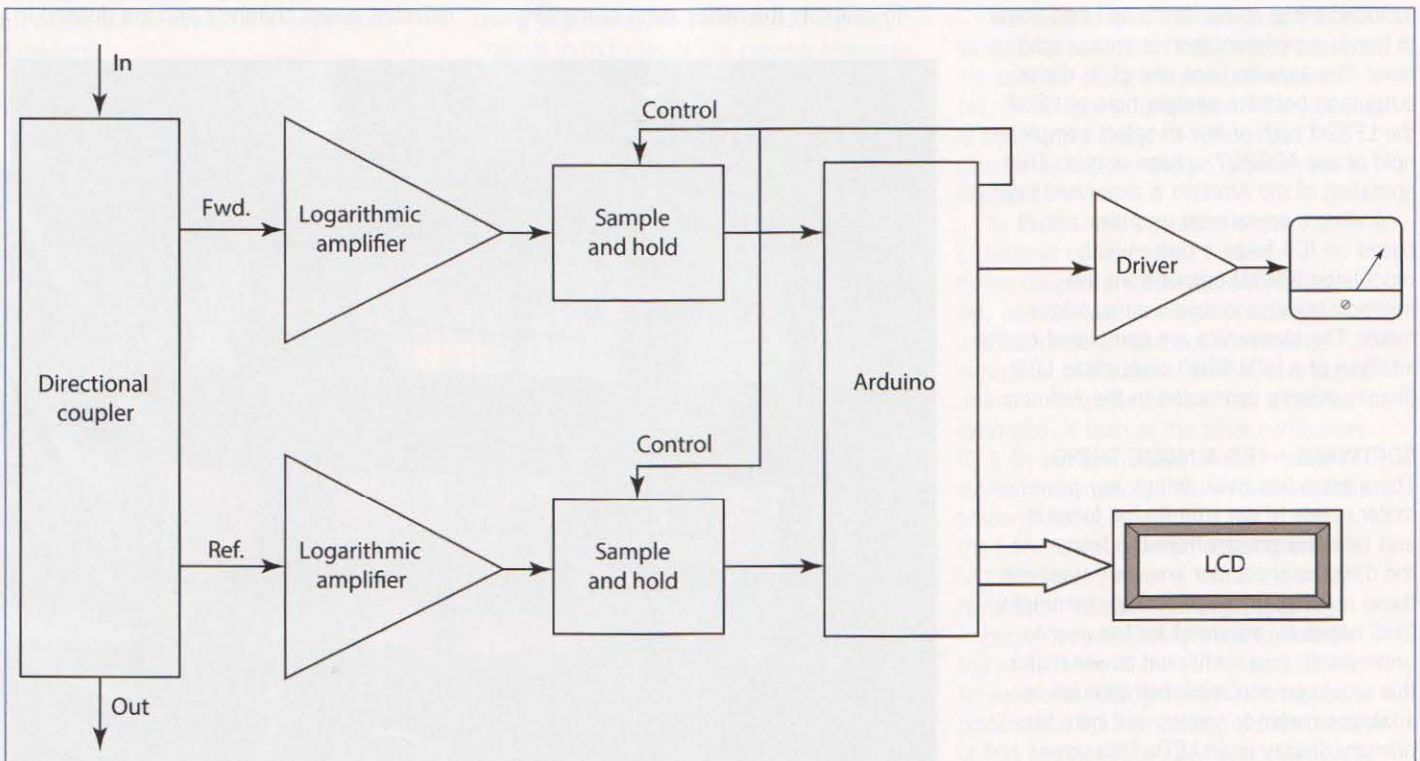

FIGURE 1: Block diagram of the Arduino power meter.

dBm or dBW and also which of the short or long sample times are selected.

The output functionality should be easy to find in the code and also very easy to customise to your own requirements.

Photo 5 shows a close-up of the four line LCD displaying a forward power of 15dBW (31W) and reflected power of -1dBW (1W). The calculated SWR Is 1.41:1 and the switches are in short sample mode and configured for the output to be displayed in dBW.

CONCLUSIONS. The software I have written for the project plus the calibration spreadsheet is available from **[6]**. The Arduino mega compatible boards are available via eBay at very reasonable prices and the IDE for Arduino is available to download for free from www.arduino.cc. There are very comprehensive instructions included on the website for installing and getting your first Arduino project up and running. It's then a matter of connecting the board to a spare USB port on your PC and loading the power meter code. To do this you simply hit the Upload button in the IDE and the software is compiled and transferred into the boards memory.

The power meter works well and has already proved to be a valuable addition to my shack. The most surprising aspect is its ability to read very small power levels; currently only powers down to 10mW are displayed (-20dBW), but this makes tuning for minimum reflected power very accurate when compared to my analogue power/SWR meters which are unable to display such small power values. The unit has been used with very low power modes and also at full UK limit in a recent RTTY contest and worked extremely well under both circumstances.

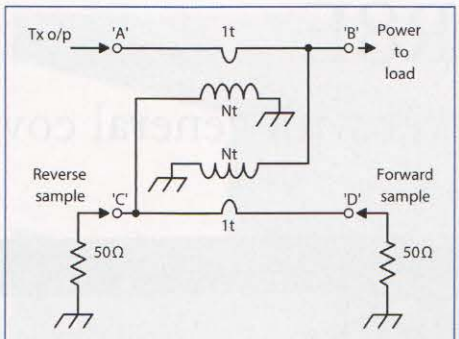

FIGURE 2: Circuit diagram of the directional coupler.

This project may also prove to be the inspiration of a smaller, more portable power meter. The additional analogue electronics associated with the sample and hold devices and the meter driving opamp could be removed; the time taken to read the two analogue channels sequentially is likely to prove negligible and the meter could be driven directly by software (albeit with the calibration being moved from a simple preset to a software based setting). This would remove the need for the complex power supply requirements and would lend itself to more portable battery powered operation. However it is used, I hope this simple project of mine will inspire others and hopefully will form the basis of other projects within the ham community; go on – have a go!

WEBSEARCH **REFERENCES**

[1] A PIC-based HF/VHF Power Meter, Roger Hayward, KA7EXM, *QEX* May/June 2005

[2] A Modern Directional Power/SWR Meter, Bill Kaune, W7IEQ, *QST* January 2011

[3] The Tandem Match – An Accurate Directional Wattmeter, John Grebenkemper, KI6WX, *The ARRL Handbook 2005*

[4] A Bi-Directional In Line Wattmeter, David Stockton, G4ZNQ, *SPRAT*

[5] Low Cost, DC to 500MHz, 92dB Logarithmic Amplifier AD8307, Analog Devices

[6] *RadCom* section of RSGB website

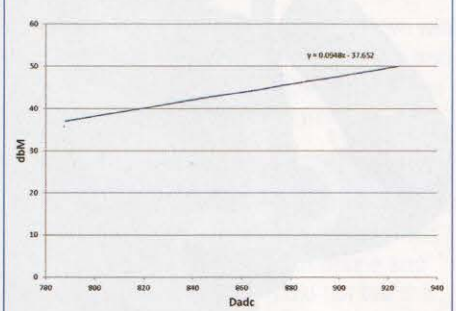

FIGURE 4: Example calibration plot.

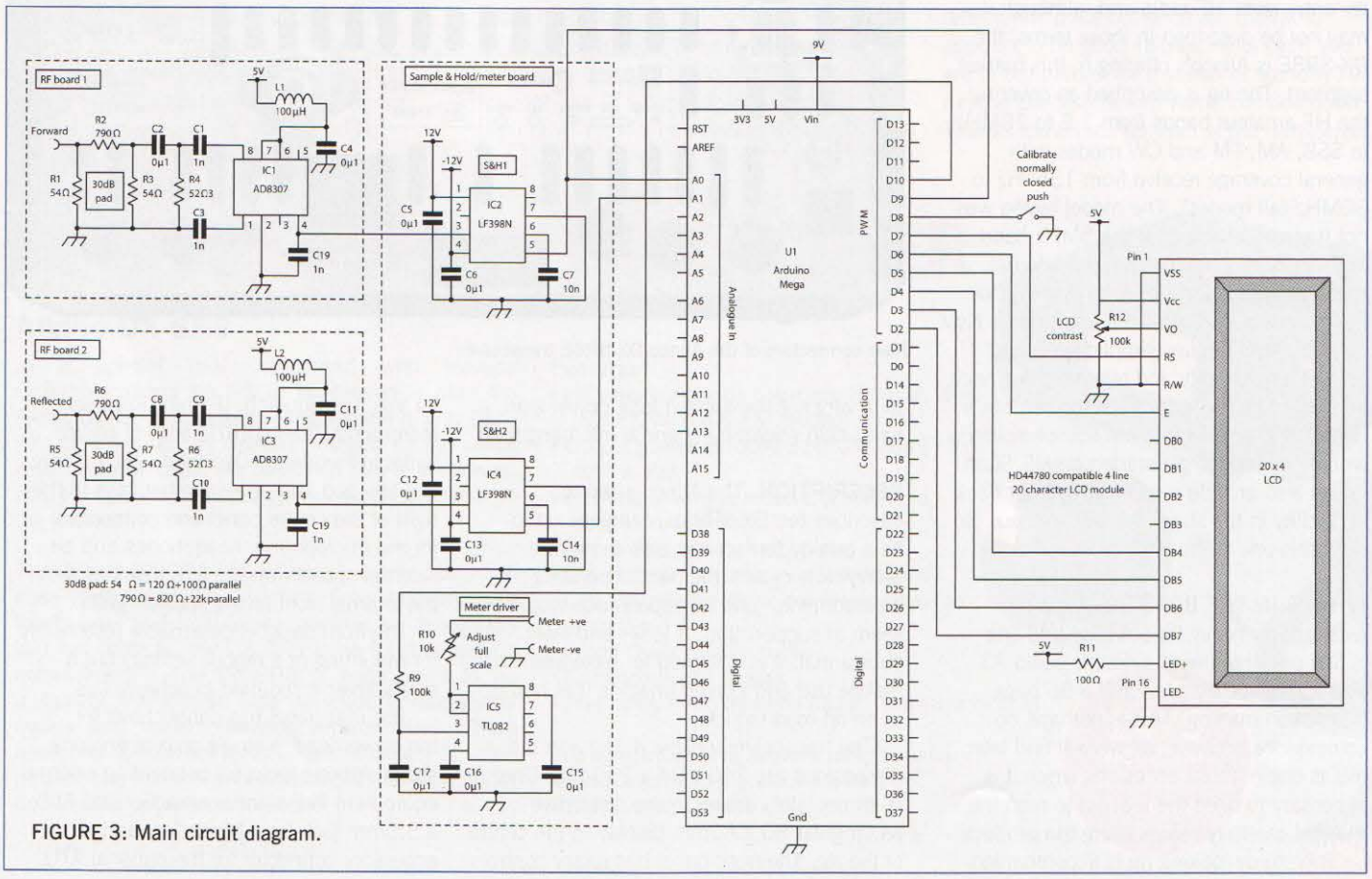

FIGURE 3: Main circuit diagram.

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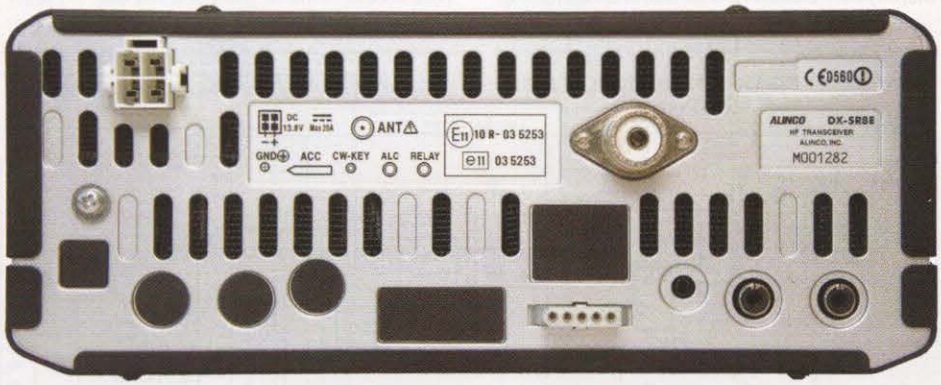
Alinco DX-SR8E

1.8 to 28MHz transceiver with general coverage receiver

The Alinco DX-SR8E HF receiver has an uncluttered front panel.

INTRODUCTION. Every manufacturer has its 'entry level' HF radio and, although it may not be described in those terms, the DX-SR8E is Alinco's offering in this market segment. The rig is described as covering the HF amateur bands from 1.8 to 28MHz in SSB, AM, FM and CW modes with general coverage receive from 135kHz to 30MHz (all modes). The model tested was not transmit enabled for the 5MHz band, but a cursory trawl through the internet revealed instructions for rectifying this for Full licensees who hold the appropriate NoV.

Entry level implies simplicity of use, limited functionality and relatively low price and might be the sort of transceiver that a Foundation or Intermediate licence holder would consider to get started on HF. Such radios also provide a good standby or back up facility in the shack for any amateur. So does this one fit the bill?



Rear connectors of the Alinco DX-SR8E transceiver.

WHAT'S IN THE BOX? The box is reassuringly heavy (about 6kg) and one is first presented with a double sided A3 size schematic diagram and a 96 page instruction manual. This is perhaps no coincidence because, as we will find later, this is one of those occasions when it is necessary to heed the request to read the manual carefully before using the product!

The sturdy-looking rig is accompanied by a very substantial 3m long power lead, a hand held microphone and a mic hanger kit.

DESCRIPTION. The Alinco website describes the DX-SR8 as, "engineered to be a quality transceiver, able to endure heavy-duty cycles and harsh operating environments" and its appearance would seem to support that. It looks and feels substantial. It is designed for base and mobile use and I could imagine it at home in an off-road vehicle.

The transceiver weighs 4.1kg and the dimensions are 240 x 94 x 255mm. One is immediately drawn to the distinctive rectangular 80 x 40mm display in the centre of the rig. The front panel has rotary controls for Volume, Squelch, IF Shift, Receiver Incremental Tuning (RIT) and, of course, a Variable Frequency Oscillator (VFO). There is a key pad and array of other keys to the right of the centre panel and connectors for the microphone, headphones and an external speaker on the left, together with the internal front facing speaker grille.

The front panel is detachable (ostensibly for mounting in a mobile setting) but a screwdriver is required to achieve this.

The rear panel has connections for the power lead, a single coaxial antenna socket, phono jacks for connecting external equipment like a linear amplifier and ALC, a 3.5mm jack for a Morse key and an accessory connector for the optional ATU.

The panel is drilled to accept a number of other connectors (all blanked off), suggesting that higher specification versions may be available.

There is no serial or USB port and no obvious way of connecting a computer.

IN USE. After making the only 3 connections needed to get started (power supply, resonant antenna and key/mic) the initial impression is very favourable. The sound from the internal speaker is easy on the ear and the central display shows the frequency in large numbers, useful for those whose eyesight may not be 20/20. The VFO is smooth. Then comes the part when one needs to refer to the manual! Changing frequency is not intuitive – there are no buttons marked to guide you – but all is revealed with a study of the instructions. All of the keys are function driven and all clearly explained. It really is worth reading the manual all the way through because, at the very end, there is a handy reference sheet that summarises all of the essential parameters, and it is suggested that you keep a copy handy until you are familiar with everything (which does not take long).

On receive, there are 600 memory channels that store a range of settings that will exceed the needs of most SWLs interested in the general receive coverage. There is a single switchable narrow filter that together with the IF shift and noise blanker are the main tools for eliminating interference.

The manual also reveals some of the idiosyncrasies of the radio. For example, there is no continuous adjustment of the power level, just three selectable settings – 1W, 10W and 100W. This could be useful for a Foundation licence holder, but an Intermediate licensee would need to undertake a simple soldering task inside the rig to reduce the higher setting to 50W. This lack of variability could cause problems if the rig is used to drive a linear amplifier.

The key pad and array of other keys are to the right of the centre panel.

And it is not just changing the power level that requires removal of the cover. Microphone gain, beep tone and CW sidetone volume are all adjustable from within although these changes should not be needed more than once, if at all.

RF gain is subject to the same pre-set treatment with 4 selectable settings which, although sounding cumbersome, was not a problem in practice.

Using SSB, reports were universally positive in terms of audio quality. The microphone PTT (push-to-talk) has a distinctive 'click' when operated but which I soon got used to.

The CW functionality was impressive with a built in electronic keyer and full, semi and auto break in. The narrow filter reduces the bandwidth to 500Hz, useful in a crowded band segment.

The lack of a serial or USB port gives the clue that the rig has no dedicated features for data modes. The manual says that this can be achieved by using the microphone and external speaker jack, but I did not test this.

CONCLUSION. Once the function keys are mastered, this is an easy to use rig that does what is says on the box. The specification reflects the price but all in all, the radio appears to be good value for money. If you are in the market for a starter or standby HF rig, the DX-SR8 is well worth consideration. Thanks to Nevada for loan of the transceiver.

January 2014 • RadCom
John Welsh, G0NVZ • e-mail: johnwelsh_1@yahoo.co.uk

Moving On

Units of measurement

INTRODUCTION. This month we take a slightly tongue in cheek look at the units that we all use in amateur radio such as volts, amps, watts, metres, kilograms etc. Units have what are known as 'dimensions' that, at their most fundamental, can usually be expressed in terms of length, mass and time, giving the various 'systems of units' their names. The size of a 'unit' is chosen so that it can be easily compared and easily reproduced. Its value does not change with time. A modern unit is usually internationally accepted together with its abbreviation symbol. Nowadays, in science we mainly use 'SI' units (explained later), but it wasn't always so.

HISTORY. In Isaac Newton's day in Britain and much of Europe there were three main units for length, mass and time: the foot, the pound and the second. With these Newton did all his excellent work on the laws of motion. These units remained good for 300 years and we gave them to the world. They were of convenient size for everyday use (like buying groceries) and also for scientific use. Their size was somewhat arbitrary but convenient. The foot was based on the length of a man's foot and its sub-division, the inch, on the length of a man's thumb. The pound was a convenient weight for groceries and, incidentally, the origin of the Pound Sterling – the value of a pound weight of silver. The second was less arbitrary as it was related to the minute, the hour, and the mean length of a (solar) day. The units of the 'foot-pound-second system' were formalised in the Weights and Measures Act of 1878 and eventually became known as the 'Imperial System of Units', though the Americans didn't and still don't like this term.

Then the French got involved and, with Napoleonic pride, felt that the size of the units should be less arbitrary. They felt that a length similar to a yard would be convenient, so they came up with a new unit of length of just over a yard, which they called the metre. This was originally defined as "one ten millionth part of the line of longitude passing through Paris and extending from the North Pole to the equator". For convenience when comparing this length with various sub-standards, they made a platinum-iridium bar of this calculated length that they kept at a constant temperature in Paris. It looked remarkably similar to the 'Standard Yard' bar kept in London. However, although they got their calculated distance from the North Pole to the equator wrong, they still relied on their platinum bar. From the metre were derived the tonne (the weight of a cubic metre of water), the litre, one thousandth of a cubic metre, and the weight of one litre of water at 3.98°C (the temperature at which it is most dense), the kilogram. This led eventually to the older and now obsolete 'centimetre gram second (cgs) system of scientific units but is still related to the modern SI system. These days the units are defined quite differently and with much greater precision, but are still of almost exactly the same size.

The set of units you use in no way affects the fundamental laws of physics; the principles remain the same. You can even invent your own system of units – let's say a 'Furlong Ton Fortnight' system – provided you use consistent numerical factors.

MODERN MEASUREMENTS. SI units are those of the International System of Units adopted in 1960 by the *Conférence Générale des Pois et Measures*. The primary units in this system are the metre, the kilogram and the second (usually referred to as the 'mks' system). The 'secondary' units are the Ampere, Kelvin, mole and candela. There is also a host of other 'derived' units, which include most of the electrical units we're familiar with. To all of these there are SI recognised multipliers. As mentioned earlier, units have 'dimensions' and this fact can be useful when checking the veracity of scientific equations. Each side of an equation must be dimensionally equal in addition to any numerical correctness.

Multipliers are used when larger or smaller quantities are referred to and radio amateurs are familiar with terms like microamps (μA), megohms (MΩ) etc. However, the SI system imposes certain rules to avoid 'orders of magnitude confusion'. These are basically as follows:

- Units named after people (eg newton, kelvin, siemens, volt, hertz, etc) are given upper case abbreviations, (N, K, S, V, Hz etc). All the rest (eg metre, second, permeability, litre etc) have lower case abbreviations (m, s, μ, l etc).
- Multiplying factors change their names every three orders of magnitude. Those greater than unity (eg mega, giga, tera etc) have upper case abbreviations (M, G, T etc).
- Multiplying factors less than unity (eg milli, micro, nano, pico, femto etc) have lower case abbreviations, (eg m, μ, p, f etc), although financiers insist on abbreviating one million pounds as £1m, which should really mean one tenth of a penny (£1 x 0.001).

An important exception to these rules occurs because the kilogram (1000 grams) has been adopted as the fundamental unit of mass in the SI system of units. As it is not named after a person, its abbreviation is therefore kg. (There was a move at one time to rename the kilogram the Einstein). Probably to avoid confusion with the kelvin, K, 'kilo', meaning 1000 times any other unit, retains the lower case k. Thus, although multiples like terahertz, gigahertz and megahertz are abbreviated to THz, GHz, and MHz, kilohertz is kHz.

In electronics we sometimes have to deal with very small quantities such as the charge on, or the size of, an electron, and very large quantities such as the number of conduction electrons per kilogram of copper. There therefore have to be internationally recognised multipliers and sub-multipliers of the basic units. A list of the more frequently used of these is shown in **Table 1**. Note that the centimetre, although frequently used, is not an SI unit.

IN USE. Some practical examples of the use of units and their multipliers include the charge on the electron, about 0.1 atto coulomb, 0.1aC, or 10^{-19} coulombs. The equivalent capacity of the resonant circuit of a quartz crystal is measured in femto Farads, (fF). A microwave oven frequency is about 2.5 giga hertz, 2.5GHz. Visible light has a frequency of about 1 peta hertz, 1PHz. And so on.

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TABLE 1: Commonly-encountered multiplication factors in the SI system.

Multiplication factor	Factor	Prefix	Symbol
1 000 000 000 000 000	10^{15}	peta	P
1 000 000 000 000	10^{12}	tera	T
1 000 000 000	10^{9}	giga	G
1 000 000	10^{6}	mega	M
1 000	10^{3}	kilo	k
1	1	(no prefix)	(none)
0.001	10^{-3}	milli	m
0.000 001	10^{-6}	micro	μ
0.000 000 001	10^{-9}	nano	n
0.000 000 000 001	10^{-12}	pico	p
0.000 000 000 000 001	10^{-15}	femto	f
0.000 000 000 000 000 001	10^{-18}	atto	a

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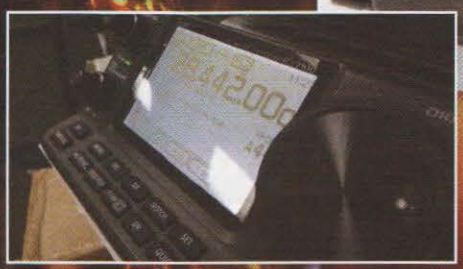

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January 2014 • RadCom
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Operating on the 472kHz band

Part 2: Practical equipment

472kHz TRANSMITTERS. At the time of writing, there is no ready-built option. However, those who want to explore 472kHz without needing to amass the parts for a transmitter, there is a commercial kit available. The JUMA500, which is sold directly from Finland **[4]**, runs 60W from 14VDC and includes SWR protection, transmit-receiver switching, a keyer, receive preamplifier and a converter with a 3.5MHz output. However, this comprehensive list of features comes at a price – and import duty and shipping must also be taken into account.

Two cheaper alternatives are described here; one is a kit, the other completely home built. Several others can be found in *LF Today*.

As mentioned in part 1, beacon modes such as WSPR are very popular with low power operators on 472kHz. A WSPR signal is usually generated by sending tones to an SSB transmitter, but to do that on 472kHz a transverter would need to be built. However, a simple and inexpensive alternative is the Ultimate2 QRSS/WSPR kit from Hans Summers, G0UPL **[5]**. It comprises a DDS-controlled driver/transmitter running 100mW or so on any frequency from below 1kHz to over 40MHz. It is intended as a low power beacon transmitter with pre-programmed messages transmitted in various built-in modes including QRSS, DFCW, CW, FSK-CW and WSPR. Inexpensive low pass filters are available from the same source. With a little ingenuity it can also be used for CW QSOs. At less than £20, this little QRP kit represents extraordinary value for money.

For CW operators, a much higher power option is a design by Roger Plimmer, GW3UEP **[6]**. This is one of a series of his simple transmitters that have been built by many who use the band.

THE VFO. GW3UEP's VFO divides by eight from 3.8MHz (**Figure 8**). It has a low component count yet will produce a stable enough signal for CW, *Opera* and QRSS modes. The oscillator runs continuously. Simple CMOS keying is achieved using the 4024 divider reset line. When used with the companion 100W transmitter, the keyed RF envelope is free from spikes and glitches, minimising key-clicks.

It is important to take care to ensure maximum stability of the 3.8MHz oscillator. Inductor L1 is lacquered then hot glued in place 4mm above the ground plane and clear of metalwork. Note the temperature coefficients specified for the capacitors in Figure 8. Non-ferrous (eg brass) screws/fixings should be used in the vicinity of the toroid. The VFO box is separate from the PA unit in order to avoid thermal coupling and temperature change. The construction of a prototype is shown in **Photo 1**. More details can be found at [6].

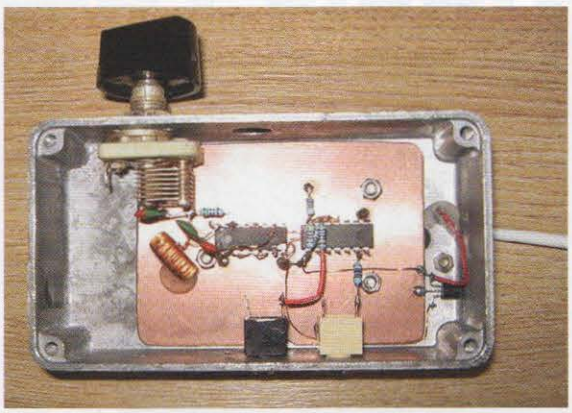

PHOTO 1 : The VFO is housed separately from the PA.

100W POWER AMPLIFIER. This amplifier produces 100 watts at high efficiency from a 24V regulated supply (operation over the range 14-24V is recommended, though power output will be reduced at lower voltages). It is nevertheless simple to build. **Figure 9** shows the circuit of the amplifier and a prototype is in **Photo 2**. The IRF540 MOSFET was chosen for operation as the power switch, TR1. Note that if other devices are used, for instance an IRF640, resistor R10 must be fitted directly on the gate pin. The PA operates in switched mode (Class E) with drain efficiency in the 80% range.

TR3 and TR4 form a zero-biased complementary voltage follower, buffering the IC2 output stage and providing adequate source/sink current for the IRF540 gate charge (alternative devices for TR3 and TR4 are BC549/559, BC337/327, BC109/BCY71 or 2N3904/3906). The gate is AC-coupled to the buffer and DC-restored to ground, to prevent high DC current flow in TR1 should a fault in the 472kHz drive occur.

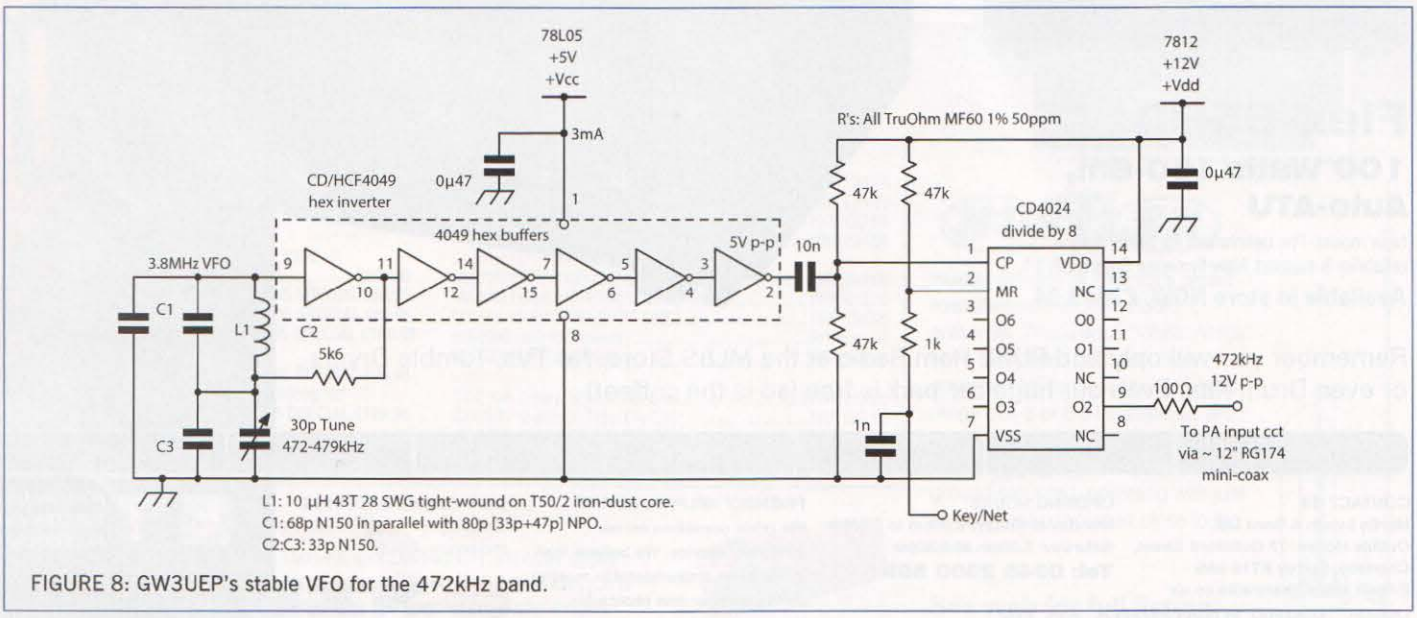

FIGURE 8: GW3UEP's stable VFO for the 472kHz band.

LF Today

A guide to success on the bands below 1MHz

By: Mike Dennision, G3XDV

Low frequency operating has never been more popular, and the introduction of a new international amateur allocation at 472kHz means that, with 136kHz, there are now two bands below 1MHz. Written by a leading authority on LF, Mike Dennison, G3XDV this book distils nearly twenty years experience of the low frequencies and aims to help the beginner who wants to try out this fascinating amateur allocation, but it is also of great value to anyone already active on the band who wants to expand their knowledge of the bands.

This third edition of *LF Today* aims to provide the reader with a firm knowledge of the frequencies below 1MHz and has been expanded to include the many revisions and updates. New to this edition are many projects for the 472kHz band, an analysis of the various modes used on the low frequencies, and how to receive and transmit on even lower frequencies at VLF. Covering everything LF the book covers topics from getting started through equipment, operating, modes and much more. A guest chapter by Alan Melia, G3NYK, on LF propagation explains how to predict LF ionospheric conditions. There is much else besides including lots of practical information on antennas, receivers, transmitters and operating.

In short, *LF Today* is a one-stop shop for anyone seeking information on amateur radio operation below 1MHz.

Size 174x240mm, 192 pages, ISBN: 9781 9050 8693 1

Non Members' Price: £13.99
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Mike Dennison, G3XDV • e-mail: mike.dennison@ntlworld.com

The output circuit provides matching and low pass filter functions, and presents a clean sine wave into the 50Ω load. C1/L1 forms a resonant MF tank circuit. L-match C2/L2 transforms the 50Ω output load to a lower impedance at the drain. The output inductors are air-cored and wound on 22mm diameter plastic 'waste pipe' available from plumbing suppliers.

PA keying is achieved with P-channel MOSFET TR2, which also shapes the keyed RF envelope and eliminates key clicks. The key input switches TR2 gate via R6 and R7, which along with C10 also set the rise and fall times. R5 ensures stability by rolling off the frequency response of TR2, forming a LPF with its input capacitance. If keying is to be done in the oscillator stage instead (as in the companion VFO described earlier), this circuitry can be omitted. TR2 is then replaced by additional transmit-receive relay contacts, which switch off the PA drain supply on receive for key-down netting.

The maximum supply voltage for the transmitter is 25V; this allows for a voltage drop across TR2, which has V_{DS} of 1V at 5A supply current. R6/R7 reduce the gate-source voltage of TR2 to 14V with a 25V supply. Heat sinks are required – at maximum output TR1 dissipates 20 – 25W, TR2 5W. Ideally, a stabilised 24V PSU with current limiting set to approximately 5A should be used. Additionally, a 5A quick-blow fuse should be incorporated. An unregulated PSU should deliver 24-25V maximum on load.

A typical setting-up procedure includes the following steps and approximate values (assumes a 24V DC supply. Measurements made using a DVM, plus oscilloscope with a 10:1 probe for the RF tests):

- Terminate the transmitter output with a 100W dummy load/power meter and observe the DC supply current.
- With no VFO input, check PA current is 20mA when switched to transmit and receive (excludes relay current).
- Apply VFO input.
- With Vpa = 0, check >10Vpk-pk at 472kHz across R4.
- Apply 14V or 24V supply Vpa.
- With transmitter key-down: check 100W RF output, 5A DC supply current (Vpa = 24V) or 30W RF output and 3A (Vpa=14V).
- Check that PA drain waveform is a clean pulse and that efficiency is >80%. The drain voltage waveform (**Figure 10**) should be approximately 100V pk-pk.

It is important that the transmitter is connected to a properly matched load with an SWR of no more than 1.25:1. A simple QRP LF/MF reflectometer and power meter can be found at [6].

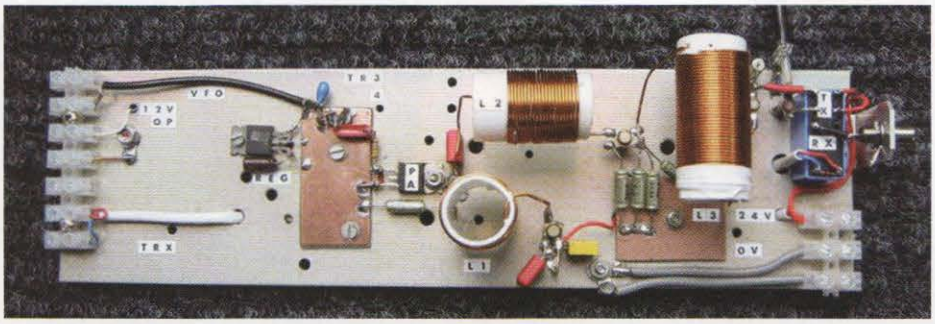


PHOTO 2: The 100W 472kHz amplifier ready for testing. This is the version without PA keying.

ESTIMATING YOUR EIRP. There are several ways of estimating your radiated power by calculation but only one will be discussed here, in simplified form. The full derivation of this formula and other methods of determining radiated power can be found in *LF Today*.

As mentioned earlier, the efficiency of the antenna must be taken into account, and the simplest way to do this with a Marconi antenna is to look at its dimensions. This will lead us to the all-important effective height, H_{eff}, as follows:

$H_{eff} = H_{actual} \times (10h + 6v) / 2 \times (5h + 6v)$

where h is the length of the horizontal top loading wires and v is the length of the vertical section. All dimensions are in metres. Note that where the top wires droop, the average height should be used for H_{actual}.

Next we need to measure the RF current at the base of the antenna. This will be affected by the power from your transmitter and the losses in the antenna system.

RF current cannot be measured with an ordinary meter, but a suitable meter can be constructed easily using the circuit in **Figure 11**, which will measure RF currents up to

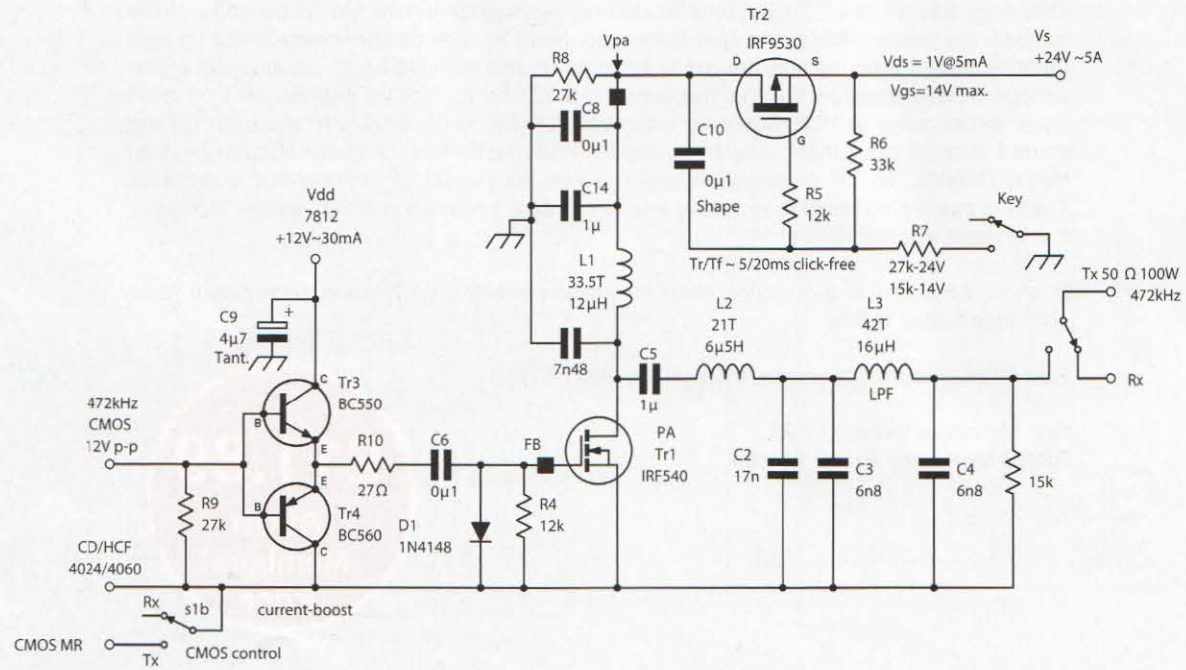


FIGURE 9: GW3UEP's 100W 472kHz power amplifier. The keying circuit (top right) is optional, see text.

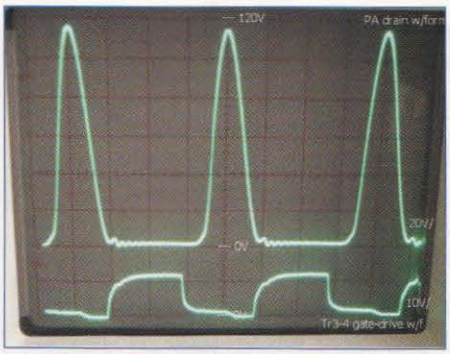


FIGURE 10: PA scope shots: 100W output matched to a 50Ω load.

1A. A small transformer wound on a high permeability (5000 or above) ferrite core is used to sample the current flowing in a conductor. The sampled current flowing from the secondary winding of the transformer is equal to the primary current multiplied by the transformer turns ratio. Rectifying the sample and applying the output to a moving coil meter provides a predictable and reliable method of current indication that will tolerate overloads, is linear scaled and will respond quickly.

The transformer primary is a single 'turn' which simply means the antenna wire passes through the central hole. The 470Ω resistor is essential to reflect a low impedance load to the antenna and minimise insertion loss.

Radiated power with respect to an isotropic source (EIRP) is calculated as follows:

$P_{EIRP} = I^2 H_{eff}^2 / 100$

where I is the measured antenna current and H_{eff} is the effective height of the antenna. Note that this simplified formula includes a wavelength factor, so *it is only valid for the 472kHz band*.

Example: An inverted-L antenna has an average height of 10m, consisting of a 12m vertical wire and a slightly drooping top wire with a length of 20m. The antenna current is 0.8A.

The effective height is

$10 \times (200 + 72) / 2 \times (100 + 72) = 10 \times 272/344 = 7.9$m.

$P_{EIRP} = 0.8^2 \times 7.9^2 / 100 = 0.4$W.

LOW PASS FILTER. The proximity of the medium wave broadcast band can cause problems both on receiving and transmitting. Strong broadcast stations can lead to receiver blocking and the second and third harmonics of your transmitter will fall in the broadcast band. A low pass filter is therefore most important. A design by G0MRF (**Figure 12**) has a sharp cutoff above 550kHz and the results of measurements on the prototype are shown in **Figure 13**.

Component values are: C1 and C4, 4400pF made from two 2200pF in parallel; C2 and C3, 10nF; L1 and L3, 20.6μH, 49 turns of 0.56mm dia on a T-94-2 toroid; L2, 24.3μH, 54 turns 0.56mm on T-94-2. The capacitors are polypropylene from RS Components [7]. The maximum power level is limited by the core and wire size to about 100W.

FURTHER READING. This article should have given you enough information to get started on the 472kHz band, either as a listener or transmitting. There is much more information available in the new 3rd edition of the RSGB book *LF Today*, which also covers the 136kHz band.

Finally, there is a Yahoo discussion group, the RSGB LF Group, which has daily postings by novices and experts alike. This is the place to ask technical questions, publicise activity and report DX. To join, simply send an e-mail to rsgb_lf_group-subscribe@yahoogroups.co.uk or go to the web site, http://uk.groups.yahoo.com/group/rsgb_lf_group/ and follow the appropriate link.

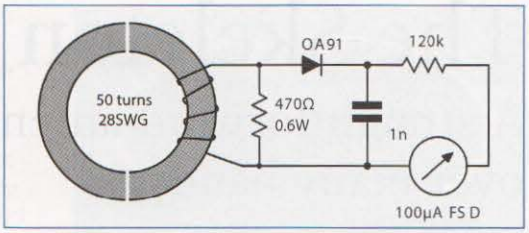


FIGURE 11: This RF current meter is linear and versatile. The ferrite ring can be split to enable it to be clamped onto a wire without disconnecting it.

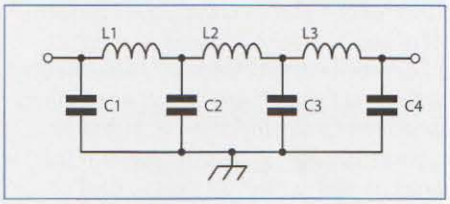


FIGURE 12: Low pass filter for 472kHz.

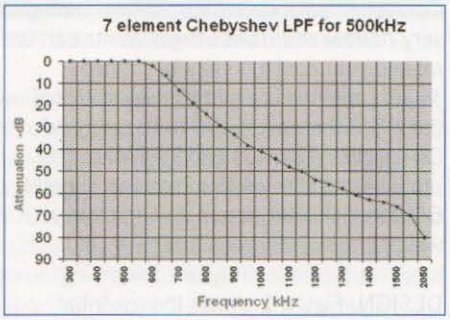


FIGURE 13: Measured performance of low pass filter.

WEBSEARCH

[4] Juma kits: www.jumaradio.com/juma/
[5] Ultimate2 QRSS kit: www.hanssummers.com
[6] GW3UEP's website: www.gw3uep.ukfsn.org/
[7] RS Components: http://uk.rs-online.com

January 2014 • RadCom
Tony Preedy, G3LNP • e-mail: g3lnp@talktalk.net

The Skeleton HF beam antenna

A straightforward antenna with good performance over many bands

HISTORY. As proposed many years ago by W8JK, two horizontal dipoles driven with currents of equal amplitude but 180° out of phase can make an easy to construct bi-directional beam antenna. At low height it has more gain at low takeoff angles than when the same dipoles are operated as a parasitic array. In its simplest form the antenna has its elements suspended on spreaders between a pair of masts. Up to 3dB more gain may be achieved if the dipoles are extended but the beam then gets very narrow and unless the antenna can be rotated your contacts may be limited.

This antenna is a rotatable derivative of the W8JK that covers all the amateur and CB spectrum from 10.1 to 29.7MHz. It is probably the best value and easiest to build 6/7 band HF rotary beam antenna that you will find!

DESIGN. **Figure 1** shows the essential dimensions of the antenna, which is shown aloft in **Photo 1**. The skeleton frame serves only to support the elements and allow their rotation. The central spine has no induced current and does not therefore contribute to or distort the radiation pattern. An element length of 11.6m was chosen because at more than a wavelength a pair of minor lobes are produced each side of the main beams. With this length these are better than -20dB down at 29.7MHz. Element impedances reduce with close spacing and ultimately will reach the point where the resistive component is comparable with losses in the wires. With spacing of 3.4m and thickness of 5mm the loss of gain is less than 1dB at 10.1MHz. Elements are formed from RG59 coaxial cable to achieve the necessary wire thickness without excessive weight. The inner steel conductor and outer copper braid are joined and sealed at each end, as can be seen in **Photo 2**.

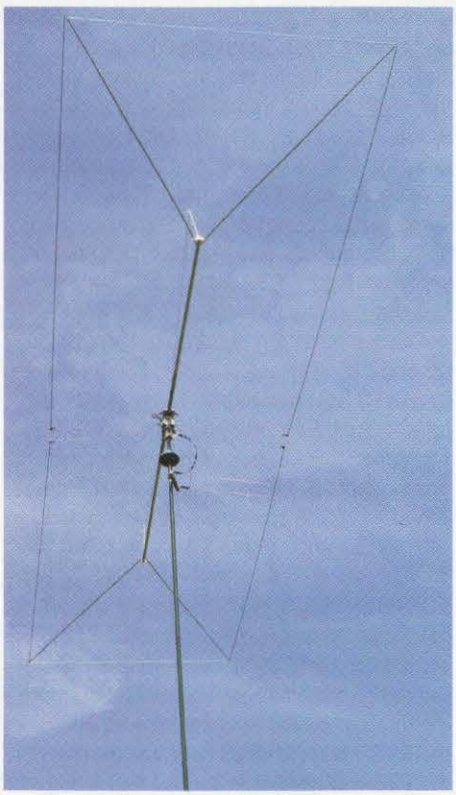


PHOTO 1: General view of the antenna.

FEEDING. The elements are not resonant at any working frequency. To allow the wide spectrum to be covered efficiently, phasing lines need to be short and of the highest characteristic impedance. They are therefore made of 1mm wire with 250mm separation and reach only to the centre of the array. Further separation has an insignificant influence on impedance, a characteristic that allows relative movement with negligible impedance fluctuation in windy conditions. The resulting impedance of 720Ω is also used for the main feeder because the wide separation allows, in my case, an unsupported 50m run without spacers between mast and shack. Standard 450Ω ribbon feeder may also be used.

Unless a remote balanced tuner is attached to the antenna there is no possibility of using a main feeder of coaxial cable because the high SWR would result in low efficiency. However, to allow for rotation a 1.5m length of 450Ω ribbon feeder is used to connect the phasing lines to the main feeder. The main feeder connects via a balun, described later, outside the shack and then via a few metres of coax to an automatic tuner. My feeder wires are 1mm soft enamelled copper that has been hardened by stretching it to 101 to 102% of its original length. The feeder wires have equal tension of 10kg provided by a pulley and weight system. Insulators for the elements are fabricated from sheet insulation material and they grip the RG59 by looping it through a pair of holes as seen in **Photo 2**. At element centres a length of Dacron sets the spacing between a pair of insulators.

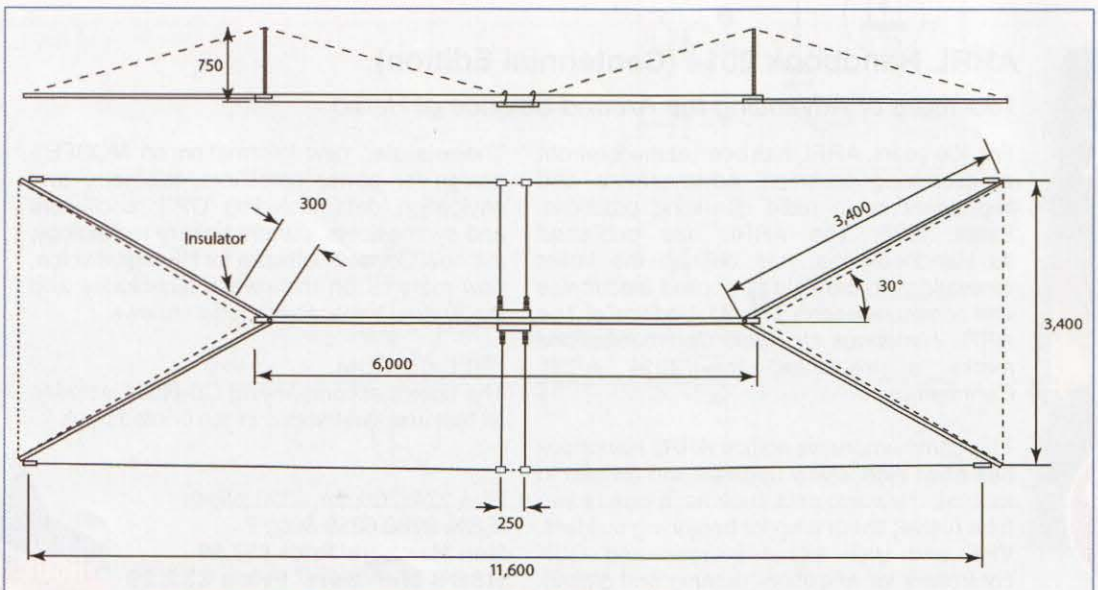


FIGURE 1: Dimensions of the Skeleton antenna. All dimensions in mm.

CONSTRUCTION. The braced skeleton frame is constructed from aluminium tubes. The spine is made from two 2m lengths of 2 inch OD 16 SWG with a centre 2m section of 2 inch

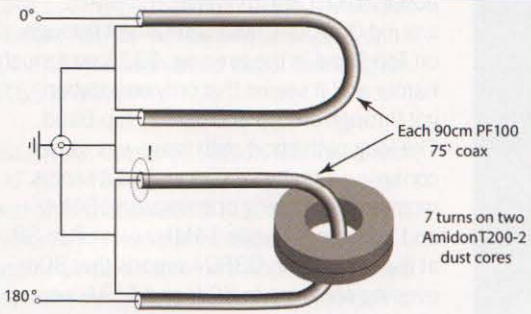


FIGURE 2: The balun circuit (see text). Note that there are 7 turns of the '180°' cable on the toroid, not one as shown here for clarity.

OD 10 SWG joined by 30cm sleeves of 2 inch ID 16 SWG. At each end a pair of 16 SWG aluminium arms are attached that taper from ¾ inch to ½ inch diameter. These were salvaged from an old Yagi antenna but except for the first 30cm may be bamboo or glass fibre. To prevent them from filling in the nulls off the side of the radiation pattern they have an insulator of Tufnol rod 30cm from their thick end. The arms are fixed to the spine with a 6mm bolt and held at 30° to the spine by shoulders of 32mm x 5mm aluminium bar. **Photo 3** and **Photo 4** indicate how this was achieved.

A spacer of 3/8 inch tube is fixed inside to prevent the bolt from crushing the spine. This is installed before fixing the strut or forming the tabs, to which the shoulders are attached with self tapping screws. Please be aware that some grades of aluminium, sold for masts, may not be sufficiently malleable to allow the tabs to be bent without fracture. In this case an alternative is to fit a disc of 8mm material inside the spine.

At each end of the spine a 75cm vertical strut of ½ inch 10 SWG tube is fixed via a half inch hole in the top and a large self tapping screw below. This is used to brace the arms in the vertical plane, using tendons of 2mm Dacron to their tips and 3mm Dacron to an anchor near the centre of the spine. In the horizontal plane the arms are braced by 2mm Dacron between their tips and by the elements, as seen in Photo 2.

PHOTO 2: Close up of the RG59 element ends and supports.

The spine is fixed to an 8mm plate 300mm x 150mm by a pair of U bolts. The plate is drilled for fixing to a rotator, replacing an upper clamp. It may otherwise be turned 90° for bolting to a rotating mast. Phasing lines terminate on polythene insulators attached each side of the plate. The lines then connect to a pair of pillar insulators, with one line transposed. The 450Ω rotation feeder also connects here. The other end connects to the main feeder at insulators on a cross arm 1m below the rotator. This is also where the upper mast guys are attached. A plastic bowl was fixed to the mast below the rotator to prevent the rotation feeder from touching but this was later replaced by a stand-off insulator.

BALUN. I designed the balun for use with a linear amplifier when required to drive the open feeders of doublet antennas. Several friends have used this design with their G5RV antennas. It is a compact version of the linear 4:1 type used between HF broadcast transmitters and curtain antennas. Two 90cm lengths of PF100 coax, a pair of Amidon T200-2 cores and a weatherproof box with coax connector and two terminals are required for its construction. The cores are taped together and one length of coax is wound through them to give 7 turns. The other length of coax is coiled to fit into the box. **Figure 2** shows how the cables are connected. For clarity only one turn of the 180° cable is shown. The shell of the coax connector should be joined via a short thick conductor to a local ground point.

The balun works as follows. Common mode signals appear equally on the 0 and 180° terminals. Signals on the 0° terminal are conveyed directly to the input connector. Signals on the 180° terminal are inverted to cause cancellation at the input terminal. The two transmission lines are in parallel on the input side and in series on the output side and therefore provide a 4:1 impedance ratio. The screen of the 180° coax forms an inductor in parallel with the input terminal and determines the lowest operating frequency. PF100 cable was chosen because its screen is solid copper foil and with the iron dust core it makes a low loss inductor. There is in theory no load impedance at which balance is not maintained and no upper frequency limit. Because no ferrite material is used the power handling capacity and working SWR are limited only by the current rating and insulation of the cables.

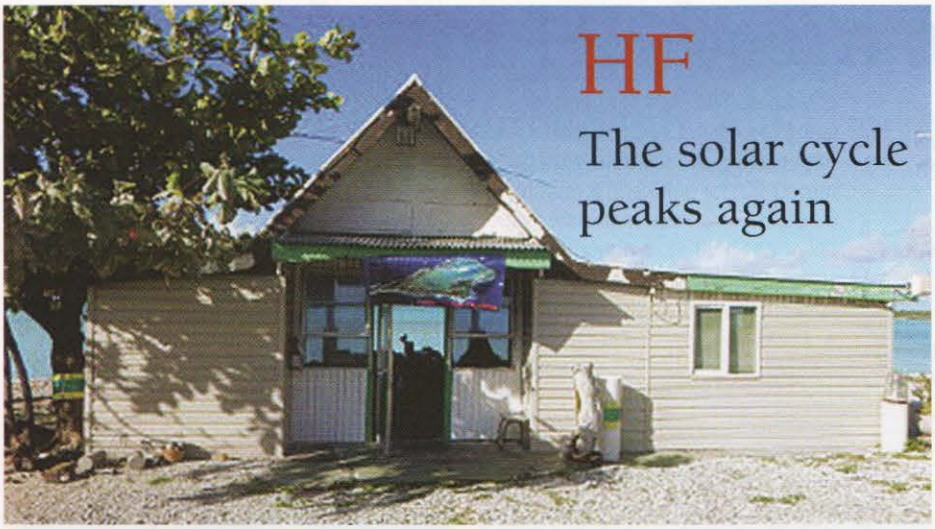
WINDAGE. The Skeleton has a wind load area of about 0.42 square metres, the same as a TH3, and mine has survived two winters with winds up to 145km/h. Its weight is less than 10kg but the total weight of rotator and mast is likely to be more than can be safely lifted without mechanical assistance. I use a scaffold pole derrick and 500lb winch. My Skeleton is fixed on a 12m scaffold mast where, compared with a half wave type multiband vertical antenna, it gets reports of 2 to 4 S-points in its favour.

PHOTO 3: Preparing the end of the spine.

FINAL THOUGHTS. If your tuner is unable to cope with the high SWR on the lower bands it may be reduced significantly by arranging to switch a capacitor across the phasing line junction. Typical values are 25pF at 14MHz and 500pF at 10MHz. These were omitted because I wanted to drive the antenna from a remote location and could not incorporate the extra switching facility. My Skeleton works on all bands, 10 to 29MHz, when using the internal automatic tuner of an Icom IC-765 radio and with an ITT/Macay MSR4020 automatic tuner, both without needing the capacitors. An Icom AT-180 tuner in the 'through inhibit' mode needed the capacitors and some fiddling with the length of the coax between balun and tuner before it would accept all bands. With a linear amplifier I use a manual 'T' network tuner.

PHOTO 4: How the arms are braced from the spine.

Martin Atherton, G3ZAY • e-mail: g3zay@btinternet.com



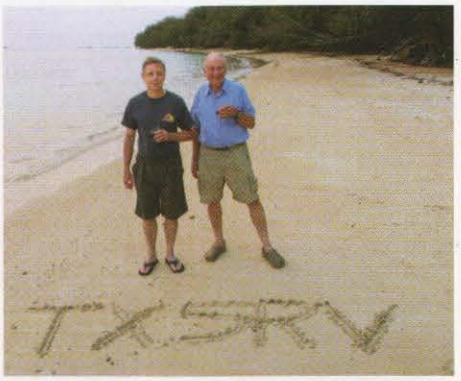
HF
The solar cycle peaks again

The Wake Island DXpedition SSB station.

SUNSPOTS AND MAGNETIC FIELDS. The southern hemisphere of the sun burst into life during November and produced a rash of sunspots and magnetic fields. The northern hemisphere was still making a contribution and, at one stage, the previous daily solar flux record for this cycle looked like it might be exceeded – but we never quite got there and numbers were tailing off as the month ended. Enthusiastic sun watchers should take advantage of an excellent website at solarham.net run by VE3EN, which brings together a range of information from different sources.

One such source is the site devoted to NASA's STEREO satellites that puts online the latest pictures from a pair of satellites orbiting the sun. One is moving a little faster than the earth and the other a little slower. This means they are gradually drifting away from us around the orbit and are seeing the solar surface ahead of and behind our position. When you look at a picture from STEREO 'behind', only features on the extreme right of the image are visible from the earth; everything else will be coming into view within the next 12 days or so. The satellites are currently about ±140° away and will pass behind the sun from opposite directions in a little over a year. We will lose data for a few weeks but they should re-emerge in working order and continue to provide a forecasting service for some time. See http://stereo.gsfc.nasa.gov/ for more information.

Turning back to propagation, statistics from M4A during CQWW SSB at the end of October revealed what seemed to me to be a slightly strange effect on the path to Japan. It was noticeable that 10m opened to JA significantly earlier than 15m – around 0700 compared to 0900. One would expect rising MUFs and LUFs to mean that the lower frequency band would open first – but maybe the rises were so steep that 15m opened and closed almost immediately around 0630 before reopening later as the MUF/LUF fell?



The TX5RV DXpedition, K3EL (L) and VE7DS (R) on Raivavae Island.

DXPEDITION RESULTS. The Wake, Banaba, and Juan Fernandez DXpeditions were the highlights of the first half of November for many, though the high sunspot count meant there was a vast amount of DX to be had from all parts of the world. One reader has asked that I include a results table showing who made the most QSOs with some of these expeditions and I think this may be possible using *Club Log*. There isn't space here to describe *Club Log*, an amazing DX tool developed by Cambridge University Wireless Society member Michael Wells, G7VJR, so I suggest you look at www.clublog.org if you aren't familiar with it. As an experiment I have generated **Table 1** from *Club Log* data, showing the UK stations making the most band/mode slots with K9W and T33A combined. Congratulations to G3XHZ, the clear winner.

Looking at the *Club Log* plots of when QSOs were made with these two expeditions it seems that on 21-28MHz most QSOs were around 0800-0900UTC, but on 18MHz there was a difference between England and Scotland, with Gs going through mostly in the morning and GMs mostly in the evening around 1900-2100UTC. 14MHz QSOs peaked in the morning and early evening, while 10 and 7MHz QSOs were mostly late afternoon and early evening. There were about 20 QSOs with Wake on 3.5MHz around 0700UTC and G3PQA got through on Top Band in the evening. T33A was much harder and it seems that only one station got through on 3.5 and one on Top Band. The long path/short path issue was rather confusing with these stations but it seems most of the morning openings on 18MHz and up were LP while 14MHz was often SP at the same time. G3PQA reports that 80m evening openings to K9W and T33A were disappointing but early November saw some strong morning openings to Wake, which petered out later in the month when T33A and W8A were on. Nevertheless some UK stations in the north and west managed morning 80m QSOs with Banaba and Samoa.

The XR0ZR signals from Juan Fernandez were weaker than expected and I suspect we will learn that they were shielded by a hill in the best direction for Europe. From 160m-20m the QSOs were almost all made around 0600-0900UTC – confounding my expectation of late evening propagation. Above 17m the optimum time switched to the afternoon and evening with 15m bridging the gap and allowing QSOs from 0900-2000. One QSO appears to have been made from G on 6m around midnight if the log is accurate.

ANTARCTICA (AN-016). This is the time of year when the continental Antarctic bases are humming with activity and present an opportunity to get that necessary QSO for the basic IOTA 100 award.

Slava, RD3MX, Alex, UA1PAW and Oleg, ZS1ANF will be at Novo Runway from November 2013 to March 2014. They plan to be QRV as RI1ANR in their spare time with a focus on the low bands. Mike, RW1AI will be active as RI1ANT from Mirny Station from December 2013 to February 2015. Alex, RD1AV will be active again as RI1ANC from Vostok Station from 1 December 2013 to 1 February 2015.

In the UK sector, Will, M0ZXA will be VP8DOI (DXing On Ice) from Halley Base from late December 2013 until Spring 2014. He is taking a K3 and will be QRV as time permits. See www.vp8doi.com.

Gerry, VK0GB (G3WIP) is located at Casey Station, Antarctica until February 2014 and according to the Worldwide Antarctic Program (WAP) he will be active regularly around 0930 and 1730UTC. Look for him around 7.195, 14.315, 18.130 and 21.300MHz.

Max, IW0HEU left for Mario Zucchelli Base, Antarctica on 14 October and expects to remain there until 31 January 2014 operating as IA0MZ during his spare time. I worked him in mid-November and his signal was arriving over the North Pole (not uncommon for stations on the far side of Antarctica).

W2EMT, AF7DJ and WY7AA are currently working at McMurdo Station and will be

QRV as time permits from the KC4USV club station. Activity will be mostly on SSB on 14.243MHz with some 'experimenting' on JT65 and WSPR.

ISLANDS. Carson, ZS8C on Marion Island (AF-021) has updated his QRZ.com page with information about his operating habits. "Recently I have started becoming more active on the air and I am hoping to make a lot more contacts in the coming weeks and months. My preferred method of making contacts is to arrange a 'private' sked between a couple of hams". He may already have been swamped with requests but worth sending an email to zs8c@hamcity.co.za if you need this one. Apparently two new operators are being trained on the base so there could be quite a lot of activity early next year.

Freddy, F5IRO will be active as FK/F5IRO from New Caledonia (OC-032) until 1 March 2014. He plans to operate mainly CW with some PSK on 10-80 metres, running 100 watts into dipoles and long wire antennas.

John, YB5NOF says his OC-109 and OC-122 visits were postponed due to bad weather but may be rescheduled in January. He is also trying to arrange expeditions to Talaud Island, OC-209, and Sangihe Island, OC-210, for May 2014. There is now an Indonesian Island Award and details are at www.nusantaraaward.com.

Take, JG8NQJ, is expected to be working again at the weather station on Minami Torishima (OC-073) from the middle of December. He usually stays for 6 to 8 weeks and is QRV as JD1/JG8NQJ in his spare time.

Japanese operators JA3ARJ and JA1CJA are planning to operate as TO3JA from the island of Martinique (NA-107) from 13-19 January. If they don't get the special TO3 call they'll sign FM/home call.

TABLE 1: Leading band/mode slots with K9W and T33A.

Callsign	K9W	T33A	Total
G3XHZ	16	12	28
GM3POI	15	4	19
G4CCZ	14	5	19
MD0CCE	12	7	19
GM0UDL	12	6	18
G4PWA	11	6	17
G0BNR	11	6	17
GI3OQR	10	6	16
G3TXF	12	4	16
G0DQS	11	4	15
MW0ZZK	10	5	15
G3BJ	11	3	14
G3SED	8	6	14
GM3YTS	10	3	13
G4EZT	9	4	13
G0BLB	6	6	12
G3XRJ	9	3	12
M0BCT	8	4	12
G3TBK	10	2	12

The Wake Island Dxpedition CW station.

Mick, G1EUZ will be active as VP8BTU from the Falkland Islands (SA-002) until 25 May 2014.

CORRESPONDENCE. Fred, G3SVK was away for some of the last month but still netted a good haul of CW DX including: on 10m (with a sloping dipole) Hawaii, Peru, Ascension, Myanmar, Swaziland, Djibouti, Australia, Rodrigues, Uganda and Libya. On 12m Bangladesh, Myanmar, Guam, New Caledonia, Namibia, Juan Fernandez, Reunion, New Zealand and Tasmania. 20m yielded several Middle East QSOs plus Juan Fernandez and Indonesia. 30m was clearly in great shape and produced the South Cook Islands and China as well as a range of Caribbean stations. 40m seems to have been his busiest band with over 30 DXCCs worked from west coast USA to New Zealand.

Peter, G3HQT found the South Cook Islands on 10m, Lesotho Libya and Egypt on 12m, and San Andres Island and Jordan on 30m – all CW. On RTTY he found Madagascar on 15m and Cape Verde and Ascension on 12m.

Peter, G4XEX says he is "DXed out" and often had to steer clear of the radio to avoid spending the whole day on the air. On 10m SSB he found China, Ecuador, Dominican Republic, Colombia, Sudan, South Sudan, Afghanistan, Macao and Ascension Island. On 12m SSB he worked Pakistan, Angola, Philippines, Afghanistan and Cameroon. 12m data yielded Guantanamo Bay and Cape Verde.

Dave, M0BVE seems to have focussed on 10m and 12m CW and found Bermuda, Madagascar, Tanzania, Sri Lanka and San Andres on 10m, with Curacao and the Congo on 12m.

John, G3PQA is an LF specialist and managed to work Sakhalin Island, Indonesia and Alaska on 160m at the end of October. He also noted long path openings to Hawaii and Alaska on 80m in early October. In November he worked K9W on 160m just before the Wake sunrise around 1730UTC and reports other UK Top Banders working Myanmar, Bangladesh, South Sudan and Juan Fernandez even though conditions generally were poor. In CQWW CW at the end of November, N7GP in Arizona was putting a good 160m signal into the UK so conditions may be improving.

Not exactly correspondence but I notice from G3TXF's web report of his 10m CQWW CW entry that he worked 39 out of 40 zones on the first day with only Zone 1 (Alaska) missing. Best DX QSOs were probably American Samoa and French Polynesia during the afternoon. Japanese stations were thin on the ground and coming in from due east rather than the great circle direction of NNE.

Tom, ZS1AFS (G0CAJ) has e-mailed to say that he and his wife, Sue ZS1AFR, will be active as ZT1T until early January to celebrate their mid-Atlantic rescue from their sinking yacht in 2010. This is a unique prefix for the prefix chasers.

Please let me have your reports around the third Monday of each month – any earlier and the material risks being out of date, any later and you may miss the deadline.

OTHER ISSUES. December and January are prime time for LF DXers and quite remarkable DX should be workable on 80m in the Pacific area from mid-afternoon through to breakfast time whenever there is a darkness path. Good antennas are likely to be needed however as signals are often weak and noise levels high.

Special Ukrainian stations EM110RAEM, EN110RAEM and EO110RAEM will be active until the end of December to commemorate the 100th anniversary of the birth of Ernst T Krenkel (RAEM). Krenkel was a famous Arctic radio operator in the 1920s and 1930s and remained active on HF until shortly before his death in 1971. He produced an autobiography *RAEM is my Callsign* that was translated into a number of European languages and is occasionally available from online secondhand bookstores (at a rather high price). The RSGB Library at the National Radio Centre has a copy for research purposes.

I am still looking for some early Geoff Watts *DX News Sheets* for the RSGB archives. Missing numbers are 1-7, 9-16, 34-41, 324-336, 461, 579 and 584. If you have any of these I would be grateful if I could borrow them or have a scanned electronic copy. I would also like to obtain scans of WA6AUD's *West Coast DX Bulletin*, so if anyone has copies of these that they could scan or lend please let me know.

And finally, thanks as always to DX-World.net, the 425 DX Bulletin, and Daily DX.

TABLE 2: 2013 worked DXCC entities.

Call	CW	SSB	Data	All
G0RPM	108	72	139	175
M0BVE	172	0	0	172
M0BKV	121	108	22	164
G4XEX	0	153	93	163
G3HQT	132	0	111	143
G4FVK	67	71	0	107

January 2014 • RadCom
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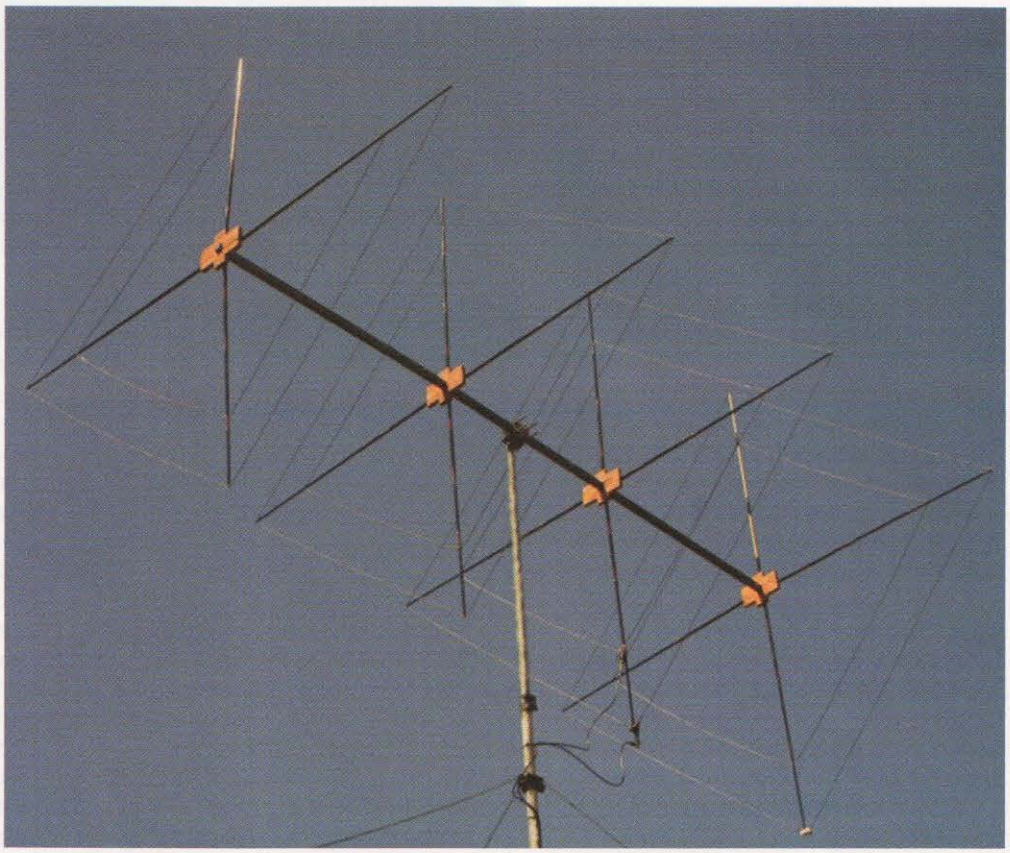
VHF UHF

Low frequency VHF bands provide DX to the southern hemisphere

INTRODUCTION. As Autumn turns to Winter and the hot days of summer seem long gone, November produced some surprises and disappointments on the VHF bands. Steady sporadic meteor scatter traffic on 6, 4 and 2m produced good DX contacts across Europe, however the once acclaimed Leonids meteor shower failed to produce much in the way of DX. Surprise openings to South Africa on 6m during 17, 18 and 21 November gave southern UK stations some overdue trans equatorial propagation (TEP). There has also been excellent feedback from last month's column regarding 70cm activity and the re-introduction of the 'league table' format. More of that later in this column and on the various bulletin boards up to the end of December.



GW4MBN dual band 6 and 4m quad.

50/70/144MHz NEWS & REPORTS. Bob, G8HGN (JO01) reports that fortunately his antennas survived the great storms of late October. Bob hadn't luffed them over as the BBC forecast wasn't predicting anything like what occurred before he left for a holiday in EA8 on the 24th, so he was sweating – and not just because of the hot weather! Although Bob's fence panels bit the dust, his antenna system was fine and with the rig back in the shack he worked ZS6CCY (KG45) via TEP on 6m on 17 November. Bob also heard ZS6OB, ZS6RAD (KG44) and the ZS6JON beacon in KG33. Unfortunately, Bob hadn't been watching the cluster as usual so only came on during the last few minutes of the hour long opening.

Richard, G4CZP (IO90) also caught the 6m opening to South Africa, which was a pleasant surprise on a dull November day. Richard had originally just gone into the shack to check on 2m conditions but for no particular reason checked 6m as well. He heard a signal around 50.050MHz which, when peaked up on the beam, turned out to be the ZS6JON beacon in KG33. Over the next half hour or so he worked ZS6WN, ZS6AYE, ZS4N and ZS4TX. Also heard were ZS4A, ZS6BTE and ZS6CCY but Richard couldn't get through the S9+ calls from stations from southern Europe. He first thought was that this must have been TEP but, considering how good HF conditions have been recently, it may have been F2.

John, GW4MBN (IO71) has been busy on the lower VHF bands working DX via meteor scatter this month. Using JT6M and FSK441, on 6m (JT6M) he worked DL5WP, IS0GQX, IZ4MAO, EA2ARD, S59A, G0MGX, GJ0JSY, DJ2TX, F6ECI, F8GGD, DK5SF, EA3KU and F1BHB. QSOs on 4m were completed with IS0AWZ, OZ1JXY, LA4YGA and IZ5ILX all using FSK441 and GM3NKG using the PSK2K software developed by DJ5HG. John's dual band setup includes an excellent homebrew dual-band 4 element quad antenna and a homebrew amplifier using 2 x GI7B triodes.

Peter, G8BCG (IO70) reports on his 50MHz EME and terrestrial activities. He completed EME QSOs on 11 November with OH6MIK, HA0DU, K7CW, N3XX, S59A and OE9ICI. On the 13th, Peter worked XR0ZR for DXCC #226 and initial #52 on EME with thanks to Josep, EA3AKY for a good job under difficult circumstances. Afternoon TEP on 17 November brought V51YJ and ZS6A both at good signals. The *big* afternoon was on 18 November with TEP QSOs with ZS6A, ZS6RAD, ZS6AYE, ZS4N, ZS6JON, ZS6CCY, ZS6OB, ZS6RIC and, at the end, ZS6BTE on RTTY for his first ZS on 6m RTTY. There were further openings on the 21st completing QSOs with ZS6AYE and ZS6NK. Peter is now off to EA8 so he will be active for evening DX as time permits from IL39.

Mike, M5MUF (IO92) thought the last half of October had been a bit odd with no real tropo to speak of and the Orionids meteor shower was... well, a bit of a shower! The Sun kept producing coronal mass ejections (CMEs) that seemed determined to miss the Earth, so he was forever waiting for the aurora that never was. As ever, 4m meteor scatter remained a good way to work some DX depending on conditions. The IG9Y operation from Lampedusa (JM65) certainly caused a bit of a stir on the VHF bands, and Mike was particularly pleased to have worked them on both 6 and 4m on 22 October. Mike QSOs with IG9Y turned out to be their best DX at 2192km.

From 1 November to 31 December, Swedish club station SK5AA have temporary permission to use 4m on 70.1375MHz. Per-Olaf, SM5EPO already had an excellent MS capable station available for use by Vasteras Radio Club , SK5AA. Having missed the previous SK3JR operation on 4m, Mike was glad to finally have the new country in the log, being the first UK station to work SK5AA. A follow up QSO on 11 November was made as the Swedish team, despite all their efforts, were struggling for sked partners.

During the 50MHz UK Activity Contest on 22 October, Mike managed two MS QSOs, working GM0HTT (Orkney, IO89) for a new square, and then GM4VVX (IO78), completing a contest exchange just in the nick of time. The last 70MHz UK Activity Contest of the year was equally dire with nothing outside G in the log, not even GW. The 6m Nordic Activity Contest on 14 November landed a whopping two QSOs, both on MS using JT6M – GM4VVX (IO78) and OZ7EDR (JO55).

During late October, Mike made his first 144MHz MS QSO since getting back on the air. Using just 30 watts he completed easily with DJ9EV (JN49) showing that high power is not a prerequisite in working stations via MS. Patience and skill is just as, if not more, important. Mike also worked YU7TRI (KN04), DL1VPL (JO61) and YU1EV (KN04). The 144MHz Marconi CW contest brought DX contacts with ON, PA even with Mike's low power and rusty Morse his best DX was DF0MU at 580km. Having the contest on the busiest weekend for fireworks didn't help as it was hard to concentrate on receiving weak signals. Mike also added a few unwelcome dits of CW as the bangers went off! Sadly the conditions on 2m were poor and there were no fireworks on the air.

The 144MHz UK Activity Contest on 5 November produced surprisingly good results. Mike was expecting a flat band, but managed to work GI, GD, & GM quite easily, with ODX being an old friend to the VHF/UHF Column, GM8FFX. It's great to see Graham back on the band and let's hope it's a regular signal from IO87. 16 November brought some conditions on 2m, though not as good as was expected from the Hepburn forecast. As usual it was mostly confined to coastal/southern areas and not great for IO92. Mike managed to work Mark, EI3KD (IO51) on CW and then SSB with good signals but later in the evening a test with SM6CEN didn't complete. Using JT65A mode did allow for a QSO with DJ6AG (JO51) for a new square. The Leonids peak was supposed to be on 17 November, but conditions didn't seem too good just like other operators had observed.

The UK Six Metre Group has decided to introduce a new concept for the Winter season that they are calling the 'UKSMG Winter Marathon'. As its name suggests it is a marathon style competition event and will be held over a two-month period, which started on 1 December and ending on 31 January 2014. Check out the Group's website for more details [1].

Lyn, GW8LJY (IO81) gave an excellent talk on meteor scatter at the RSGB Convention. The presentation was videoed by Paul, G4DCV and is now on line [2]. For anyone who is just starting out using meteor scatter or indeed a bit rusty on using the current software and techniques, this video is well worth watching. Lyn has become a prolific MS operator over the past few years but was a bit surprised when Joe Taylor, K1JT came to sit in and enjoy the presentation. Lyn follows with an excellent report on activity on 144MHz during late October and early November. On 27/28 October he completed MS QSOs with OE9ICI (JN47), IV3GTH (JN65), IK0BZY (JN61), SM6CEN (JO67), SP2CHY (JO94) SP7BUZ (KO00), SM3EPC (JP81), IS0AWZ (JM49) and S58M (JN76).

On 16 November there was a little tropo opening and one or two German stations were quite strong. DF0MU (JO32) was indeed the strongest on SSB at S7. During an MS QSO with SM6CEN (JO67) on the same day, Hakan informed Lyn that he could copy him very weakly on tropo too. With his experience using the WSJT suite of software, Lyn was aware that the JT65b element is very effective under marginal tropo conditions and so they tried a tropo QSO using that mode. The QSO was completed easily at a distance over 1182km with SM6CEN at speaker level for a few periods. Afterwards they tried SSB but although they could copy each other very weakly, unfortunately no QSO resulted.

A further tropo test using JT65b with Dieter, DJ6AG (JO51) at 940km completed no problem. Interestingly this QSO was completed with no identifiable signals from DJ6AG showing the ability of the software to copy sub audible signals. Meteor scatter continues to be Lyn's main method of working daily DX on the 2m band. Lyn can't understand why so few try it as it's so easy to do. If you are interested, but wonder what MS FSK441 entails, please check out Lyn's video Meteor scatter using FSK441 for Beginners, it is very informative with excellent presentation.

Thanks to David, G0FVH (IO80) for his compliments regarding the column content. David has started using digimodes on 2m, having seen the report from Brian, GW0GHF. David is now looking for contacts on 144.138MHz although he does say activity seems to be low in the Dorset area. No activity on 2m in this part of the country as yet.

70cm ACTIVITY PROPOSALS. Many thanks indeed for the feedback from December's column regarding increasing activity on the 70cm band. There were many comments agreeing that the band is so under used and numerous suggestions of a way forward. The majority however seemed to agree that definable Activity Periods are one way forward and, with this in mind, I would like to propose the following. Starting in January 2014 there will be two activity periods per week on Wednesday 7 to 9pm and Sunday 9 to 11am (local time). It was thought to be important that these periods were outside of the Tuesday night UK Activity Contest series to give an opportunity for non contesters to enjoy increased activity levels. The Sunday period was chosen because there are an excellent series of continental contests, in particular the French REF 70cm contests, that would benefit from an increased activity level. A key feature of these periods is to motivate club stations to participate and, to this end, clubs will be contacted as soon as possible to try and activate their own club callsign along with their members during these periods.

We are investigating the possibility also of a Gx100RSGB style callsign programme that could be operated in a similar way identified particularly with 70cm in mind. As this will take time and negotiation it would be great for us all as clubs and individuals to establish the activity period in the meantime. As the first period is on New Year's day evening there seems no better day to start. More information will be available before this time via the usual Yahoo and other Message Board Groups but in any event let's try and be QRV in the first week. It is not impossible to consider additional periods on different days in the week as activity levels increase.

LEAGUE TABLES. There was also a keen interest in the re-establishment of the Norman Fitch, G3FPK league tables, run very much on the same lines as before. However as the licensing structure has changed over the years it is hoped that the tables be re-introduced but with three different categories with respect to power levels. It is proposed that these levels follow the 10/50/400 watts style with respect to the Foundation, Intermediate and Full licence structure. Please give your considered feedback on this so we can introduce the tables again as soon as possible in the New Year.

Thanks to all who have sent in reports this month and look forward to more in the New Year.

WEBSEARCH

[1] www.uksmg.org/contest/winter-contest-rules.php
[2] https://vimeo.com/77358505

January 2014 • RadCom
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GHz Bands

More from the activity soapbox and another propagation mode to try

PHOTO 1: DL3MBG (front) and OE3WOG with their 122GHz equipment. Photo: OE3WOG.

ONE YEAR ON. A Merry Christmas and a Happy New Year to you all! When I started writing this column a year ago I hinted that I was looking for a steer on where the column should go, and I was reminded of this by a letter in the December *RadCom* asking for more content for beginners. Other than that request, duly noted, I have had little feedback as to how people would like to see the column evolve so I can only continue taking it my way until anyone else has a better idea! I've actually featured some beginners' content, such as the SDR dongle/LNB 10GHz receiver idea and the feature on a low cost kit for 1.3GHz, but I'm not at all convinced that the GHz Bands column should be too beginner focussed. It is by definition a 'specialist' column, reporting what is happening at the sharp end of amateur radio technology. Be patient; *RadCom* will be publishing a 'microwaves' article in the 'Getting Started in' series later this year, written by G4DDK and myself.

So what else can be done to get people interested in the GHz bands? Like it or not, setting up a GHz bands station requires more dedication and technical competence than many other amateur radio interests and I firmly believe two things; namely that the route in to microwaves is to first gain some experience operating on the VHF / UHF bands, then get help from an existing microwaver. The UKuG runs a 'technical support scheme' [1] where members can get help in starting and in building equipment. The existing microwavers, in turn, should set an example by being active themselves. The majority of amateurs like to go on the air and have QSOs, so those of us who already have microwave gear should get on the air outside of Tuesday night and the big openings, and don't just sit at home reading about the topic, watching internet reflectors, or at best building kit we never use! Try to set up skeds with people, try a new digimode, get out to the radio clubs and enthuse for half an hour about why you are a microwaver. My 'Introduction to Microwaves' presentation [2] is available to anyone and I encourage all of you to get a copy, tweak it to suit and take it round your club. I'm sure like me, many of you find it difficult to advise people when the main reaction seem to be a dismissive "It's too expensive" or "It's too difficult" and "You don't make enough QSOs." Go out and debunk these myths. For those who are already microwavers, I ask two questions. When did you last go on the air outside a contest or major opening, and what have YOU done to encourage a beginner recently? Tell me. I'm always looking for stories about what's going on around the country to get people interested.

TALKING TO MYSELF. The lack of 10GHz activity in the UK recently inspired me to try something other than passively listening to beacons. As there was no one to work one Monday Activity Night, I tried transmitting JT modes to myself via the Mow Cop SDR [3]. My signal was not audible via the SDR but faintly visible on the waterfall display once in a while. I connected the SDR PC speaker output to the input of my sound card and by running two instances of WSJT I could transmit for one period and listen to my signal back via the SDR. I tried all the JT4A to G modes plus JT65C. My signal via the SDR was clearly visible on the JT screen and decoded on all modes except the widest, JT4G, at around -19 to -23 depending on the path at the time. Further tests when the path was enhanced by rain scatter showed that the widest mode, JT4G, worked the best and JT4A and B failed due to spreading. 'Data' columnist Andy, G4JNT, who observed these tests via the SDR will be writing more about this next month. This bit of self-indulgence just shows what JT modes can do on 10GHz with paths that are below the audio threshold. If anyone else would like a play it'd be fun to have a JT QSO via the SDR. Or even better, a REAL, two station, JT mode, below threshold, QSO!

ANOTHER PROPAGATION MODE? I reported recently that the GB3CAM beacon on 24048.870MHz (IO92WI53) was back up to full power. Well it's been a bit of a revelation having a consistently strong 24GHz signal to look at. As the autumn leaves fell it became even stronger and is now a consistent 55 on the 27km path from Wyton. Turning my dish round I can pick up three distinct peaks of signal as well as the direct one and these seem to correspond to my local high ground at Haddenham (NW), Brinkley (SE) and Boxworth (SW). All are in the order of 10-15km from me and are typically 50m higher. While these efforts could hardly be described as 'mountain bounce', at the same time I came across a note by Rein, W6SZ in the November issue of the San Bernardino Microwave Society Newsletter [4] describing his experiments with mountain bounce on 10GHz. For some time he has been using mountain bouncing techniques from his valley QTH in Cucamonga (DM64ed) to reach hams in San Diego and Orange County on paths obstructed by mountains. He observed that

PHOTO 2: 24GHz Feed, preamp WG22 switch and 10W SSPA at G3WDG. Photo: G3WDG.

when AF6NA was /P at the coast in Santa Barbara (200km the opposite side of Los Angeles) his signals could be identified via two bounces. Rein would like to see more efforts using bouncing, and I would be interested to try in the UK. I would be keen to hear from anyone in hillier areas than me who have had success on this mode. Using waterfall detection and JT modes, many contacts should be possible between suitably sited stations, and it just might encourage more of you to try home to home QSOs.

ACTIVITY REPORTS. Wolfgang, OE3WOG sent me a report of a record breaking QSO on 122GHz of over 130km on 19 October. A group consisting of OE5VRL, OE3WOG, OE3WRA and DL3MBG broke the distance record with equipment consisting of single diode mixer downconverters for RX and CW transmitters using a diode tripler for Tx. Both used a G3RUH GPS reference to drive an OE2JOM PLL controlling a crystal in the 100MHz range. The output of the PLL locks a 13.5GHz DRO that delivers +15dBm output. This 13.5GHz signal is used to overdrive a 40GHz linear amplifier from a piece of 38GHz microwave link equipment and provides 100mW at 40GHz on the WR28 waveguide output. This LO chain is tripled for the CW Tx and also used for as the LO for the receive converter. DB6NT mixers were used as an RF head. The line of sight QSO was from Mount Plöckenstein in Oberösterreich, JN68WS14qp, 1360m ASL and Mount Geiereck on the Untersberg Mountain in Salzburg, JN67MR13bk, 1708m ASL. There is a YouTube video clip of the QSO, see **[5]**. Jim, GM3UAG (IO87XJ) reported things to be, as usual, quiet at his QTH but he did have a scheduled contact with GM4YLN (IO85IV) on 1.3GHz. SSB 59 both ways at 182km. Jim notes that with 45W to a 2m dish and a good take off south and with 10W to a 65-ele Yagi at Chris's end with a good take off north, maybe the QSO is not surprising, but it did though make a change from his usual 20km Aberdeen contacts that are about the only ones he gets on 23cm! It just shows that the possibilities are there – we just need more activity. Good to see Denis, G3UVR (IO83KH) now QRV on 10GHz. Bob, G8DTF (IO83SM) reported a QSO with him on 18 November. Denis is using a G3WDG transverter with less than 100mW out into a dish pointed out of an open window. He was 59+ with Bob who received him 59+20dB. I believe this was Denis' first QSO with this equipment.

EME. The 24GHz 'firsts' continue, with a G – VK QSO on 6 November, taking 30 minutes and completed at 1715UTC. It was between G3WDG/G4KGC and VK3NX. Charlie and Petra have made several attempts previously with VK7MO who has 10W and 1.1m dish, but no QSO has been possible to date. Both stations have managed successful decodes of each other but not all in one test yet! VK3NX has a larger dish and the path worked first time. The distance is shorter, meaning that the mutual window allowed higher elevations than with VK7MO and consequently lower atmospheric absorption. 24GHz is different from other EME bands in that it becomes more difficult at lower elevations so earth distance can matter on EME! Equipment: G3WDG: 10W/3m dish (**Photo 2**), G4DDK004 with G8ACE RDDS at G3WDG locked to homemade G3RUH style GPSDO. VK3NX: 10W/2.4m dish, free running LO (G8ACE oven oscillator). A full technical report on the QSO can be seen in the UKuG magazine *Scatterpoint*. Here on the Fen Edge I had that rare beast, an SSB EME QSO with OK1KIR on 2.3GHz. The Czech club station runs a 4.5m dish and I was using my little 1.9m RF Hamdesign dish **[6]** and around 180W. After working them on JT65C random, then CW, I 'completed the set', copying both callsigns and my report on SSB on the first over and getting 'Rogers' from them shortly afterwards. Doug, G4DZU sent me a report of his activity on 1.3GHz JT modes in the October ARRL contest. He writes: "As my existing LDF5 cable to the dish had become faulty, our son was very useful, digging a 2ft trench across the lawn to lay new duct for a length of LDF6. The return loss and attenuation is now much better. This was used in the November session of the ARRL EME contest where there was tremendous activity on CW & JT65. My waterfall display looked like a swathe of multicoloured cloth as it displayed the various signals off the moon. I could only be active for a limited amount of time, but still managed to work 15 stations using JT65." Doug also sent me the 'log' from his *MAP65* **[7]** software that automatically monitors JT activity over the band. I counted 42 individual callsigns in the list!

BEACON NEWS. F5EJZ has put two new beacons in to service near St Malo, IN88XP. One is on 10368.935MHz running 250mW in to a 10dB corner reflector and another one on 2320.935MHz running 3W to a 2 element quad. The locator is IN88XP and both beam 20°. EA5DOM sent me details of another 10GHz WebSDR receiver **[8]** located in Playa de Muchavista, Campello, near Alicante in Spain. This one allows you to switch antennas between a dish and an omnidirectional slot. It is operated by EA5CV and EA5DOM, e-mail ea5dom@ure.es for more details. Anyone planning a trip to the Costas and taking 10GHz equipment may find this of interest.

FOOTNOTES. I was saddened in December to receive the final ever copy of *VHF Communications*, the English version of *UKW Berichte Magazine*. Andy, G8ATD, who has published it since 1999, writes that it is no longer viable due to falling subscriptions and that he could find no one to take over publication. This a great shame. Over a few beers at Friedrichshafen this year I got chatting to Michael, G7VJR, the author of the HFers log analysis application *Clublog* **[9]** and, after a little prompting, he said he'd look into extending the bands it covers. It now accepts log entries on all bands up to 2.3GHz. Unfortunately, despite my best efforts at persuasion, it would not have been easy to change it to accept and track locator squares, but I'm hoping Michael will soon get it to produce tables of DXCCs above 50MHz as well!

WEBSEARCH

[1] UKuG Tech support: www.microwavers.org/tech-support.htm
[2] Introduction to Microwaves: www.g4bao.com/Files/CUWS2012.pdf
[3] Mow Cop SDR: http://mowcopsdr.boldlygoingnowhere.org:8901
[4] San Bernardino Microwave Society: www.ham-radio.com/sbms/newsletters/2013nwsltrs/11sbms2013.pdf
[5] 122GHz QSO video: www.youtube.com/watch?v=JlgoepVF43E
[6] RF Hamdesign mesh dish kits: www.rfhamdesign.com/products/parabolicdishkit/index.php
[7] *Map65*: www.physics.princeton.edu/pulsar/K1JT/map65.html
[8] Alicante 10GHz WebSDR receiver: http://maxiplaya.dyndns.org:8901
[9] *Clublog*: www.clublog.org
[10] GHz bands on Twitter @g4bao
[11] 2014 Microwave events list: http://microwavers.org/events.htm

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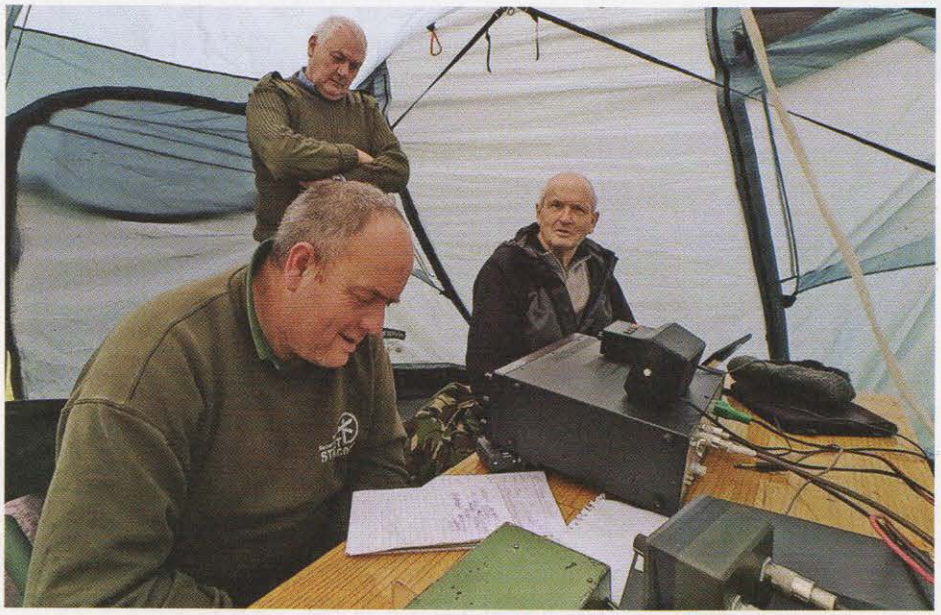
http//rsgb.org/main/operating/centenary-station/

G100RSGB – amateur radio at its very best

More stories from the clubs who have operated the RSGB's Centenary station



Wide angle view of LF station: L-R, Paul, M0PNN, Eric, M0KZB, Martyn, G3UKV.

TELFORD & DISTRICT ARS. Telford & District ARS started planning for their involvement in running a G100RSGB station early in the spring. They applied for a couple of slots, to include a Wednesday (their club meeting night) and a weekend. Unfortunately, with only four weekends available, they got 26 & 27 October, which was neatly covered the 48 hour CQ World Wide DX SSB contest – so it was quickly decided to concentrate on the WARC bands and VHF/UHF. However, it was also decided to operate on all 13 bands that qualify for the RSGB Centenary awards (160m to 70cm, excluding the 60m band), so antennas and rigs were prepared, using club-owned equipment and aerials as far as possible for all bands.

LF station tent and masts etc.

TDARS club premises are great, but there is limited scope for good antennas, so the decision was made to operate from the nearby Little Wenlock Parish Field. Plenty of room, but also a clayey, water-retaining soil. Four stations were established, covering LF (160-30m), HF (20-10m), VHF/UHF (6, 4, 2m and 70cm), plus a separate 2m/70cm vertical (FM) setup.

About 25 club members participated in one way or another and gave all 13 bands a good airing, with about 1000 QSOs in 53 DXCC entities, using a mixture of beam and wire antennas. They avoided the CQ WW SSB contest in general, although a few ops seemed to like receiving '59-14' reports. The weather threw everything at them over both sessions and it was interesting to clear the field of tents, towers and masts at the end of the Wednesday session in darkness. Wellies were the order of the day – every day!

A few random observations from the three days of activity: – G100RSGB is a '#~@+*]#' to send using CW, but a memory keyer helps; club turnout and support was magnificent and a motivation for further expeditions and equipment improvements; propagation, after two X rated solar flares, was very mixed, to put it mildly; the DX spotting and RSGB 'Alerts' system were a god-send in guiding stations to the current frequencies in use. For example, there were 149 'spots' for G100RSGB over the weekend.

Finally, everyone said they had had a great time.

Humour was a vital ingredient in the awful weather conditions of late October – good luck to those that followed in November/December in Regions 1 and 8, especially if they also choose to operate portable. The VHF/UHF FM station was the only one *not* to operate in a tent. Following a comment sent by a station working Simon, G0UFE in his work's van to the effect that he was fortunate to be better protected from the elements with some home comforts, he replied that really the other on-site stations were far better off, as they had the luxury of running water!

Martyn, G3UKV

WYTHALL RADIO CLUB. When the members of Wythall Radio Club first heard of the RSGB plans to have a roaming G100RSGB licence going around the Regions to celebrate the centenary of their foundation, it felt like something we felt should have a go at.

We had wanted a weekend spot when the NoV came to Region 5 in October and November but those seemed unavailable so we had to go for a two day Thursday/Friday event, something that would later prove to be a blessing in disguise, especially as the contest season was in full swing during weekends in the autumn!

Reading about the experiences of other stations drove us to set high standards for ourselves and a desire to be one of the best G100RSGB activations in the country.

We had a number of things going for us:

- A highly enthusiastic and large membership
- Our own shack and equipment
- Members with the technical and engineering expertise to bring it all together
- A desire to publicise our progress and our hobby via our website, the press and by inviting some VIPs to come and see what we were about.

So what did we achieve? A 6 station, 160m-70cm, multi-mode operation, using the N1MM logging software networked

Some of the ladies of Wythall Radio Club operating G100RSGB. Is this some strange kind of record?

Mike Pugh, G4VPD demonstrates 10m to the Financial Secretary to the Treasury, Sajid Javid MP.

across the computer workstations, so that at any one time, all 6 operators could see who our other stations were working and on what band and mode and in real time! The N1MM data was collated and together with shack webcam shots, streamed via a Raspberry Pi live to our website so that the whole world could see what we were doing and see our logs live as they made their contacts. With a chat box available too, we were able to interact with stations and respond promptly to requests to change bands or modes or beam in certain directions, for example.

Two days of 0800 – 2300 operation garnered a total of 2,234 QSOs, which meant that we beat our self-imposed target of 2,000 QSOs for the event.

On the Friday, we were pleased to receive visits from the Financial Secretary to the Treasury, Sajid Javid (who also happens to be our local MP) together with two of his teenage daughters. It transpires that Friday is constituency day for most MPs and that gave us a better than average chance of 'getting our man'.

Two of our local councillors, Mark Bullivant and Roy Clarke also popped in to encourage us and we were especially pleased to welcome the General Manager of the RSGB, Graham Coomber, GONBI who operated the station for a while, as well as making some useful personal contact with Mr Javid, with a view to developing representation for the RSGB at a higher level. Clearly our VIP visitor enjoyed himself as he tweeted a few hours afterwards "Exciting visit to G100RSGB aka Wythall Radio Club. Brought back childhood memories..."

Naturally we all had a great deal of fun as well, living up to our club motto "Having fun with RF".

There are lots of people to credit, our president Chris, GOEYO project managed the whole event and generally whipped us all into shape! Lee, GOMTN and Callum, MOMCX were our computer genii allowing the fantastic live feedback on our club website www.wythallradioclub.co.uk while Jim, 2E0BLP kept us all plied with food and drink & Chris, G7DDN handled the VIP invites and the publicity side of things.

There are so many operators and so many highlights that we would probably need half of *RadCom* to tell you about it! So please spare a thought for those who we cannot mention by name due to space constraints, but we are proud of them all.

However, we really should give an honourable mention to our Chairman (and a Founder Member from 1981) Mike, G4VPD, who was present for almost the whole two days, but just a couple of hours after we finally went QRT, rushed to the Queen Elizabeth Hospital in Birmingham to become a Granddad for the first time!

It was the perfect ending to a great couple of days. See you in 2113?

Chris, GOEYO & Chris, G7DDN

SCOTLAND. When I first learnt of the RSGB's Centenary celebrations, I immediately thought that I wanted to be part of that, having been a Member since shortly after getting my ticket 46 years ago. Well, I had to wait till November before Region 1 got its turn, yet it was very refreshing to see that plenty of interest in this activity was being maintained, both in UK and abroad.

The West of Scotland ARS was allocated 11 and 12 November. The 11th was an all modes session from the Club's shack near Clydebank, whilst the 12th was billed as a CW Demonstration and practice session from my station on the south side of Glasgow. I was also privileged to be allocated 13 November as an individual event.

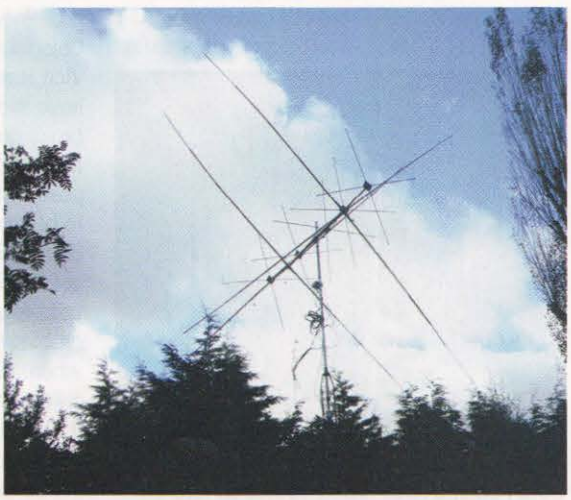
Boosted by the adrenalin of the FOC 75th anniversary celebration in May, I decided to attempt an extensive all band effort. I think this was achieved, despite my having a commitment on the Wednesday afternoon and a prior disaster that degraded my doublet's performance on the lower bands. Some 1400 plus QSOs later, I confirm that this has been (and still is) an amazingly exciting celebration – a true once in a lifetime opportunity for those who don't often get chance to take part in DXpeditions to enjoy being on the receiving end of major pile ups.

One down side was that I was competing with several major DXpeditions and it was sometimes less than obvious which frequencies were available. I once received significant (unjustified) abuse for accidentally treading on the frequency of a DX station I couldn't hear. I also found myself being hampered by large pile ups calling other stations.

I do wonder at the spread of these pile ups. When operating GS4FOC, I listened 1kHz up. In practice, most people were calling me between +800 and +1200Hz, this seemed enough (by and large) for CW. For GM100RSGB I used same frequency and only responded to those who called within the limits of a narrow filter (about 250Hz). It's a pity similar discipline can't be enforced more generally.

Finally, thanks to all for arranging such an excellent event.

Terry Robinson, GM3WUX



The quad used for part of the GM100RSGB operation.

January 2014 • RadCom
Elaine Richards, G4LFM • e-mail: elaine.richards@rsgb.org.uk

RSGB Centenary Convention

In defence of the quad antenna

The 2013 RSGB Centenary Convention was a great success with accommodation on Saturday night selling out weeks before the event. More visitors than ever before attended the lectures. There was a full programme of events including the judging of the RSGB Centenary Construction Competition and several historic lectures to reflect the Society's centenary year. The event was again sponsored by Martin Lynch & Sons, to whom the RSGB is most grateful.

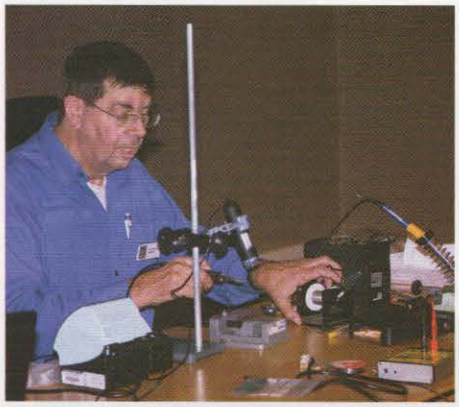
The event opened with the ML&S Buffet on Friday evening when guests were entertained by Steve Dean, who brought his own brand of unforgettable close up magic. Several new tricks were shown, but guests still haven't worked out how he does the ones they have seen before!

On Saturday morning, RSGB President Bob Whelan, G3PJT opened proceedings and welcomed all guests, particularly the overseas visitors. He then introduced the keynote speaker Joe Taylor, K1JT who spoke on DXing with weak signals.

Joe Taylor, K1JT spoke on DXing with weak signals to packed lecture rooms.

JOE TAYLOR, K1JT. It's not often that you get to meet a Nobel Laureate but Joe Taylor, K1JT is just that and he earned the honour through his pioneering work in radio astronomy. It's difficult to imagine anyone better qualified to talk about weak signal reception.

Joe has become well known in the world of data modes through his WSJT (Weak Signal JT) suite of programs. Although originally designed to help with moonbounce and meteor scatter propagation, his suite of software is now used right across the radio spectrum. After giving the audience some background on his amateur radio studies into weak signal reception, Joe moved on to look specifically at the HF bands. Here his JT65 software has become very popular and successful. As a result of this success, Joe described how he set about designing a mode that was optimised particularly for the LF and MF bands. The end result was the development of JT9. This mode uses just 9 tones (hence the name) and occupies a tiny 15Hz channel. Joe reported that JT9 signals are receivable at -26dB below noise and JT9 appears to be about 2dB more sensitive than JT65. Joe concluded by explaining that the new JT9 and JT65 programs are available in the WSJT-X download. Joe also explained that he is planning to migrate the entire software suite into WSJT-X.



Dave Powis, G4HUP demonstrated surface mount construction techniques.

OTHER LECTURES. There is only one problem with being involved in the historic presentations to celebrate the RSGB's Centenary – you don't get the chance to visit as many lectures as you may wish. But given the attendance over the two days, these historic talks were appreciated by visitors. In particular, Dr Elizabeth Bruton, who spoke on the role that radio amateurs played in World War I in the advancement of radio technology, including several very prominent Members of the Society such as Colonel Hippisley, HLX who was an RSGB Vice President. He later went on to have the callsign 2CW. When war broke out in 1914 he joined Naval Intelligence and set up listening post on the coast. They were able to predict Zeppelin raids, as they could receive the orders given to get the Zeppelins out of their sheds prior to a raid. He also solved the problem of listening to U-boats when they were talking to each on the radio by devising a double-tuning device that simultaneously identified the waveband and precise wavelength. Leslie McMichael, MXA (2MI in 1919 and later G2FG), a Founding Member of the RSGB, served in the Wireless Instructional Section of Royal Flying Corps in WWI. He worked on the miniaturisation of aircraft radios. Dr Bruton is continuing her research as we go toward the Centenary of WWI.

The ongoing problem with increasing levels of distortion were tackled by Peter Chadwick, G3RZP in his own inimitable style. Peter reviewed how the widespread use of low voltage high power linear amplifiers was contributing to the problem and indicated how designers might tackle the need for greater linearity.

One of the most well attended and lively sessions was headed by Paul Jarvis from Ofcom who presented the background to the planned review of the Amateur Radio Licence next year, a subject dear to everyone's heart.

It was good to see Ofcom engaging with the amateur radio community at this early stage in the process and, whilst not everyone agreed with some of the developing proposals, there was widespread appreciation that Paul had made the time to come and debate with us.

Sam Jewell, G4DDK described a modern 70MHz/28MHz linear transverter module, the Napton. His project received an award of 'Highly Recommended' in the accompanying Centenary Construction Contest. A kit will be available for this project in the near future. You can find more details at www.g4ddk.com/4m%20web%20doc.pdf.

Carl Luetzelschwab, K9LA gave a fascinating overview of the findings from many observers of the sunspot cycle and the various hypotheses of the causes. Of particular interest to many was his treatment of the hot topic of whether we would experience a double peak in the current cycle. Whilst avoiding a clear prediction,

Dr Elizabeth Bruton spoke on the input to technological advancement that radio amateurs made during WWI.

Rob Chipperfield, MOVFC was the recipient of the G5RP Trophy.

The ROTAB trophy was awarded to Gavin Taylor, GMOGAV.

Cyril James, G3VVB was awarded the G3VVB trophy by the UK Microwave Group.

Carl commented that most of the sunspots in the current cycle had predominantly been from one of the solar hemispheres. As they tend to come from both hemispheres during a full cycle, there was the hope that the other hemisphere would soon start to exhibit spots.

Carl also mentioned the long-term correlation between sunspots and the solar magnetic field strength. Rather alarming was the suggestion that the field strength would fall below a threshold below at which sunspots may not be apparent. However, Carl made some more optimistic observations for our ionosphere continuing to be ionised if observable sunspots were to diminish or disappear.

Carl and his wife, Vicky, also did the DXCC checking, a service for which visitors are most grateful.

John Regnault, G4SWX, presented Building a Remotely Operated Station. The talks on both days were full to overflowing and were extremely popular with well informed questions that showed many amateurs are interested in following this route. Although John is the RSGB's VHF Manager, the same approach works at all frequencies. The talk covered UK licence conditions as well as the technology both of the internet and station RF and control issues. John has great experience of this mode of working and the detail that he applies to 'get it right' was much appreciated by the audience.

CENTENARY CONSTRUCTION COMPETITION. This was the first time in recent history, possibly ever, that the Convention has hosted a construction competition. There were around a dozen entrants in the three categories – Builders, Designers and Raspberry Pi users. Marks were awarded for innovation, build quality and application.

The competition entries were assessed by a formidable panel of judges led by Joe Taylor, K1JT who was joined by Eben Upton, co-Founder of the Raspberry Pi Foundation, Olof Lundberg, GOCKV and Steve Hartley, GOFUW.

With no precedent to guide them, the judges were able to approach their task with completely open minds and were impressed by the range of entries and the thought that had gone into them. In the end, and after much discussion, they came to a unanimous decision on the winners in each category, although it was a close run contest with 3 other entries highly commended.

Cash prizes (and a radio from ML&S) were awarded to the winners. In recognition of the fact that there were other very worthy entrants, the highly commended recipients also received cheques.

The Society intends that a Construction competition should become a regular feature of the Convention programme and details for 2014 will be announced in *RadCom* in the near future.

PRESENTATIONS. This year there was an addition to the usual Gala Dinner, a Technical Dinner, which was a quieter, more relaxed affair that conclude with a after dinner talk by the well-known QRPer George Dobbs, G3RJV. Traditionally, two presentations are made at the Gala Dinner on Saturday evening – the ROTAB trophy and the G5RP trophy – but this year an additional microwave award was made.

The Royal Order of Transatlantic Brass Pounders trophy recognises outstanding and consistent DX work and was awarded to Gavin Taylor, GMOGAV. The G5RP trophy is an annual award for the greatest progress in the DX field made by an RSGB Member

The three raffle prizewinners with their radios.

resident in the UK. This year the winner was Rob Chipperfield, MOVFC. The UK Microwave group trophy for the best home-constructed microwave equipment exhibited at a microwave roundtable or convention, in honour of Cyril James, G3VVB was presented to Brian Austin, G1IKV.

RAFFLE. Thanks to the generosity of Icom UK, Kenwood UK and Yaesu UK there were three top prizes in the raffle that raises funds for the RSGB DXpedition Fund. The final act of the Convention is the draw, which always attracts a large crowd.

VOLUNTEERS. The RSGB Convention couldn't take place without a small army of volunteers who work in the background to make the event the success it is. There's not enough space to mention everyone, and apologies to anyone missed from the list. The RSGB would particularly like to thank Dave Wilson, MOOBW for his work in bringing the Convention to life, Kath Wilson, M1CNY for manning the visitor's reception among many other details, as well as Jim Lee, G4AEH, Julian Woolvin, MOJPW, the Regional Team and Brenda Woolvin for their invaluable help over the weekend.

NEXT YEAR. The date to put in your diary for 2014 is 10 to 12 October. Details of the programme and bookings will appear later in the year in *RadCom* and on the website. If you have any suggestions, let us know.

January 2014 • RadCom
Steve White, G3ZVW • e-mail: steve.g3zvw@gmail.com

Sport Radio

How to be top dog in 80m AFS, virtual meeting places and dealing with a cheat

WINNING AFS. Last year Mark Haynes, MODXR scored a double, by being the leading individual entrant in both CW and SSB AFS. I really wanted Mark to tell us how he was so successful, so here's his explanation of CW AFS.

"Usually I can be found taking part in the large 48 hour contests such as CQWW, ARRL, WPX, etc, however some of the shorter events can be extreme fun and contests such as AFS CW provide an opportunity to either team up with other local club members or put in an entry on your own – or both! This contest is less strenuous than those that last a whole weekend, being just 4 hours long – plus it is primarily an 'inter-G' event with perhaps the odd DX QSO... if you're fortunate, that is. It's great to hear some huge signals and say 'hi' to friends around the UK. Not having a station at home at present I am fortunate in that Dave, G3RGS allows me to use his station and enter as part of the Cray Valley Radio Society team. Dave really looks after me with refreshments and generally making sure all is in order, which is actually a key component to success in any contest. Feeling comfortable is very important, for me at least, and fuels my ability to be motivated to do well. I bring my FT-2000 or use Dave's FT-1000MP, run an ACOM linear and the antenna is a simple dipole – the centre of which is supported by a 70ft tower. One end is tied off on the house and the other to a tree. It is often felt that too high an antenna cannot be so good in contests such as AFS, where working the UK is the main source of QSOs (as more height can reduce the high radiation angle needed for short skip).

"My operating tactics are:

1. Ensure accuracy – be mindful that what is being logged is checked in my mind and verified again mentally, at the same time as it's received the first time.
2. Don't send too fast, maybe no more than 30-32WPM – and if called by someone slower, reduce speed to match.
3. Ensure you search for others and not just call CQ. When someone is found in mid QSO, store them in VFO B and continue tuning to then switch back to hear their callsign – don't wait for it, as it's wasted time.

Photo 1: MODXR in G3RGS's shack.

4. Go to the toilet before the contest and don't drink too much – a toilet break can result in losing the contest! The margins in CW AFS really are wafer thin and the difference between first and second place could easily be one QSO.
5. This point is the one I consider the most important – frequency selection. If there is QRM, it will not yield QSOs. I always try to select my run frequency by imagining I'm on the other end. I ask myself whether I can be easily found, could I be lost in the QRM by people tuning by, etc?" My experience of this last point is that it's quite possible to find a clear frequency in CW AFS, but pretty-much impossible in SSB AFS because of overcrowding.

"I never change my log at the end – what you log is what you submit. The analysis afterwards can prove to be adverse and make you change good QSOs. This is why I try to be so careful about what goes in to the log. If you're not sure, it's always a good idea to ask for a repeat."

For those who might be thinking of dipping their toe in the CW AFS water for the first time but fear being overwhelmed by high speed operation and QRM, 'QRS Corral' at the top end of the contest allocation is the place to be. Operating speeds around 3580kHz will be more pedestrian, and because the speed merchants pack themselves in at the bottom end of the allocation there is usually sufficient space between signals that those without narrow filters can work successfully "in a more relaxed environment", as the rules for the event put it. Some years ago – and for several years – I used to spend time in CW AFS in the QRS Corral, calling CQ at modest speed and working whoever came back. I was usually quite pleased with the result.

VIRTUAL MEETING PLACES. As I mentioned last November, from 1 January the concept of Virtual Meeting Places will apply to clubs entering team contests. For AFS events all the stations contributing to the team score will need to be within 80km of a Virtual Meeting Place, nominated by the group (35km in the case of Local Clubs in the 80m Club Championships and 80m Sprints). To see if your club has provided this info and whether your club is registered as entering in the Local or National category, an online list is available at www.rsgbcc.org/cgi-bin/afs.pl. If your club has not yet notified the CC of your Virtual Meeting Place, someone might like to e-mail afs.query@rsgbcc.org and give the 6-digit QTH locator or the postcode before the first AFS event of 2014. The location of the club meeting place that is already held on file will continue to be used if no message is received. Whatever the location, it will be fixed for the whole year.

DISQUALIFIED AND BANNED. Early last year the Contest Committee became aware of someone who was suspected of operating portable in the UKACs from a location other than where he siad he was. Tip-offs were received that beam headings and signal strengths did not coincide with what would be expected. Naturally the CC takes an extremely dim view of cheating, but before they take action against anyone they exercise extreme caution. First of all they don't simply take anyone's word for it; they gather evidence of their own. In this instance bearings were taken over some months, because it was suspected that the person concerned repeatedly operated a considerable distance from the Locator being given. Eventually, sufficient evidence was collected that proved beyond reasonable doubt that the person in question was giving a misleading Locator about 50 miles away from the location being used, in a totally different Locator square.

The penalty for this breach of the rules is a personal ban of three years from participating in RSGB contests in any way. Those who made contact with this station have not had points docked from their scores, because QSOs were made in good faith.

RSGB HF Events

Date	Event	Times (UTC)	Mode(s)	Band(s)	Exchange
Jan 12	CW AFS §	1400-1800	CW	3.5	RST + SN
Jan 18	SSB AFS §	1400-1800	SSB	3.5	RS + SN

RSGB VHF Events

Date	Event	Times (UTC)	Mode(s)	Band(s)	Exchange
Jan 7	144MHz UKAC	2000-2230	All	144	RS(T) + SN + Locator
Jan 14	432MHz UKAC	2000-2230	All	432	RS(T) + SN + Locator
Jan 21	1.3GHz UKAC	2000-2230	All	1.3G	RS(T) + SN + Locator
Jan 28	50MHz UKAC	2000-2230	All	50	RS(T) + SN + Locator
Jan 28	SHF UKAC	2000-2230	All	2.3-10G	RS(T) + SN + Locator

Best of the Rest Events

Date	Event	Times (UTC)	Mode(s)	Band(s)	Exchange (info)
Jan 1-31	UKSMG Winter Marathon	All	All	50	RS(T) + Locator
Jan 1	IRTS 80m Counties	1400-1700	SSB/CW	3.5	RS(T) + SN (EIs & GIs also send County)
Jan 4-5	ARRL RTTY Roundup	1800-2359	Data	3.5-28	RST+ SN (Ws send State, VEs Province)
Jan 4	*EUCW 160m CW Party*	*2000-2300*	*CW*	*1.8*	*See text*
Jan 5	*EUCW 160m CW Party*	*0400-0700*	*CW*	*1.8*	*See text*
Jan 24-26	CQ WW 160m DX	2200-2200	CW	1.8	RST +CQ Zone (Ws send State, VEs Province)
Jan 25-26	BARTG RTTY Sprint	1200-1200	RTTY	3.5-28	SN
Jan 25	WAB 1.8MHz Phone	1900-2300	SSB	1.8	RS + SN + WAB square

* HF Championship event; + VHF Championship event; § Super League event; Δ VHF CW Championship event. *Italics* indicate that only provisional information was available when going to press. For the latest RSGB contest info and results, visit www.rsgbcc.org.

HF CLAIMED SCORES. It was back in 2001 that a Claimed Scores facility was added to the then VHF Contest Committee website. In those days some entries were still being sent by post and in that year there were 406 claimed scores posted. The following year the number jumped to 713 and the number has continued to grow each year since. 2013 was another record, with well over 7000 claimed scores posted.

In those days there were separate committees for HF and VHF contests and the facility wasn't introduced for HF when they merged, but a Claimed Scores facility for HF contests will be introduced in the early part of 2014 – possibly by the start of the year. For many HF contests, like the 80m AFS contests and Club Championships, the score is just a multiple of the number of QSOs, so the robot page that shows logs posted already acts as a kind of claimed scores page, but even in these contests the new facility will have the added bonus that entrants will be able to add comments about conditions and other aspects of the contest which can be shared with other entrants immediately after event.

THIS MONTH'S EVENTS. We have two 80m events this month. Although each is hotly contested in its own right, since 2011 they have also become qualifying events to the Super League. When the Super League was introduced it certainly boosted the number of entries to some of the qualifying events, but the results tables of these two show they have been unaffected. CW AFS takes place on Sunday 12th and SSB AFS six days later on Saturday 18th. Because twilight occurs about half way through them, propagation at the end can be expected to be nothing like it is at the start. At the start signals from around the UK should be strong and Continentals relatively weak, but by the end it is not unusual for inter-UK propagation to be difficult and for Continentals to be much stronger.

A New Year means a new series of UKACs – and this month it's exclusively UKACs. As ever they all take place on Tuesday evenings; 2m on the 7th, 70cm on the 14th, 23cm on the 21st, and 6m plus SHF on the 28th.

The UK Six Metre Group's Winter Marathon started on 1 December and continues until the end of this month. It doesn't have any specific operating periods and there are no points per QSO; instead its all about working Locator squares. You can claim the squares worked in everyday QSOs and any contests you take part in.

The IRTS 80m Counties contest takes place on the afternoon of New Year's Day. There are certificates to be won by non-EI stations and my experience of taking part is that Ireland is quite workable on a winter's afternoon. Work anyone, but bear in mind that stations in EI/GI are worth more points, and collect counties (32 in total) for multipliers. The ARRL RTTY Roundup takes place on the weekend of 4th-5th. Work everyone, but be aware that entrants are limited to operating no more than 24 of the 30 hours. There are low- and high-power categories for single- and multi-operator stations, but no single-band entries. Entrants are limited to a single transmitter, irrespective of section. Send a signal report and serial number. US stations will send a signal report and their 2-letter State code, while Canadian stations will send a signal report and their 3-letter Province code. On the same weekend the European Association's CW 160m QSO Party takes place. There are two sessions, the first on Saturday evening and the second in the early hours of Sunday morning. You can work the same stations in each session. The exchange depends on whether you are a member of a club that's affiliated to the Association (in the UK that means FOC, FISTS, G-QRP and the Essex CW Club). If you are, send RST + name + club + membership number; if not send RST + name + 'NM' (for non member).

For 48 hours starting at 10pm on Friday 24th the CQ WW 160m DX Contest takes place. Work the contiguous 48 States plus Canada only, giving a signal report and CQ Zone (the UK is 14). USA stations will send a signal report and their 2-letter State code, while Canadian stations will send a signal report and their 3-letter Province code. There are five different operating categories (various power levels, number of ops). This is the CW leg of the contest, the SSB leg taking place next month.

The BARTG RTTY Sprint takes place for 24 hours on 25-26th. Single band entries aren't allowed and the contest exchange is serial number *only*. And finally... the WAB 1.8MHz Phone Contest is on the evening of Saturday 25th. Exchange a signal report, a serial number and your WAB square (the first, second, third and sixth digits of your 8-digit National Grid Reference).

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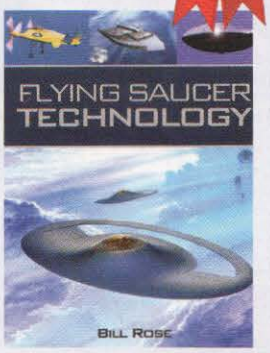
Book Review

Every January the editorial team looks back at our favourite books of the previous year and makes three very special awards...

Flying Saucer Technology

RadCom 1st

By Bill Rose



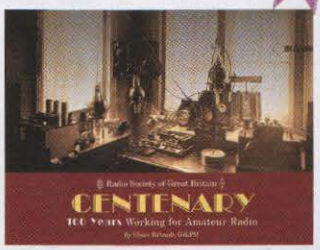
This isn't an amateur radio book by any stretch of the imagination. Instead, it takes a detailed and sensible look at circular-winged flying machines – anything that could remotely be thought of as a flying saucer. These range from very early designs, through circular-winged aircraft, to a few experimental ducted fan powered disc-shaped devices that (more or less) flew. Some of the descriptions hint at heroic failures, for example: "The air jeep was little more than an incredibly noisy hovercraft that didn't function properly". And yes, there is mention of 'space alien' type flying saucer sightings, but that is a very small part of the book. The majority is well-sourced, solid, demonstrable fact and the techniques mentioned include a range of technologies and techniques that will be new to many readers. It is all truly fascinating stuff.

ISBN 978-1-8570-323-5
160 pages, 219 x 289mm
Non Members' price £24.99
Members' price £12.49

Centenary – 100 Years Working for Amateur Radio

RadCom 2nd

By Elaine Richards, G4LFM



This beautiful book is the result of many hours of exhaustive research trawling through the RSGB archives at the National Radio Centre. It is a remarkable view of the people who have helped shape amateur radio and the RSGB over its first century. Amateur radio has come an enormous way since four men got together on 5 July 1913 and founded the London Wireless Club. From the Transatlantic Tests of the early 1920s to the latest digital modes, this book covers it all. The pages are also peppered with short biographies, including people like Sir Oliver Lodge (President in 1925), Dud Charman, G6CJ with a remarkable wartime photograph of his work at Hanslope Park, Pat Hawker, G3VA and Helen Sharman, the first British astronaut, who operated GB1MIR aboard space station MIR in 1991.

ISBN 978-1-90508-689-4
144 pages, 300 x 225mm
Non Members' price £19.99
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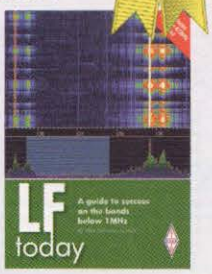
LF Today, 3rd Edition

RadCom 3rd

By Mike Dennison, G3XDV



With the existing 137kHz LF band and the advent of the new 472-479kHz MF band, more amateurs than ever before are now becoming active on these low frequency bands. Whether you have existing experience below Top Band or are a relative newcomer, you're sure to find some fascinating material here. There is a great deal of really practical constructional information, with an emphasis on practical advice based on personal experience. One of the early images is a graphic illustration of a full size vertical for 136kHz that dwarfs the London BT Tower. Yet this book shows how you can put a useful LF transmitting antenna in a suburban back garden: a testament to the ingenuity of radio amateurs. Indeed, in some parts of the LF spectrum, amateurs are breaking new ground. There certainly is some theory, where necessary, but the main thrust is good old-fashioned radio experimentation – and the author describes the techniques in a highly accessible manner.

ISBN 9781 9050 8693 1
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Highly Commended

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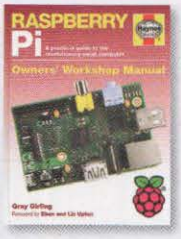

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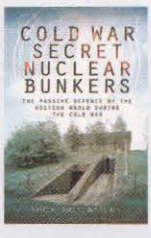

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HF F-Layer Propagation Predictions for January 2014

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	883....77788	6372..288678	...766783...	...88888....	...8999.....	...7999.....	....997.....	....88.....
*** Asia								
Yakutsk	15442	654...577767	...773.66..3	...66.....	.....	.....	.....	.....
Tokyo	.......3222.	...55367645.	.....	.....	.....	.....	.....	.....
Singapore	.......1212.	787554	......65....	......6.....	.....67.....	.....56.....	.....5.....	.....
Hyderabad	.....	34333	.......64...	......55....	......6.....	......5.....	......4.....	.....
Tel Aviv	883....48888	868....99989	.......85...	...53367....	...68886....	....887.....	....888.....	.....
*** Oceania								
Wellington	.....	....5565....	....6776....	....577.....	.....54.....	.....	.....4.....	.....
Well (ZL) (LP)	.....	.....	.....	.....	.....	.....	.....	.....
Perth	.....	.......42...	......783...	......86....	......4.....	.....	.....	.....
Sydney	.....	.....4873...	....5886....	....788.....	....453.....	.....4.....	.....	.....
Melbourne (LP)	.....	...87.....	...89.....	...79.....	....96.....	....96.....	....8.....	.....
Honolulu	.....	.....	.....4.3....	.....	.....	.....	.....	.....
Honolulu (LP)	.....	.....	.....	.....	.....	.....	.....	.....
W. Samoa	.....	....7566....	....8886....	....687.....	.....86.....	.....6.....	.....	.....
*** Africa								
Mauritius	2.....111	6......36766	4......77534	.......73...	.....	.....	.....	.....
Johanesburg	.....	4.....233	6.......7756	.......563..	.......6....	.......5....	.....	.....
Ibadan	11.....111	775.....6677	775.....7777	...4...587..	...755578...	...766774...	...47778....	....7775....
Nairobi	3.....222	87.....28888	6......36555	.......66...	......46....	...4..56....	...65674....	......5.....
Canary Isles	666.....5666	8775....8878	88.7...58688	....656768..	....8889....	....6777....	.....	.....
*** S. America								
Buenos Aires	.....	12.6.....	23.8......2.	...6.....	.....	.....	.....	.....
Rio de Janeiro	.....	22.6.......2	34.8.....343	...7.....	.....	.....	.....	.....
Lima	.....	.2.3.....	.3.5.....	.....	.....	.....	.....	.....
Caracas	.....	44.3......23	35.84....464	....7...4...	.....6557...	.....7674...	.....777....	.....675....
*** N. America								
Guatemala	.....	.2.2.....	.3..6.....	.....	.....	......3.....	.....	.....
New Orleans	222.....	66.6......26	.....	.....	.....	.....	.....	.....
Washington	3342.....3	77372.....77	.5.......653	.....6.36...	......456...	......66....	......67....	.....
Quebec	5552.....365	67.6....2775	....4...74..	....66667...	......66....	......66....	......75....	.....
Anchorage	333.....	66.5...35445	4...66..7..3	.....	.....	.....	.....	.....
Vancouver	.....	33.2.....	.....	.....	.....	.....	.....	.....
San Francisco	.....	22.....	.....	.....	.....	.....	.....	.....
San Fran (LP)	.....	.....	.....	.....	.....5....	.....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 February, March and April are respectively (SIDC classical method – Waldmeier's standard) 57, 56 & 55 and (combined method) 76, 78 & 80. The provisional mean sunspot number for November was 77.6. The daily maximum / minimum numbers were 131 on 17 November and 25 on 26 November.

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Robert Webster Ford, AC4RF

Known to Tibetans as Phodo Kusho – Ford Esq.

Robert Webster Ford was a career diplomat who, as a young RAF radio officer, was posted to Tibet and later recruited by the Tibetan Government. Captured on the Tibet-China border in 1950 by the invading Chinese People's Liberation Army, he was imprisoned for nearly five years. He was one of only 86 westerners to reach Lhasa between the British invasion of 1904 and 1950 when China annexed Tibet. After retirement from the Foreign Office he took up the cause of the Tibetan people by whom he was revered as Phodo Kusho – Ford Esquire.

Robert Ford was born in Rolleston-on-Dove on 27 March 1923. From the village school he won a scholarship to Alleyne's Grammar School, Uttoxeter. In 1939, aged 16, he took an RAF exam to become a radio technician. His course at Cranwell was halved to 18 months because of war. His first commission was with the No 1 Polish Flying Training School at RAF Hucknall, near Nottingham. In 1943, he was posted to India where, with five others, he established the No 1 Royal Indian Air Force Signals School at "a huge remote aerodrome near Lahore originally built strategically against Russian invasion. Even though there were no aircraft, we set up the radio school from scratch." The unit later relocated to Secunderabad where Ford was promoted to Sergeant.

Aged 22, finding instructing repetitively dull, he seized the opportunity to go to Tibet to replace Reginald Fox, AC4YN for three months as wireless operator at the British Mission, Lhasa. Ford recalled his first impressions of Tibet, "crossing the Natu La pass from Sikkim at 14,300 feet, I got a view into Tibet. At the top the sky cleared and I saw the incredibly beautiful peak of Chomolhari towering to 24,000 feet and the plateau of Tibet... a few weeks later I saw the Potala Palace – a remarkable sight, white and red, still half a day's journey away. I thought, 'now I've arrived', but did not realise then that it was the start of a lifelong attachment to Tibet."

Coded diplomatic reports were transmitted twice daily to the External Affairs Department, India. Until then, there were only two transmitting radios in the entire country, the other being at the Chinese Mission, which the British wanted to counterbalance. (The Chinese had offered the 13th Dalai Lama a radio transmitter as a 'religious gift' in 1934. Transmission started on 24 August, being

worked by Mr Chang Wei-pei (also known as Tang Fe-tang). In response, the British established a transmitter in Lhasa on 24 August 1936 operated by Lieutenants Evan Yorke-Nepean, AC4YN and Sidney Dagg. The station and AC4YN was taken over by Reginald Fox in March 1937 and he operated it until the Chinese invasion in 1950).

Immediately the world war ended, amateur 'ham' radio was again permitted and a radio contact with Tibet was the most sought after by those who wanted to work all zones. "We were our own licensing authority, so I gave myself the call sign AC4RF."

After three months, Fox came back and Ford returned to the Political Mission Sikkim, where he discovered that fellow radio operator Henry Baker, Royal Signals, (who had established a Tibetan language radio station in Gangtok which started transmission on 3 April 1944), was due to be demobbed, so Ford took over and spent 1945 to 1947 in Sikkim on loan from the RAF.

Upon Indian independence he was offered employment by the Tibetan government to install the country's first ever broadcasting station, Radio Lhasa, which started transmission in summer 1948 using a Hallicrafter HT9 alongside a Hallicrafter SX28 receiver, as well as to develop a radio network throughout Tibet and train operators for it. From 1947 to 1950, Ford was Radio Officer to the Foreign Affairs Bureau of the Tibetan Government. He was the first of five foreigners to be formally employed by the Tibetans and was given the official fifth rank of Letsampa.

After a year in Lhasa, he was asked to go to Chamdo, 100 miles from the Chinese border, to improve internal political and trade communications. He lived on the upper floor of the former Summer Palace of the Governor General of the province. One day while searching amateur radio wavebands, he made contact with a Charles Jeffries, G5JF, a tailor, who by chance lived in his hometown of Burton-on-Trent; soon he was in weekly conversation with his parents by radio-telephone; he had to reply in Morse.

The idyll of life in Chamdo, filled with lavish summer parties, was soon disrupted by threats of Chinese invasion, broadcast by Radio Peking in January 1950. Instead of fleeing, Ford promised to stay as he felt committed to the country and greatly enjoyed living there. One day a high-ranking official of the Chinese communist government arrived en-route to Lhasa to negotiate Tibet's incorporation into China. After several days, he fell ill and died. He was thought to have been murdered, a fact that later had very serious consequences for Ford.

By mid-October 1950, the Red Army was on the doorstep and panic ensued. Ford was on the radio to Lhasa all hours, but to his amazement, no announcement was made to the world about the ensuing invasion. The new provincial Governor, Ngabo Shape', fled westwards towards Lhasa. Ford, having removed the crystals from his radios, planned an escape south to India but all mountain tracks had been obliterated by a catastrophic earthquake, so he followed in the Governor's wake. However, the route had been cut off by the advancing Chinese and Ngabo and Ford were captured at a monastery near Lamda.

Taken back to Chamdo he was interrogated and accused of being a British spy, spreading anti-communist propaganda and causing the death of Geda by poisoning. Further interrogations became increasingly aggressive, more cunning and malicious; he was urged to confess to many more charges. Things progressively worsened and after three years of intense interrogation he signed a false confession. In May 1954, he was permitted to write to his parents who had not heard from him since his capture. He was tried in December and sentenced to ten years; then told he would be 'immediately' deported – a process of further psychological pressure that took six months.

On 27 May 1950, he was deported to Hong Kong. After reluctantly giving a press conference, he was flown to London where he was joyfully reunited with his parents.

(Since Ford's death, a Chinese commentator has reported that he had been framed for the murder of Geda Rinpoche.)

After release, he had to find a new way to earn a living – the transistor had meanwhile been invented and radio technology had completely changed. Despite this, he was offered a job as Marconi's representative in Asia but decided instead to recuperate for ten months and write a book, *Captured in Tibet* (1957).

With his command of Mandarin, the BBC offered Ford a job in the Chinese Service and he made a couple of broadcasts, "but it was not for me, the prospects were poor." However, another opportunity arose with a temporary job at the Foreign Office (FO) in June 1956 to analyse Chinese propaganda in a covert department. He was twice sent to Saigon, Vietnam; then Laos and Cambodia. He then returned to the UK to successfully sit a FO exam in which, competing against Oxbridge graduates he came third, for a permanent job in Diplomatic Service until 1983 when he retired.

Retiring to London, he returned to his interest in Tibet, which as a diplomat he had been unable to do. This resulted in renewed contact with the Dalai Lama with whom he met whenever the opportunity arose. At His Holiness's request, he undertook a five-week lecture tour of India in 1991 accompanied by his wife. He spoke at many venues, including the Indian Military Academy, the Indian Civil Service and the Indian Parliament. On their way to Dharamsala, the Dalai Lama's residence in exile, the Fords were put under house arrest without warning. Eventually, the British High Commissioner managed to get them freed to return home. China had again intervened in his life; the reason for arrest was a coincidental visit to India by the Chinese Prime Minster.

In March 2013, The Office of Tibet, London, organised a reception for Ford's 90th birthday. He had earlier joked that he had not received his back pay, so he was presented with the last of his salary, a 100 Srang Tibetan bank note with apologies for the delay "due to extenuating circumstances". The respect shown to him by the Tibetan community in exile on this occasion moved him deeply. Furthermore, in April 2013, he received the International Campaign for Tibet's 'Light of Truth Award' presented by the Dalai Lama in Switzerland, in acknowledgement of his tireless advocacy on behalf of Tibet.

As one of the last foreigners who had experienced an independent Tibet, Ford's memories were important and accordingly he was interviewed in May 2013, by the BBC. Three days after his death the World Service broadcast the interview on its *Witness* programme, and two hours later his experiences were broadcast along with those of others on BBC Radio Four's 'Tibet Remembered'.

On hearing of "Phodo Kusho's" passing, the Dalai Lama sent condolences to his family, noting that Robert Ford had occupied a special place in the history of Tibet.

FURTHER READING

Robert Ford, *Captured in Tibet*, George Harrap & Co 1957, Republished 1990, Oxford University Press
RadCom, June 2002, pages 39-40
RadCom, August 2005, pages 35-36
RadCom, June 2006, page 62

Roger Croston is a researcher on westerners who visited or worked in Tibet before 1950. He is not a radio amateur and any technical errors in this article are his alone. He would be interested in any further information on radio in Tibet especially the Indian radio operators who took over in Lhasa in the 1950s, such as AC4NC N Chakravarty and AC4AX Shankar. He can be contacted at Eaglescliffe, Bridge Drive, Christleton, Chester CH3 6AW.

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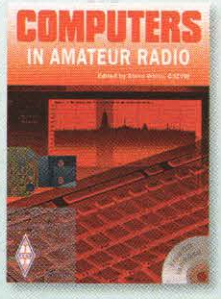

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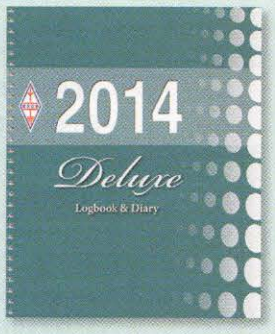

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from 2013

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By Bill Rose

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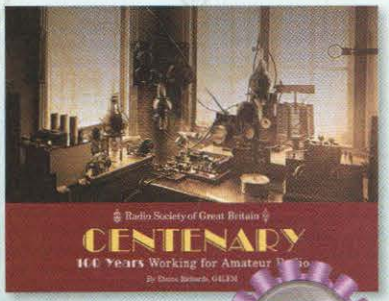
By Elaine Richards, G4LFM



As part of the Centenary celebrations the RSGB commissioned and produced this special hardback book looking at 100 years of RSGB History. In its first century, the RSGB has represented the interests of members at national and international level and provided the framework within which the early pioneers and experimenters thrived.

The stories gathered together provide a glimpse of the people behind the organisation and the way they have shaped the history of the Society. It would have been impossible for *all* the stories, famous names and events from the first 100 years to have made it into print. Nevertheless, this collection of events gives a flavour of the RSGB history and the hobby it supports.

Packed with over 200 colour and mono photographs this book provides a fascinating insight into the life and times of the RSGB. Produced as a quality hardback book, with a glossy slip cover and glossy paper throughout.

RadCom 2nd

Hardback, Size: 300x225mm (landscape),
144 pages, ISBN: 9781 9050 8689 4
Non Members' Price £19.99
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Please send news reports to radcom@rsgb.org.uk. To get future events listed here and put on GB2RS, e-mail details of your meetings as early as possible to GB2RS@RSGB.org.uk and we'll do the rest. We need to know your club name, RSGB Region number, contact name & phone number, date of meeting and detail of meeting. Example: South Bristol ARS, Region 11, Len, G4RZY, 01275 834 282,29 October, On the Air. It's that simple. Please note that we don't normally print 'closed', 'TBA' or 'every Tuesday' type submissions. The deadline for the February *RadCom* is 19 December and for the March edition it's 23 January. For GB2RS, the deadline is 10am on the Thursday for the week of broadcast. If you need to amend your club details, please visit www.rsgb.org/clubupdates.

INTERNATIONAL

Pafos Radio Club, Cyprus,
Richard, 5B4AJG, 00357 97857891,
5B4AJG@cyprusliving.org

NATIONAL

Civil Service Amateur Radio Society,
Weekly net every Tuesday, 8pm, 3.763MHz

REGION 1: SCOTLAND SOUTH & WESTERN ISLES

REGIONAL MANAGER: JASON, O'NEILL, GM7VSB, RM1@RSGB.ORG.UK

Ayr ARG
Ralph, GM4SQO, 01292 285 281
8 Surplus equipment sale
22 Dayton Hamvention, Dave, GM3WIL
Borders ARS
Alex, GM8BOX, 01890 830 607
10 Club meeting
Cockenzie & Port Seton ARC
Bob, GM4UYZ, 01875 811 723,
10 Normal club night
15 Activity night
Livingston & DARS
Norman, GM1CNH, 07740 946 192,
7, 21 Club evening
14 Operating evening
28 Morse code practice
Lothians RS
Alan, GM3PSP, 0131 623 4580,
8 Video evening at the Edinburgh Cine & Video Society
22 Life as a Radio Officer in the 1960s & 70s, Eric Lamb

REGIONAL MANAGER VACANCIES

2014 vacancies exist for Regional Managers for Regions 1, 2, 4, 5, 6, 10 and 12. Candidates for the role of Regional Managers will require the support of 10 Corporate Members residing in the Region. Paperwork can be downloaded from the RSGB website (www.rsgb.org.uk/candidatepack) or by post from RSGB HQ. Completed papers must be returned to RSGB HQ by noon on 1 February 2014.

REGION 2: SCOTLAND NORTH & NORTHERN ISLES

REGIONAL MANAGER: DENNY MORRISON, GM1BAN, RM2@RSGB.ORG.UK

Aberdeen ARS
Fred, MM0ODL, 01975 651 365
2 Closed
9 Junk sale
16 Construction evening
23 Discussion night
30 Morse and on the air

REGION 3: NORTH WEST

REGIONAL MANAGER: KATH WILSON, M1CNY, RM3@RSGB.ORG.UK

Chester & DRS
Bruce, M0CVP, 01244 343 825
7 Construction competition
14 Committee meeting
21 Surplus sale
28 Operating club station at Waverton Institute
Fleetwood Radio Enthusiasts Group
John, M0JFE, 0794 085 659,
7 Natter & discussion evening with Sharon, M6TKU
14 Baluns explained
21 Combating interference
28 Video night
Mid-Cheshire ARS
Peter, G8HAV, 01606 553 401
1 General discussion evening for the New Year
8 Ask the panel
15 Committee meeting
22 Rally preparation overview
29 Rally operational assignments
Thornton Cleveleys ARS
John, G4FRK, 01253 862 810
6 Club night
13 Chat on other hobbies
20 Planning & construction project
27 Talk by Jen, G8YOK
Workington & D AR&IT Group
Barry, G0RZI, 01946 812 092,
6 Club meeting and on the air
20 Remote switching, Paul, M1PAF

Chorley & District ARS recently ran a series of special event stations after many months of planning by Stuart, M0WSW. This was the first time the club had tried something as big this over three weekends. It started on 29 September with GB0AH from Astley Hall in Chorley, an historic house and museum and art gallery. The weather was brilliant blue sky and 20° and the station was set up in the walled garden. Operating from a frame tent, it was on the air from 10am to 3pm with 140 contacts worked. Most members took a turn including 13 year Joshua, M6NAV who enjoyed himself on 40m dealing with the pile ups that occurred from the first CQ. There was also a display in a wigwam tent with vintage radio equipment going back 30+ years, which proved popular with public, especially the opportunity to try their hand at Morse code. Joshua has since passed his Intermediate exam and is now 2E0IRN.

The second event saw GB1LCT on the air from Leyland. This time they operated alongside a Centurion tank mounted on a plinth at the entrance to Leyland. This event was a tribute to the men and women of Leyland who built them and the service personnel who operated them. The pile up started after the first CQ call and again lasted all day with 110 contacts worked, operation was again on 40m. The kit used was a Yaesu FT-920 into a half wave dipole at 30' mounted on a Clark mast fixed to the rear of a Land Rover.

The third and final weekend operated from the site of the old ROC bunker at Brinscall using the call GB1BNB. Using a dipole at 30' on the Clark mast the pile up went on all day until low fuel in the generator prompted the shut down. Activity was again on 40m but with a quick trip to 15m, resulting in a total of 148 QSOs with European and UK stations. Joshua operated again and performed very well. QSL cards have been done for all the events.

Joshua, 2E0IRN operating GB1BNB. Photo: Mark, G1PIE.

To raise cash and awareness for the work of the RAF Association, **2199 (Workington) Squadron, Air Training Corps** and local amateur radio operators joined together to hold collections, events and a special event station, GB70RAF, during Battle Of Britain weekend. The radio station also commemorated the 70th anniversary of the RAF Association, RAF Mountain Rescue Service and The Dambusters with a special QSL card.

During the event around 300 people were contacted across the UK and internationally and around £1000 was jointly raised by the radio station and the Wings Appeal collections carried

out by 2199 (Workington) Squadron, Air Training Corps.
They would like to say a very big thank you to all that helped support them.

The second annual Halton & District Amateur Radio Rally took place on 16 November and was a great success. Over 300 amateurs attended and a great day was had by all. The food as always was very popular and the restaurant was very busy for most of the day. A total of over £400 was raised at the rally and two local charities – Halton Disability Partnership and Halton Autistic Family Support – will benefit from a donation of £200 each.
Halton & District Radio Amateurs Rally Group would like to thank the General Manager of the venue, Alastair Mclean, and his staff for providing the venue and the food. Thanks also go to Ian, 2E0CYS, Geoff, 2E1BZH, Dave, M3GZD, Tug, G7EOK and all who got up early and gave their time and effort to making the rally a success including Warrington Amateur Radio Club who ran the Bring and Buy very efficiently.
Last, but not least, thanks also go to all of the traders who attended and gave prizes and cash donations to help the charity fund.
Work will soon start on planning for next year and details published as soon as available.

REGION 4: NORTH EAST

REGIONAL MANAGER: NIGEL FERGUSON, G0BPK, RM4@RSGB.ORG.UK

Angel of the North ARC
Nancy, G7UUR, 01914 770 036
6 On the air
13 Mock Foundation exam (and Intermediate if required)
20 Operating on all the Wainwrights, David Stansfield
27 Foundation (Intermediate if required) exam

Denby Dale RC
Richard, M0RBG, 07976 220 126,
1 Club Night - meeting cancelled
8, 22 On the air, 7.30pm, 145.575MHz±
15 RSGB Club Calls Contest, Richard, M0RBG
25 WAB 1.8MHz Phone contest, operating G6LD from Cartworth Moor 7-11pm
29 Real Ale Night from 8pm at the Star Inn, Lockwood HD1 3PJ

Mexborough & DARS
Darrell, G0FUO, 0788 742 3221
3 Christmas card recycling evening
10 Foundation course starts
17 Film night
24 Talk on forthcoming charity bike event
31 End of month chit-chat night on 144.700MHz, 7.30pm

6th Ripon Scouts operated a JOTA station with the help of **Hambleton ARS**. The photo shows the group of Scouts with the amateur operators, front row (l-r) Tony, G8FLV, Tony, G3MAE, Ian, G7MFN (RSGB DRM district 4) Brian, G3VGZ and Craig, M6ECD. A great time was had by all and plenty of HF contacts.

In November, members of **Mexborough & District ARS** operated GB1CIN in aid of Children in Need. The event raised £300 and a massive thank you goes out to all the amateur stations that took the time to work GB1CIN.

Two members of **South Tyne Amateur Radio Society** passed their Foundation licence in October. The photo shows (l-r) John, M6JFJ, instructor John, G0ROK and Thomas M6PCU. Congratulations from all the other club members.

REGION 5: WEST MIDLANDS

REGIONAL MANAGER: VAUGHAN RAVENSCROFT, M0VRR, RM5@RSGB.ORG.UK

Central Radio Amateur Circle
Martin, G1TYV, 07906 905 071
6 144 UKAC Contest
16 Group meeting
19-27 SOS Radio Week
30 Advanced Exam night

Cheltenham ARA
Derek, G3NKS, 01242 241 099
12 AFS CW
16 Sale of surplus equipment
18 AFS SSB
21 Lunch

Coventry ARS
John, G8SEQ, 07958 777 363
1 1st Round G2FDC 2m DF Trophy, 10am
3 Bedworth Lions Awareness Month, 11am
6, 13, 20, 27 Net 145.375MHz 8pm
10 Video night
17 Annual dinner 7.30 for 8pm
24 Quiz night
31 No meeting

Gloucester AR&ES
Anne, 2E1GKY, 01242 699 595, daytime
6 No meeting – school closed
13 Talking over a light beam, Chris, 2E0OLO
20 Operating/ workshop evening
27 Informal meeting

Rugby ATS
Steve, G8LYB, 01788 578 940
4 Talk/presentation
7 UKAC 144MHz, radio operation and projects
11 PIC/Arduino/PC problem solving, C programming and general assistance, Steve, G8LYB
14 UKAC 432MHz, radio operation and projects
18 Vintage electronics video, Mike, G8CTJ
21 UKAC 1296MHz, radio operation and projects
25 Practical project session, bring your current project along
28 UKAC 50MHz, radio operation and projects

Stratford Upon Avon DRS
G0CHO, 01608 664 488,
27 Dip into the RSGB Archives talk

Telford & DARS
Mike, G3JKX, 01952 299 677
1 Members net, 3pm, 144.600MHz (±)
8 Committee Meeting & GX3ZME OTA
15 Winter projects
22 Video evening

After the summer break **Central Radio Amateur Circle** came back with a bang. In September, GB1BBF operated from the Black Country Boating Festival, which was a very wet weekend. The station made 111 contacts, 1 on Morse, 52 VHF and 58 HF (45 of which were datamodes). Not a brilliant weekend, but fun was had by all that attended.
The following weekend it was the club's first ever camp out on Barr Beacon, for the British Wireless for the Blind Fund. GB1TTT was on the air for 24 hours, which was hard work. A large number of people attend and most stayed overnight. It was very hot during the day, but the night was cold. 243 contacts were made in 24 hours, 157 VHF, 13 UHF (done by Dean, M6WMD, the youngest member), 73 HF (47 were datamodes). It was a very good weekend with 'fun' with the generators. The club operated G100RSGB for five days in October and it was used by a few members of the group at different locations, with around 250 contacts being made.
In November, Martin, M6SKU and Lisa, M6LDT

passed the Foundation exam, and the club is offering exams at the end of January for all three levels.

Dudley & District Amateur Radio Society ended another successful Foundation training course. The weekend course at the windmill ended with all seven candidates passing the exam. Well done to Dave, Tahrif, Steve, Matt, Jade, Amy & Mark.

One unique highlight of **Wythall Radio Club's** recent activation of the G100RSGB callsign was the number of YL operators they managed to get on the air. At various points throughout the operation, Marie, G7OKF, Dawn, M6UDY, Juliet, M6RSC, Anita, M6DUO and Lynne, M6FAB worked the world as G100RSGB. Sadly, Wythall's other YL operators (they have a lot!) were indisposed on the days they had the callsign. Even so, five YL operators is quite a haul and having them all on air together generated some significant pile ups! Clearly a good time was had by all, as can be seen from the photo.

NEXT DEADLINE

The deadline for Around Your Region in the February *RadCom* is 19 December 2013

REGION 6: NORTH WALES

REGIONAL MANAGER: MARK HARPER, MW1MDH, RM6@RSGB.ORG.UK

Dragon ARC
Stewart, GW0ETF, 07833 620 733
6 AFS planning and film
20 A look back at GW100RSGB
North Wales Radio Society
Liz, lizcabban@vodafoneemail.co.uk
16 MW6BKS on mountain rescue – Ogwen Valley, Neil Adam
Wrexham ARS
Frank, M1EYH, fcbailey20@btinternet.com
14 First meeting of New Year

REGION 7: SOUTH WALES

REGIONAL MANAGER: JIMMY SNEDDON, MW0EQL, RM7@RSGB.ORG.UK

Marches ARS
marchesars@hotmail.co.uk,
www.marchesradiosociety.org
9 Natter night, Morse practice and on the air
30 Computers and amateur radio: do they mix?

REGION 8: NORTHERN IRELAND

REGIONAL MANAGER: PHILIP HOSEY, MI0MSO, RM8@RSGB.ORG.UK

Mid Ulster ARC
Brian, MI0TGO,
muarc.secretary@yahoo.co.uk
9 Partnering the BBC at 'Stargaze' from The Folk and Transport Museum at Cultra
12 Secret listeners of Gilnahirk, George Busby
25-2 Feb SOS radio week

Marconi Radio Group, based in Ballycastle, took part in the Potato Festival held at the Giant's Causeway recently with a special event station to mark the occasion using the club's callsign MN0MRG. This was a very successful event with over 50 contacts being made with a variety of stations. QSL cards will be issued through the RSGB bureau to all stations that made contact with the Potato Festival.
The Marconi Radio Club was formed in April 2001 by Kevin McAuley, MI0CRQ and Paul Quinn, MI0CRR and now meets on the first Thursday and third Thursday of each month at 71a Whitepark Road, Ballycastle. The third Thursday is a club radio on the air evening.

Bushvalley Radio Club are at present restoring Kilrea Royal Observer Corp Bunker Post 21 are looking for help sourcing some of the original equipment that was used in these posts. Anyone who can help please contact John Graham by e-mail to jgraham733@btinternet.com. The photo shows a young John Graham on duty in the post (headset on) along with his father and other observers
The club will be taking a break over the winter months and the next club meeting will be on 27 March 2014 in the Community House, 13 Travers Place, Dervock at 8pm.

Mid Ulster ARC held an amateur radio awareness course for 16 Scouts, in conjunction with **2nd Banbridge Scouts** in November. This prepared the way for a number of them to sit a Foundation exam. The club will be running an Intermediate course starting in January 2014 for anyone interested.
After running several special event stations at annual open days, The Ulster Aviation Society has selected the MUARC as the amateur radio club 'in residence' for their aircraft museum site at The Maze, near Lisburn. They will use GB4UAS as a permanent special event callsign and plan to activate most Saturday mornings, plus the odd Wednesday for the mid-week special event chasers. A full multi band station is now being established to compliment the existing equipment already on display in the 'radio room'.

Marconi Radio Group laid wreaths in Ballycastle and Rathlin Island in Memory of all radio operators who lost their lives in the war.

REGION 9: LONDON & THAMES VALLEY

REGIONAL MANAGER: LARRY SMITH, G4OXY, RM9@RSGB.ORG.UK

Burnham Beeches RC
Dave, G4XDU, 01628 625 720
6 Contest special - what will we do this year?
20 Programming hancies, Peter, M6UDP
Edgware & DRS
Mike, G4RNW, 02089 500 658
9 AGM
23 Pay your subs
Harwell ARS
Malcolm, G8NRP, 01235 524 844
7 Rally preparation and quiz
28 Activity night
Newbury & DARS
Rob, G4LMW, 01635 862 737
22 Question night
Radio Society of Harrow
Linda, G7RJL, 02083 868 586
2 GX3EFX activity night
16 The history of FETs, G3YKB
Reading & DARC
Pete, G8FRC, 01189 695 697
9 Civil Defence in the Thames Valley, David Oliver
23 How I got into amateur radio, Fergus, ZL1TOY
Southgate ARC
Mr K Mendum, G8RPA, g8rpa@arrl.net
8 Bring & show a piece of hardware or software and give a 5-10 minute talk on it
Verulam ARC
Ralph, G1BSZ, 01923 265 572
21 Current techniques of SSB by phasing, Alex, M0HCL

Stevenage & District ARS held Foundation course number 37 in November. All seven candidates passed with flying colours. The photo shows the students Ed, Ryan, Kathryn, Hannah, Julian, Keith & son Nathan all hard at work. A big thank you to the tutors and helpers.

The West London Radio Rally at Kempton Park took place in November. The event was very well attended by dealers, clubs and amateurs, with presence from Icom, Kenwood and Yaesu as well as the RSGB bookstall.
Pete, M0PSX and Kelly, M6KFA from Essex Ham went along to take in the atmosphere, and they have prepared a short video clip of the event. This was newly-licensed Kelly's first time at a radio rally, and it was something of an eye-opener – not just amateur radio equipment, but all sorts of random things can be found... even horseshoes. "There were so many people at this year's rally, and it was great to see so many different callsigns and stallholders. It's definitely good to go to a rally and to meet other people. Amateur radio is such a unique hobby, and you don't find a lot of other young people doing it, so it's great to meet others, get advice and experience the community feel of a rally." You can view the video at www.essexham.co.uk/kempton2013.

Reading & District Amateur Radio Club is pleased to announce the success of all 7 candidates in the October Foundation course. Most passed with 100%. Definitely their most successful course in recent years. All will be taking the Intermediate course planned for January. In the picture (l-r) are Cesar, M6DPU, Simon, M6SEW, Ian, M6IWF, Ian, M6HIT, Phill, M6SFX, Ben, M6DPE and David, M6NXD. Near the middle (without a pass certificate) is Graham, G3XZJ one of the lead tutors and joint lead for this course. The club wishes them well with their new hobby and many happy years of amateur radio.

In November, **Edgware & District RS** had the pleasure of a lecture and visual presentation by Dr Jamie Barras on the subject of 'Radio frequency spectroscopy, drugs and the internet'. It was extremely interesting and there was a very good turn out from both members and those from other clubs.

Dr Barras, left, being welcomed by club chairman Hasu, G4KEP.

REGION 10: SOUTH & SOUTH EAST

REGIONAL MANAGER: MICHAEL SENIOR, G4EFO, RM10@RSGB.ORG.UK

Coulsdon ATS
Steve, G3WZK, secretary@catsradio.org
13 Annual dinner at The Fox, Coulsdon Common
Crawley ARC
John, G3VLH, 01342 714 402
22 AGM at club house, 8pm
Cray Valley RS
Lawrie, G4FAA, 0208 300 1894 evenings and weekends
16 Planning meeting for events and presentations for the New Year
Horndean & DARC
Stuart, G0FYX, 02392 472 846
2 Natter night/social and activities evening
16 Quiz evening (other clubs invited)
Southdown ARS
John, G3DQY, 01424 424 319
6 AGM at Chaseley
8 Operating at Hailsham shack
Surrey Radio Contact Club
John, G3MCX, 020 8688 3322,
6 GB3NS, Denis, G0OLX
20 Fix it and natter night
Sutton & Cheam RS
John, G0BWV, 020 8644 9945
16 Loops and novel small antennas, Prof Mike Underhill, G3LHZ
Swindon & DARC
Kevin, G6FOP, www.sdarc.net
2, 16, 30 Activity night
9 DVD: QRT 500kc/s
23 PAT testing and the pitfalls, Dennis, G3LLZ

REGION 11: SOUTH WEST & CHANNEL ISLANDS

REGIONAL MANAGER: PAM HELLIWELL, G7SME, RM11@RSGB.ORG.UK

Appledore & DARC
Brian, M0BRB, 01237 473 251
Zepp Net Monday, Tuesday and Thursday from 4pm on 145.450MHz, Wednesday via GB3DN at 4pm, HF net on Friday at 4pm, 7.185MHz ±QRM
20 Practical demo of audio recording by Laurence, G4XHK & John, M0JKL
Bristol RSGB Group
Robin, G3TKF, 01225 420 442
27 AGM and Bring and Buy
Callington ARS
John, G4PBN, 01822 835 834,
8 Natter night and on the air
Exeter ARS
Nick, M0NRJ, 01363 775 756
6, 20 HF net on 3.675kHz at 7.45pm
7, 14, 21, 28 Tuesday 2m net on 145.575MHz at 7.45pm
13 Radio Amateurs Invalid and Blind Club talk
27 4m promotion night

Exmouth Amateur Radio Club
Mike G1GZG, 01395 274 172
20 Club night and auction
Flight Refuelling ARS
John, G4POF, g4pof@hotmail.com
19 The Life of Py-lon, we're linesman that what we do, Alan, MOVLT
Plymouth Radio Club,
Robert, 01752 777 888,
14 Ian Harley, G6BJJ, Controller of West Devon RAYNET
Torbay ARS, Dave, G6FSP, g6fsp@tars.org.uk
3, 10, 17, 24 Natter night
31 Construction contest
Yeovil ARC, Rodney, MORGE, 01935 825 791,
9 DVD evening
16 Air bands, Adrian Dening
23 What is single sideband?, G3MYM

REGION 12: EAST & EAST ANGLIA

REGIONAL MANAGER: MARK SANDERSON, MOIEO, RM12@RSGB.ORG.UK

Braintree & DARS
John, M5AJB, 01787 460 947
6 Start of season natter night
20 PAC testing part 1
Bredhurst Receiving & Transmitting Society
Charles, G4VSZ, 07982 244 788,
2 What did you get for Christmas
16 DDS by John, G8JAD
30 Fish and chip supper
Cambridge & DARC
David, M0ZEB, 01353 778 093
10 A Dip into the RSGB Archives – The Race to Cross the Atlantic, Colin, G8TMV
24 AGM
Colchester Radio Amateurs
Jeff, G7TAT, 07899 894 435
16 CERN particle accelerator, Ed, M0HDK
Dover RC
Pete, M0PKH, peter.halloway@sky.com
8 Gadget night - show off your Christmas gadgets!
Hilderstone R&EC
Chrissie, hilderstoneclub@gmail.com
9 Natter night
23 Preparation for the SOS Radio event
25 SOS radio event at Ramsgate Lifeboat Station
Lowestoft & District PYE ARC
Tim, 2E0TJW, 07810 481 182,
2, 23, 30 Night at the shack
9 Christmas meal at the Jolly Sailors

South Essex ARS
Dave, G4UVJ, 01268 697 978
14 Preparation for the 29th Canvey Radio Rally
West Kent ARS
Keith, G4JED, info@wkars.org.uk
20 Planning club presentations and events for the year ahead, followed by refreshments and time to natter

Chelmsford-based amateur Charlie, M0PZT, author of the free *PZTLog* logging application, has created a free data viewer application to help fellow Essex amateurs. The *EssexPSK* application is a simple receive-only data decoder that can display conversations in the common PSK and RTTY modes. The application runs on the Windows platform, is less than 1.5MB and has just two controls. Once the operator's rig is connected to the PC's soundcard, the *EssexPSK* waterfall starts showing activity to give users a taste of what PSK31 and RTTY have to offer. The application has been made available, free of charge, for the Essex Ham website (www.essexham.co.uk/essexpsk), to help the site's community to give the PSK and RTTY data modes a try, without the hassle of setting up a full suite of data software.

Dover Radio Club has just had its annual construction contest. There were a number of novel entries and some fantastic construction. Tony Fishpool from the G QRP club came down to carry out the judging for the main competition but there was also a 'people's choice', where club members got to cast a vote each. The main prize and shield went to Ian Keyser, G3ROO for his superb HF linear that he can operate at a distance with its remote head, as shown in the second photograph. The people's choice went to Peter Weatherall, G3MLO for his very well constructed 2.5kV HV power supply. Both winners were lucky enough to scoop a couple of prizes from the GQRP club.

Braintree and District ARS had talks by two members on different ends of the communications spectrum. The first was entitled Fibre Optics and was given by Dave, G0DEC. Dave tests fibre optics and their connections as part of his job. He gave explanations on what fibre optics are used for, how they are used and the dangers of misuse. He brought along samples and items of test equipment that he uses to fault find on any length of fibre optic cable and its joints. Dave made the point that fibre optic joints are face to face, so must be perfectly aligned at all times. It was a fascinating talk and well received. The other meeting was a talk about baluns given by Melvin, G0EMK, one of the club's founder members. He started by explaining about how mismatches between aerial and feeder can cause many problems. These can include RF interference, poor aerial performance and in some cases, reports of distortion on your signal. Melvin said by using the correct balun to match your feeder and aerial, you can eradicate some or all of these problems. Melvin then produced examples of baluns he had built for various aerial systems, normally from used components at a total cost of £3 or less. The talk ended with a lively Q & A session and was enjoyed by all.

Hilderstone R&EC is now fully functional in terms of HF and VHF/UHF thanks to the efforts of Ian, M0CAG, Len, G0GNQ and Don, G4TKR in putting up an antenna. They were able to show off the Icom IC-7800 to ten students from the University of Kent, who had come to the club in order to complete their Foundation practical. Many club members turned up to help them through the Morse exercise.
The club has a busy examination schedule ahead with twelve Foundation, one Intermediate and two Advanced candidates in December; not all on the same day!
At the meeting in November, Matt, M0LMK gave a fascinating demonstration and explanation of his 'drifting buoy'. He plans to have it dropped off in the mid-Atlantic allowing it to drift along with the currents. It will periodically take measurements of air and sea temperature, position and speed, which will be sent to a satellite and then on to a server in London. He wants the measurements to be available to anyone interested, including university groups. So far it has only cost him £250, much less than other similar drifting buoys.

NEXT DEADLINE

The deadline for Around Your Region in the February *RadCom* is 19 December 2013

REGION 13: EAST MIDLANDS

REGIONAL MANAGER: STEVE BODEN, G4XCK, RM13@RSGB.ORG.UK

Derby & DARS, Richard, radio@dadars.org.uk
7 Junk sale
14 Committee meeting
21 Technical topics
28 On the air

Lincoln Short Wave Club
Pam Rose, G4STO, 01427 788356
2 Repeater net on GB3LM
8 Shack activities and natter night
9, 16, 23, 30 Simplex net on 145.375MHz
15 AGM
21 1.3GHz UKAC Contest
22 Club meeting
29 Buying and selling radio equipment online

Loughborough & DARC
Chris, G1ETZ, 01509 504 319
7 Welcome to 2014 natter night
14 Part II Now it can be told video
21 Yet more valves, Andrew, G7SEG
28 Practical evening

RAF Waddington ARC
Bob, G3VCA, 0791 166 250
9 AGM

'Solder: it isn't as simple as it seems' was the subject of the talk to **Verulam ARC** in November. Fortunately the chemistry and physics of this useful eutectic alloy and how it is used in making electrical connections were explained in simple terms by Dr Roger Bleaney, MORKB, who is a retired chemistry school teacher.

The first SOTA international cycling weekend

On two wheels to the top

COMBINING HOBBIES. One of the many great things about amateur radio is the ease with which it can be combined with other leisure activities. The popular Summits on the Air award programme is a good example, combining hill walking and amateur radio. The idea of combining amateur radio and cycling is far from a new one. Back in the early 80s I used to cycle round Cambridge on 2m FM with an old Icom IC-22A strapped to the handlebars; I am sure that I was not the only one.

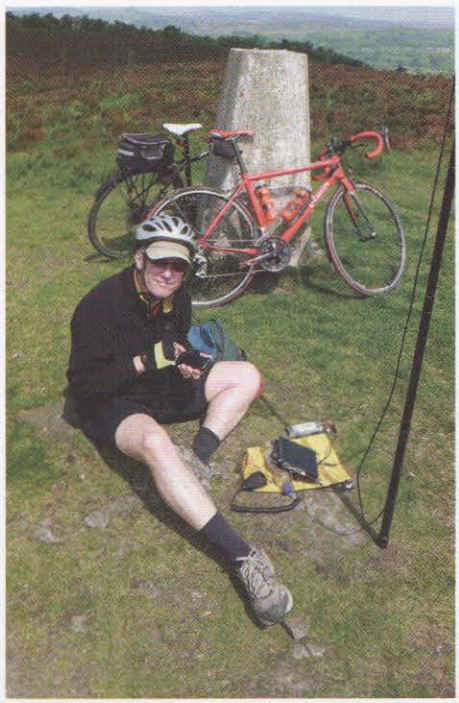
The idea for a SOTA Cycling Weekend came in the depths of the long winter when the idea of sunshine seemed a long way away. Initial interest was gauged on the SOTA reflector and, as there seemed to be some interest, a weekend in June was chosen.

GETTING READY. In the build-up to the weekend I had two things to do, to get a viable cycle-borne radio system sorted out (the easy bit) and to get fit enough to cycle to the hills (a bit harder). My radio system was largely dictated by my choice of band. SOTA launched a 12m Challenge at the beginning of June so I decided that would be my band. That was a bit risky of course as the sun is not really all that active and it was by no means certain that 12m would yield any contacts. My radio would have to be my old FT-817; perhaps the most ground breaking radio ever made and my only portable radio that covers 12m. Carrying a mast with me was going to be essential for my local hills. This can be tricky on a bike. The longer telescopic masts (1.2m when collapsed) can be strapped to the top tube of the bike but in the end I decided on a shorter telescopic mast that would fit in my rucksack. There were really only two antenna types to chose from: a ground plane or a dipole. There has been much debate in SOTA circles recently about which is best on a hilltop. In the absence of any convincing data, I decided on a dipole; this would mount at 4m on the mast. Batteries are often a heavy part of a portable setup but I stuck with my trusty 4Ah lithium polymer battery pack.

Choice of a bike was equally tricky. I have two, a hybrid that is suitable for use on and off road and a road-bike, a fast and exciting machine that is unsuited to anything except smooth tarmac. In the end my heart triumphed over my head and I decided on the road-bike.

IN TRAINING. Training was soon under way and routes were planned. I am fortunate in having three SOTA summits within easy cycling range:

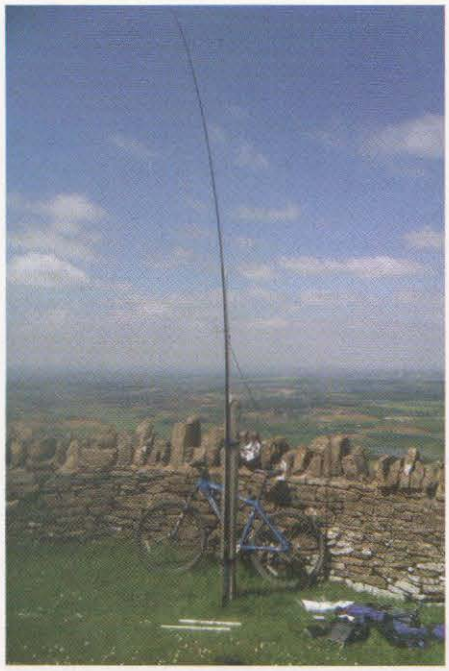
- Shining Tor, a typical Peak hilltop on the border between Cheshire and Derbyshire. At 559 metres it is my highest local hill but it is not very easy to take a bike to the top so I decided against that one.
- The Cloud, SOTA's most activated summit is an easy walk and although cycling is not permitted I could easily push my bike to the summit.
- Gun, a Staffordshire Moorlands hilltop. Again, no cycling access but relatively easy to push a bike up from the road.



Richard, G3CWI takes a minimalist approach to HF operation in Staffordshire.

CYCLING WEEKEND. Soon the Cycling Weekend arrived and amazingly the

Richard Newstead, G3CWI • e-mail: richard@sotabeams.co.uk



Richard, G0IBE enjoyed good weather on Bredon Hill.

weather was forecast to be hot and sunny. For the Saturday I decided to cycle out to The Cloud with a friend. It's only 12 miles away so not too far but inevitably the ride involved a lot of ascent. Once on the hilltop my friend ate his lunch while I set up the radio station. Several calls on the 12m band only gave some local G contacts. One of the local contacts was Richard, G0IBE/P on Bredon Hill in the Midlands. He had also cycled to his hill so it was a cycle to cycle contact! I could hear stations in India, Australia and the UAE weakly but my 5W was insufficient to raise them.

Taking full advantage of the weather we cycled back via a longer route, involving two pub stops for essential rehydration. The total for the day was 24 miles cycles with 2,500ft ascent.

The next day my friend was busy so I decided on a two-summit day starting with The Cloud and ending on Gun. Pushing the bike up to the summit of The Cloud was hard work. The 12m band was still quiet but did yield contacts with 7Q (Malawi) and 4Z (Israel) as well as the usual locals. My station attracted many interested bystanders as The Cloud is a popular picnic site and there were lots of people enjoying the good weather.

A few miles more riding got me to Gun. A short push across the moor to the trig point and I was on the air again. No DX to report beyond hearing stations in Brazil and India. I made some local contacts including Steve, G1INK/P on nearby Shining Tor. He had not cycled though. A CW QSO with a Spanish station finished the activation off. I was able to take full advantage of the road-bike on the way home, averaging well over 19mph.

Several others participated in their first event.

OTHER CYCLISTS. Richard, G0IBE, as mentioned above, enjoyed his activation of Bredon Hill near Tewkesbury. The idea of the cycling weekend led him to achieve a long held ambition of cycling up his local hill. He used a long-wire with a Z817 auto tuner on HF and a vertical dipole on VHF. Although he also found 12m rather dead, he did make some summit-to-summit contacts on 2m FM and also a second cycle-to-cycle contact with Rod, MOJLA.

Rod, MOJLA cycled to his summit and using his VX7 on 2m with a beam he made 15 contacts including 7 summit-to-summit contacts. He also made two contacts on 70cm. A lost connector meant that while he had HF equipment with him, it remained unused.

David, G3RDQ was on Walton Hill, near Newbury. He was mainly on 5MHz and

Phil, G4OBK operated from the wilds on Northumbria.

made plenty of contacts.

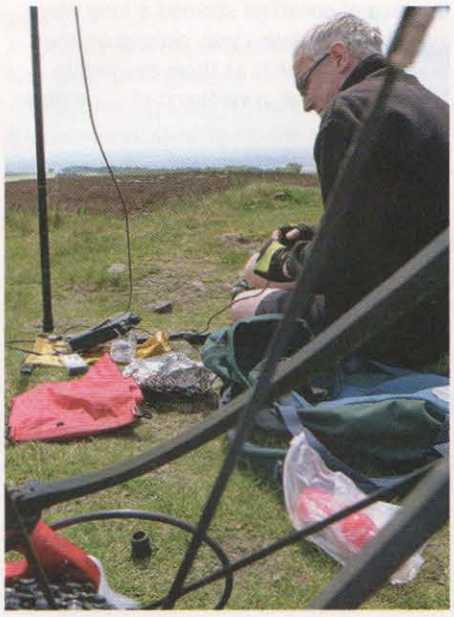
Vicki, M6BWA braved the potholes to activate Aconbury Hill, near Hereford. She used 2m FM and had a good day out with 12 contacts.

Phil, G4OBK was on his bike activating hills in the North Pennines. Using his new portable transceiver he was active on 40, 30 and 20m CW and inevitably made lots of contacts. He seemed to enjoy the weekend as he was spotted activating other summits by bike the following week.

Finally, Panos, S53X joined in and activated one of his local summits on HF to make the weekend truly international.

NEXT YEAR. Everyone seemed to enjoy the event so I feel sure that there will be a bigger and better version next year!

Given good weather and some energy, more than one summit is possible by bicycle in a day. Richard, G3CWI managed two.



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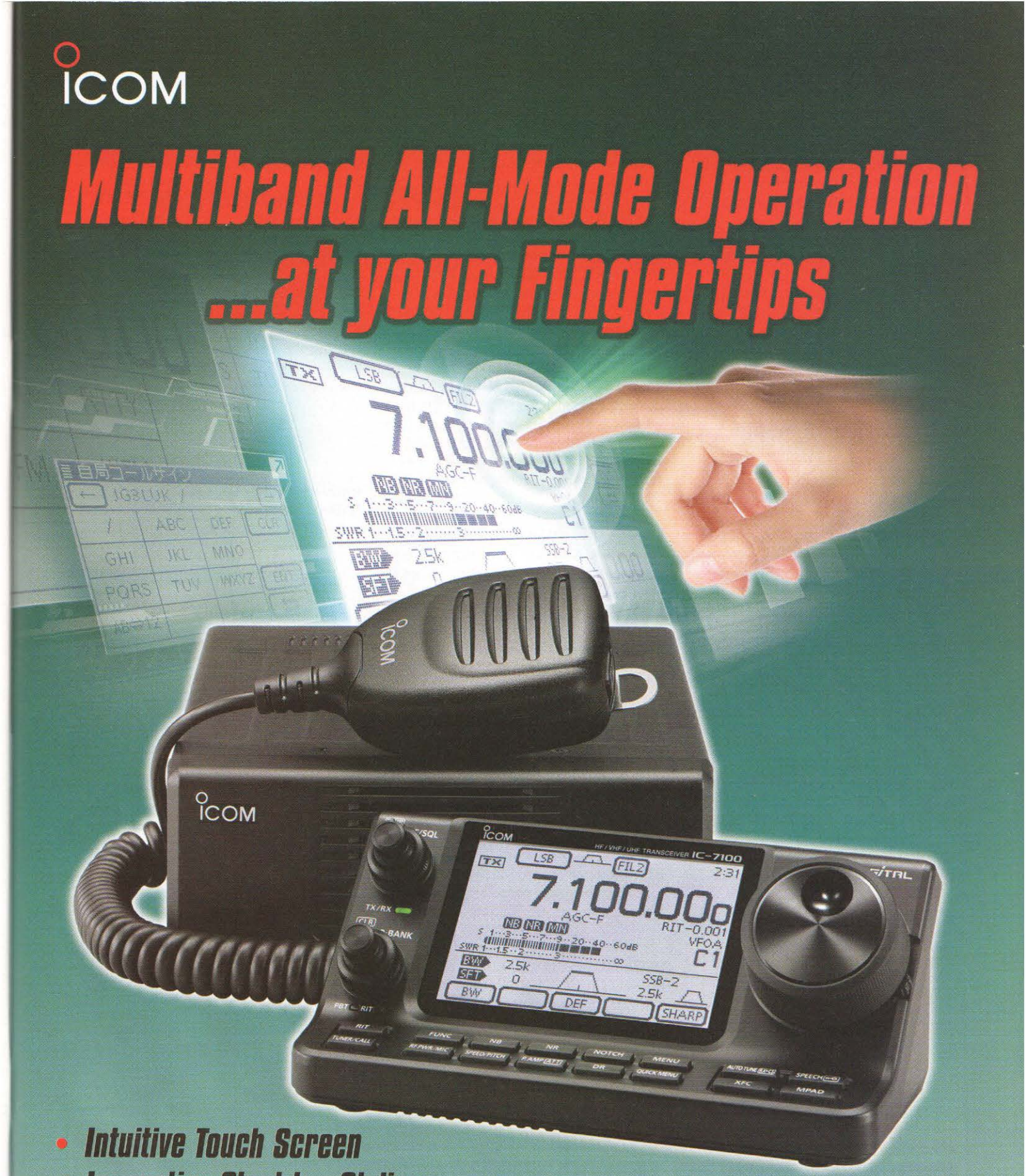

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UNWANTED VALVE AMPLIFIERS, working or not. Known makes only (Kenwood, Yaesu, Drake, Linear Amp, etc), not home-brew. Also 3-500Z/ZG valves. Cash paid. Contact Peter G3ZRS on 01482 862323 or g3zrs@hotmail.co.uk

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FOR SALE

EA12 in very good condition; 840C in good condition. Both working, with handbooks & mains leads. Good KW Vanguard, working. Also, Hammarlund HQ-170A RX and HX-50 TX, complete but requiring TLC. Downsizing! Wanted: Audio output transformer for Eddystone model 750. Terry, G3VFO, 01435 882 245, terry.hart@btinternet.com (Burwash, East Sussex).

HRO-MX receiver, not used for 40 years. Complete with instruction booklet and 9 band tuning units. PSU needs checking over. Offers please. Roger, G0CYC, 01707 324 958 (Welwyn Garden City).

ICOM IC-718 transceiver with UT 106 DSP and 500Hz FL52A CW filter fitted. Full working order and in excellent condition, widebanded for 5MHz by Castle Electronics, manual and original box, £450 ONO. Buyer to inspect and collect. Ed Emery, G0WDT 01782 717 837 (Newcastle Under Lyme, Staffs).

ICOM IC-735, 250Hz filter, mic, accessories and PS-55 PSU, £200. Buyer collects/shipping extra. Bencher BY-1, £50. Kent TP-1, £50. Vibroplex Original Deluxe (Broadway NY), £125. All keys plus post/packing. David Aldridge, G3VGR, 07802 241 365, g3vgr@qsl.net (Buckhurst Hill, Essex).

ICOM IC-781 in excellent condition, £875 ono, carriage extra. Manuals: RA17/RA218, £12, p&p £3. Manual: Wireless Set 19, £12, p&p £3. Vibroplex Champion Model s/no 146670, £75, carriage £6. Theodore Mcelroy Deluxe Speed Key, £65, carriage £6. Brian Atkinson, G3GSI, 01435 883 248 (Heathfield, Sussex).

NAVMAN TRACKER 5500 TFT colour marine chartplotter, 5" colour screen, inbuilt GPS antenna, never been used, cost £700, £150 + postage. Brian, GM0EGI, 01786 850 377, gm0egi@btinternet.com (Stirling).

QTH, SE CORNWALL. 1970 built 3 bed semi-det + garage. Ready made shack in bedroom 3. Antennas for 80m to 70cm. No onward chain, £170k. G4HOL, 01579 342 503 (Cornwall).

R1155 classic ex WW2 bomber receiver. Neat inbuilt power supply and output stage. Variable BFO control. Working order, £95.Carriage extra. Possible collection from Exeter or Bournemouth. C Young, M0BGA 01637 875 848, rcry100@yahoo.com.

RACAL TRA-931 (Syncal 30) HF transceiver with MA-949 loudspeaker amp and power supply unit, £500 ovno. Buyer collects, or carriage at cost. W Sawyer, G7FHN, wfsawyer@hotmail.com (Reading, Berkshire).

RT-320 CLANSMAN xcvr. Fully synthesised 2-30MHz USB, CW, AM. Tested, good wkg order, no mods, all fins intact. £140 plus £15 p&p. Stuart, G3YPS, 07803 601 176, atko99@tiscali.co.uk (Lincolnshire).

SIX NEW AND UNUSED BNC to banana /screw terminal adapters. £10, post free. Peter Ball, G3HQT, 01489 570 735 (Warsash, Southampton).

SKYSTAR 2 PCI digital sat Rx card and original CD, used only for HR Eumetsat WX data. £20 + postage. 0.9m elliptical dish and LNB for same, GW0, free, collect only. **Urgently need** circuits for IFR AM/FM-1200 communications service monitor. Bob White, G8SPC, 01275 874 001, g8spc@blueyonder.co.uk (Clevedon).

TENNAMAST ADAPT-A-MAST 7.6m. Excellent condition, as are the winches and cabling. Includes rotator cage, 3 wall brackets and stub masts. Sensible offers please. Ready for collection or delivery at cost. John, G3UCQ, 01736 752 982, e-mail@johnfarrar.plus.com (Hayle, Cornwall).

TRIO SSB transceiver TS-520, all bands, £170. Yaesu FRDX-400 receiver 160m to 10m +2m +6m, £50. Marconi CT452A RF sig gen, £15. Marconi TF1370 LF sig gen, £15. Linear Amp QRP to 100W, offers. Telequipment D75 50MHz scope, £50. John Hey, G3TDZ, 01132 637 885, john.hey@talktalk.net (Leeds).

TRIO TS-120V, £125. Yaesu FT7, £110. 10W out transceivers. Yaesu FL-110 linear amplifier, 100W out, £135. All HF solid state, no WARC bands. Collection only. Steve, G3YOL, s.k.cole@btinternet.com (Weston-super-Mare).

TRIO TS-530S, GW0, £225. Icom IC-P51S PSU, 13.8V 20A, GW0, £50. Star Master CMOS memory keyer, £30. Tono 2m-50W VHF all mode amplifier, GW0, £50. ERA Microreader, CW/RTTY, GW0, £25. Dave, G4NLH 01288 355 791 davidg4nlh@talktalk.net (Bude).

VINTAGE/COLLECTOR ICOM IC-202S. Rare SSB/CW transceiver in mint and working condition, on the market around end 70's. VXO controlled, two bands 144.000–144.200 and 144.200–144.400MHz, 3W. Manual and mic. £75 plus shipping from the Netherlands. Hans Mulder, PA0HRM, +31 743 764 336, pa0hrm@amsat.org (Holland).

WIRELESS SET NO 22, WS No 12 and WS ZD1 Mk 2 with remote control unit. All complete, working and unmodified. WS No 18 and 38, complete and working with 'Pietro' 6V PSU. Offers. Buyer to inspect and collect only. Tom, GW3LJS, (Swansea), 01792 363 442, twb.1515@btinternet.com.

YAESU FT-747 GX HF transceiver in good working condition. Duncan, 01969 624 100 duncan.trout@sky.com, (Leyburn, N Yorkshire).

YAESU FT-847 (4m able), MyDEL MP-30SWIII 28-30A power supply, Yaesu MD-100 a8x desk mic & Signalink USB interface. Also included is Diamond MX-2000 triplexer. £800 ovno. Cash only on collection. Andy, G0MNI 07752 530 954 (Humberside).

YAESU FT-897 HF/VHF/UHF all mode transceiver. Complete with additional Collins filters for both SSB/CW and TXCO fitted. In good condition with original box, manual, microphone and cables for CAT/data, £450. Ian McCarthy, G3YBY, 077672 230 290, g3yby@arrl.net (Swindon).

WANTED

2m QRO LINEAR amplifier eg Linear Amp Discovery 2 or similar or solid state, 200W plus output. Keith, G4GZS, 07859 917 317, keith@jpl.co.uk (Warwickshire).

ACOM 1000 HF/6m linear amplifier in good working condition, from non-smoking environment. Prefer unit complete with original packaging, instructions, invoice, etc. Also looking for Icom PS-125 PSU. Can collect. Roger, G0BSU, roger@g0bsu.net (Cheshire).

BETAMAX videotape cassette (the tape, not a machine!) for static display, clean looks but not working. Godfrey, G4GLM, 020 8958 5113, cgmm2@btinternet.com (Middlesex).

FERRITE POT CORES FX2240, FX 2241, FX 2242, FX 2243. Barry, G3NFY, 01643 706 823, oli.g3nfy@googlemail.com (email contact preferred) (Minehead, Somerset).

FLYING HORSE INTERNATIONAL CALL BOOK 1970s and 1980s. Any years considered. *The Amateur RadioDX Handbook* (*CQ* operating series) edited by Don Miller, published by CowanCorp, 1968. Book (not sure of title) by Jim Smith, P29JS covering his DXpeditions. Mike Giddings, G3XLB 020 8776 7791, mikegiddings1@yahoo.com (London).

RACAL RA1218 & Siemens E311 wanted, to complete my receiver collection. Steve, M6WAA, 07552 678 725, chunky9@btinternet.com (Warrington).

TOSHIBA TB2922HQ dual power amplifier integrated circuit. Ray Howgego, G4DTC, 01883 343 838, ray@howgego.co.uk (Surrey).

WODEN UM1 or similar transformer for KW Vanguard restoration project. If anyone is scrapping KW Vangaurd or Hallicrafters HT-32, I am looking for any parts they may have left over. James, MD0MDI, 01624 860 120, james@md0mdi.com, Laxey, Isle of Man.

YAESU FL-101 Tx in GW0 to use with my FR-101 Rx. Ross Bradshaw, G4DTD, 01726 891 320 (Cornwall).

YAESU FV-901 VFO, Yaesu YR-901 Morse reader and Yaesu world clock, to complete Yaesu 902 lineup. Must be in working order. Can you help? Ian, G4UGD, 07842 238 931 (Little Budworth, Cheshire).

HELPLINES

COMPLETE INPUT matching coil set for HF amplifier covering 80 to 10m. Limited space available. John, M0ELS, 07502 194 599 (Essex).

LOST – VFO associated with Tx by G3AAZ and SK G2QA featured in *RSGB Handbook* 1961 p199-203. 3.5-3.8MHz VFO housed in black crackle finish cabinet approx 18 x 15 x 10cm, backlit 180° dial. Any info? G Gibbs, G3AAZ, 01480 456 781 (Huntingdon). *[Reprinted from last month with a corrected phone number and our apologies – Ed.]*

WPO COMMUNICATIONS AUDIOBRIDGE. Information needed for my blind pal who owns this item but has no instructions for its use and doesn't want to blow his PA transistors. Info not available from WPO communications or previous suppliers (now defunct). Does anyone out there have such info?? If so please contact me (copying or postage costs willingly reimbursed). Jim, G0JGB, jimanju@btinternet.com, 01782 321 717 (Stoke-on-Trent).

RALLIES & EVENTS

4 JANUARY - BATH BUILDATHON. Running 9am-5pm, £25. **Booking essential.** The project is the 20m PSK Centenary Receiver. Intermediate Practical Assessments will also be available on the day. Steve Hartley, G0FUW, G0FUW@tiscali.co.uk.

12 JANUARY - RED ROSE WINTER RALLY – The George H Carnall Leisure Centre, Kingsway Park, M41 7FJ. Easily accessible from M60 J9 (opp. Trafford Centre). OT 11am. CP (free), TS, B&B, SIG, C, DF, DIS, RSGB Bookstall. John, 07840 389 427. [www.wmrc.org.uk]

26 JANUARY - HORNCASTLE WINTER RALLY – Horncastle Youth Centre, Lincolnshire LN9 6DZ. OT 10.00/10.30, £1.50, DF, C, free CP. Tables £5, free power. Tony, G3ZPU, 01507 527 835, tony.nightingale@yahoo.co.uk.

2 FEBRUARY - 29th CANVEY RADIO & ELECTRONICS RALLY – 'The Paddocks', Long Road, Canvey Island, Essex SS8 0JA (southern end of A130). Free CP, OT 10.30. C, DF, TS. Vic Rogers, G6BHE, 01702 308 562, nvr@blueyonder.co.uk. [www.southessex-ars.co.uk].

2 FEBRUARY - PENCOED ARC TABLE TOP SALE – Pencoed RFC, Felindre Rd, Pencoed CF33 5PB off at J35 M4. OT 9:30am, £2, C. Gerry Day, 01656 860 761.

9 FEBRUARY - HARWELL RADIO AND ELECTRONICS RALLY – Didcot Leisure Centre, Mereland Road, Didcot. TI S22, free CP, OT 9.45/10.00, £3 (under 12s free). TS, FM, SIG, LB, C, DF. Ann, G8NVI, 01235 816 379, ann.stevens@btinternet.com. [www.g3pia.org.uk].

16 FEBRUARY - RADIO-ACTIVE RALLY – Civic Hall, Nantwich, Cheshire CW5 5DG. OT 10.30. TS, B&B, C, WIN. Tim, 01948. 519 249. tm0sin@yahoo.com. [www.midcars.org].

23 FEBRUARY - BRATS RAINHAM RADIO RALLY – Rainham School for Girls, Derwent Way, Rainham, Gillingham, Kent ME8 0BX. TI, OT 10.00/9.30, TS, SIG. C Darley, 0798 2244 788, charlesdarley@hotmail.co.uk.

1 MARCH - LAGEN VALLEY ARS ANNUAL RALLY – the Village Centre, Ballynahinch Street, Hillsborough. OT 11.30am, CP, C, B&B, SIG, TS. Jim, GI0DVU, 02892 662 270.

2 MARCH - EXETER RADIO & ELECTRONICS RALLY – America Hall, De La Rue Way, Pinhoe Exeter EX4 8PW. OT 10.15/10.30, £2. TS, B&B, C. Pete, G3ZVI, 07714 198 374, g3zvi@yahoo.co.uk.

9 MARCH - WYTHALL RC ANNUAL RADIO RALLY – Woodrush Sports Centre, Shawhurst Lane, Hollywood, nr Birmingham B47 5JW on the A435, 2 mi from J3 M42. TI S22 (V44), CP, OT 10am, £3. TS, C. Chris, G0EYO, 07710 412 819, g0eyo@blueyonder.co.uk. [www.wrcrally.co.uk].

15 MARCH - 39th DUTCH NATIONAL RADIO FLEA MARKET – "Autotron", Rosmalen, just off A59 motorway. TI PI4SHB, 145.500MHz, CP, OT 9am. TS, FM, C. Details: info@radiovlooienmarkt.nl. [www.radiovlooienmarkt.nl].

16 MARCH - DOVER RADIO RALLY – Whitfield Village Hall, Sandwich Rd, Whitfield, Dover, Kent CT16 3LY. OT 10am, £2. TS, B&B, A, C, CP. Tables £10. Ian Keyser, ian.g3roo@googlemail.com.

6 APRIL - 51st NORTHERN AMATEUR RADIO SOCIETIES ASSOCIATION EXHIBITION (Blackpool rally) – Norbreck Castle Exhibition Centre, Blackpool FY2 9AA. TI, CP, OT 10.15/10.30. TS, B&B, SIG, MT, LB, C, DF, RSGB book stall. Dave, M0OBW, 01270 761 608, dwilson@btinternet.com. [www.narsa.org.uk].

13 APRIL - HACK GREEN BUNKER RALLY – Hack Green Secret Nuclear Bunker, Nantwich, Cheshire, CW5 8AL Sale of electronic equipment, amateur gear, components, military radio sets and vehicle spares. OT 10am, TS, C. Lucy, 01270 623 353, Lucy@hackgreen.co.uk. [www.hackgreen.co.uk]

13 APRIL - SOUTH GLOUCESTERSHIRE AMATEUR RADIO RALLY – Scout Activity Centre, Woodhouse Park, Almondsbury, BS32 4LX. OT 10am, B&B, CP, C, CBS, TI S22 (V44). Mike, M1DPB, southglosradiorallycoordinator@gmail.com, 07806 310 095. [southglosradiorally.org.uk].

13 APRIL - WEST LONDON RADIO & ELECTRONICS SHOW (Kempton Rally) – Kempton Park Racecourse, Staines Road East, Sunbury on Thames, TW16 5AQ. TI, free CP, OT 9.50/10am. TS, FM, B&B, SIG, C, DF, WIN, LEC. Paul, M0CJX, 08451 650 351, info@radiofairs.co.uk. [www.radiofairs.co.uk].

27 APRIL - 30th YEOVIL QRP CONVENTION – Digby Hall, Hound Street, Sherborne, Dorset DT9 3AA (adjoining the central shopping car park). TI S22, CP, OT 9.30am-3pm. TS, LEC, B&B, C, DF. Steve, G7AHP, 01803 666 407, steve@g7ahp.co.uk.

4 MAY - DAMBUSTERS HAMFEST – Thorpe Camp Visitor Centre, Coningsby, Lincs LN4 4PE. TI S22, GB3FR, £3, B&B new for 2013 free parking, Pitches free but size is limited if not pre-booked. RAF heritage centre on site. Overnight camping by appointment. C, OT 10am. Contact tcrm@hotmail.co.uk. [www.qsl.net/gb4tcm/dambusters.html].

5 MAY (BANK HOLIDAY MONDAY) - DARTMOOR RADIO RALLY - Tavistock College, Crowndale Road, Tavistock, Devon. PL19 8DD. No TI. OT 10:15/10:30, £2, Free CP, TS, B&B, SIG, C, DF. Viv, 01752 823 427, vivwatsondrc@aol.com.

This list shows all rallies and events we are aware of as of press deadline. 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. We also recommend you check the details are correct in *RadCom* and tell us if not.

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.

SILENT KEYS

We regret to record the passing of the following Members:

Name	Date
Mr P G Lewis, G3EMF/F5VJE	5/11/2013
Mr W B Kendal, G3GDU	4/11/2013
Mr J W Bluff, G3SJE	27/10/2013
Mr D Calder, GM4WHD	14/11/2013
Mr D Jefferys, G6RAR	
Mr D M Balharrie, G8GCT	30/10/2013
Mr G W Hancox, G8PVM	5/11/13
Mr G I Sydenham, G0DJW	26/10/2013
Mr A G Sparks, G0VHW	7/2013
Mr T R Rennie, G0WDL	
Mr E G Oliver, M0AEO	11/11/2013
Mr W L Gray, M0CPH	
Mr P L G Mockridge, RS52958	
Mr R Bradshaw, 2W0UXW	17/11/2013

OBITUARIES

As part of the improvements to the RSGB website, an obituaries section is being opened at www.rsgb.org/sk and we welcome obituaries from clubs or individuals when someone sadly passes away. Please send submissions by e-mail (only) to sk@rsgb.org.uk. All submissions will be moderated.

SILENT KEY ENTRIES

The Silent Keys column is separate from the obituaries section. To notify the RSGB that a Member has passed away (and their subscription should end and they should be listed in Silent Keys), please e-mail sales@rsgb.org.uk or telephone 01234 832 700 and then select option 1. We will need to know the deceased's name, callsign or RS number and, if possible, date of death.

SPECIAL EVENTS STATIONS

These callsigns are valid for use from the date given, but the period of operation may vary from 1 - 28 days before or after the event date. Operating details are provided in an abbreviated form as follows: T = 160m; L = 80 or 40m; H = HF bands (30 - 10m); V = 6 and/or 4m; 2 = 2m; 7 = 70cm; S = satellite and P = packet. Details published here are kindly provided by Ofcom.

Date	Callsign	Phonetics	Location	Bands	Keeper
01/01/2014	GB4BLC	Bedworth Lions Club	Bedworth	LH27	G8GMU
04/01/2014	GB100L	100 Years Leic RS	Leicester	TLHV27	G4SJX
19/01/2014	GB5SLB	Sheringham Lifeboat	Norfolk	TLH27	G0AJJ
24/01/2014	GB6WLB	Golf Bravo Six Walton Life Boat	Walton on the Naze	LHV2	G6XOU
25/01/2014	GB4LBC	Lifeboat Cumbria	Cumbria	LH2	G7KSE
	GB2LBC	Lima Bravo Charlie	Cumbria	TLH27	G8RZ

11 MAY - LOUGH ERNE AMATEUR RADIO CLUB ANNUAL RALLY – Share Discovery Village, Lisnaskea, Co. Fermanagh BT92 0EQ, N Ireland. Access from Erne/Shannon Waterway. OT 11.30am CP, B&B, TS, LB, C, DF. Iain, 028 6632 6693, iain@learc.eu.

16 – 18 MAY - DAYTON HAMVENTION® – Hara Arena, Dayton, Ohio, USA. CP, OT 8am, $20-$25, TS, huge FM, SIG, DF, LEC, C, CBS, WIN, US exams, FAM. RSGB book stall. Contact international@hamvention.org. [www.hamvention.org].

8 JUNE - 13th JUNCTION 28 QRP RALLY – South Normanton Alfreton and District Amateur Radio Club in association with the G QRP Club. Alfreton Leisure Centre, Church Street, Alfreton, Derbyshire DE55 7BD. 10 mins from M1 J28 and the A38. TI S21, OT 10am. TS, SIG, C, LB. Anya Lawrence, 2E0BQS, 0115 930 7322, adylawri@btinternet.com. [www.snadarc.com].

27 – 29 JUNE - HAMTRONIC SHOW, FRIEDRICHSHAFEN – Messe, Friedrichshafen, Germany. TS, FM, CP, SIG, LB, C, DF, LEC, CS. Large RSGB book stall. [www.hamradio-friedrichshafen.de].

29 JUNE - WEST OF ENGLAND RADIO RALLY – Cheese & Grain, Bridge Street, Frome, Somerset BA11 1BE. CP, OT 10am-2pm, £2.50. TS, RSGB book stall, C, DIS. Shaun, G8VPG, 01225 873 098, rallymanager@westrally.org.uk. [www.westrally.org.uk].

5 JULY - BANGOR AND DISTRICT ARS RALLY – Donaghadee Community Centre, County Down BT21 0HB. OT 11.30, £3. TS, B&B, SIG. Peter, MI6NID, 028 9188 9 018, petermi6nid@outlook.com. [www.bdars.com].

13 JULY - McMICHAEL RADIO RALLY & CAR BOOT SALE – Reading Rugby Football Club, Holme Park Farm Lane, Sonning Lane (B4446), Sonning on Thames, Reading RG4 6ST. TI, free CP, £2, LB, C, SIG, WIN, TS, CBS, OT 9:30. Pete, G8FRC, 01189 695 697. [www.mcmichaelrally.org.uk]

27 JULY - HORNCASTLE SUMMER RALLY – Horncastle Youth Centre, Lincolnshire LN9 6DZ. OT 10.00/10.30, £1.50, DF, C, free CP. Tables £5, free power. Tony, G3ZPU, 01507 527 835, tony.nightingale@yahoo.co.uk.

17 AUGUST - RUGBY AMATEUR TRANSMITTING SOCIETY ANNUAL RADIO RALLY – Princethorpe College, Princethorpe, Rugby CV23 9PX. Stephen, G8LYB, 01788 578 940, stephen@tompsett.net. [www.rugbyats.co.uk].

31 AUGUST - TELFORD HAMFEST – Enginuity Technology Centre, Coalbrookdale, Telford TF8 7DU. Martyn, G3UKV, 01952 255 416. [www.telfordhamfest.co.uk].

26 & 27 SEPTEMBER - 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). Free CP, TS, B&B, CB, C, SIG, Morse proficiency tests on demand, RSGB book stall, RSGB Services & Committees, DF, FM. [www.nationalhamfest.org.uk].

10-12 OCTOBER - RSGB CONVENTION – The full convention programme of lectures for all interests will be available on the website later in the year. Principal sponsor Martin Lynch & Sons. [www.rsgbevents.org/].

12 OCTOBER - HACK GREEN BUNKER RALLY – Hack Green Secret Nuclear Bunker, Nantwich, Cheshire, CW5 8AL Sale of electronic equipment, amateur gear, components, military radio sets and vehicle spares. OT 10am, TS, C. Lucy, 01270 623 353, Lucy@hackgreen.co.uk. [www.hackgreen.co.uk]

26 OCTOBER - 24th GREAT NORTHERN HAMFEST – Barnsley Premier Leisure Complex, Queens Road, Barnsley S71 1AN or follow the brown Metrodome signs. GNHF in association with SYRG. OT 10.30, TS, SIG, C, FAM. Ernie, G4LUE, 07984 191 873. [www.gnhf.co.uk].

9 NOVEMBER - WEST LONDON RADIO & ELECTRONICS SHOW (Kempton Rally) – Kempton Park Racecourse, Staines Road East, Sunbury on Thames, TW16 5AQ. TI, free CP, OT 9.50/10am. TS, FM, B&B, SIG, C, DF, WIN, LEC. Paul, M0CJX, 08451 650 351, info@radiofairs.co.uk. [www.radiofairs.co.uk].

RSGB MEMBERS' ADVERTISEMENTS

RSGB Members wishing to place an advertisement may do so free of charge by e-mail.

The following terms and conditions apply to all Members' Advertisements.

1) In order to qualify for free insertion, Members Ads must be submitted by e-mail to memads@rsgb.org.uk. Ads may still be submitted by post but must be accompanied by a payment of £5 to cover administration costs.

2) **Your advert must clearly show whether it is For Sale or Wanted and must include your name, callsign or Membership number, telephone number and postal town, in that order.**

3) The Ad may not contain more than 40 words, excluding the information in (2), and maybe edited for readability at our sole discretion. Longer ads may be accepted if there is a good reason, eg a shack clearance on behalf of a SK Member; e-mail us and ask.

4) Not more than one ad per month will be accepted from any member. 'Recurring' ads will not be accepted, but Members may re-submit the same advert each month if they wish.

5) E-mailed adverts may optionally include one photograph of the item(s) being offered. Images must be attached as a jpg file, at least 800 pixels wide and of good quality. By submitting any image you warrant that you own the copyright and that you permit the RSGB to use it in anyway. We will endeavour to publish photographs with ads as space permits but cannot guarantee to publish any particular photograph.

6) Adverts will be published at the first available opportunity but no guarantee can be given as to when a particular ad will appear.

7) The RSGB believes that it is inappropriate for Members trading in radio equipment in any way to place Members' Ads. We therefore regret we are unable to accept such ads, although we do welcome these in the 'Classified' advertising section of *RadCom*.

8) The RSGB accepts no responsibility for errors or omissions, or for the quality of goods for sale or exchange.

9) Members' Ads are accepted and published in good faith.

10) Members' Ads are accepted at the sole discretion of the Editor, whose decision is final.

WARNING

Members are advised to ensure that the equipment they intend to purchase is not subject to a current hire purchase agreement.

The 'purchase' of goods legally owned by a finance company could result in the 'purchaser' losing both the goods and the money paid.

Members' Ads also appear on the Members Only website at www.rsgb.org/membersonly/membersads.

RADIO SOCIETY OF GREAT BRITAIN

THE NATIONAL SOCIETY WHICH REPRESENTS UK RADIO AMATEURS

Founded in 1913 incorporated 1926. RSGB is a trading name of Radio Society of Great Britain, a limited company registered in England and Wales with company number 00216431. Member society of the International Amateur Radio Union.

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

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

RSGB MEMBERSHIP

Annual rates from 1 January 2011

Full membership (by Direct Debit). £47.00
(individual & club)
Family membership (by Direct Debit). £56.00

Paying other than by Direct Debit attracts a £4 premium.

Student (21-25). . . . . Free
Ham Club (under 21). . . . . Free

Subscriptions include VAT where applicable.
Special arrangements exist for visually impaired persons. Details and membership application forms are available from RSGB HQ or see www.rsgb.org/join.

YOUR RSGB

This page provides names and contact details for Board Members, Regional Managers, Committee Chairmen and Honorary Officers. Members seeking advice and guidance on any aspect of Amateur Radio or the Society's work are free to contact the relevant person below. Before doing so, please do check the comprehensive FAQs on the RSGB website, www.rsgb.org/faq/ to see if your question is answered there.

For HQ staff below, both e-mail addresses and telephone details are provided, including the option to select when dialling through the RSGB switchboard (01234 832 700).

Chairmen and Honorary Officers:
These are all volunteers and give their time freely to support the Society. Members should respect the fact that many also have full time day jobs, and so e-mail is the appropriate method of communication.

General Manager:
Graham Coomber, G0NBI,
e-mail: graham.coomber@rsgb.org.uk

Honorary Treasurer (Acting):
Richard Horton, G4AOJ, e-mail: g4aoj@rsgb.org.uk

Company Secretary:
Rupert R Thorogood, G3KKT, e-mail: g3kkt@rsgb.org.uk

THE RSGB BOARD

Dr Bob Whelan, G3PJT (President), e-mail: g3pjt@rsgb.org.uk

Graham Murchie, G4FSG, (Board Chairman)
e-mail: g4fsg@rsgb.org.uk
Phillip Brooks, G4NZQ, e-mail: g4nzq@rsgb.org.uk
Stewart Bryant, G3YSX, e-mail@ g3ysx@rsgb.org.uk
Stan Lee, G4XXI, e-mail: g4xx@rsgb.org.uk
Len Paget, GM0ONX, e-mail: gm0onx@rsgb.org.uk
Dr John Rogers, M0JAV, e-mail: m0jav@rsgb.org.uk

Note: The General Manager, Company Secretary and Acting Honorary Treasurer are not Directors, but are in attendance at Board Meetings.

REGIONAL MANAGERS

Region 1 – J O'Neill, GM7VSB, e-mail: rm1@rsgb.org.uk
Region 2 – D Morrison, GM1BAN, e-mail: rm2@rsgb.org.uk
Region 3 – K A Wilson, M1CNY, e-mail: rm3@rsgb.org.uk
Region 4 – N Ferguson, G0BPK, e-mail: rm4@rsgb.org.uk
Region 5 – V Ravenscroft, M0VRR, e-mail: rm5@rsgb.org.uk
Region 6 – M Harper, MW1MDH, e-mail: rm6@rsgb.org.uk
Region 7 – J Sneddon, MW0EQL, e-mail: rm7@rsgb.org.uk
Region 8 – P Hosey, M1OMSO,
e-mail: rm8@rsgb.org.uk
Region 9 – L Smith, G4OXY, e-mail:rm9@rsgb.org.uk
Region 10 – M Senior, G4EFO, e-mail: rm10@rsgb.org.uk
Region 11 – P Helliwell, G7SME, e-mail: rm11@rsgb.org.uk
Region 12 – M Sanderson, M0IEO, e-mail: rm12@rsgb.org.uk
Region 13 – S Boden, G4XCK, e-mail: rm13@rsgb.org.uk

SPECIALIST AREAS – CHAIRMEN & HONORARY OFFICERS

Abuse and poor operating
Amateur Radio Observation Service (AROS), Keith Bassett, G7NBU, AROS coordinator, e-mail: aros@rsgb.org.uk, www.rsgb.org/aros/

Amateur Radio Direction Finding
Bob Titterington, G3ORY, Chairman, ARDF Committee, e-mail: ardf.chairman@rsgb.org.uk, www.rsgb.org/ardf/

Contests
Ian Pawson, G0FCT, Chairman, Contests Committee, e-mail: cc.chair@rsgb.org.uk, www.rsgb.org/radiosport/

EMC
John Rogers, M0JAV, Chairman, EMC Committee, e-mail: emc.chairman@rsgb.org.uk, www.rsgb.org/emc/

General Technical Matters
Andy Talbot, G4JNT, Chairman, Technical Forum, e-mail: tech.chair@rsgb.org.uk, www.rsgb.org/technicalmatters/

General Spectrum & Regulatory Matters
John Gould, G3WKL, Chairman, Spectrum Forum, e-mail: spectrum.chairman@rsgb.org.uk www.rsgb.org/committees/spectrumforum/

GB2RS News Service Management
Gordon Adams, G3LEQ, GB2RS Manager, e-mail: gb2rs@ntlworld.com
(GB2RS news items should be sent to gb2rs@rsgb.org.uk)

HF Matters
Ian Greenshields, G4FSU, HF Manager, e-mail: hf.manager@rsgb.org.uk

Intruders to the Amateur Bands
Chris Cummings, G4BOH, e-mail: iw@rsgb.org.uk www.rsgb.org/intruders/

IOTA Activity Programme
Roger Balister, G3KMA, IOTA Manager, e-mail: iota.manager@rsgb.org.uk, www.rsgbiota.org/

Microwave Matters
Murray Niman, G6JYB, Microwave Manager, e-mail: mw.manager@rsgb.org.uk

Planning Advice
Stephen Purser, G4SHF, Chairman, Planning Advisory Committee, e-mail: pac.chairman@rsgb.org.uk, www.rsgb.org/planning/

Propagation Studies
Steve Nichols, G0KYA, Chairman, Propagation Studies Committee, e-mail: psc.chairman@rsgb.org.uk, www.rsgb.org/psc/

Repeater and Data Communications
John McCullagh, GI4BWM, Chairman, ETCC, e-mail: etcc.chairman@rsgb.org.uk, www.ukrepeater.net

RSGB Awards
John Dunnington, G3LZQ, Awards Manager (Contact HQ in the first instance on 01234 832 715), e-mail: hf.awards@rsgb.org.uk, www.rsgb.org/operating/awards/

Training & Education
Steve Hartley, G0FUW, Chairman, Training & Education Committee, e-mail: tec.chair@rsgb.org.uk, www.rsgb.org/clubsandtraining/

VHF Matters
John Regnault, G4SWX, VHF Manager
E-mail: vhf.manager@rsgb.org.uk

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

HEADQUARTERS STAFF

General Amateur Radio Issues
E-mail: AR.dept@rsgb.org.uk
Telephone: 01234 832 700, Option 5

Amateur Radio Examinations
E-mail: exams@rsgb.org.uk
Telephone: 01234 832 700, Option 4

***RadCom* (news items, feature submissions, etc)**
Elaine Richards, G4LFM or Giles Read, G1MFG
E-mail: radcom@rsgb.org.uk
Telephone: 01234 832 700, Option 3

GB2RS and Club News
E-mail: GB2RS@rsgb.org.uk
Telephone: 01234 832 700, Option 3

Sales department
(Membership, books and other products)
E-mail: sales@rsgb.org.uk
Telephone: 01234 832 700, Option 1

Subscription renewals
Telephone: 01234 832 700, Option 2

IOTA
E-mail: IOTA_HQ@rsgb.org.uk
Telephone: 01234 832 700, Option 5

General Manager
E-mail: GM.dept@rsgb.org.uk
Telephone: 01234 832 702

HEADQUARTERS AND REGISTERED OFFICE

3 Abbey Court, Fraser Road,
Priory Business Park, Bedford MK44 3WH,
Telephone: 01234 832 700
Fax: 01234 831 496

QSL BUREAU ADDRESS

PO Box 5, Halifax HX1 9JR, England
Telephone: 01422 359 362
E-mail: qsl@rsgb.org.uk, www.rsgb.org/qsl

PLAY YOUR PART IN YOUR RSGB

Have Your Say
Let us know how we're doing! Through "Have Your Say" you can let us know your views and you will receive a reply from the General Manager or a Board Member.
Write to haveyoursay@rsgb.org.uk or go to www.rsgb.org/haveyoursay/

Consultations
From time to time you will find we are consulting the Membership on aspects of Society policy. You can find current consultations at www.rsgb.org/consultations/

National Radio Centre
Don't forget to tell your friends about the National Radio Centre at Bletchley Park. Full details can be found at www.nationalradiocentre.com

Licensing & Special Event Stations
Licensing and Notices of Variation (NoVs) for special event stations are handled by Ofcom, 0207 981 3131, www.ofcom.org.uk

FAQs
The RSGB has compiled the questions most frequently asked by Members at www.rsgb.org/faq/

Band plan
The latest version of the band plan is always available on the website at www.rsgb.org/committees/spectrumforum/band-plans.php

Good Operating Practice
The RSGB fully supports the code of conduct and encourages all amateurs to read the advice. www.rsgb.org/tutors/pdf/good_operating_practices.pdf & www.rsgb.org/operating/ethics/docs/ethics_and_operating.pdf

RSGB Tech
The purpose of this service is to be the first port of call for technical queries on amateur radio matters. It is open to all radio amateurs. http://groups.yahoo.com/group/rsgbtech/

RSGB Shop
All RSGB goods - books, filters, clothing - can be purchased online at www.rsgbshop.org/

Club Finder
Use the website to find your nearest radio club and check out the facilities they have to offer.
www.rsgb.org/clubsandtraining/

WEBSITE

Main website: www.rsgb.org
Members Pages
Log in using your callsign ***in lower case*** as the user name and your Membership number, without the leading zeros (see your *RadCom* address label) as the password.
If you need to update your Membership details, please visit www.rsgb.org/myaccount/.

AMSTERDAM ISLAND

Ralph Fedor, K0IR

In January 2014, fourteen of us from seven countries will land on Amsterdam Island, AF-002, go on the air with FT5ZM and, hopefully, give many DXers a new country or a new band-mode QSO. We are in the home stretch of our preparations. Our website, www.amsterdamdx.org will tell you all about the DXpedition itself, our transceivers, amplifiers and our many antennas.

European amateurs should do well in making contacts with FT5ZM. Ten metres may be difficult, but otherwise propagation to Europe should be good and we expect multiple band-mode contacts with many stations. With the assistance of DX Engineering, we are particularly well equipped to receive your signals on 160 meters (Top Band). Given our eight stations with amplifiers, ten 3-element Yagis and low band verticals with lots of radials, we expect you will hear us too. We are going to enjoy working you and we hope you'll enjoy working us as well.

So what are our remaining challenges? As many of you may expect, they are primarily financial. Our budget is over $400,000. Each team member must personally contribute a minimum of $10,000, possibly more, and pay their travel and lodging expenses to get to and from our departure point of Fremantle, Australia. We have done some aggressive fund-raising but the possibilities of team members having to dig deeper into their pockets and ending this DXpedition in debt still loom. And, we find ourselves in the cross hairs of the controversy over large, expensive DXpeditions.

One can argue that a mega DXpedition, like this one, is against the amateur spirit, that it smacks of commercialism and that the means of bringing money into a project like this do not seem ethical. One can debate the merit of things that have been done to try and make DXpeditions like this possible: selling baseball caps and coffee mugs, delaying updates to Logbook of the World in the hopes of garnishing few more QSL request envelops that contain dollar bills, and rewarding those who supported the DXpedition with special handling.

But we *do* need to sell some baseball caps and raise some money to make it happen. There is no other way. We are dependent on material and financial support from our commercial sponsors and our amateur radio audience. Have a look at our website to see the tremendous help we've received. And, if you're inclined to help, we still need it – very much.

This not the first DXpedition in this situation and, if amateurs want really rare countries to appear on the air, we will not be the last. But consider this: if each QSO we make were rewarded with the value of one cup of Starbuck's coffee, we would have a surplus of funds. But, that scenario won't happen. Reality is that the majority of DXpedition support comes from a minority of DXers. And boy, are we glad that you in that minority are with us.

ENCOURAGING THE M6s

Pete Sipple, M0PSX

Echoing the words of John Rowlands, MW1CFN (*RadCom* December 2013), could it be that clubs need to up their game to help amateur radio survive?

There has been much discussion of how to encourage people into the hobby, but what of those who've crossed the threshold? Of the other eleven candidates on my Foundation course back in 2010, it seems that only four are currently active. I'm convinced this number would be higher if local clubs were to do more to keep up the momentum once the newcomers have got their licence.

Whilst clubs, in general, do an excellent job of serving their members and promoting the hobby, I'd like to encourage clubs to take a hard look at just what support they're offering to the new generation. How many M6s serve on your club's committee? What percentage of club night talks focus on beginner's topics? What does the club's website offer in the way of getting-started guides? How does your club stay in touch with its Foundation candidates? All questions that committee members need to have on their next agenda, perhaps.

For my part, I decided to tackle the problem by starting up a beginners' net on the local 2m repeater – this was designed to allow new M6s to come on air and talk to both the trainers and those who'd trained with them. The weekly net regularly pulls in 20 or so participants, with a good mix of old and new operators. We make use of a live chatroom whilst the net is active to allow online discussion whilst others are taking their turn and the net has its own website and community at www.essexham.net.

As an active trainer with local two clubs, I feel it's important look at ways of keep in contact with candidates, especially those whose voices you don't hear on the air very often, if at all. Has the cost or complexity of equipment put them off? Are they mic-shy? Has a bad experience put them off? Chances are, other club members would be willing and able to help overcome some of those initial hurdles, but only if they're identified. I take careful note of questions that I hear from newcomers raised during training, at club nights, or on air, and have slowly been putting together a series of Getting Started guides, to try to make the journey from the exam pass to competent operator as easy as possible. If these guides could be of use to your newbies, feel free to share (or add to) the content at www.essexham.co.uk/getstarted.

I'd be interested to hear what other ideas clubs have for keeping the M6s involved, interested and engaged, and I'd encourage you to ask your local club's committee the same question.

POWERPOLE CONNECTORS

Bob Clinton, G0BUX

I have been an enthusiastic user and advocate of PowerPole connectors for over a decade so I read Andy Talbot's comments on them in Design Notes (Nov 2013 *RadCom*) with interest and agreement. I was also interested in his comments on Jones connectors, which I have been using since the late 1950s. In addition to the 12VDC application that Andy mentions, Jones connectors were useful for conveying a variety of circuits: B+, filament voltage, audio, control signals, just about anything except RF and extremely high voltages. They came in a variety of pin and mounting configurations. Because of their large size, by today's standards, constructors would be unlikely to use them in new designs but if you are attempting to breathe new life into some antique boat anchors and need to fabricate a replacement cable, nothing else will do as well. Andy has his chemistry a bit wrong, however. Jones connectors are not made of Unobtanium but of the somewhat less rare and costly element Scarcium. You won't find them in the catalogues of the major component suppliers but the US supplier Quicksilver Radio can provide 2, 4, 8, and 12 pin versions in both line and chassis mount configurations. Visit their website at www.qsradio.com.

A SUSTAINABLE AND SOCIALLY INCLUSIVE FUTURE?

Patrick Bell, M3ZTG

Let me start on a positive note. Since the dark days of 2010/11 the RSGB has made enormous progress in terms of governance, financial controls and many other issues that needed review and remedial action. To that extent all those involved deserve our appreciation and congratulations. In similar vein, recognition should be given to the Society's continued vigilance in protecting and preserving the interests of amateur radio enthusiasts.

However, there are two issues that crop up time and again; both are intractable and neither lend themselves to overnight resolution.

Evidence for these twin challenges can often be found in the letters pages of *RadCom* and confirmed by the presentation of Paul Jarvis of Ofcom at the recent National Hamfest. In a letter (December *RadCom*), Ken Smith, G3JIX neatly coupled both when he wrote of *"young beginners in amateur radio and the negative experiences they've suffered"* and of a young person describing the members of an ARC – *"they*

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were so old". Ken concluded by posing the question *"...are we on a losing wicket?"*

The answer is probably yes and is given weight by Ofcom when they refer to the large numbers of Foundation licence holders who chose not to progress and if Paul Jarvis feels that embedding a Progressive Learning Culture through incentives will stop the rot, he is sadly mistaken. Let's face it, a great deal can be accomplished with 5 or 10 watts or by resorting to the computer based virtual ionospheres. I firmly believe there is and always will be an interest amongst young people in communicating by means other than Skype and its recent internet counterparts, but what they will find on passing the Foundation exam will be exactly the same as their predecessors encountered, both young and adult.

Having outlined the problems, it's only right to offer options for consideration. In listening to the networks, it's difficult not to conclude there is a growing tension occasioned by the Society's original vision of a hands-on technological/research hobby and those whose desire is to simply communicate safely, over distance and without detriment to neighbours. The latter have no intention whatsoever of taking a soldering iron to the insides of their expensive black boxes and even less desire to build homebrew equipment. It is that tension that perhaps gives rise to the inexcusable disdain with which some of the experienced full licence holders give to newcomers.

If there is to be room for both to operate in harmony and gain satisfaction from this wonderful hobby, an in-depth revision is required. The demography of membership is changing and not for the better. The halcyon pre-internet days of hundreds of skilled radio operators and technicians trained by the defence services taking up the hobby are over. Similarly those members who acquired their skills when homebrew was almost a necessity are aging and diminishing in number. Please don't misinterpret what is being stated. The promotion of technical research and experimentation remains as vital as ever it was and should be encouraged, but that is only one element when looking to the future of the hobby and the Society.

The concept that one size fits all in terms of the licence examinations and privileges is, in this day and age and with the changing 'customer base', possibly outmoded and will not be helped by attempting to force feed income generating 'incentives' to progression.

Maybe in the second decade of the 21st century the time is right to recognise two distinct and *equal* groups within this hobby. One whose drive is for technical advancement and the other who, to use the words of the BBC's motto, is for "nation to speak peace unto nation" using only commercially produced equipment. It is a radical thought and one which will require a rethink and revision of the examination structure and the privileges. However, if this or a similar proposal is pursued, maybe, just maybe, we'd see far more young people and women featured in the pages of *RadCom* and a more assured future for the Society.

WHAT KIND OF HOBBY?

John Welch, M0TDF

Recent comments about the lack of articles with basic information relevant to newcomers to amateur radio brought to mind a regular item in *The Radio Constructor* magazine many years ago. It was entitled 'In Your Workshop' and featured Smithy the Serviceman and his assistant Dick.

Using the platform of a service workshop handling radios and televisions, basic theory and practical applications were discussed in an entertaining manner. I remember topics ranging from choosing a replacement mains transformer to discussions on FM detectors, fault-finding of circuitry and many others. All interwoven into the account of a typical workday interspersed with the obligatory tea break, the latter an opportunity to tackle more abstract matters. Overall, one learned electronic principles, plus their practical application, in an easily assimilated manner.

Whilst, for amateurs, basic service tips and procedures may be less relevant to today's complex black boxes with surface mount components and large scale integration that require highly specialised tools and test equipment, may there not be some aspects of In Your Workshop's model which could be valuable here? Power supply principles and repairs, as just one example?

Ray J Howes, G4OWY

Where, as MW1CFN rightly points out, are we going to see more articles written for those perhaps new to our hobby, or 'still largely clueless about electronics'? *RadCom* has remained editorially the same as it always has been. The same type of ads, the same type of articles. But will we see published in *RadCom* the sort of articles that MW1CFN wants? Unlikely. Probably because this particular 'leopard' will never change its spots.

In the last year, the RSGB has started and electronic publication especially for beginners with the sort of basic level information discussed here. It is available bi-monthly, for those Members who sign up – go to http://rsgb.org/main/get-started-in-amateur-radio/new-amateurs-newsletter/. The aim of the newsletter is to help RSGB Members progress with their hobby by answering all those niggling questions that you might have, such as what is WSPR, what are QSLs, what is PSK31 and is it worth bothering with Morse? It's well worth signing up - over 1,900 Members are already enjoying the newsletter. If there are any prospective authors within the Membership who feel they can write for beginners, please get in touch. Ed

NO EXCUSE FOR BAD CONDUCT

Tom, GM4FDM

Having been a policeman for 32 years and served in some of the toughest areas of Glasgow, I felt sure that if I've not seen it all, I've seen most of it. Nothing ever amazes me as I have seen the depths to which the common man can stoop.

Therefore it troubles me when I listen to the conduct of so called amateur radio enthusiasts as soon as an expedition takes place. Sure, I understand that expeditions may not be everybody's cup of tea, a bit like contesting I suppose, but it is no excuse for the conduct that is now common place on every expedition's transmit frequency.

It makes me stop and think as to whether I really want to go on another expedition or not. Why save my money up for 2 years to indulge in something that gives me (and others like me) pleasure, and in doing so give pleasure to others, only to have to put up with the antics of the perpetrators?

Often the situation is made worse with what we call the 'frequency police' and they often make more noise than the others.

I would seriously challenge any of the deliberate QRMers to give a presentation at Friedrichshafen or indeed Dayton, to try to explain to me why they actually do that. Why they are happy to sit all day, day after day, and cause misery to others. They could tell us what makes them tick and why they sit anonymously behind their microphone or CW key.

Unfortunately the people who do these things lack the moral fibre to stand up and be counted. I doubt if any will ever have to courage to stand up and admit they are a perpetrator. Ignoring them is not always an option.

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