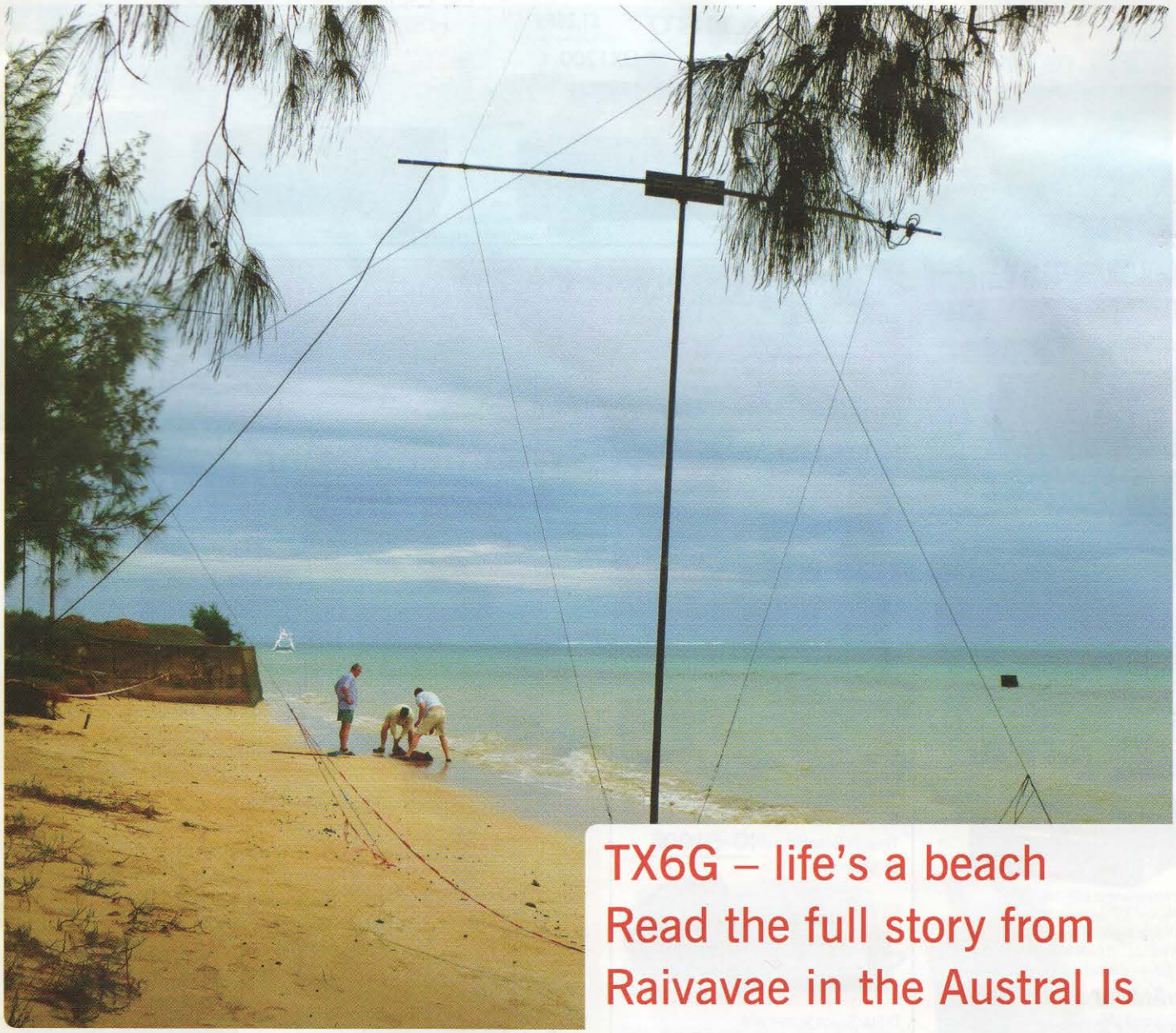
BF Pepe Luis

RadCom

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

JUNE 2014
VOLUME 90
NUMBER 06
£4.95



TX6G – life's a beach
Read the full story from Raivavae in the Austral Is

Emergency communications

How amateur radio helped in the Philippines when typhoon Haiyan made four million people displaced and/or homeless

South Africa

Amateur radio similarities and differences between the UK and SA

Homebrew

Mixing and switching for the low bands transceiver

0614

WATERS & STANTON

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FAX: (+44) 01702 205843
Email: sales@wsplc.com
Opening: Monday - Saturday 9am - 5.30pm

Scotland & Northern Store

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Sposers of RSGB Club Of The Year

OPEN DAY 2014

Sunday 25th May 10am - 4pm

Hockley - Make it a Date - Get The Bargain Deals - Once Only Discounts!

YAESU Choice of the World's top DX'ers

£1,266 d Inclusive of Cash Back

FT-DX1200

In Stock!

Part Exchange & Cash Back

FT-DX3000 HF & 6m Transceiver

Peter Hart Review in RadCom: £1902 Inclusive of Cash Back

"There is little I could find fault with."

The new HF generation of base stations from Yaesu/ Built in auto ATU with advanced DSP and superb roofing filters.

Call us for some really special deals - PLUS FREE CREDIT

More Exclusive Yaesu Deals from Top UK Yaesu Dealer!

FT-897D HF & 70cms 100W £719 d

The FT-897D is a very compact radio, like the FT-817ND on steroids. All modes and all bands in a very compact package .

FT-DX5000MP

We have the latest version of this great transceiver at a great price.This is the Yaesu Flag Ship radio that has proved itself with DXers around the world. Now offered at a really great price.

Includes £250 Yaesu Cash Back £3975 d

WATSON **Power Mite-NF**

£69.95c

- 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
- Dual V/A Meters with Back LightSpecifications

InnovAntennas

For Immediate Shipment

144MHz	Elements	Boom L.	Gain dB	Price inc VAT
144-LFA-3	3el	0.67	8.67	£59.95c
144-LFA-4	4el	1.17	9.49	£74.95c
144-LFA-5	5el	1.79	11.16	£89.96
144-LFA-6	6el	2.41	11.88	£104.95c
144-LFA-8	8el	3.73	13.32	£164.95c
144-LFA-9	9el	4.40	14.06	£194.95c
144-LFA-12	12el	7.13	15.80	£269.95c

10m Tiltover Mast Ground Mounted

The ideal mast for the smaller QTH. Galvanised and winch operated. Includes 3m mounting post (1m below ground) and ground socket for easy removal. Also provision for rotator mount.

£695 FREE Mainland Delivery

8m Tiltover Tube Mast Wall Mounted

This is a great mast for those who want to get just above the roof top and not upset the naighbours!

£350 FREE Mainland Delivery

Buy Now Pay Later - Another Great service from Waters & Stanton

Now you can afford to buy that dream radio. Just come into the store with ID (driving licence, passport credit card or utility bill - we need two of these) and we can sign you up while you wait. Alternatively we can email you the forms and arrange it within 24 hours.

SIX MONTH DEAL - You pay no deposit and at the end of six months you must pay the purchase price to settle the debt.

TWELVE MONTHS - You pay no deposit and at the end of twelve months you must pay the purchase price plus £15 settlement

Our NEW BABY - Weather Station

W-8682-MKII

Ideal for hams or normal domestic use. This lovely little station will give you a true picture of what is happening outside including rain, wind, temperature, pressure and trends.

Just £49.95c

Weather Station W-8681-Pro

£199.95

The W-8681 Pro Weather Station. It's our most advanced yet. Full colour touch screen with SD card and WiFi that enables you to get the full picture and forward forecast. It is totally wireless. No wires. Features: UV, Wind dir. & speed, humidity, in/out and min/max temp., Day and week, Pressure, Forecast, C/F, Clock, History. AC mains powered display.

ICOM

Dual Band Touch Screen D-Star **ID-5100E**

D-Star Touch Screen with **FREE UK NEXT DAY DELIVERY** **£569**

SAVE £126!

ID-5100E Deluxe £715

ID-5100E plus Bluetooth UT-133 module and VS-3 Bluetooth headset, MBF-1 Suction mount, MBA-20 Control bracket, and MBR-100 Trunion bracket . Representing a saving of £126 on the package. Please note the additions listed will be delivered by Icom UK in August.

YAESU Choice of the World's top DX'ers

FT-817ND HF - 70cms 5W All Mode Transceiver

Here's a great combination offer for those who want to go portable with a complete station including matching auto ATU and case for the transceiver. All battery operated and capable of feeding even a long wire. Comprises FT-817ND, Case and Elecraft T1-A auto ATU.

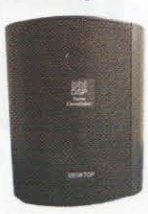
Complete Package **£699 c**

OM Power 2000 + Amplifier

- HF - 6m 2kW SSB CW (1.5kW on 6m) 1.5kW RTTY
- Self Contained Desk Top Operation
- 40 - 60W Drive to FU-728F ceramic tetrode
- Full QSK with silent vacuum relay
- Automatic Protection - LED Display
- 3-way antenna switching
- 390mm x 195mm x 370mm (w x h x d)
- Weight 24kgs 220 - 240v AC input.

In Stock ready for shipment. **£3995 d**

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

£179.95 c

YAESU Choice of the World's top DX'ers

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! **£569.95c**

VX-8DE

6m /2m/70cm

The VX-8DE TNC APRS/GPS provides an economical opportunity to obtain a handheld dedicated to APRS on all bands. This radio includes wideband receive 500kHz - 999MHz, Bluetooth option, IPX7 waterproof rating, includes AC charger and LiON 7.4v 11mAh battery pack.

£349.95c

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

YAESU · ICOM · bhi · KENWOOD

FREE local parking
Free Refreshments
Raffle Prizes
Lecture Talks
Service Department Clearance

ELECRAFT · MFJ · Heil Sound · APACHE LABS · OM Power · InnovAntennas

Our annual Open Days have become a "fixture" in the ham radio events list. It is a day to meet old friends, get some bargains with one-off discounts. We have now introduced a few short talks on ham radio subjects. It's a great day out.

We are just 3 miles from the Southend Sea Front and world's longest pier

WATSON

MultiRanger-9

Back in stock - one of our most popular antennas. Covers 80m to 2m (not WARC Bands) and is great for mobile or portable operation (with a ground plane). Fitted PL-259 base, it is remarkable value. Band changing is achieved simply by means of a wander plug and the top section can be tuned for fine adjustment.

£59.95

Signal Link USB

In Stock!

£99.95

* *Built-in Low-noise Sound Card*
* *Simple Installation and Setup*
* *Complete Radio Isolation*
* *USB Port Powered*
* *Works with virtually ALL Radios*
* *Uses Mic, Data, or Accy. Port*

This data interface matches virtually any soundcard based software, and is USB powered. Supplied with lead to matrch your radio.

DV-ACCESS 2m / 70cm

The DV Access Point Dongle connects to your PC or Intel based Mac via a USB port and provides a 2 meter Or 70cms Access Point for use with a D-STAR radio

DC-ACCESS 2m USB **£239**
DV-ACCESS 70cm **£249**

DV Dongle

Provides encoding and decoding of compressed audio using the DVSI AMBE2000 full duplex vocoder DSP chip. AMBE technology is used in all D-Star radios to provide efficient voice transmissions **£179**

ICOM IC-7100E

Exclusive W&S Offer

Get FREE (List £139)
InnovAntennas Dual Band 4m/6m 6 El. Yagi

All for £1249 *Offer Expires 20th June*

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! **£699c!**

Handheld Transceivers

YAESU

FT-252 2m Handy £69.95

Genuine Yaesu
Genuine Quality!

- 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

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	£289.95c
VX-8DE	6/2m/70cm Upgraded APRS	£349.95c
IC-E80D	2m/70cm D-Star GPS ready	£299.95c
IC-E92D	2m/70cm + D-Star	£387.95c
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	£84.95c
KG-UV6D	2m/ 70cm 5W/4W SMA	£94.95c

NEW

ID-51E 2m/70cm

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

£409.95c

TS-590S 160-6m Transceiver

Get A FREE MC-60S Base Mic- - - +
- - £50 off any additional items totalling £100 +

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.

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**

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 spectrum scope - USB for flash card or keyboard. 104dB dynamic range for great receiver performance
IN STOCK £2999.95c

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. **£599.95c**

NEW

FG-01 MkII Antenna Analyser

The new FG-01 antenna analyser that covers up to 72MHz with larger screen, includes a matching AC charger/PSU. This highly portable unit features dual impedance and VSWR traces with colour screen. **£239b**

Fast Antenna Adjustments

WANTED DEAD OR ALIVE!

We will accept any ham radio equipment in part exchange, even non-working items in many cases.

Just a Phone Call Away! 01702 203353
email: sales@wsple.com

Yaesu FREE GIFTS

Buy any of the rigs below and you get a free remote head kit.
Limited stocks so Hurry!

FT-857D Get FREE YSK-857 Remote kit
FT-8900R Get FREE YSK-8900 Remote kit
FT-8800 Get FREE YSK-8900 Remote kit
FT-7900 Get FREE YSK-7900 Remote kit

Mobiles

TM-281E

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

FT-8800E

Dualband Mobile 50W / 30W Great Value **£279.95c**

FTM-350AE

2m/70cm Mobile Bluetooth GPS APRS **£399.95c**

FT-2900E

75 Watt 2m 3W Audio, CTCSS, DTMF mic & "WIRES" internet. **£149.95c**

FT-7900E

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

TM-V71E

2m/70cm Mobile with Echo Link ~~£299.95~~ **£299.95 c**

FT-8900R

Quad band 10/6/2m/70cm FM 50W (70cm 35W) **£299.95c**

FTM-10E

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

ID-E880

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

TM-D710E

50 Watts 2m/70cms with APRS **£445.95c**

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. **£749.95c inc. CashBack**

FT-857D The great value mobile or base HF-6m 100W, 2m 50W 70cm 20W. **£699.95c**

WATSON HF-VHF Mobile Whips

MultiRanger 9 £59.95c

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

MultiRanger 2000 £79.95c

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 HF - 6m 100W transceiver. Includes Auto ATU Amazing value and a best seller. **£699.95c**

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

ICOM

ICOM

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

KENWOOD

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

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

WATERS & STANTON

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Opening: Monday - Saturday 9am - 5.30pm

Scotland & Northern Store

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The Best Handheld Scanner?

AOR AR-8200
All Bands
All Modes
All Occasions

The AR-8200 MK III is the kind of radio that you can carry around with you, and get serious wide band coverage reception of HF - UHF including SSB and CW. It's a radio that we sell to UK government organisations for monitoring and it could be a great travelling companion for ham enthusiasts.

£449.95

- 530kHz - 3GHz coverage
- AM FM FMW CW & SSB
- Inc rechargeable batts
- Multi steps Inc. 8.33kHz airband
- 1,000 memories (20 banks)
- Detachable MW bar antenna
- Noise limiter & attenuator
- Dual Freq. & MW bar antenna
- signal meter & PC socket fitted
- 4 x AA cells or Ext 12v

Antenna Time!

SPID Elektronik

These are high quality worm drive rotators that are capable of turning large loads and the promise of extended life and low maintenance.

RAU-PWM Medium Duty Azimuth Rotator	£479.95 d
REAL Elevation rotator	£549.95 d
RAK Meduym duty rotator	£569.95 d
BIG-RAK Heavy Duty Azimuth & Elevation	£874.95 d
RAS Azimuth and Elevation	£924.95 d
RAS Azimuth and Elevation 0.1 degree steps	£1099.95 d
BIG RAS Azimuth and Elevation heavy duty	£1374.85 d

CUSHCRAFT COMMUNICATIONS ANTENNAS

MA5B Suoer Compact 3 Element Yagi £529

Multiband HF Antennas

X7 10, 15 & 20m 7 el, yagi 2KW 5.48m long 12.5-13db	£999.95 D
A3-S 10, 15, & 20m 3 el. yagi 8db gain 2KW 4.27m long	£629.95 D
A3-WS 12 & 17m 3 el. yagi 8db gain 2KW 4.27m long	£499.95 D
A4-S 10-20m 4 element yagi 8.9db gain 2KW 5.48m long	£699.95 D
ASL-2010 13.5-32MHz 8 el. log periodic 6.4dbd 5.48m	£999.95 D
MA5B 10/12/15/17/20m 3 element mini beam with balun	£529.95 D
R-6000 6, 10, 12, 15, 17 & 20m vertical 5.8m long	£459.95 D
R-8 40-6m vertical 1.5kW 8.7m	£559.95 D
MA-160V 160m vertical monopole antenna 30-36 ft	£309.95 D
MA8040V 80m & 40m Lightweight vertical inc radial kit.	£329.95 D
MA5VA 10,12,15,17,20m compact vertical 500W	£309.95 D
MA6VA 6,10,12,15,17,20m compact vertical 500W	£349.95 D
TEN-3 10m 3 element beam 8dbd gain 2.44m long	£299.95 D
XM-240 40m 2 el. yagi 6.7m long 6.0dBi gain 1500W	£979.95 D

HUSTLER — Great Value Vertical Antennas.

If you have a small garden and are looking for a compact antenna that really works the DX and is well made, then may we suggest the Hustler range. Famous for years and the main antenna for many ham operators with only a small garden. Mount one at ground level and just put in an earth rod. Yes it really works. But for better performance, add some radials, and you will really notice the difference! Available fromstock.

The easy way to **add 80m** to any 4BTV antenna. Simple to install and to adjust. All for the price of **£67.90**

4BTV	40,20,15,10m	**£189 c**
5BTV	80,40,20,15,10m	**£229 c**
6BTV	80,40,30,20,15,10m	**£269 c**
RM-80	Upgrade (4BTV to 5BTV)	**£67.90**
17m Kit	17m Add on for any model	**£55.95 b**

HEIL SOUND — The Origin of Great Sounding Signals

It All Starts at The Microphone!
W&S Exclusive Ham & Pro Distributors

ProSet Boom Mic.

The favourite of contesters and DXpeditions

ProSet-3 Heaphones

ProSet-3
If you have never tried a pair of professional headphones, then you are in for a big Surprise. The ProSet 3 has a real "WOW" factor. At last you can hear exactly what is coming out of your receiver. Nothing missing and nothing added. A real investment.
£109.95 c

Fist Mic. HMM

The fist mic is back with an acoustic front vent to reduce noise and echo. Typical Heil quality.
Available from stock **£79.95 c**
Matching Rig leads available

ProSet Elite Boom Mic Headset
Large dual headphone & boom mic. with HC-6 element and Phase Reversal System. **£179.95 c**

ProSet Elite IC Boom Mic Headset
Icom boom set inc Icom lead **£189.95 c**

ProSet- 6 Boom Mic Headset
Everything that you get with the ProSet Elite other than the phase reversal.
£149.95 c

We can supply matching cables for any radio

Blue Tooth Set

HBA Blue Tooth Set.
Allows you to dispense with your microphone lead and wander all round the room if needed! For use with PR-781 mics. or other "PR" series microphones. A great idea. **£109.95 c**

Pro Series Mic

If you are looking for the very best microphone for ham radio, this is the one. Bob Heil designed this for use with top range transceivers using the same element as is used in the best broadcast mics. Available from stock. **£179.95**

Mic. Adaptors
These have **CC** codes
£35.95 for each radio type

Headset Adaptors for boom mics.
These are **AD-1** codes **£18.95 for each radio type**

Base Station Mic

HM-12 Base station Mic.

Using the broadcast quality HC-6 insert, this is the ideal base station microphone for the modern transceiver with EQ control. This really is great value and gives you Heil quality at a great price. Call us with details of your radio and we advise on matching lead.
£69.95 c

ARRAY SOLUTIONS — New to The UK Analysers and Antenna Solutions

VNA UHF 5kHz - 1GHZ

Used in conjunction with a PC this is a high performance unit.

- *Resistance and reactance for series or parallel equivalent circuits.*
- *Impedance magnitude and phase angle.*
- *SWR*
- *Return loss*
- *Two port network transmission (S21, magnitude and phase).*
- *S11 and S21 can be plotted at the same time.*

MFJ We Carry Huge Stocks Great Deals

MFJ-994BRT 600W Remote ATY

As you're ragchewing, contesting or DXing, your MFJ IntelliTuner is learning! to operate in millisecond! 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. **£389.00c**

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).
£279.00c

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)

£379c

MFJ-993B Auto ATU

£259c

- Automatically tunes unbalanced/balanced antennas
- 1.8-30 MHz with 4:1 current balun for balanced line
- Now with 20,000 memories
- Antenna Switch and Efficient L-network design
- Select 300 Watts (6-1600 Ω) or 150 Watts (6-3200 Ω)
- Digital SWR/Wattmeter Audio SWR meter
- Backlit LCD - Remote control port .- Radio interface

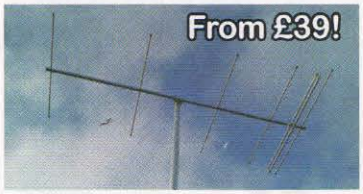
MFJ-991B 300W Auto ATU

First dual 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 SWR/Wattmeter/LCD display, audio SWR meter/audio feedback, antenna switch or 4:1 current balun.
£229.00c

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 frequency 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.
£729.00c

INNOVANTENNAS SUPER LIGHTWEIGHT 2M YAGIS



This new range provides powerful, wideband design within a simple, light weight mechanical structure meaning this Yagi is ideal for Portable, SOTA & light home installations.

144-OWL-3 3 element i 52cm 6.94dBi gain	**£39.95 D**
144-OWL-4 4 element 56cm 8.58dBi gain	**£49.95 D**
144-OWL-4-RM 4 element 90cm 8.58dBi gain	**£53.95 D**
144-OWL-5 5 element 1.3m 10.55dBi gain	**£59.95 D**
144-OWL-5-RM 5 element 6m 10.55dBi gain	**£63.95 D**
144-OWL-6 6 element 1.8m l11.65dBi gain	**£75.95 D**
144-OWL-6-RM 6 element 2.1m 11.65dBi gain	**£79.95 D**
144-OWL-7 7 element 3m 12.88dBi gain	**£99.95 D**
144-OWL-8 8 element 3.75m 13.4dBi gain	**£129.95 D**
144-OWL-9 9 element 4.4m 14.23dBi gain	**£149.95 D**

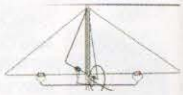
STACKMATCHER

The standard 3kW model covers 1.8 - 59 MHz and can be used with 2 or 3 mono or multiband Yagis. It controls phase and angle of radiation, An experimenters dream!

SHARED APEX LOOP

Use this control box in conjunction with a compact 4-loop receiving array to obtain high directional control over a wide HF bandwidth.

A 10 foot tall, ten foot radius array provides continuous frequency coverage between 500 KHz to 22 MHz with good sensitivity above 5 MHz.



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Contents

RadCom

THE RADIO SOCIETY OF GREAT BRITAIN'S MEMBERS' MAGAZINE

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RadCom is published by the Radio Society of Great Britain as its official journal and is sent free and post paid to all Members of the Society. **The July edition of *RadCom* is expected to arrive with most Members by 20 June, although this can take up to a week longer in some cases; international deliveries can take longer still.**

Layout and design by Kevin Williams. Original concept by Imotea Creative Mediadesign.

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

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Gear at ZS5MAX Durban Amateur radio in South Africa – P81

Cover image: The recent TX6G DXpedition received many plaudits for the standard of operating, read the full story.

Photo: Hilary Claytonsmith, G4JKS

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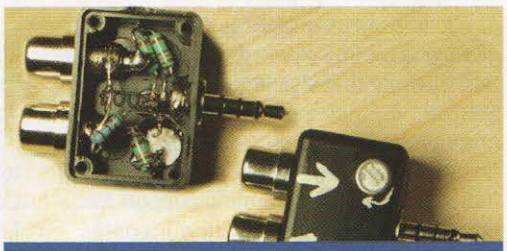


Making special-purpose audio adapters – P72

Regulars

Getting Involved

It has become a tradition that the incoming President writes the leader following their appointment. Faced with this opportunity I have been pondering how I should use this space. Perhaps the core of what the RSGB is about is to remind ourselves that it exists to make a difference, and that only really happens when Members get involved. Getting involved is why a number of my friends supported my nomination and, whilst my election was unopposed, I would like to take this opportunity to thank all 28 of my nominators for their strong support.

We have around 1,000 volunteers who give their time and skill in one way or another every year directly to RSGB activities and services. Their support is greatly appreciated. In addition to this, many more of our Members give their active support for the hobby through local or national clubs. A lot of this produces vibrant clubs, as seen in The Club of the Year awards, generously supported by Waters and Stanton. Many of us also belong to national clubs that specialise in a particular aspect of amateur radio, and they do this specialised work very well. This support to local and national clubs is great and necessary, as both types of club are important to amateur radio in the UK.

So if there are generally lots of you involved, one way or another, in supporting amateur radio what is the issue? The challenge, as I see it, is to maintain and even extend the good work done by the local and national clubs and, at the same time, increase and improve the RSGB's core activities.

We already provide an important mix of services, some of which are long-term and thus not that visible to the average Member. Examples are the protection and development of our spectrum. Other services are more visible such as individual EMC and planning support for our Members, and help for new licensees through our education and training publications and exam administration. Other activities include support for repeaters, beacons and internet gateways, and provision of contests, band plans, operating awards and propagation studies. There are also communication roles that include outreach to local clubs and individual members through our Regional Teams. It is disappointing and frustrating that with all of this volunteer effort we often fail to get this good work across, as some question Membership because they just see the benefits of belonging to the RSGB as the QSL Bureau or our monthly journal, *RadCom* and its beginners' e-supplement, the *New Starters Newsletter*.

I feel that we need to do three things. First, communicate better what we provide, secondly improve coordination with and the support that we provide to the local and national clubs and, finally, we need to foster a steady flow of volunteers to maintain and, in some cases, improve the quality of what we provide. The previous Board agreed the appointment of a Communications Officer, which addresses the first point, and a plan is to be trialled shortly to improve our outreach to clubs, which should address the second point. So getting that steady flow of volunteers is something still to be tackled.

Where do we need volunteers? Well, the list is long and diverse and, of course, changes over time. It includes support to the Regional teams, people with spectrum engineering / EMC expertise, database/web development skills for complex projects such as IOTA, and authors for *RadCom* and RSGB books. The need for volunteers is across the whole of the RSGB as volunteers change their roles, some aspiring to become committee Chairs, Hon Officers, Regional Managers, Board members or hopefully to enter the election for President in 2016!

Let me just outline some of our current key activities, which are long-term and more or less completely covered by volunteers.

In my first week of office I wrote to a senior member of the European Commission concerning the new standard, EN50561-1, that covers unintentional radiation in frequencies up to 30MHz from Power Line Adaptors. That letter followed several years of RSGB volunteer support for the international effort to limit the effects of Power Line Adaptors to the noise level within the HF spectrum. Elsewhere in this edition you will see that this long-standing effort has now shifted to other aspects of the technology and higher frequencies, which will again need experienced and capable volunteers to challenge the professionals and policy makers.

Some of you will recall that in 2002 I was asked to coordinate our pioneering experimental access to 5MHz. Developing access to new spectrum often takes many years. We are currently approaching the end of CEPT's preparation stage ahead of the World Radiocommunication Conference next year (WRC15), when amongst many other topics an amateur allocation at 5MHz will be considered. CEPT is the grouping of postal and telecommunications administrations, like Ofcom, within our part of the world. It is too early to call the outcome of the CEPT position on 5MHz, but I am proud to report that several RSGB Members and volunteer officers have been extremely active over the past few years in supporting this and the other WRC15 items along with the international amateur effort during the CEPT discussions, and the related ones in the ITU (International Telecommunications Union).

Looking ahead we have the celebration of the 50th anniversary of the RSGB Islands on the Air programme and the Youngsters on the Air (YOTA) event in Finland, both in July, the IARU Region 1 General Conference and National Hamfest, both in September, the RSGB Convention generously supported by Martin Lynch & Sons in October, and an opportunity for a wider group of young amateurs to participate in the special YOTA station activity in December. All of these events are supported by volunteers.

So I wish you all well for the year ahead. Whilst I hope that you will have fun operating, constructing or whatever is your preference within amateur radio, I also hope that you will give consideration to 'getting involved' with RSGB activities in some way or by responding to specific volunteer vacancies.

Remember that your RSGB is what you can help make it!

John Gould, G3WKL
RSGB President

Ofcom Announcement

Ofcom has published a statement on amateur use of 2310 to 2450 and 3400 to 3475MHz ahead of the planned release of spectrum by the Ministry of Defence (MoD). The statement follows a consultation on the topic in summer 2013.

Ofcom considers amateur radio to be a constructive and beneficial use of radio spectrum and is keen to liaise with the amateur radio community. For example, before this consultation they invited a group of amateur TV repeater users to Baldock to participate in testing to determine what the impact of the MoD's release might be.

As a result of the consultation, Ofcom has decided that they will remove the release spectrum in the 2.3 and 3.4GHz band (ie 2350 to 2390 and 3410 to 3475MHz) from the Amateur Radio Licence but retain amateur access to the adjacent bands. Ofcom also clarify the notice period that they would give, if interference were to affect new or existing uses in the future, such that they must withdraw these adjacent bands, too.

In addition to the decisions resulting from the consultation, the statement also sets out additional protection requirements that need to be implemented immediately as a result of the MoD's new and changing operational use. This guidance is set out in the statement and on Ofcom's website http://stakeholders.ofcom.org.uk/consultations/public-sector-spectrum-release/statement and comes into effect immediately.

The statement also announces that Ofcom will make 2300 to 2302MHz available to Amateurs who apply for a Notice of Variation to their licence. Amateurs can apply for the NoV from Ofcom at a later date.

New Era for UK 70cm Beacons

A new era is dawning for the UK UHF beacon network. The current systems have diminished in number to just two (GB3AMG and GB3MCB), as others have been lost over the years. These have also been hampered by not having permission to implement frequency changes first agreed by IARU Region 1 back in 2002. However the Society's Spectrum Managers have now gained full approval from Ofcom and the Primary User for both these and several new ones to be brought into use on the IARU preferred frequencies. The new systems are GB3FNY, GB3LEU, GB3NGI and GB3UHF.

The NoVs for all six beacons have now been issued, effective from 1 May and represent a major step forward for the RSGB 70cm Beacon Project that started back in 2010. The Propagation Studies Committee is supporting the keepers involved with new synthesised sources, as it is planned that common F1 keying and JT65 may be feature on most or all of them. Further details will appear as their test/rollout occurs over the coming months, as part of the wider effort to stimulate 70cm activity (see also this month's VHF / UHF column on pages 66 and 67).

Free Admission to Bletchley Park

RSGB Members have always had free access to the National Radio Centre but, with the recent signing of a lease for the building, this facility has been extended to the whole of Bletchley Park. Members must download an admission voucher from the RSGB website at www.rsgb.org/bpvoucher that will be exchanged for a free pass in the Admissions Office. There is no limit on the number of visits that a Member may make, but accompanying friends and relatives will need to pay the usual admission fees. Bletchley Park is open every day, but the NRC and its radio room is currently only able to receive visitors from Wednesday to Sunday.

Joiners and Rejoiners

We are unable to bring you details of recent joiners and rejoiners due to the changeover of the RSGB database system. We would like to apologise to Peter Wilkins, G4LRL and Mr Williams, GOEGA who joined in 2103 but due to an error were omitted from the relevant listing in *RadCom*. The RSGB welcomes both into Membership.

Training & Education Committee

Following the election of Steve Hartley, G0FUW to the RSGB Board, we are looking for a new Chair for the RSGB Training & Education Committee (TEC). The ideal person will hold a UK Full amateur radio licence and have a strong background in amateur radio training. The candidate should also have direct experience in delivering the current UK system of training, assessments and RCF examinations. Experience of leading project-orientated delivery teams and a proven track record in stakeholder engagement will also be extremely useful. Links to mainstream education will be an advantage as would experience of working in a senior management role.

Details of the TEC can be found on the RSGB website under 'About Us' and 'Committees'. Applications in the form of a CV and a covering letter outlining how you meet the requirements should be sent to the RSGB General Manager, Graham Coomber, G0NBI, (graham.coomber@rsgb.org.uk) by 6 June.

CONGRATULATIONS

To the following Members whom our records show as having reached 70, 60 or 50 years' continuous Membership of the RSGB.

70 Years

Mr A G Short	G2DGB

60 Years

Mr M Harrington	RS20249

50 Years

Mr D R Coltart	G3SYM
Mr D Houghton	G3UPY
Mr G W Bedwell	G3XYX
Mr F Wilson	G3YQA
Mr B R Coleman	G4NNS
Mr P Helm	G8AEN
Mr C G Partridge	G8AUU

Emergency Communications Committee

Charlie Morrison, GI4FUE has recently stood down from the post of chairman of the Emergency Communications Committee. The Board would like to record its thanks to Charlie for all his past works in promoting emergency communications on behalf of the Society.

The Emergency Communications Committee is tasked with raising the profile of RSGB RAYNET, fostering closer links with the Radio Amateurs Emergency Network (RAEN), user services, the wider amateur radio community and is now looking for a candidate to chair the committee. The successful candidate will be actively involved in emergency communication and must be affiliated to a RSGB RAYNET or joint affiliated RAEN/RSGB RAYNET group.

If you wish to discuss this key position please contact Len Paget, GM0ONX on 01563 534 383 (evenings) or via gm0onx@rsgb.org.uk

Intruder Watch Co-ordinator

After serving for 21 years, Chris Cummings, G4BOH has decided that the time has come for him to hand over the reins of this important role.

The RSGB Monitoring System, more popularly known as the Intruder Watch, forms part of the IARU Monitoring System. As such it submits reports of non-amateur transmissions heard on the exclusive HF amateur bands to both the Ofcom Monitoring Station at Baldock and IARU Region 1 (see http://rsgb.org/main/about-us/honorary-officers/intruder-watch-co-ordinator/). This service has proved itself to be very effective in instigating the removal of intruders on the amateur bands and we need someone to carry on this valued work.

Chris would be pleased to speak with anyone needing more information – e-mail iw@rsgb.org.uk – and applications should be sent to Graham Coomber, G0NBI, General Manager by 13 June 2014, via graham.coomber@rsgb.org.uk

EMC Matters Forum

Amateurs seeking advice on interference and EMC matters – whether they are the source or the victim – can now access the EMC Matters Forum via the main RSGB website. The forum permits EMC committee members or others with experience of interference problems to hear about interference issues, discuss them and suggest solutions. The EMC committee's local volunteer advisers can also access the forum and help solve interference cases. In addition, the forum will also provide a means for the EMC Committee to gauge the main interference problems affecting amateurs, from which policy can be formulated to address them with the appropriate regulatory or standards bodies.

The forum, which is moderated by the Society, can be found at: www.forums.thersgb.org/index.php?forums/emcmatters/

You will need to register, following the online instructions, before you can post.

Homebrew circuit values correction

There was an error in Figure 4 in the April edition or Homebrew. The two inductors should have been 990nH, not 990μU as shown. The toroid type and coil winding instructions were correct. Our thanks to Geoff Sims, G4GNQ for spotting this error and getting in touch.

New Regional Managers

At the recent AGM in Manchester, Martyn Vincent, G3UKV was confirmed as the Regional Manager for Region 5 following the vote from that Region. The RSGB Board has co-opted Bernie Macintosh, GM4WZG as the new Regional Manager for Region 2 and Liz Cabban, GW0ETU as the Regional Manager for Region 6. They join Jason O'Neill, GM7VSB (Region 1), Nigel Ferguson, G0BPK (Region 4), Michael Senior, G4EFO (Region 10) and Steve Thomas, M1ACB (Region 12) who were elected unopposed. Details of how to contact you Regional Manager are in Around Your Region, starting on page 84.

New Quality Manager

The Radio Communications Foundation (RCF) has announced that, with effect from 1 May 2014, Dave Wilson, M0OBW is appointed RCE Quality Manager of the RCF on an interim basis, pending recruitment actions to fill this volunteer role. He succeeds Jeff Smith, M1OAEX, to whom the Trustees express their gratitude for his contribution to the role over a number of years.

Regional Changes

The boundary between Regions 10 and 12 is due to change on 1 June 2014. These changes mean that all Members in the county of Kent will now come within the remit of Region 10. The Regional Manager is in touch with the affected clubs and the DRM, Keith Bird, G4JED will remain as the District Regional Manager for the county.

New DRM Sought

Martin Hallard, G1TYV has transferred from District 54 to District 52 as District Regional Manager. There is now a vacancy for a District Regional Manager for Region 54 (Gloucestershire). If you are an RSGB Members residing in that District and would like to be considered for the DRM role, please contact Martyn Vincent, G3UKV by e-mail to rm5@rsgb.org.uk

New Training Resources

The RSGB website now has a new webpage designed to provide a comprehensive list of useful training resources for both trainers and students at http://rsgb.org/main/clubs-training/training-resources/

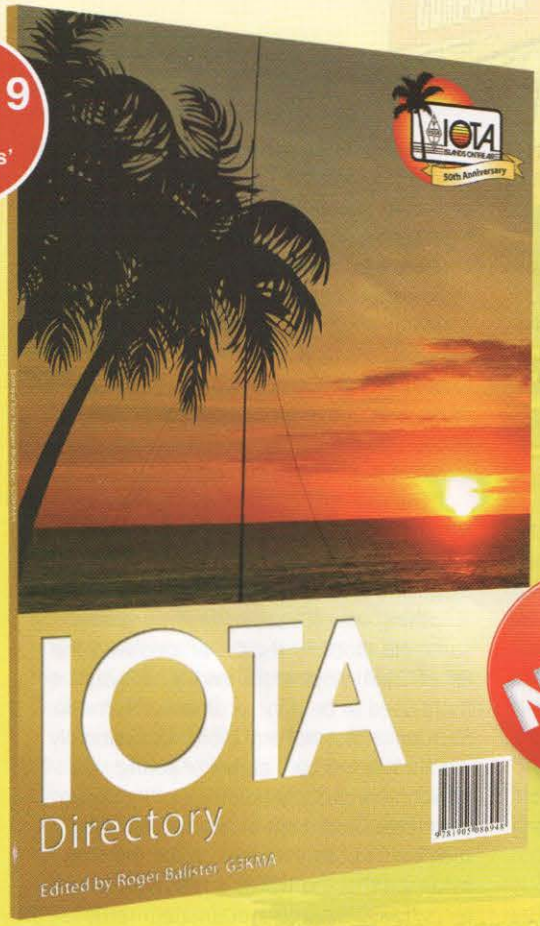
Anyone wishing to add further links or material should contact Patrick Kirkden, M0ZPK on m0zpk@yahoo.co.uk

QSL Matters

The holiday season is with us again and time to remind all Members to lodge collection envelopes with the appropriate sub-manager if they visit another prefix area, GM, MW, GI etc. Check whether UK mainland stamps are acceptable and buy stamps before returning home. Also keep QRZ.com up to date too.

RSGB shop

£10.19
RSGB Members' Price



NEW

FROM P&P FREE
OVER £30 SEE PAGE 76 FOR DETAILS

E&OE All prices shown plus p&p

IOTA Directory – 50th Anniversary Edition

Edited by Roger Balister, G3KMA

Now celebrating 50 years, the *Island on the Air* (IOTA) programme is one of the most popular DX programmes in the world. To mark this golden anniversary, the fully updated *IOTA Directory* provides the essential guide to participating in the IOTA award programme and much more.

Edited and introduced by IOTA manager Roger Balister, G3KMA *IOTA Directory – 50th Anniversary Edition* contains a review of the first 50 years of the programme from the founder of the programme, Geoff Watts, through to the present. The extensive colour section of the book also contains fascinating articles covering the IOTA operation on Timoteo Dominguez, the upsurge of Island Activity in Indonesia and even Antennas for IOTA DXpeditions. There is much more besides with details of the latest IOTA Honour roll, Golden List, etc. The *IOTA Directory – 50th Anniversary Edition* is the only complete, official listing of IOTA islands but is much more than just a simple list. This edition contains all the rule changes and island updates of this dynamic and exciting programme. There is everything you need to participate in IOTA, from an explanation of the programme, the rules, lists of islands, grouped by continent and indexed by prefix, through to application forms and masses of information and advice for island hunters, award applicants and DXpeditioners alike.

If the simple act of collecting QSL cards from around the world hasn't appealed before. The multitude of islands and the fascinating IOTA programme laid out in this book will change your mind. The *IOTA Directory – 50th Anniversary Edition* is a must have if you are already involved or simply just interested.

Size 210x297mm, 128 pages
ISBN 9781-9050-8694-8
Non Members £11.99
RSGB Members £10.19

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

Our Changing Hobby

The RSGB welcomes Members' comments and contributions and The Last Word tries to bring you a representative sample of the raft of mail that we receive. Where appropriate, we respond briefly to questions raised within that column but, sometimes, a Member's letter raises points that deserve a fuller explanation and reply. One such letter arrived from Robert Andrews, G4BWB, that we reprint in full here.

OUR FADING HOBBY

Robert Andrews, G4BWB

"I noticed in the news section of the March issue of *RadCom* that the RSGB Board had 'approved' a team of youngsters to be sent to the IARU Youngsters on the Air event (YOTA) in July and I was slightly heartened to see that the Board may have recognised that youngsters are important to our hobby.

"Some while back, my very good friend James Brooks, 9V1YC, wrote a piece of narration for one of his excellent DXpedition videos, in which he talked about 'our fading hobby'. How true, I thought. With the emergence of new computer and online technologies over the last thirty years, I often wonder how sustainable our hobby will be over the coming decades.

"At this point, I must say that I appreciate that the RSGB Board, Members and representatives of amateur radio in other areas of the hobby around the world, undoubtedly genuinely feel that they have the best interests of amateur radio at heart. However, it strikes me that those, who currently steer amateur radio toward a sustainable future – and particularly within our national organisation are, in the main, somewhat irreversibly ageing. As a Member fast approaching 60, I too, fit into that bracket. Surely, to a great degree, the future of amateur radio lies with the new and particularly younger generation of amateur radio enthusiasts, yet I see very little representation within the national society by young people (under 25). They are the future of our hobby. Where is their say in how the hobby will mould itself toward the future?

"Is there any specific advisory committee or group within the RSGB made up of people below the age of 25, with representation on the board? I am not aware of such. I think the RSGB and other amateur radio organisations have (unintentionally) a slightly stuffy middle-age – senior male dominated image and that perhaps it needs to change to encompass a much wider, cross-gender age group and particularly encourage the young, which it needs to attract if the hobby is going to survive.

"The monthly excitement of receiving *RadCom* is short-lived and fast clouded by a feeling of *déjà vu*. Because each month's magazine is roughly the same as the last – nothing new – treading water with the same old monthly regular articles with the list of Silent Keys at the end. I believe that there used to be a 'newcomers' column in *RadCom* – but not any more. Occasionally we are greeted by pictures of young newcomers proudly holding up their exam certificates and a list of new or returning members but that appears to be the only evidence that the RSGB seems to have in recognising the future of amateur radio is dependent on new and particularly young members joining the ranks.

"I am not suggesting I have the answers but I do think that amateur radio is a very insular hobby within and we are not good at promoting it externally. We need to change with the times to survive. As a matter of interest, does the RSGB have an official presence on Facebook or other social media? I don't see much evidence of such, apart from a reference on the RSGB website to an unofficial Facebook site. Even the RSGB website could do with a page specifically focused toward the younger generation.

"I've written much above about how I think the RSGB as our national organisation should change. Perhaps it's a little unfair to shoulder the RSGB alone with that responsibility. The hobby belongs to all of us involved and we each need to play our part in ensuring the survival of our hobby for future generations. Think of amateur radio as a product. It needs marketing.

"By the way, here are a couple of suggestions for what to do with your old *RadComs*. You might think of giving them to the physics teacher at your local school or college for students to read and I also drop some at my local doctor and dentist surgery. Stick a little note inside with links to local societies and clubs. Has the RSGB ever thought about making *RadCom* available to the general public at shops such as WH Smith? It would spread the word to those outside the hobby and raise much needed additional income to the Society."

REPLY. Robert's contribution is entitled 'Our Fading Hobby' but the evidence suggests that amateur radio is alive and well.

Table 1 shows the number of licences issued by Ofcom in the last 3 years and **Table 2** gives a longer trend from the USA. Whilst these data do not reflect the number of active licence holders, since its inception in 2001, some 20,000 new recruits have sat the Foundation examination and more and more are progressing to a Full licence.

Robert's challenge about the importance of attracting younger people to our hobby and involving younger people in the running of the Society is very valid and, it has to be said, our past experience has not been encouraging. Currently, there are 295 RSGB Members under the age of 25 out of a total of 21,400.

Table 3 gives an indication of the age profile of those taking the Foundation examination, which underlines the need for action, and this challenge has been taken on by the Board. Apart from the Youngsters On The Air initiative that has been covered in *RadCom*, Steve Hartley, GOFUW is now listed as the IARU UK Youth Co-ordinator. His vision is to use the considerable interest that YOTA has generated within our group of younger Members to establish a Youth Committee much as Robert suggests. Steve would be pleased to hear from any young member wishing to get involved. Watch out for a great technical article by one of the YOTA team in a future edition of *RadCom* and for increased reporting about our

Table 1: Ofcom Amateur Licence Statistics

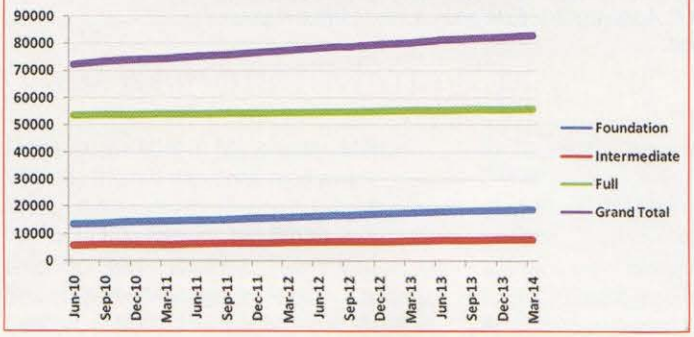


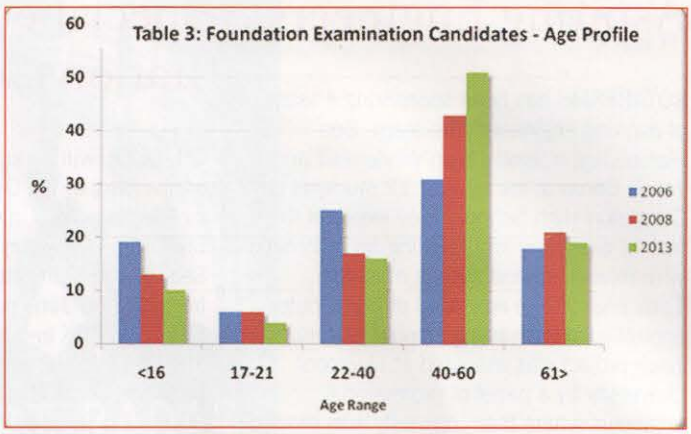
Table 2: Number of Amateur Radio Operators in the US (ARRL)

younger Members.

Help and support for young (and not so young) newcomers to amateur radio is widely available in our publications. For over a year, Steve Nichols, G0KYA has provided the New Starters Newsletter, an electronic supplement to the printed *RadCom* that is available to all Members. Within *RadCom*, we have been running a series of articles about 'Getting Started' and our website contains a wealth of information and advice for beginners of any age.

Table 3 also shows that amateur radio continues to attract a more mature audience and, in the shorter term, the future of the hobby lies in their hands. Many of these 'new recruits' will have been aware of amateur radio in their younger days and are now rekindling their initial interest as time and money permits. An investment in sparking interest amongst the young may well thus pay off later, but they will not drive us forward in the short term. As many of these 'returners' discover, the hobby has come long way from their previous exposure and is a reminder of how amateur radio is indeed changing.

The Board has been conscious for some time that their approach to social media has been underdeveloped but have not had the resource to address this deficiency. That is now changing. We are shortly to appoint a part-time Communications Officer who will manage and develop this aspect of our communication and bring a much needed improvement. This is not to say that social media is in the exclusive domain of the young, of course!



Promoting amateur radio is also high on the Board's agenda. A new publicity leaflet is near to completion and we are working with the TX Factor team to produce two promotional videos. One of these will be specifically aimed at a younger audience and we will not fall into the trap of letting the 'aging' Board and Committee Members decide the content!

Whilst the RSGB Board can develop strategies for developing the hobby in the 21st century, the key to the future lies with our affiliated clubs, Special Interest Groups and all those active in the hobby. It is within a club environment that the young person will receive their training and early experience and, whilst the Board is rising to the challenge of inspiring and involving young people, our success will depend upon local club actions. We know of several clubs that are working with colleges and universities and *RadCom* will be pleased to feature those initiatives in the coming months. Please let us know what your club is doing to attract young people.

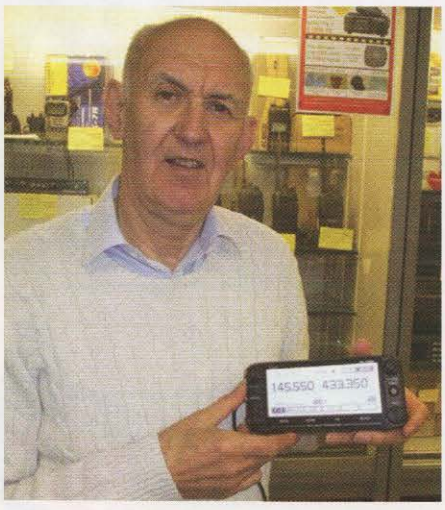
Finally, as Robert suggests, every Member can play their part, and making the most of unwanted copies of *RadCom* by recycling them though schools or colleges is an excellent idea. The feasability of putting *RadCom* onto newsstands has been examined on several occasions but is not economically viable.

Aspiring Engineers

SOTABEAMS has been sponsoring a team of aspiring engineers. The team, Ben Harris, Jayne Booth, Sam Whitehead and Jamie Bernardi are all year 12 students at Congleton High School. They were set the task of designing and building an automatic wire measuring and cutting machine. Their final design consisted of a computer controlled system using stepper motors. Their project was assessed at Liverpool University by a panel of professional engineers where their ingenuity was praised. Two of the team hope to study engineering at Uuniversity while the other two intend studying physics See www.sotabeams.co.uk

ID-5100 Deliveries

On a sunny April day, John Turner, G0KFO from Icom UK visited Waters & Stanton to demonstrate the ID-5100 transceiver. This 50W dualband transceiver (2m/70cm) has a huge touchscreen, D-Star operation and Bluetooth connectivity (as an option) amongst many other features. Peter Waters, G3OJV, commented that Icom's latest products including the best-selling IC-7100, are world-beaters setting the standard for future hobby radio products. Waters & Stanton are promised early delivery of the ID-5100 – expected in May, in time for their Annual Open Day on 25 May.



Special event stations

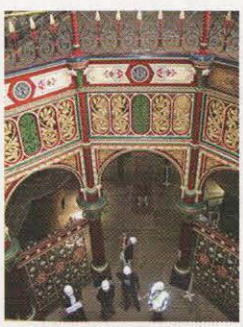
GB70DDL will be active for the 70th anniversary of the D-Day landings. Operated by Riverway ARS in conjunction with the Stafford and Rugeley Sea Cadets from the Sea Cadet HQ in Stafford, they will operate from 1 to 28 June on all HF bands using SSB, CW, PSK and other digital modes. They will also be operating from four Royal Observer Corps Nuclear Bunkers from 30 May to 9 June – GB1SNB Shenstone, GB6GNB Gonsall, GB0RNB Rugeley and GB4SNB Standon. Information on QRZ.com

Seven members of the Portable Operating Group will be operating MC0POG from various locations around Pembrokeshire Wales from 14 to 21 June. They will use SSB,CW and digital modes, experimenting with antennas, working QRP and the more energetic members of the group operating SOTA and pedestrian HF mobile. Details on QRZ.com

Riviera ARC will be running GB8AFD on 28 and 29th June for National Armed Forces Day. The plan is (weather permitting) to run SSB on HF on the 28th and datamodes on HF on the 29th. They may also be active on 2m FM.

Amateurs of Burnham-on-Sea Moose Lodge 123 are celebrating the 90th anniversary of the opening of the Mooseheart Radio Station WJJD, affectionately known as 'The Voice of the Loyal Order of Moose'. The event will take place on 21 and 22 June using the callsign GB4JJD. All contacts will receive a commemorative QSL card if requested. They will be particularly listening for any calls from Moose amateurs in the States both on phone or CW. Details on QRZ.com

GB2CM



Cray Valley RS will be taking part in International Museums Weekend for the first time on 22 June operating GB2CM from The Crossness Engines Trust at Crossness Museum, Abbey Wood, London SE2 9AQ. GB2CM will form part of the open day attractions that also include model engineering exhibits along with the Woolwich Arsenal Narrow Gauge Railway project.

ID-5100E D-Star Mobile

The ID-5100E VHF/UHF dual band digital D-Star transceiver featuring large responsive touch screen, integrated GPS, optional Bluetooth connectivity and support for Android devices will be available from authorised Icom amateur dealers from the first week in May 2014. The ID-5100E will be available in two versions. The standard version, complete with multi-functional microphone and hanger, DC power and controller cables and CS-5100 cloning software will be available for a suggested retail price of £569.95 (inc VAT). The Deluxe version includes Bluetooth features and mounting equipment: MBF-1 Suction cup mounting bracket; MBA-2 controller bracket; MBR-100 Trunion mount; UT-133 Bluetooth unit and VS-3 Bluetooth headset with a suggested retail price of £719.95, saving £126 (inc.VAT)!

HamCom-270

This is a Bluetooth light-weight low earth orbiting satellite tracking system. The companies aim is to introduce amateurs and SWLs to working 2m/70cm satellites. The unit is 1° accurate on its elevation and better than 2.5° accurate on azimuth. There are also matching antennas to go with the unit. The system will work with most software - HRD, Obitron, Simple Sat, PSTRotator etc - as it has the GS-232 protocol built in. Full details can be found at www.hammicro.com

Icom Marathon Runner raises £537

Ian Lockyer, M3INL, Marketing Manager of Icom UK Ltd has raised £537 for the British Heart Foundation after completing the recent Virgin London Marathon. Ian completed the marathon in 5 hours 57 minutes and is hoping to run again next year. Well done Ian.

RSGB shop

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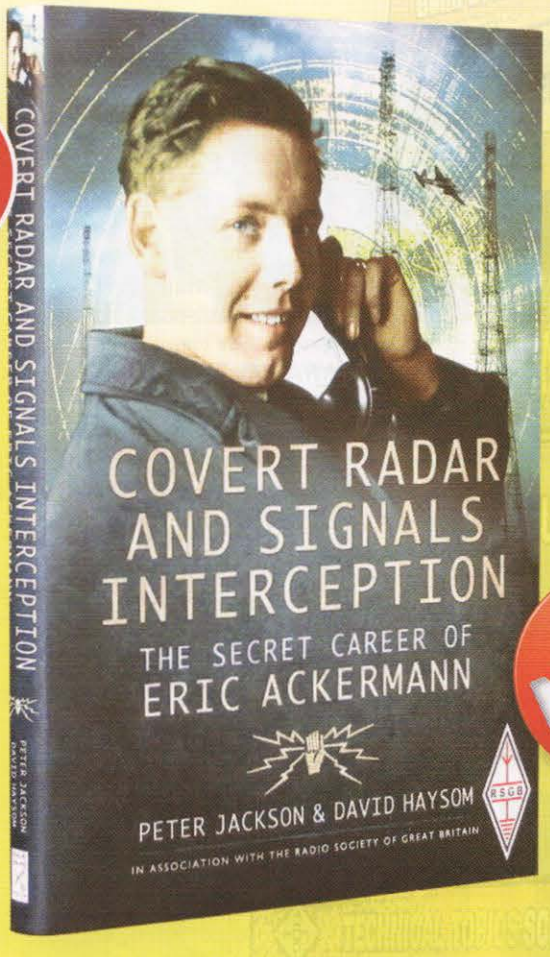

NEW

Covert Radar And Signals Interception

The Secret Career of Eric Ackermann

By Peter Jackson & David Haysom

Few know the story of Eric Ackermann who became a leading figure in the world of signals and electronic intelligence during WWII and beyond. This book seeks to explain his activities during the war and the subsequent Cold War activity.

Covert Radar and Signals Interception explores the various highs and lows of Eric's role at the vanguard of tactical intelligence operations where he saw conflict up close and personal. Winner of the George Medal for conspicuous gallantry, Eric had an extraordinary wartime career that included over 40 bomber flights assessing the enemy's radar capabilities. He was also involved in searching for, monitoring and destroying Germany's *Wuerzburg*, *Knickebein* and *X Band* radar systems, and a host of secret missions carried out in North Africa, Gibraltar and Italy. His research was passed to the highest levels of wartime government, and was highly prized. The end of the war did not signal the end of Ackermann's role. He was to play a major part in the setting up and implementation of a string of listening stations built along the borders of Soviet Bloc countries. Further work in aeronautics and satellite construction in the United States followed. Despite the might and scale of his achievement, this leading figure is relatively unknown and this book seeks to rectify that as well as provide new insights into intelligence practices and their often far-reaching consequences.

Covert Radar and Signals Interception is a highly illuminating and thoroughly recommended read.

Hardback. Size: 160x240mm, 224 pages
ISBN: 9781 7834 6268 1
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RSGB AGM 2014

The 87th AGM held in Manchester

WELCOME. The RSGB General Manager, Graham Coomber, G0NBI, welcomed Members and visitors to the AGM. The RSGB Chairman, Graham Murchie, G4FSG extended a particular welcome to some of the team members representing the RSGB at the Youngsters on the Air (YOTA) event in Finland this summer. Apologies for absence were also recorded. More than 50 Members were present, so the meeting was quorate.

The first item on the agenda was to receive and, if approved, confirm the minutes of the 86th Annual General Meeting. The motion to approve the minutes was proposed by David Crowe, G4NVU and seconded by Mike Isherwood, G4VSS. It was carried by a show of hands in the room.

Agenda item 2 was to receive and consider the accounts for 2013. Several questions were raised on the information in *RadCom* and were answered by those on the rostrum. The motion to appoint the auditors was proposed by Graham Murchie, G4FSG, seconded by Ken Hatton, G3VBA and carried by a show of hands in the room.

Agenda item 3 was a proposal to amend Article 7 of the Society's Articles of Association. The RSGB Board proposed that Article 7 should read 'No business shall be transacted at any meeting unless a quorum is present. Fifty persons present in person or by proxy entitled to vote upon the business to be transacted, each being a Member or a proxy for a Member or a duly authorised representative of a corporation, shall be a quorum'. In the wide ranging discussion, several Members were concerned that the wording would lead to meetings where the postal vote would carry changes with no opportunity to discuss the motions. The RSGB Chairman, Graham Murchie, G4FSG, explained the thinking behind the Board's proposal and reassured those concerned that Members would always be welcome at either AGMs or EGMs. The resolution was proposed by Graham Murchie, G4FSG and seconded by Ian Brothwell, G4EAM. It was carried by a show of hands in the room.

Agenda item 4 was the election for a Board Director and resulted in Steve Hartley, G0FUW being elected when votes in the room were tallied with the postal votes (356 votes out of 475 cast). Agenda item 5 was the election for the Regional Manager of Region 5 and when votes in room were added to the postal vote, Martyn Vincent, G3UKV was elected (70 votes out of 106 cast).

This concluded the formal part of the AGM and lunch was then available to those who had registered their attendance.

TROPHYS & AWARDS. Following lunch was the presentation of the major Society trophies for 2013. The Norman Keith Adams prize is awarded for the most original article published in *RadCom* in 2013. This went to Steve Ireland, VK6VZ and Phil Harman, VK6APH for their in-depth look at software defined radio (SDR) technology and its future, published in August and September. Steve and Phil were unable to make the trip but John Gould, G3WKL received the award on their behalf.

The Courtenay-Price Trophy is awarded for the most outstanding published technical contribution to amateur radio in 2013. It was awarded to Andy Talbot, G4JNT for his Design Notes column, specifically on the AD9850 DDS chip.

The **Ostermeyer Trophy** is awarded for the most meritorious description of a piece of home constructed or electronic equipment published in *RadCom* in 2013. It was awarded to Gordon Miller, G8YYC for his biscuit tin tuning capacitor published in June 2013.

The **Bennet Prize** is awarded for any significant contribution of innovation that furthers the art of radio communications. This was awarded to Roger Lapthorn, G3XBM for his earth-electrode pair antenna article in March 2013. Regrettably, Roger could not attend due to poor health and other arrangements will be made to get the award to him.

The **Wortley-Talbot Trophy** is awarded for the most outstanding experimental work in amateur radio. It went to Mark Atherton, ZL3JVX for the Waveguide Filter Sweeper published in May 2013. Mark could not be at the AGM and sent his apologies.

The **Founders Trophy** is awarded for services to the Society and was awarded to Dave Wilson, M0OBW, the immediate past President.

The **Harold Rose Plate** is awarded for an outstanding contribution on 50MHz and was awarded to Trevor Day, G3ZYY, the long-time Chairman of the UK Six Metre Group in recognition of his long-standing work in support of 50MHz both in the UK and around the world.

The **Don Cameron, G4STT Award** is given for an outstanding contribution of low power amateur radio communication. It was awarded to Dave Deane, G3ZOI for his outstanding contribution to low power transmitters and receivers used for ARDF.

The **Louis Varney Cup** is awarded for advances in space communication and went to the AMSAT FUNcube team for their work on the highly successful FUNcube-1 project. Jim Heck, G3WGM, the Chairman of AMSAT-UK, accepted the award on behalf of the team.

The **Fraser Shepherd Award** for research into microwave application for radio communications was awarded to Charlie Suckling, G3WGD for his work on gallium nitride FET power amplifiers for the amateur bands.

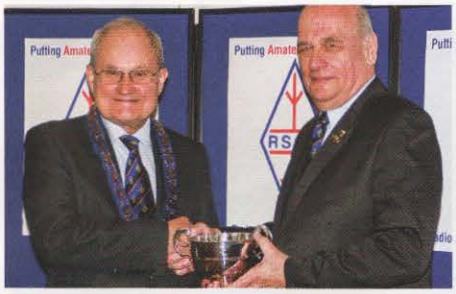
The **Kenwood Trophy** is awarded for a significant contribution to training and development in amateur radio within the UK and went to Alan Betts, G0HIQ for his work as chairman of the EC and his authorship of training manuals.

The **Jack Wylie Trophy** is awarded to the leading Scottish amateur for the year and

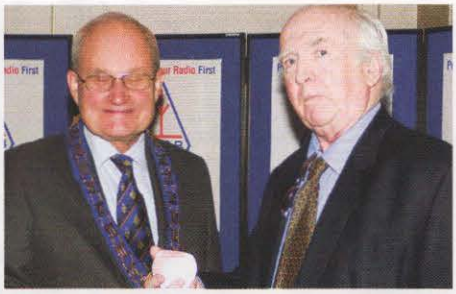
The Calcutta Key, presented to Roger Balister, G3KMA.

The Don Cameron Award, presented to Dave Deane, G3ZOI.

Charlie Suckling, G3WDG receives the Fraser Shepherd Award.



The Founders Trophy awarded to Dave Wilson, M0OBW, RSGB past President.



A long-service award went to Gordon Adams, G3LEQ for his work as GB2RS Manager.

Alan Betts, G0HIQ received the Kenwood Trophy for his contribution to training.

The Jack Wylie Trophy went to Rob Ferguson, M3YTS, presented at the GMDX Convention.

Gordon Miller, G8YYC received the Ostermeyer Tropy for his biscuit tim capacitor project.

The Louis Varney Cup went to the AMSAT-UK FUNcube team for the FUNcube-1 project.

Brian Burns, MI0TGO on behalf of Mid Ulster ARC, 3rd place in NCOTY.

Reading & District ARC won the National Club of the Year (NCOTY) trophy.

John Gould, G3WKL was presented with the Special Centenary Award.

was awarded to Rob Ferguson, GM3YTS. He was presented with the cup during the DX Dinner at the GMDX Convention in Stirling.

One of the most prestigious trophies that the RSGB awards is the **Calcutta Key** for outstanding service to international friendship. This was awarded to Roger Balister, G3KMA for international friendship via the Islands on the Air programme (IOTA).

This year, the RSGB Board felt that two outstanding contributions to the work of the Society warranted special mention. At the end of last year, Gordon Adams, G3LEQ retired as the GB2RS Manager following 35 years of service, something that will probably never be equalled. For this he was awarded the RSGB Long Service Trophy. He has also read the news for 42 years.

The second special trophy is one that will not be awarded again in the lifetime of anyone present. Only once every hundred years do we have the opportunity of celebrating a centenary, and whilst many Members played their part in ensuring the success that it was, the Board agreed that one individual stood out for special praise. John Gould, G3WKL provided leadership to the year-long programme of events and spent many hours making Gx100RSGB an event that many Members will not forget. He was awarded a **Special Centenary Award**.

NATIONAL CLUB OF THE YEAR. Once again, the RSGB thanks Waters and Stanton for sponsoring the event, as they have done for the past two years. Unfortunately, due to other commitments at the Kempton Rally, they could not attend the AGM, but John Gould, G3WKL made the presentations on their behalf. First place was awarded to Reading & District ARC and Vin Robinson, G4JTR received the trophy and the £1000 cheque on behalf of the club. Second place went to Caithness ARS, who were unable to attend.

Third place went to Mid Ulster ARC and Brian Burns, MI0TGO received the certificate and £250 cheque on behalf of the club.

CENTENARY AWARD PROGRAMME. 2013 was a very special year for the Society and one of the year-long events was the Centenary Award. This was run in conjunction with the Gx100RSGB callsign. The winner of the UK category was Peter Hart, G3SJX, the winner of the overseas category was Fabrizio Zanarotti, IZ2KXC and the winner of the SWL category was Sjuk Veenstra, NL6904.

NEW PRESIDENT. At the end of the trophies and awards, Bob Whelan, G3PJT wished the new Board well for the coming year and passed the chain of office to the new President, John Gould, G3WKL. The AGM concluded following a presentation by the new President looking back at the Centenary years and the activities surrounding the Gx100RSGB callsign as it passed around the country.

June 2014 • RadCom

Roger Lapthorn, G3XBM • e-mail: rogerlapthorn@gmail.com

Over the Horizon at 481THz

Optical frequency DXing via clear air scattering

INTRODUCTION. The *RadCom* articles in early 2012 by Stuart, G8CYW inspired me to get back into optical communications again. My last try was with torch bulbs and OC71 transistors in 1966 and since those far-off school days, techniques and equipment have improved. Also, excellent weak signal PC software is now freely available. What seemed impossible to contemplate then – communicating over the horizon on non line-of-sight (NLOS) paths with simple, low powered, home made, optical equipment – is now possible. My experiments so far, using clear air forward scatter, are described here.

Over-the-horizon scattered optical signals may be inaudible and invisible in the sky at the receiving end yet may be successfully decoded and captured over considerable distances using well aimed, sensitive detection equipment and weak signal PC software. My NLOS optical tests have been carried out using a QRSS3 (slow CW with 3 second dot period) beacon located at home. Using a portable receiver at various locations over the horizon some way from home, results have already exceeded expectations. Best result so far is successful reception over an 8.5km path from Burwell to Stow-cum-Quy that has a hill and many trees in the way. Much further should be possible, as discussed later. The basic principle of scattering is shown in **Figure 1**.

SIMPLE TO MAKE. As G8CYW showed, unlike microwaves, optical communications equipment is very easy to make and to test. All the specialised kit needed may be built for next to nothing using parts from well-known electronics suppliers, eBay, plumbing merchants and local pound shops. Test equipment for nanowaves (the posh name for optical frequencies) is extremely simple too and consists of just a multi-meter, a simple LF oscilloscope, an audio generator, a dimly lit modulated LED, a laptop PC and a pair of eyes!

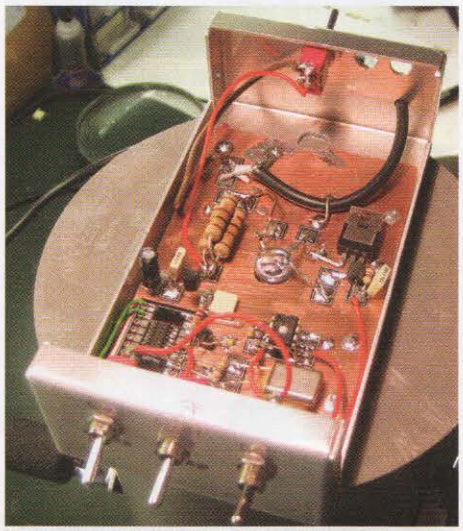


PHOTO 1: The beacon transmitter electronics.

CAUTIONS. Although the output power used in these experiments is relatively low, the light produced by the LEDs can be bright when focused with lenses. Care must be taken in directing the beam to avoid anyone inadvertently looking into it, especially at short distances. When working close to the emitted beam it is strongly advisable to wear sunglasses *[or, better still, suitable laser-rated goggles – Ed]* and avoid looking directly at the beam 'head on'.

There are CAA rules **[1]** about searchlight and laser beams near airfields. Basically, avoid tests close to airports or on their approach paths, for obvious safety reasons. Check the rules if in any doubt. *Under no circumstances aim the transmitted beam at any kind of aircraft.*

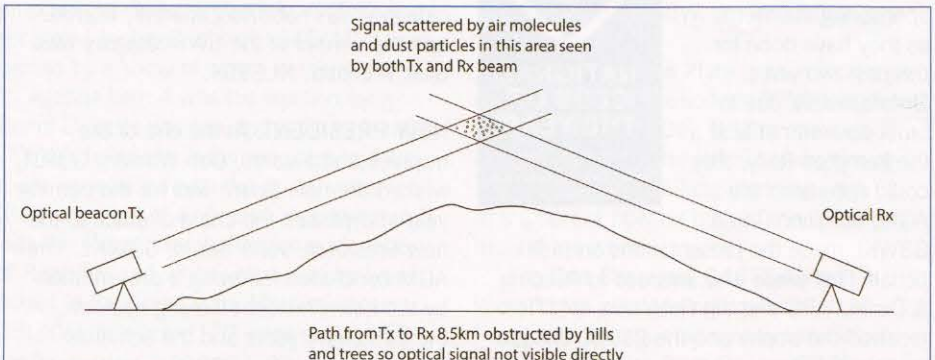


FIGURE 1: The basic principle of scatter-mode communication.

OPTICAL PROPAGATION OVER THE HORIZON. Over-the-horizon NLOS paths are far more challenging than line of sight paths as the transmitted beam is not visible and received signals are very much weaker. In most cases, this means that narrow band, weak signal modes are essential to successfully receive and decode the signal at the far end of the path.

Communication by light over the horizon is possible by several different propagation modes:

Refraction – bending of light as a result of the variation in refractive index in certain weather conditions. In the north of England, some DX speech tests over 100km have been aided to some extent by refraction;

Cloud-bounce – bouncing a signal obliquely off the base of clouds;

Clear air forward scattering [2] – effectively, scatter using air molecules, water vapour and dust in the air in the first tens of metres above ground. For so called Rayleigh scattering, particles must be small compared to the wavelength of light. As air molecules are about one thousand times smaller than visible wavelengths, scattering definitely occurs with light at all wavelengths. Air molecules actually scatter blue and violet wavelengths more strongly than longer red wavelengths. So, at some future point scatter tests at shorter wavelengths than red light will be worth trying.

My tests, described here, used the last method of propagation: clear air forward scattering. Tests were done at night in cold weather with near-cloudless skies using a 1W red LED.

The equipment described here would be suitable for all the above NLOS propagation methods. Much greater ranges are possible using refraction and cloud-bounce.

AN OPTICAL BEACON TRANSMITTER. To transmit an optical signal suitable for weak signal modes, a high frequency crystal around 5MHz was divided down using a 4060 CMOS oscillator/divider IC to a low audio frequency (producing a 572Hz square wave in my case) and this was used to switch, via a MOSFET, a 1W, 10mm diameter 'conventional style' red LED. Essentially, the audio tone modulates the optical signal with an audio sub-carrier that can be demodulated at the receiving end. The circuit diagram is shown in **Figure 2** and the completed transmitter in **Photo 1**.

A divided down HF crystal gave excellent audio tone stability, which was very suitable

PHOTO 2: Transmitting through the bedroom window.

for weak signal modes where very narrow (sub-Hz) bandwidths may be used. A K1EL keyer IC was used to key the 4060 IC with a number of CW and QRSS beacon messages at speeds from 10wpm down to QRSS30 (30 second dot period). QRSS3 (3 second dot period) was used in the most recent tests. Other similar beacon keyers may be substituted.

The 10mm diameter LED was obtained from a supplier in Hong Kong via eBay [3]. It has a stated output of 280,000mcd at 1W DC input, which is high for such a package. This particular LED is very robust and I have yet to damage any. The beacon has run continuously for hours at a time without any issues.

The current flowing through the LED was set by series resistors, which needed to have adequate rating. In my case, power for the beacon came from an old PC switched mode power supply able to supply 19V at 3A, although nothing like that power was needed. The beacon signal was fired out through a double glazed bedroom window, see **Photo 2**.

RECEIVER. At the (portable) receiving end, an SFH213 PIN photodiode was used in a receiver based on a design by K3PGP [4], seen in **Figure 3**. This proved to be *very* sensitive in absolute darkness, although sensitivity degraded with ambient light. Even moonlight degraded its sensitivity. The PIN diode was connected directly to the gate of the FET in so-called photovoltaic mode. In my case the FET was an MPF102, although other lower noise FETs may be better. A *very* high impedance was needed at the gate of the FET. The junction between the PIN photodiode and the gate of the FET must be 'up in the air' to avoid any board strays that may introduce losses. Any losses here would have severely degraded the sensitivity. The output of the FET was amplified in a couple of stages of gain and fed, via an emitter follower, to a laptop PC and headphones via screened audio cable. Because of the PIN photodiode capacitance, the use of lower audio tone frequencies is recommended as sensitivity will be better than at higher frequencies. Lower frequencies, below 50Hz, are likely to result in even greater sensitivity, but coupling capacitors in the receiver would then need to be increased.

SCREENING AND CONSTRUCTION METHOD. The receiver had to be housed in a well screened box as it was very sensitive to nearby AC mains and RF fields. Both the transmitter and receiver were built using a piece of copper laminate as ground plane using dead bug techniques. Although a PCB might have been neater, it was not essential. Both the transmitter and receiver were housed in small aluminium boxes. The receiver was powered by an internal 9V battery to avoid mains and RF pickup.

OPTICS. Optics for the transmitter and the receiver consisted of 100mm Poundland lenses (obtained from a £1 hand magnifying glass) mounted in 110mm drain pipe. As G8CYW explained, the Poundland lens is an almost perfect fit in the drain pipe. The red LED used at the transmitter was mounted on a pipe joining piece that is mounted at the focal point, around 34cm from the lens. Similarly, the PIN photodiode was mounted at the focal point in the receiver optics. To aid optical alignment, a small gun sight telescope with cross hairs – available via eBay for just a few pounds – was mounted on top of the Tx and Rx assemblies. Both optical assemblies were mounted on tripods. **Photo 3** and **Photo 4** show the general arrangement of the receiver.

At dusk, the aim of the gun sights had to be adjusted by looking for the red transmitter beam focused on a distant object. It had to be precisely in the centre of the cross hairs. Likewise, the position of maximum sensitivity of the receiver when looking, for example, at a distant star or street light had to correspond to the centre of the cross hairs in the gun sight. It was most important to know exactly where the beam was aiming and also that the receiver could be reliably aimed in the right direction. Looking for a very weak optical signal without the aid of a visible red light is a bit of an art, especially in total darkness! It helped to know the approximate direction to aim beforehand.

WEAK SIGNAL SOFTWARE. The laptop PC ran *Spectran* software [5], which was able to filter the incoming signal in a 0.34Hz bandwidth (for QRSS3 speeds) and display the signal on a spectrum display. Signals at QRSS3 speeds can be detected when some 27dB weaker than a 12wpm CW signal when using the optimum bandwidth. Using *Spectran*, one can take screenshots as well as audio recordings of the signal received. At the limit of range it was impossible to see or hear the optical beacon, but it was possible to see the slow QRSS3 CW signal appear on the screen. It took several seconds for the signal to appear, so aiming of the receiver had to be done based on compass settings and local landmarks. The headphones gave an indication of noise directly from streetlights and from more distant streetlights scattered in the sky. It was also possible to hear noise from strobe lights when pointing the receiver at aircraft and from stars and the moon.

DARK NIGHT TEST METHOD. At home, the QRSS3 beacon transmitter was set up on a small video camera tripod and aimed out through the glass of the bedroom window to a waypoint some 1km away, looking in the gun sight to ensure accurate aim. The initial optical alignment of the transmitter was done in daylight. Knowing that the aim was very accurate, the OS map was then consulted to find a number of locations 'over the hill' in the same direction, but much further away.

Initially a location 4.5km NLOS was tried for the first reception tests using a continuous carrier. Disappointingly, signals were weak. Then it was realised that this point was actually about 2 degrees out! The next night, a QRSS3 transmission was again made and the receiver moved to be definitely 'on beam' at a point 4.8km away

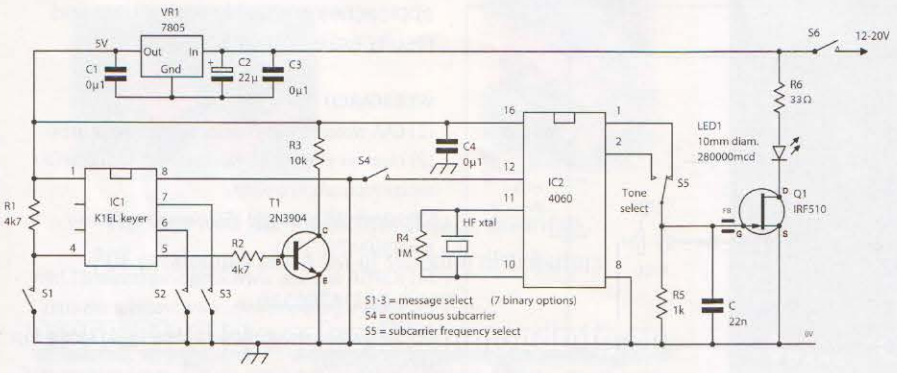


FIGURE 2: CW/QRSS3 optical beacon transmitter.

Roger Lapthorn, G3XBM • e-mail: rogerlapthorn@gmail.com

PHOTO 3: General view of the receiver.

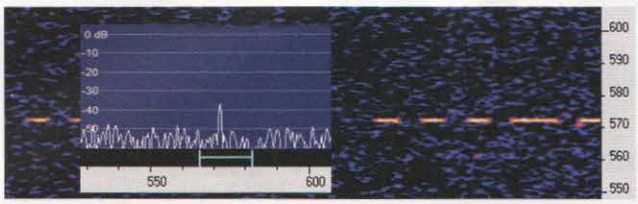


FIGURE 4: QRSS3 signals received at 4.8km with 20dB S/N in 0.34Hz bandwidth.

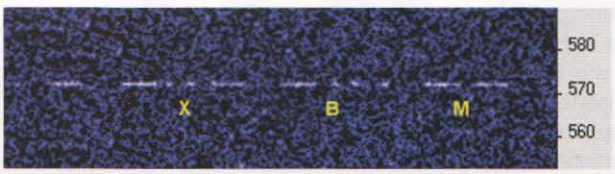


FIGURE 5: QRSS3 signals received at 8.5km with 14dB S/N in 0.34Hz bandwidth.

from home. Once the receiver was correctly directed (a process of trial and error over a few degrees of rotation in azimuth and elevation) signals were received at 20dB S/N in 0.34Hz bandwidth using the *Spectran* software, as shown in **Figure 4**. This was a good signal. Incidentally, the strongest signals with clear air scattering appear to be just above the horizon and great accuracy in aiming is needed.

A few nights later, a more distant 8.5km NLOS path was attempted and signals were quickly received at 14dB S/N using QRSS3 and 0.34Hz receiver bandwidth, see **Figure 5**. A recording and screenshot were made. Attempts were then made to get an even stronger signal but a slight mist had descended and signals disappeared completely.

TESTS AT GREATER RANGE. For these tests a very basic, low cost, camera tripod was used at the receiving end. This wobbled and it had no method of calibrating the direction in which it was firing in azimuth or elevation. As such, it was really not very suitable. What is needed for future tests is a much more stable mount with a calibrated horizontal and vertical scale so that repeatable settings may be made. So, before my next tests such a tripod will be obtained. A sturdy surveyor's tripod should be suitable.

Slower modes than QRSS3, possibly QRSS30 (30 second dot period) or a slow dual frequency CW (DFCW) modulation, will allow even weaker signals to be detected. DFCW would allow a continuous FSK signal that would also help with optical alignment as the optical signal would be continuously transmitted. More powerful LEDs are available with powers up to several watts, for example Phlatlights, which would increase the ERP by several dB.

Taken together – more powerful LEDs and narrower bandwidth modulation schemes – much greater paths should be possible using clear air forward scattering over the horizon.

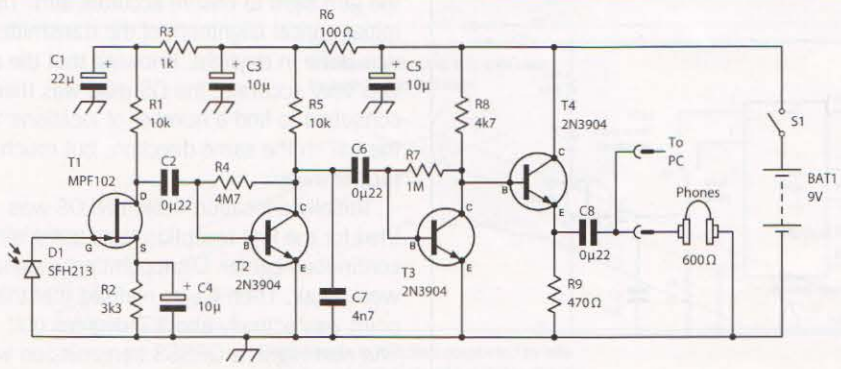


FIGURE 3: K3PGP-derived 481THz optical receiver.

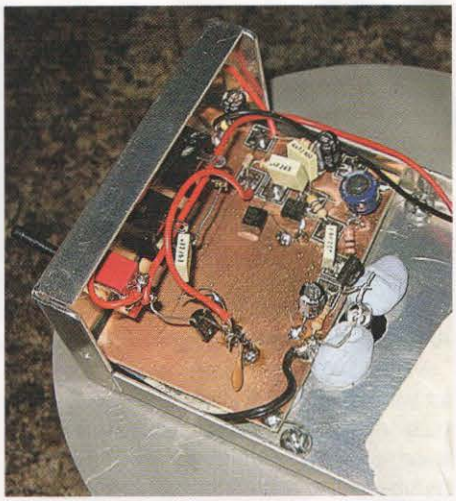


PHOTO 4: The receiver electronics.

Currently I am examining a path of around 27-28km to the far side of Cambridge that is very much non line-of sight. I think this will be achievable with some preparation.

Using cloud-bounce propagation and much higher powered transmitters, much further non line-of-sight paths are possible. Indeed, amateurs in Australia have covered far greater ranges using very high powered LED transmitters.

SUMMARY. It amazes me that the modulation of a 1W input QRP optical beacon beaming a red light out through a double glazed bedroom window can be successfully decoded on a tiny, and very low cost, simple optical receiver 8.5km away over a non line-of-sight path. Results suggest much further is possible NLOS using similar equipment.

Up-to-date information on ongoing nanowave work is available on the UKnanowaves Yahoo group [6]. Details of my ongoing experiments are on my website [7] and blog [8].

CONCLUSION. Please consider having a go at optical frequency work. Perhaps not NLOS, but maybe trying speech over line-of-sight paths. There is still a lot to learn about optical frequency communications. As equipment is easy and inexpensive to build, this is one area where homebrew approaches are highly appropriate and results extremely satisfying.

WEBSEARCH

[1] CAA website: www.caa.co.uk/homepage.aspx
[2] Clear air scattering: http://mintaka.sdsu.edu/GF/explain/optics/optintro.html
[3] 10mm 280000mcd LED: www.ebay.co.uk/itm/350347623711
[4] K3PGP receiver: www.k3pgp.org/frontend1.htm
[5] Weak signals software: www.weaksignals.com/
[6] Nanowaves Group: http://groups.yahoo.com/group/UKNanowaves/
[7] G3XBM website: www.g3xbm.co.uk
[8] G3XBM QRP blog: http://g3xbm-qrp.blogspot.co.uk/

June 2014 • RadCom
Stuart Wisher, G8CYW • e-mail: stuart.wisher@talktalk.net

Modifying surplus 13cm linear amplifiers

A team effort yields excellent low cost power

PHOTO 1: General view of the REMEC amplifier.

PHOTO 2: General view of the Andrews amplifier.

INTRODUCTION. Most of the NE Optical Communications group are also keen microwavers and in recent years we've obtained between us no fewer than five of the commonly available surplus 13cm ex-telecoms amplifiers and associated 50V switch mode power supplies. Whilst we have had some success in getting some power out of the amps we have been plagued with problems of low output power and with them abruptly switching off as power increases.

None of us has had a direct involvement with these in the relevant industry and so we have searched the web, asked around and attended talks on their modification. Gradually, we have pieced together enough information to get these amplifiers running at useful power levels. I thought it might be of use to others if I were to share this information, and describe how we have done it. My apologies if I am trying to teach old dogs new tricks, but if you have already solved this problem you are probably not reading this!

EQUIPMENT. We have two different types of amplifier. Eddie, G0EHV and I have the REMEC type shown in **Photo 1**, which is instantly recognisable by the uniform milled heatsink (and the name REMEC on the back panel!) whereas Brian, G8KPD and Gordon, G8PNN have the Andrews version shown in **Photo 2** and characterised by the diecast heatsink. These two types are quite different inside; there are two output devices in the Andrews unit and four in the REMEC, both complete with plenty of power splitters/combiners and a circulator feeding the N-type output socket. Both types have very complex signal processing circuits necessary for their original use, and equally complex monitoring and protection circuitry, it seems to me that it is this circuitry that may have been causing the problems.

Both types also have an efficient 50V to 28V switch mode PSU included, as the power devices (output and driver stages) operate from 28V but the common supply to these modules seems to be 50V. One observation is that this could be removed and the whole amplifier run off a 28V supply but we decided to retain the 50V option because (a) we had obtained the PSUs with the amplifiers and (b) the low power and monitoring/ protection stages run from a 9V auxiliary supply that we would have had to provide separately.

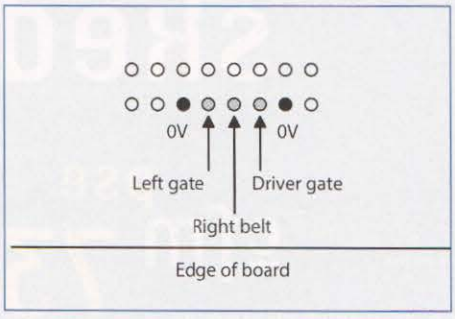


FIGURE 1: The RF board bias connector.

REMEC. On to the REMEC first; because this was solved earlier by Eddie, working with Gordon. **Photo 3** shows a general view of the circuit once the base plate and screening enclosure have been removed. No fewer than six power MOSFETs are visible on the board. The REMEC has milliwatt input sensitivity but grounding the PTT pin (pin 1) on the 25 pin data I/O socket on the front panel as advised results in only low output power. Eddie was getting 16W output for a few mW input and mine was even worse at 10W output. In my case, that was achieved with 8A input current at 50V – that's 400W DC input power! I reduced the drive from my homebrew transverter down to 1mW since any more drive increased the DC input current up to 10A (yes half a kilowatt!) whereupon the protection circuit unsurprisingly cut in and switched the thing off. It has been quite stable for some time at the 10W output power level and it has enabled me to join in on the microwave activity nights and work those GM stations QRV on 13cm (my take-off south is poor). I just had quite a large extra contribution to shack heating as well!

Eddie acquired a low power 13cm transverter and was keen to use his REMEC amplifier on SSB rather than his previous TV application where he was using a different PTT method with no trouble and getting 60W or so output. There's a clue then.

To cut a long story short, using the pin 1 input as PTT control, he found just 16W output power available on SSB when Gordon measured it. When he switched to the alternative PTT method for SSB, his measured output jumped up from 16W to an acceptable 60W+. This is achieved by a simple mod shown in **Photo 4**; the small green insulated wire on the PSU board hard-switches the amplifier on. I think it must defeat the power reducing function. I have yet to do this to mine since much of my time recently has been spent on a different approach to the Andrews amplifier, but I am looking forward to the extra output power!

ANDREWS AMPLIFIER. The Andrews amplifier is a different story. We all spent quite some time with one of Gordon's amplifiers opened up, placed on the kitchen table and us trying to find our way around the circuits and discussing how we might make it work. Eddie's recent success with the REMEC spurred us on; circuit diagrams were emailed around the group and a solution dreamed up. The Andrews amplifier also has the ability to be driven with milliwatt power levels but Gordon didn't need this, having a DB6NT transverter with an output power of a watt or so. Gordon had attenuated the drive when he originally tested his amplifier, but he was plagued with the amplifier repeatedly cutting off as soon as he was getting any useful power out of it. He passed it over to me with the instruction "do whatever you want with the ******* thing!"

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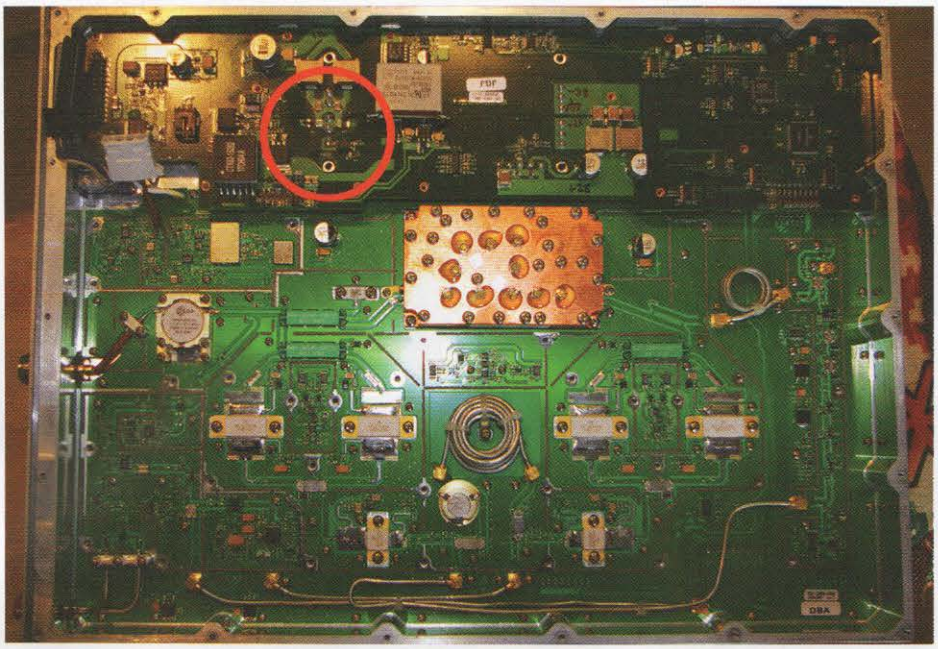


PHOTO 3: Interior of the REMEC amplifier once all the casing and shielding has been stripped. The red circle indicates the area shown in Photo 4.

I then realised that if I were building a 13cm amplifier from scratch as an amateur radio project, I would be building just the amplifier stages and a simple bias network, to hell with all the protection etc (oops!). By then we had reached the conclusion that much of what we had bought inside the box should be thrown away! So, here's what I did...

With the amplifier upside down on the bench, it's time to get the screwdriver out for a lot of exercise! Make sure you have the correct bit in the screwdriver as the screws have quite a hold on the aluminium and damage to a screw head will cause obvious problems. Quite a bit of effort is required to 'crack' them open.

Taking off the base plate is only the start. You will be met by the sight of yards of solid coax and three printed circuit boards. Unplug as much of the coax as you can, leaving enough from one of the input sockets to reach to the back of the box for later use. Don't touch the printed circuit board at the very back of the box: it is the power supply board and you want this one! Remove the other two boards, unplugging and disconnecting as you go. The long board at the side of the diecast screening enclosure seems to be the signal conditioning board and the one on the top of the screen seems to house the monitoring/protection functions. The 25 way data connector on the front panel should be removed as that is the easier option than wrecking the cable: you never know, someone might want one of these boards in the future. It doesn't matter if I have got the descriptions of the board functions slightly incorrect as you don't need either of them! Finally, for the last of the demolition moves, get that screwdriver out again to remove the many screws securing the diecast screening enclosure. The manufacturers have even numbered the screws on this one on the moulding if you look! Lift the screen off vertically, as it plugs into the RF board below. Don't weigh the screening enclosure in for scrap just yet, you will need to remove the connector that goes down to the RF board for future use. Fortunately it comes off easily with yet more screws: be careful here.

You should now be down to the two boards you actually need, the PSU at the back and the RF board in front with all those lovely high power MOSFETs on! It might be worth noting at this point that the 3 pin power input socket on the front panel is wired to the PSU board at the back with some appropriately thick wire, keep this and the power switch with its thinner wire going along in the same direction. The crazy thing here (to me) is that the RED thick wire is NEGATIVE and the BLACK one is

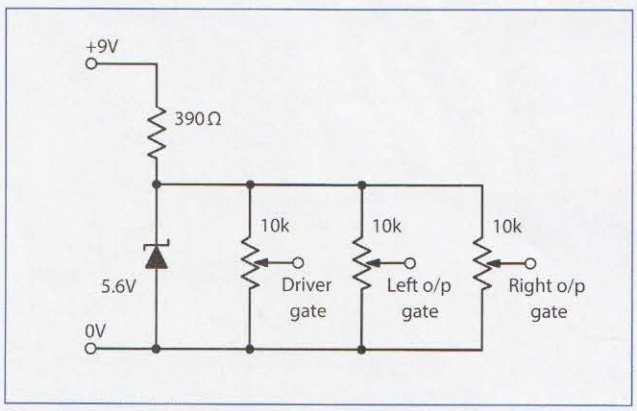


FIGURE 2: The simple bias circuit.

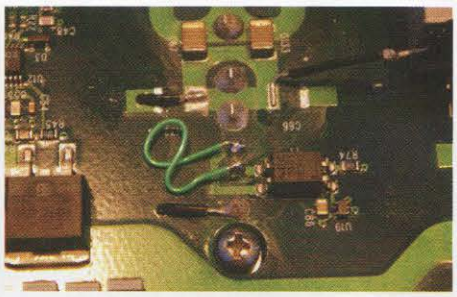


PHOTO 4: The very simple PTT modification for the REMEC amplifier.

POSITIVE! You will have pulled out the spade connector for the 28V power wire (blue on Gordon's version) that goes from the PSU to the RF board in order to remove the screening enclosure, you need this later so keep it dangling from the PSU. **Photo 5** shows what I was left with.

It doesn't take long to figure out the signal path on the RF board: in at the mW level at the gold coax socket on the RF board near the PSU and progressively through four stages of amplification, power splitters and combiners to the output. There must be some 50dB of gain in all. I reasoned that I didn't need the first two stages as the driver MOSFET must need something of the order of one watt and the DB6NT transverter could be connected in at this point. This is why you don't need the screening enclosure either (I'm sure someone will tell me off about this!). My reasoning is based on about 10dB of driver gain and the same for the pair of output MOSFETs. I wasn't far out as it turned out. The coax input cable you left from the input socket can be soldered in to the driver input by removing the coupling capacitor from the combiner just before the driver stage and taking the centre of the coax to the end of the track vacated by the capacitor connected to the gate. I didn't bother with a coupling capacitor as the output of the transverter already has a coupling capacitor in it. I don't mind living dangerously, with no monitoring, no protection, no screening enclosure and now no coupling capacitor! The outer of the coax cable can easily be soldered to the adjacent earthed area on the board; this can be seen on **Photo 6**.

Now for the power and bias connections to get the now-two-stage 13cm linear amplifier working. Wiring the 28V power drain supplies is easy; it is where you took the spade connector off earlier to get the screening enclosure off and is already done for you if you simply plug the spade connector back on to the RF board. Look at this area and you will see three similar sections, each with a large surface mount 0.01Ω SMD resistor with three sets of over-current sensors that will now forever remain silent! With no gate bias, the amplifier will draw virtually no current at 28V; all the gate bias circuits are tied down to 0V with 10k resistors so all gates are held at 0V and their respective MOSFETs are off until further notice. You might want to put a

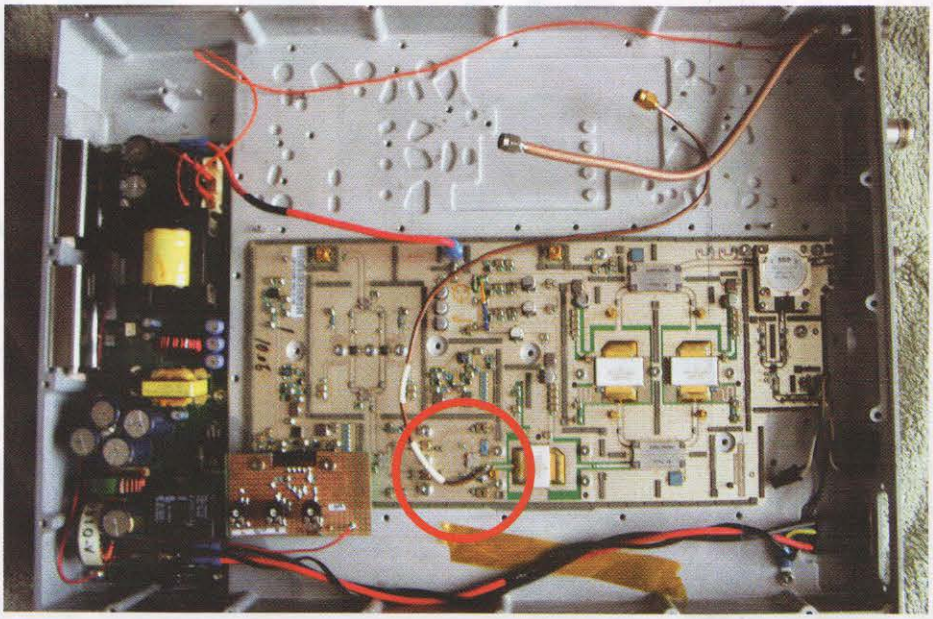


PHOTO 5: General view inside the Andrews amplifier after stripping extraneous shielding, cables and circuit boards. The red circle indicates the area shown in Photo 6.

multimeter on its 10A range from the PSU to the 28V input on the board when you set up the bias instead of using the blue lead and test the amplifier in its new life. You might even put a 10A fuse here later if you are more cautious (I nearly said chicken!).

The gate bias was a little more problematic. At first, I thought I was going to have to cut tracks and run wires over the board to the ends of the gate bias decoupling for each of the three MOSFETs (all clearly visible on the board, but then in each case it all disappears under the board on a plated through hole). Luckily, I avoided this because I identified three pins on the connector socket that were simply gate bias pins. You can 'ring' them through with a continuity tester: I did. Not only that, but the two adjacent pins either side on the socket are at 0V. See **Figure 1** for details of the 16 pin socket and the connections I found. The simple gate bias circuit is shown in **Figure 2**. The stabilised 9V output on the PSU is used and further brought down to 5.6V by the Zener diode. Three 10k pots then tap off this to provide the necessary gate bias for each MOSFET. These outputs are somewhat loaded down by the 10k resistors on the bias lines so the pots end up near the top of their tracks to get the required bias voltage, but it works!

I built the gate bias board on a piece of stripboard due to the simplicity of it and

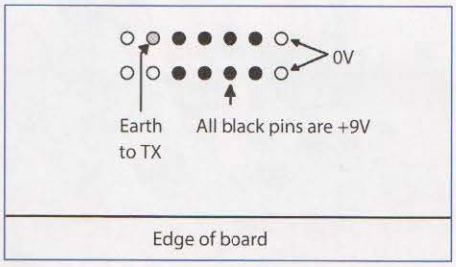


FIGURE 3: The PSU connector.

the fact that the connector for the socket recovered from the screening enclosure and the three pots are all on a 0.1" pitch. You can see this on Photo 5; I have bolted the connector to the stripboard and only soldered to the five pins used for this bias board (two 0V pins for some reason, perhaps to try and make sure it is always earthed?). This makes the new bias board a plug-in module. The 9V supply comes from the socket on the PSU near the 28V output connection. See **Figure 3** for details of the PSU socket connections. Because of this bias board and the coax cable tapped in to the RF board, you can't fit the screening enclosure back on but, there again. I don't think you need it: I have never experienced any instability in the remaining two active stages. If you do need the original mW sensitivity and you can get the two previous stages working (they run off the 9V supply), you would need to reinstate the screening enclosure. In this case, the bias board would be still mounted on the connector, but with the connector still attached to the screening enclosure.

With regard to the socket on the PSU, providing the front panel power switch is on, the 9V output is always available but the 28V output remains off until another of the pins on this socket is grounded. This is a good place to use for PTT control. Leave the gate bias on all the time and key the amplifier on by enabling the 28V output on the PSU with this pin. The pin only sinks some 4mA or so to 0V and has just a few volts on it when not grounded. The PTT pin details are also shown on Figure 3.

Setting up the amplifier is straightforward. Make sure all three bias pots are at 0V, connect a 10A meter in the 28V line and have a low power 13cm signal available for the input. Don't forget to connect the amplifier output to a load and some sort

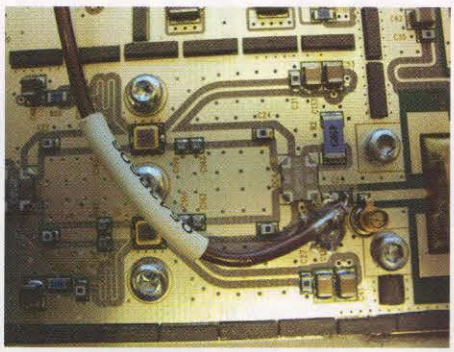


PHOTO 6: Feed point for the Andrews amplifier (see text).

of power meter! Connect the 50V power supply, operate the front panel power switch and earth the PTT line. After an initial small pulse of current as the decoupling capacitors charge up, the meter should read zero. My digital meter reads down to 0.01A on its 10A range and shows nothing at this point. Slowly turn up the driver bias pot until 200mA is registered on the meter (I have settled for this level of quiescent current for the driver). Now turn your attention to the left output MOSFET bias pot and turn it up until the total current drain is now 600mA, ie 400mA standing current for the output MOSFET – it *is* bigger, after all! Now complete the bias set-up by turning the right output MOSFET bias pot until you hit 1A in total. Then apply a small input signal. I found that a 1mW input signal increased the total current drain by 50mA or so and the output power from the amplifier was in the region of 100mW, so small signal amplification is of the order of 20dB – as hoped for. Over then to Gordon, who applied his nominal 1W drive. The current drawn then hits 10A on a good 'G8PNN tuning up whistle' and he measured the output power as 80W: job done! We have not even thought about tuning it up yet; there are a few variable capacitors on the tracks around the MOSFETs that might yield a little more output. Much less have we considered putting the base plate back on and spoiling the view of all those nice RF components!

CONCLUSION. I have notes from my research that indicate that more than double this output power is available with more drive, but since the circulator rating is 125W maximum, it would have to be bypassed and the current drawn by the amplifier would possibly rise to the region of 30A at 28V: ouch! Actually, Gordon has now realised that there is so much space vacated inside the main box that there is room for his transverter inside as well, which will shorten the length of the cable between transverter and amplifier to good effect. All you need now is a suitable coaxial relay for the amplifier output that will carry all this power and a sequencer that will control the amplifier in a safe way from your rig and transverter. Now, where's that 10A fuse?

QRP

Further notes on the Rock-Mite

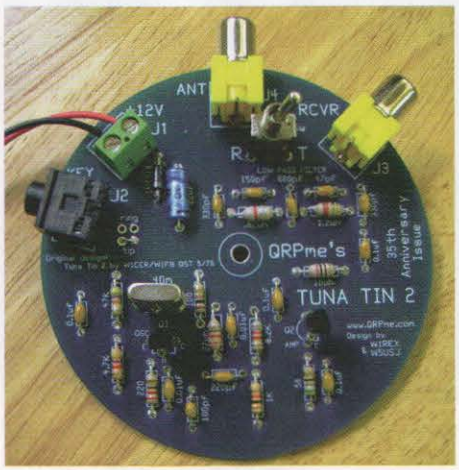
ROCK-MITE KITS. In the May 2014 issue of *RadCom*, Ron Stone, GW3YDX, wrote an interesting review of the Rock-Mite QRP transceiver kit in which he pointed out that sales of this fascinating, tiny, transceiver have moved from Small Wonder Labs to QRPme.

QRPme is a one-man company in the USA selling a large range of mainly simpler QRP kits. In recent years, it has had a UK presence through the G QRP Club. QRPme has a reputation for mounting a range of kits in tuna cans! It was founded, and is run, by Rex Harper, W1REX. Rex explains the company ethos: "QRPme is neither a club nor big time organisation! It is the part time business of one guy, Rex Harper, W1REX. All the kits offered on the website are designed, kitted, updated, packed and shipped by me. At times, personal commitments take precedence over kitting and shipping kits so shipping times may vary. QRPme has one of the widest ranges of kits for the QRP community and we strive to ship kits within 2 or 3 weeks from receiving your order."

Further information can be had from the homepage at www.qrpme.com whilst www.qrpme.com/pages/RM gives the latest details and prices of all the Rock-Mite options. Currently the kit is listed at US$40.

MORE INFORMATION. If you already own a Rock-Mite or are thinking of buying a kit, lots of useful information can be found at the The Rock-Mite Files; a website hosted by Rob, N0RC (www.qsl.net/n0rc/rm/). As Rob explains it, "Here, I will attempt to collect information to share with others about the Rock-Mite. This will include operating stories, builder hints and tips, modifications, links to web pages done by others, and the Rock-Pile; lots of pictures of Rock-Mites built by others!" It is certainly a source of information, and some amusement for Rock-Mite fans.

The Rock-Mite Files is certainly extensive.



A typical 'tuna tin style' kit from QRPme.

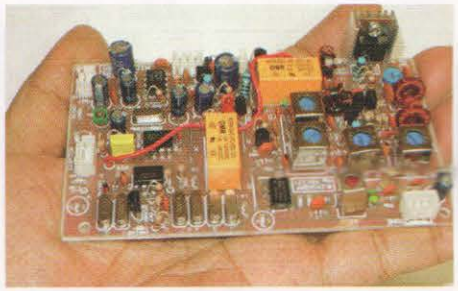
There are many modifications and suggested improvements for the original Rock-Mite circuit. The constructors offering their ideas for the Rock-Mite include some of the best known QRP constructors and technical authors. An article on extending the tuning range of the transceiver comes from Wayne Burdick, N6KR the co-founder of Elecraft. I especially enjoyed the wide selection of photographs showing individual examples of the building and mounting of Rock-Mite transceivers.

IK0IXI WORKS QRP SSB DX. Fabio Bonucci, IK0IXI, is the G QRP Club Italian representative. Fabio recently sent me a delighted e-mail. He had just worked 3B9FR on 10 metres using only 3 watts of RF power. 3B9FR is Rodrigues Island IOTA AF-017 and part of the Republic of Mauritius. 3B9FR had been reported on 10m SSB and Fabio was curious to see if he could hear this, for him, new callsign. Fabio's e-mail said, "Usually I use CW only and rarely I switch to SSB QRP. My wire antennas (and my entire shack) are built for CW and QRP, not for SSB pile ups... but that morning I was curious to see if I could hear 3B9FR. 10m is an incredible band for DX, never say never... and signals from Africa are always strong on late morning and early afternoon. In fact, the 3B9FR voice was clear but his 59 signal was affected by deep and fast QSB. He was working simplex and I heard 'Only Europe please!' At that point I started to call him 'QRP QRP'. After a couple of times he said, 'Who is QRP. Go ahead'. So I made my call and he replied 'IK0 something please call again'. After three or four times my entire callsign was copied and the QSO confirmed. This was done with a simple wire antenna and homemade transceiver. The antenna was my old OCF (off-centre-fed) dipole (41m long). I have used it on 80/20/15/10m plus WARC since 1997, although on 40m I use an end fed (less noisy). The transceiver was my KTR-1; a homemade multi-band, multi-mode transceiver with an RF output of some 3 watts."

QRP IN INDONESIA. Fabio, IK0IXI also told me about some QRP activity in Indonesia. Indra Ekoputro, YD1JJJ, from Bogor in Indonesia runs a blog called Blekok QRP (http://blekokqrp.blogspot.co.uk). The blog gives mention of two QRP transceiver kits: the Micro-40S (SSB) and the Micro-40C (CW). Both kits are printed circuit board plus components. Cases and connectors are not supplied. The printed circuit board is epoxy fibre and measures 7cm x 11.5cm. The whole transceiver only uses only 85 components, 25 of which are SMD parts pre-soldered to the board. The inductors for the local oscillator and the band-pass filters are supplied pre-wound. The RF output is a nominal 2 watts although, with choice of output transistors, it can be up to 5 watts. The kit availability appears to be a little erratic but there is also mention of several projects from YD1JJJ with varying degrees of information. This is a blog worth following and has many useful links to practical construction projects.

The 3B9FR QSL card received by IK0IXI.

Homemade SSB/CW transceiver (3 watt) used by IK0IXI.



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Getting started in mobile operation Part 1

What you need to know about going mobile

PHOTO 1: IC-706 front panel dash-mounted.

TRAVEL. Whether you're commuting, driving for a living or going on holiday, the chances are that you'll be in a vehicle. Why not use the time to explore an aspect of amateur radio that offers both an interesting technical challenge and the opportunity to spend time on the air – time you might find difficult to justify were you at home. We're going to concentrate on operation from a vehicle in this article but the comments apply whether you're driving, riding or walking. Developing and operating a mobile station can become an obsession but it's one where the skills you acquire will be useful in any aspect of amateur radio.

If you haven't tried operating from a vehicle before, this article should give you the information you'll need to get started. If you're already a convert to mobile operating I hope you will find the encouragement to try a different band or mode.

OPERATING. If you're moving while using your radio then you are a mobile station. The licence recommends that you sign /M but there is no compulsion to do so. However, as we'll find later, it's a good idea. It also recommended that the location is given. Again, this makes sense – particularly on VHF, where it could help a receiving station optimise their beam heading.

Any band or mode you can use from your home station can be used from your vehicle – albeit you'll need to stop to use some of the digital modes. Probably the ideal way to get started is on 2m or 70cm FM using VHF and UHF repeaters. This form of channelised operation is ideal for mobile use as it removes the need for tuning and allows scanning to be used. I operate entirely from memory channels – even on HF. Stored in memory are a number of channels or spot frequencies for each band. I have included the most popular frequencies on HF, the calling channels for VHF SSB and FM plus all the usual FM channels. This makes band and channel selection both quick and safe. It also means activity can be effectively monitored using the radio's scan feature. It's worth having a few beacon frequencies in the scan sequence as it will help you catch any anomalous propagation.

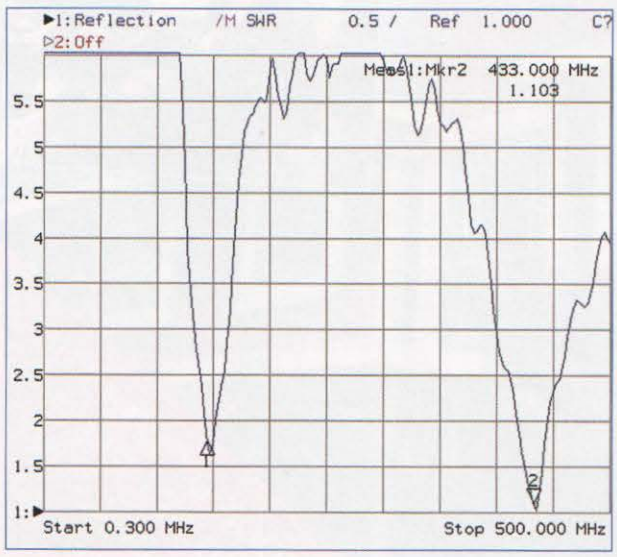

FIGURE 1: VSWR plot of a 2m/70cm antenna.

The repeater network has been designed specifically to extend the range available for mobile to mobile and mobile to fixed station QSOs on our VHF and UHF bands. They require split-frequency operation. You transmit to the repeater on one frequency and listen to its output on another. They require either a sub-audible tone (CTCSS) or a 1750Hz tone to gain access initially, so it makes sense to program any well-used channels into your radio's memory. Your radio will usually be able to generate the required CTCSS tone for you. If you listen to the repeater's regular ident it will tell you the required tone by a letter between A and J corresponding to a tone between 67Hz and 118.8Hz. You'll find frequencies, access tones, coverage maps and repeater group contact details listed at [1].

The repeaters all cost money to maintain so it's reasonable to send a subscription to the groups who run the ones you use most.

Operating mobile on HF has some advantages over a base station. For a start the noise level in a rural environment is likely to be lower than that at the average suburban home station. This is particularly so on the lower bands. Although your station is less efficient on these bands DXpeditions are often in quiet locations and able to hear smaller signals. Many DXpeditions will specifically listen for mobile stations – indeed good operators will often pick out '/ mobile' in a pileup.

ERGONOMICS. The ergonomics of a mobile station are very important. Minor changes in its layout can make a big difference to the ease of use so it pays to experiment. Probably the most important thing to get right is the positioning of the rig so that the front panel is close to your sight line without it obscuring your view of the road ahead. For obvious safety reasons it should be possible to take a quick glance at the display whilst maintaining a peripheral view of the road. My favourite radio is still the IC-706 and that choice is based on the clear display and the easy-to-use menu system. The display contrast is good – regardless of ambient light levels.

Modern mobile rigs such as the IC-706 and the FT-857 have detachable front panels that can be dash-mounted relatively easily, see **Photo 1**. The manufacturer generally provides a separation kit that includes cables and a custom bracket, allowing the panel to be detached when leaving the vehicle. It is necessary to mount this bracket on a flat surface for correct operation so an adaptor plate will probably be necessary. Although Velcro-type fixing solutions are good, the glue tends to give up at the elevated temperatures found in closed cars. The resultant creepage or

PHOTO 2: Momentary PTT switch attached to one of the steering column stalks.

even complete failure can be avoided by supplementing the Velcro with a fine bead of sealing compound around the bracket.

For those wishing to use the radio's fist microphone, a small hook upon which it can be hung when not in use is a minor but very useful addition to the station. It means the mic can be found by feel alone – again minimising the distraction while driving.

Leaving the microphone PTT closed so you're unintentionally transmitting is definitely to be avoided and can prove extremely embarrassing. If you're using a fist mic the problem is eliminated, barring a failure, but if you choose to use a switch in a hands-free installation it's worth finding a momentary type. I mount a momentary switch either on an auxiliary stalk off the steering column or utilise one of the car's existing stalks as a support, see **Photo 2**. It is placed so that it can be operated with both hands on the steering wheel.

The PTT switch connection is often only available on the rear panel of the radio. It's possible to run a cable forward from here to the steering wheel – but a better solution is to break into the mic cable where the PTT and GND signals are available. This can be conveniently achieved using a short adaptor lead. Be aware that while many of the manufacturers use the RJ-45 connector they have not standardised on the pinout so, for example, the Icom IC-706 and the Yaesu FT-857 are different.

LOGGING. These days there is no requirement to keep a mobile log (how did we manage when it was...?). If you wish to keep a record, either to claim an award or just for interest, the only safe way to do so is by using a voice or video recorder. I have used my IPaq for this purpose but a better solution is to mount a small video recorder focussed on the radio and a clock so that the frequency and time are recorded along with the audio.

POWER. Finding power for your radio has always been a challenge. A direct connection to the battery is desirable as it will minimise the voltage drop in the car's DC cables. This will also help prevent low frequency noise getting into the radio via the DC supply – however, the impedance of a battery is related to frequency and it increases as the frequency increases, meaning that it becomes less effective as a filter.

For a temporary installation, the FT-817 is a good bet as its internal battery removes the need for a power source but, for more extended use, a connection to the car supply is advisable. The obvious solution in a modern car is to use the auxiliary power socket – the type known until recently as a cigar lighter socket. Check the handbook to see how much current you can draw. Many cars have several sockets with different maximum currents. It's unlikely you'll find a socket that will allow you to run a 100W radio but many sockets are specified at 7A, which is enough for full power from most VHF/UHF radios. Some manufacturers offer a high power socket as a factory-fitted option and this is often handily located towards the rear of the vehicle. If you want to run high power but access to the car's battery is not possible you could consider fitting an auxiliary battery close to the radio and charging it via the auxiliary power socket. The battery will be discharged on transmit but topped up by the vehicle's charging system when you're on receive.

If you drive a lorry or have an old military vehicle and want to operate mobile you have the added complication of obtaining 12V power from the vehicle's 24V system. Nowadays there are electrically quiet DC to DC converters that will allow you to operate your 12V radio equipment safely [2].

AUDIO. Vehicles make for a noisy operating environment. You'll be aware just how noisy if you've got your broadcast radio running and you stop – at which point you immediately reach for the volume control to turn it down. You may wish to add an external speaker to your transceiver in order to boost the volume – especially if it is mounted at the rear of the vehicle. (Using a headset could be deemed dangerous as it may reduce your awareness of your surroundings.)

Producing clean transmitted audio in a noisy environment is more of a challenge. If you choose to use the radio's fist microphone handheld then this is less of a problem – especially if you have a contest voice like mine (according to my XYL). Holding a microphone whilst driving is not desirable and some form of hands-free arrangement is to be recommended. The simplest way to achieve this is to use the fist mic mounted close to your mouth using a halter arrangement. A suitable arrangement for an IC-706 microphone can be seen in **Photo 3**.

Care needs to be taken to avoid the curly cord interfering with driving controls and an extension cable could be used to route the lead safely. The halter solution avoids any problems with matching the microphone to the radio and also when you move the microphone moves with you, maintaining a consistent transmitted audio level.

The more common approach is to attach a boom microphone to an appropriate point in the car such that the element is close to your mouth when you are in your normal seated position. If you can't get it close to your mouth you may end up having to increase the mic gain in the radio but this will have the undesired effect of bringing up the background noise. A noise-cancelling microphone will help in this respect since the voice is predominantly a point source and the background noise is omnidirectional.

Finding the correct mic gain will probably require the assistance of an experienced QSO partner. Many repeaters will complain if your signal has too great a deviation – similarly they may not open with too little. Finding the balance will take time.

MOUNTING AN ANTENNA. So, you've got your radio installed and powered but now comes the question of mounting an antenna on your car. For most of us, drilling holes in bodywork isn't an option so some inventiveness and a little engineering will be required. Apart from the antenna mount there's also the problem of getting the feeder from the outside to the inside of the vehicle without compromising the integrity of the

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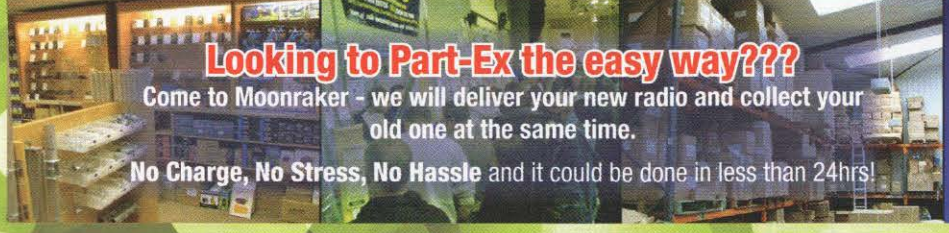

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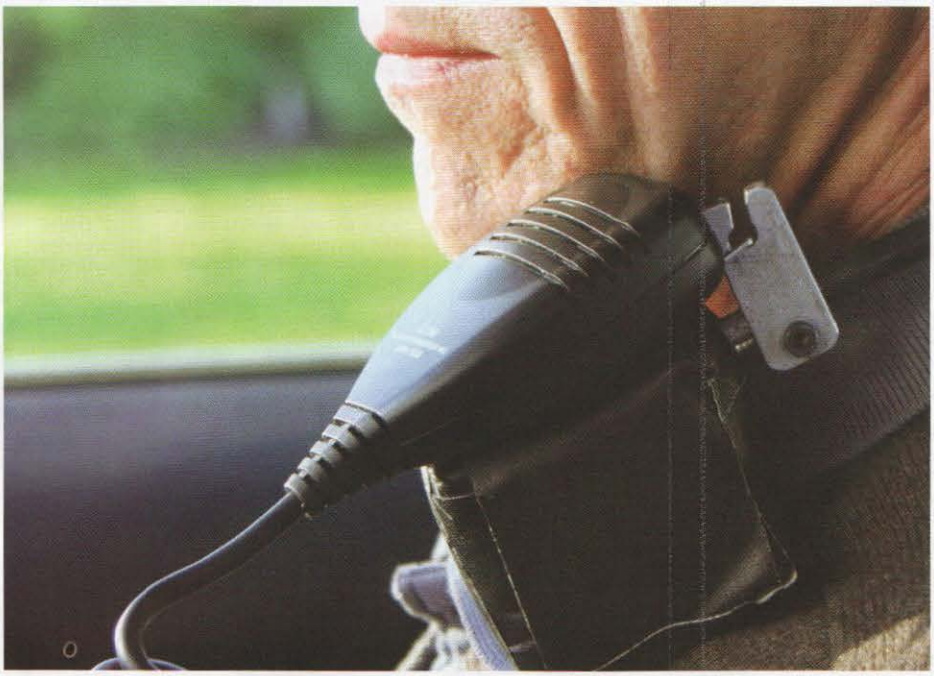

PHOTO 3: Halter for hands-free operation with a standard microphone.

car's seals. It's surprising how small a gap will cause both wind noise and water leaks.

Thin coax cables of the RG-316 type are to be preferred when it comes to minimising the risks of leaks but their loss at VHF and above is high. If you intend running 50W at these frequencies you will notice the coax becoming warm after even a short period on transmit. RG-58 is a sensible compromise between loss and ease of installation for both HF and VHF operation. A rear door or hatch is the obvious point of entry into the cockpit since this part of the vehicle is least affected by wind and driving rain so least susceptible to leaks. Forming the coax into an inverted 'U' where it enters will also help prevent water ingress.

This coax entry point suggests mounting the radio at the rear of the vehicle. Many modern vehicles have a power outlet conveniently situated in this area. Another benefit of installing the radio here is one of security. It is conveniently located out of sight, meaning just the head has to be removed when leaving the vehicle.

MOUNTS. The easiest and quickest way to mount an antenna on your car is to use a magnetic mount. They range in size from tiny ones that will support a thin VHF or UHF λ/4 antenna up to triple-magnet bases that will support large HF antennas. One word of caution though. Modern vehicles use a range of materials in their construction, not all of which are magnetic. Clearly an aluminium or composite roof will not support a mag mount. Photo 4 shows three types of mount – all suitable for use with VHF / UHF antennas. Gutters like the one to the right are becoming less common on vehicles. Conversely, longitudinal roof bars are becoming more common and they offer the possibility of a very strong mount. Antenna manufacturers themselves offer mounts to assist with both types of installation. A roof rack may look like an attractive base and, although fine for a short-term installation, it will certainly have an adverse effect on fuel consumption. Given the choice of sides for your installation the driver's side is to be preferred as there is less chance of the antenna being damaged by overhanging branches.

ANTENNAS FOR 6m AND ABOVE. Most operation on 6m and above is on FM using vertical polarisation. The dyed-in-the-wool SSB enthusiast will probably want to use horizontal polarisation; a halo or the Lambda Loop described in the March 2014 *RadCom* make suitable antennas.

Vertical whip antennas come in a bewildering range of designs ranging from the λ/4 single-band antenna to triple-band antennas measuring nearly 2m long. At these frequencies even the length of a 6m antenna may be accommodated without recourse to loading in order to reduce its length. Consequently, the efficiency is good. To obtain a match approaching 50Ω the λ/4 requires a ground plane. Antennas such as the 5/8λ, which has a much higher feed impedance and a built-in matching network, are generally less dependent on a ground plane. The 5/8λ antenna shown in **Photo 4** (centre) is mounted to the ladder on the rear of a motorhome with no specific ground connection and fibreglass bodywork yet it still performs well. The antenna may be tuned *in situ* by slackening a grub screw at the base and adjusting the length. A typical VSWR plot of a dual-band antenna is shown in **Figure 1**, with markers at 145 and 433MHz.

The performance you will obtain from these antennas depends on more than just the quoted free-space gain. It depends very much on the installation. Most of the radiation from an antenna comes from the high current portion so getting that as high as possible is the key to getting the best performance. For example, a 5/8λ will outperform a 1/4λ by more than the quoted difference in gain in a *real situation*. It works on two counts: a) the extra height helps to get over obstacles and b) a lower radiation angle helps put more of the signal where it's wanted.

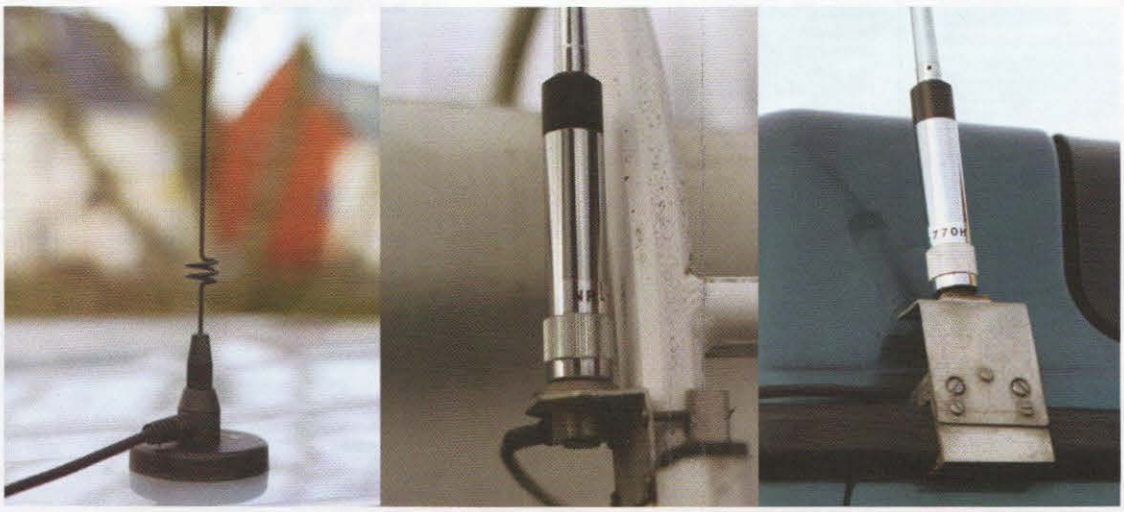

PHOTO 4: VHF antenna mounts.

[1] www.ukrepeater.net
[2] www.dmstech.co.uk/product_details.php?flag=1&type=9&subtype=28&pro_id=28

Next month we'll look at HF antennas and mobile operation and the law.

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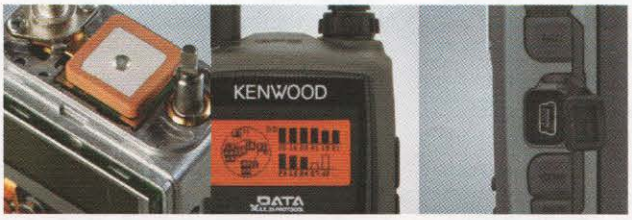

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Simon Dabbs, G4GFN, DU9AQQ • e-mail: simon.n.dabbs@gmail.com

Amateur radio, Philippines-style

Emergency communications following typhoon Haiyan

Badly damaged house near Tacloban City.

My wife, Evelyn, and I retired in 2011 and, after 24 years of married life in the UK, decided to move to the Philippines, Evelyn's country of birth. It took us the best part of a year to build our home on the small island of Samal (not to be confused with Samar) in the southern Philippines.

Meanwhile, I got in touch with the local amateur radio community, who pointed me towards the National Telecommunications Commission in nearby Davao City. In recognition of my full UK licence, I was required to sit only one multiple-choice exam module, plus a Morse test. The callsign, DU9AQQ was issued from Manila. 'DU' denotes a full Class A Philippines licence, good for 2kW on HF. '9' denotes the southern region of the country and 'AQQ' is the suffix allocated to me.

Our one-hectare site is about 150m above sea level with a good sea-path take-off in all directions, with nice views to match. I put up some antennas in the coconut trees, comprising high dipoles for 40m and 20m and a high rectangular quad-loop for 15m. Regular skeds were arranged on 15m SSB with the UK, providing fairly reliable communications with G3SED, G3IMX and M0GHQ along the south coast. My equipment is Yaesu FT-1000 MP MkV and a Tokyo Hi-Power HL-2K amplifier, good for about 1.5kW PEP. In the first seven months 104 counties were worked, with ease.

NEW FRIENDS. The DX-scene is pretty new to me, as most of my time in UK was spent on vintage and military radio collectors' (VMARS) nets on 80m, involving a fair amount of 'rag-chewing'. I do miss this. But soon I found a group of English-speaking expats in the Philippines who like to waffle on 40m. My most frequent rag-chewer and closest friend became Lester Price, DV5PO, a very affable New Zealander living in the eastern part of Samar Island to the north. Lester had worked in radio straight from school, becoming a professional telegraphist and marine radio operator, then manager, with the New Zealand Post Office. When he retired, he set up a large radio museum at Awarua (www.awaruamuseum.co.nz/). So we were soon chewing the fat about AR88s, ZC1s, CR100s, RA17s and so forth. We ended up talking three or four times a week on 40m, usually having most of the band to ourselves in the daytime. We find that daytime NVIS propagation on 40m is so good that we can usually communicate perfectly with just 10W.

Breached sea wall at DV5PO.

EVENTS IN LATE 2013. In early November, a tropical storm was brewing in the Pacific Ocean, several hundred kilometres to the east of the Philippines. These storms are not uncommon in the typhoon season, roughly July to December. These are massive, spinning vortices of air. But it is anyone's guess where these typhoons will make landfall. Their spin tends to make them veer northwards as they track west, so they tend to miss the southern Philippines, usually slamming into the Visayan Islands in the central Philippines, or sometimes tracking across the main northern landmass of Luzon, home to the capital, Manila.

Typhoons pick up huge amounts of energy as they move across the very warm equatorial parts of the ocean. If we imagine the Pacific as an enormous, high-energy skittle alley, then the Philippine Islands are the skittles at the end of it, unfortunately.

By 5 November, the Philippines Atmospheric, Geophysical and Astronomical Services Administration (PAGASA), had announced 'storm signals' for communities across a wide swathe throughout the Visayas. Storm signals vary on a scale from No 1, a warning of significant gales, to No 4, a warning of winds of catastrophic destructive power.

As the days rolled by, the picture became clearer and it wasn't pretty. It became obvious from satellite images that the storm was going to be enormous. The term 'super-typhoon' was coined, denoting expected wind speeds of a colossal 300km/hr, previously unknown. It was predicted that the storm would make landfall somewhere on the east coast of the island of Samar. Signal 4 was posted for this area, and Signal 3 as far afield as Panay Island, 250km to the northwest.

THE TEMPEST. In the south, we were completely oblivious to the storm. We switched on the TV. On BBC World News, the UK Met Office provided some very useful graphics. Typhoon Haiyan had made landfall in the southeastern corner of Samar Island at around 6.30am on 8 November. It had tracked northwesterly and slammed into the city of Tacloban, population about a third of a million, on the east coast of Leyte. Haiyan then tracked across rural Leyte and hit northern Cebu. It then headed out into the Visayan Sea, decimating small islands there and affecting southern and eastern parts of Panay Island, including the main city, Iloilo. Finally, it then headed away towards Vietnam across the South China Sea.

We saw appalling footage of total carnage in Tacloban, only about 80km south west of Lester. The whole city had been flooded and smashed by a surge of seawater over 10m high. This, together with huge winds, had wrecked nearly every building in sight including even large concrete structures such as shopping malls, supermarkets, hospitals and schools. All the buildings of Tacloban airport were destroyed and the runway was strewn with all kinds of debris. Lesser structures, like wooden and bamboo houses, were simply annihilated with terrible loss of life. The whole area was a quagmire of sewage, fallen trees, debris and destruction. Survivors were seen clinging to trees and huddled on mangled rooftops.

We were shocked and very worried indeed about Lester and his family in Borongan. The typhoon had come ashore just 50km south of them and we knew that their house was built just above the beach, facing the open Pacific Ocean.

ESTABLISHING COMMUNICATIONS. Lester was on the 7095kHz national PARA (Philippines Amateur Radio Association) net every day at 7am and 7pm, using an Icom IC-746, running from a 12 volt battery.

I went on the air the next day. I had missed the PARA net, but tried calling Lester on 7095kHz. Within minutes, Lester came up on the frequency. Much relieved that he was OK, we moved to our usual working channel, 7185kHz.

THE SITUATION AT DV5PO, BORONGAN. Lester explained to me that he, his wife and two teenage daughters had been woken at about 5am on 8 November by a strong northeasterly wind roaring across the steel roof of their concrete house. But they were able to keep reasonably calm as Lester had wisely built strong shutters to cover the outside of all east-facing windows. He had also built a reinforced concrete sea wall near the top of the beach. At around 6.20am, the eye of the typhoon crossed the coast about 50km south of them, near Guiuan. A north-easterly wind peaked to around 300km/hr,

Collapsed 3G mobile phone mast 50km south of Borongan.

consistent with the typhoon's anticlockwise rotation. A storm-surge of seawater about 4m high lunged up the beach. This was attenuated sufficiently by the sea wall that it washed around the perimeter of their house but did not enter, except into a basement store-room that had been cleared. But there was lots of flying debris consisting of all kinds of rubbish, tree branches, coconuts and palms.

Many of their neighbours' timber houses were washed or blown away completely. Even some of the more affluent people's concrete houses were badly damaged, many being rendered uninhabitable. Many of their neighbours' vehicles were badly damaged, some completely crushed.

Lester and his family knew that probably a big storm would one day hit them. So they had wisely laid in a good war chest of canned and dry foodstuffs. They also had two chest freezers well stocked with meat and fish. Lester ran his 5kVA diesel generator for 3 hours a day to keep the food chilled, pump water from their well and keep his radio battery topped up. But he was getting low on diesel.

Unfortunately, Lester's main radio mast folded double, destroying his multiband Yagi and his rotator, leaving only his 40m dipole.

EMERGENCY COMMUNICATIONS. I maintained daily skeds with Lester on 7185kHz at 9am. This was the only form of telecommunications available to him or indeed to the whole of Borongan. There were no amateurs operating on HF from elsewhere on Samar/Leyte islands, including Tacloban. He was able to receive news bulletins from Radio New Zealand and from BBC World Service, but depended on me for more detailed information gleaned from Philippine national TV channels. I was also able to obtain much from maps and images seen on BBC World News on our satellite TV.

Probably more important to Lester was my ability to receive messages from him for onward forwarding. I was able to pass messages to various friends and relatives of theirs via text messages, e-mails and by asking Evelyn to post information on their social networking sites. I was able to extend this service to some of Lester's friends and neighbours. Third-party messages are allowed during emergencies.

I asked Lester to give me the names of any British citizens he knew of in the Borongan area who had survived the storm. Over a period of a few weeks he gave me five names for passing to the British Embassy in Manila. I had the privilege of communicating directly with Brendan Gill, HM Consul in Manila, who thanked me profusely.

AID AND MILITARY ACTIVITY. By 20 November, the Philippines government declared a total of four million people displaced and homeless. The situation in Tacloban became critical. Looting was rife. Most large stores and supermarkets turned a blind eye to small-scale theft of food. But they posted armed guards who were ordered to shoot people seen looting capital goods such as TVs. There were reports of all kinds of crime and lawlessness being committed after dark, some quite unsavoury. Eventually, the Philippine army and police took control, imposing a dusk-to-dawn curfew. Large numbers of armed US Marines were later drafted in to assist.

As early as 12 November, aid supplies were pouring into major airports such as Manila and Cebu. This included food, water, tents, medicines and water-purification equipment. However, it was difficult to get this huge tonnage of material shipped to

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International Red Cross Tents in Tacloban City.

places like Tacloban, Borongan and further afield, due to short runways at these cities' airports. But fortunately, US Navy aircraft carrier, *USS George Washington*, anchored in Tacloban Bay and deployed many conventional helicopters and several of the novel Osprey V-22 twin-rotor aircraft that could select vertical take-off and landing (VTOL) or rapid horizontal flight. The Philippine Army also supplied helicopters. The UK's Royal Air Force and the USAF also assisted, making available a good number of Hercules C-130J transport aircraft with STOL (Short Take-Off and Landing) capability, even with heavy payloads. So it became possible to get the supplies to where they were needed, quickly. The C-130s bringing in supplies from Manila were also used to evacuate civilians to that city on the return flight, should they so wish.

Type-45 Royal Navy (RN) destroyer, *HMS Daring* was tasked to the Philippines from an exercise off the coast of Malaysia. Their Lynx helicopter was deployed to assess the state of various communities on tiny islands in the Visayan Sea between Leyte and Panay. It then docked in Cebu City to load up with supplies, returning to provide aid to those communities.

Invincible-class RN aircraft carrier, *HMS Illustrious* was diverted from anti-piracy operations off the coast of Somalia, arriving off Panay Island on 24 November, having loaded a staggering 100 tonnes of rice onto its flight deck in Singapore. Other aid included large numbers of hand tools to help repair dwellings, small generators and water-purification units. Using its eighteen on-board helicopters, this aid could readily be airlifted to where it was needed. As well as materials, military personnel were airlifted in, comprising sailors from the two RN ships, Royal Marines from 42 Commando and soldiers from 24 Commando, Royal Engineers. These people helped rebuild public assets such as hospitals and schools and set up temporary facilities. The helicopters were deployed also to sweep the region, identifying needy areas, notably, remote islands and coastal strips.

Even within a week of the typhoon striking, Lester reported a great deal of helicopter and C-130 air activity over Borongan. It appeared that most aircraft were flying north-south over him, moving supplies to needy communities in the south of Samar Island. Also, Borongan itself has an airport under construction, with a serviceable 1km concrete runway, so C-130s could land there with ease. However, there was difficulty in clearing civilians from the runway. Such was the state of panic among people desperate for food and water, or the chance of a free airlift to Manila.

MAINTAINING COMMUNICATIONS. Lester and I kept up communications every day at 9am on 7185kHz. They were getting low on diesel fuel. The next day, his wife queued for 6 hours at a petrol station in Borongan, but to no avail. But the following day, she was able to buy 60 litres quite quickly, much to Lester's relief. It would keep him on the air and their food fresh for about 15 days.

Lester reported that he had heard military traffic on 7010kHz USB. It was in the local dialect of Samar and he surmised it was probably a tactical ground station coordinating Philippine Army operations. On the weekend of 16/17 November, the Army radio network started to experience deliberate jamming in CW. This was almost certainly by radio amateurs incensed at the presence of phone signals in the CW section during a major contest. Lester heard this and felt embarrassed. He spoke to PARA on 40m. They managed to post a message on the contest organisers' website explaining that the offending traffic was legitimate and part of the international Haiyan aid effort. Most of the interference abated.

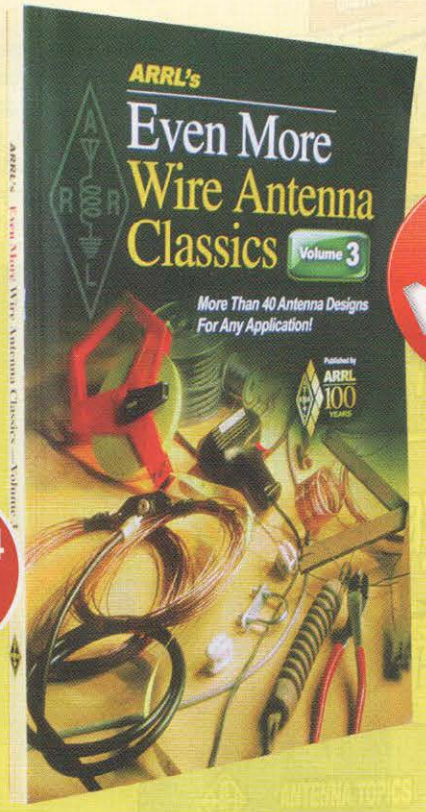
FAMOUS FOR FIVE MINUTES. Typhoon Haiyan attracted plenty of coverage in the media all around the world. Following a tip-off from one of my former neighbours, I received an e-mail from Liz Allaway, journalist and news presenter for radio station Wave 105, near Portsmouth, asking me if she could call me. I agreed and, a couple of days later, Liz interviewed me via my mobile phone. I had no idea whether the material would be used. But to my surprise, I received a series of e-mails from former colleagues and friends saying they were amazed to hear my voice as the headline story on the hour during 20 November, under the headline 'Southampton ex-pat radio enthusiast helps in typhoon Haiyan emergency communications'.

ONE MONTH ON. As I write this account, it is now 8 December. I have just seen via BBC World News that Tacloban's situation is slowly improving. They showed images of people starting to rebuild their homes and their lives. About 80% of the city is reported to have electricity restored and shops are gradually re-opening for business. A limited mobile phone service is now available. The death toll is reported as about 6,000 people, but with 1,000 still unaccounted for. It is thought that the remains of many of these people are still buried under rubble and other waste. There are still tens of thousands of people without a proper roof over their heads. Clearly, there is a huge amount still to be done.

In Borongan, Lester reports that power has just been restored in his neighbourhood, but not the mobile phone/3G internet service. Shops and other businesses are slowly coming back to life, but many, especially banks, are hindered by the lack of internet access for their data. This has led to a critical shortage of cash, leading to bartering of goods and commodities.

It is clear that anything approaching full recovery for many communities affected by Haiyan will be measured not in months, but in years. There are many lessons to be learned. But perhaps the most obvious point about Haiyan in the Philippines is the fact that the telecommunications system proved very vulnerable and was destroyed outright in the affected areas. This is because it depends hugely on mobile phone infrastructure, which proved very fragile. It is clear that what is required is an emergency network of HF radios in town halls, or perhaps churches, running from batteries, charged by small solar panels. Probably the biggest challenge, however, would be providing sufficient trained operators. But it could be done.

It just goes to show, when all else fails... there's amateur radio.



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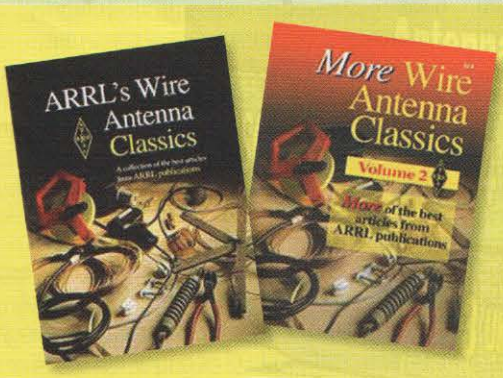

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Antennas

Small antennas and dielectric loading

INTRODUCTION. In the January 2014 edition of Antennas I discussed electrically small antennas and included an example of how they were treated in professional publications. One of these was the *Small Antenna Handbook* published by jointly by Wiley and the IEEE, which I had consulted it to see if there were techniques not covered in amateur radio literature. Chapter 4 of this publication is headed 'Clever Physics, but Bad Numbers' and covers

- Contrawound toroidal helix antenna
- Transmission line antennas
- Halo, hula hoop and DDRR antennas
- Dielectric-loaded antennas
- Meanderline antennas

I reviewed my knowledge and experience of some of these antennas to see how they could justify being grouped under such a title. I had previously made a study of the contrawound toroidal helix antenna in [1] and a DDRR antenna in [2]. More recently I discussed the meanderline antenna although I don't have personal experience with this device.

As regards the dielectric-loaded antennas, it could be many of you are unwittingly using the technique. Here we are talking about using a dielectric to load the antenna element so that its resonant physical length is reduced.

It is all brought about because electromagnetic waves travel more slowly in dielectrics such as polyethylene, compared with air. When applied to dielectric filled coaxial cable this ratio is termed the velocity factor (VF) and in the case of RG-213 it is 0.66. If you could use such a technique to load a 14MHz dipole then the element length would be reduced from 10.24m to 6.76m. In view of the need to reduce the physical sizes of our HF antennas why are we not taking advantage of this dielectric loading?

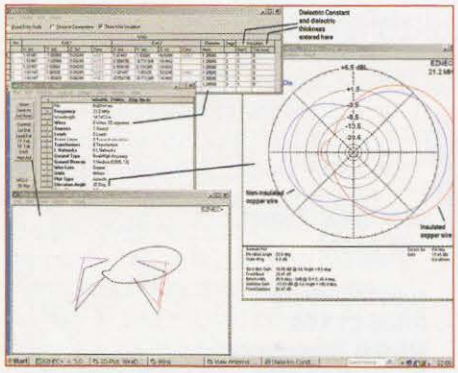

FIGURE 1: *EZNEC*+ 5 model of a compact two-element parasitic beam and the effects of using insulated wire for the elements.

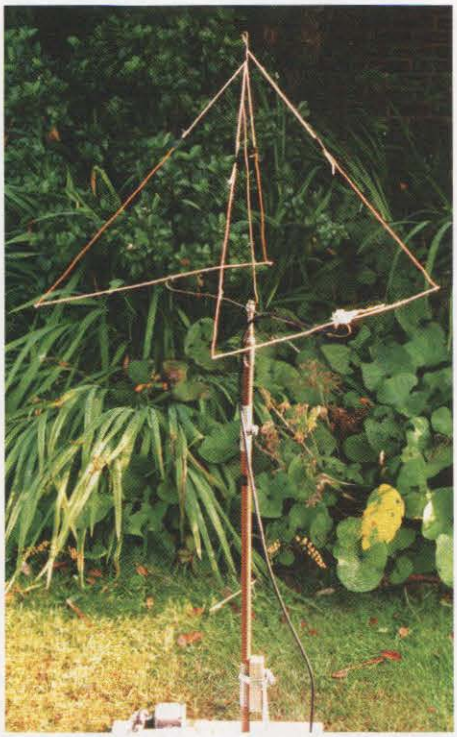

PHOTO 1: A VHF model of a compact two-element beam. The main structure is made from 14SWG hard drawn copper wire. 1mm insulated covered wire was used for the element extensions.

In the case of coax the dielectric fills the space between the centre conductor and the outer braiding so the electromagnetic energy is contained within the dielectric. It is reasonable to expect a similar slowing of the wave would occur in an antenna immersed in a dielectric. However, this is only true if the dielectric is infinite in extent. Any other arrangement results in a stratified dielectric with an outer layer of air and a velocity factor considerably more than 0.66 for a solid dielectric coax.

ANTENNA MODELS. In the early 1970s I became involved in modelling HF antennas; this was long before the days of computer modelling. It was achieved by constructing VHF models of the HF antennas under investigation, so the length variables were much easier to manage. An example of such a VHF model is shown in **Photo 1**. This work was documented in [3]. During this and subsequent investigations it was noted that insulated and non-insulated wire had different characteristics: it appeared a given length of insulated wire had a lower resonant frequency than an equal length of non-insulated wire.

The loading effect of PVC insulation was measured by first noting the resonance of a 15ft (457cm) length of uninsulated stranded copper wire using a grid dip oscillator (GDO). This frequency turned out to be 31.1MHz, very close to the *ARRL Antenna Handbook* figure of length (ft) = 468/f (length (cm) = 14313/f).

This was compared with PVC-covered wire of the same length and found to vary between 29.9 and 30MHz. I said at the time that it would seem that the velocity factor of PVC-covered wire is about 0.965. These measurements were made using a homebrew GDO with the frequency monitored using a receiver.

Recently these measurements were repeated on three 19ft (5.8m) lengths of copper wire. Wire 1 comprised uninsulated Flexweave; wire 2, insulated covered Flexweave and wire 3 was RG213 coax with the outer sheath and copper braid removed. The resonances were measured using a home made resonant measuring kit, as shown in **Photo 2**.

The frequency differential between wire 1 and wire 2 measured 300kHz and between wire 1 and wire 3 was 1.3MHz. Although the extra thickness of insulation did reduce the resonant length it is not significant.

There are situations where the resonant length of a conductor is significant and one of these is a close spaced compact two-element parasitic beam. I refer you to **Figure 1**, which is a computer model of the Double D antenna shown in Photo 1. The structure of the antenna, together with the current distribution and azimuth polar diagram, is shown in the bottom left corner. The polar azimuth pattern is shown in the right hand window in red. When the elements were replaced with insulated wire the azimuth plot changed to that shown in blue.

This does not mean that insulated wire is inferior. The model was originally optimised for uninsulated wire and would revert to the red plot if the element lengths were optimised.

COMPUTER MODELLING THE EFFECT OF INSULATION. The facility for modelling the effect of wire insulation in *EZNEC*+5 is interesting. The instructions go on to say, "The insulation parameter choices appear as new columns in the Wires window grid *[top left window of Figure 1]*. These columns can be hidden for convenience if desired, via the checkbox above the grid. If you right-click any of the insulation columns, you'll get a dialog box for convenient entry. Here's how the dialog box works:

"The first three fixed choices, PVC (polyvinyl chloride), PTFE (Teflon), and PE (polyethylene or polythene), will enter values for dielectric constant (k, or relative permittivity).

"The None choice and the three custom choices will replace the thickness value. Choices, including custom values, are saved

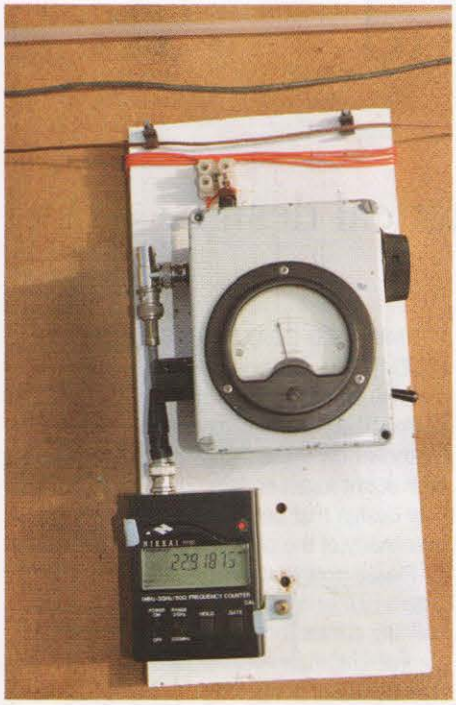

PHOTO 2: Measurement of varied types of insulated wire relative to uninsulated wire using a home made resonant measuring kit.

permanently unless you close the dialog box with <Esc> or Cancel. The intent of the custom values is to let you enter parameters appropriate for some specific wire you might be using for antenna construction.

"To set insulation to zero, enter a thickness of zero. For convenience, there's a None choice in the dialog box which will do this. A dielectric constant of 1 will result in no effect. However, calculations will be done any time the thickness isn't zero. Insulation thickness is scaled when the antenna is scaled. Insulation properties of added wires are copied from the wire just preceding, as are the diameter and number of segments.

"The characteristics of PVC vary widely, so the values are a rough average for the HF range. The Custom windows can be used for any values you think are better."

The instructions also warn that the Wire Insulation feature is accurate only for a thin insulation layer, and dielectric constants in the range of those of typical wire insulating materials. Attempts to extend its use to purposes other than simulating the effect of wire insulation will produce inaccurate results.

You may have noticed that the properties of dielectric material are given as Dielectric Constant (k) rather that Velocity Factor in the *EZNEC* program. The Dielectric Constant (k) is the relative permittivity of a dielectric material and indicates the extent to which it concentrates the electrostatic lines of flux. Examples of some material k constants are given in **Table 1**.

The velocity factor (VF) can be obtained from the dielectric constant using the simple formula $VF = 1/\sqrt{k}$

In the case of polyethylene used in RG-213 having a k factor of 2.25,

$VF = 1/\sqrt{2.25}$

$= 0.66$

TABLE 1: DIELECTRIC CONSTANTS (K) FOR VARIOUS COMMON MATERIALS.

Dielectric Material	Constant (k)
Vacuum	1
Glass	5-10
Mica	3-6
Neoprene	6.70
Plexiglas	3.40
Polyethylene	2.25
Polyvinyl chloride	3.18
Teflon	2.1

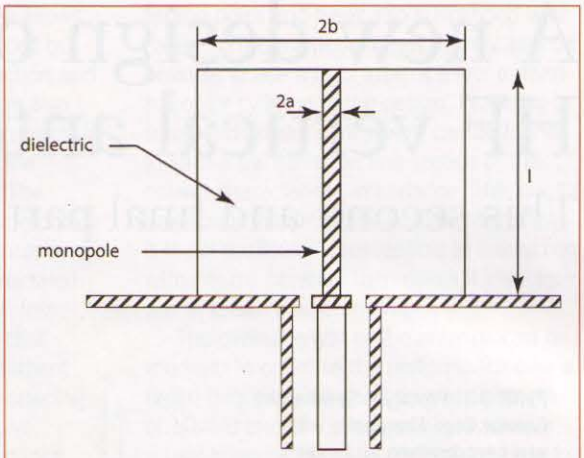

FIGURE 2. A monopole in a dielectric cylinder.

DIELECTRIC LOADED ANTENNAS. So, is the dielectric loaded antenna a practical proposition? There were no examples of such an antenna in Kraus's *Antennas* or Balanis's *Antenna Theory* bibles. Eventually I found one in chapter 17 of *The Handbook of Antenna Design*, an IEE publication. This chapter is devoted to VHF and UHF antennas, which implies the technique is applicable mainly to these types of antennas. According to the text there are three distinct regions for dielectric loading:

"(i) Electrically small antennas in which the main effect is capacitive and the coatings may be thick or thin.

"(ii) Near resonant antennas with thin coatings, in which the main effect is a moderate reduction in resonant frequency and input impedance.

(iii) Thick dielectric coatings; a dielectric resonance effect has been identified, giving narrow bandwidths and a low radiation resistance."

As an example of class (ii) antenna, a monopole 100mm long is quoted. Without a dielectric coating, resonance occurred at 750MHz. When coated with a 10mm dielectric having k = 40, resonance changed to 450MHz but with a 3dB loss.

When a thick dielectric having a length an exact multiple of a quarter wavelength is used (see **Figure 2**) resonator action occurs in the in the dielectric. Depending on the relative diameter of the monopole and the dielectric there will be some end-loading, which will increase the effective length of the antenna.

DIPOLE POLAR DIAGRAMS. As we all know, the azimuth polar diagram of a dipole is a figure of eight with the nulls at the ends of the elements. Some people are surprised when they appear to work stations off the ends of the

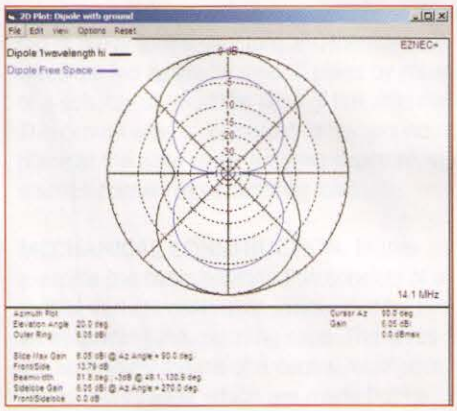

FIGURE 3: Comparison polar diagrams a dipole antenna in free space (inner trace) and the same antenna mounted 10m above ground (outer trace) modelled at 22 degrees elevation.

dipole when the information in some antenna theory books implies that this should not be feasible. The answer can be seen in **Figure 3**. The inner pattern is for the theoretical dipole in free space and shows nulls at the ends of the dipole over -30dB down on the maximum of 2.2dB relative to isotropic. When the dipole is erected about a wavelength high then the gain increases to 6 or 7dB relative to isotropic (due to ground gain but depending on the quality of the ground) and the nulls fill in to just over -10dB relative to maximum.

But this isn't the end of the story. Any radiation from the feeder or re-radiation from nearby electromagnetic obstructions will further fill in the nulls so that it is impossible to predict how the antenna will perform. So there should often be no difficulty in working stations off the ends of a dipole. It is more important where an antenna is than what it is.

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[2] The Mobile Roof-rack Antenna, Peter Dodd, G3LDO, *QST* November 1988

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A new design of broadband HF vertical antenna

This second and final part describes the practical design

PHOTO 1: Prototype Terminated Coaxial Cage Monopole, with wires emphasised for better visibility.

TERMINATED COAXIAL CAGE MONOPOLE (TC2M). The previous part of this article outlined several ways of producing broadband or electrically loaded antennas. In this section I'll show how these differing techniques can be brought together, to produce an innovative new design that provides a distinct advantage over many of the previous types.

Please note that this design is protected by patent [9]. I have no objection to individuals building copies for their own use. However commercial manufacturers who wish to reproduce the design should contact me to discuss licensing. All approved manufacturers are listed on the TC2M website [10].

As a starting point, the symmetry of the Terminated Folded Dipole / Monopole antenna can be improved by adding additional feed wires around the terminated load wire. Although adding a resistive load can reduce the overall efficiency of an antenna, if a skeleton cage of wires is placed around a central load wire, radiation from the load wire is suppressed, the pattern asymmetry decreases, and the antenna efficiency increases with respect to that of a standard terminated design.

By transforming the antenna into a wire cage the natural bandwidth of the antenna is widened and excessive impedance excursions at the feed point are tamed. This was demonstrated in the first part of this article, where it was suggested that a five wire cage seemed to offer the best compromise between overall size, bandwidth and ease of construction. Adding an extra central 'load' wire makes the antenna appear to be electrically longer than it actually is. This helps to further improve the impedance match, towards the lower end of the operational frequency range.

The outer wire cage, in conjunction with the central 'load' wire, forms a 'skeleton' coaxial transmission line. The impedance of the transmission line can be adjusted by varying the conductor diameter and spacing. This can be used to optimise the match between the radiating 'cage' section of the antenna and a terminating load. Placing the terminating load at the end of the central loading wire, rather than connecting it directly across the secondary of the unbalanced to unbalanced transformer (unun) results in much less power being dissipated in the load and a better match throughout the operational frequency range of the antenna.

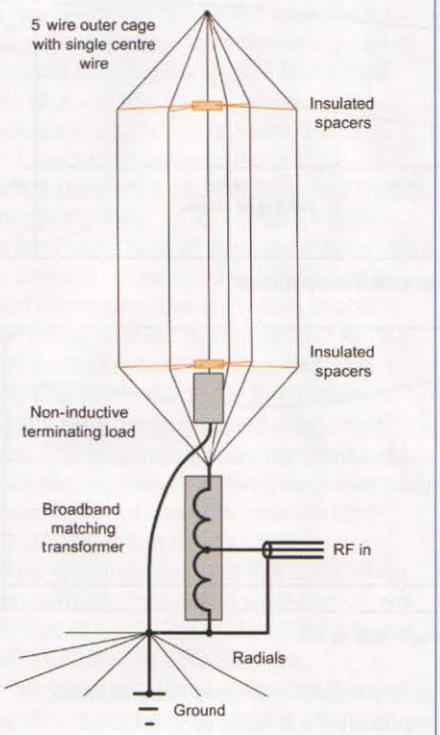

FIGURE 9: Simplified representation of the Terminated Coaxial Cage Monopole.

So by combining the best aspects of 'fat' cage antenna and a Terminated Folded antenna, it is possible to achieve a very wide instantaneous bandwidth and good efficiency, without the need for a tuneable antenna matching unit.

A simplified representation of the new design is shown in **Figure 9** and **Photo 1**.

IMPLEMENTATION. The choice of cage dimensions needs to be made by trading various parameters against each other in order to optimise the performance. This nearly always involves having to make some compromises, which will depend upon the required frequency coverage, method of construction and placement of the antenna.

There are many factors affecting this design, including:

Length & height of cage – by making a suitable choice of the overall length it is possible to maximise efficiency over the required operating bandwidth. The upper HF frequency limited by beam tilt when the antenna is greater than 5/8 wavelength long. The lower LF frequency is determined by the acceptable level of efficiency required by the user. A 10m long cage is capable of providing good performance over the frequency range 1.8 to 70MHz. A longer cage would be more efficient on the lower frequency bands, but performance on the higher frequency bands is likely to be degraded as a result.

Diameter of cage – this affects the bandwidth & range of feed impedance. Increasing the diameter of the cage increases the bandwidth and lowers the peak value of feed impedance. Adding more wires allows the diameter of the cage to be reduced but increases the complexity of construction and weight of the antenna. Consideration also needs to be given to the ease of constructing a coaxial cage transmission line of the required characteristic impedance. The characteristic impedance is set by the choice of wire gauge and cage diameter. Increasing the distance between cage and terminated centre wire can minimise mismatch loss.

Number of wires – the more wires that are added the more the radiating element looks like a single conductor. If the spacing between the wires becomes excessive (greater than 1/4 wave) large impedance variations will occur at higher frequencies. The *absolute* minimum number of cage wires should be three.

Height above ground plane – this determines the feed impedance and radiation efficiency at the HF and LF ends of operating frequency range. Ideally, a reduced size ground plane should be more conductive near the feed point, as the maximum amount of current flows in this region.

Impedance of terminating load – this determines the overall flatness of SWR curve across whole frequency range, especially the maximum SWR at the low frequency end of the operational bandwidth (less than 1/4 wave), but also the efficiency at LF due to the amount of power absorbed by the terminating load.

Practical design – for this implementation I have chosen to use a five wire cage with one centre wire to form the coaxial cage antenna. I believe this offers the best compromise in terms of overall radiation efficiency, ease of construction and cost of materials. As mentioned earlier, fewer than five wires results in much less consistent performance at the upper end of the frequency range, as the spacing between adjacent wires starts to become a significant proportion of a wavelength long. Using more than five wires provides very little additional improvement.

The exact method of implementing the Terminated Coaxial Cage Monopole can be modified to accommodate different construction techniques or specific design requirements. I have built versions using self-supporting telescopic GRP tube, guyed fishing poles and have also suspended wire cages from the limbs of trees. It may also be possible to use a rigid tube or tower to form the outer cylinder of the design. Providing a suitable diameter centre wire can be found, to form a transmission line section of the correct characteristic impedance. The low 'Q' broadband nature of the design means that it is not particularly susceptible to interaction with nearby objects. This makes it ideal for use in urban environments.

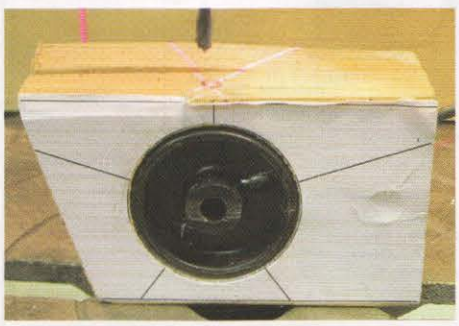

PHOTO 2: A simple jig used when making the insulators from castors.

The overall length of the antenna can be modified to optimise the performance over a broad frequency range. If an overall length of 10m is chosen, it is possible to achieve a usable operating bandwidth of 1.5MHz to 70MHz, along with good overall radiation efficiency throughout most of the frequency range.

All six wires are connected together at the top of the antenna structure and the five outer wires are fed against a ground plane by means of a suitable unun at the base of the antenna. The central wire is connected to the ground plane at the base of the antenna structure, via a series connected terminating load.

MECHANICAL CONSTRUCTION. In this example the basic construction consists of a central vertical conductor surrounded by five wires forming the radiating cage. The wires are spaced by means of a central 'hub' with five 'spokes', all of which are made from a suitable dielectric, non-conductive insulating material such as plastic or GRP. When constructing the prototypes I used plastic furniture castors to make the hubs. I found that it was useful to hold them in a wooden jig, which makes them very quick and easy to drill out using a standard pillar (press) drill. **Photo 2** shows a simple jig used as a drilling guide.

The spokes were made by cutting up a cheap set of 5mm diameter GRP cable access rods and fitting sleeved grommets on the ends to help secure the wires and to prevent injuries to passers-by. By shopping around it is possible to build several sets of insulated spacers for under £10.

The spacers are arranged to form a suitable support structure for the wire frame coaxial transmission line. By using 1mm diameter insulated wire with centre wire to outer wire spacing of 0.4 to 0.5m. A wire cage coaxial transmission line, with a characteristic impedance of approximately 400 to 450Ω is formed. It is possible to use thicker diameter wire, but the wire to wire spacing has to be increased in order to maintain something close to the target value of characteristic impedance. If you choose to use larger spacing between wires, you may also need to increase the number of wires forming the outer screen of the antenna. This is because the effectiveness of the wire screen decreases, as the spacing between the outer wires becomes greater than 1/10

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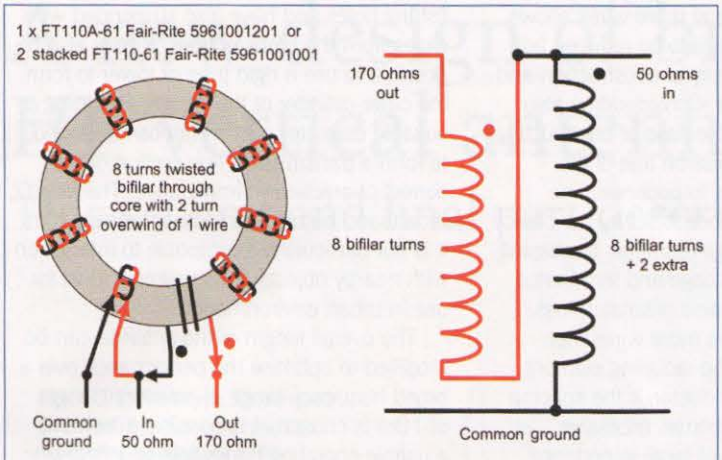

FIGURE 10: 170:50Ω unun construction.

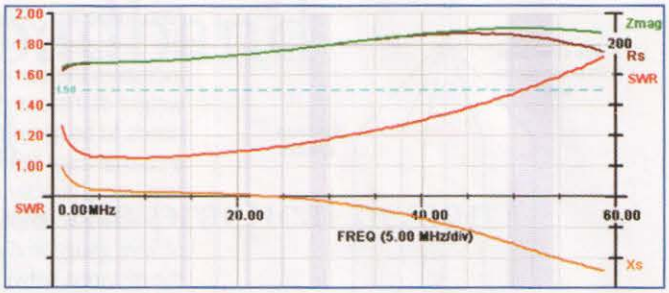

FIGURE 11: Unun impedance transformation.

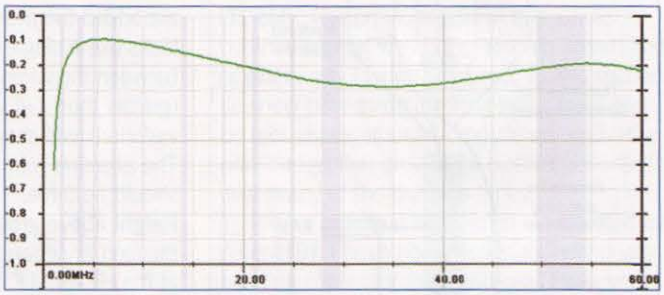

FIGURE 12: Unun through loss in dB.

of a wavelength at the highest operating frequency.

CONSTRUCTION OF UNUN. The input impedance at the feed point of the antenna is in the region of 150 to 170Ω. It is possible to use a standard design of 4:1 ratio Ruthroff (voltage) unun to achieve a reasonable match. However, in order to get the best results, it is preferable to use a non-standard ratio; although many constructors may consider that it is not worth the additional effort, it really doesn't take any more time to build.

I recommend the design shown in **Figure 10**, which I have tested for extended periods with CW power levels of up to 250W. I used sliver plated PTFE covered wire, but any reasonable diameter cable with good insulation would be acceptable. The choice of core size and material is critical. Do not substitute other types of ferrite or iron powder cores. If built correctly this design is easily repeatable, with a reasonably consistent impedance transformation and minimum amount of through loss, as shown in **Figures 11** and **12**.

CONSTRUCTION OF TERMINATING LOAD. One of the biggest challenges during this project was to source a high resistance, high power, non-inductive terminating load. Most non-inductive resistors are not suitable for this purpose as they only exhibit a non-inductive characteristic at frequencies below 1MHz.

The power dissipation of the resistive load needs to be chosen to match the required transmitter power. For CW operation a wattage rating of 50% of the transmitter power should be used. If other forms of modulation such as SSB are used that have a lower duty factor, then the wattage rating of the terminating load can be reduced accordingly.

Also note that if there is inadequate heat sinking, or airflow, the overall power rating of any resistor may need to be reduced; especially if it is installed in a sealed enclosure, or mounted too close to other resistors in the bundle.

It is possible to modify the feed impedance versus frequency characteristics of the antenna by changing the value of load resistance. Computer modelling using *EZNEC* [11] suggested that a resistance value of 450 to 470Ω, which is approximately three times the feed point impedance, would provide the best match across the required range of operating frequencies.

I was fortunate when I built the first prototype, as I found that some cheap unmarked 10W ceramic cased wire wound resistors that I bought online exhibited a predominantly resistive impedance curve at frequencies up to about 30MHz. This is particularly desirable at the low frequency end of the operating frequency range, where the antenna is less than 1/4 of a wavelength long. I was able to construct a 470Ω terminating load, by connecting ten 4K7 resistors in parallel. This was capable of dissipating 100W. However a later batch of resistors bought from the same supplier were not suitable. So if you decide to use this method of construction, some experimentation with different makes and quantities of resistors may be required to get the best results. I would really only consider this option if you have access to suitable impedance measuring equipment.

One other technique I tried was to replace the fixed value of terminating load with a suitable ratio broadband impedance transformer and high power 50Ω load. One method would be to use a 9:1 (450:50Ω) transformer with a standard 50Ω terminating load. In fact I used this technique to measure the amount of power being dissipated in the load at various operating frequencies during

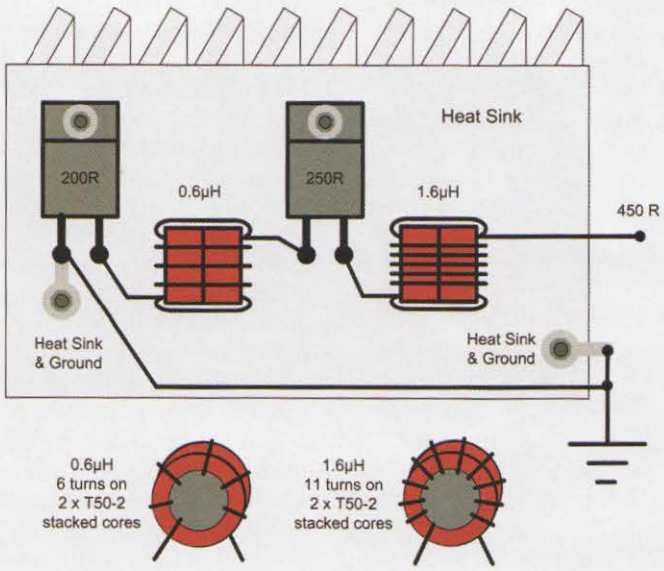

FIGURE 13: Detail of 450Ω terminating load and impedance correction network.

tests of my prototype designs. However it is very difficult to build a 9:1 unun with a flat impedance transformation ratio over the required frequency range so I abandoned this idea and resumed my quest to obtain repeatable results from standard parts.

I used a network analyser to measure a variety of different resistors, including types specifically designed for use as RF loads. Unfortunately most of these are only available in standard values of 50 or 100Ω. So I tried connecting several in series to obtain something near the desired value of 470Ω. But the distributed capacitive reactance was excessive, mainly due to the resistors having to be flange mounted onto a heat sink. This was true of most, non-inductive thick film resistors that I tried, but I eventually determined that two 30W rated Caddock TO-220 thick film resistors connected in series were most suited in this application. The number of the parts I used were MP930-200-1% 200Ω ohm 30W 1% and MP930-250-1% 50Ω 30W 1%.

However even these resistors still have a significant amount of capacitive reactance present when mounted on a heat sink. So in order to provide a more satisfactory value of resistive impedance across the required frequency range, I found it necessary to include two inductors in order to compensate for the distributed capacitive reactance present in the series connected resistors. The final configuration is shown in **Figure 13**. The improvement in match can be clearly seen in **Figure 14**.

The full layout of the input transformer and terminating load, which is capable of being used with transmitter powers of up to 100W, is shown in **Photo 3**. Note that by building the whole unit in one box, which is also used to provide a heatsink for the load resistors, it is possible to quickly configure the antenna as either a conventional unun fed cage monopole, or as a TC2M. This can be achieved by simply disconnecting the centre wire from the black terminal and re-connecting it, along with the five outer cage wires, to the red terminal. This feature is useful if you are concerned about the amount of power being dissipated in the terminating load, as it makes it very easy to compare the performance in the two different configurations.

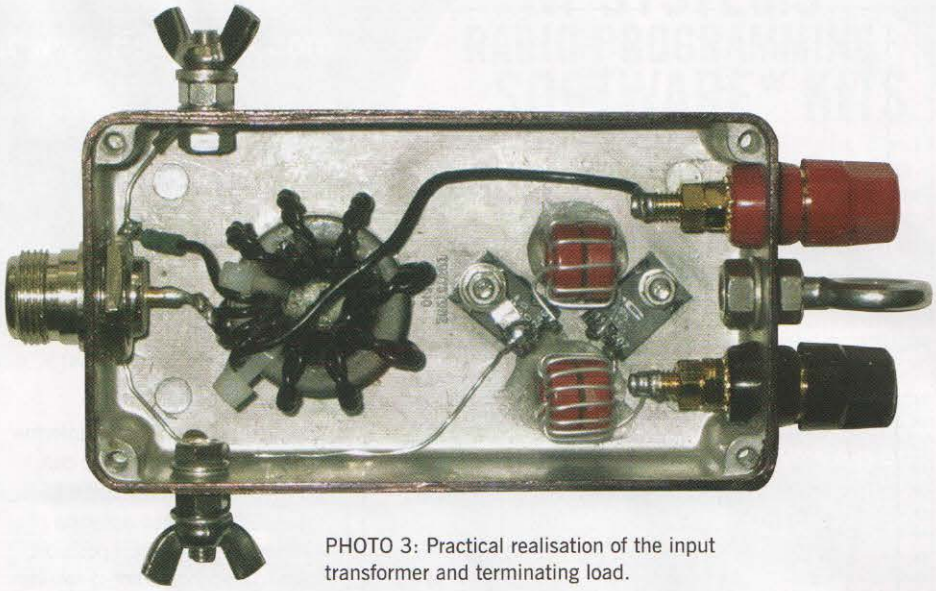

PHOTO 3: Practical realisation of the input transformer and terminating load.

GROUND SCREEN. In order to operate in an efficient manner, this antenna (as is the case with all vertical monopole antennas) needs to be fed against an appropriately dimensioned ground screen (ground plane, radials or counterpoise wires). Ideally this would take the form of a continuously conductive metal sheet, extending out to beyond 1/4 of a wavelength at the lowest required operating frequency. However in most cases this would not be practical to implement.

The next best solution would is a series of wire spokes extending out away from the base of the antenna out to beyond 1/4 wavelength at the lowest required operating frequency. A minimum of 8 buried wires would seem to offer the best compromise between cost, effort and efficiency.

If this is not possible then as many radial wires as possible should be used. If the wires are considerably shorter than 1/4 of a wavelength at the lowest required operating frequency, then it is better to use more wires. In practice, eight wires of 10m length with a further eight wires of 5m length laid in-between each other on the surface of the soil will produce reasonable results on most frequencies.

Although the antenna is designed for broadband operation, it may be that unwanted resonances are present in the radial wires. This is especially true if they are laid on the surface of the soil, in which case then, combinations of different lengths may be required in order to achieve a smooth impedance match across the required frequency range. Ideally, radial wires should be buried at a depth of at least 25mm in order to reduce the incidence of self-resonance.

PERFORMANCE. **Figure 15** shows the input impedance over the operating frequency range of 1 to 60MHz. This has been measured directly at the antenna feed point, with no additional cable losses. Note that the SWR does not exceed 2.5:1 and in most cases is less than 2:1. This means that the antenna can be used without the need for a tuner over the entire frequency range.

In a practical installation, a moderate length of coaxial cable will be required to connect the antenna to the transceiver. In such cases the SWR measured at the transceiver will appear to be even lower, due to the additional cable losses.

EFFICIENCY. The main limit on efficiency with the TC2M antenna is the amount of power dissipated in the terminating load and power wasted due to mismatch loss between the unun transformer and the antenna structure. Many engineers will naturally express concern about deliberately adding resistive loss into an antenna system. However, unwanted losses occur in all practical antennas. This can be through resistive or dielectric losses in cables, conductors, ground systems, matching networks and tuners. Although most designers would endeavour to reduce such losses, they can easily be in the region of 0.5 to 2dB, depending upon the impedance range presented to the tuner. In this design the unun is nearly always operating into impedance that is close to its design value, so losses are greatly minimised.

On frequencies where the antenna is shorter than an electrical 1/4 wavelength, the resistive feed impedance of the radiating element decreases, and the mismatch losses associated with the unun transformer become much greater. Other losses also increase due to a greater proportion of the applied power

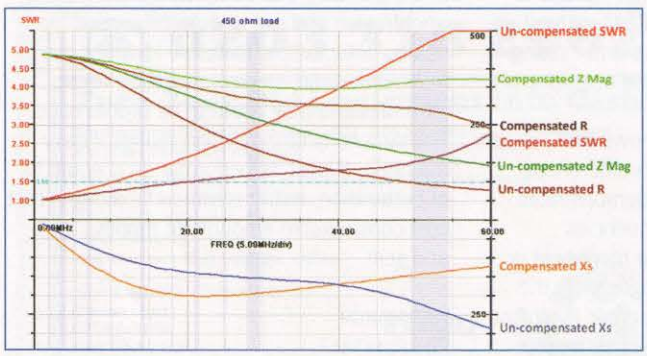

FIGURE 14: Terminating load characteristics with and without impedance compensation.

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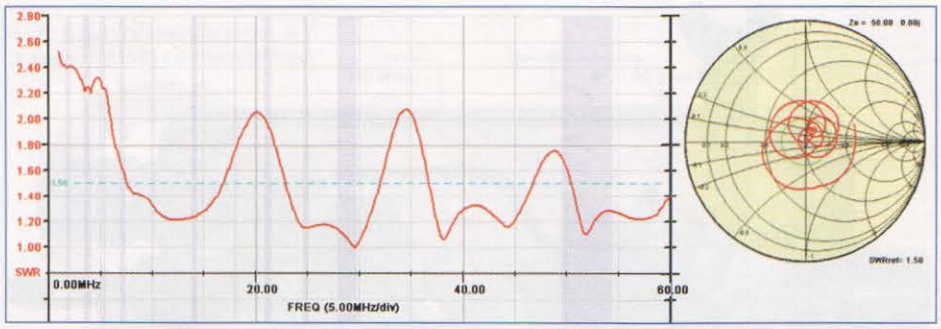

FIGURE 15: Input impedance from 1 to 60MHz, measured at the feedpoint.

FIGURE 16: Power measured in terminating load relative to applied input power.

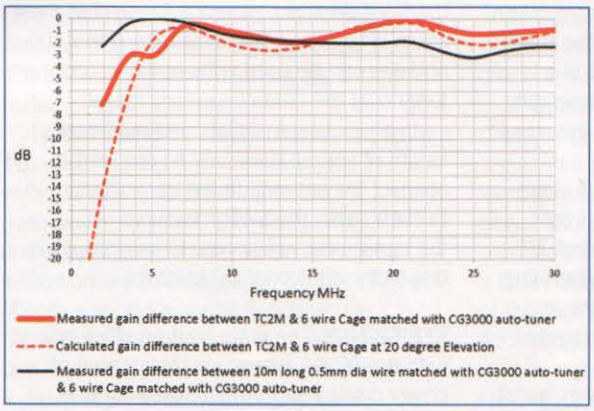

FIGURE 17: Gain difference between cage and wire antenna with tuner and TC2M.

being absorbed by the terminating load and ground resistance. It is possible to quantify the amount of power being absorbed by the terminating load simply by replacing it with a 9:1 unun terminated with a 50Ω power meter or network analyser.

This graph in **Figure 16** shows the actual measured RF power being dissipated in the terminating load relative to the applied RF input power. This is expressed as a ratio in dB relative to input power at various operating frequencies.

In order to get the losses associated with the terminating load into perspective, especially at the low frequency end of the operating range, the power dissipated in the load should be compared with the considerable amount of power that is lost due to ground resistance when the resistive component of the feed impedance is in the order of only a few ohms. Although it is difficult to accurately measure the gain of an antenna directly, the performance can be modelled and compared against a reference antenna of similar size. It is then possible to validate the predicted results by measuring the radiated field strengths of both types of antenna.

I have been able verify these results, by making measurements with a remotely operated spectrum analyser and active antenna. Figure 12 shows the results of these measurements that were produced by transmitting a test signal and connecting the vertical antenna in different configurations.

When connected as a 'fat' radiator, with the terminating load removed and all six wires connected in parallel, at both the top and the bottom of the wire structure, a 50Ω match to the transmitter and coaxial cable could easily be achieved by means of a good quality automatic antenna tuner connected directly to the unun at the base of the antenna. The antenna was fed against 10 mixed length buried radial wires. These extended in a circular pattern away from the base of the antenna. The advantage of using the same basic cage antenna as the reference was that it made it very quick and easy to remove the ATU and reconnect the terminating load to configure the antenna as a TC2M without disturbing the rest of the setup and cabling that could, otherwise, affect the accuracy of any measurements.

The graph in **Figure 17** shows the calculated and measured gain differences between antennas. It clearly demonstrates a very good correlation at frequencies higher than 7MHz. Where the monopole is greater than 1/4 of a wavelength long, the Terminated Coaxial Cage Monopole is almost as efficient as the cage antenna with auto-tuner.

I have also included another plot in Figure 17 for reference purposes. This shows the performance of a similar length of thin wire and an auto-tuner in comparison to the cage antenna and tuner. This is the same configuration that I outlined in part one of this article. Note that on some frequencies at the higher end of the operating range the TC2M is actually 1 or 2dB more efficient than using a similar sized length of thin wire and auto-tuner.

At frequencies below 1/4 wave electrical length the efficiency of the Terminated Coaxial Cage Monopole gradually tails off in a predictable manner, but it is still capable of providing useful operation at frequencies as low as 1.8MHz. In fact, tests on 160m have demonstrated a similar level of performance to that of a 100ft G5RV sized doublet (not connected as a Tee).

Note that the measured performance at the lower end of the frequency range is actually better than the modelled values. This is not an error. The most likely explanation is that the system losses of the cage antenna, tuner and ground resistance are worse than calculated. So by comparison the TC2M results seem better than would perhaps be expected. This is not untypical of electrically short antennas on the LF band, as ground and tuner losses can be significant due to the low resistive and high capacitive value of feed impedance encountered with such designs. These are quite often not noticed by operators unless measurements can be taken, or comparisons made with other antennas. Although I have mainly focused on measuring the transmission efficiency, it should also be noted that the design functions very well as a wideband receive antenna. The reduction in gain at lower frequencies is not an issue, as the received signal to noise ratio tends to remain fairly constant, being dominated by external factors such as the location of the antenna relative to external noise sources, rather than its absolute gain.

CONCLUSION. I hope that you have found this article informative and that it may have stimulated you to construct your own version of the TC2M antenna. I have found it to be very easy to build, as it is suited to the use of a variety of different construction techniques and materials. It can be made to be visually unobtrusive and not unduly influenced by nearby objects. It is therefore ideal for use in difficult or urban environments, where other designs may prove to be problematic. The simplicity of the design makes it easy to maintain. Whilst its performance is equal to, or better than, many commercial designs that cost considerable amounts of money. Try it and see!

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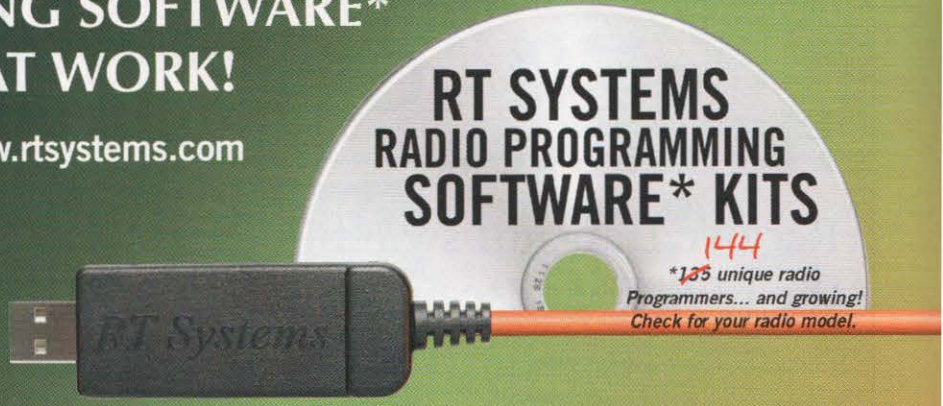

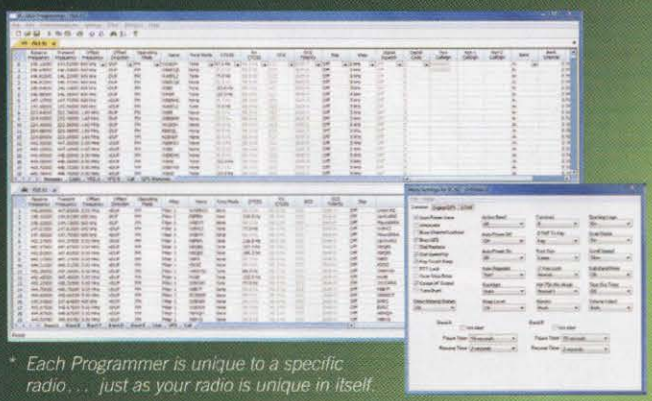

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For KN-Q7A Kit review see Radcom Nov 2013 Page 47

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Homebrew

Receive/transmit switching for the LF/MF transceiver

OVERVIEW. The receiver and transmitter stages of the new transceiver have been tested and are working well independently. Before we can add Rx/Tx switching, we must now choose from one of the several types of RF switch available. The two basic types are electronic (PIN diode or CMOS) and mechanical (usually relays).

The ideal RF switch will have very low resistance when on, excellent isolation when in the off position and will be absolutely linear. A simple mechanical switch or relay comes very close to this ideal. A typical relay will have contact resistance measured in milliohms and excellent isolation between open contacts. As there are no non-linear semiconductors involved, linearity and power handling are excellent. Even reasonably small PCB mounted relays can carry several amps. Although standard miniature relays are not usually specified for use at RF, most types will give excellent performance from DC up to the low VHF region.

There are some disadvantages to using relays. Even miniature types will consume more power than an electronic switch. Relays are also relatively slow. A typical device will have on/off times of 10-20ms and will tend to suffer from contact bounce. This is fast enough for normal PTT and semi-break-in CW. It may not be fast enough for full-break-in CW. As well as the electrical noise due to contact bounce, some relays are acoustically noisy. This is an obvious issue with large relays, but even some of the miniature types are quite noisy.

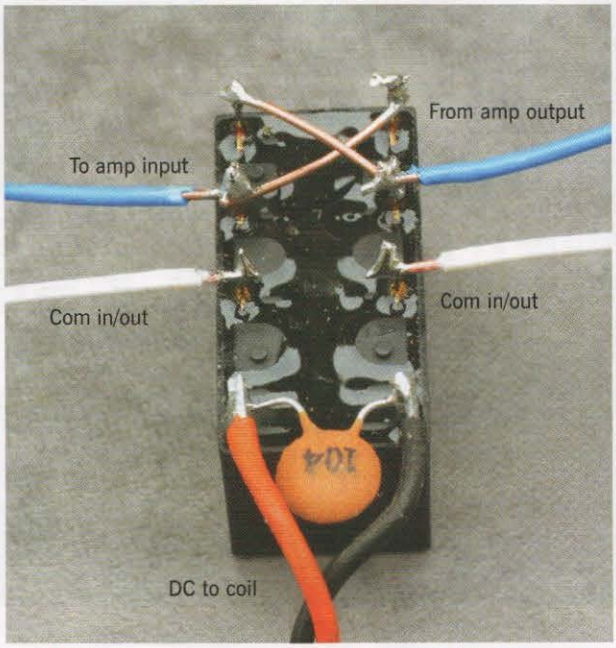

PHOTO 1: The simplest and most direct method of cross-wiring the NC and NO contacts of a miniature relay for reversing the input/output of an amplifier.

PRACTICE. I have found that miniature relays with current rating of around 1-2A tend to be about optimum for quiet switching. The RSB-12-S (Maplin N17AW) is a DPDT 2 x 2A (double-pole, double-throw) relay with a 12V coil. These devices switch very quietly, with a barely audible 'tick' when changing over. They have a built-in back-EMF protection diode so you must be careful to observe the correct polarity when connecting the coil. The RSB-12-S is a high-sensitivity type and the coil only draws 18.5mA from my 13.8V DC supply. The pinout of the RSB-12-S is shown at the top of **Figure 1**. Also shown is the pinout for the LMR2-12D (Maplin N31AW) 2 x 5A DPDT relay. Note that this device doesn't have a back-EMF protection diode. Also note the differences in contact pin layouts.

The RSB-12-S relay will be used for signal switching or for reversing the direction of signal flow at several points in the transceiver. **Photo 1** shows the simplest and most direct method of cross-wiring the NC (normally closed) and NO (normally open) contacts for the purpose of reversing the input/output of an amplifier. If you use an alternative relay type, check the manufacturer's datasheet for connection details.

I have decided to use relays in performance-critical parts of the transceiver and use diode switching in less critical areas like crystal selection in the carrier oscillator (see the April 2014 Homebrew). One pole of a LMR2 DPDT relay will be used as the aerial changeover relay, the other pole will be used to supply Rx or Tx supply voltage as appropriate to various parts of the transceiver. The schematic of the main changeover relay is shown in **Figure 2**. The circuit might seem overly elaborate when you consider its relatively simple function. A few words of explanation are in order. Starting at the top left there is a simple RFI filter. This keeps stray RF from entering the transceiver enclosure and, more importantly, it keeps spurious RF signals from being radiated via the DC power supply leads.

There would be little point in spending the time and effort to design a good linear PA and 9th order LPF if we then allowed spurious signals to escape via the power supply wiring. The ferrite sleeve marked FE is a Maplin N98AB or similar. The value of this component is not critical: 3-4 turns on a ferrite toroid would make a good replacement. As the coil in my relay does not have a diode built in, I used a 1N4004 for back-EMF protection. This will help to protect external switching circuits connected to the PTT line from damage by voltage

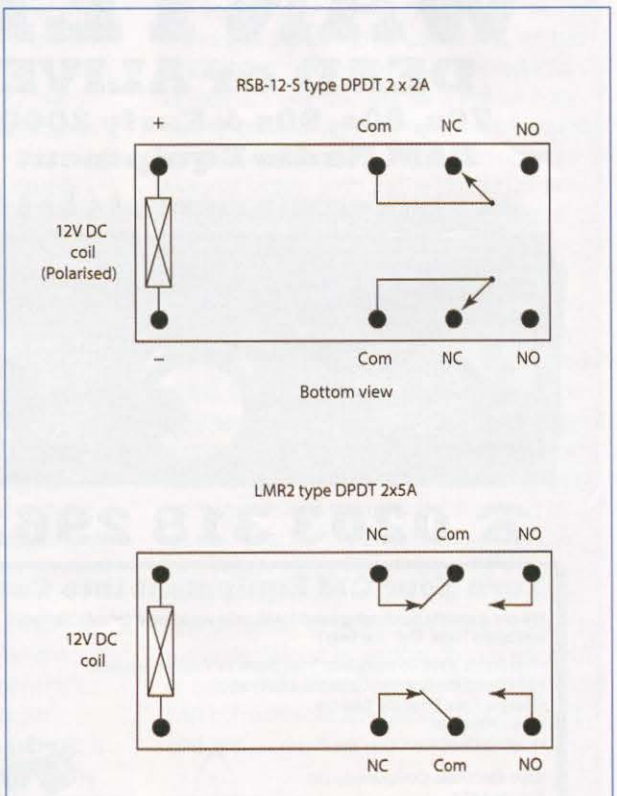

FIGURE 1: Pinout of two typical miniature double-pole double-throw (DPDT) relays (see text).

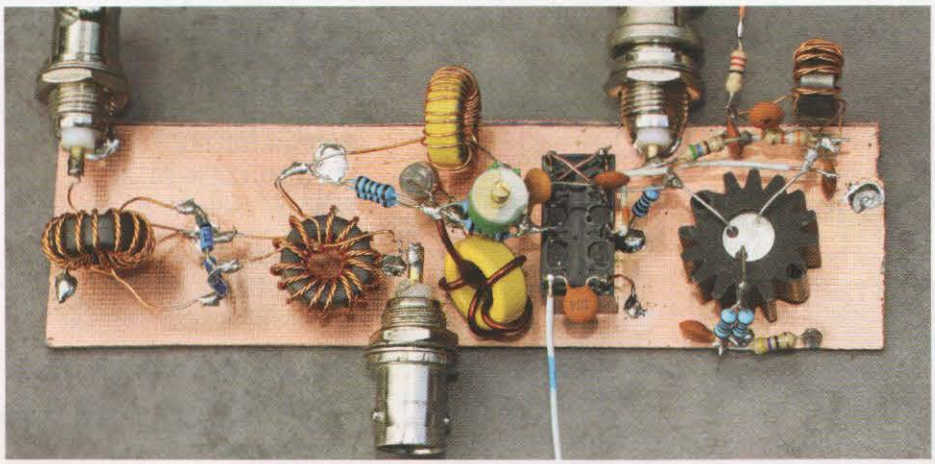

PHOTO 2: The completed switched mixer block.

spikes from the relay coil. The transmitter is activated by grounding the PTT line. Voltage on the PTT line is nominally 13.8VDC and the PTT switch will need to sink around 50mA. If you are switching the PTT with digital logic-level signals, it will be necessary to use a buffer transistor. A 2N7000 or similar switching MOSFET would make an ideal PTT buffer for 5V logic outputs. It is always a good idea to bypass the relay coil to ground (or in this case, the positive supply rail) using a 100nF bypass capacitor. The reasons for this may not be obvious. There are very substantial RF currents on the wires connected to the PA and on the relay contacts used for RF switching. Bypassing the coil for RF will reduce stray capacitive coupling between the RF and DC circuits. I remember spending a very long night trying to cure an instability problem in a VHF transverter. The problem was eventually solved by bypassing the coil supply to the two changeover relays.

The DC outputs to the receiver and transmitter stages are also bypassed by 100nF capacitors. DPDT relays generally have good isolation between the two separate poles, but sometimes 'good' is not quite adequate for the job. The changeover relays presents a worst-case scenario where one set of contacts is carrying watts of RF, the other is supplying DC to high gain, low-level amplifiers. It would be possible to improve isolation further by using a pair of separate SPST (single -pole) relays, but this would also increase size, cost and power consumption.

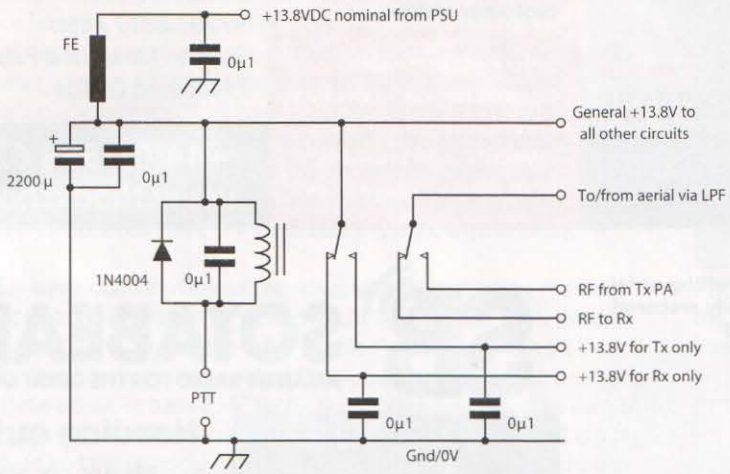

FIGURE 2: Power and Tx/Rx switching relay circuit.

STATE OF BUILD. Figure 3 is an updated block diagram showing the current state of the transceiver. Where possible, *RadCom* issue dates are shown for each block. The three signal relays are DPDT 1-2A types (Maplin N17AW or similar). A DPDT relay is necessary for the mixer/diplexer/post-mixer-amp stage. SPST types would suffice for the other two relays. I just used one pole of an N17AW and left the other pole unconnected.

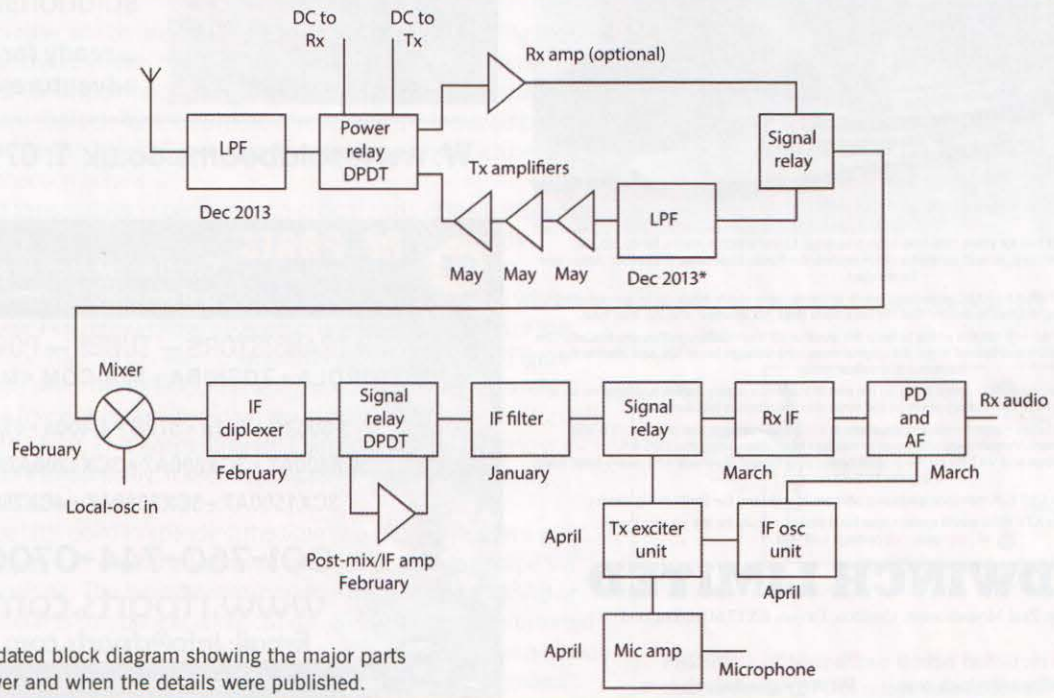

FIGURE 3: Updated block diagram showing the major parts of the transceiver and when the details were published.

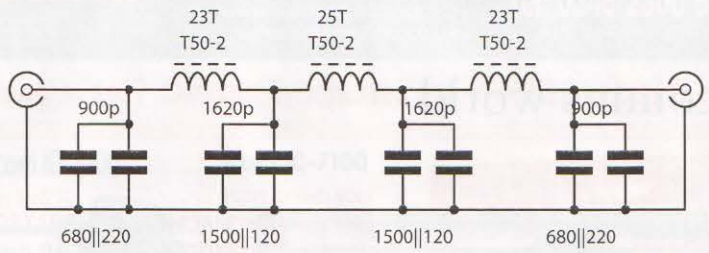

FIGURE 4: 7th order 4MHz Chebyshev filter.

The main Rx/Tx LPF was described in detail in December 2013. Since the transmitter circuit blocks were installed, there is now a need for an RF filter at the input of the transmit low-level amplifier stage. In most transceiver designs, one or more bandpass filters would be used for RF filtering. Due to the low frequency, general coverage nature of this transceiver design, a simple LPF will provide adequate RF filtering. This provides suppression of the LO, IF image and any other unwanted signals. You may choose to use a filter that is identical to the main input/output filter. As I felt using a second 9th order filter would be overkill, I used a simpler 7th order Chebyshev filter, shown in **Figure 4**. The thee inductors are 23t, 25t and 23t of 0.375mm enamelled copper on T50-2 powdered iron toroids. As usual, wire diameter isn't that critical for this type of inductor. You can use slightly thicker wire provided the turns will fit on the core. The non-standard capacitor values are made up from parallel pairs of standard values.

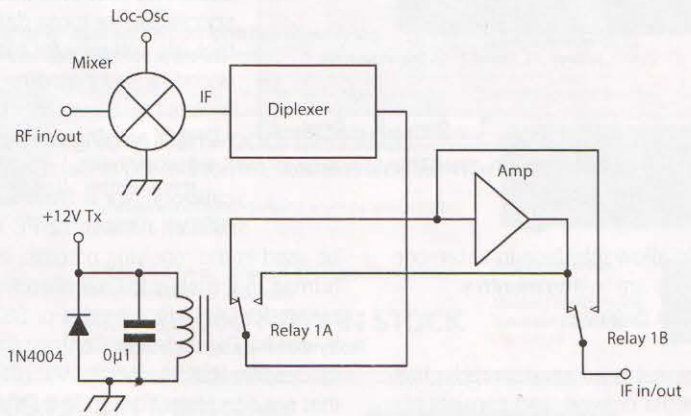

FIGURE 5: The bidirectional mixer/diplexer/amplifier unit.

The bidirectional mixer/diplexer/amplifier unit is shown in **Figure 5**. The diode mixer and diplexer are bidirectional by nature and no additional switching is required for these stages. A DPDT relay is used to reverse the signal direction of the transistor amplifier. This is achieved by switching input and output connections. If you are using an N17AW relay, the 1N4007 diode can be omitted. You will see from the layout of the circuit that it would be a very simple matter to substitute a pair of SPST relays instead. As the amplifier is used for both Rx and Tx, it takes its power from the general 13.8V supply. The relay coil voltage comes from the 13.8V Tx-only supply rail (see Figure 2).

Previous tests have shown that the amplifier gain was a little excessive. This has been addressed by changing the shunt and regenerative feedback resistors. The changed values reduce gain from 20dB to approximately 15dB. This is about optimum for receive. The amended schematic is shown in **Figure 6**. New component values are shown in red. There is room for further reduction of the Tx IF gain, but this will be handled separately by inserting a fixed attenuator at the output of the exciter stage. Despite the gain reduction, the overall gain of the mixer block is still positive, at just over +8dB. The assembled mixer block is shown in **Photo 2**.

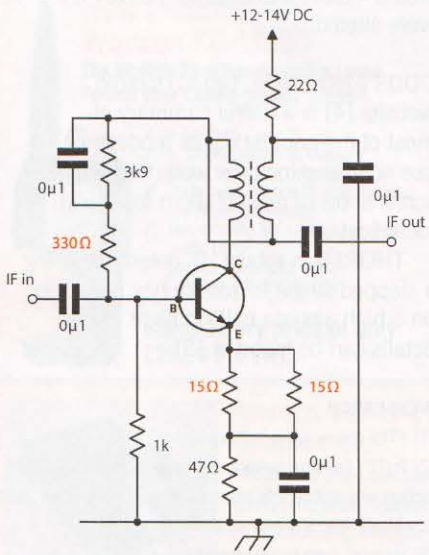

FIGURE 6: IF amplifier gain block – similar to that shown in February 2014 but with the components marked in red changed in order to lower the gain.

TESTING. The existing modules were wired up as shown in the block diagram. The quality of reception of SSB and CW signals on 160m is excellent. The selectivity of the 8th order crystal filter is also excellent. The carrier oscillator frequency is currently at 9.997MHz, which is still a little too close to the edge of the filter passband. None of my crystals will tune below this frequency so I will have to use some inductance in series with the crystal for the next set of tests. The quality of the SSB from the transmit exciter is also excellent, although I think this would also benefit from further adjustment to the carrier frequency. Spurious output from the transmitter is better than 60-70dB below the wanted output. As all the main spurii are at frequencies well above the LPF passband, spurious suppression should be even better once the project is boxed up in a well-screened enclosure. Carrier suppression is only about 40-50dB down on peak output. I suspect this is due to the transmit IF gain, which is still excessive, and the fact that the carrier oscillator is not far enough down the lower slope of the SSB filter. Remember that due to the frequency-inverting mixer scheme, the USB (below IF passband) crystal is used to generate and receive LSB signals.

The two missing modules are the local oscillator and the receiver AGC. My DDS-based signal generator is currently providing good service as the local oscillator. We will look at some of the options for a new LO unit next month. IF gain is currently controlled by a screwdriver on the IF amplifier gain pot. This works fine until a local station makes an unexpected call into the 160m net. I am currently evaluating both audio and IF-derived AGC systems. These will be described in the final part of this project that should be complete for the August issue.

ERRATA. April 2014, Figure 4, LPF: the toroid inductors should be marked 990nH and not 990µH as shown.

June 2014 • RadCom
Andy Talbot, G4JNT • e-mail: ac.talbot@btinternet.com

Data

Latest titbits from the datacomms world

PUTTY. I recently acquired a small secondhand HP notebook PC running Windows 7 – my first using this operating system; all the rest are XP machines. Most software installed easily enough, but I needed a serial communications driver. I have quite a few FTDI chip [1] USB-COM port devices for the serial port hardware itself, and often have two or more in use together for interfacing to external hardware. Most of these are home built with the FT232 chips, but I also have a couple of ready-made units with the chip built into the USB plug. The software drivers were downloaded from the manufacturer's website and these installed easily enough using the manufacturer's installer tool. I now needed a terminal emulator. In the past, on XP and earlier operating systems I have always used *Hyperterm*. This is an old and rather flaky bit of software, having been originally designed in the Windows 95 era, and it appeared to be impossible to cleanly install a plug-n-use version on this Win-7 operating system. Web searching revealed other people's experiences trying to do this, and some had just about succeeded However, I had no such luck so just decided to forget *Hyperterm* and use a more modern terminal emulator package. I settled on *PuTTY* [2].

This turned out to be an excellent choice. The installation went painlessly and although there were no user notes to get help in getting the software going, it proved intuitive and straightforward to navigate through the settings. Unlike the situation when using *Hyperterm*, separate sessions for different COM ports, baud rates or protocols do not have to be saved as individual shortcuts (which can lead to a messy desktop with different icons needed for each setting). In *PuTTY* they are all saved in a common menu and can be loaded from that as needed. **Figure 1** shows the User Screen for *PuTTY* with several named terminal setup configurations. The menu on the right allows any number of named sessions with different COM ports and terminal parameters to be loaded and sessions can run simultaneously. You can choose any name you like that will help in the selection of the right hardware and terminal parameters. I only wish I'd abandoned *Hyperterm* and discovered *PuTTY* years ago!

AUDIO INTERFACING. This small notebook uses a common microphone / headphone jack as the only audio interfacing connector, so an adaptor had to be made up to allow interface to datamode software. Details are in this month's Design Notes on page 72.

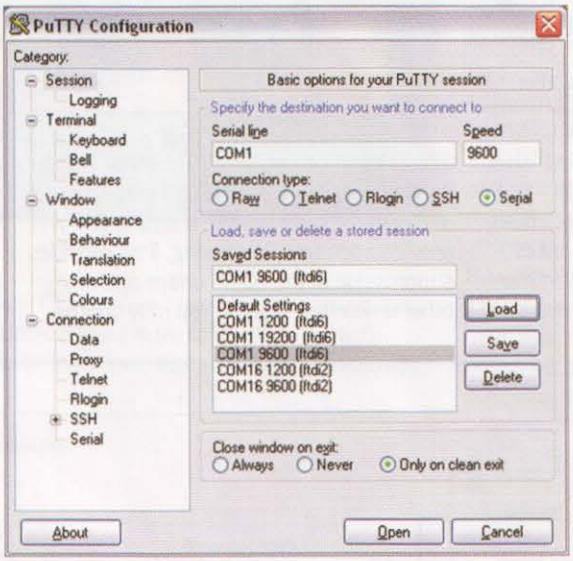

FIGURE 1: The user screen for the *PuTTY* terminal emulator for serial or COM ports.

HAMNET. Hamnet is an amateur radio high speed multimedia network and consists of a closed wireless-based network by radio amateurs for radio amateurs, involving a network of automatically operating amateur radio stations. Using open language (non encrypted) it is essentially a radio amateur intranet, networking amateur radio modes, such as voice, packet radio, APRS, etc. However, it should not be seen as an internet replacement, or as a route to providing direct / transparent connected to the internet.

Hamnet has physically separate network segments that can be connected via a wireless connection in advance through the Internet or WLAN. It mostly operates using WLANs running in the 2.4GHz band where the ISM unlicensed band overlaps our 13cm allocation. This allows higher powers to be used with more directional antennas than otherwise permitted under the ISM restrictions and also allows other amateur bands to be included as needed. While amateurs have for some time been using modified WLAN equipment within the 2.3GHz band, Hamnet is an attempt to make an interworkable system by defining interconnections and protocols, while allowing other links to be included. Some organisations have included Hamnet links on high altitude balloon flights. More details of Hamnet can be found at [3] or by searching for 'Hamnet'.

MACHINE GENERATED MODES. The RSGB band plans include a block of frequencies within each band labelled MGM, which stands for Machine Generated Modes. There appears to be some confusion as to what that actually refers to so I'll clarify it here. MGM refers to any mode that is generated by a computer *and also needs a computer to decode it*. Note the emphasis. The term Machine Generated Modes is intended specifically for those data modes that use software for mode encoding and decoding. This means that Slow CW / QRSS / DFCW and Digital Voice are not classed under the MGM category. Nor is Slow Scan TV (SSTV). Although a PC may well be used in the receiving process, it is the human that makes to final decoding, either by eye for QRSS type modes or SSTV, or by ear for Digital Voice. Contrast that with modes like PSK31, WSJT, PACTOR etc that are completely decoded by machine and truly are classed as MGM. The MGM designation is also included within the Notices of Variation for some amateur beacons to allow users flexibility with regard to modulation type, without rigidly being tied down to any specific mode that would require a change to the NoV if it were altered.

ODDS AND ENDS. G4UCJ's radio website [4] is a useful summary of most of the popular digital modes in use now, and includes waterfall display screenshots of most of them to help in identification.

THOR16, a robust HF datamode using a stepped single frequency has been used on a high altitude balloon flight. More details can be found at [5].

WEBSEARCH

[1] FTDI chip – www.ftdichip.com
[2] PuTTY terminal software - the URL unwieldy so the easiest way to find this terminal emulator is to type "putty download" into a search engine
[3] Hamnet – www.broadband-hamnet.org/
[4] Digital Modes Summary – http://hfradio.org.uk/html/digital_modes.html
[5] THOR16 used on Balloon Tracker Payload – www.theregister.co.uk/Print/2014/03/19/upgraded_lohan_tracker/

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Perseus VLF-LF-HF Receiver

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

Save £100 this month. Only £599.95

Perseus-FM+

High Performance FM 88-108MHz adapter for the Perseus SDR Receiver. Available now.
£299.95

FUNcube Dongle Pro+ £149.95

As featured on TX Factor Episode 2

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

X1M Platinum 5 Band QRP SSB/CW 80-10m Transceiver

This brilliant little transceiver covers 80m-10m, has built-in CAT interface, CW Keyer, 2 VFO's, 5 Watts output & can even work split mode.
Only £279.95 Available from stock.

Looking for a hands free mic for you car that actually works?

The MS-5.
A safety microphone for mobile or base use that really is "plug & play". Available for most Icom, Kenwood & Yaesu Radios.

Only £39.95

Looking for the best USED EQUIPMENT? See www.HamRadio.co.uk/used

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New! Yaesu FTM-400

Large Colour Touch Screen Display.

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

ONLY £479.95
May & June offer

See www.hamradio.co.uk/ftm400 for more info.

FT-897D

The UK Military really do use this radio, 160m-70cm, compact & rugged.

CALL FOR BEST PRICE

New! Yaesu FT-1D

Very first Dual Band Full Digital Handie using C4FM & FDMA Digital technology. **£379.95**

FT-450D

The baby of the range but not in performance or functionality. Full feature HF-6M base transceiver with large easy to read display.
Only £695.00

Yaesu FT-857D & ATAS-120A

160m-70cm HF Base/Mobile.
Still our best selling HF Mobile Radio.
FT-857D + ATAS-120A: £979.95
FT-857D HF-70cm Mobile Only: £689.99

Yaesu FT-1900
Rugged 50W 2m FM **£129.95**

Yaesu FT-2900
2m 75W, MiL spec, high performance **£149.95**

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

NEW Yaesu FT-252 2M Handie
A compact, simple to operate 2M Handheld Transceiver that provides up to 5 Watts of RF power, along with loud audio output (800 mW)
ONLY £69.95

Yaesu VX-3E
Micro Handie 2/70 with scanner **£129.99**

Yaesu FT-60R
Twin band handie **£119.95**

Yaesu VX-6E
2/70 handie **£179.99**

Yaesu VX-8DE Triple Band 6/2/70 with enhanced APRS.
£379.95

Yaesu FT-817ND
All Band All Mode Portable Transceiver
ML&S price only £524.95

Yaesu VR-120D
100kHz - 1300MHz FM/WFM/A **£139.95**

Yaesu VR-160
Miniature communications receiver **£199.95**

QUADRA (VL-1000)
1kW HF/6m Solid State Fully Automatic 1kW HF/6m Linear Amplifier with matching power supply and internal Auto-ATU. **Last one available, call for a superb deal.**

MD-100a8x
Base Station Microphone **£139.95**

MD-200a8x
Elite Deluxe base Station Microphone **£229.95**

Looking for the very best deal on any Yaesu product?

Then call the company that sells more Yaesu than any other dealer in the UK.
Got a trade-in? Martin founded the business on trade-in's almost 25 years ago! We want to get that new Yaesu rig into your shack as much as you do.
Give our sales team a call today on 0345 2300 599.

Choice of the World's Top DX'ers

Only £3985.00 after CASHBACK from Yaesu

FTdx5000MP
200 Watt Base transceiver with Pan-adapter display & balanced speaker system, internal PSU & ATU. MP Spec includes OXCO Hi-Stab Oscillator & additional roofing filter.

Only £1982.95 after CASHBACK from Yaesu

FTdx3000
Big brother of the FTdx1200 boasting additional readout, down-conversion architecture receiver like its bigger brother FTdx5000.

Only £1299.95 after CASHBACK from Yaesu

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

FTdx1200
The Yaesu FTdx1200 provides sophisticated operation on 160 to 6 meters with up to 100 Watts on SSB, CW, and FM (25 Watts AM carrier).

Yaesu Flagship Champion

FTdx9000 Series
Built to order, with a **massive £418 off** ML&S discounted price. **Call for details.**

Get up to £418 CASHBACK when you buy a new HF Rig. See hamradio.co.uk/YaesuCashback

This offer ends June 30th 2014.

Yaesu Rotators

Largest stocks in the UK and, of course, the best prices. Cable extra.

G-450	£339.95
G-550	£329.95
G-5500	£629.95
G-650C	£379.95
G-1000DXC	£499.95
G-2800DXC	£949.95
GS-065 Mast bearing	£57.14
GC-038 Lower clamps	£34.95
Rotator cable 25m	£69.95
Rotator cable 40m	£123.95
Rotator connector plugs	£25.95

YAESU
UK's Largest Dealer Distributor

CG SB-2000 Mk11 Radio Interface

New from CG. the SB-2000Mk11 is an updated version of the original. The unit now supports 2 serial ports allowing you to have one reserved for CAT/CI-V rg control, the other for data operation. It also supports faster speed rate for CAT & CI-V, up to 19200bps.

Only £89.99

Connect your computer with USB port.
- USB to UART bridge by FT232 single chip. USB 2.0 compliant. Full speed.
- CAT, CI/V controller and audio transformer are combined together.
- Complete isolation between computer and radio station.
- Optical isolation used for digital signal.
- Audio signal isolated 1:1 transformer. It has internal static isolation.
- Powered via your USB port.
- Excellent EMC(Electromagnetic compatibility)
- Dimensions 135 x 76 x 48mm.
- Weight less than 400 grams.

Complete set of interface cables for your radio £19.95.
For more info see: www.hamradio.co.uk/cg2000

LATEST MODEL Elad FDM-S2

£449.95

The New FDM-S2 is the latest in a line of ELAD SDR Sampler receivers.

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

HF: 9kHz-52MHz MDS:-132dBm @14MHz, Clipping lev -8dBm.
FM: 74-108MHz sensitivity <2uV 12dB SINAD @98MHz, Clip lev -3dBm
VHF: 135-160MHz MDS -137dBm @145MHz, Clipping level -19dBm

FACTORY APPOINTED DEALER
FlexRadio Systems® Software Defined Radios

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We always have the entire FlexRadio range on demonstration via three 42" screens. Call in for a demo today.

Flex-6700 Signature now on demonstration in store!

Flex-6500 1.8-60MHz, 4 Slice RX SDR 100W Transceiver.....**£3349.95**
Flex-6700 1.8-60MHz, (+RX 135-165MHz) 8 Slice RX SDR 100W Transceiver .....RRP £5799.95 **Only £4999.95**
Flex-6700R as above, Receiver only **£4799.95**
Flex 1500 SDR Low cost SDR Transceiver, connect via USB & you have 5W 160-6m.....**£599.95**
Flex 3000 with ATU 100 Watt SDR 160-6m with Auto ATU fitted.....RRP £1399.95 **Only £1199.95**

With the FLEX-6000 Signature Series radios, FlexRadio brings a wealth of new capabilities to the amateur including direct digital reception, transmission and networking.

Tigertronics SL-USB From only £99.95

Tigertronics

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

Call to discuss your rig-to-cable requirements.

Nifty KX3 Stand

Made of heavy duty black acrylic with a beautiful high gloss finish especially designed to fit the Elecraft KX3.
Only £29.95

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

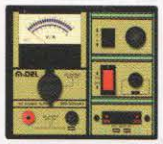
MyDEL MP-30SW1V

It's Back!

You kept asking for it so we asked the factory to build us another run.

25Amps, 9-15V DC, super light with digital metering for Volts & Amps. **£89.95**

Two-year warranty on all MyDEL PSUs

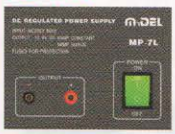


MyDEL MP-304Mk11

New addition to the MyDEL range of PSU's. Heavy Duty LINEAR 30Amp

For those of you that prefer old style non-switching technology in your power supply we think this new 30 Amper from MyDEL is the one. Switchable Volts/Amps with large precise metering (analogue of course!) variable Voltage, Cigar socket output for all your accessories, twin front panel outlets for up to 6Amps and two large binding post terminals for up to 30Amps. Remember, all MyDEL PSU's come with a two year no quibble guarantee. **£99.95**

NEW MP-7L



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

ML&S Price: £29.95

MyDEL MP-50SW111

50Amp DC power supply. **£125.00**

Probably one of the lightest 50Amp DC power supplies available today, the new MP-50SW111 weighs in at only 2.2Kilos (4.85lbs). Unbelievably compact measuring a mere 195mm wide including chunky rear terminals and front panel knobs and only 85mm wide.

MyDEL MP-9626

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

~~£399.95~~ **Now £369.95**

Yaesu FP-1030A

25-30Amp 13.8V fixed DC PSU, Twin meters, near silent running. **£179.94**

New product!

CG-FS02 Heavy Duty Foot Switch.

Your house will probably fall down before you break this new remote Foot Switch from CG. All metal construction with 1m heavy duty screened cable and terminated with 1/4" jack plug.

Only £29.95

New product!

MyDEL SW-2PL

Made from solid die-cast alloy, 2kW DC-30MHz, 250W .5-1GHz and SO-239 sockets. **Only £29.95**

MyDEL

Have you seen the TX Factor yet?

Episode 3 out now!

In Episode 3, the TX Factor team join Roger Stafford G4ROJ (the amateur radio 'King of Kites') to fly some amazing antennas for the lower HF bands and viewers are taken on a guided tour of the Military Wireless Museum, with curator Ben Nock G4BXD. Mike Marsh visits the Exeter Rally to report on how important smaller local rallies are to the amateur community and we take you to the cutting edge of SDR with a close look at the latest products from Flex Radio.

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

RADIOSPORT HEADSETS

Manufactured by Arlan Communications in the USA, they were first shown to Hams at the recent RSGB Convention in October. The response was so good we doubled our order to the factory.

Designed around their professional series of race headsets, the new Radio Sport range is aptly named. Ever tripped over a lead of your existing headset only to find you can't simply unplug it and pop in another? A mandatory requirement in contest conditions and just one example of how Arlan have taken a different approach to existing products design. Using a miniXLR 5P interface plug & socket you can be up and operating again in a matter of seconds.

Want to remove external noise without resorting to RF prone DSP reduction circuitry in your headset? Arlan Radio Sport headsets use a real Carbon Fibre outer shell to reduce external clatter by as much as 24dB. Even the ear cushions are interchangeable between Gel or Foam filled muffs in a matter of seconds. The microphone just unscrews for interchange to a different insert. Not a soldering iron in sight.

Whether for DXing, contesting, field day, or casual everyday use we think you'll agree Radiosport headsets have the features you want. Little wonder Arlan have supplied over 2 million headsets since their introduction in 1992. ML&S are proud to have been appointed their distributor and have stock today.

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

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

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

Kent Morse Keys

Kent Morse Practice Oscillator.	£31.95	Kent Single Paddle Key.	£95.95
Kent Twin Paddle Key.	£114.95	Kent Single Paddle Key Kit.	£94.95
Kent Twin Paddle Key Kit.	£98.95	Kent KT-1 Professional.	£109.95
Kent Hand Key.	£99.95	Kent Vail Lever Correspondent Replica.	£219.95
Kent Hand Key Kit.	£86.95		

ALPHA DELTA COMMUNICATIONS, INC.

Delta-2B	2-way position SO-239 switch (1kW) for use up to 1.3GHz	£59.95	
Delta-4B	4-way position SO-239 switch (2kW) for use up to 500MHz	£79.95	
Delta-4BN	4-way position N-type switch (1.5kW) for use up to 1.2GHz	£89.95	
AD-ATT3G50	0MHz to 3GHz (200W) surge protector. N-Female Connector	54.95	
AD-ATT3G50/HP	0MHz to 3GHz (2kW) surge protector. N-Female Connector.	£56.95	
AD-ATT3G50U	0MHz to 500MHz (200W) surge protector. SO-239 Connector	£49.95	
AD-ATT3G50U/HP	0MHz to 500MHz (2kW) surge protector. SO-239 Connector	£49.95	
End Insulators	Dog Bones. They are extremely rugged, UV and RF resistant	£1.95	
Delta-DX-A	160m, 80m and 40m 1/4 twin slope trap antenna. This antenna combines the tremendous DX firepower of the 1/4-wave slope with the wide bandwidth of the 1/2-wave dipole. One leg is 67ft long and the other is 55ft long	£89.95	
Delta-DX-B	160m, 80m, 40m and 30m single slope trapped antenna. This antenna is designed for limited space installations, were room does not allow for large wire antennas; it only requires 60ft of space providing amazing DX performance at installation heights of 35ft	£89.95	
Delta-DX-CC	80m, 40m, 20m, 15m and 10m dipole. This antenna is parallel length dipole with no traps; overall length is 82ft	£139.95	
Delta-DX-DD	80m and 40m dipole. This antenna is parallel length dipole with no traps; overall length is 82ft	£119.95	
Delta-DX-EE	40m, 20m, 15m, 10m dipole, it can be used on 30m, 17m, 12m with an ATU. This antenna is not trapped, and has an overall length of 40ft	£129.95	
Delta-DX-LB	160m - 80m, and 40m Low Band dipole. This antenna performance and 2:1 VSWR bandwidth depends on the height and surrounding objects; overall length is 100ft	£119.96	
DX-LB-PLUS	160m, 80m, 40m and 20m - 10m Low Band dipole. This antenna performance and 2:1 VSWR bandwidth depends on the height and surrounding objects; overall length is 100ft.	£169.95	
DX-Series	Full-size utilized monoband dipole. These dipoles are using the Delta-C Centre Insulator with built-in Arc-Purge Surge Suppressor. **DX-20:** 20m Monoband Dipole at 33ft long **DX-40:** 40m Monoband Dipole at 66ft long **DX-80:** 80m Monoband Dipole at 133ft long	£49.95	
DX-Ultra	Medium wave to 30MHz 80ft AM Broadcast Dipole. Efficient, low-noise dipole for military, government, etc., use.	£149.95	
AD-Delta C	Hardware Kit contains the following: 1 x Dipole Centre. 2 x Dog Bones. 1 x Surge Protection Block	£29.95	
Delta-SEP	Replacement/spare Arc-Plug™ Static Electricity Protector. This unit is usually attached to the back of the Alpha Delta Centre T Balun	£14.95	

Alpha Delta Antennas

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

Alpin HF Linear Amplifiers

Very special prices for two very special amplifiers

BOTH IN STOCK

Offering extraordinary value for money, Alpin offer superbly engineered HF & 6m Linear amplifiers with excellent reliability. To date we haven't had one back for repair!

Alpin 100Mk11
HF+6m Linear Amplifier 1kW+ PEP output.
RRP £2299.95
ML&S Price Only £2279.95

Alpin 200
HF Linear Amplifier 2kW PEP Output from 2 x 4CX800A's.
RRP £3499.95
ML&S Price Only £3195.95

Ameritron Amplifiers

Only available from ML&S, each and every AL-811HXCE is modified and checked in our workshops to improve reliability & performance. A very cost effective way of getting up to 800W PEP from a neat compact mains powered HF Linear Amplifier.

Ameritron AL-811HXCE+ ML&S Price: £1099.95

See web for full range and specifications.

MyDEL

New! CG-3000R

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

Only £289.95

WonderWand WonderLoop Antenna

WonderWand Antennas U.K.

The UK's favourite rig-mounted antenna system!

NEW! WonderWand Widebander
1.8-460MHz with 1.3M Whip!.....£129.95

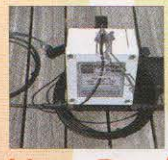
Wonder-TCP
40-10m Tuneable Counterpoise.....£59.95

ML&S PRICE ONLY £91.95 *For full info & video see: www.hamradio.co.uk/wonderloop*

If you are an avid FT-817 or KX-3 operator and enjoy nothing more than heading for the hills on a weekend to active those rare WAB squares. Take a look at the all new WonderWand WonderLoop Antenna.

Incorporating their easy to use tuning circuit, which offers frequency coverage from 20m-6m and handling 10w of RF power, you can be on the air in seconds. The tuning unit is enclosed within a lightweight ABS case, no larger than a pack of cards. This means you will no longer need to carry around all those additional extras needed to string up a wire in the field. There is also no need to worry about running a counterpoise with this efficient loop design.

So how does it perform? As we had sunshine this afternoon, we popped out into the car park here at ML&S and attached the loop to our demo FT-817. Within minutes we had tuned to the 20m band worked into EA, I and 9A. Not bad for 5w and the 'shack' in our hand.



NEW IN STOCK

New Product! HighEndFed Antennas

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

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

For the full range see www.hamradio.co.uk/hyendfed

MyDEL-SARK110 Vector Impedance Antenna Analyser

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

£329.94

mRS MiniVNA Series of Antenna Analysers

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

MiniVNA Pro with Bluetooth
100kHz-200MHz
£379.94

MiniVNA Extender
For Pro only, extends range to 1500MHz
£299.94

Super Antenna MP1 SuperStick

Covering a massive 80m right through to 450MHz*, this simple to erect compact vertical antenna weighs only 1kG, is only 2.1m tall when fully extended and collapses down to just 30.5cm (12")!

*With optional 80 & 60m coils

Only £159.95 including the 80m Coil FREE!

Product features:

- Ham bands: 40m-30m-20m-17m-15m-12m-10m-6m-4m-2m-70cm
- Frequency Range: HF 7MHz~30MHz continuous
- Frequency Range: VHF 48 to 144MHz continuous
- SWR: 1.5 : 1 or better
- Rated Power: 500W SSB; 300W CW / DIGITAL
- Antenna Weight: < 2 pounds (1kg)
- Also configurable for up to 450MHz
- Standard 3/8"-24 male thread for mounting
- Low profile TM1 tripod included
- MC80 80m coil included for 80m band
- Optional MR series radial sets available
- Optional MC60 60m coil for 60m band

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

DIAMOND

Huge selection of Diamond products always available

Base Antennas

NEW! CP-VU8 80m-70cm 200W Compact HF Base, only 2.7m Long! £469.95
X-30 2/70, 3/5.5dB, 1.3m Long .. RRP £79.95 **SPECIAL £59.95**
X-50N 2/70, 4.5/7.2dB, 1.7m Long RRP £72.95 **SPECIAL £64.95**
X-300N 2/70, 6.5/9dB, 3.1m Long RRP £146.95 **SPECIAL £109.95**
VX-1000 6/2/70 2.15/6.2/8.4DB 1.42M Long ..... RRP £149.95 **SPECIAL £99.95**
X-510N 2/70 Fibre glass 8.3/11.7dB gain. 5.2m long "N" ..... RRP £154.95 **SPECIAL £129.95**
V-2000 6/2/70, 2.15/6.2/8.4dB, 2.5m Long ..... RRP £149.95 **SPECIAL £109.95**

Mobile Antennas

NR-770R 100W, 2/70, 3/5.5dB, .98m Long ..... RRP £34.95
NR-770RSP as NR-770 but spring loaded..... RRP £39.95
NR-7900 2/70, 3.2/6.4dB, 1.46m Long ..... RRP £54.95

Duplexers/Triplexers

MX-72N 1.6-150/400-460MHz Duplexer ..... RRP £44.95
MX-62M1.6-56/140-470MHz Duplexer ..... RRP £69.95
MX-610 HF/6+2+70 (for FT-8900)..... RRP £59.95
MX-2000 6/2/70 Triplexer ..... RRP £91.95
MX-3000N 2/70/23 Triplexer ..... RRP £86.95

Switches

CX-210A 2-way, SO-239 Die Cast..... RRP £53.95
CX-210N 2-way, N-Type, Die Cast ..... RRP £82.95
CX-310A 3-way, SO-239, Die Cast..... RRP £89.95
CX-310N 3-way, N-Type, Die Cast ..... RRP £114.95

HUSTLER

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

See web for full listing!

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

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

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

BlueCAT Repeater Controller

Using your Android phone you can instantly touch a repeater and see your rig jump to the frequency, CTCSS & offset. Designed & built in the UK by ZB2M, exclusive to ML&S and appointed dealers.

Only £59.99

Now available for Yaesu & Icom Transceivers, see www.hamradio.co.uk/BlueCAT

MFJ Products

Lots more MFJ stocked! See web for details

MFJ

MFJ-266	V/U Portable Antenna Analyser 1.5-185MHz + 300-490MHz..... **Free UK carriage**	£339.95
MFJ-974HB	Manual ATU for balanced line antennas, 160-10m	£199.96
MFJ-974	as above but without 160m ..... **Special! £179.95**	
MFJ-16010	Random Wire ATU 160-10M	£71.95
MFJ-949E	Manual ATU metered, Dummy Load, 1.8-30MHz, 300W	£199.95
MFJ-901B	Manual Mini ATU 1.8-30MHz, 200W	£111.95
MFJ-971	Manual ATU metered, 1.8-30MHz, 200W	£119.95
MFJ-904H	Manual ATU, metered, inc balanced, 1.8-30MHz 150W	£139.94
MFJ-969	Manual Roller ATU Metered 1.8-54MHz, 300W	£199.94
MFJ-993B	Auto ATU Metered 1.8-30MHz, 300W	£279.95
MFJ-1786X	Magnetic Loop 10-30MHz, 150W **re-built & re-aligned by ML&S**	£479.95
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EMC

Measuring field strength, noise levels and using loops for measurements

MEASURING HF FIELD STRENGTH. The RSGB EMC Committee has been developing improved EMC measurement methods for measuring radiated field strengths up to 30MHz. First, let's consider why it can be useful to make radiated EMC measurements at MF/HF. Most EMC emission standards specify conducted emission tests below 30MHz. This is based on the assumption that below 30MHz, the size of typical items of electronic equipment is small in relation to a wavelength so the predominant source of radiated interference is from power cables and other connected cables rather than from the equipment itself. This assumption appears to be reasonable in many cases, although there are some exceptions such as large screen plasma TV sets that may radiate directly at HF.

Making conducted emission measurements under laboratory conditions is relatively straightforward when equipment is undergoing compliance testing in an EMC test laboratory. If the equipment is installed in the field and appears to be radiating interference however, then it is another matter. First it is necessary to identify the source of interference in a particular case and then try to make measurements. If the equipment is not owned by the radio amateur who is suffering interference then in many cases the only option is to make radiated measurements at a distance and then try to deduce from these whether the equipment is likely to be compliant with the relevant EMC standard if properly installed.

Even if the equipment in question is owned by a radio amateur or a co-operative neighbour, it is still generally impracticable to check emissions by means of a conducted emission test. For example, how could a conducted emission test be performed on an inverter or optimiser that is installed in a solar PV system? What about LED lighting installed in a kitchen? In both cases, any work on the mains electrical connections would be governed by Part P of the Building Regulations so any change to the mains connections would need to be done by a Government-approved Competent Person. What about radiated emissions from overhead wiring in a telecommunication network such as VDSL2? What about large fixed installations such as wind farms? This all points to an increasing need to be able to measure RF field strengths and with a signal to noise ration that is comparable to the radio and telecommunications equipment that is being protected.

PHOTO 1: 1.6m diameter resonant loop for EMC measurements from 1.6MHz to 12MHz.

PHOTO 2: 0.6m diameter resonant loop for EMC measurements from 3.5MHz to 30MHz.

In cases where Ofcom investigates interference to amateur radio reception, measurements may be made with the radio amateur's own antennas. This gives a useful relative indication of the level of the interference but it is difficult to relate such measurements to RF field strength in microvolts per metre. Another limitation is that the radio amateur's antenna is normally fixed so measurements can only be made at one location. What is needed is a portable or transportable measuring antenna that can be calibrated and that has sufficient sensitivity to allow measurements to be made without being limited by the noise of the measuring system.

Ofcom Field Engineers have portable 600mm diameter active loops but measurements made using these loops are often limited by the noise in the preamplifier. This is typically far above natural or man-made noise levels (see later) so interfering signals may be strong when received on the amateur radio antenna but 'below the noise' when received on the 600mm active loop. It is important to understand the significance of 'below the noise' in such cases however. A particular interfering signal may be below the noise of the measuring system but well above the natural atmospheric noise level and the typical man-made noise levels in residential or rural locations.

In any case, the EMC Directive and the national regulations that implement the Directive define some Essential Requirements. These require that, "equipment shall be designed and manufactured, having regard to the state of the art, so as to ensure that

- "the electromagnetic disturbance it generates does not exceed a level above which radio and telecommunications equipment or other equipment cannot operate as intended; and
- "it has a level of immunity to the electromagnetic disturbance to be expected in its intended use which allows it to operate without unacceptable degradation of its intended use."

The use of harmonised product standards only gives a presumption of conformity with the essential requirements but does not guarantee it. There is also a possibility that a harmonised EMC standard may be inadequate to achieve the Essential Requirements. Another consideration is that presumption of conformity for CE marked equipment is based on the assumption that the equipment has been properly installed; merely being CE marked is not sufficient by itself.

RADIO NOISE LEVELS. When designing a measuring system for measuring HF field strength, the background noise levels need to be taken into account. The International Telecommunication Union Radiocommunication Sector (ITU-R) issues Recommendation P.372 on Radio Noise. The current version, P372.11 was issued in September 2013. It covers the frequency range from 0.1Hz to 100GHz although information for frequencies below 30MHz does not appear to have changed since previous editions. This 78 page document is available for free download from the ITU website (See Websearch).

Noise levels up to 30MHz are given for an equivalent short vertical lossless grounded monopole antenna above a perfectly conducting ground plane. Although a practical monopole has losses, an allowance has been made for these losses so that the figures given are those that would be measured with a lossless antenna.

P.372 gives radio noise levels in terms of External Noise Figure Fa in dB, which is defined in Section 2. Equations (7) and (8) in Section 2 allow Fa to be converted to a field strength in dB(μV/m) for a bandwidth of B Hz.

P.372 gives estimates of background radio noise levels in the absence of other signals, whether intentionally or unintentionally radiated. Figure 2 in P.372 shows various categories of noise from 10kHz to 100MHz. These include the maximum and minimum range of atmospheric noise taking account of all seasons, all times of day and the whole earth's surface. Figures 15 – 38 give further details of expected values of atmospheric noise for different parts of the world, different seasons and different times of day. For example, in the Northern Hemisphere at latitudes north of the tropics, the lowest atmospheric noise levels up to 25MHz occur in northern hemisphere winter during daylight hours.

Although the general trend at MF/HF is for natural noise levels to decrease at higher frequencies some curves have a deep dip to a minimum at around 1MHz and daytime noise field strengths are usually lower on the 1.8MHz and 3.5MHz amateur bands than on 10MHz and 14MHz.

Figure 10 in P.372 also shows median man-made noise levels that are intended to be representative of various environmental categories such as Residential, Rural and Quiet rural. The Quiet Rural line is also shown elsewhere as a Quiet Receiving Location or Quiet Receiving Site line.

Figure 1 here shows the median man-made noise levels from P.372 for residential (red), rural (blue) and quiet rural or quiet receiving site line (green). These are plotted in terms of E-field strength in dB(μV/m) and also equivalent H-field strength in dB(μA/m), assuming 'free space' conditions. The plot is for a bandwidth of 9kHz, which is the standard bandwidth used for EMC measurements from 150kHz – 30MHz. As they are median values, there may be significant variations from these levels in practice.

NOISE MEASUREMENT UPDATE. The man-made noise levels in P.372 were originally measured in the 1970s in the USA. This raises the question of how these US levels relate to those present in Europe about 40 years later. There are a number of differences. First, electricity distribution in the US primarily uses overhead wiring so that man-made noise levels are likely to be higher in the US than in Europe, where distribution is predominantly underground. Secondly, interference from vehicle ignition systems (mainly at VHF) has reduced due to stricter regulations. Thirdly, the use of switch-mode power supplies has increased the levels of man-made interference at some frequencies.

Work on evaluation of the noise levels given in ITU-R P.372 has been done in Europe by the Conference of European Posts and Telecommunications (CEPT), Electronic Communications Committee (ECC), FM22 group. Further work was done by the Netherlands Radiocommunications Agency, department of Applied Spectrum Research, who produced a report titled *Radio noise measurements, European harmonisation of measurement methods* (see Websearch). This report includes information on practical aspects of radio noise measurements including the use of software defined radio (SDR) techniques. A related paper was also presented at the EMC 2006 conference in Wroclaw (see Websearch). Although there is some information on antennas, it only describes loop antennas in general terms.

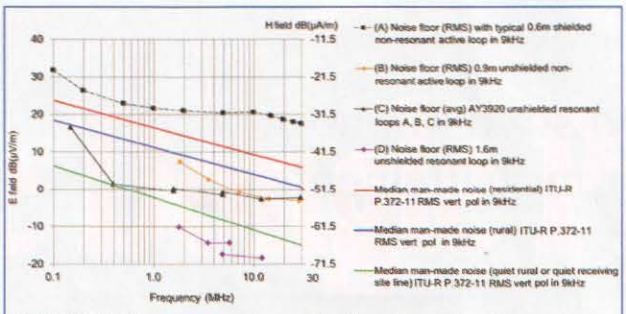


FIGURE 1: Measuring system noise floor for various types of loop antenna in relation to ITU-R man-made noise levels.

LOOP MEASURING ANTENNAS. Various types of antenna have been evaluated to see how well they would perform as HF EMC measuring antenna covering 1.8MHz – 30MHz. In principle, either an 'electrically short' dipole or an 'electrically small' loop antenna could be used. A short dipole responds to the electric or E-field component of the electromagnetic wave whereas a small loop responds to the magnetic or H-Field component. Under 'free space' conditions, either the E-field or the H-field could be measured as they are related by a constant ratio E/H = 120π or 377Ω.

When making radiated EMC measurements at HF however, a practical height above ground for the measuring antenna would be about 1 metre, which is a small fraction of a wavelength. 'Free space' conditions are not met and E-field measurements are more likely to be affected by close proximity of ground or other electrically conductive objects. They are also affected by variations in ground conductivity between different locations and between wet or dry weather. H-field measurements are generally considered to give more consistent results in an EMC measurement situation at HF where the measuring antenna is likely to be close to ground in terms of a wavelength. It also makes a difference whether the measuring antenna is vertically or horizontally polarised.

A type of loop antenna that is specified in CISPR16 for H-field measurements is sometimes called a 'shielded loop'. As with any loop, the output is proportional to the rate of change of the magnetic field, so the output amplitude is proportional to frequency. To compensate for this and to make the antenna factor relatively constant with frequency, the loop contains a built-in preamplifier whose gain increases at lower frequencies. This results in increased noise output at lower frequencies.

Curve A in Figure 1 shows the typical noise floor of a CISPR16 shielded active non-resonant loop in terms of field strength, in 9kHz bandwidth. This loop has a similar performance to the type used by Ofcom field engineers. It can be seen that this is well above the ITU-R Residential noise levels.

Curve B in Figure 1 shows what can be achieved by a commercially available 0.9m unshielded active non-resonant loop that is intended as an MF/HF receiving loop. Although this loop is designed for use down to 100kHz, Figure 1 only shows the noise performance above 1.8MHz.

Curve C in Figure 1 shows the noise floor that was achieved by a set of three unshielded resonant loops that were developed by the author for the Radiocommunications Agency, which subsequently became part of Ofcom. The target specification was to be able to achieve a noise floor of 1μV/m in 9kHz bandwidth. Curve C shows average detection, which is 1.05dB less than RMS for noise measurement.

Curve D in Figure 1 shows the noise floor that can be achieved from 1.8MHz to 12MHz using a 1.6m diameter resonant measuring loop antenna developed by the author (see **Photo 1**). This gets below the quiet receiving site line so that the noise figure of the measuring system will not generally be a limiting factor.

Another development by the author is a 0.6m unshielded resonant loop that can cover from 1.6MHz to 30MHz (see **Photo 2**).

The loops shown in Photos 1 and 2 are currently being used to make MF/HF radiated emission measurements from solar PV installations, LED lighting, VDSL and a wind farm. Results will be published when available together with further details of these loop antennas.

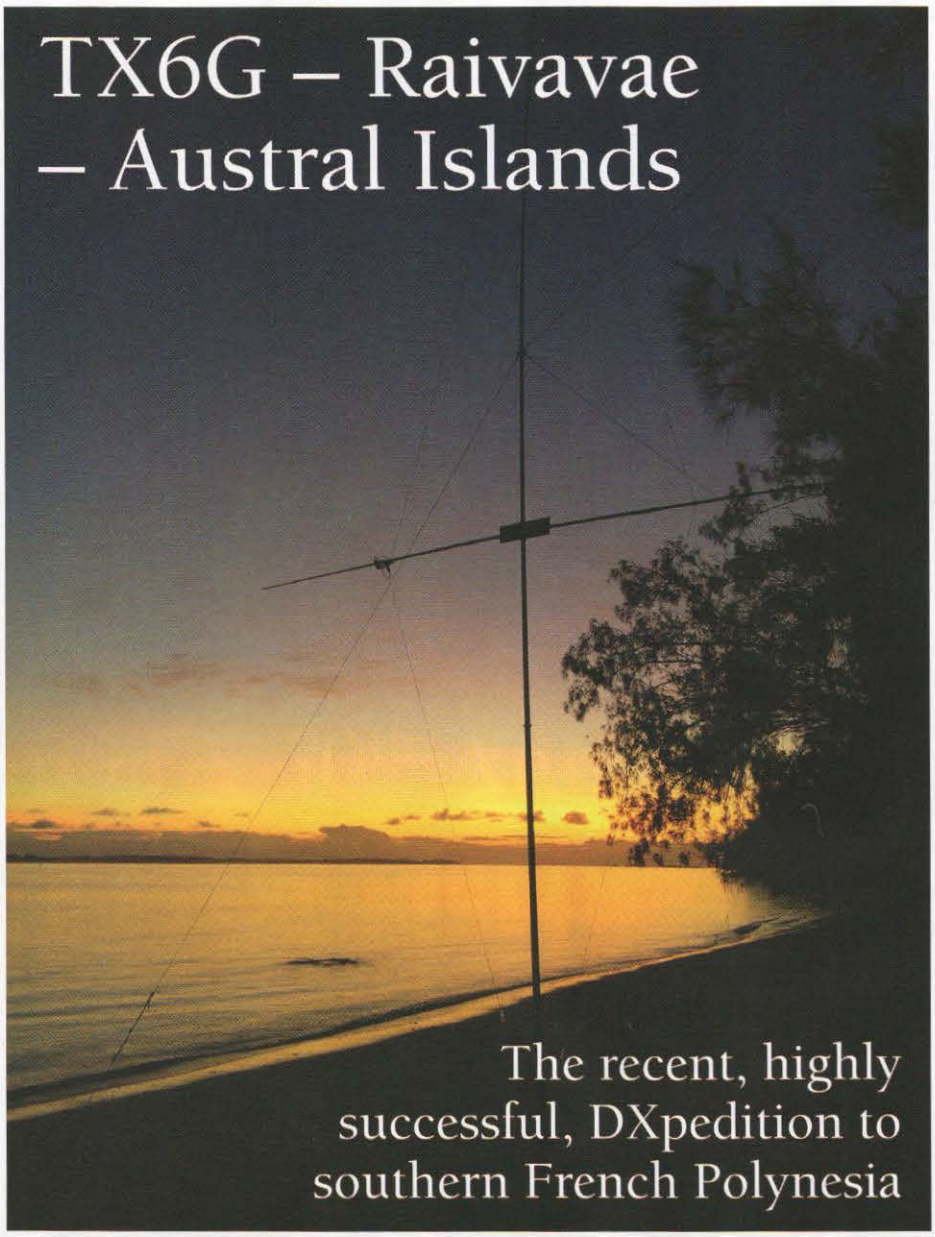
WEBSEARCH

ITU-T Recommendation P.372: *Radio Noise* – https://www.itu.int/rec/R-REC-P.372/en

Radio noise measurements European harmonisation of measurement methods by Radiocommunications Agency Netherlands – department of Applied Spectrum Research [TSO] – www.agentschaptelecom.nl/sites/default/files/special-pages/radio-noise-measurements---european-harmonisation.pdf

Practical radio noise measurements paper at EMC 2006 conference – www.agentschaptelecom.nl/sites/default/files/practical-radio-noise-measurements_0.pdf

TX6G – Raivavae – Austral Islands



The recent, highly successful, DXpedition to southern French Polynesia

Dawn at TX6G with one of the VDA antennas in the foreground.

There are a number of radio amateurs who enjoy DXpeditioning – going to countries that are much wanted by those who collect DXCC countries and putting them on the air for a short while. This article is about an expedition to the Austral Islands, the most southerly of the French Polynesian islands.

The idea of a small expedition by half a dozen or so keen radio amateurs began to take shape at the 2013 RSGB Convention. In a discussion in the bar, the idea of a 'serious' expedition to 'somewhere' was mooted, which soon developed into going for two weeks around the equinox in March/April 2014. We looked at the most wanted tables in *Club Log* [1] and reduced the possible list to few really achievable ones. We had a set of criteria that we applied:

- No travel by small boat!
- A pleasant place to visit (this was to be a holiday as well)
- Nowhere politically unstable or with armed conflict
- Somewhere not too cold and, preferably, in the Pacific

In the end we settled on the Austral Islands at the very southern end of French Polynesia, about two hours flying from Tahiti. The next land mass to the south is Antarctica and because of their distance from the rest of French Polynesia had become a new DXCC country (entity) in 1998. The Australs consist of four main inhabited islands – Rimatara, Rurutu, Tubuai and Raivavae. All are served by a twice/thrice weekly air service from Tahiti. G3BJ and G4JKS had been there in 2009, but only to Tubuai and Rurutu, and concluded there was no reasonable site for a serious DXpedition on either island. Since then, the island of Raivavae had emerged as a good location, with the most recent operation by K3EL and VE7DS being in September 2013.

We set some objectives for our expedition:

- To operate to highest standards of DXpeditioning, in accordance with the DX Code of Conduct [2]
- To give a particular focus to Europe – where the path to the Australs is difficult
- To provide 21st century quality of service by uploading our logs to *Club Log* and LOTW daily
- To have fun.

For equipment, we found that between us we had enough Elecraft K3 transceivers and linear amplifiers to take four complete stations. We had six operators, so one station would be a spare in case of equipment failure. In the event, we occasionally used the fourth station, but the load on the six operators meant that it was essentially stand-by equipment.

PLANNING IT ALL. There are five key aspects to getting a DXpedition right:

- The right team
- The right location
- The right time of year and position in the solar cycle
- The relevant permissions
- The right logistics

Getting a team together was not a problem. Most were members of previous FSDXA expeditions and everyone knew everyone else well. The team was Chris, G3SVL, Nigel, G3TXF, David, G3WGN, Don, G3XTT, Justin, G4TSH, Hilary, G4JKS and myself.

The location was self-evident from the K3EL/VE7DS trip and an exchange of e-mails with the '*pension*' resulted in us booking the whole place for two weeks. This would give rooms for the stations right at the edge of the beach (north facing) and other rooms for sleeping, together with full board. Dave, K3EL was enormously helpful in providing background information on aspects of the location.

Our choice of the equinox was designed to give optimum balance of propagation – HF and LF. We planned operation from 10m-160m but not on 60m. We felt that late March/early April would be good for all these bands and our propagation predictions also suggested that this was the case.

Licensing in Tahiti is fairly straightforward. A licence can be obtained by e-mail, after submission of relevant documents. Normally the call would be FO/home call, but we wanted something special for our expedition, and asked for the TX6G call (6G representing the six main operators from England). After some work by G3TXF, we obtained this call.

Raivavae is a small island. 900 people live there and although very civilised (it is French, after all!), the facilities are very limited. No local B&Q! And so, getting a fault-free inventory was of utmost importance. We had to take everything and there was no room for errors. But we also wanted, if possible, to fit everything within

June 2014 • RadCom
Don Beattie, G3BJ • e-mail: g3ozf@btinternet.com

our luggage allowances on the aircraft, and that represented a greater challenge. We had three flights to get to Raivavae – London to Los Angeles, Los Angeles to Tahiti and Tahiti to Raivavae – this last flight on a small plane. In the end, we had to pay a small amount of excess baggage charge, but most everything else went as either checked bags or carry-on. Ducking and diving between the different regulations for baggage is an acquired skill, requiring careful planning and a little negotiation with the airlines. For example Air Tahiti Nui allows 'sports equipment' as an extra allowance between Los Angeles and Tahiti. But it defines very closely what 'sports equipment' is – and it does not include amateur antennas (or even 'fishing poles'). However, an e-mail to the airline asking for approval to take fishing poles as an extra item without cost received a positive reply.

We decided not to takes risks with flight delays. We could have flown straight through from London to Tahiti, changing in Los Angeles, but any aircraft delay would have risked the thrice-weekly connection at Tahiti. We therefore planned in an overnight stopover in Los Angeles and another at Tahiti to give ourselves some 'buffer' time. In the event, all the flights went without a hitch, but had we not have planned the buffer...?

A last glimpse of Raivavae through the aircraft window.

ARRIVAL. Early in the morning of 19 March, we all assembled at Tahiti airport for the 0600 flight to Raivavae. Baggage was exactly 1kg over the limit (no problem) and two hours later we were disembarking on the island to be met by our hosts, Eléonor and Dennis. They knew we would have lots of bags and had brought a minibus and a truck. A little later we were exploring the site that was to house TX6G.

We chose two of the beach-side chalets for the stations and the third for sleeping two of the team. The rest of the team was accommodated in garden bungalows on the other side of the road. Early on we identified a power distribution problem in the chalets, with a faulty earth system, and so had Justin, G4TSH, crawling inside the power distribution panel to rectify the problem. We then set to work erecting the antennas and preparing the stations. By dusk we were ready to go on 40 and 30m and, despite being tired from the flights, worked 1,500 or so stations before getting some sleep. The following day the rest of the antennas went up and we were able to operate across all bands (except 80/160) by that evening. Finally, the 80/160 antenna was raised and tuned the following day, and we had all-band capability. For the HF bands (10-20m) we used vertical dipole arrays [3] that allowed a driven element and reflector to be mounted on a single pole. Although a little 'touchy' to adjust, these antennas work exceptionally well alongside the sea. We had their toes in the water, with guys out into the ocean, using the 'dead-men' technique of securing guys in sand. The performance was really excellent and it was clear from the start that we were strong in Europe and pile-up control was reasonably easy. For logging we used *WinTest*, networked by Wi-Fi. It worked faultlessly [4].

The team then settled into the well-tried routine of sleep-eat-operate for twelve days. The pileups were enormous and it is perhaps worth noting that the maximum daily number of QSOs was achieved in our last day – some 8,350 in 24 hours. The demand appeared insatiable. After a few days we began RTTY operation and again were swamped by the volume of callers. We used *MMTTY* in multi-channel mode to decode a number of callers in parallel, which worked very well. Although our main logging was by WinTest, we used *N1MM* for RTTY, as *WinTest* does not integrate with *MMTTY* [5].

The limited beach area was still able to support eight antennas, including five VDA two element vertical beams.

RAIVAVAE. After a week or so, we closed down for half a day, to see the island. Raivavae is a beautiful place. Its 900 population live mainly around the coast in generally good quality single-storey houses. The first impression of the villages is how neat and well-kept everything is. Much of the island has the appearance of parkland and its population seem very proud of where they live.

The people of the island seem very happy – and are polite and courteous. They are somewhat cautious about the few 'incomers' from Tahiti and claim that these people do not share the islanders' values and sense of pride. It seems that if you are an incomer and commit a crime, you get sent to jail in Tahiti. Subject to good behaviour you may return to Raivavae but, if you offend again, you are banished for life from the island. Not too many repeat offences, I suspect.

Eléonor and Dennis were the ideal hosts. They had lived in the US for 35 years (Dennis is a US national and Eléonor is from Raivavae) and returned to the island in 2002. Dennis had run a haulage company in California before retiring. They were both very helpful in working around the needs of team scheduling. Breakfast and dinner were in two sittings and lunch was (at our request) just a

IOTA 50th Anniversary Convention

2014 is the 50th Anniversary of the RSGB IOTA Programme and the Society will celebrate the event at Beaumont House over the weekend of 4-6 July 2014 with the IOTA 50th Anniversary Convention.

If you are a keen IOTA follower or interested in things DX you will find this event not only fascinating but memorable in many ways. During the day there will be fascinating IOTA and DX lectures, reports of the IOTA marathon and much more. On Saturday night there will be an extra special Gala dinner to celebrate the anniversary.

The venue for the event is Beaumont House in Old Windsor, which is in a beautiful setting within 40 acres of countryside just by the River Thames. Beaumont was also the venue for the IOTA 30th anniversary party in 1994 and some may remember it fondly as the home for many years of the RSGB HF Convention.

IOTA 50th Anniversary Convention will be a truly international celebration of IOTA and will be an event to remember. Come and mingle with well-known island enthusiasts both from the UK and overseas and celebrate 50 years of the IOTA programme with the RSGB.

The booking website is open to accept your reservations at **www.rsgbevents.org**

www.rsgbevents.org

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June 2014 • RadCom
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G3XTT, G3BJ and G4TSH adjust the feed point on the 80/160m vertical.

G3SVL operates RTTY. Note the copious supply of drinking water !

sandwich. Beer was available in the fridge although we were quite modest in our consumption, which surprised a number of us. Coffee was on tap 24/7 and, all in all, fitted our needs well.

CLOSING DOWN. By lunch time on the day prior to the flight back to Tahiti, we ceased operations. It took half a day to dismantle everything and pack for the return journey. An early start the following morning saw us in Tahiti by 1100 for a civilised lunch at a coastal restaurant, followed by a few hours killing time before our overnight flight back to Los Angeles. We had timed the expedition so that we could take in the Visalia International DX Convention on the way home and spent a pleasant few days in the company of some of the world's top DXers at the convention. We were made to feel very welcome and there were many positive comments about the TX6G operation.

We finished with around 76,900 QSOs. QSOs per operator day were just under 1,000 and for some 18% of those who contacted us, it was a new DXCC country. For many others it was a new band slot or mode. Overall, a very satisfactory result.

A FEW REFLECTIONS. Our stations consisted of Elecraft K3s, most with KPA500 linear amplifiers. The K3 is a well-proven high performance transceiver, but the KPA500s were new to many of us. They are quite excellent. They didn't even break sweat when being worked 24/7 in a non-air conditioned quasi-tropical environment (and it did get *hot* from time to time). We were a tad worried about mains voltage regulation in our bungalows, but in the event the KPAs coped well. The integration to the K3 is very effective, as is the protection.

The five VDAs were the star of the show. It is clear that by the water they represent a simple and elegant way to get a very low angle signal away. When operating we 'felt' we were loud and pileup control was relatively easy.

In our log are QSOs with some 3,000 stations who chose to work us twice on the same band/mode. Given that we were uploading to *Club Log* and LOTW every day, and it was easy for them to check whether they were in the log, this seems very selfish, and means that 3,000 others were denied QSOs. We hope in future expeditions that we can encourage people to work us once and once only on each band mode.

Luggage strategy is a core part of any expedition like this – we spent a lot of time optimising the weights and distribution to take maximum advantage of the regulations. Although we managed to obtain a written dispensation for Air Tahiti Nui in advance about the antenna poles, this was disputed at Los Angeles. In the event the piece of paper won the day and saved us some $300!

We were lucky with noise. Our earlier trip to Rurutu and Tubuai in 2009 was plagued by serious noise issues and Dave, K3EL had warned of similar issues on Raivavae. But in the end, there was nothing of note. However, noise is one big risk of not undertaking a site survey prior to an expedition. The other aspect of noise surprised us significantly. On previous expeditions to the Inter-Tropical Convergence Zone we have suffered from huge storm static issues. At Raivavae, although there were weak static crashes, these did not impair communication. Perhaps our major noise problem was the local cockerel that insisted on crowing at 2.30 in the morning

And finally was it fun? You bet. I think we'd all do it again tomorrow (well, perhaps next month). A beautiful retreat from the 'real' world – or was this in fact the real world?

Our final statistics included some 2,456 QSOs with the UK and, more generally the results are shown in Table 1.

All photos by G4JKS or G3TXF.

Tropical paradise! - a crowded beach scene on Raivavae.

[1] Club Log: www.clublog.org
[2] DX Code of Conduct: www.dx-code.org
[3] VDA antennas: www.f4bkv.net/antenna-vda.html
[4] Win-Test: www. win-test.com
[5] N1MM: www.n1mm.hamdocs.com

Table 1

Band	CW	PHONE	RTTY	Total	Total %
160	49	0	0	49	0.10%
80	1337	0	0	1337	1.70%
40	3995	879	0	4874	6.30%
30	6028	0	0	6028	7.90%
20	8242	2716	0	10960	14.30%
17	5809	3724	0	9533	12.40%
15	7436	5046	3600	16080	20.90%
12	8557	5432	0	13989	18.20%
10	7664	6248	0	13912	18.10%
Totals	49117	24045	3600	**76762**	

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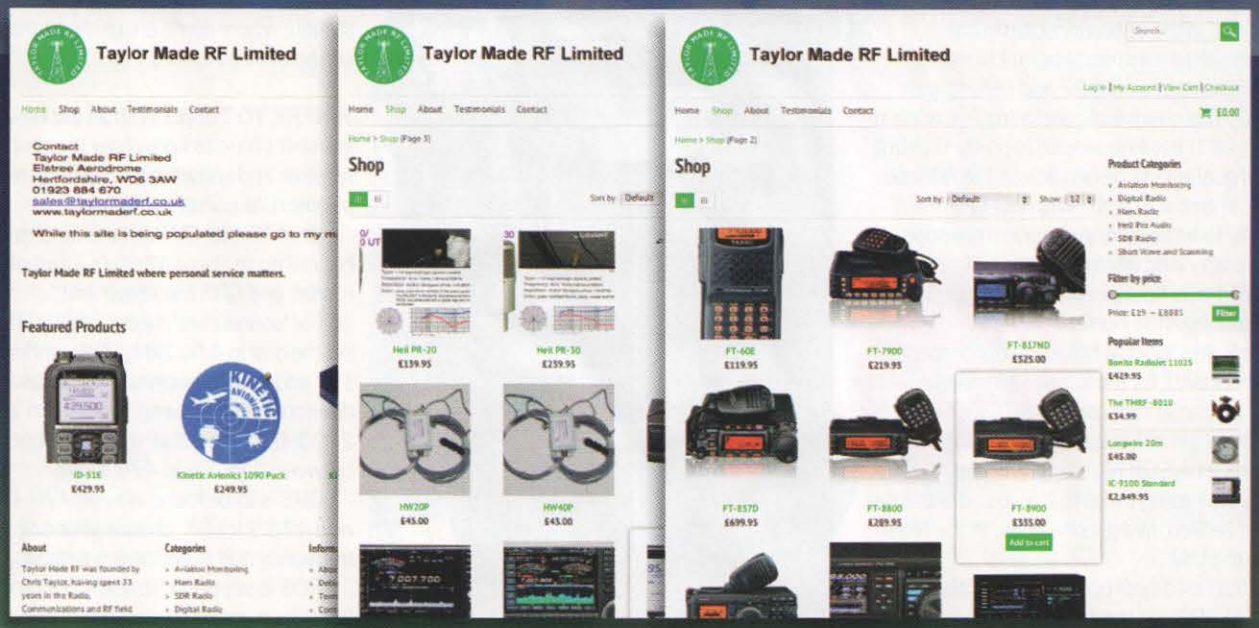

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June 2014 • RadCom
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LF

First amateur VLF Atlantic crossing

THE STORY SO FAR. The US group mentioned in the February column has now received their special permit to make transmissions between 27 and 59kHz with 5W ERP. The chance of generating five watts of ERP on such low frequencies is pretty slim but the real goal was to be first across the Atlantic on VLF, ie below 30kHz. With low ERP the only way to achieve long distance reception is to use very long transmissions that can be integrated over hours in order to identify the signal amongst the noise.

Bob Raide, W2ZM holds the experimental call WH2XBA/1 for these tests. He has an 800W LF transmitter using a 3CX3000 and has wound the obligatory huge loading coil to resonate his 90ft high long-wire aerial. If anyone was going to make it across it was most likely to be Bob, living as he does, in the North East of the USA.

On the first day of operation, 28 February, Bob's 29.499kHz transmission was detected as far away as Austin, Texas whilst he attempted to increase power without smoke and sparks!

Then on 2 March, Paul Nicholson near Todmorden in West Yorkshire reported seeing a signal on Bob's exact frequency at exactly the time Bob was transmitting. This signal peaked at 20dB above the noise in a 0.5mHz bandwidth and was definitely coming from the West. Without any data being recovered from the transmission it can't be 100% certain, but such a good detection so soon was a great encouragement.

Over the next few evenings more tests were made, transmission and reception times and frequencies correlated until there was no doubt that amateur VLF signals were indeed crossing the pond for the first time. It wasn't only Paul getting reception; G3XDV saw a clear trace on 4 March, then DF6NM caught some traces.

The race was now on to be the first to get a positive ID from these tiny signals. It was thought that the best chance was to use the *Opera* mode, which is a single-frequency on-off keyed sequence, easy to identify with very narrow band receivers. A special extra slow version called '2H' (two hour) was employed for the tests and the 'deep search' add-on was used to post-process the received signals looking for correlation.

Since then Dex, W4DEX and others have joined the party and signals have been identified by *Opera* deep search, the first logged by DF6NM was on 7 March and was Bob's transmission over a distance of 6,448km. The best signal to noise ratio achieved was on 14 March and good

You need a big coil for 29kHz!

detections went on into April. Since then, with the hours of darkness reducing, conditions have tailed off.

I wonder what they'll try next year!

FRANCE ON 472 AT LAST. From 12 March, all French amateurs have access to the 472kHz band with 1W ERP. It has been a long time coming and most of the keen French LF/MF operators had already applied for special permits to use the band, but maybe this will encourage some more to experience the joys of MF?

MORE VLF EXPERIMENTS. Mancin, SQ2BXI and the SP2KDS club team are working on a powerful 8.270kHz transmitter. They hope to be on the air in a few weeks and have already built a loading coil. If you thought Bob's 29kHz coil was big, imagine the size of theirs – it takes two people to lift it!

WSQ RE-BORN. This new LF/MF QSO mode, developed by ZL2AFP and ZL1BPU has been further improved by DL4YHF, the author of *Spectrum Laboratory*. The new version is at DL4YHF's QSL.net site and promises better performance by using two or more decoders and other tweaks, it also has adjustable 'squelch' and the ability to record files for later processing. Another improvement is the ability to select the sound card – very useful when you have more than one in your PC!

Initial impressions are good with quite a few operators giving it a try. The sound-card choice is a critical one in many an LF operator's station, where some are using as many as four sound devices on one PC.

WHERE TO TUNE? With all the new modes in use it's hard to know how to set up the receiver and software so that you are using the appropriate part of the band.

On 472kHz, CW is at the bottom of the band – up to about 474kHz – and digital modes and QRS are above that.

For 'sound card' modes, select USB and set the dial to 474.2kHz. This works for WSQ, JT9 and *WSPR* because they all use slightly different tone frequencies between 1000 and 2000Hz giving actual receive frequencies between 475.2 and 476.2kHz.

QRS is to be found around 476.175 and also 478.9 for DX, choose your own dial frequency and spectrogram settings.

ROS is supposed to use 476kHz dial frequency and *Opera* uses 477kHz, which makes it difficult to watch for both at the same time.

Just to complicate matters it appears that some French stations are using 477.3kHz dial frequency for WSQ to avoid QRM.

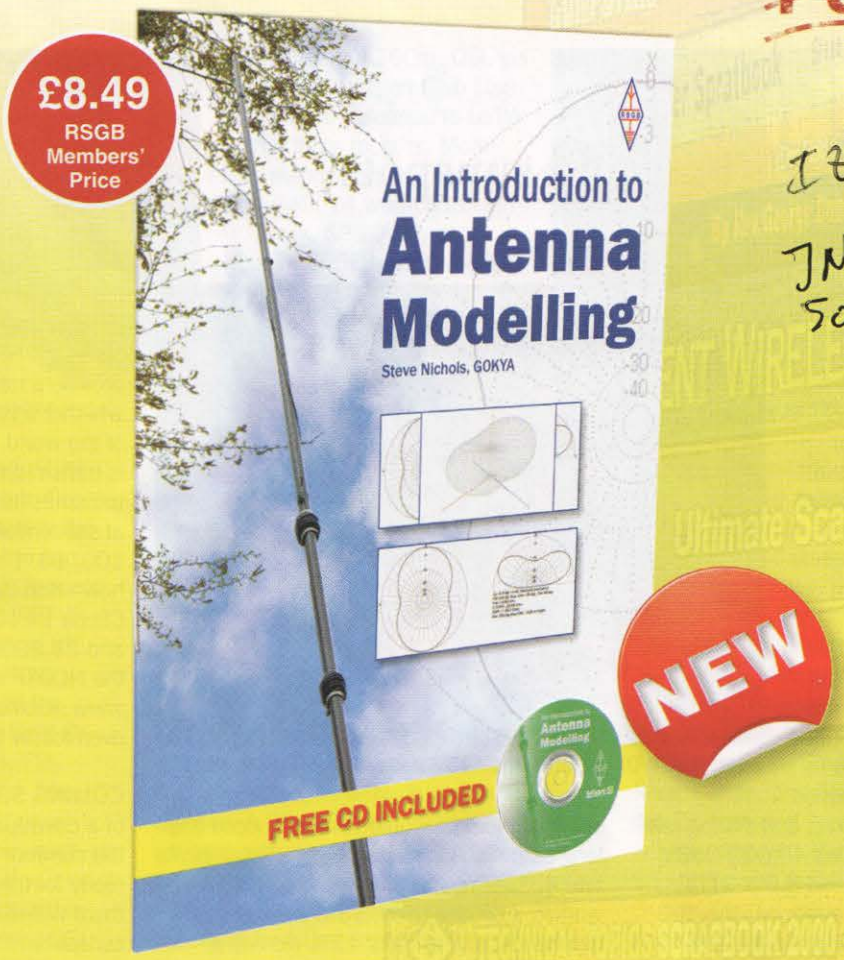
On 136kHz the dial frequency for most modes is 136.0kHz. DX calls in QRS are at the bottom of the band for European transmitters, recently around 136.170, and trans-Atlantic stations use 137.77 so as not to cause QRM to each other.

If there is any CW activity on 136kHz it will usually be around 136.5kHz.

***SPECTRUM LABORATORY* TO THE RESCUE.** The search for the Malaysian aircraft in the South Pacific required a system to identify 37kHz signals from an acoustic transponder in the black box flight data recorder. What software did they use for this? DL4YHF's *Spectrum Laboratory* of course! The group on the *Ocean Shield* have been in contact with Wolf for assistance with some problems and are now very happy with the performance. As with *WSQ*, you can download this very useful program at Wolf's QSL.net pages, just search for DL4YHF.

LITZ WIRE ANYONE? If you are thinking of winding a loading coil for LF then Litz wire is the best stuff to use. Derek, G3GRO informs me that the Crawley club still has a considerable length of plastic coated 725 strand Litz available. This was used in Decca's LF stations before they closed down about ten years ago. If you need any, contact me and I'll put you in touch with Derek.

I28EEV
JN70CV
50.155



An Introduction to Antenna Modelling

By Steve Nichols G0KYA

For many years, the only way for most radio amateurs to work out how well an antenna design would work was to build it and find out. The arrival of computer based antenna modelling programs has changed this. This book looks at the Free MMANA-GAL antenna modelling program that will let you design and optimise a whole host of antennas, and all on your PC.

An Introduction to Antenna Modelling has been written by antenna guru Steve Nichols, G0KYA and shows you step-by-step how to input antennas designs into MMANA-GAL, how to adapt designs you are given and how to optimise your designs for the best performance. By the time you have finished you should be able to model a whole host of antennas including dipoles, the G5RV, the W3DZZ trapped dipole, verticals, off-centre fed dipoles (OCFD), magnetic loop antennas and many more. Computerised antenna modelling for many radio amateurs looks like a black art – needing expensive programs that look like you need a degree in astrophysics to get them to work. This book dispels that and provides a straightforward way to design antennas with predictable results.

Building antennas can be hard work. You have to work out what you want to build, source the appropriate copper wire or tubing, measure everything carefully and spend hours putting it all together. But it needn't be like that *An Introduction to Antenna Modelling* provides an easy way to design and 'test' your antennas without ever lifting a saw or picking up wire cutters

FREE CD
This book is enhanced by the inclusion of CD that not only contains the MMANA-GAL software so you can get started immediately but much more. There are sample antenna files and event other antenna modelling software including EZNEC, MININEC Pro and 4nec2. There are also over 30 other amateur radio programmes included.

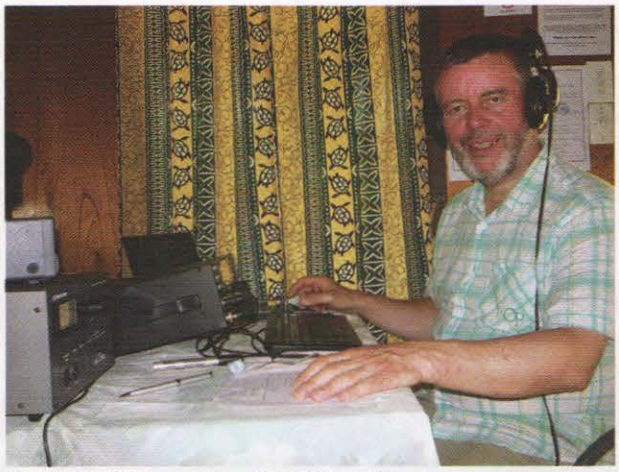
Size 174x240mm 80 pages ISBN: 9781 9101 9300 6
Non Members £9.99
RSGB Members £8.49

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

HF

Lots of DXpeditions and sunspots

EXCELLENT DXING. The Sun continued to show plenty of spots and deliver high levels of ultraviolet radiation during April. Combined with the usual seasonal lift this meant that HF conditions were excellent for DXing throughout the month with even the 10m band open until midnight on some occasions.



Chris, GM3WOJ operating the A35V station.

Unhappily, the VK9MT operation from Mellish Reef was forced to go QRT about five days earlier than planned when tropical cyclone Ita developed nearby and lashed the reef with 40 knot winds and driving rain. The team managed around 40,000 QSOs (61% CW, 30.5% SSB and 8.5% RTTY) but this was only half the number they'd been hoping for. Propagation to the UK was good and QSOs were made on every band from 7MHz to 28MHz. On 10m-17m, propagation peaked during the morning, 20m was best in late afternoon, and 30/40m opened during the evening.

The TX6G team on Raivavae in the Austral Islands, in the sweet spot for Pacific propagation to the UK, had a great time and made about 77,000 QSOs (64% CW, 31% SSB and 5% RTTY) with 23,000 different stations. As you would expect for a station out to the west on the short path, the propagation pattern was almost the opposite of VK9MT; 10m and 12m QSOs happened in late afternoon or early evening, 15m and 17m were open to the UK all day but best during late morning, 20m was best around breakfast and 30/40 around dawn. There was probably a long path opening on 20m around 1600 but the team were on the north side of the island with a mountain south of them so wouldn't have noticed any long path signals! *Club Log* statistics indicate that 42% of people who worked TX6G only worked it on one band, 18% worked it on two bands, and another 12% worked it on three bands. Only a tiny number made QSOs on 8 or 9 bands. I will leave it to *RadCom* readers to decide whether these numbers suggest that slot-chasing is or is not a problem for those with less competitive stations looking for a single QSO.

In the mid-Pacific A35V (GM3WOJ) and A35X (GM4YXI) in Tonga made about 29,000 QSOs between them. Most UK QSOs were made between dawn and lunchtime but on 20m-15m there were openings during late afternoon as well.

Top ten UK slot hunters for VK9MT, TX6G and the A35s are shown in **Table 1** (based on *Club Log* statistics and tie-break rules).

The YW0A Aves Island DXpedition was confirmed a few days before the end of April and should have started as *RadCom* was going to press. If all went well then UK amateurs would have had a fairly easy shot at this one.

Ken Claerbout, K4ZW reported from Addis Ababa, Ethiopia that he and fellow ET3AA club operators entered the CQ WPX SSB contest and made 1,300 QSOS. ET3AA is now operational on RTTY and the club has a significant number of student operators from the university looking forward to trying digital modes.

Make the most of the current conditions as the summer doldrums will be on us soon and even if the sunspot number holds up there will be less DX around for a few months.

ARE THE BANDS OPEN? Many years ago the Northern California DX Foundation set up a global network of beacons that transmit on all the HF bands from 14-28MHz. These provide a tremendous resource for checking whether a band is open to a particular part of the world, regardless of whether anyone is transmitting from there. Each beacon transmits its callsign and then steady carrier at sequentially reducing power levels of 100, 10, 1 and 0.1 watts. It's amazing how often the 100mW signal can be heard. Check 14.100, 18.110, 21.150, 24.930 and 28.200MHz and also take a look at the NCDXF website for more information at www.ncdxf.org/beacon/intro.html. You can even follow the beacons on Twitter.

COMING SOON. There seems to be a bit of a downturn in major DXpeditions during the summer but a large number are getting ready for the autumn when hopefully there will still be a reasonable number of sunspots.

Masa, JA0RQV will be active as A35JP/P from Niuatoputapu (OC-191), Tonga from 28 May to 3 June. He plans to be QRV on 6-80 metres CW and SSB, but his operations are likely to be limited as they will depend on the availability of electric power. If his flight is cancelled, he will operate from Vava'u (OC-064) or Tongatapu (OC-049) instead. Updates will be posted at http://blog.goo.ne.jp/rqv

JH1BGH and 7K1HLJ will be operating from the VIP Guest Hotel on Palau from 20 to 28 May. They will be QRV as T88WI and T88WH respectively. QSL via their home calls.

Bob, M0RCX will be active as 3B8/M0RCX from Mauritius (AF-049) until 27 May. He will operate SSB, CW and digital modes (RTTY, JT65 and PSK) on 6-40 metres. Bureau cards will be sent automatically six months after the operation.

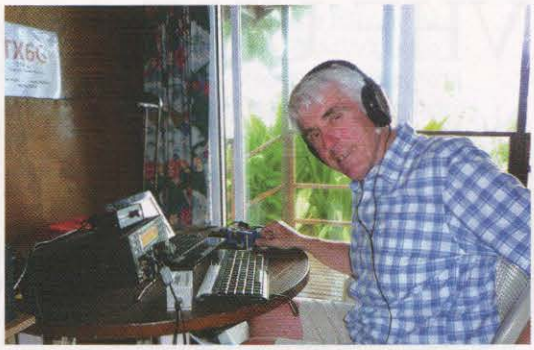
Special event station HO100CANAL will be active until 15 August, the date that marks the 100th anniversary of the formal opening of the Panama Canal. Expect activity on 10-160 metres SSB, CW, RTTY and PSK. QSL via HP1AVS.

Three Czech operators will put Togo, 5V, on the air in September for 10 days. The ops are OK6DJ as 5V7DB, OK1FPS as 5V7PS and OK1FCJ as 5V7ST. They will be on 10-160 with three Elecraft rigs, two amplifiers, two Spiderbeams, verticals, and dedicated receiving antennas. They'll be on CW, SSB and digital modes and will be in the CQWW RTTY Contest on 27-28

TABLE 1: Top 10 slot hunters for recent DXpeditions.

VK9MT	TX6G	A35V	A35X
G4CCZ (11)	G3XHZ (15)	G4CCZ (10)	G0TSM (8)
GM3YTS (10)	G3SED (15)	G0TSM (8)	G3VMW (7)
G3TTJ (10)	G3XRJ (15)	G3VMW (7)	G0DBE (7)
G4EZT (9)	GW4BLE (15)	G3TTJ (7)	MW0ZZK (6)
GM4XMD (9)	G4CCZ (15)	GM4XMD (6)	G3VKW (6)
G0DQS (9)	G0TSM (15)	G4EZT (6)	G4CCZ (6)
MW0ZZK (9)	GM3POI (14)	G0DBE (6)	G4EZT (5)
G0TSM (8)	G3XAQ (14)	GM3POI (5)	GM4XMD (5)
G0BLB (8)	G4EZT (14)	EI7BA (5)	M0BCT (5)
G3VMW (7)	G4SOF (14)	MW0ZZK (5)	G3SVD (5)


Keith, GM4YXI operating the A35X station.


G3TXF QRV on Raivavae as TX6G.

September. See http://qrz.com/db/5V7DB

Five Japanese operators will go to Cocos Keeling Island and Christmas Island in the Indian Ocean for an operation at the end of July into August. Their VK9 callsigns are not yet assigned. The ops will be JA3FVJ, JA3QWN, JA3TJA, JF3PLF and JH3FUK. The Cocos Keeling, VK9C, part will be between 29 July and 2 August and the VK9X, Christmas Island, part will be 2-8 August. They will be QRV on SSB, FM, CW, RTTY and PSK31 on 6-160m. They describe the operating as vacation style around the ordinary DX frequencies such as 14025, 21295, etc. Apparently, if you want a bureau card, you must request it within one year because the JARL Japanese QSL bureau membership is one year at a time. See http://vk9.nobody.jp/index.html

The FT4TA team continues to prepare for the Tromelin Island expedition from 30 October to 10 November. Their website at www.tromelin2014.com/en/ contains the latest updates. It seems the French government agency controlling the Indian Ocean and Antarctic islands is supportive of amateur radio and was pleased with the conduct and outcome of the recent Amsterdam Island trip. Stamp collectors will want to monitor the website carefully as there may well be a special Tromelin issue around the time of the FT4TA DXpedition.

Phil, ZL3PAH, Geoff, ZL3GA, Paul, ZL4PW and Gordon, G3USR will be active as YJ0X from Efate (OC-035), Vanuatu on 3-15 October, including operations in the SSB and CW weekends of the Oceania DX Contest (see www.oceaniadxcontest.com). They will run at least two stations with amplifiers on CW, SSB and RTTY on 6-80 metres and are still thinking about 160m. QSL via ZL3PAH (OQRS on *Club Log*); logs will be uploaded to LoTW within three months. More information can be found at http://yj2014.wordpress.com

Jacek, SP5EAQ and Marcin, SP5ES will be active as ZK3Q and ZK3E (requested calls) from Nukunonu, Tokelau (OC-048) starting on 8 October for three weeks (dates may change due to transport problems). They will operate SSB and CW on 10-80 metres. Some activity from Samoa (5W) is planned in early November on their way back home. Check http://zk3.sp5drh.com for updates.

THE CRIMEA. The ARRL has issued some clarification about the DXCC status of stations in the Crimea. The position is that a QSL with a callsign issued by the administration of Ukraine and showing the entity name as Ukraine counts as Ukraine. A QSL with a callsign issued by the administration of Russia and showing the entity name as Russia counts as Russia. A QSL that satisfies neither condition does not count for either entity. It seems that the same station could conceivably change calls and count for two different DXCCs – a situation that has occurred once or twice in the past.

CORRESPONDENCE. Dave, M0BVE was busy on CW last month and worked Mali, Angola, British Virgin Islands, Afghanistan, East Malaysia, Barbados, Vietnam and Korea on 10m; Tajikistan and Thailand on 12m; Papua, Bahrain, Taiwan, Palau and Philippines on 15m; Djibouti on 17m; Ecuador and French Guiana on 20m; Galapagos, Austral Islands, Haiti, St Vincent, and Easter Island on 30m.

Fred, G3SVK found conditions very variable but worked a vast amount of CW DX on his dipole antenna farm. On 10m he worked Antarctica, Hawaii, Japan, Guam, New Caledonia, Austral Islands, Malaysia, Thailand, Vietnam, India, Pakistan, Rodrigues Island, Namibia, South Africa, Afghanistan, Djibouti, Barbados, Grenada and Guadeloupe. 12m produced Japan, Papua, Myanmar, Sri Lanka, India, Saudi Arabia, Djibouti, Maldives, Madagascar, Cuba, Barbados, Jamaica, Bahrain, Guadeloupe and St Vincent. On 15m he found Austral Islands, Japan, China, Thailand, Mongolia, Saudi Arabia, Pakistan and Reunion Island. 17m highlights were Guam, Palau, New Zealand, American Samoa, Hawaii, Austral Islands, Singapore, Angola, Mellish Reef, Congo, and New Caledonia. On 20m the DX included Australia, Guam, Austral Islands, Hawaii, Micronesia, Mali, Nepal, Sri Lanka and India. Best DX on 30 was Guam, Austral Islands, New Zealand, Australia, Galapagos Islands, Japan and Alaska. Finally, Fred was particularly pleased with his 40m haul that included the Austral Islands, Alaska, Hawaii, Korea, Myanmar, Nepal, Costa Rica, Mexico, Sri Lanka, Maldives, India, San Andres and Guatemala.

Peter, G3HQT thought conditions had dropped off a bit at his QTH compared with February but he still kept his DXCC score moving along. On 10m he worked Mozambique (CW) and Surinam and Guatemala (RTTY); 12m Myanmar (CW) and Honduras (PSK); 15m Singapore, St Helena, Mauritius, and Congo (CW) and Indonesia (RTTY); 20m Mali (CW), Burkina Faso (PSK) and British Virgin Islands (RTTY); 30m Galapagos Islands (RTTY); and on 40m CW Austral Islands, South Korea, Maldives, San Andres and Cape Verde Islands.

Peter, G4XEX thought March was a great month and took advantage of the DX contests by coming on in the last few hours after all the big guns had worked each other. He bagged two new countries – Eastern Kiribati and Haiti. Other DX included Myanmar, Laos, Mongolia, Afghanistan, Iran, Mozambique, Zambia, Namibia, St Helena and the Falklands on 10m; Korea, Hong Kong, Papua, Annobon and Zambia on 12m; and Angola and New Caledonia on 15m.

THANKS. As always, thanks to DX-World, 425 DX News and Daily DX.

Table 2: 2014 worked DXCC entities.

Call	CW	SSB	Data	All
G3UEG	0	222	0	222
G3SVK	203	0	0	203
G4ZOY	143	152	118	196
G3HQT	176	0	82	180
M0BVE	162	0	0	162
G4XEX	0	145	67	145
G4FVK	53	78	0	98
G4IDL	90	0	0	90

Table 3: Forthcoming DXpeditions.

Until 27 May	3B8/M0RCX
20-28 May	T88WI T88WH
28 May – 3 June	A35JP/P
29 July-2 Aug	VK9C by JA ops
2-8 Aug	VK9X by JA ops
Late September	5V by OK ops
3-15 Oct	YJ0X
8-29 Oct	ZK3Q ZK3E
30 Oct-10Nov	FT4TA

June 2014 • RadCom
Richard Staples, G4HGI • e-mail: g4hgi@live.com

VHF UHF

New 70cm beacon network NoVs issued

INTRODUCTION. Some exciting news came from Murray, G6JYB regarding the approval and release of new NoVs for four new beacons in the 70cm band and the change of frequency for the two existing beacons. Since the demise of the Bristol, Emley Moor, Sutton Coldfield and Lerwick beacons there have been no UK beacons available apart from the outstanding long term service of GB3MCB and GB3ANG. The RSGB 70cm Beacon Project was launched by Murray at a talk given at the 2010 RSGB Convention, but has its roots further back, starting with the 2002 IARU frequency changes. After negotiations with Ofcom and the Primary User, we have finally obtained NoVs for all the new beacons effective from 1 May 2014. All the beacons will be F1 keying and we hope that most/all will be including JT65 using new synthesisers courtesy of the Propagation Studies Committee led by John, G4BAO. The new beacons are GB3FNY, GB3LEU, GB3NGI and GB3UHF, see **Table 1**. Testing is underway, however it will be some months before all come on air. Further news to follow as this excellent project develops.

EXPEDITION NEWS. David, G4DHF and Julian, G4YHF report on their recent trip to GM activating two rare locator squares. "Our early spring trip to IO66 and IO88 was basically a holiday jaunt with a little radio, although we did take a good deal of equipment! Over the last 35 years, travelling with our good friend Keith, G4ODA we have activated all GM grid squares, including IO79 (Rona) and IO57 (Kilda) so this was yet another welcome return visit to the mainland. We were both interested in finding if people actually monitor the VHF calling frequencies or rely on internet spotting for information, so there was no prior announcement of our planned visit. Our IO66 QTH had a wonderful take off to the NW but was in a valley surrounded by mountains. The next best take off was to the SE, but the land rose some 100m within a few kilometres so we opted to use an 11-ele Yagi and run FSK441 on meteor scatter.

"We had intermittent mobile phone signals and no internet access. For two days we called during the early morning, late afternoon and evening on 144.370MHz simplex and split on 144.361MHz, running 400W and LNA with no success. A drive to Kilchoan gave us phone coverage and when we announced that we would be QRV on 144.361 later that day we had a string of takers. Over the next few days, 27 MS QSOs were completed covering most of EU at a QRB of around 1900km.

"At the end of the week we drove across the Great Glen to our next location at Rockhead near Dunbeath in IO88. This cliff edge site had a great take off to Central Europe and the UK. It was so good we could regularly hear GB3VHF in JO01 at over 800km. At the beginning of the week we called on 144.370MHz simplex and 144.361MHz split for several hours again with no success. It took DX spots by Clive, GM4VVX to alert others that we were QRV. In fact, Clive had been relaying information of our activities, for which we thank him. Around 30 MS QSOs were completed with many of the same stations worked in IO66, but with far stronger and longer bursts, some lasting over 20s in duration. Julian (YHF) was active during the 144MHz UKAC and gave many stations a rare multiplier as far south as IO81. Had other stations in the Midlands not been QRV on the same frequency, many more contacts would have been made. We were ideally placed for any auroral activity but sadly had no propagation. These comments on our activities are not intended as criticism and are simply our observations during a short trip to two relatively rare squares on 144MHz. During major showers with increased activity we know that we would have easily doubled our number of completed QSOs. Many have witnessed that there is, on occasions, the temptation for participants to suggest ongoing QSO information in real time via the internet, the classic being, 'We only need one more stone', effectively telling the other operator that both calls and a report have been received and that "Rogers" are being transmitted. We embrace new technologies and no one is expecting that we turn back the clock, but QSO integrity should remain paramount, regardless of any additional aids that may be available. The one letter difference in our callsigns required stations to listen particularly carefully rather than relying on what had been spotted on the DX Cluster. This largely non-internet activation on our part was interesting and our findings were not too surprising. The enjoyment factor was, however, still undiluted."

Dave, G7RAU/P (IN79JX) activated this rare square from the Lizard 'holiday style'. Dave was QRV on most VHF/UHF bands and particularly 70cm during the Sunday activity period on 20 April logging F6DQZ, MOBTZ, F1DRR, G4RRA, GW8ASD, F8BRK, G4HGI and GD8EXI. Other bands were activated with 2m producing 29 QSOs, 6m 9 QSOs and 23cm 2 QSOs. No JO01 or PA stations worked even though GB3VHF and PI7CIS were solid signals for a couple of days.

Bo, OZ2M runs a fantastic DXpedition 'shout box' with up to date postings by VHF/UHF xxpeditioners who activate rare locator squares and DXCCs **[1]**.

BAND REPORTS. John, GW4MBN (IO71) reports QSOs via TEP and MS on 6m using the ISCAT-B mode in the *WSJT* suite of software. At the beginning of April, via TEP, John worked ZS6AYE and ZS6NK with John's signal also being decoded at the time by ZS6A and ZS4TX. Meteor scatter QSOs included HB9FLU, F4GWG, EI7BMB, EA3KU, ON6NA, DF6HT, DC8TS, DL5WP, LA4YGA, GM4VVX, PA2J and DM2ECM. As a long time user of *WSJT*, John observes that with JT6M (in its WSJT7 incarnation, not the WSJT10 beta) you could decode 'live' by clicking in the SpecJT window during the cycle, to get full or partial decodes on very short bursts. With *ISCAT* you have to wait until the end of the cycle and let it work out its average. When using *ISCAT*, it's tempting to click as well, but this often produces garbage. If you wait until the end of the cycle, however, you get good decodes. John thinks *ISCAT* is definitely more sensitive. Signals that are inaudible and invisible on the spectrum (less than -20dB) can still decode perfectly. The ZS TEP signals were sometimes quite strong (ZS6AYE came up to -1dB) but mostly consisted of 2 or 3 second bursts so *ISCAT* was the ideal mode. He found this last year also when working VE via multi-hop Es.

Two reports from Peter, G8BCG from IL39 and IO70 this month. His DX activities can be reviewed on Peter's website that now contains a Blog with a daily diary of events **[2]**. There are also links to his YouTube channel, audio files and information on working 6m DX. On 27 March, after arriving at the house in the Canary Islands at midday, Peter had the antenna up and running by 1645 working D4C, C5YK and CE8B at 599. Later in the afternoon 9Y4VU, FG4NN, FG5FR, EA8DBM (backscatter), J69MV and

9Z4AMA were worked at 59. Continuing through the evening, the following were heard/worked LU5FF, 6V7SIX, TJ3SN/B, LU5FF/B, CX1CCC, LU5FTF, ZD7VC, ZD8VHF, LU5EGY, LU8DCH PR8ZIX, FM1ZAC, FY7THF, J88ARC, 9Z4AMA and 9Y4VU. The band stayed wide open to PY, LU and CX until at least 0200UTC, at which point Peter fell asleep! The period 29 March to 4 April brought more extreme 6m DX in IL39, the highlights being a new propagation mode 'Mountain Scatter' or knife edge propagation? Being screened from 20° to 180° by steep cliffs Peter heard ZS6EZ weak on CW peaking at 90°! Also worked were ZS6NK, TJ3SN, V51YJ and S57RR plus TR8CA and D2EB at good strength. A case of never say never! The OA4TT beacon was copied as was CP4BU but not worked.

On 5 April, Peter returned to IO70 and to some great weather. The V51YJ/B beacon was loud and using good backscatter conditions he worked PA2M, F8ZW, F1UJS, F2BLQ, F5BZB, F6BKI, IS0GQX and a great QSO with Angelo, IG9/I2ADN. Openings on the 7th and 9th brought QSOs with Bruce, ZD7VC and EME initials KD3UY and UZ5DZ, where Peter was delighted to give Vlad his first 6m EME QSO. On the 14th, 6V7SIX/B and C5YK were copied at 599 for about 45 minutes. More new initials on EME were worked, Oliver, DJ2TX (DXCC # 54 via EME) and Hannu, OH3DP who was running just 150W and 6-ele Yagi and another first EME QSO.

On 15 April ZL1RS spotted ED7YAD/B and within minutes, alerted by this, he had worked EA9(!) and EA7. Who said beacons are of little use these days!

Lyn, GW8JLY (IO81) was disappointed by the lack of activity on 2m SSB and although QRV almost daily, rarely does anyone reply to his and others CQ calls. Lyn's focus now, barring contests or openings, is using digital modes to work DX. Daily tropo JT65a tests are completed with PD0HCV (JO31) at 669km and regularly with DL6YBF (JO31) at 723km. The signals vary with conditions and range from full speaker copy, to weak but decodeable copy. Lyn has now worked many PA, DL and F stations using this mode up to a QRB of 750km on a flat band. Lyn's prolific meteor scatter log included EB5AL (IN90) and GM4YHF/P (IO66 &IO88) for new locator squares who was worked via back scatter (BS), where both stations point to a common reflecting area. This was necessary as the direct path to GM was blocked by high mountains. With no elevation system Lyn has also started making Earth Moon Earth (EME) QSOs for the first time on his moonrise. On 4 April, Mark, EI3KD suggested he tried with HB9Q who was producing a big signal via the moon. At only a few degrees above his horizon Lyn was amazed to copy the JT65b CQ from HB9Q and a completed QSO resulted. Amazingly, 3 other stations copied Lyn's signal via the moon (G4SWX, RZ3BA/1 GM6VXB). Subsequent QSOs have been completed with I2FAK, DK3WG and UA3PTW. The VK3UM EME Planner is an excellent tool to establish moon availability [3].

John, G4SWX (JO02) reports a fair month on the 144MHz DX band this time. On 24 March he completed with Martin, GM6VXB/P who was on N Rona (IO79) running a fairly new digital mode, PSK2K developed by DJ5HG [4]. Having never used this software before, John downloaded it, set it up and the QSO was completed even though Martin was running low power on depleting batteries and a small Yagi antenna. Unfortunately, John missed GM6VXB/P the following day from St Kilda (IO57RT) as there was no tropo and few meteor reflections from him. GM4YHF/P (IO66) was worked despite only being 696km away, worked with 40° offset and 12° of elevation. On 31 March John worked GM4DHF/P (IO88) with really strong 12-15dB bursts with a similar offset. Unless the expedition is a very long way away >1700km, or beaming in the opposite direction you simply have to work out where the common volume of E layer is and beam at it! FR/DL1RPL (LG78) was also worked despite the mega pile-up for square # 593 since he came back on the band 2.5 years ago.

During the April Nordic Activity Contest, John worked most of the 'regulars' at 600/900+km, the best being SK6QA (JO58) at 918km plus a full contest exchange with Clive, GM4VVX using meteor scatter. Moonbounce was good with 111 QSOs. New stations included: VK2DVZ (QF68), N5TM (EL29), W1AW/1 (FN34) special event, RA9DA (MO17), K0KUK (EM28), LA3EQ (JO28) and HS0ZFZ (OK03) very rare on EME. Martin, GM6VXB/P came on from IO76 on 30 March; Wayne, VK5APN was worked in QF01 on 8 April and in QF02 on the 9th. 9Y4TBG (FK91) was worked on the 8th and HB0/PA2CHR was worked on the 11th via EME and on the 12th via MS.

Kev, G0CHE (IO90) reports on his continuing good successes in working DX on 2m. Although always difficult with a single Yagi and no elevation, Kev has worked 19 initials on EME including SK6EI, HB9Q, S52LM, ES3RF, UR3EE, SP4K,3Z4EME, EA6VQ, I2FAK, UA3PTW, YL2GD and S56P. 2m MS QSOs in the log included SM5EPO, OK2PM, DL8SCQ, EA4QR, SM3EPC, GM4YHF/P, IK0BZY, IW4ARD, EB5AL, IV3DXW, IW4BET, DK5OX, EA4QR, YU7TRI, DK5OX, SM6CEN, DM2ECM, YT3N, EA1YV, IW4ARD and HB0/PA2CHR for a new DXCC. Tropo highlights were F4AZF, GI4SNA, DP7X, DK0TR and G7RAU/P in IN79. On 6m there were TEP/F2 QSOs with ZS6EZ, V51YJ, XT2AEF and TZ6BB.

Leiston ARC (JO02) have established their own activity contest that has been a great success. Running on 145MHz FM on the 4th Tuesday of the month at 8 to 9pm, the objectives are to get members on the air and to provide opportunity for skills and development in terms of operating and logging. Check out the clubs website for more information [5].

PSK31 144MHz ACTIVITY. Rob, G7LAS has started a Facebook page to highlight an activity programme for PSK31 operators [6]. The group aims to encourage operations with regular Thursday night activity periods on 144.138MHz. Everyone is welcome and it would be great to see growing activity in this part of the spectrum and experience some of the interesting properties of this band/mode combination.

SIGN OFF. Thanks to all the contributors this month. Indications while writing this have been some very small openings on 6m in Southern Europe so hopefully by the time this edition is read there will be some DX on the lower VHF bands.

Table 1: UK 70cm beacon project

Callsign	ERP	Heading(s)	Freq (MHz)	Location
GB3ANG	50	170°	432.453	ANGUS
GB3MCB	20	45°	432.470	ST AUSTELL
GB3LEU	50	135° & 300°	432.490	LEICESTER
GB3FNY	50	90° & 180°	432.445	FINNINGLEY
GB3NGI	250	125°	432.482	BALLYMENA
GB3UHF	160	288° & 348°	432.430	FAIRSEAT

Key: Red indicates a frequency change and twin headings means that power is split into two Yagis. Details at www.microwavers.org/?maps/70cms-plan.htm

WEB SEARCH

1: www.rudius.net/dxp/
2: www.g8bcg.org.uk/
3: www.vk3um.com/eme%20planner.html
4: www.dj5hg.de/digitalmodes/digitalmodes.html
5: http://larc.org.uk/Contest.html
6: http://tiny.cc/a4ledx

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ProSet Elite 6 ..... £179.99
ProSet Icom..... £179.99
Heil Radio Adaptor ..... £20 (specify-model)

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AT-200 PRO II 1.8-54MHz/250W/10W	£219.99
AT-1000 PRO (1.8-54MHz) 1Kw	£499.99
AT-897 plus bolt-on ATU-897	£185.95
YT-100 ATU for 857/897	£177.95
Z-817 ATU for FT-817	£119.95
Z-100 plus ATU FT-817	£134.95
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GHz Bands

Calculating your interference potential on 2.3GHz – and plenty of activity to report

CHANGES TO 2.3 AND 3.4GHz. Most readers will now be aware (*RadCom*, May 2014, p10) that following a consultation on Public Sector Spectrum Release (PSSR) last year, Ofcom has decided to remove from the Amateur Radio Licence, 2350 to 2390 and 3410 to 3475MHz, giving amateurs at least twelve months' notice of this intention. The good news is that after an excellent response from the amateur GHz bands community to the consultation, Ofcom has also decided to retain amateur access to the adjacent bands, namely 2310 to 2350 and 3400 to 3410 (with some restrictions) and will shortly be introducing NoVs to allow operation from 2300 – 2302MHz. Hopefully by now, all 2.3GHz stations will have responded to the Ofcom request to register their use and provide contact details to Ofcom. The restrictions, with immediate effect, limit use of 2310 to 2350MHz for stations in range of three key locations during 'typical daylight hours on business days'. These locations are St Kilda (NF094987), Aberporth (SN247518) and Boscombe Down (SU172404).

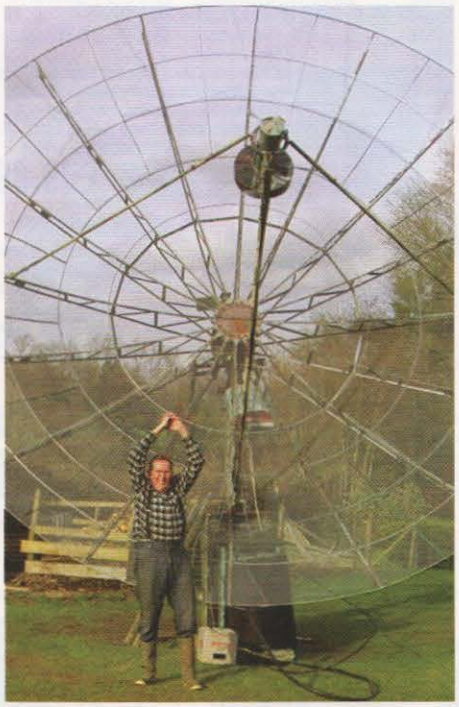

PHOTO 1: G3LTF celebrates the completion of his dish upgrades.

CALCULATING SIGNAL STRENGTH AT A DISTANCE. So what do I mean by 'in range'? The technical definition of this is given in Appendix 1 of the full PSSR document **[1]** and is defined thus: "amateurs must limit the received power at the Sites from their stations (including temporary or mobile use) to below the thresholds specified". As I am a long way from St Kilda and Aberporth, I decided to look at my signal in to Boscombe Down, where the threshold is defined as -129dBm per carrier in to a 0dBi antenna at 15m AGL for 50% of the time for normal conditions and 10% of the time for 'lift' conditions (Appendix A1.16). I used the excellent SRTM path profile program from Mike Willis, G0MJW **[2]**. Putting in my antenna, height, ERP and a receiver at Boscombe Down at the specified 15m AGL I come up with path losses for the 182km path from JO02CG33 of 218dB and 210dB for 50% and 10% of the time respectively. My Tx power is 60W (+48dBm) and antenna gain for my quad loop Yagi is 19dBi, giving me an EIRP of +67dBm. Subtracting the path losses from this leaves a signal of -151dBm and -143dBm at Boscombe down for 50 and 10% of the time respectively. I can breathe a sigh of relief and carry on (responsibly of course!) as it's well below the limit. Mike's program takes account of terrain and other factors such as diffraction, but we can estimate the path loss due to pure tropo scatter (the likely over-the-horizon propagation mechanism) using the Smooth Earth Tropo Scatter loss formula from p3.8 of the RSGB *Microwave Handbook* volume 1. **[3]**:

Mean Loss (dB) = 55.5+20log(D) + 30Log (F) +1800D/π R

where D= km, F= MHz L= dB R =4/3 Earth radius = 8500

Crunching the numbers with a calculator gives a path loss for 182km of 214dB, pretty close to Mike's program's value of 218dB and probably good enough if you are well away from the target site like me as it errs on the low side. Do make sure you do this calculation if you are planning to operate on 2.3GHz.

ACTIVITY NEWS. One consequence of the changes to 2.3GHz is that the monthly SHF UKAC contests have moved to Sunday nights from May onwards. The events now take place on the Sunday of the third full weekend of the month, at the slightly earlier times of 7-9.30pm clock time. This is to avoid any possibility of interference to Primary User services in some parts of the UK. It will be interesting to see what effect these changes have on activity. This may not suit everybody, but actually I'm quite pleased. I've been campaigning for more activity outside of Tuesday nights for some time, so maybe Sunday evening can become something of an activity night for all the microwave bands. The April SHF UKAC seemed like hard going for me, with stations especially on 10GHz well down on normal, but others said conditions were up a little. Leaders on 2.3GHz at the time of writing were G8OHM in the Open section and G4NBS in the Restricted section. The best DX I managed on the two bands I'm currently active on were G4KUX (IO94BP) at 298km on 10GHz and PE9GHZ (JO11WM) at 266km on 2.3GHz. It is pleasing to see an entry from relatively new licensee, Dan, 2E0NNX in both the 3.4GHz and 5.7GHz sections of the April SHFUKAC. Dan's web page **[4]** shows that he has a wide range of interests within the hobby. Good to hear from Shaun, G8VPG (IO81SJ) who describes himself as a 'newcomer to narrowband microwaves', but he's being modest as he's been active on 23cm ATV for 30 years or so! He writes, "I have been dabbling with satellite TV for about the same time I have been on 23cm ATV, so I thought another LNB would be useful and ordered one". To try it out as a receive converter for 10GHz, he mounted it on a 60cm prime focus dish and used a cheap satellite splitter with power feed through to provide 12V to the LNB. The 618MHz IF was a FUNcube Dongle Pro+ SDR and a small laptop PC running HDSDR software. Shaun took the system up 200m ASL to Tog Hill, IO81TK and copied GB3CCX (IO81XW) on 10368.940MHz over a path length of about 60km at some 20-25dB above the noise. With 12V on the LNB, he needed to turn the LNB through 90° to get the polarisation right as most LNBs use a 12/18V supply to switch polarisation V/H. **Figure 1** shows a still of his recording from HDSDR. The LNB frequency was about 52kHz out and did drift somewhat but settled down somewhat after 20-25 minutes. Shaun's next plan is to take it up to another hill top with an outlook towards the South & West, to see if he can receive the Taunton and Swansea beacons. I look forward to hearing your results Shaun, and hope you get the bug enough to build a Tx as well.

A couple of EME reports this month, on the *Dubus* 5760MHz event. Peter, G3LTF, now with 2dB more power (40W) and about 1.5dB more dish gain after rebuilding his dish had a much more productive contest than previously. **Photo 1** shows Peter celebrating the completion of the upgrade in front of this magnificent 6 metre diameter dish at his home QTH. On the Saturday he worked 29 stations on CW, including

PHOTO 2: The 55-ele Yagi and 'EME in a toolbox' for GS3PYE/P.

2 initials, SM6CKU and LA8LF. On the Sunday, he worked more including TM8PB on SSB. Ben, SM6CKU made his 6cm debut on Saturday with the help of SM6PGP. Measuring more than 16dB of sun noise from his 4m dish and 48W at the feed, his first QSO was with OK1CA. Later, Ben had what he described as 'a pileup of Gs', namely G3LTF, G4NNS and G4CCH, and went on to work many more stations over the weekend despite some moon tracking problems.

BEACON NEWS. It's good to hear that the new GB3PKT 10GHz beacon near Clacton (JO01MT) is operating well. It's a good consistent signal here, but weak enough to show up Tropo or RS events. Petra, G4KGC emailed me to say that she drove home from the continent with a 15dB horn antenna in the car for listening to 10GHz beacons. She started hearing GB3PKT just before Dunkirk and was a good signal all the way to Calais. Then after driving up the hill a little in Dover, there it was again, on and off and she copied it all the way home to IO92RG, Northants, sometimes at S9. Also briefly heard were GB3SEE and later GB3LEX for a few minutes. Propagation was interesting. Around Dover there was a lot of back scatter, later ducting and also some aircraft scatter. During the drive, it was foggy with a lot of temperature changes, suggesting ducting. It's quite amazing what a tiny antenna, inside a car, pointing in the wrong direction, can hear on 10GHz! I'm inspired to rig up my 10GHz RX converter and small slotted waveguide antenna in the car again! Josemi, EA2TZ reports that his beacon EA2TZ/B IN93BF, 1296.8550MHz is back on and now running with a 10W amplifier. He fixed several problems including coax with a SWR of 3:1 that has now been replaced by Ecoflex15. The antenna is a temporary biquad, as Josemi reckons it will not stand high winds!

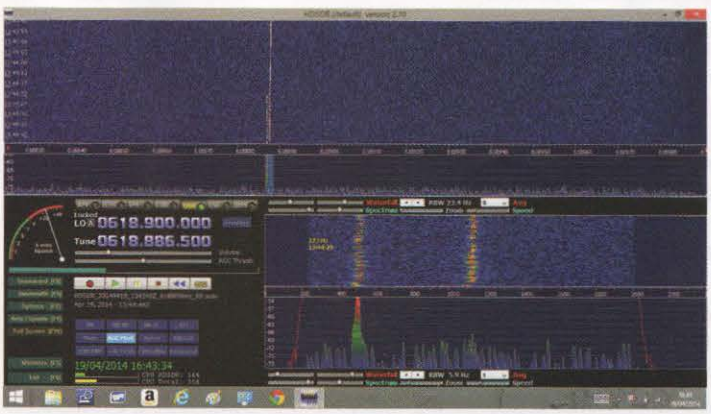

FIGURE 1: GB3CCX 10GHz beacon received on an LNB by G8VPG.

HAM RADIO HOLIDAY TIME. I write this column three days before departing for the Isle of Lewis (IO68UL) with the Camb Hams DXpedition **[5]**, so I plan to report on our 1296MHz QRP EME operation in the July issue. Our system runs 150W to a single 55-ele Tonna Yagi and a G4DDK VLNA23. The outdoor PA and PSU (**Photo 2**) are in a wheeled toolbox! I've already tested it all from home and it's pretty borderline, so I'll be pleasantly surprised if I work more that the 'big guns'.

The test was very worthwhile though, as it shook out a number of bugs in the system and was the first use of my TS-2000X direct on 1296 for JT modes. First of all, the rig was 890Hz off frequency, so I reset the reference against a rubidium-locked signal generator and I should now stay within 100Hz or so. Secondly the dreaded TS-2000X fan drift was very obvious. This is where the rig drifts about 50Hz or so on 1296 every time the cooling fan starts up. I did the K0BT modifications [6] that make the fan run continuously but slowly all the time and that seems to have done the trick. Nice one Bob for that simple mod! The two 'big guns' I worked on JT65C during the test, HB9Q and UA3PTW, were 'CW copy' level. The other station I worked, I1NDP would probably also have been workable on CW with some effort. After about 2145, the Moon was behind some trees so that would probably explain my failure to hear people after that time. The Isle of Lewis is far enough north not to have many trees, so that will not be an issue from GS3PYE/P. More reports on this next month.

WEBSEARCH

[1] Ofcom PSSR statement – http://bit.ly/1reb7C8
[2] Mike Willis' website – www.mike-willis.com/software.html
[3] RSGB *Microwave handbook* Volume 1 p3.8 (sadly now out of print)
[4] 2E0NNX's website – www.dan.me.uk/2E0NNX
[5] Camb Hams Isle of Lewis DXpedition – http://dx.camb-hams.com
[6] TS2000X Fan drift modifications – look in the Kenwood TS2000 section of www.mods.dk/

June 2014 • RadCom
Andy Talbot, G4JNT • e-mail: ac.talbot@btinternet.com

Design Notes

Third Method SSB, smart phone audio interfacing and using a mixer for gain control

A CORRECTION. Martin Farrell, G8ASG contacted me about an error in April's Column. He wrote, "Can I point out that Figure 3 doesn't work? The BSP452 doesn't invert so the neat trick used in Figure 2 of Rx = [not]Tx fails." He is, of course, perfectly correct. Simply replacing FET switches with BSP452 devices isn't quite as simple as I suggested. You will still need an inverter such as an extra transistor or FET to swap the logic drive to the gate of one of the high-side switches. Unfortunately, the error came about as I drove these directly from sequencer using logic level output from a PIC with Tx and Rx on separate lines and didn't stop and think when drawing the diagram. If an inverting version of the BSP452 were to exist, then Figure 3 would work as intended but, as shown, it doesn't.

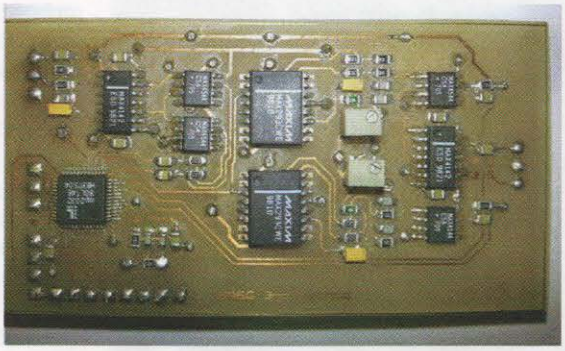

PHOTO 1: G8ASG's Third Method SSB generator using CMOS switches and switched capacitor filters.

THIRD METHOD SSB GENERATOR. Martin then wrote "Your article sparked a few thoughts, I've always been intrigued by the Third Method. You re-awakened my interest earlier with your request for a dsPIC generator (October 2013). So I thought I'd have a go and played with sin/cos oscillators and multiplying by the audio from the 12 bit ADC. Then I remembered a design I did a few years ago for an SSB generator for a free space light link. It used a subcarrier at 455kHz as I was using an IF transformer as a simple tuned optical receiver. I've lost the circuit but you can see the principle from **Photo 1**. The gate array produced all the clocking for the 1800Hz switched capacitor filters and remixing to 455kHz from a single crystal below the PCB. *[The MAX293 is an 8th-order, lowpass, elliptic, switched capacitor filter. Its 1.5 transition ratio provides sharp rolloff and -80dB of stopband rejection. The MAX4142 is a 250MHz, low-power, high output current, differential line driver and the MAX4544 a SPDT CMOS switch (an alternative to the FST series of bus switches often seen in SDRs such as the SoftRock) – JNT]*

"The point of this is that the first mixers are digital switches fed with quadrature 1800Hz and followed by 1700Hz low pass filters. You don't care about the 3rd, 5th etc products from the square wave LO, as they are filtered out. In a dsPIC version surely the same result is achieved by alternatively inverting the ADC output at 1800Hz and filtering the result by the normal FIR filters. This really simplifies the software. I know it produces intelligible SSB as my H/W design sounded quite good but I didn't care about or check any spurious products as it was an optical link.

"Is there any advantage in using a sin/cos oscillator? From what I can see, all you need is the ADC, a quadrature square wave inverting the ADC, two FIR filters and a pair of DACs. Only the FIR filters will take any processing time if I use a dsPIC with built in DACs."

Martin's idea is seems reasonable for a hardware solution. Low pass filtering will always follow the downconversion that folds the audio channels onto themselves. So if high order switched capacitor filters are used there is less need for a clean audio mixer with low LO sideband levels, so a square wave quadrature LO will suffice. Identical switched capacitor filters will hopefully be able to maintain accurate phase tracking to keep the essential 0/90 degree phase separation between the baseband outputs.

However, it has to be said that in a DSP implementation, generating a proper quadrature LO is a very straightforward thing to do, involving just a table lookup to get the current sin/cos values, followed by two multiplications. The resulting clean mixer product, with just images to be filtered rather than images as well as a complete set of sidebands, may simplify filter design and hence lead to a lower time latency.

AUDIO INTERFACING. Many smartphones and small notebook PCs combine their soundcard audio interface into a single connector designed for a combined headset / microphone combination. An 'almost' standard has developed, with a single 3.5mm four way jack connector carrying stereo headphone outputs and microphone input with bias for electret mics. The four way jack is similar to the standard three way type used for headphones, except that there are now two rings in addition to the tip and body connections. These are often referred to as TRRS (Tip Ring Ring Shell) connectors. To maintain compatibility with three way headphone-only usage, the connections for the second ring and the shell are reversed. The second ring is used as the ground connection and is the common for the headphones, while the body, or shell, connection is used for the microphone. This odd configuration means that when using the microphone input with a four way connector, a plug with a plastic outer shell is advisable to prevent inadvertent shorting of the mic input.

With only a microphone input available, if we want to use a PC or device with one of these connectors for datamodes, the audio from the receiver has to be attenuated to a level of a few millivolts in order to not

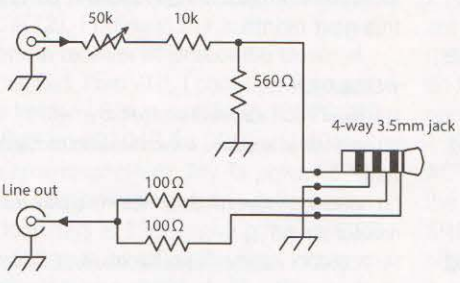

FIGURE 1: Interfacing audio line level signals to the combined microphone / headphone connector seen on handheld and notebook computers.

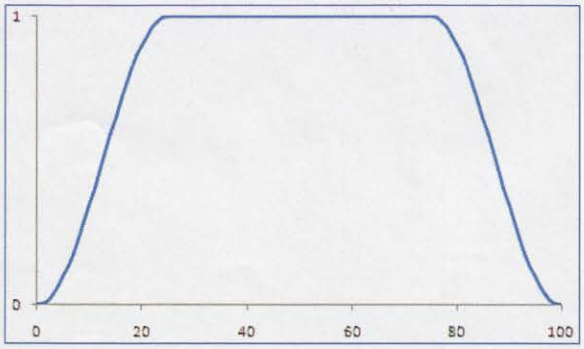

FIGURE 2: Raised cosine waveform shaping on a CW pulse to control sidebands and keyclicks.

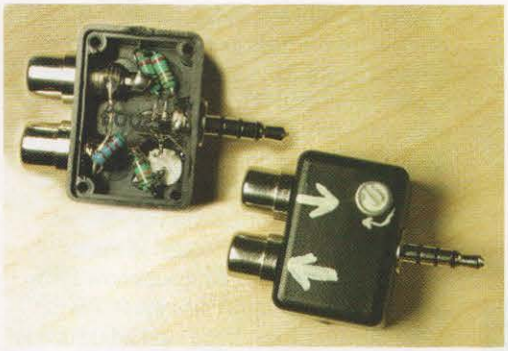

PHOTO 2: The notebook interface module of Figure 1 built into a self-contained plug-in module.

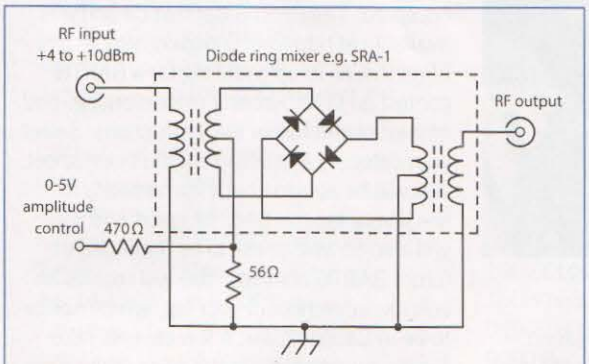

FIGURE 3: Driving a diode ring mixer from a DC voltage while maintaining a 50Ω source resistance.

overload the input stages. **Figure 1** gives the circuit of a suitable attenuator and shows the jack connections. A preset pot has been included to allow the optimum audio input level to be set. Resistors have also been included on the headphone outputs so both left and right channels may be combined into a single mono output. Although not shown, an additional potentiometer could be added to control Tx drive level. **Photo 2** shows this circuit built into a small interface module. The jack connector was mounted to the plastic box by drilling a hole slightly smaller than the diameter of the thread then screwing the body into it. Epoxy-resin glue was used to fix the body in the plastic case. The phono connectors were mounted the same way.

Do note that not all devices use the same wiring and it's well worth checking how things are arranged *before* you build your own interface box.

DIODE RING MIXERS AT DC.

A recent series of discussions on the RSGBTech Yahoo Group discussed the merits of different rise and fall shaping to a CW waveform and how these influence key clicks, readability and occupied bandwidth. On the GB3RAL and GB3VHF beacons the CW keying waveform is generated using a DDS that allows the output amplitude to be set to a programmed level. So here the rise and fall shapes are set via software by setting a new amplitude from a table of values approximately every 300μs to generate a proper rise and fall shape. On GB3RAL the shape is a raised cosine such as that shown in **Figure 2**. But if the RF signal is generated at a constant amplitude such as from a PLL synthesiser, how can the amplitude subsequently be tailored to give the wanted shape?

Many double balanced mixers (DBMs) such as the SRA-1 and SBL-1 (as well as a myriad of others for higher frequencies) give direct access to the diode ring via the IF port, allowing this to be used down to very low frequencies. So I wondered about how linear these may be if the IF port actually were driven with DC. Clearly a test was needed. All the 'rules' state the ports of such a mixer need to be properly terminated, so the circuit of **Figure 3** was used to present a 50Ω resistive load to the IF port with a 0 – 5V signal input range. The impedance seen by the mixer is 50Ω, formed of the 470Ω and 56Ω resistors in parallel. The LO port of the ZLW-1 mixer (a packaged version of the SRA-1 with SMA connectors) was driven with an input signal of +4dBm at 50MHz. The power coming from the RF port was measured using an AD8307 based power meter (with a digital readout in dBm) as the DC voltage on the input to the potential divider was varied over the range 0 – 5V.

Varying the control voltage gave nearly 50dB amplitude control range. A plot of output level in dBm versus control voltage is not particularly helpful for showing linearity, so the results were entered into a spreadsheet with the RF output level converted to a relative voltage, shown in **Figure 4**. The line is remarkably straight over the 0 to 4V region and only flattens slightly over the last bit, suggesting that at least 40dB of linear amplitude control is possible. As a final check, the mixer drive was increased to +10dBm and the measurement repeated. The linearity was now maintained up to 5V. The complete spreadsheet with all the measured results can be downloaded from **[1]**.

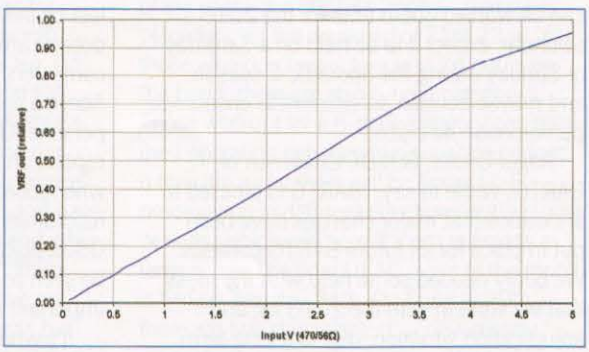

FIGURE 4: RF output voltage vs DC control for a diode ring mixer.

GENERATING THE WAVEFORM. So we know the RF can be linearly controlled from a DC level of 0 to 5V. How do we now generate the correctly shaped and filtered DC waveform to drive the mixer to create the optimum RF rise and fall for the perfect keying waveform? What is the correct shape for the rise and fall of the RF pulse? It was this aspect that generated such a long running discussion thread on the Group, with the result that several members went away to do some deep mathematical analysis and modelling. A simple RC filter is a terrible choice. The analysis is too complex to go into here, but it does not do a good job of attenuating sidebands well removed from the keying rate. Those at several kHz away, where clicks are annoying, may only be 40 or 50dB down; those spaced a few 100Hz away only 20dB. It turns out that there are two waveform shapes that are an excellent compromise: these are the raised cosine and the Gaussian. The former consists of half a cosine waveform, raised so it sits above 0V and applied to the leading edge of the pulse. The reverse is applied to the falling edge. The other waveform is Gaussian and is derived from the Normal Distribution curve. Strictly speaking, this can only be an approximation as the true Gaussian curve goes to infinity at zero amplitude, but this is good enough for practical purposes.

The relative merits of which curve is best are too complex to consider here, but neither can be easily generated in any simple filter. It is possible to generate approximations to the Gaussian response using LC filters and tabulated component values for these do exist in the handbooks **[2]**, but the size of the inductors required make the approach impractical. So what other solutions exist? Opamp filters can, theoretically, be made that will meet any tabulated filter type. Opamp designs for complex filter types is not something I have any experience with; nor, apparently, do any others! So I'm investigating that route at the moment.

Another solution, probably simpler in terms of component count and cost, is to do it digitally. Since for any practical signal source there is likely to be a microcontroller running things, this might as well be used to generate the waveform via a lookup table, then program a digital to analogue converter to drive the mixer. A lookup table was, after all, the technique used with the DDS source for the existing VHF beacons.

WEBSEARCH

[1] Spreadsheet showing ZLW-1 mixer is used as a DC controlled attenuator – www.g4jnt.com/DownLoad/MixerAtten.xls

[2] *Handbook of Filter Synthesis*, Anatol I Zverev, ISBN 978-0471986805

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Sport Radio

Multiple entries to NFD, data contests and how to appeal against lost QSOs

PHOTO 1: G0OOR logging while M0MBF operates the Norfolk ARC B-station in CW NFD 2013.

REAL ENTHUSIASM. Norfolk ARC are well known for having a lot of active contesting members, but their members don't just flood 80m in the Club Championship series. Malcolm Prestwood, G3PDH wrote to tell me what they did last year in CW NFD. "Again we made NFD into a general radio interest and family weekend, by combining the contest with an activity weekend for all. For NFD itself we decided to enter three stations; Open, Restricted (simple antenna) and QRP. With several new and CW-orientated operators coming up through the 80m Club Championship series of contests, it was decided they should try their hand at NFD. Having never tried QRP in NFD, it was treated as a new venture and manned by just two of our 'senior' operators as an experiment, as they preferred to do only 12 hours this year. Surprisingly, whilst we were expecting to have time to read books between QSOs, we were kept fairly busy.

"The A-station in the Open section was mainly manned by many of our earlier B-station operators, thus leaving our B-station in the Restricted (simple antenna) section to newer converts to CW (**Photo 1**). The A-station used a 3-element Yagi plus LF dipoles with an Icom IC-756 Pro3, the B-station a 264ft doublet and K3, whilst the C-station (Low Power) also used a 264ft doublet but with a K2.

"This time the weather behaved itself and it was nice to have a fine, rain-free weekend with no thunderstorms. All the stations were on the same general site. Naturally our main concerns were interaction, but whilst this caused problems at times we were able to adequately coexist. In addition to the three NFD stations we also simultaneously operated a station in the 6m Trophy Contest that was running over the same weekend.

"Throughout the weekend a series of talks were given, mainly aimed at newcomers to the hobby and a superb demonstration was provided of aeronautical comms and navigation activity by some enthusiasts. With a roast meal on the Sunday this all culminated in an excellent weekend that was enjoyed by all, including the visiting families." Having treated the weekend as a 'general radio interest and family weekend', for Norfolk the results were always going to be mixed. Their A-station came 7th out of 9 and their B-station came 17th out of 20, but in the Low Power section their C-station came 2nd out of 9 and was awarded certificates for top score on 40m and 20m. What they clearly sought to do was involve as many as possible and develop talent for the future, which has got to be a good thing.

BITS ABOUT BYTES. The Contest Committee are looking at the possibility of running a datamodes contest on 6m. Such a contest is currently very much at the concept stage, so nothing is going to suddenly appear in this year's calendar. If details can be worked out in time for the 2015 calendar, expect it to be held on a Saturday or Sunday during the Sporadic-E season and maybe contain an element to encourage participation by clubs.

Roger Cooke, G3LDI, Chairman of BARTG, wrote to say, "BARTG is pleased to announce that major changes have been put in place for all future BARTG contests. We badly needed some help with the mess that we were in with the 2013 log and adjudication situation, due to a long-term illness problem. We tried several solutions, all of which failed, but with the help of Mike Goodey, G0GJV and Pete Lindsay, G4CLA we now have access to the RSGB Robot system of log submission. Pete has set up access for all BARTG contests and Mike has enabled us to use his adjudication software (which is used for adjudicating RSGB contests). The culmination of this is that Simone Wilson, M0BOX has volunteered to become the BARTG Contest Manager, so we are extremely pleased to welcome her to BARTG. Simone adjudicates the RSGB CC datamodes contests. It is a rigid adjudication system and as such it is extremely important that henceforth all entrants use *only* the robot for log submissions. No other method will be accepted. The BARTG Contest Calendar is available at http://bartg.rsgbcc.org/cgi-bin/hfreadcal.pl To upload a log for a BARTG contest go to http://bartg.rsgbcc.org/cgi-bin/hfenter.pl and follow the instructions. Select your category and complete the cover sheet. You will be able to check immediately to see if your log has been received and you will also be able to ask to be reminded of future BARTG contests. You will receive an acknowledgement of your log, which needs to be in Cabrillo form. A few caveats here: Please pay attention to the rules. If the rules ask for the time in GMT, make sure it is. If the rules state that no RST is needed, please make sure there is no RST in your log. Logs may be returned for amending, if conditions are not met. Robots do not converse, nor do they make allowances for mistakes. Hopefully BARTG will, in future, be far more efficient and this new system will add to everybody's enjoyment."

In April I mentioned the website where MINOS logging software could be downloaded, but pretty soon afterwards it moved and can now be found at http://minos.sourceforge.net

APPEALS PROCEDURE. The RSGB Contest Committee recently introduced an Appeals Procedure for those who wish to appeal against an adjudication decision.

The background to this is that these days the adjudication process employed by the RSGB CC is extremely thorough. Basically it is computerised, but each event has an adjudicator who checks the QSOs that the software says are invalid. Some points are lost by the majority of entrants, but if it doesn't amount to many QSOs/points most contesters accept this as 'par for the course'. About a year ago everyone became entitled to personal UBN (Unique, Busted, Not-in-log) reports and some people, especially those who record contests, like to play back their recordings to find out where they lost those QSOs/points. This is good, because it can be seen as part of the self-training that is so important in amateur radio in general.

It's what happens when some of those people who cannot reconcile the losses decide what to do about it. The correct

RSGB HF Events

Date	Event	Times (UTC)	Mode(s)	Band(s)	Exchange
Jun 2	80m Club Championships	1900-2030	Data	3.5	RST + SN
Jun 7-8	CW National Field Day	1500-1500	CW	1.8-28	RST + SN
Jun 11	80m Club Championships	1900-2030	CW	3.5	RST + SN
Jun 19	80m Club Championships	1900-2030	SSB	3.5	RS + SN

RSGB VHF Events

Date	Event	Times (UTC)	Mode(s)	Band(s)	Exchange
Jun 3	144MHz UKAC	1900-2130	All	144	RS(T) + SN + Locator
Jun 10	432MHz UKAC	1900-2130	All	432	RS(T) + SN + Locator
Jun 15	144MHz Backpackers #2	0900-1300	All	144	RS(T) + SN + Locator
Jun 15	SHF UKAC	1800-2030	All	2.3-10G	RS(T) + SN + Locator
Jun 17	1.3GHz UKAC	1900-2130	All	1.3	RS(T) + SN + Locator
Jun 21-22	50MHz Trophy +	1400-1400	All	50	RS(T) + SN + Locator
Jun 24	50MHz UKAC	1900-2130	All	50	RS(T) + SN + Locator
Jun 29	50MHz CW Δ	0900-1200	CW	50	RST + SN + Locator
Jun 29	70MHz Cumulative #4	1400-1600	All	70	RS(T) + SN + Locator

Best of the Rest Events

Date	Event	Times (UTC)	Mode(s)	Band(s)	Exchange (info)
Jun 7-8	SEANET	1200-1200	CW, SSB	3.5-28	RS(T) + SN
Jun 7-8	UKSMG Summer Es	1300-1300	All	50	RS(T) + SN + Locator + Member Number
Jun 8	UKuG Low Band	1000-1600	All		1.3/2.3/3.4G RS(T) + SN + Locator
Jun 14-15	REF DDFM 6m	1600-1600	SSB, CW, FM	50	RS(T) + SN + Locator (first 4 digits only)
Jun 15	PW 2m Low Power	0900-1600	All	144	RS(T) + SN + Locator (3W max.)
Jun 21-22	All Asian DX	0000-2359	CW	1.8-28	RST + age
Jun 22	WAB 6m Phone	0900-1500	Phone	50	RS + SN + WAB square
Jun 22	IRTS 80m Counties	1400-1700	SSB/CW	3.5	RS(T) + SN (EIs & GIs also give county)
Jun 29	UKuG	0600-1800	All	5.7/10/24G	RS(T) + SN + Locator

* HF Championship event; + VHF Championship event. For the latest RSGB contest info and results, visit www.rsgbcc.org.

course of action is to ask the adjudicator for an explanation. But some people are so sure they did not make any mistakes they do not accept any explanation and then pursue the topic on the internet. Abusive behaviour is not unknown, so the CC has finally decided to formalise an appeals procedure. It may be found at www.rsgbcc.org/app.shtml Basically it itemises an appeals process, but it also includes a section on frivolous/excessive questioning or appeals, and abuse.

At the end of the day the members of the CC are volunteers who give their time freely and are entitled to do their work without being subject to any nastiness. Running a contesting programme is no simple matter and we would all the poorer if they quit!

THIS MONTH'S EVENTS. With two months of the 80m Club Championship series for 2014 to run, we begin the fun this month on Tuesday 2nd with the datamodes leg. On the weekend of 7-8th the ever-popular CW National Field Day will see dozens of groups heading off to portable sites across the nation, for a weekend of operation. For some groups the radio aspect will just be to go out and have some fun, with families, a barbecue and other activities taking place on site, whilst others will be going all-out to win. There have not been any changes to the rules this year, but the FAQs and diagrams used to clarify the Restricted Section antenna arrangements have been updated. Then it's back to the 80m Club Championships, with CW on Wednesday 11th and SSB on Thursday 19th.

It's a busy month for RSGB VHF contests, starting with the 2m UKAC on Tuesday 3rd, followed by the 70cm UKAC on the 10th. The second of this years' series of 2m Backpacker contests is on Sunday 15th. As a result of the recent Ofcom review of amateur access to 2.3GHz and 3.4GHz, changes have been made to the SHF UKACs with immediate effect. From May onwards these events will take place on the third Sunday of the month, at the earlier time of 7 – 9.30pm (clock time). This is to avoid any possibility of interference to primary user services in some parts of the UK. Accordingly the SHF UKAC will be held on Sunday 15th. The 23cm UKAC on Tuesday 17th is followed by the biggest 6m contest of the year – the 50MHz Trophy – that takes place for over the weekend of 21st-22nd. For those who don't want to spend 24 hours on the band, there are also 6-hour categories. Those who opt for a 6-hour category can split their operating between two separate periods. If they are lucky there will be Sporadic-E propagation in different directions during those periods, which will permit them to amass a large score. The final UKAC event of the month is 6m on Tuesday 24th. On Sunday 29th there are two short contests, conveniently separated by a couple of hours. The first is the 50MHz CW, which is part of the VHF CW Championships, and the 4th session of the 4m Cumulative series.

The South East Asia Network (SEANET) Contest runs for 24 hours on 7-8th. From outside the SEANET region (CQ Zones 22, 24, 25, 26, 27, 28 and 29), work only the SEANET region. Last year in the Multi-op Rest of the World category there was just one entry (with very few points), so some definite wallpaper possibilities exist. The UK Six Metre Group's Summer Es Contest also runs for 24 hours on 7-8th. It is held at the peak of the Sporadic-E season, although that doesn't guarantee favourable conditions! The *Practical Wireless* 2m Low Power Contest on Sunday 15th starts at the same time as the RSGB 2m Backpacker contest, but runs for longer. There seems no reason why someone entering the 3W section of the RSGB contest cannot enter the other; just carry on for up to three more hours for the *PW* event. The All Asian CW DX Contest takes place for 48 hours over the weekend of 21st-22nd. Exchange RST and your age (YL ops may send 00). On Sunday 22nd we have the WAB 6m Phone Contest. Exchange signal report, serial number and your WAB square. The IRTS 80m Counties Contest takes place in the afternoon. In this one you exchange a signal report and serial number. As with all IRTS Counties contests, there are awards for those outside of EI. Finally, there is a session of the UKuG series of contests on 5.7-24GHz.

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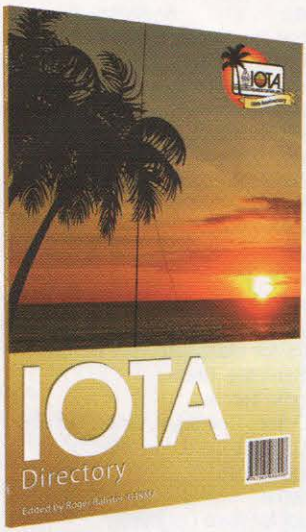
Book Review

50th Anniversary IOTA Directory and secrets of wartime radar



The IOTA Directory 50th Anniversary Edition

Edited by Roger Balister, G3KMA

2014 marks the 50th anniversary since Geoff Watts, BRS3129 came up with his vision for encouraging activity on the HF bands. As a leading short wave listener (SWL), he realised that many areas of the world were sparsely populated with amateurs and his programme – Islands on the Air – was designed to generate activity, particularly from far-flung places. Geoff managed the programme for around 20 years before asking the RSGB to take over in 1985. The *IOTA Directory's* author, Roger Balister, G3KMA currently manages IOTA on behalf of the RSGB and is thus uniquely well-placed and authoritative on all matters relating to the Programme.

The first section of *The IOTA Directory* contains information such as the history of the Programme and a report on the IOTA Marathon, the two-year-long pre-commemoration event that ran throughout 2012 and 2013 and saw activation of over half the IOTA island groups. The author, Cézar Trifu, VE3LYC, will be attending the 50th anniversary IOTA Convention in July to lecture on the IOTA Marathon.

One section that caught my eye was the report on the DXpedition CW5F from Timoteo Domínguez Island that happened in mid-February 2014 – a DXpedition that had to end prematurely because a storm caused local sea level to rise to *within one metre of the highest point on the island*... Gripping stuff!

The Directory isn't all tales of derring-do. It contains the Annual Listing 2014 of all 1400-odd participants that have over 100 Islands to their credit, holders of the 1000 Islands Trophy, 750 Islands Plaque of Excellence and many more lists. You'll also find several very helpful articles and, crucially, a complete set of the IOTA Programme and IOTA Contest rules.

But perhaps the most important listing of all is the IOTA Island Group Listings – the authoritative reference of *every* valid island, its IOTA reference (of course!) and its geographical co-ordinates. This, along with the other (quite significant amount of) data in the book makes it the essential go-to reference for anything to do with the Programme. If you like island-chasing, I think you *need* a copy of this book.

ISBN 9781-9050-8694-8
144 pages, 210 x 297mm
Non-Members' price £11.99
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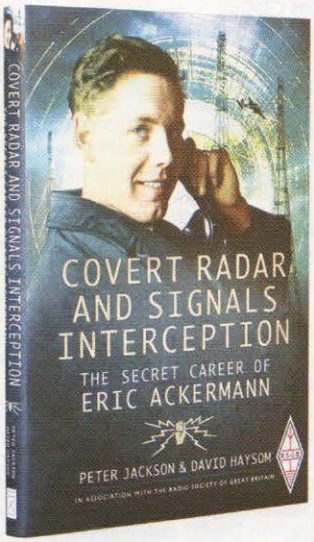

Covert Radar and Signals Interception

By Peter Jackson & David Haysom

Subtitled The Secret Career of Eric Ackermann, this is another of those fascinating WWII technical books that does exactly what it says on the cover.

Eric Ackermann's name is perhaps not so well-known as, say, Robert Watson-Watt but that is at least in part to the secret nature of some of the work in which he was involved. He had a hand in many radio and radar developments during the war, including – for example – many secret radio reconnaissance flights over enemy territory determining the characteristics of German Knickerbein and X-Gerät transmissions. He was given an honorary RAF commission and uniform "in case he had the misfortune to be shot down". We also learn how he was involved in a mission to uncover the secrets of the Flying Bombs. Indeed, at one point in the immediate aftermath of the war we discover his was "Assistant Director of Intelligence (Science) with the British Air Forces of Occupation" – quite a grand, but accurate, position for a Flight Lieutenant!

Of course, it's not all about the war and we discover what he did after the cessation of hostilities. There were a variety of posts including Head of the Military Satellite Communications Group at MoD Signals Research & Development Establishment and, latterly, moving permanently to the United States, initially due to a posting to the British Embassy.

The thing that strikes me most about this book is its breadth of coverage. Whilst some of its ilk focus very narrowly on their titular subject, dredging up everything down to odd half-verses of poetry found scrawled in the margin of a lab notebook, this book is like a breath of fresh air. It paints Eric Ackermann very firmly in context, showing how he interacted with other greats such as R V Jones. However, official paperwork is reported as remarkably scant – many of the facts presented in the book are from sources other than the official records (but are no less reliable as a result).

I rather enjoyed this book. It threw new light on some very interesting dark corners of technical advancements and at the same time tells a very human story. Definitely one well worth considering.

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Where are we?

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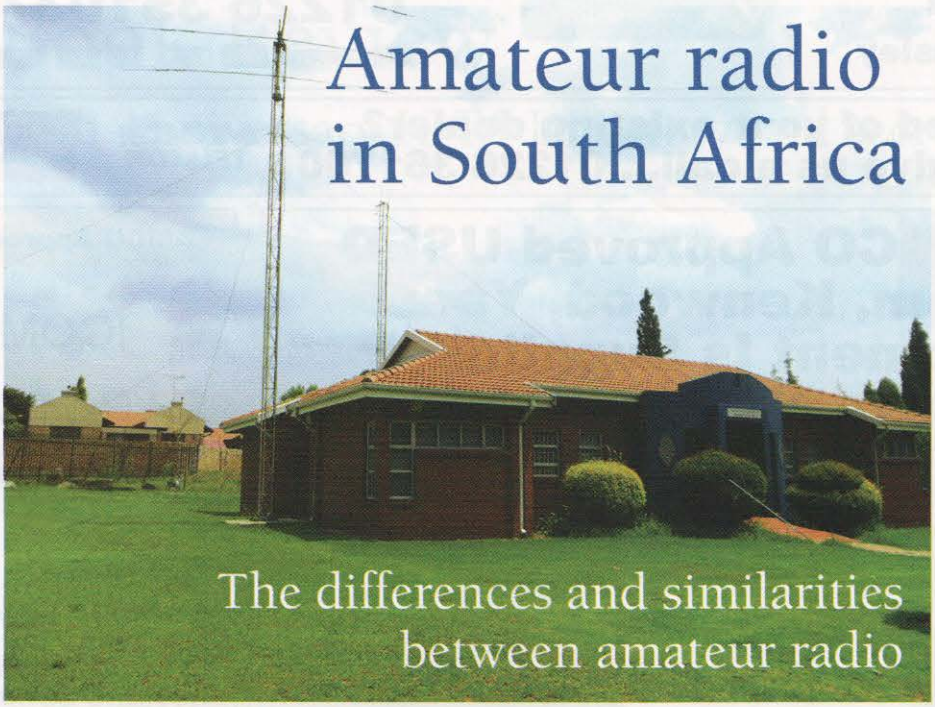
Amateur radio in South Africa

The differences and similarities between amateur radio



The South African Radio League (SARL) HQ.

South Africa is a large country with an area almost five times that of the UK and amateur radio is a popular and growing hobby, participation in all aspects being undertaken.

RULES AND REGULATIONS. The Independent Communications Authority of South Africa (ICASA and equivalent to Ofcom) is the Radio Regulatory Authority for the South African Telecommunications, Broadcasting and Postal Service Sector. ICASA was established by an Act of Statute, the *Independent Communications Authority of South Africa Act of 2000*, as amended.

Unlike the UK, there are only two categories of amateur licence, an Entry level licence with a ZU callsign and a Full licence with a ZS or ZR callsign. These can be obtained by students passing the Radio Amateur Examination (RAE).

The Entry level (Class B) is similar to the UK Foundation licence, but applicants have to be under the age of 25 when they apply for the callsign (once they have passed the required exam). When they reach the age of 25 the ZU callsign is cancelled and they must apply for the Class A licence, having gained the required qualifications. The Class A licence qualifications and specifications are similar to the UK's Full licence. The licence is not free and costs about £10 per year.

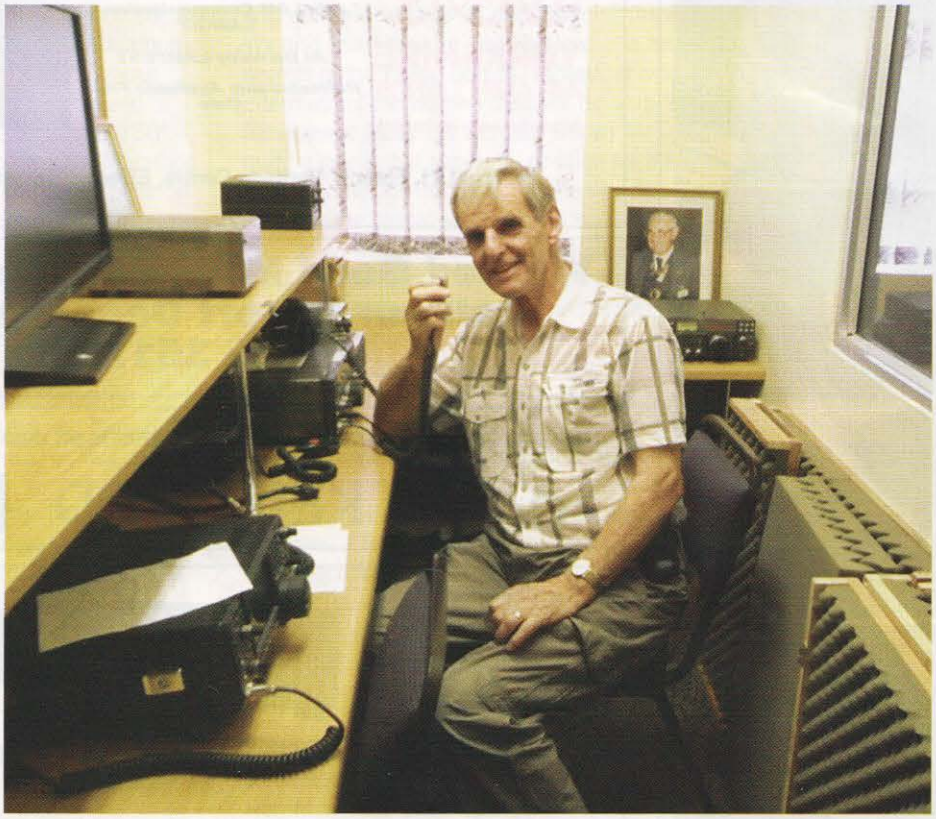
SOUTH AFRICAN RADIO LEAGUE (SARL). There is close co-operation between ICASA is SARL, as happens in the UK between Ofcom and the RSGB. There are about 5,000 ZS, ZR and ZU callsigns issued, with over 1,600 being members of SARL. The HQ of the SARL is located on the grounds of Sentech, the national signal distributor in SA, on a small industrial estate in Radiokop, Roodepoort, a suburb on the west of Johannesburg. A substantial HQ building consists of the administration, QSL bureau and lecture room and a fully equipped amateur radio station (ZS6SRL). The equipment available at ZS6SRL includes an IC-746, Hansen FS-500H, power meter, IC F515 power supply, IC-207, IC-2100, IC-706 Mk IIG, Kenwood PS-430DC PSU, HM-97 and HM-103 microphones, PS-304MB, IC127IE with a TH3 jnr antenna. The busy QSL Bureau is managed by Willem Weideman, ZS6WWJ.

If you are in the Johannesburg area, do find time to visit the HQ. Mariska Faasen, who is the only paid member of the SARL team, handles all the information and is affectionately known as 'Mrs SARL'. She worked for many years at ICASA so can quickly sort out any amateur problems that may arise.

SARL is a very active organisation and a visit to their website (www.sarl.org.za) will show the scope of the organisation and the many activities that are undertaken. The RAE exams and tuition are handled by the SARL and many clubs affiliated with the SARL assist with RAE classes in preparation for the exam that can be taken in May or October of each year.

RADIO CONDITIONS AND REPEATERS. A look at a map will show you that, unlike the UK, South African amateurs are in a location that certainly has a shortage of radio amateurs in nearby territories. This can be particularly challenging to QRP operators. There is little or no regular activity from the countries to the north of South Africa (Namibia, Botswana, Zimbabwe and Mozambique) although DXpeditions do operate from time to time from some of these countries.

South African operators can be found on most LF and HF bands when conditions are suitable and ZS calls are often in much



ZS-G3LWM at the SARL station.

The SARL QSL bureau.

G3LWM XYL and Mariska Faasen.

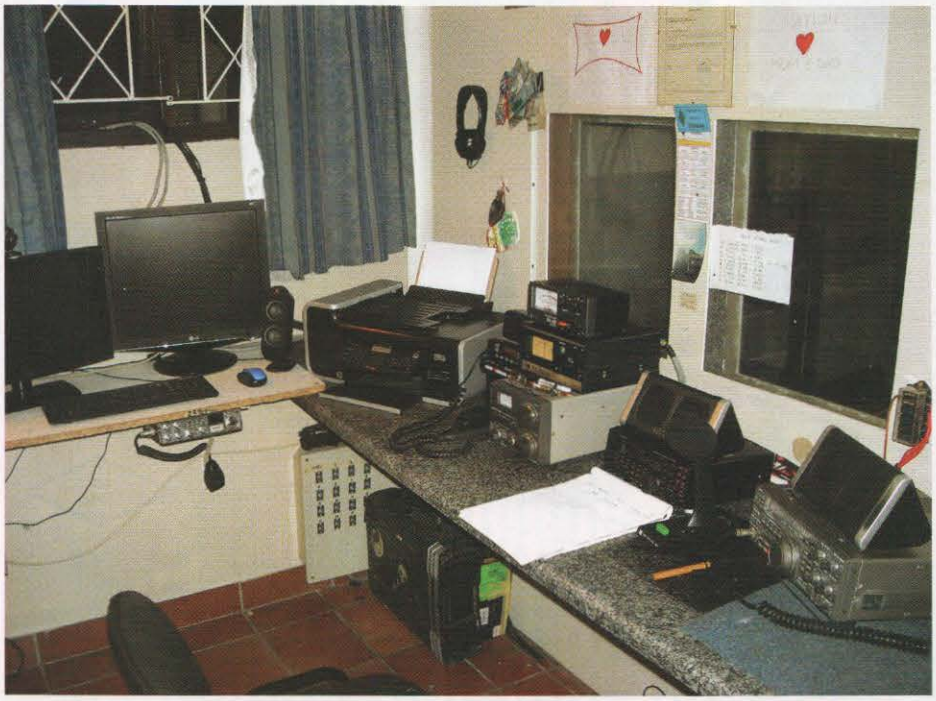
demand. The lower bands are used, but static levels tend to be higher for many months of the year. In the north of the country (Johannesburg area), thunder storms are very frequent and stringent lightning precautions need to be taken.

An extensive 2m and 70cm repeater network has been established that covers the main centres of population and major roads from the North (Polokwane) to Cape Town in the South. This network is only found on the Eastern side of South Africa. Unlike UK repeaters, the majority of repeaters in South Africa are carrier-operated, whilst those that have CTCSS access use 88.5Hz throughout the country. The SARL website gives up to date information www.sarl.org.za/public/local/repeater.asp.

You will hear Afrikaans and English being spoken but do announce your presence and you will be welcomed and given assistance and information that you may require.

HIGHWAY AMATEUR RADIO CLUB (HARC). During our stay in Durban, contact was made using a small hand portable with the Durban Highway repeater and members of HARC. The club maintains a 2m repeater, ZS5KZN, located on a high site at Kloof at a height of 600m ASL, giving good coverage over the Durban Highway area. The repeater (145.625MHz, -600kHz shift) is carrier operated and does not give ID. In addition, it has an IRLP link (8300) so it was easy to maintain contact with the club using my local 6m repeater (GB3FH).

We met with Derek, ZS5DM and examined his 40m QRP transmitter that will be featured in *Sprat*, the QRP club magazine. Derek is a keen CW operator and has made many QRP QSOs with this transmitter. His next project is a companion receiver.



The gear at ZS5MAX in Durban.

AMATEUR RETAILERS. Whilst in Johannesburg we visited the premises of Radio Accessories and Data Modems a business run by Sam Ford, ZS6BRZ and his son Bertrand, located in Gallo Manor, a suburb of Johannesburg. They have a good selection of amateur equipment. Sam is a keen DXer as his World Wide WPX DX certificate shows. His TH3 will soon be on the air again and if the conditions are favourable he is likely to be heard in the UK.

There are a number of other retailers situated in South Africa including HRO-SA Communications in Cape Town and Kevtronics in Pretoria.

RECIPROCAL LICENCING. South Africa is a signatory of the CEPT arrangements, so provided you have a Full UK licence, you can operate in South Africa. Be sure to take a copy of your licence with you and also a Harmonised Amateur Radio Examination Certificate (HAREC) with you. If you do not have one you can obtain this from Ofcom. It is also possible to obtain a ZS call and, if you want this, contact the SARL and they will give you the details required (admin@sarl.org.za).

I hope you have enjoyed this brief look at amateur radio in South Africa. We certainly enjoyed our visit and were made to feel welcome.

RadCom

HF F-Layer Propagation Predictions for June 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	56	74.....2688	87.32..27888	367777777885	..6777.6786.	.....	.....	.....
*** Asia								
Yakutsk	.....	.....	2.....3443	666666667777	...45444....	.....	.....	.....
Tokyo	.....	.....	.....	.....	.....4...	.....	.....	.....
Singapore	.....22.	.....788.	.....564.	.....54..	.....5...	.....	.....	.....
Hyderabad	.....	255	2566	5665	.....455.	.....	.....	.....
Tel Aviv	8.....799	98.....7999	76....26887	...3....676.	.....56..	.....	.....	.....
*** Oceania								
Wellington	.....	.....	.....	.....	.....	.....	.....	.....
Well (ZL) (LP)	.....	.7.....62.	36.....352	34.....64	.....4.	.....	.....6.	.....
Perth	.....	.....3..	.....35.6	5	.....	.....	.....	.....
Sydney	.....	.....37..	.....67..	.....34..	.....	.....	.....	.....
Melbourne (LP)	.....	399.....	9998.....8	99984.....79	8.8.....79	78	.....	.....
Honolulu	.....	.....	.....	.....	...454.....	.....	.....	.....
Honolulu (LP)	.....	.....	.....	.....	.....	.....	.....	.....
W. Samoa	.....	.....	.....	.....	...454.....	.....	.....	.....
*** Africa								
Mauritius	2.....22	6.....4887	3.....7887	.....3886.	.....4...	.....	.....	.....
Johanesburg	.....	342	6774	.....75..	.....35...	.....	.....	.....
Ibadan	1.....1	65.....556	772....2677	357....7887	..76...4786.	..57....78..	.....67..	.....
Nairobi	3.....23	8.....788	62.....666	.5.....5666	.....5666.	.....4566..	.....4...	.....
Canary Isles	65.....66	886.....688	8873....6888	8787....8888	7.8988899998	...888889987	...4....56..	.....4..
*** S. America								
Buenos Aires	.....	66.....3	887.....78	766.....88	476	.....46.	.....	.....
Rio de Janeiro	.....	66.....6	984.....89	76.....788	776	664	.....5..	.....
Lima	.....	652.....2	888.....58	7565.....78	.....	.....	.....	.....
Caracas	.....	32.....3	8872.....68	87873....488	3..465435688	....4....774	.....	.....
*** N. America								
Guatemala	.....	33.....	887.....7	756.....7	45	.....	.....	.....
New Orleans	.....	64.....	775.....4	75.....46	.....	.....	.....	.....
Washington	2.....	652.....2	8763.....7	86..4....577	.....56.	.....	.....	.....
Quebec	2.....	76.....6	764.....47	.....3.5565	.....	.....	.....	.....
Anchorage	.....	.....	32.....	766555556666	.665..666776	.....	.....	.....
Vancouver	.....	.....	.....	.....	.....3.	.....	.....	.....
San Francisco	.....	.....	.....	.....	.....	.....	.....	.....
San Fran (LP)	.....	.....	.....	.....	.....	.....	.....	.....

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 June, July & August 2014 are respectively (SIDC classical method – Waldmeier's standard) 81, 80 & 79 and (combined method) 77, 78 & 78. The provisional mean sunspot number for April was 84.7. The daily maximum / minimum numbers were 150 on 17 April and 34 on 26 April.

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 July *RadCom* is 20 May and for the August edition it's 24 June. 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

AMSAT-UK
http://amsat-uk.org/
Weekly net every Sunday 10am, 3.780MHz
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
11 QRP, Rev George Dobbs, G3RJV
25 Discussion on promoting amateur radio, Gordon, MM0YET
Border ARS
Alex, GM8BDX, 01890 830 607
13 Club meeting
Cockenzie & Port Seton ARC
Bob, GM4UYZ, 01875 811 723
6 Normal club night
8 *PW* 144MHz QRP Contest
14 Port Seton Gala Day – MM0CPS
14, 15 GB2MOF for Museums on the Air
18 Summer Solstice on-air activity night 1900 to 2200
27 Club night – note change of night
Kilmarnock & Loudoun ARC
Graham, MM3GDC,
mm3gdc@btinternet.com
1, 8, 15, 22, 29 Sunday club 9am-1pm
3, 17 Construction/education night 7-10.30pm
5, 12, 19, 26 Construction
10, 25 Club night 7pm
Livingston & DARS
Norman, GM1CNH, 07740 946 192
6 Mini convention, doors open 10am
Lothians RS
Alan, GM3PSP, 0131 623 4580
11 AGM
25 Summer barbecue
Stirling & DARS
John McGowan, gm0fsv@gm6nx.com
1, 8, 15, 22, 29 10.30am till late afternoon for construction, training, projects & operating
5, 12, 19, 26 Weekly club meeting
Wigtownshire ARC
Ellis, GM0HPK, www.gm4riv.org
12 Radio activity night
19 Presentations on logging software led by Ian, GM3SEK

Stornoway Repeater Group in the Outer Hebrides, who manage GB3IG, recently celebrated 25 years since the repeater was installed. A cake that was a replica of the hill on which the repeater stands (Eitshal, IO68QE) was presented and GM3JIJ, the group's oldest member, had the pleasure of cutting the cake. GM3JIJ was also celebrating becoming the first honorary member of the group. Jon was a founding member of the group has been a radio amateur for 64 years. Group chairman, Dolan, GM0LZE presented Jon with a framed certificate in recognition of Jon's contribution to Stornoway Repeater Group and amateur radio. GB3IG is on channel R7/R62 and IRLP Node ID 5426. See www.gb3ig.co.uk/

Wigtownshire ARC has a new web domain and website (www.gm4riv.org) and plans to run a Foundation course very soon. If you would like to know more about becoming a radio amateur and gaining your Foundation licence or know someone who may be interested, then contact Ellis, GM0HPK via the club website.
The weekend of 29-30 March was the CQ WPX SSB contest so the club's contest call, GM3W, was used to good effect, utilising the superb station run by Ian, GM3SEK and Nadine, MM0WNW. The strategy for the weekend was for it to be an introduction to contesting and training event with a bit of socialising thrown in for good measure. The station was on the air from 0900 until midnight both days and even though this was a low pressure non-competitive weekend with no overnight working they still made 1900 contacts to every continent except Antarctica and had two club members participate in their first contest. It was a good training weekend with some members experiencing very good quality, well engineered equipment and fantastic DX as well.

The annual **GMDX Convention** took place at The King Robert Hotel, Bannockburn, Stirling in April. The programme was varied and, as usual, full of interest for the DXer. The presenters included Michael, G7VJR and Alan, 5B4AHJ who gave a presentation on *Club Log* and how to get the best out of it; Don, G3XTT, who presented the DXpedition to Australis, TX6G and Ralph, K0IR, who gave a fine talk on the recent FT5ZM expedition to Amsterdam Island. Martin, G3ZAY presented ZD8UW whilst Nick, G3RWF spoke about his travels and tribulations in Africa.
In the evening there was the usual DX Dinner. The Expedition of the Year award – a pewter Quaich – was awarded to the KH9W Expedition to Wake Island and the award for DX Excellence was awarded to FT5ZM and gratefully received by Ralph, K0IR. During the DX Dinner the Jack Wyllie Trophy was awarded to Robert Ferguson, GM3YTS, the Chairman and founder of The GMDX Group. Robert is also Chairman of the FOC Group. He is Number 1 Honor Roll DXCC and has just become the first GM station to reach 3,000 Band/Mode/Countries in DXCC. The organisers would like to express their thanks to Graham Coomber, the RSGB General Manager, for helping to make this happen at short notice.

REGION 2: SCOTLAND NORTH & NORTHERN ISLES

REGIONAL MANAGER: BERNIE MACINTOSH, GM4WZG, RM2@RSGB.ORG.UK

Aberdeen ARS
Fred, MM0ODL, 01975 651 365
5 Junk sale
12 Museums on the Air preparation
14, 15 Museums on the Air
19 Construction evening
26 Fox hunt

REGION 3: NORTH WEST

REGIONAL MANAGER: KATH WILSON, M1CNY, RM3@RSGB.ORG.UK

Bolton Wireless Club
boltonwireless@gmail.com
9 GB3OA, David, G4TUP, Mark, G4EID & friends
23 Kite antennas 2, Roger, G4ROJ
Chester & DRS
Bruce, M0CVP, 01244 343 825
3 2m contest
10 Committee meeting

17 Annual dinner
24 Bring and tell

Chorley & DARS
Mark, G1PIE, procter_family@sky.com
15 GB0AH at Astley Hall for museums weekend

Fleetwood REG
John, M0JFE, 07940 815 659
3 Natter night and planning
10 On the air from the nature reserve
17 On the air at the boating lake, Dronsfield Rd
24 On the air from the Sea Cadets' base

South Manchester R&CC
Ron, G3SVW, 01619 693 999
5 On the air
12 Dress rehearsal for Sale Festival event on the 15th
19 Summer Solstice barbecue
26 Moodle virtual learning environment, Dave, G4UGM

Stockport RS
Nigel Roscoe, 07973 312 699
3, 17 Meeting at Walthew House
24 On the air

Thornton Cleveleys ARS
John, G4FRK, 01253 862 810
7, 8 HF NFD
9 On the air
16 Construction project
23 VHF/NFD discussion
30 Social on the beach

Warrington ARC
Ken, G3VBA, 01928 733 234
1, 8, 15, 29 Solder Sunday
3 APRS, Chris Moulding of Cross Country Radio
5, 12, 29, 26 Grumpy Club
10 Guide to digital TV part 4 by Vincent, M0LCR
17 Club involvement with the Halton Rally, George, G0RLF
21, 22 Burtonwood Museum, Warrington for International Museums on the Air weekend
24 Visit by Spiffo Mzangwe from South Africa

Wirral & DARC
Simon, G6XHF, 0151 601 3269
3 UKAC 2m contest
4 Social at Ship Hotel, Parkgate
27-29 Friedrichshafen Rally

Workington & DARC
Alex Hill, G7KSE, mx0wrc@gmail.com
9 Homebrew evening

Workington ARC managed to raise £1,240 during SOS radio week and with the joint effort with the Furness Radio Club they managed a staggering £2,240, so again, Cumbria's generosity shines through. The group would also like to thank Bill, G4USW for producing the QSL cards and the certificates for the four stations put on in Cumbria. Last, but not least, thanks goes to all the operators who give up their time to make this good cause such a success.

The British Young Ladies Amateur Radio Association received the G8AYD trophy for the best stand at the Norbreck rally in Blackpool. The trophy was presented by John Gould, G3WKL. The photo shows Val, G6MML and Elaine, 2E1BVS on the stand.

REGION 4: NORTH EAST

REGIONAL MANAGER: NIGEL FERGUSON, G0BPK, RM4@RSGB.ORG.UK

Denby Dale RC
Richard, M0RBG, 07976 220 126
2 80m CC SSB
4 Machine control systems, Jim, G1MOZ
11 80m CC CW + night on the air, 145.575MHz
18 Mototrbo Radio System, Michael, G1XCC
19 80m CC SSB
21, 22 GB2NCM, International Museums weekend
22 G6LD for WAB 50MHz Phone & RSGB Trophy from Cartworth Moor 0900-1500
25 Night on the air, 145.575MHz, 1930

Hornsea ARC
Gordon, G3WOV, 01377 240 573
4 Foxhunt + NFD prep
7, 8 NFD
11 NFD washup + CW
18 Committee meeting
25 Railway days, G3WOV

Mexborough & DARS
Darrell, G0FUO, 0788 742 3221
6 Film night
13 International Museums Weekend prep
20 IMW & charity bike ride equipment check
27 VHF contest equipment check

Ripon & DARS
David, G3UNA, 01423 860 778
5, 12, 26 Club night
19 Club Night - Homebrew

Sheffield & DWS
Krystyna, 2E0KSH, 07884 065 375
4 Invisible antennas, Peter Day, G3PHO
18 Final prep for VHF Field Day

Wakefield & DRS
Ken, G8FSO, 07900 563 117
21 Construction competition judged by Terry Clayton, G0TKJ of Diode Communications

Wakefield & DRS is running its inaugural annual Construction Competition to honour their founder, Walter Farrar, G3ESP. The competition is open to any radio amateur or interested individual from RSGB Region 4. Projects must be entirely home built from components, must be of an amateur radio nature and must work.
Kits are acceptable, but will be marked lower than completely home-constructed projects. Judging will be by Terry Clayton, G0TKJ, of Diode Communications. The G3ESP trophy will be presented to the winner after engraving (to be retained for a year), plus a prize of £25. All entrants will receive a certificate on the Judging Day. Further details from wdrscc@gmail.com. Entrants should note that the judging will take place on Saturday 21 June at the W&DRS HQ in Wakefield, must pay a £5 entry fee on that day and they are responsible for all costs of the project itself along with their transport to and from the W&DRS HQ. Details of the location of W&DRS HQ can be downloaded from the club website at www.wdrs.org.uk

REGION 5: WEST MIDLANDS

REGIONAL MANAGER: MARTYN VINCENT, G3UKV, RM5@RSGB.ORG.UK

Aldridge & Barr Beacon ARC
Albert, G0KFS, 01922 614 169
2 Morse class, general discussion
16 Talk

Central RAC
Martin, G1TYV, 07906 905 071
3 144MHz UKAC
5 Group meeting
19 Night on the air
21 Barr Beacon

Cheltenham ARA
Derek, G3NKS, 01242 241 099
17 Lunch
19 Commonwealth Contest from Monserrat, Iain, M0PCB

Coventry ARS
John, G8SEQ, 07958 777 363
2, 9, 16, 23, 30 Club net, 145.375MHz
6 Multa Paucis
13 Castles on the Air – Astley Castle
20 2nd Round G4ZMC Trophy – Hatton Locks
21, 22 GB4H, Herbert Museum, Coventry
22, 28 GB4BLC at 30th Signals Bramcote nr Nuneaton
27 Radio workshop – SSTV

Dudley and District ARS
Carl, M0ZCR, m0zcr@live.co.uk
3 UKAC 2m night on the air
10 Discussion of forthcoming special events
17 M0RSD on air plus club casual
24 Club social - open discussion

Gloucester AR&ES
Anne, 2E1GKY, 01242 699 595 daytime
2 Bring and show evening
9 Out of doors with various antennas
16 Junk sale
23 Informal and exam session
30 Visit to Courtyard Books

Malvern Hills RAC
Dave, G4IDF, 01905 351 568
10 Radio operation out of the jungles of Honduras, Chris, G6BDM & Liz, G6BOQ

Midland ARS
Norman, G8BHE, 07808 078 003
4, 11, 18, 25 Training classes
4 Open meeting, shack on the air
11 Planning for radio day & BBQ at farm site, committee meeting

13 QRP Rally at Alfreton Leisure Centre, Church Street, Derbyshire DE55 7BD
18 On the air
25 Summer social plus planning

Rugby ATS
Steve, G8LYB, 01788 578 940
3 UKAC 144MHz, radio operation and projects
7, 8 NFD + general radio & technical activities
10 UKAC 432MHz, radio operation and projects
14 Video about vintage electronics by Mike, G8CTJ
17 UKAC 1296MHz, radio operation and projects
21 SOTABeams talk and presentation by Richard Newstead
24 UKAC 50MHz, radio operation and projects
28 Preparation for VHF NFD

South Birmingham RS
Gemma, M6GKG,
gemmagordon.m6gkg@gmail.com
2 Cleaning shack ready for Tuesday contest
3, 10, 17, 24 Coffee morning in the shack, 11 am to 1pm, all welcome
5, 12, 19, 26 Training classes with Dave Murphy, G8OWL
6 Dismantling equipment in shack
16 Sorting out aerials for sale
26 Open meeting and ragchew

Sutton Coldfield ARS
Robert Bird, spirit.guide@hotmail.co.uk
2, 16, 30 Open net on 145.250MHz from 7.30pm
9, 23 Club meeting, 7.15pm
10 Open net on 70.475MHz
14 GB4FMC Waterways on Air from Fazeley Mill Marina nr Tamworth
21 Radio station at Orton Water Carnival run

Telford & DARS
Mike, G3JKX, 01952 299 677
5 GX3ZME OTA, committee meeting 19.30

Wythall Radio Club
Chris, G0EYO, 07710 412 819
1, 8, 15, 22, 29 Club net, 145.225MHz, 8pm
2 80m Club Championship Data, 8pm
3, 10, 17, 24 Morse class 7.45pm
3 HF CW Field Day prep/144MHz UKAC Contest 8:15pm
6, 13, 20, 27 Nibbles night in the shack, 7.30pm
7, 8 HF CW Field Day
8 Club trip to J28 QRP Rally, Derbyshire, 8am
10 Committee meeting 8.30pm
11 80m Club Championship CW, 8pm
17 Centenary Talk 3 - The Race to Cross The Atlantic, Chris, G7DDN, 8.30pm
19 80m Club Championship SSB, 8pm
24 Kite antennas, Roger, G4ROJ, 8.30pm
30 Curry night at the Monsoon, 6.30pm

At the recent construction competition, **Gloucester AR&ES** members entered a variety of projects from the Chairman's 'cheaply, cheerfully and lovingly lashed together' to the winning entry of a Z Match that had the judges saying how well the kit had been made. In 3rd place was Richard with his DF receiver, 2nd place was George, G7GQC with a QRP transceiver and first place went to Mike, M6OTP with his Z Match project.

Special event station GB70DDL for the 70th anniversary of the D-Day Landings will be operated by **Riverway ARS** in conjunction with the Stafford and Rugeley Sea Cadets from the Sea Cadet HQ in Stafford. The station will operate from 1 to 28 June on all HF bands using SSB, CW, PSK and other digital modes. Events will be put on during the month for members of the public to see the station in operation and the work of the Sea Cadet Unit. The club will also be operating portable from four Royal Observer Corps nuclear bunkers from 30 May to 9 June – GB1SNB Shenstone, GB6GNB Gonsall, GB0RNB Rugeley and GB4SNB Standon. Information on all these Special Event Stations is on QRZ.com

Gloucester AR&ES have always been very interested in DF Hunts, both in woods and other daylight locations. But on 17 March, a challenge was set for one to be done in the dark within the grounds of the school where the club meets. It was enjoyed by established and new members alike. For once it was dry and requests have been made for more. The winners were: 1st Graeme, G0EEA, 2nd Algi, SWL, 3rd Richard, M0HNK, 4th Dave, G4BCA, 5th Alan, G4MGW. 6th Gary, M0XAC.

REGION 6: NORTH WALES

REGIONAL MANAGER: LIZ CABBAN, GW0ETU, RM6@RSGB.ORG.UK

Dragon ARC
Stewart, GW0ETF, 07833 620 733
2 Amateur television
16 Antennas to get you started

North Wales Radio Society
Liz Cabban,
lizcabban@vodafoneemail.co.uk
5 General meeting
12 Technical topics
19 SOTA talk
26 Natter night

RAF Air Cadets from **2364 squadron Welshpool** operated GB6RAF for Airfields on the Air at ex-RAF Rednal, near Oswestry in Shropshire. Several stations were set up on HF covering 7, 14, 21, 24 and 28MHz. The radios were an IC-746, TS-440S & TS-430, with inverted-V dipoles at 5m and running 100W from batteries. It was an extremely successful event with non-stop contacts on 7MHz with UK stations from John O'Groats to Falmouth as well as GI, GD, EI, PA, ON, F, D, LZ, LA, SP, TF, HB9, UT. On 28MHz, cadets worked many stations with VP8, CE, YB, 9M and W7 being among the furthest, with many interesting islands and counties in the log. The organiser was amused when he overheard one Comms Badge cadet who is also a MW6 say to a new to radio cadet that "a W4 station is only on the east coast of the USA, so try and find something further if you can". The cadets & staff would like to thank RAFARS for all their assistance and giving them the opportunity to set up and operate the special event station for such a good cause. All stations that they spoke to were extremely helpful to the cadets in slowing down and allowing them time to think before replying, it was quite difficult sometimes even for the staff as all that could be heard was a wall of callsigns coming out of the speaker.

REGION 7: SOUTH WALES

REGIONAL MANAGER: JIMMY SNEDDON, MW0EQL, RM7@RSGB.ORG.UK

Aberystwyth & DARS
Ray, GW7AGG, 01970 611 853
12 HF demo, 8pm (listen for GW0ARA)
26 Club net 8pm, 145.500 then 145.550MHz

Carmarthen ARS
Lloyd, 2W0LLT, 01239 711 297,
MW3OLT@btinternet.com
3 AGM
15 *PW* 2m contest
17 Software Defined Radio, Jeff, GW3UZS

Cleddau ARS
Howard, MW0HVB, 01348 874 236
2 Life as an RO in the Merchant Navy by Heinz, MW0ECY
9 Foundation Course starts – spaces available 01348 874 236
10 Open net, 145.350MHz 19.30
16 Club antenna analyser, Simon, MW0SGD
23 Digimode primer & demo, Howard, MW0HVB
30 Work in the shack

Llanelli ARS
Craig, MW0MXT, 01269 845 773
2, 23 On the air
9, 30 Club raffle
16 Social evening
30 Junk sale

Seven members of the **Portable Operating Group** will be operating MC0POG from various locations around Pembrokeshire, Wales from 14 to 21 June. They will be working on all bands using SSB, CW and digital modes, experimenting with antennas, working QRP and the more energetic members of the group will be operating SOTA and pedestrian HF mobile. Details can be found on QRZ.com

REGION 8: NORTHERN IRELAND

REGIONAL MANAGER: PHILIP HOSEY, MI0MSO, RM8@RSGB.ORG.UK

Grey Point Fort ARS
Stephen, GI4RNP, 02891 852 731
6, 7, 8 D-Day – 70th Anniversary of WW2
14, 15, 16 International Museums Weekend + World Castles
21, 22 International Museums secondary weekend

Mid Ulster ARC
Brian, MI0TGO, muarc.secretary@yahoo.co.uk
3 RSGB 2m activity night and preparation for Lurgan Show
7 Display at Lurgan Show
8 Video night, Tony Hancock's The Radio Ham
10 Tips on extending Wi-Fi signals
17 Antenna tinkering night
24 Barbecue plus summer season planning

Grey Point Fort ARS are commemorating the 70th anniversary of the D-Day landings on 6 to 8 June. They will also be running a station for International Museums Weekend on 14/15 and 21/22 June.

West Tyrone ARC recently held a Foundation amateur radio course in the Technology Centre, Omagh. The photo shows the successful candidates (L to R) Phil, MI6PCJ, Sean, MI6SFK, Vincent, MI6TYR, Kenny, MI6EDX and Tina, MI6ECV. The second photo shows (L to R) Oisin, MI6LJO, Raymond, MI6VJR, Greg, MI6GNP and Christopher, MI6EJT. Details of further courses and information on amateur radio can be found at the club website www.wtarc.net.

REGION 9: LONDON & THAMES VALLEY

REGIONAL MANAGER: LARRY SMITH, G4OXY, RM9@RSGB.ORG.UK

Bracknell ARC
Andy, M0HAK, andy@m0hak.co.uk
4, 18, 25 Club net, 145.375MHz, 8pm
11 RSGB 80m Club Challenge

Burnham Beeches RC
Dave, G4XDU, 01628 625 720
2 Evening visit to ML&S shop

Chesham & DARS
Terry, G0VFW, 01442 831 491
4 PSK31 & datamodes, Terry, G0VFW

Echelford ARS
John, G4GSC, 01784 451 898
12 Loops and novel small antennas, G3LHZ
26 50th anniversary dinner

Edgware & DRS
Mike, G4RNW, 02089 500 658
8 Table top sale
26 Constructors Cup Competition

Harwell ARS
Malcolm, G8NRP, 01235 524 844
10 Understanding the design and operation of the G5RV, Mike Parkin, G0JMI, Alton Antenna Arrays

Newbury & DARS
Rob, G4LMW, 01635 862 737
15 Newbury Radio Rally
25 Club night, surplus equipment sale

Reading & DARC
Pete, G8FRC, 01189 695 697
7, 14, 28 Intermediate course, (info: Eric, M0LUV)
12 Risk assessments talk by John Turner
21 80th Anniversary summer BBQ, venue: RRFC (as McMichael Radio Rally)
26 80 Years a Radio Club – 1934 to 2014

Southgate ARC
Mr K Mendum, G8RPA, g8rpa@arrl.net
11 Remote access digimode demo, Nigel, G0RPM

14 students passed an Intermediate exam held by **Verulam ARC** in March thanks to the club's lead tutor Dr Roger Bleaney, M0RKB (seated) and his team of helpers. Planning is under way to run an Advanced course and the club welcomes enquires by e-mail (G3V@btinternet.com). In April, a talk by John, G8SYD on safe and effective radio installation in vehicles proved very popular, with over 30 club members attending. The talk explained the best practice for installing radio equipment in our modern complex vehicles, to get the best performance, while not affecting the safe operation of the vehicle. The club is also developing its own new website at www.verulam-arc.org.uk

REGION 10: SOUTH & SOUTH EAST

REGIONAL MANAGER: MICHAEL SENIOR, G4EFO, RM10@RSGB.ORG.UK

Brede Steam ARS
Steve, 01424 720 815
3, 10, 17, 24 At the shack
7 AGM

Bromley & DARS
Andy, G4WGZ, 01689 878 089
17 DF hunt

Coulsdon ATS
Steve, G3WZK, 01883 620 730
9 DF hunt, M0NDJ

Crystal Palace R&EC
Bob, G3OOU, 01737 552 170
6 Software Defined Radio, Prof Norman Billingham, M0EBI

Dorking & DRS
Garth, G3NPC, 01737 359 472
24 ATV, Noel, G8GTZ

Hastings E&RC
Gordon, 01424 431 909
26 Natter night

Horndean & DARC
Stuart, G0FYX, 02392 472 846
5 Natter night and social activities evening
14, 15 GB0RMM at the Royal Marines Museum, Southsea
19 How telecoms get to the house, Bob Button
21, 22 GB2WRM from the WW1 Remembrance Museum at Fort Widley

Itchen Valley ARC
Quintin, M1ENU, 023 8078 7799
6 DF hunt, 6pm
27 Mid-year auction

Southdown ARS
John, G3DQY, 01424 424 319
2 Members' forum
4 Operating at Hailsham shack

Surrey Radio Contact Club
John, G3MCX, 020 8688 3322
2 Fix-it, move-it-on & advice clinic (note change of date)
16 G5RV Revisited, Mike Parkin, G0JMI, Alton Antenna Arrays (note change of date)

Sutton & Cheam RS
John, G0BWV, 020 8644 9945
19 Introduction to datamodes Andrew, M0GJH

Trowbridge & DARC
Ian, G0GRI, 01225 864 698, E/W
4 The G5RV antenna, Mike Parkin, G0JMI, Alton Antenna Arrays
18 144MHz DF Night 7.30pm (from Village Hall)
29 Club table at West Rally, Cheese & Grain, Frome

Wimbledon & DARS
Kim Brown, G6JXA, 07812 735 507,
13 The R210 and RBZ receiver, Len Stuart and Dick Shanahan
27 Amateur radio, Merton, U3A

Worthing & DARC
John, G8FMJ, 01273 593 232
1 Breakfast meeting 9am at the Goring Café
4 The Dayton Hamvention, Phil, G4UDU
8 *Practical Wireless* 2m QRP Contest
11 Discussion evening 80m CC CW Contest
18 Annual club DF competition
19 80m CC SSB Contest
25 GX3WOR on the air

DEADLINES

The deadline for the July *RadCom* is 20 May

Crawley ARC will be activating a station from the Gatwick Aviation Museum in Charlwood, Surrey over both weekends of the International Museums on the Air event (14/15 and 21/22 June). The station will be on the 80 to 10m bands.

Riviera ARC will be running a special event station on 28 and 29 June. The event is to celebrate National Armed Forces Day and give the proper acknowledgements to the men and women serving in Her Majesty's Armed Forces. The plan is (weather permitting) to run SSB on HF on the 28th and data modes on HF on the 29th. The club may also be active on 2m FM. The callsign granted by Ofcom for this event is GB8AFD.

REGION 11: SOUTH WEST & CHANNEL ISLANDS

REGIONAL MANAGER: PAM HELLIWELL, G7SME, RM11@RSGB.ORG.UK

Appledore & DARC
Alan Fisher, M6CCW, 01237 422 833
16 SDR on the cheap, Mike, G4KXQ
Bristol RSGB Group
Robin Thompson, G3TKF, robin@g3tkf.co.uk
30 Early Christmas party
Devon & Cornwall Repeater Group
www.gb3pl.co.uk/
4, 11, 18, 25 Open meeting at Engine House, Compton Park, Callington
Exeter ARS
Nick, M0NRJ, 01363 775 756
2, 16, 30 Club net on 3.675MHz at 7.45pm
3, 10, 17, 24 Club net on 145.575MHz at 7.45pm
9 CW and video night, Keith, G7NBU
23 Construction Competition
Exmouth Amateur Radio Club
Mike, G1GZG, 01395 274 172
4 Computer control of rigs
18 Summer operating night
Plymouth Radio Club
David, 2E0DTC, d.beck123@btinternet.com
10 Mythbusters, Chris Wingate
Poldhu ARC
Keith, G0WYS, g0wys@yahoo.co.uk
10 My other hobby: glass work, Ellis, M6ECL
28, 29 GB8AFD, SSB on 28th and data on 29th, QSL via bureau
South Bristol ARC
Andrew, G7KNA, 07838 695 471
5 VHF NFD demonstration
12 Summer table top sale
19 Contact Lundy
26 Open house and on the air
Torbay ARS
Dave, G6FSP, g6fsp@tars.org.uk
27 ARPS, Stephen, G6UIM
Weston Super Mare RS
Paul, G3SDH, 01761 221 206
2, 9, 23, 30 Club night
4 Committee meeting
7, 8 CW NFD
16 2m DF hunt
21 WSM Air Day
Yeovil ARC
Rodney Edwards, M0RGE, 01935 825 791
5 Hi-Fi amplifiers, G7LNJ
12 Field day at Bruton
19 2m foxhunt
26 On air

REGION 12: EAST & EAST ANGLIA

REGIONAL MANAGER: STEVE THOMAS, M1ACB, RM12@RSGB.ORG.UK

Braintree & DARS
John, M5AJB, 01787 460 947
2 Construction contest and club challenge contest
16 Evening DF hunt
Cambridge & DARC
David, M0ZEB, 01353 778 093
13 Mag loop aerial theory and construction, Peter, M0DCV
27 Introduction to datamodes, Steve, G8CRB
Chelmsford ARS
Martyn, G1EFL, 01245 469 008
3 Closed
6 Joint table top sale with TARG at Canvey Island
16 Amateur radio skills workshop, Danbury Village Hall
Felixstowe & DARS
Paul, G4YQC, pjw@btinternet.com
9 Planning for ESWR
22 ESWR Rally, Orwell Crossing Truck Stop
30 Transatlantic radio, Steve, M1ACB
Hilderstone R&EC
Chrissie Turner, hilderstoneclub@gmail.com
12 Natter night
14, 15 Special event at Spitfire Museum
26 Aerials by Erwin David, G4LQI
Norfolk ARC
Chris Danby, G0DWV, 01603 898 678
4 Has Es started yet? Jim, G3YLA, plus contest workshop & NFD final briefing
11 Informal
18 Informal and bright sparks
25 Visit from Dave Sumner, K1ZZ, Chief Executive Officer, Executive Vice President and Secretary of the ARRL
South Essex ARS
Dave, G4UVJ, 01268 697 978, g4uvj@btinternet.com
10 On the air
22 GB2BM from Bay Museum for Museums Weekend
28 Armed Forces Day, Paddocks, Canvey Island

Hilderstone Radio Club enjoyed a more light-hearted evening with a general knowledge quiz, along with wives and partners. Clive, G1WCR set the questions, with not one on amateur radio! The club will be celebrating Mills on the Air at the White Mill Rural Heritage Centre in Sandwich. The windmill was built in 1760 and has the original wooden machinery. The callsign will be GB2WM and they hope to be on two HF bands.

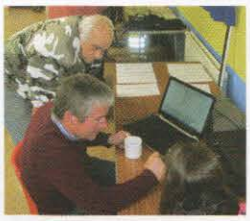
Braintree and DARS held their annual rig clinic recently. Dave, G0DEC, the resident 'boffin' was in charge. He set up a test area with a spectrum analyser, frequency counter and other test gear and spent the evening testing rigs for power, deviation and sensitivity amongst other things. The rig clinic is always popular and, of course, most helpful. The final presentation in the series of four on the history of the RSGB was shown in April. Once again, Edwin, G0LPO, using the material downloaded from the Society's archive, gave the presentation totally dedicated to the development of antennas. The accompanying photographs showed examples of massive wire cage antennas filling gardens and resulting contact distances of only a few miles. The presentation showed how the development from these early days by the 'experimenters' gave us the wide selection of very efficient antenna's we have today and the world wide coverage they give us. The Braintree club would like to thank the RSGB for making this archive material available and to Edwin, G0LPO for editing and presenting the material.

To celebrate England's National Day, the special event callsign GB1STG was activated in honour of dragon-slayer St George. The event took place on 23 April and saw around 20 local amateurs gather at Galleywood Common, near Chelmsford. Over 200 contacts were made on a range of different bands and antennas, including an impressive magnetic loop and a 9m tall inverted V. Congratulations to Kristian, 2E0SSX for achieving the best DX of the day – LU5EOI (Argentina) and ZS5ROB (South Africa) on 10m from a car mag mount! The photo shows event organiser Charlie, M0PZT erecting the 9m inverted V. For a report on the event, and a selection of photos, please go to www.essexham.co.uk/GB1STG

Around Your Region

Special event station GB0CBN was activated on 5 April from a narrowboat at Indigo Wharf in Chelmsford. This was part of a fun day that included live music, an exhibition, craft events and a visit from the Major of Chelmsford. The special event station was activated by Dennis, G1AJQ, using a Yaesu FT-817 with antennas for 2m, 70cm and 20m. Essex amateurs from local clubs including CARS, the Essex Repeater Group, SEARS and TARG met up to support the event. The photo shows Dennis, G1AJQ aboard his narrowboat at Indigo Wharf, Chelmsford.

Easter Monday saw a successful fourth Skills Night take place in Danbury, near Chelmsford. Despite being a bank holiday weekend, 35 people gathered together for a mix of demonstrations and show-and-tell sessions, with highlights including a demonstration of radio orienteering equipment ahead of a Danbury direction-finding event, demonstrations by the Essex RAYNET team and some impressive and imposing HF antennas. Representatives of the Essex CW Club, CARS, Essex RAYNET, the Essex Repeater Group and Essex Ham were also on hand to give help and advice as needed. For a bit of fun, the evening's short quiz had a seasonal theme, with a number of Easter eggs being dished out. The photo shows Jim, 2E0RMI demonstrating Echolink. The evenings have proven to be a great way of getting people together – regardless of club membership and licence level – they're also free, see www.hamskills.co.uk



To celebrate the 50th anniversary of the start of offshore radio in the UK, a group of Essex amateurs gathered at Walton-on-the Naze on the Essex coast to operate the special event station GB5OR (5 decades of offshore radio). Radio Caroline launched at midday on 28 March 1964, not many miles away from Walton-on-the-Naze. To celebrate, the *Caroline* bell was sounded from an RNLI lifeboat just off the pier, where there was a radio link to the crowds on land. The event was opened by Radio Caroline fan Paul Barber. The callsign was active on 40m for much of the day, with some contacts made on 20m and 10m when pileups subsided. Operators for the day were Charlie, M0PZT, Pete, M0PSX, Kristian, 2E0SSX, Chris, G0IPU, James, 2E1GUA and Jim, 2E0RMI.

The photo shows Radio Caroline's Captain Campbell (left) with Essex Ham's Jim, 2E0RMI and the *Caroline* bell.

Over 400 people attended the first 2014 public open day of Sandford Mill that was held on International Marconi Day on 26 April. **Chelmsford ARS** operated two demonstration stations using the callsign GX0MWT. The HF SSB demonstration station was located in the 1920s Marconi 2MT Writtle hut that is now housed inside the museum. It was active on 40m for much of the day, running around 80W into a doublet antenna and getting good results around the UK and Europe. The SSB team were joined for the day by Louise, M3WSQ, who was able to make her first HF QSOs and work her first pileup with the help of CARS. The CW team operated from the first floor of the museum using an Icom IC-756 Pro 3 with a delta loop antenna. Despite the poor conditions on 20m, CW contacts were made across North and South America as well as Europe. Three members of the CARS Morse class, run by Andrew, G0IBN, attended the station and took advantage of the opportunity to listen in and improve their Morse. A particular point was made of talking to visitors and explaining what was going on rather than continuous operating. Colin, G0TRM, Peter, M0ZBU and Gordon Illes demonstrated the impressive mechanical Morse and Morse key display with the opportunity for the youngsters to try their hand at sending Morse. The Morse punched paper tape sending and decoding process always proves to be a big hit with potential junior CW operators.

On 28 April, a group of keen radio orienteers set off to Lingwood Common in Danbury for a multi-TX direction-finding event. The three-hour DF hunt saw contestants searching through woodland for ten concealed HF transmitters operating on 160m. Participants used handheld directional radio receivers to track down the transmitters, where they found tags that had to be brought back to an agreed meeting point in the allotted time. The experienced DF contesters were joined for the day by Pete, M0PSX, his daughter Kathryn and James, 2E1GUA, all keen to try their hand at the sport. The event was organised by Roy, G4JAC. Congratulations to Steve S, Philip C and Colin M for the top rankings for this event, and thanks to Gary Parker for setting up the transmitters and helping to make sure that the Essex Ham team didn't get lost. The photo shows Kathryn, daughter of M0PSX, with direction-finding receiver.

Duxford RS, based at the Imperial War Museum Duxford, Cambridgeshire, will be operating GB2IWM on 6 June for the 70th anniversary of D-Day. They will be operating on most HF bands using mainly military radios. The station will operate between 0900 and1700UTC. Visitors are welcome in the shack at Duxford and the group are looking forward to working other D-Day stations on the air.

Cambridge and DARC conducted another successful weekend Foundation course at Foxton in April. All five candidates (l to r Matthew, Alice, Karen, Kévin and Alex) passed and are looking forward to receiving their licences and getting on the air. CDARC organises at least two Foundation courses each year with Intermediate and Full courses as well (www.cdarc.co.uk)

REGION 13: EAST MIDLANDS

REGIONAL MANAGER: STEVE BODEN, G4XCK, RM13@RSGB.ORG.UK

Derby & DARS
Richard Buckby, radio@dadars.org.uk
3 Junk sale
10 Committee meeting
Lincoln Short-Wave Club
Pam Rose, G4STO, 01427 788 356
25 Nano technology, Kevin, G3AAF
Loughborough & DARC
Chris, G1ETZ, 01509 504 319
3 Handheld night – bring something along
10 Allotment on the air, Andrew, G7SEG
17 Annual radio ramble, Andrew, G7SEG
24 Practical evening
RAF Waddington ARC
Bob, G3VCA, 07971 166 250
2, 9, 16, 23, 30 Club net on 145.325MHz at 8pm
12 *Ham Radio Deluxe* by Alan, 2E0KVR
South Kesteven ARS
Nigel, M0CVO, 01476 402 550
4, 18 Club net, 145.525MHz, 8pm
11, 25 Informal
Spalding & DARS
Graham Boor, G8NWC, 0775 760 832
1 Spalding Rally

DEADLINES

The next deadlines for entries in *RadCom* are 20 May and 24 June. Get your news stories in on time to see your club on these pages!

Classified Ads

For Sale

WANT A DATA INTERFACE ? You need an ISOTERM, Various models for your needs. PSK, WSJT, WSPR, CW & RTTY.
New Model for Elecraft KX3 available
See www.g3liv.co.uk

THINK ITS TIME TO TIDY up your Morse key connections? NEW GOLD PLATED UNIVERSAL CABLETIDYS for most BUG's and PADDLES, VIBROPLEX, JA7GHD,etc 40mm to 60mm spaced connections. See www.g3liv.co.uk email:johnny@melvin.com tel: 0191 2843028

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Equipment

REPAIRS to all amateur and vintage RX/TX cost effective service phone or call in for details. Kent Rigs, 52, Salisbury Road, CHATHAM, Kent, ME4 5NN, 07903 023437

RELIABLE REPAIRS for all amateur and vintage equipment. Professional service, reasonable rates. Call: 01807 580376 E: radiorepairs@btconnect.com

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Professional qualified services and repairs to all amateur radio equipment. We also buy and sell amateur radio equipment. Contact David on 01323 472216 – 07517 445452

Aerials

M0CVO ANTENNAS for all your amateur radio antenna needs. Full details at: http://www.m0cvoantennas.com

G4TPH PORTABLE MAGLOOPS Remote and manual tune models for 40m through 10 metres Details at www.g4tph.com

SIGMA EURO-COMM LTD HF Vertical, Wire, G5RV & Mobile Antennas, VHF Base Station Antennas Mounting Poles, Magnetic Mounts Tel 0121 766 8146
stores.ebay.co.uk/sigmaeurocommltd

"WESTERN HF 10" 67ft wire dipole 160-6m, full details lookup m0bzi at: www.qrz.com buy direct: m0bzi@hotmail.co.uk or 07748331458 reviews at: http://g0kya.blogspot.com/2010_08_01_archive.html or http://www.eham.net/reviews/detail/9424

G WHIP ANTENNAS over 45 years of amateur & commercial business. Military specification at amateur prices. Famous resonant end fdes, baluns, windoms, many different antennas, mostly made using kevlar mill spec wire. See Eham reports or www.gwhip.co.uk Tel: 07592 135431

Computer Software

PROGRAMMING SOFTWARE FOR YAESU RADIOS Http://www.g4hfq.co.uk
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Miscellaneous

CALL IN ON THE UK 'GOOD NEWS' CHRISTIAN NETS! Every Sunday morning at 8am local on 3747kHz, 2pm on 3747 or 7147KHz (propagation) and 144.205 SSB at 3pm sharing Christian fellowship. Go to www.wacral.org for more information or contact G3XNX at 51 Alma Road, Brixham, South Devon, TQ5 8QR, Tel: 01803 854504 or derekg3xnx@talktalk.net

PAFOS, CYPRUS. Pafos, 2 bed villa. Simple HF station 300m ASL. www.domsvilla.co.uk

ACCOMMODATION NORTH COAST SCOTLAND. Self catering, B&B, camping. Discounts for licensed amateurs. GM4JYB Tel: 01847 851774. Web: www.letsgonorth.co.uk/dunnet_head
Email: briansparks@dunnethead.co.uk

Wanted

UNWANTED VALVE AMPLIFIERS, working or not. Known makes only (Kenwood, Yaesu, Drake, Linear Amp, etc), not homebrew. Also 3-500Z/ZG valves. Cash paid. Contact Peter G3ZRS on 01482 862323 or g3zrs@hotmail.co.uk

VINTAGE RADIO & VALVES WANTED - national cash settlement for silent key, shack clearouts 07552678725, vintageradio@btinternet.com

Classified advertisements 58p per word (VAT inc.) with a minimum of 14 words £8.12.
All classified advertisements must be prepaid. Please write clearly. No responsibility accepted for errors. Latest date for acceptance is 1st of the month prior to publication
Payment to: RSGB, 3 Abbey Court, Priory Business Park, Bedford, MK44 3WH

Business Cards

Adertisers Index

FREE MEMBERS' ADS

Charges are waived for Members' Ads submitted by e-mail to memads@rsgb.org.uk. One ad per Member per month; other important terms & conditions apply (see grey box on page 95).

FOR SALE

BOXED ICOM IC-7000, some marks, 100% working order, Non smoking and hardly used, includes LDG200ATPro automatic tuner, IC-700 tuner interface lead, AB5N NAGY mic mod, spare power lead. £825 ONO. Collect / meet only. Dan Rimell, MOMST, 0770 464 1836 (Stratford–on–Avon).

FORTOP TVT1300 FM VIDEO TX, 2.5W output, manual, two frequencies, calling channel and GB3GV. MMA1296 1296 RX preamp. UHF Tx/Rx relay. SWR/power meter SP-400, 130-500MHz. 23cm brass filter. Homebrew BATC Rx, £250. Buyer collects. G3XKX, 0116 271 5378, derykwills@btinternet.com (Leicester).

FT-2000D 200W HF/6m xcvr, £1500. Matching SP-2000 desk speaker, £150. Heil HM-12 mic, stand with PTT and AD-1-Y lead, £90. Carriage at cost. Boxes, manuals, etc. Set up but rarely used, so pristine condition. Non-smoker. G0EOL, 01606 594 205, billg0eol@o2.co.uk (Cheshire).

HEATHKIT GDO model GD-IU, good working order, all coils 1.8 to 230Mc, complete with manual. £15 plus P&P. Bird though line dual sensor model 4230-053, no elements, good condition, no meters, £18 plus P&P. Meters are available on eBay. Gordon King, G3XTH, 01273 843 276, graking@talktalk.net (Sussex).

HYGAIN TH2 MK3 Yagi antenna for 10/15/20m. This antenna is brand new, never been used, still in original box. Purchase price was £449, will sell for £375 OVNO. Grab yourself a bargain. G3WCY, 01276 500 648 (Berkshire).

I HAVE A NUMBER OF new high impedance earphones (ex Rapid Electronics) all new in plastic resealable bags. £1 for 2 if you send a 69p SAE to my home QTH. Jon, G6UWK, 01255 870 690 (Manningtree, Essex).

ICOM IC-7000 2 yrs old, one owner from new, no mods, mint condition. 1.8-30MHz HF + 6m, 2m, 70cm all mode. Original MH-151 mic, paper manual, original EMC filter and box included, £825. Raul, MOZZM, 0871 245 6767, m0zzm@rdob.org (SE London).

ICOM IC-706MKIIG, VGC, mic, EMC filter, MB-63, boxed, £320 ONO. MFJ-989C Versa Tuner V 3kW ATU, front panel lettering damaged in parts but GWO, £70. KW EZEE Match balanced feeder ATU, fair condition, GWO, £35. Can demo, prefer buyer collects. Terry, G3MXH, 01664 454 949, G3MXH@btinternet.com (Nr Melton Mowbray).

ICOM IC-756 PRO 3 HF transceiver, 1.8-50MHz, 100W, in mint condition complete with mic, power lead, box and manual. Buyer collects, £1,450. Glenn, G8NOF, 07855 959 498, glennholt@btconnect.com (Warwickshire).

ICOM IC-756 PRO II, s/n 01089, inc HM-36 mic and printed handbook. Sorry no box. To be collected, £800 ONO. Les, G4GMS, 01778 420 224 (Bourne, Lincolnshire).

ICOM IC-910H excellent condition boxed with mic & manual, £600 plus post. John E Rodway, G4FRK, 01253 862 810 j.rodway@yahoo.co.uk (Cleveleys, Lancashire).

ICOM IC-R75 DSP HF and 6m receiver, VGC, inc manual and power supply, £370 + p&p or collection. Mike, G1KOT, 07769 161 424 (Essex).

KENWOOD TM-V7E 2m/70cm dual-band 50W/35W FM mobile, £100. President Lincoln 10/11m multimode, £120 ovno. Both boxed, in exc condx & unused for past few years. Stu, G4KUR, 07954 562 692, G4KUR@btinternet.com (nr Coventry).

LINE-UP OF FT-902DM transceiver with manual and DC lead, SP-901 speaker with manual, FTV-901R transverter with manual, FC-902 antenna tuner, Yaesu YH-55 headphones. All in good working order and immaculate condition. No splits and bargain at £600. Buyer to collect. Rob, G2BKZ 07986 367 537 (QTHR, Hertfordshire).

LOGBOOK, QSLS ETC belonging to the late GW2CSX offered to a good home; to be collected. Rowland Stellig, 01403 700 850 (West Sussex).

PALSTAR HF AUTO ATU, like new, £1000. SteppIR. 3-ele, £1000. FT-101 ZD, £180. TS-830S, £310. SM-220, £140. TS-500, all valve, £120. All these in very nice condition. Kenwood TS-950 SDX, mint, chassis number 61200039, original packing, £1200. John, G3XNH, 01953 788 376 (Norwich).

SILENT KEY SALE on behalf of M5KEN. Two Kenwood TS-850s, believed working. One comes with the original box. All the rest is missing. Prefer buyer inspects and collects, or carriage at cost. Reasonable offers accepted. Pauline Park, 01524 792 323, pauline-park@live.co.uk (Preston).

SILENT KEY SALE. Kenwood TS-570D HF transceiver, as new condition, £425. Icom IC-718 HF transceiver, £400. Both with hand mic and manual. MyDEL MP-4128 13.8V 20A PSU, £45. Prefer buyer collects and inspects; carriage extra. Ken Taylor, M1SLH, M1SLH@yahoo.co.uk, 01235 531 935 (Abingdon).

TENNADYNE 5-ELE LOG PERIODIC 14-30MHz, buyer to dismantle for correct reassembly, £75. P60 60' Versa Tower, £285 collected. Yaesu G650XL rotator, £65 plus post. MFJ 259 HF/VHF SWR analyser, 1.8-170MHz, £85 plus post. Brian Atkinson, G3GSI, 01435 883 248, g3gsi@tiscali.co.uk (Heathfield, East Sussex).

TENNAMAST 12m STANDARD PLUS tower, winch, rotator cage, G-800SDX rotator, control unit, control cable, stub mast, co-axial cable, Mosley TA-33Jr triband aerial. Spares: ground socket, rotator cage, G-800SDX rotator, control cable, winch, tower nylon top sleeve. £700 the lot. G3RKQ, 01406 362 498 (Spalding area).

TEN-TEC OMNI 6 S/N 11A10542, Standard 6.3 and 9MHz 2.4kHz filters plus additional filter line up #217 9MHz 8-pole 500Hz, #282 6.3MHz 6-pole 250Hz, Inrad 6.3MHz 400Hz, #288 6.3MHz 8-pole 1.8kHz; Ten-Tec 961 PSU, 705 desk mic. £500 + carriage. Gordon, G3ZFZ, 01229 827 701, gordon@gibson174.plus.com (Barrow-in-Furness).

TRIDENT 4m 3-ELE BEAM, well built antenna, £65. HP wireless G USB Print server 2101nw, new, never been out of box, £35. HP all in one printer DeskJet F-4280, just put 2 new cartridges in, £35. Or both for £50. MOCVS, 01629 823 025, hamradio12@gmail.com (Wirksworth, Matlock).

TWO KACHINA 100W PC CONTROLLED transceivers plus all accessories, cables etc. Circa 1998 precursors of software controlled radios. Needs some PC knowledge. One working, one faulty. Outstanding RX performance. Need 30A PSU. Base stations free to uplifter. Dave Lawrence, MOBPS, 01530 411 513, d.f.l@btinternet.com (Leicestershire).

WALL MOUNTED, right tilting Tennamast 7.6m Adapt-a-Mast plus rotator cage. Stand offs are 2ft. Cables and winches in good condition. £400 ono. Collection preferred or delivery could be arranged at extra cost. Kieron Murphy, M5KJM, 07801 929 728, kieronmurphy@tiscali.co.uk (Stockport).

WELLBROOK ACTIVE LOOP antenna type ALA1530 (aluminium) complete with rotator, substantial wall mounting brackets and auto T/R switch, £200. Prefer buyer collects or carriage extra at cost. Phil, G3SWH, 01934 832 736, phil@g3swh.demon.co.uk (Bristol).

YAESU FT-102, FV-102DM, MD-1 mic, excellent condition, new valves fitted in 2013, plus a spare set, £350. Ken, G0FEX, 0116 367 9862, g0fex212@gmail.com (Leicestershire).

YAESU FT-77 HF TRANSCEIVER. Includes 600Hz CW filter option. One careful owner from new. In good condition. Comes with original handbook, power lead and packaging. Microphone not included. £200 ONO plus delivery. Email for more info. Laurence G4SXH, 01380 850 900, laurencefletcher@phonecoop.coop (Wiltshire).

YAESU FT-817ND, little used, absolutely mint condition with leather case and original packing case, £385. Maplin XM20W PSU, 2/5A, mint condition, £20. Tokyo HL66V 6m 60W linear, £45. Raycom 2m 25W linear, £20. Tom, G8AMP, 01202 577 030 (Dorset).

YAESU FT-847 EARTH STATION. Unmodified and in perfect condition. HF to 70cm. Includes Diamond MX2000 triplexer and MFJ tuner interface box. £720 ono. Mike B, M0MMB, mick_b777@hotmail.com (Essex).

YAESU FTV-1000 6m 200W transverter to partner FT-1000MP Mk5. VGC with box, manual and all connecting leads, £365. Microset SR100 100W 2m linear. No box or manual but good condition and GWO, £130. Carriage and insurance extra on both items. Graham, G8BZL, 07799 312 939 (Hove).

WANTED

AVO VCM163 or Metrix U61/LX109 valve tester, Racal RA1218 & Siemens E311 wanted to complete my test gear & receiver collection. Steve, M6WAA, 07552 678 725, chunky9@btinternet.com (Warrington).

DEAD OR ALIVE Drake power supply AC-4 for use with TR4 etc, also MS-4 Speaker unit. Richard, G3UGF, 01422 359 362 g3ugf@norcomm.co.uk (Halifax).

FREQUENCY SWITCH PROBLEM on FT290 Mk 1. Wires have come off the display unit. I would be grateful for information regarding the wiring to the display. Would consider purchase of FT290 with u/s Tx or Rx. Andrew Chamberlain, G7CFC, 01902 865 304 (Wolverhampton).

G-600RC (OR G600) CONTROLLER in good working condition. Would accept one together with rotor too. Can collect if in Scotland or N England, but will pay all delivery charges. Colin, GM4JPZ, 01382 477 394, gm4jpz@gmail.com (Dundee).

KW 160 TRANSMITTER. Would prefer unit to be unmodified and working, but repairable and complete could be acceptable. Dennis, G3LLZ, 01793 828 188 (Swindon).

LICENCE CANDIDATE OR NEW LICENSEE to clear E Midlands shack. GM4FQE, 01333 450 753, ethirkell73@btinternet.com.

MFJ-1040B OR 1040C preselector. Jim, G3UZB, 01642 470 623. jim.shewan@ntlworld.com (Redcar).

VECTOR NETWORK ANALYSER (VNA) 3GHz such as HP8753B (preferably with HP85046A S parameter test set attachment) or 6GHz such as HP8753D. Any other VNA considered. Must be working. Mike Bush, G3LZM, 01432 271 162 (Hereford).

YAESU FRA-7700 active antenna in good condition. I am willing to travel to purchase ones in good condition. Brian, G8NHN, 07792 859 886 (Manchester).

HELPLINES

AN OLD FRIEND OF G3HTO is trying to re-establish contact. If anyone knows how Ron is faring these days, could you please contact Mr Leslie Grout, 68 The Drive, Worthing BN11 5LN?

DOES ANYONE HAVE EXPERIENCE of operating HF from a Toyota Prius? I am interested in doing so but am concerned that the complicated control systems on these hybrid cars may be sensitive to RF. Thank you in anticipation of any advice. John, G3EGC, 01204 301 502, jvhoban@o2.co.uk (Bolton).

IS THERE ANYONE who can service my Drake TR7 please? Ian, G4KJD, 01823 481 101 (QTHR, Somerset).

I'M AFTER THE HANDBOOK or calibration instructions for a Sinclair DM450 DVM, as I don't really want to have tweak pots to see what they do! Expenses met. Fortunately, I have some voltage standards available so that I can calibrate the instrumentation here... Peter Chadwick, G3RZP, peter.chadwick@ties.itu.int (Swindon).

RALLIES & EVENTS

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

1 JUNE – **SPALDING & DARS ANNUAL RALLY** – The Sir John Gleed Technology School, Halmer Gardens, Spalding, Lincs PE11 2EF. TI S22, free CP, OT 10am. TS, C, CBS. John, G4NBR, 07946 302 815, rally-secretary@sdars.org.uk. [www.sdars.org.uk].

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 they're not.**

Abbreviations: 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 F E Wyer, G8RY	27/5/2014
Mr C E Pollard, G3DPX	10/2/2014
Mr J T Parker, G3ITP	5/2/2014
Mr K D Hallam, G3KKB	14/4/2014
Mr D T Legg, G3TFZ	?
Mr W H McKinlay, GM8IWC	14/3/2014

OBITUARIES
We welcome obituaries from clubs or individuals when someone sadly passes away. They are published at www.rsgb.org/sk. Please send submissions by e-mail (only) to sk@rsgb.org.uk. All submissions are moderated and may be edited for reasons of style, grammar, length etc..

SILENT KEY ENTRIES
The Silent Keys column is **separate** from the online 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.

7 JUNE – **CENTRAL SCOTLAND MINI HAM RADIO CONVENTION** – Crofthead Farm Community Education Centre, Templar Rise, Livingston EH54 6DG. OT 9.50/10am, TS, FM, B&B, LEC, RSGB, WIN, C. [uk.groups.yahoo.com/group/cshrc].

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].

14 JUNE – **ROCHDALE & DARS SUMMER FLEA MARKET** – St Vincent de Paul's, Caldershaw Rd, off Edenfield Rd (A680), Norden, Rochdale OL12 6BU. OT 10.15am (8.30am traders), £2.50, TI S22, C. Pitches £5, bring your own table. G0PUD, 0161 285 1600, dave.shaw1@sky.com.

15 JUNE – **27th NEWBURY RADIO RALLY** – Newbury Showground, next to M4 J13. TI S22 (V44), free CP, OT 9am (visitors), 8am (sellers). Visitors £2.50, CBS pitch £12.50. Huge radio, electronics & computing boot sale including demonstration marquee with display of amateur radio on air (SSB, CW, & DATA), air traffic radar, plus clubs and national society stands. TS, C, CBS, WIN, DF, FM, SIG. Contact rally@nadars.org.uk. [www.nadars.org.uk].

21 JUNE – **SOUTH LANCS SUMMER RALLY** – Bickershaw Labour Club, Bickershaw Lane, Bickershaw, Wigan WN2 5TE. OT 9.00 (traders 7.30). £2, B&B, C, DIS, CP, SIG, DF, TS, LB. Jason, G0IZR 01942 735 828. [www.slarc.co.uk/rally].

22 JUNE – **EAST SUFFOLK WIRELESS REVIVAL (Ipswich Radio Rally)** – The Orwell Crossing Lorry Park, A14 Eastbound, Nacton, Ipswich IP10 0DD. TI S22, CP, OT 9.30, £2, CBS, B&B, SIG, LRC, RSGB book stall, GB4SWR HF station, Kevin, G8MXV, 07710 046 846. [www.eswr.org.uk].

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
01/06/2014	GB1KEM	King Edward Mine	Cornwall	LH2	G1LNA
	GB4TDM	Thornbury District Museum	Thornbury	LH27	G0RYM
	GB0WHC	Whitchurch Heritage Centre	Whitchurch	LH27	M1BKL
04/06/2014	G8XDR	International event supporting amateur Radio and Historic Museum	Abbeywood	TLHV27	GB2CM
07/06/2014	GB4AOT	Abingdon on Thames	Abingdon	LHV2	G6ZHB
12/06/2014	GB2PLF	Protect Luton Factories	Hitchin	LH27	G4PLW
13/06/2014	GB2RSM	Royal Signals Museum	Dorset	TLHV27	M0GKD
	GB2MOF	Museum of Flight	East Lothian	LH	GM4UYZ
	GB1AMB	Avoncroft Museum of Buildings	Bromsgrove	TLH2	G6NYG
	GB0AWS	All Wales Scouts	Powys	TLH27	GW7VJK
14/06/2014	GB2CAM	Cranwell Aviation Museum	Lincs	TLHV27	M0GUU
	GB2NCM	Museums On The Air	Wakefield	LHV2	M0RBG
	GB0RMM	Royal Marines Museum	Hampshire	TLH2	M0KTT
	GB2NMC	National Museum of Computing	Bedfordshire	LHV2	G0GQP
	GB1HA	Museums On The Air	Kent	TLHV27	G0UXG
	GB2NWA	North Weald Airfield	Essex	LH2	G0TOC
	GB1BSI	Bath Science Institution	Bath	LH	G0FUW
	GB4TCK	Tango Charlie Kilo	Maidstone	LH	G0GDA
	GB1MSM	Manston Spitfire Museum	Kent	LH27	M0CAG
	GB0THM	The Helicopter Museum	Somerset	LH27	M0INI
	GB2WRM	Widley Museum Rememberance	Portsmouth	LHV27	M0NAF
	GB2MOP	Museum of Power	Ceredigion	LH27	GW7EUL
	GB0NIM	Nottingham Industrial Museum	Nottingham	LH27	M0NPT
	GB8CC	Conisbrough Castle	South Yorkshire	TLHV27	G0FUO
	GB0CIM	Cleveland Ironstone Museum	Cleveland	TLH	M0DAF
	GB8WOL	War on Line	Ropley	L	G8YFH
19/06/2014	GB4JJD	Celebrating 90th Anniversary of WJJD	Somerset	TLHV27	G4TBO
21/06/2014	GB2WVG	Woodhouse Village Gala	Notts	LHV27	G4WPW
26/06/2014	GB2AVF	Abridge Village Fete	Essex	2	G0TOC
27/06/2014	GB0APS	Abbey Pumping Station	Leicester	LHV2	G0IJM
28/06/2014	GB4AFD	Armed Forces Day	Woolwich	LHV2	M1CCF
	GB8AFD	Armed Forces Day	Devon	LH2	G4XKH
	GB4NGS	National Garden Scheme	Brentwood	LH	M0HJY
	GB8AF	Armed Forces	Boston	TLH	G3JRY

22 JUNE – **LAM COMMUNICATIONS RALLY** – In aid of Yorkshire Air Ambulance. Building 21, Elsecar Heritage Centre, Wath Road, Elsecar, Barnsley S74 8HJ. Admission to Heritage Centre and CP free, OT 10am-4.30pm, £2, TS, B&B, C. FAM. Clare Marsh, sales@lamcommunications.net.

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 9018, petermi6nid@outlook.com. [www.bdars.com].

6 JULY – **CORNISH RAC 51st MOBILE RALLY** – Penair School, St Clements, Truro, Cornwall, TR1 1TN. TS, B&B, C, TI, CP. OT 10.30, £2. Steve, 01209 844 939, g7voh@btinternet.com. [www.gx4crc.com].

6 JULY – **18th RED ROSE QRP FESTIVAL** – Formby Hall, Alder Street, Atherton, Manchester M46 9EY. Free CP, OT 11.00, £2 (U14 free). TS, SIG, B&B, DF, LB, C. Les Jackson, G4HZJ, 01942 870 634, g4hzj@ntlworld.com.

6 JULY – **BARFORD NORFOLK RADIO RALLY** – Barford Village Hall & Green, Barford, Norwich NR9 4AB, TI S22, CP, OT 9.00 £1.50 (U16s free). C, DF, WIN, TS, B&B. Contact radio@dcpmicro.com. [www.norfolkamateurradio.org].

12 JULY (Saturday) – **STOCKPORT RALLY** – Walthew House, 112 Shaw Heath, Stockport SK2 6QS. OT 10am, £2. TS, DIS, CP, C, TI S22. Tables available £10 each. Bernard, G3SHF, 01625 850 088 (day) or Nigel, G0RXA, 0161 428 8413 (eves).

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].

20 JULY – **FINNINGLEY ARS SUMMER RALLY** – The Hurst Radio Communications Centre, Belton Road, Sand toft, Doncaster DN8 5SX. Easily accessible from the M180 Jct 1 / Jct 2. OT 10am, TS,CP, B&B,TI, RSGB book stall. Kevin, G3AAF, 07831 614 640. [www.finningleyradiorally.co.uk].

25 JULY – **SSC/AMSAT-UK CUBESAT WORKSHOP** – Surrey Space Centre, University of Surrey, Guildford, GU2 7XH 9am-4pm, free admittance. Amateur satellite beginners' session at 4pm. [http://amsat-uk.org].

25-27 JULY – **AMSAT-UK INTERNATIONAL SPACE COLLOQUIUM** – Holiday Inn, Guildford, GU2 7XZ. A great opportunity to hear about the latest developments and to chat with satellite designers and builders. [http://amsat-uk.org].

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.

3 AUGUST – **25th KING'S LYNN ARC RALLY & CAR BOOT** – Gaywood Community Centre, PE30 4DZ. OT 10am, £2, CP free, TS, CBS pitches, C, CS (by prior arrangement), TI 145.550MHz. Ted, G4OZG, 01553 768701, g4ozg@raynet-uk.net. [www.klarc.org.uk].

8 AUGUST (Friday) – **COCKENZIE & PORT SETON ARC 21st MINI-RALLY** – Community Centre, Main Hall, Port Seton. Bring along your own 'junk' and sell it. Tables free, first come first served. OT 6pm, £2. C, DF. bob.gm4uyz@talktalk.net [www.cpsarc.com].

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].

10 AUGUST – **FLIGHT REFUELLING ARS HAMFEST** – Cobham Sports and Social Club Ground, Merley, Nr. Wimborne, Dorset BH21 3DA. TI S22, CP, OT 10.00, TS, CBS, LB, C. Details hamfest@frars.org.uk. [www.frars.org.uk].

24 AUGUST – **MILTON KEYNES ARS RALLY** – Longueville Hall, Hammond Park, Whaddon Road, Newton Longville, Milton Keynes MK17 0AT. Why not combine a visit to our rally with Bletchley Park and visit the National Radio Centre (NRC) as well? Modern venue with large indoor and outdoor areas. CP, OT 10am, £3, TS, TI, LB, C. Steve, G6KJU, 07866 673 192. [www.mkars.org.uk/mkars/rally].

25 AUGUST Bank Holiday Monday – **HUNTINGDONSHIRE ARS RALLY** – St Neots Community College, Barford Rd, St Neots PE19 2SH. OT 10am, £2, TI S22 (V44), CP, CBS, B&B, C, TS, DF. Clive Burchell, G3NKQ, 01480 810 473, clive.burchell@btinternet.com.

31 AUGUST – **TELFORD HAMFEST** – Enginuity Technology Centre, Coalbrookdale, Telford TF8 7DU. Martyn, G3UKV, 01952 255 416. [www.telfordhamfest.co.uk].

Rallies & Events

6 SEPTEMBER (Saturday) – **FRISKNEY & EAST LINCOLNSHIRE COMMUNICATIONS CLUB RALLY** – The Friskney Village Hall, Church Road, Friskney, Lincs PE22 8RD, 6.5 miles south of Skegness. OT 8.45, traders 7am, TI 145.550, C, B&B. Details on 070753 4624 559. [www.felcc.com].

14 SEPTEMBER – **HALTON & DISTRICT RADIO AMATEURS RALLY** – Manley Mere. OT 10am, £1.50. TS, B&B, C £2, LB, SIG, FAM. All proceeds after costs to charity. George Low, G0RLF, 07919 935 725 (daytime), g0rlf@talktalk.net. [www.haltonradiorally.webs.com].

14 SEPTEMBER – **TARS 50th ANNUAL COMMUNICATIONS FAIR.** Newton Abbot Race Course, Devon TQ12 3AF. All indoors, TS, B&B, C, DF, WIN, RSGB book stall. OT 9.30/10am £2. Mike Dixon, 01803 557 941, rally@tars.org.uk.

14 SEPTEMBER – **WEST KENT ARS RADIO AND ELECTRONICS FAIR** – Tunbridge Wells Grammar School for Boys, St John's Road, Tunbridge Wells, Kent TN4 9XB. TI, CP, £2.50, 10am, TS, B&B, C, DF, WIN, RSGB book stall. Dave, G4OTV, rally@wkars.org.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].

4 OCTOBER – **5TH WEST TYRONE ARC CONFERENCE** - Village Inn, Killyclogher, Old Mountfield Rd, Omagh, County Tyrone BT79 7LT. LEC, C, TS, B&B. Ian, MI1CCU, mi1ccu@mail.com.

5 OCTOBER – **BLACKWOOD AND DISTRICT ARS RALLY** – Rougemont School, Llantarnum Hall, Malpas Rd, Newport, NP20 6QB. TI V44 (S22), CP, OT 10am, £2, TS, SIG, CBS, RSGB book stall, B&B, C. Andy, MW0MWZ, 01495 220 687. [www.gw6gw.co.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].

12 OCTOBER – **HORNSEA AMATEUR RADIO CLUB RALLY** – Floral Hall, 7 The Esplanade, Hornsea, East Yorks HU18 1NQ. OT 10am, CP, TS, B&B, SIG, RSGB, RAFARS, LB, C, DF, WIN. Details from Rick, M0CZR, 01964 533 712, R106221@aol.com. [www.hornseaarc.co.uk].

18 OCTOBER – **CARRICKFERGUS AMATEUR RADIO GROUP RADIO RALLY** – Downshire Community School, Carrickfergus, BT38 7DA. OT 11:30am, £3. TS, B&B, CP, C, DF, SIG, RSGB, MT. Details from Tim, MI0TBL, carg@hotmail.co.uk. [www.radioclubs.net/carg].

19 OCTOBER – **GALASHIELS AND DISTRICT ARS RADIO RALLY** – The Volunteer Hall, St Johns Street, Galashiels, Scottish Borders TD1 3JX. OT 11.30 /11.15, £2.50. B&B, TS, WIN, C. Jim, GM7LUN, 01896 850 245, gm7lun@qsl.net.

25 OCTOBER – **FOG ON THE TYNE RALLY** – Whitehall Road Methodist Church Hall, Bensham, Gateshead NE8 4LH, organised by Angel of the North ARC. £1.50, TS, B&B, C, CP, RSGB bookstall. Nancy Bone, G7UUR, 01914 770 036 (eves), nancybone2001@yahoo.co.uk. [www.anarc.net].

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].

22 NOVEMBER – **ROCHDALE & DISTRICT ARS TRADITIONAL RADIO RALLY** – St Vincent de Paul's, Caldershaw Rd., off Edenfield Rd (A680), Norden, Rochdale OL12 6BU. OT 10.15/10.30, £2.50 (concessions U12 & seniors), TI S22, C. Pitches £5 bring your own table. Dave, G0PUD, 0161 285 1600, dave.shaw1@sky.com. [www.radars.me.uk].

23 NOVEMBER – **CATS RADIO & ELECTRONICS BAZAAR** – 1st Coulsdon Scout HQ, r/o Council Car Park, Lion Green Road, Coulsdon, Surrey. OT 10am-1pm, £1, B&B, C, DIS, free CP. Glenn, G4FVL, bazaar@catsradio.org.

23 NOVEMBER – **PLYMOUTH RADIO CLUB RALLY** – Harewood House, The Ridgeway, Plympton, Plymouth PL7 2AS. CP, TI, OT 10.00, £2, TS, C. Contact Sheila Hart, 2E0YSH, 07815 542 477, sheo@fsmail.net.

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. You should receive an automatic acknowledgement almost immediately. 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.**

3) The Ad may not contain more than 40 words, excluding the information in (2), and may be 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.

6 DECEMBER – **SOUTH LANCS WINTER RALLY** – Bickershaw Labour Club, Bickershaw Lane, Bickershaw, Wigan WN2 5TE. OT 9am, traders 7.30am. £2, B&B, C, DIS, CP, SIG, DF, TS, LB. Jason, 01942 735 828.

7 DECEMBER – **BISHOP AUCKLAND RADIO AMATEURS CLUB RALLY** – Spennymoor Leisure Centre, Co Durham DL16 6DB. CP, TI S22 (V44), OT 10.15 /10.30, £2 (U14 free). TS, B&B, C, LB, DF, FAM. John, G4LRG, 01388 606 396.

SCIENCE IN SCHOOLS

Dave Howard CEng FIET, M0BGR

I am sure I am not alone in being horrified by the current proposals, in England, to purge practical work from schools' science curriculum. However, this is a great opportunity for amateur radio. We may not offer the rigor required to become a fully-qualified scientist or engineer but we do offer a great many opportunities to enthuse youngsters with the fun of hands-on science. I trust the relevant committees in RSGB, and at club level, are looking at how we might help fill the vacuum created by the Secretary of State.

We are aware that the new science curriculum will start in Junior Schools from 2015 and in Secondary Schools from 2016. Whilst examination will be the only means of assessment, the information published by Department for Education does not advocate an end to practical learning in science, quite the opposite. In launching the new GCSE content the Secretary of State said: "In the sciences, there will also be a new requirement that students must carry out a minimum of 12 practical activities [...] This will make sure that all A level scientists develop the experimental and practical skills essential for further study."

A deeper dive into the Content Documents for Key Stages 1 and 2 finds specific requirements for children to be taught about "simple series circuits involving batteries, wires, bulbs and other components [for example, buzzers, motors]", much as we do in our Foundation and Intermediate courses.

At GCSE level, the physics content includes reference to AC, DC, EMR, radio, microwaves, wavelength, current, potential difference and resistance, induced current transformers and use of maths, all of which would benefit from practical demonstrations in a radio context.

The RSGB Training & Education Committee has a project in train to identify where the curriculum could be delivered using amateur radio and/or where amateur radio could be used to demonstrate the concepts. The ARRL has used this approach in the USA to help teachers see the benefit of amateur radio in schools.

It is hoped that clubs in the UK will be able to use the outputs from our project to show amateur radio in a way that is entirely relevant to mainstream education, rather than trying to get schools to embrace amateur radio on our terms. We are therefore looking to review and re-publish the list of clubs willing and able to help schools.

We are also looking at how we can work with the new Studio Schools to make radio communication a core topic in how they deliver BTEC qualifications.

If any member would like more information, drop me a line via tec.chair@rsgb.org.uk

Steve Hartley, G0FUW
Training & Education Committee Chair

TUNER-UPPERS

David Horton, G3RZF

Apropos the recent correspondence on annoying tuner-uppers, I'm surprised that no one has suggested using a noise bridge for the purpose. I have used a SEM Ezitune for about 20 years and consider it one of the best investments in my shack. It is in-line with my SEM TranZmatch and couldn't be simpler and quicker to use. It even has an automatic RF bypass relay incorporated in case one forgets to switch it off when transmitting! The purists may argue that anything in-line between the transmitter output and the antenna leads to losses, but in how many shacks is that the case? I believe you can still find SEM products on sites such as eBay and there are circuit designs available as well for the home builder.

AERIAL THEORY

David Sumner, G3PVH

Andy, G3PKW writes a very clear explanation of matching a transmitter to an antenna. He mentions the coupling of RF power to the aether, and I wonder if I might comment on this small point? In 1887, Michelson and Morley tried to detect the aether by measuring the speed of light travelling both with, and against, the Earth's movement. It was the most famous of failed experiments – they found no difference and no aether.

Two famous scientists, Fleming and Larmor, seem to have stayed with the concept of an aether. Fleming's explanations of the electrical and magnetic properties of a vacuum, and how radio waves can pass through it, are most interesting [1]. Larmor, incidentally, devised the formula allowing us to find the power radiated by an antenna, though we rarely hear his name.

1: *An Elementary Manual of Radiotelegraphy and Radiotelephony for Students and Operators*, Sir John Ambrose Fleming, 1908, (Nabu Public Domain Reprint).

FITTING PL-259 PLUGS

David Stansfield, G0EVV C. Eng

I am writing in support of Peter Dodd's article about the fitting of PL-259 connectors. As club secretary, I have often had the sensitive task of preparing 'silent key' equipment for sale by auction. The list of equipment often includes very expensive transceivers, amplifiers and inevitable many RF patch leads. When inspected, the RF plugs are often found to be poorly attached, braid continuity being the worst problem. Clearly this problem is widespread and should be addressed following Peter's advice.

I suggest that in addition to taking care to fit these plugs properly, it is also imperative to carry out an electrical test on the completed plug. When used to carry 400 watts of RF it will be subjected to 141 volts RMS, 200 volts peak. If the VSWR is not 1:1, the voltage will be significantly higher. Whenever I fit a PL-259, I test the fitting using a 500 volt Megger. Using the HV setting I test the dielectric insulation and then using the low resistance setting, I test the conductivity of the screen and centre conductor. In my opinion this test is critically important prior to connecting up a shiny new transceiver or linear.

REGION 5 ELECTIONS

Martin, G0JCN

I would just like to say how disappointed I am with the recent Region 5 Regional election. Not with the result I must add but with the apathy of the Membership towards this valuable role with only approx. 70 votes for one and approx 30 for the other. This must represent only about 5% of the Region 5 membership.

Frankly, I find it very disappointing.

In fact, the turnout in Region 5 in respect of the RM election was twice as high as the national vote for the vacant Board Director position. Whether this is due to apathy or Members having no preference for either candidate is a moot point but this level of participation is in line with recent elections."

Graham Coomber, G0NBI. RSGB General Manager

ONE FUTURE FOR AMATEUR RADIO

Paul Hawkins MIET, G4KHU

I have read the Peter Cochrane, G3RVC featured article (Jan 14) several times and, whilst one can agree with some of the comments he makes, generally it seems to come from someone who has not experienced amateur radio for a very long time. "At 22 years old I closed down..." and it comes over as a lofty academic talking down to common folk and rather annoying at that. We cannot all be pathfinders in the world of technology, but there have always been amateurs who have pushed the technological boundaries, whether it be the use of SSB many decades ago or the more recent software based PSK modes and that has always been the way. A number of amateurs are already exploring the 'opportunity spaces' in the microwave/sub-optical spectrum and also looking at bands previously thought to be un-useable, 8.9kHz for example.

Amateur radio is a hobby that many of us do for pleasure and not everyone has the time, capability or resource to explore new territories. Just as people go for walks on well-trodden paths, not everyone is looking for an unclimbed mountain to conquer. The regular and featured technical articles in

The Last Word - Letters

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RadCom are as good as any in the past and are very relevant for those developing their knowledge in electronics and radio, amateur or professional. The RSGB is doing its bit to encourage young people, but nowadays there is so much more for young people to do since G3RVC gave up, so we are competing for their time. In the long term the RSGB may not be able to sustain the Membership at the level it is now but that does *not* put it on a 'trajectory to stagnation'. Modern society has moved on and people's interests change, but the need for engineers and scientists is as strong as ever and amateur radio, and the RSGB, will have a part to play.

Angus Annan, MM1CCR,
RSGB Past President

Reading the interesting articles in recent editions of *RadCom* by Peter Cochrane, one can see easily the progression that Peter followed from amateur radio to becoming a professional electronics and radio engineer. The reader can applaud that without wishing to emulate it or to support the possible future that he set out for amateur radio. Many will have read the two articles 'One Future for Amateur Radio' with some feelings of uncertainty and disappointment if that is to be mainstream in the future of the hobby. The scientific approach outlined is admirable in its rigour, but amateur radio is both an art and a science. Coding and the mathematics of information theory have fascinations for some, but that approach misses out the essential satisfactions of physical amateur radio. This response will not include any mathematics, but there will be some philosophy.

Cochrane cites the greats of information theory, Shannon and Varley, but in response I turn to an American academic philosopher turned motor bike mechanic, Mathew Crawford, and his great book, *The Case for Working with Your Hands*. Crawford turned away from his life of purely mental work to the still intellectual satisfactions and cognitive demands of repairing motorcycles. He shows, as we know, that knowledge of materials and the interoperation of components can provide huge satisfactions that cannot be matched in a life bounded by screens and keyboards. Similarly, it is the physical reality of working with real radios and seeking distant contacts in the dark hours of the night that drives the hobby for many. Human excellence can take many forms, but the utility and visibility of what radio amateurs do is paramount in enjoying the hobby and attracting new entrants.

This reality of radio is clear to the QRP community, 4,000 strong in the UK and many more besides in the wider world. In experimenting with low power, these people seek to do much with less and exemplify the experimental approach that is still strong in amateur radio. They break the bounds so prevalent in modern technology, which can be highly sophisticated but, to the user, is opaque with internals that are not accessible and provide no learning experience.

In a recent address to a meeting, Graham Coomber, G0NBI, General Manager of RSGB, set out a possible future for amateur radio where the new kitchen table homebrew might be software development on the Raspberry Pi low cost computer and working with the FUNcube dongle. This has the great merit of being logical, if somewhat mathematical and taking experimenters in the direction of software defined radio and is likely to appeal to young new comers to the hobby.

In decrying any involvement with the radio technology of the late 1960s Cochrane misses a point. When an amateur restores a radio receiver such as an HRO or an Eddystone EA12, it is about satisfaction, not sentimentality and the work is not lacking in intellectual challenges.

It may be felt that that there is some inanity in certain amateur activities but 'each to his own' is the essence of any hobby. In 1954, about 50% of the population of the UK were engaged in manufacturing industry, but the de-industrial revolution continues; so now it is closer to 8%. Those people who sit in front of screens all day turn to the physical experience of fixing things and making things at the weekends. Amateur radio must evolve and be positioned to meet this basic need. The challenge is to keep the spirit of experimentation and innovation going.

There are those who love to get dirty and fix things
They drink coffee at dawn and beer after work
And those who stay clean; just appreciate things
At breakfast they have milk and wine at night
There are those who do both, they drink tea
Gary Snyder, Philosopher and ZEN Poet

ANTENNA WIRES

Peter E Chadwick, G3RZP

Following on from G3LDO's antenna column in the May *RadCom*, when soldering antenna wires with a blowtorch the old trick is to wrap the multicore solder round the joint and add a little flux, as G3LDO advised. Then wrap the joint in aluminium foil – that stops the solder running away. Heat the joint and smoke will come out and often catch fire, but the solder will run nicely inside the foil. Afterwards, strip the foil away. Back in the 1950s, when this was published in the *RSGB Bulletin*, they suggested using the aluminium foil ('silver paper') from one's packet of cigarettes and using the usual cigarette lighter as a heat source! How times have changed...

For hard drawn 14 SWG copper wire, I've found that even better is to use silver ('hard') solder, although it means getting the wire red hot. Especially if there's going to be any repetitive bending at or near the joint, the annealing that produces helps prevent metal fatigue.

I must make a note of the salt and vinegar cleaning method... I presume that unlike some culinary applications, it does not make any difference if it's wine or malt vinegar!

WS 19 AT THE NRC

J Chris P Sharp, BRS 21683

Yes, I was one of the many who picked up ex WD radio gear for virtually nothing in the early 1950s, when I was a radio enthused schoolboy. For me, it was the one man WS 38 (36?) that got me going, leacing me to become an Associate Member of the RSGB in August 1952, A1241.

The sets cost virtually nothing even then at 7/6 plus postage – and if you got one that worked (you didn't always, it was the luck of the draw), you could receive and transmit on 40m. Claude Rye handled much of this stuff, which I have heard was sold by weight at WD disposal sales, simply to get rid of the gear quickly, never mind what it was. I also experienced operating two man WS 18, big heavy brutes that needed quite a bit of setting up.

VIRTUAL TEST GEAR

Geoff Theasby, G8BMI

I read with interest the May *RadCom*, in particular the article on using test gear, by Dave Pick, G3YXM. I think it is worth mentioning that it is possible to play with virtual test gear (audio frequency only) using those available on K4ZAD's Radio Information Site: www.radio.imradioha.org/PC_Based_Test_Gear.htm and the linked site: Andrew Steer's Soundcard Audio Tools and Toys http://techmind.org/audio/index.html

If you plug your receiver in to the sound card of your computer (A scanner is better than an amateur radio receiver, as the audio bandwidth is less likely to be tailored or restricted) you can explore the facilities and reactions of several kinds of test gear at no cost, and you may even find them useful!

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Price £1549.95c

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- *10kHz - 55MHz Rx. Displays up to 384KHz*
- *Software: PowerSDR mRX*
- *Ethernet connection*
- *13,8v DC - 165 x 63 x 140 (mm)*

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ANAN-100DE
Can be switched to 1536KHz Panoramic Display

ANAN-10E Transceiver
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- *ANAN100D- Dual Physical receivers (14 within software)*
- *Software - PowerSDR mRX - up to 768kHz display (Current)*
- *cuSDR - up to 55MHz display (In development)*
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- *Keyboard CW sending - Wave file record/playback*
- *Dual transverter sockets - PTT out - Accessory multi socket*
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- *13.8v DC - Size 265 x 220 x 80 (mm) Weight 4.5kg*

Full spec: www.apache-labs.co.uk

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HamPad

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If you are new to SDR, then this may be an iceal introduction to one of the most exciting aspects of ham radio technology. Simply connect up to your 12v PSU and plug into the USB socket of your Windows based PC. You can be on the air in minutes with panoramic display and quite the best receiver selectivity and noise reduction for the money. No analogue transceiver offers this level of performance at this price level. And if you are a VHF enthusiast, this could be the ideal driver for your station.

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K3/0-Mini Remote Control

Remote control your K3

NEW

No PC Needed!

The K3/0-mini allows distant operation in 'terminal mode' in conjunction with a base station K3. It provides unique real time remote control experiance. You can operate a K3 located in the next room, or across the world. The latest K3 firmware supports a compact remote control serial protocol that provides a 100% mirror image of the remote K3 base, on the controlling K3/0-mini. All local front panel controls: VFO knobs, other controls and button actions, are immediately communicated back to the base K3, and all display functions from the remote base K3's LCD and LEDs, are immediately displayed on the controlling K3/0-mini.

The K3/0-Mini consists of a K3 front panel only, so it's highly portable. The K3/0-Mini is perfect for home and travel use, due to its small size. It fully duplicates all K3 controls, displays and menus for a realistic remote K3 experience. With the recommended interface at each end, it is possible to connect direct to the local router at each end of the system with no PC needed.

ELECRAFT K3 HF Transceiver HF - 6m

Built or Kit?

KIT: You can build a K3 in around 15 hours of careful assembly with a limited amount of construction experience. No soldering is needed.

Built: We can build your K3 including adding optional extras, correctly align it, computer test and soak test, and deliver it to you with loving care.

Either way: You get an exclusive 24 month UK warranty.

K3-10W
Kit £1495 Built £1595
K3-100W
Kit £1995 Built £2095

The transceiver that more and more serious hams are turning to. The name of "Elecraft" spells out quality, reliability and performance. What more could you demand? And on the inside are a host of design features that make this radio one of the most satisfying and enjoyable to operate. All the essential controls are accessible from the front panel. No need to go into menus to change those things you need to do quickly, Instead, the comprehensive menu system is the preserve of what you need to change in order to create your own personal performance needs. And if you are worried about it getting out of date - don't. The K3 is probably the most regularly updated radio on the market. And that is why you rarely see them second hand!

The Amazing KX3 Transceiver Nothing Comes close in Size and Performance

- 160m - 6m SSB CW AM FM PSK31 RTTY
- 100mW to 12W continuous on 13.8v
- 100mW - 5W on internal AA cells
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- DSP filtering and Noise Reduction
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- Strong adjacent signal protection circuit
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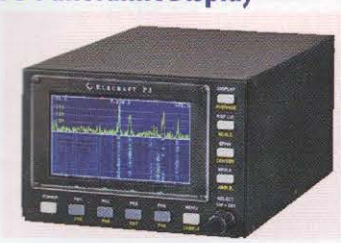
- CW PSK31 & RTTY Display decoding
- Send RTTY and PSK 31 via CW key

The KX3 represents a milestone in ham radio history. In the past twelve months it has outsold every other transceiver that we handle, by a very large margin. To many, it is the perfect transceiver. And independent tests show that it outperforms almost every other HF transceiver no matter the cost or make. That is a pretty impressive statistic in itself. But as the radio has so much to offer, it is hardly surprising. Features include: 10W output, SSB CW FM AM PSK31 RTTY, AA Battery Tray, Variable Selectivity, DSP, Large Display, CW Keyer, Voice and CW Memory, Full QSK and VOX, Dual Receive, Stereo CW, Amazing Dynamic Range etc. It all adds up to a very special radio. And with the coming 100W PA, KXPA100 and the 2014 release of the 2m transverter, it has become the classic radio for portable or QRP work.

KX3 Built or Kits from Stock.

KX3 Kit	£899 D
KX3 Built & Calibrated	£959 D

P3 Panoramic Display



KX3 Accessories from stock.

MH3	Hand Microphone	£64.95 B
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The P3 really adds performance to your K3 transceiver. It will display live spectrum up to 200kHz wide with Average feature that lets you suppress noise spikes. A press of the cursor button QSYs the K3 to the display signal. The P3 is self powered from the K3. All leads supplied. You will need the KXV3A board fitted inside the K3. We can arrange this modification to your K3 if needed or supply the board.

Built £759 D Kit £709 D

All these accessories and options are normally from stock

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KFL3A-500	500Hz 5-pole	£89.95 C	KFL3A-6K		£139.95 C
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KDVR3	Digital Voice Recorder - recommened we fit as needs front panel removal	£144.95 C
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MH2	Hand Microphone with Up/Down buttons. Eletret type.	£64.95

NEW

The NEW PX3 Panoramic Adaptor for the KX3 Transceiver

We are pleased to announce the introduction of the PX3 Panoramic adaptor that uses the same size screen as the P3. This includes the waterfall display and will be a great companion to the coming 2m transverter. Available late summer.

Now Two Amplifiers!

NEW

The NEW KXPA100 100W Linear Amplifier (FT-817 Ready!)

Did You Know The Little KX3 can drive this Amp to around 180W!

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KXPA-100F Built £749d **KXPA-100K Kit£699d**
KXPA-100AT-F Built £1099d **KXPA-100AT-K £999d**

KPA-500 600W Amplifier

The KPA-500 covers the bands 160m to 6m and delivers 600W with a drive level of around 30W. It can be used with any transceiver and features auto band switching through RF sensing. It has a built in AC supply and is the same size as the K3 transceiver. This is a great solid state design with full protection. No warm up and capable of full QSK switching.

KPA-500F Built £2199d **KPA-500K Kit £1999d**

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