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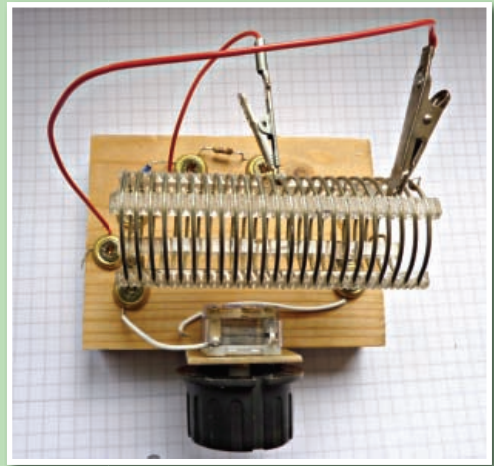
*Practical*

# WIRELESS

*Britain's Best Selling Amateur Radio Magazine*



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## Wouxun KG-UV920R

Twin-band mobile/base transceiver reviewed

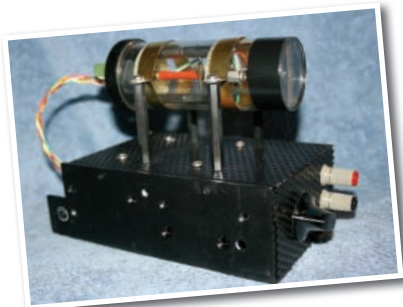


## Pitcairn Islands – First Call!

Charles Riley G4JQX describes a long, simple antenna

## In the Blink of an Eye!

A fascinating electromechanical version of those once-so-familiar 'Magic Eye' tuning valves



## Practical Way

Keeping you, the family and the grandchildren busy over Christmas

## In the Shop

A good r.f. signal generator is a valuable asset in the workshop



## Valve & Vintage

Mobile memories using 'ancient modulation'



# WATERS & STANTON

## Merry Christmas To All Our Customers!

### Christmas Open Day Sale!



Hockley, UK's Biggest Ham Store

**Saturday 15th of December \*Special Elecraft Demo\***

Come and visit our shops in Hockley & Glenrothes, enjoy free food and some great deals. In our usual Christmas spirit, we will have some special offers and great prices for callers only. Treat yourself for Christmas and get a bargain!



### The 50MHz "Magic" Band



W7EW ordered 6 x 7 element 50MHz Yagis!



W3LPL ordered a 9 element 50MHz Yagi and has now ordered 2 more!

- 2-50-LFA2 6.7dB/Gn, 14.43dB F/B, 0.7m boom **£89.95**
- 3-50-OWL 7.67dB Gn, 18.4dB F/B, 1.6m boom **£99.95**
- 3-50-LFA 8.9dB Gn, 20dB F/B, 2.3m boom **£119.95**
- 4-50-LFA-S 9.2dB Gn, 23dB F/B, 2.6m boom **£154.95**
- 5-DES-50 9.6dB Gn, 35dB F/B, 2.6m boom **£154.95**
- 5-50-LFA-S 10.5dB Gn, 27dB F/B, 4.1m boom **£194.95**
- 6-50-LFA-S 11.4dB Gn, 34dB F/B, 4.1m boom **£289.95**
- 8-50-LFA-S 14.1dB Gn, 26dB F/B, 12.5m boom **£579.95**

### 432MHz Long Yagis



- 10EL-432-LFA-SQ 14.4dB Gn, 27.8 F/B 2m bm **£92.95**
- 14EL-432-LFA-SQ 15.7dB Gn, 39dB F/B, 2.9m **£119.95**
- 16EL-432-LFA-SQ 15.9dB Gn, 40dB F/B, 3.5m **£139.95**
- 18EL-432-LFA-LN 18.1dB Gn, 38dB F/B, 4.3m **£174.95**
- 20EL-432-LFA-LN 18.6dB Gn, 39dB F/B, 4.9m **£195.95**
- 26EL-432-LFA-LN 19.8dB Gn, 36dB F/B, 6.8m **£255.95**

### The 144MHz DXers Choice



All antennas rated to at least **3kW** RF Power.

Specials to Order.

- 3-LFA-144 8.7dB Gn, 0.7m boom **£59.95**
- 4-LFA-144 9.5dB Gn, 29dB F/B, 1.17m boom **£74.95**
- 5-LFA-144 11.1dB Gn, 20.3dB F/B, 1.8m boom **£89.95**
- 6-LFA-144 11.9dB Gn, 29.3dB F/B, 2.4m boom **£104.95**
- 7-LFA-144 12.9dB Gn, 22dB F/B, 2.9m boom **£134.95**
- 8-LFA-144 13.3dB Gn, 27dB F/B, 3.8m boom **£164.95**
- 9-LFA-144 14dB Gn, 26dB F/B, 4.4m boom **£194.95**
- 12-LFA-144 15.8dB Gn, 30dB F/B, 7.2m boom **£269.95**
- 14-LFA-144 16.6dB Gn, 34dB F/B, 9m boom **£325.95**
- 16-LFA-144 17.3dB Gn, 38dB F/B, 10.9m boom **£405.95**
- 18-LFA-144 17.9dB Gn, 38dB F/B, 12.7m boom **£455.95**
- 20-LFA-144 18.3dB Gn, 38dB F/B, 14.8m boom **£509.95**

### At Last - 4m Quality Yagis!



- 3-OWL-70 7.7dB Gn, 17dB F/B, 0.9m boom **£82.95**
- 3-LFA-70 8.76dB Gn, 21.5dB F/B, 1.4m boom **£99.95**
- 4-LFA-70 9.8dB Gn, 16.3.5dB F/B, 2.14m boom **£129.95**
- 5-LFA-70 10.7dB Gn, 25dB F/B, 3.1m boom **£149.95**
- 6-LFA-70 11.3dB Gn, 34dB F/B, 4.3m boom **£189.95**
- 8-LFA-70 13.5dB Gn, 35dB F/B, 8.4m boom **£349.95**



### New FLEX-6000 Series Coming Soon!

#### Flex-3000 160-6m 100 Watts Auto ATU

94dB dynamic range. 96kHz wide receiver display. Firewire connection. Built-in auto ATU. 100 Watts and weighs just 3.2kg. The FLEX-3000 is the high performance mid-range 100 watt all-band, all-mode amateur radio transceiver that achieves receiver performance that rivals all other traditional analog hybrid DSP transceivers in its price class. The FLEX-3000 is the perfect transceiver for hams just getting started with high performance fully software defined radios or a companion SDR for existing FLEX-5000 owners who want a more convenient solution for portable operation. **£1399.95 D**



#### Flex-1500 160-6m 5 Watts All Mode

86dB dynamic range, 48kHz receiver display, USB cable, 5 Watts output. Low Cost Transceiver with Software Defined Radio Features and Performance. This is a common theme for FlexRadio Systems' software defined radios - a focus on performance and exceptional value. And the FLEX-1500 continues that tradition for a transceiver in the sub £600 price class. A QRP radio that works perfectly with your laptop and a great driver for VHF/UHF transverting. **£579.95 D**



#### Flex-5000A 160-6m 100 Watts

In addition to exceptional performance, the FLEX-5000A offers the flexibility of multiple antenna ports, keying circuitry, balanced and unbalanced audio, plus a full-featured transverter interface. Options include an automatic antenna tuner and 2nd fully synchronous receiver. The FLEX-5000A is the perfect transceiver to Tune in Excitement!™ FlexRadio Systems, founded in 2003, is a leader in Software Defined Radio (SDR) technology. Our high-performance, GPL open source PowerSDR™ software is the gold standard in Software Defined Radio software. **SPECIAL PRICE Whilst Stocks Last**  
5000A **£2495 D + ATU £2745 D**



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Online Catalogue  
**www.wsplc.com**

### HF High Performance Transceivers

#### YAESU FT-950 HF & 6m Transceiver



Step up to the FT-950 and you enter the world of advanced £1000+ class design. You get 30kHz - 56MHz Rx, Auto ATU, triple conversion Rx with 3 roofing filters, 32 bit floating point DSP, Superb dynamic range, Tx variable bandwidth and Mic EQ adjust, plus CW zero/spot feature, CW message storage etc. **IN STOCK £1264.95 D**

#### FT-2000 160 - 6m Transceiver

This radio is a DXers favourite and widely used for DXpeditions and contests. Covering 160m to 6m. It has all the digital features and auto ATU. Available as 100 Watt or 200 Watt version. **IN STOCK 100W £2259 D 200W £2899 D**



#### FT-DX5000 160 - 6m Transceiver

The current Yaesu "flagship" radio, covering 160m to 6m delivering 200 Watts. **ALL IN STOCK**  
FT-DX5000 Standard radio **£4635.95 D**  
FT-DX5000 + SM-5000 monitor **£4939.95 D**  
FT-DX5000MP + monitor & filters **£5369.95 D**

#### KENWOOD TS-590S 160m - 6m with superb receiver inc. dual roofing filters, Auto ATU, 32 bit f/p DSP & USB PC connection.



This radio has won the admiration of the radio press and hams all over the world. The best dynamic range in its class, digital IF, narrow roofing filters and auto ATU. Also FREE PC control program that can be downloaded. Exceptional value. **IN STOCK £1329.95 D**

#### ICOM IC-7410 HF-6m Transceiver

This lovely new HF-6m all-mode 100W transceiver offers superb front end dynamic range, and has a 15kHz roofing filter. It also features a 36kHz DSP razor sharp filter, internal auto ATU, PC control via a USB port and speech synthesizer. **IN STOCK £1695.95 D**



#### IC-7600 HF Transceiver



The IC-7600 HF/50MHz transceiver is enhanced with some of the main features tried tested on the flagship IC-7700/7800 models. It is highly regarded by Amateur operators world-wide. Features inc a double conversion superheterodyne system, dual DSP units & 3kHz IF (roofing) filter. **IN STOCK £3519.95 D**

#### IC-7700 HF Transceiver



The IC-7700 HF/50MHz 200W transceiver shares many features with its "big brother", the world famous IC-7800. With two independent DSP units, a +40dBm 3rd order intercept point and ultra wide dynamic range to name but a few of the features. **IN STOCK £6364.95 D**

### Ameritron - Linears at Great Prices!



**AL-811XCE 600W At An Unbeatable Price!**  
Looking for 6dB of gain for your 100W transceiver? This must be the best deal ever! It not only generates the power, but uses low cost replacement tubes. Traditional Pi network makes matching into antennas easy - even G5RVs! And if you need more power there is the AL-811HX that gives 800W output for just £979 **£899.95 D**

### Tigertronics Signalink USB Soundcard Interfaces



The Signalink USB combines the excellent performance of the SL-1+ with a built-in low-noise USB sound card. It delivers optimum performance whilst eliminating the need to use your computer's sound card. The Signalink USB will work with all radios (just select appropriate Signalink model) and it can then be attached to the Mic. jack, Data port or Accessory port. **£99.95 C Each**

- SL-USB-4R 4 pin round mic
- SL-USB-8R 8 pin round mic
- SL-USB-RJ-11 RJ-11 mic
- SL-USB-RJ-45 RJ-45 mic
- SL-USB-5PD 5 pin din
- SL-USB-8PD 8 pin din
- SL-USB-13PDI 13 pin din Icom
- SL-USB-13PDK 13 pin din
- for Kenwood
- SL-USB-6PMD 6 pin mini din
- SL-USB-NC unterminated

#### PLUG & PLAY JUMPER MODULES FOR SL-USB

- SLMOD6PM for SL-USB and 6 pin mini din data port **£7.95 A**
- SLMOD8PD for SL-USB and Icom radios with 8 pin din accessory socket **£7.95 A**
- SLMOD5PD for SL-USB and Yaesu/Ten-Tec 5 pin din accessory socket **£7.95 A**
- SLMOD13I for SL-USB and Icom radios with 13 pin din accessory socket **£7.95 A**
- SLMOD13K for SL-USB & Kenwood radios with 13 pin din accessory socket **£7.95 A**

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

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**Heil Audio Accessories**

**HM-12**

The HM-12 features the new HC6 insert that works with all modern rigs. It will give your signal that "magic" lift that will add dBs to your signal's voice power. As Bob says in his live workshop, a linear costs a whole lot more! Check out our great price of **just £69.95 C**



**Pro-Set-Elite-6**

Modelled on the ProSet-6 but adds phase reversal switch which offers a spatial awareness that moves signals around in your head to give perceived placement of signals between the two acoustic headphone chambers.



**Pro-Set-Elite-6** £179.95 C  
**Pro-Set-Elite-IC** £189.95 C  
**AD-1** Rig adaptor leads from £19.95 C

Adaptor lead for your radio is required, phone for price.

**Calling All FT-817 Owners!**  
**T1-A Elecraft Auto ATU**  
**Designed for the FT-817**

Made by Elecraft, this little tuner will handle almost any coax or wire antenna. Self powered, the battery lasts for ages. Tunes 160m to 6m and can operate from 10mW to 20W. Unlike some ATUs you get a perfect 1:1 VSWR.

**£159.95 C**



**New Icom IC-7100**

**As Seen At National Hamfest 2012!**

The most exciting news from Icom is the new IC-7100 transceiver that offers 100W from 1.8-50MHz, 50W on 4m and 2m and 35W on 70cms. A big leap forward is the introduction of a colour touch screen and a convenient built-in speaker in the remote head unit.

- HF, 6m, 2m, 70cm Multi-band, All-mode
- DSTAR DV Mode • Intuitive Touch Screen Display
- Easy-to-see, Easy-to-use Slant Top Controller
- Built-In SD Card Slot & USB • Built-In Speaker

Register your interest today!



**New Icom Remote Control System**

**As Seen At National Hamfest 2012!**

The new RC-28 remote control is Icom's new controller that works in conjunction with the RS-BA1 software to enable you to remotely control your Icom radios from anywhere in the world. The controller is a nicely weighted item that features VFO, PTT and two programmable buttons.

**IN STOCK £279.95 D** including software



Operate Your Icom Rig Via The Internet

**New TS-990S - The New Kenwood Flagship Radio**

**As Seen At National Hamfest 2012!**

- Freq. Range: 1.8 - 50MHz TX / RX
- Modes: SSB / CW / FSK / PSK / AM / FM
- TX Power: 5 - 200W (AM 50W)
- Built-In ATU • Built-In Switching PSU
- Display: 7 Inch Colour TFT

There are no firm delivery dates yet, but it is due Winter 2012.

Register your interest today!



**VHF UHF Mobiles**

**NEW TM-281E** 2m FM 65/25W Mobile **£169.95 D**

On or off the road, Kenwood's TM-281E is a mobile you can count on. This MIL-STD compliant transceiver delivers powerful performance, excellent audio clarity, and a host of advanced features.

**FT-2900E** 75 Watt 2m 3W Audio, CTCSS, DTMF mic & "WIRES" internet. **£142.95 D**



**FT-7900E** 2m/70cms mobile 50/40W CTCSS, DTMF, "WIRES" internet, wide Rx **£239.95 D**



**FT-8800E** Dualband Mobile 50W / 30W Great Value **£343.95 D**



**FT-8900R** Quad band 10/6/2m/70cm FM 50W (70cm 35W) **£389.95 D**



**FTM-10E** 2m/70cms Blue Tooth & built-in mic. **£324.95 D**



**FTM-350E** 2m/70cm Mobile Bluetooth GPS APRS **£479.95 D**



**ID-E880** 50 Watt Dual band 2m/70cm with D-Star and airband receive. **£439.95 D**



**TM-D710E** 50 Watts 2m/70cms with APRS **£445.95 D**



**TM-V71E** 2m/70cm Mobile with Echo Link **£299.95 D**



**HF - UHF in One Box!**

**YAESU FT-897D** base or portable, this 1.8 - 440MHz transceiver is great value. 1.8 - 50MHz 100W 2m 50W 70cm 20W. **IN STOCK £819.95 D**

**FT-857D** The great value mobile or base 1.8 - 440MHz, HF-6m 100W, 2m 50W 70cm 20W. **IN STOCK £714.95 D**

**KENWOOD**  
The **TS-2000E** is a firm favourite for those wanting ultimate all-mode performance on all bands. 1.8-144MHz 100W 70cm 50W. It has the highest power on 2m & 70cms and the TS-2000X version adds 23 cms! Includes auto ATU, DX cluster facility & digital IF for superb weak signal performance. **IN STOCK £1549.95 D**

**ICOM IC-7000**  
The most compact, high spec. HF-UHF transceiver available. With its lovely display and digital IF filters, it can handle all your needs - SSB CW and data. HF-6m 100W, 2m 50W and 70cms 35W. All in one lovely box. **IN STOCK £1189.95 D**

**HF on a BUDGET!**

**YAESU FT-450D** transceiver comes with the extra IF filter & an Auto ATU built in. 100W 160m - 6m with 3 IF filters 300Hz, 500Hz & 2.4kHz. **IN STOCK £839.95 D**

**ICOM IC-718** SSB CW up to 100W from 160m-10m. You won't find a more cost effective HF radio! **IN STOCK £594.95 D**

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

**KENWOOD TS-480SAT** A very HF transceiver giving 100 Watts from 160 - 6m and includes auto ATU. **IN STOCK £779.95 D**

**TEN-TEC Jupiter-538CE** 160m - 10m 100 Watts SSB CW AM FM with on-screen CW reader and socket for PC keyboard. **IN STOCK £1649.95 D**

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



## MFJ Group 40th Anniversary

### World's Most Popular AUTO ATUs!

#### MFJ-993B IntelliTuner Auto ATU 300 Watts 1.8-30MHz



This tuner lets you tune any antenna, long wire, coax cable or balanced feed. You get both analogue cross-needle metering & LCD data display! MFJ's exclusive IntelliTuner Adaptive Search and instant recall algorithm gives you ultra fast tuning with 20,000 memories! Beat that! Select 300 Watts for 6-1600 Ohms matching or 150 Watts for ultra wide 6-3200 Ohms. Versatile antenna selection and pre-used setups are found in milliseconds! This tuner matches virtually anything you throw at it. **£254.95 D**

#### MFJ-925 Ideal For IC-7000/FT-857D



This compact auto ATU sits nicely under the IC-7000 or FT-857D. It's all you need for a complete automated station that will match any antenna! **£174.95 D**

#### MFJ-929 World's Fastest ATU



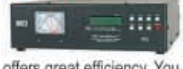
World's fastest compact auto ATU. The algorithm offers 132,072 solutions and instantly matches any antenna with near perfect VSWR. Get the best from your antenna! **£214.95 C**

#### MFJ-991B 300W Auto ATU



Handles 300W, fitted cross needle meter. Wide range: coax, balanced or wire. 300 Watts level matches 6-1600 Ohms, or 150 Watts with wider range of 6 - 3200 Ohms. **£214.95 C**

#### MFJ-998 1.5kW Auto ATU



Handle really high power, which makes it well above UK limits and also offers great efficiency. You get the same fast tuning, with cross needle metering & LCD display. Coax, balanced or wire. **£659.95 C**

#### MFJ-928 Econo 300W Auto ATU



Here's a very economical Auto ATU. No metering, but lightning fast tuning with 20,000 memories and wide matching range. Leave it in-line and just forget about it! **£203.95 C**

#### MFJ-927 Remote ATU



Here's a great way to tune wire or coax. This fully weatherproof ATU will sit outside right by your antenna and with the included "power thru" box, you feed the DC supply up the coax. No separate h cable needed. **£259.95 C**

### 1.5kW Handling Power! MFJ-998RT 1.5kW Remote Auto ATU



MFJ's 1500 Watt remote automatic antenna tuner is built into a weather-tight ABS plastic cabinet top with a stainless steel bottom. Includes MFJ-4117 Bias Tee Power Injector to send DC/RF down the coaxial line. When you key your transmitter, MFJ's InstantRecall checks to see if that frequency has been used before. If so, tuning is instantaneous. Measures 13 3/4" x 6 3/4" x 17 1/2" inches. It's the true fit and forget Auto ATU for those using linear amplifiers. **£779.95 D**

#### MFJ-994BRT 600W Remote Auto ATU



As you're ragchewing, contesting or DXing, your MFJ IntelliTuner is learning! It operates in milliseconds! We've made this tuner to suit the UK market, so that those with linear amplifiers can enjoy the benefit of auto ATU. Includes coax DC feed. **£449.95 D**

#### MFJ-993BRT 300W Remote Auto ATU



Remote IntelliTuner is mounted in a durable hard plastic case that measures just 9 1/4" x 3" x 14 1/4". Covers 1.8 to 30 MHz, have heavy duty 16 Amp / 1000 Volt relays and are a highly efficient L-network. It also includes the MFJ-4117 Bias Tee Power Injector to send DC/RF down your coax. **£329.95 D**

#### MFJ-926B 200W Remote Auto ATU



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

#### MFJ-969 300W Roller Inductor Manual ATU



160 - 6m, it will match wire, coax or balanced. It reads true PEP (requires 12V DC or internal cell), Fitted cross needle meter and, Dummy load, and QRM-Free Pre-Tune. **£219.95 C**



### Cushcraft Antennas - Part of the MFJ Group

#### Multiband HF Antennas



- X7 10, 15 & 20m 7 element yagi 2KW 5.48m long 12.5-13db gain **£999.95 D**
- A3-S 10, 15, & 20m 3 element yagi 8db gain 2KW 4.27m long **£629.95 D**
- A4-S 10, 15, & 20m 4 element yagi 8.9db gain 2KW 5.48m long **£699.95 D**
- A3-WS 12 & 17m 3 element yagi 8db gain 2KW 4.27m long **£499.95 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**
- 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**

#### VHF/UHF Antennas



- A270-6S 2m/70cms 3 element beam 7.8db gain 0.85m long **£139.95 D**
- A270-10S 2m/70cms 5 element beam 10db gain 1.9m long **£174.95 D**
- A6270-13S 6m/2m & 70cm 13 element yagi **£289.95 D**
- AR-270 2m/70cms vertical 3.7/5.5db gain 1.13m high dualband Ringo **£139.95 D**
- AR-2 2m vertical 3.75db gain 1.2m high the original Ringo **£72.95 D**
- AR-X450B 70cm Ringo ranger II **£109.95 D**
- A50-3S 6m 3 element beam 8db gain 1KW 1.8m long **£149.95 D**
- A50-5S 6m 5 element beam 10.5db gain 3.7m long **£209.95 D**
- A50-6S 6m 6 element beam 11.6db gain 6.1m long **£419.95 D**



## K3 A Serious Transceiver for 160-6m

"The Best 100W Transceiver ever tested" - Sherwood Engineering



100W or 10W  
160 - 6m  
All Modes  
PSK31  
RTTY

Part Exchange Welcome

- K3/100-F 100W Built **£1999.95 D**
- K3/100-K 100W Built **£1899.95 D**
- K3/10-F 10W Built **£1599.95 D**
- K3/10-K 10W Built **£1499.95 D**

### KX3 Transceiver 160 - 6m 10W All Modes + PSK31

"Best Transceiver ever tested"

- Sherwood Engineering  
See: [www.sherweng.com](http://www.sherweng.com)

160m to 6m at up to 12W out. Power down to 100mW. All mode plus PSK31 and RTTY. Internal AA or external 7.5-14V.



New Available From Stock!

Each KX3 built by us is burn in, auto tested and hand calibrated to fully meet the Elec Craft published specification. Plus 24 month warranty.

Built **£959 D** Kit **£899 D**

### Elecraft Accessories



- KRX3-F Sub Receiver for K3 Transceiver Fitted **£649.95 D**
- KRX3-K Sub Receiver for K3 Transceiver **£599.00 D**
- KAT3-F Internal 100W ATU Fitted to your radio **£369.95 C**
- KAT3-K Internal 100W ATU **£319.95 C**
- KPA3-F Internal 100W PA for K3/10 Fitted **£499.95 D**
- KPA3-K Internal 100W **£449.95 D**
- K144XV-F Internal 2m 10W transverter. Fitted (Requires KXV3A) **£349.95 C**
- K144XV-K Internal 2m 10W Requires KXV3A) **£299.95 C**
- KXV3A-K RX Ant. IF and I/O Interface for K3 **£129.95 C**
- KXV3A-F RX Ant. IF and I/O fitted for K3 **£149.95 C**
- KDVR3-K Digital Voice Recorder for K3 **£139.95 C**
- KDVR3-F Digital Voice Recorder for K3 Fitted **£159.95 C**
- MH2 Hand Microphone for the K3 & K2 Transceiver **£64.95 B**
- KFL3A-200 200Hz 5-pole Roofing Filter for K3 Transceiver **£89.95 C**
- KFL3A-250 250Hz 8-pole Roofing Filter for K3 Transceiver **£139.95 C**
- KFL3A-400 400Hz 8-pole Roofing Filter for K3 Transceiver **£139.95 C**
- KFL3A-500 500Hz 5-pole Roofing Filter for K3 Transceiver **£89.95 C**
- KFL3A-1K 1KHz 8-pole Roofing Filter for K3 Transceiver **£139.95 C**
- KFL3A-1.8K 1.8KHz 8-pole Roofing Filter for K3 Transceiver **£139.95 C**
- KFL3A-2.1K 2.1KHz 8-pole Roofing Filter for K3 Transceiver **£139.95 C**
- KFL3A-2.8K 2.8KHz 8-pole Roofing Filter for K3 Transceiver **£139.95 C**
- KFL3A-6K 6KHz AM/SSB 8-pole Roofing Filter for K3 **£139.95 C**
- KUSB USB Adaptor for the K3 Transceiver **£42.95 B**
- QS-112E Handheld mic KX3 single pin 4-pole **£39.95 A**
- MH3 Hand Microphone with Up/Down for KX3 **£64.95 B**
- KXFL3 Dual Passband Roofing Filter for KX3 **£129.95 C**
- KXAT3 Internal 20W Automatic Antenna Tuner for KX3 **£169.95 C**
- KXP3D Precision Iambic Keyer Paddle for KX3 **£129.95 C**
- KXBC3 Internal NiMH Charger adaptor for KX3 **£64.95 B**
- P3SVGA Large Screen Adaptor for P3 **£259.95 C**
- XG-3 Signal Source 160m to 2m down to 1uV **£169.95 C**



P3 Panadaptor



XG3 Signal Source



XG3 Signal Source

### KPA500 Linear 500W 160-6m - 4 inches high



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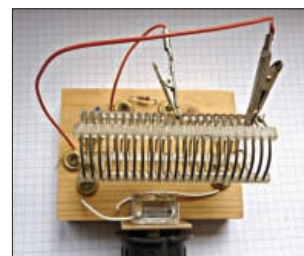
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**Please note:** The *PW* 70MHz Low Power Contest results will be published in the January 2013 issue (published in December). **Editor**.



**Rob Mannion G3XFD/EI5IW's**

# Keylines

**Rob G3XFD reflects on the recent Amateur Radio event in Newark Nottinghamshire and the many friends he met over the two days and describe his 'in car' DAB radio experiences.**

The Newark Amateur Radio event in late September turned out to be a very enjoyable few days for everyone on the PW Publishing Ltd. team. **Steve Hunt, Roger Hall G4TNT, Andy Thomsett G4EXQ** (Editor of *RadioUser*), **Tex Swann G1TEX** and I were kept very busy.

I have always to bear in mind – at any rally or show I'm able to attend – that it could be the only opportunity during the year for some readers to chat with the *PW* Editor. Because of this I concentrate on being available for our friends and this means I can't get off the stand very easily!

I received many kind comments and good wishes about my planned retirement as Editor in September 2013 – but everyone I spoke to asked the obvious question, "You are going to continue writing for *PW* aren't you?" – and I'm pleased to say that I'm certainly planning to do so! Thank you everyone – now we have to find a new Editor to carry on the tradition. Watch this space!

## The Lincoln Shortwave Club Team

Before I move on to other topics, I think it's important to pay full tribute to the hard working Stewards and supporters from the **Lincoln Short Wave Club** (LSWC) at the Newark event. Without them the Exhibitors would find things much more difficult.

The Stewards and volunteers were literally everywhere they were needed. Special thanks also go to the kind reader who traditionally keeps me

supplied with soft drinks and to the lady Steward from the LSWC who kept me topped up with cups of tea all day on Saturday. Her actions enabled me to keep my voice in good trim. Much appreciated – thank you ma'am! I'm looking forward to next year's show and meeting you all again!

## The DAB Radio Debate

As the Digital Audio Broadcast (DAB) radio debate continues, I've recently equipped my study with a new tuner-amplifier and I'm enjoying the rich, natural sounds of Band II f.m. analogue radio from the Rowridge transmitter on the Isle of Wight. However, I was tempted recently to evaluate a DAB radio adapter to enable my Band II analogue receiver in my car to receive the Band III transmissions.

Even though I'm still convinced the DAB radio system isn't suitable for domestic reception using the inefficient antennas provided on portable receivers – I regard myself as an 'Ethical Editor' (there's a mouthful for you!) and thought it best to try a DAB radio system in my car. There are several types available and I purchased two at reduced prices (manufacturer's warranty repaired units at £40 each).

"Why buy two" you may ask? The answer is that the first one was stolen (complete with the antenna) from my car within hours of it being fitted – when I foolishly left the vehicle unlocked in our driveway. Also stolen was my plug-in driving attachment for

my artificial arm and my favourite houndstooth patterned jacket! Fortunately, I was able to buy another jacket and re-equip the car (and my arm) for the drive north to Newark on Thursday September 27th.

The DAB adapter unit automatically tuned Band II to find an un-used channel that could be used as the down-converted i.f. and 'flagged up' the channel for me. Once the unit had tuned in, the miniature windscreen-mounted stick-on Band III antenna (with built-in amplifier) worked very well (I was quite surprised).

During the 200 mile trip from Bournemouth to Newark via Oxford, Northampton and Peterborough, I only experienced a few 'drop outs' although the DAB unit's signal strength indicator showed that levels varied a great deal. Interestingly, the Band III 'drop outs' where I lost the DAB signals, mostly coincided with areas where Band II f.m. reception was also poor.

So far, I've been quite impressed with the reception in my car and apart from some adjacent channel interference on the Band II i.f. channel in the Northampton area – there were no real problems. I found BBC Radio 3 to be comparable in quality to the Band II analogue signal and Radio 4 Extra was much appreciated! But obviously, I shall be continuing my evaluations and will up-date you all later.

**Rob Mannion G3XFD/EI5IW**

**PLEASE NOTE OUR NEW ADDRESS FROM 1st November**

## Practical Wireless

PW Publishing Limited  
Tayfield House  
38 Poole Road  
Westbourne  
Bournemouth BH4 9DW

Directors: Stephen Hunt & Roger Hall

Tel: 0845 803 1979

Editor (c/o PW Publishing Ltd.)  
Rob Mannion G3XFD/EI5IW  
rob@pwpublishing.ltd.uk

Technical Editor (c/o PW Publishing Ltd.)  
NG (Tex) Swann G1TEX/M3NGS  
tex@pwpublishing.ltd.uk

Art Editor  
Stephen Hunt  
steve@pwpublishing.ltd.uk

Advertising Typesetting/Admin  
Peter Eldrett  
peter@pwpublishing.ltd.uk

Advertisement Sales  
Roger Hall G4TNT  
roger@pwpublishing.ltd.uk

Finance Manager  
Alan Burgess  
alan@pwpublishing.ltd.uk

Book Orders  
bookstore@pwpublishing.ltd.uk

**PW Publishing Website**  
www.pwpublishing.ltd.uk

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Subscriptions are available at £42 per annum to UK addresses, £51 Europe Airmail and £61 RoW Airmail. See the Subscriptions page for full details.

## Components For PW Projects

In general all components used in constructing PW projects are available from a variety of component suppliers. Where special, or difficult to obtain, components are specified, a supplier will be quoted in the article.

## Photocopies & Back Issues

We have a selection of back issues, covering the past three years of *PW*. If you are looking for an article or review that you missed first time around, we can help. If we don't have the whole issue we can always supply a photocopy of the article. See the Book Store page for details.

## Placing An Order

Orders for back numbers, binders and items from our Book Store should be sent to: **PW Publishing Ltd., Post Sales Department, 38 Poole Road, Westbourne, Bournemouth BH4 9DW** with details of your credit card or a cheque or postal order payable to PW Publishing Ltd. Cheques with overseas orders must be drawn on a London Clearing Bank and in Sterling. Credit card orders (Access, Mastercard, Eurocard, AMEX or Visa) are also welcome by telephone to the office 0845 803 1979. An answering machine will accept your order out of office hours and during busy periods in the office. The E-mail address is bookstore@pwpublishing.ltd.uk

## Technical Help

We regret that due to Editorial time scales, replies to technical queries cannot be given over the telephone.

Any technical queries by E-mail are very unlikely to receive immediate attention either. So, if you require help with problems relating to topics covered by *PW*, then please write to the Editorial Offices, we will do our best to help and reply by mail.



# Readers' Letters

Send your letters to:

Rob Mannion, PW Publishing Ltd., Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW

E-mail: [rob@pwpublishing.ltd.uk](mailto:rob@pwpublishing.ltd.uk)

The Star Letter will receive a voucher worth £20 to spend on items from our Book Store or other services offered by *Practical Wireless*.

Please note that the opinions expressed in any letter published in *PW* are those of the named correspondent whose letter has been published and they don't necessarily reflect the opinions of the Editorial staff or PW Publishing Ltd. **Editor**.

## Milton Keynes Amateur Radio Society & Bletchley Park

Dear Rob,

As a long time member and former Chairman of **Milton Keynes Amateur Radio Society** (MKARS), I read your comments in November's *Topical Talk* with great interest and, it has to be said, a certain amount of sadness. The MKARS was formed in 1958 and moved to Bletchley Park in 1994 to support the Park's public opening.

Some of your readers may be unaware that the Club's involvement with the Park predates the 1990s – members had long been involved in efforts to save the historic code-breaking centre from demolition. Since 1994 the Club and its members have spent countless hours supporting Bletchley Park by providing radio related exhibits, technical assistance and facilities and, in particular, they established **GB2BP** as one of the world's most popular resident museum Amateur Radio stations. Through GB2BP, the club has made many friends all over the world, spread the word about the part played by Radio Amateurs in the Bletchley Park and wider Second World War stories. They have also introduced Amateur Radio to the thousands of visitors who have come to Bletchley over the years.

I have no doubt that the residency of MKARS at Bletchley Park has been of great benefit to Bletchley Park and to Amateur Radio in general. It has certainly been of benefit to MKARS. Today, with over 120 members, MKARS is one of Britain's biggest and best known Amateur Radio clubs. I think we can be very proud of what we've achieved over the last 20 years.

It's not for me to explain and least of all to justify the decision by the management at Bletchley Park to evict MKARS and, thus, to bring to a close the direct association between the Club and the Park after so many years. It is, perhaps, a sad reflection of the commercialisation of museums like Bletchley that a place cannot be

## £20 Star Letter

### New Life For Old Books?

Dear Rob

In *Letters* of the November 2012 issue of *PW*, your author and correspondent **Tim Kirby G4VXE** suggested giving old, unwanted Amateur Radio books to local charities. However, while I applaud supporting charity, can I add a note of warning?

I'm a volunteer for a large charity which has several charity shops in the neighbourhood and their policy is to keep books on the sale shelves for two weeks. If if the book remains unsold, it is scrapped, i.e. put in the dustbin, or re-cycled through a local organisation which collects books for pulping.

I suggest that before readers give their old and cherished radio books to a charity shop that they ask what the charity's policy is on unsold books. If there is a policy that unsold books will be scrapped, then I suggest taking the books to a rally or donating them to the local radio club which can probably make good use of them.

Our club has a library of books and equipment for loan to members and we are more than keen to receive more items. Alternatively, one of your local youth organisations such as the Air Training Corps, Scouts, etc., may appreciate donations of radio or electronic books to support their training courses. My regards.

**Martin Cox M0GQB**

**Chairman Halifax & District Amateur Radio Society**

**Haugh Shaw Hall**

**Halifax**

**West Yorkshire**

*Editor's comment: Some excellent ideas there Martin. Please join me on the Topical Talk pages for further comment.*

found for voluntary groups like MKARS and, indeed, the other groups that have recently been given their marching orders by the Park. However, I would like to comment on the role of the Radio Society of Great Britain in the Club's departure and, in this respect, I want to stress that my comments are my personal views, rather than those of MKARS.

As many of your readers will know, the RSGB recently opened its much delayed 'National Radio Centre' at Bletchley Park. The NRC is located on a site previously occupied by MKARS, the club's former hut having been demolished to make way. As well as surrendering this site, MKARS also moved out of B-block (which is adjacent to the NRC)

where it had built and established its demonstration radio station (GB2BP). The RSGB also inherited the Club's antenna site on the roof of B-block, along with the iconic 'RKO Tower' which had been salvaged and erected by the Club.

From the early stages of planning for the NRC it was apparent that unless steps were taken to secure the Club's position at BP, the arrival of the RSGB and the displacement of MKARS from B-block at the centre of the museum, had the potential to damage the long term position of MKARS as the resident radio society at BP. To his credit, the RSGB's former General Manager recognised the RSGB's responsibilities towards MKARS and prioritised the Club, both in the

negotiations with BP management and in the planning of the NRC. The Club worked very closely with the RSGB at this time and, with the General Manager's support, was able to secure and renovate alternative accommodation in Generator House 2. To set the record straight; the RSGB paid for a new wooden floor in the main hall and side door to the premises, MKARS fitted the floor in the smaller room, redecorated, installed new electrics, heating and installed the shack.

With regard to radio operations, MKARS and the RSGB agreed to integrate the Club's station (GB2BP) into the NRC, with MKARS/GB2BP on the air from the new NRC shack most weekends, and the RSGB/GB3RS operational during the week (along with the RSGB's education, outreach and archives etc). It was on that basis that MKARS publicly welcomed and (with hindsight and perhaps rather naively) fully supported the creation of the NRC.

At that time, the Club was working in partnership with the RSGB, to the benefit of both organisations and for the general good of Amateur Radio at Bletchley Park and there was regular liaison between the MKARS Chairman and the RSGB General Manager. However, following his unexpected departure in 2011, the RSGB's approach to the NRC and its attitude towards MKARS and Bletchley Park changed. A full discussion of this is beyond the scope of this letter and, in any event, would probably be of little interest to your readers. But the important point is that MKARS, as a club, found itself excluded from the NRC and, having lost its position at the centre of the museum, increasingly became marginalised at Bletchley Park.

The disconnect between the RSGB and MKARS can, perhaps, best be illustrated by an account of the visit of the then Acting General Manager of the RSGB to a highly charged meeting attended by around 40 MKARS members (in the mansion at Bletchley Park) on the 8th May 2012. By that time the RSGB had already imposed a strict house style on all operations from the NRC and limited operations to GB3RS (i.e. excluding the use of GB2BP and, thus, pushing MKARS operators into running GB2BP, largely out of the public view, at Generator House 2).

The presentation focussed almost exclusively on the RSGB's 'corporate vision' (i.e. for the RSGB) – not exactly the pressing issue, so far as MKARS members were concerned. Quote of the night (in describing the RSGB's logo) was "notice how the sanctity of the diamond is unbroken by the wavy line" as though anyone in the meeting remotely cared.

But more seriously, when pressed on why the RSGB had reneged on allowing GB2BP to be used from the NRC, the response was that the RSGB didn't want the NRC turning into a "club shack", as though Amateur Radio clubs, along with their shacks, were something to be kept well away from the bottom of the RSGB's shiny, new, corporate, NRC shoes. A disgraceful response which got the counter-response it deserved.

Since the eviction of MKARS from Bletchley Park was announced a few months ago, the RSGB has been conspicuous by its absence. It is only fair to acknowledge that there were, apparently, some discussions between the RSGB and Bletchley Park about the Club's position. It is also fair to say that an interim RSGB board member, who is also an MKARS member, did what he could to support the Club in making submissions to the Bletchley Park Trust. But at no time has there been any acknowledgement from the RSGB that they are in any way responsible for the Club's present plight nor indeed, any offer of direct assistance. Frankly, the RSGB has appeared to be more concerned to distance itself from MKARS and, one assumes, protect itself from any criticism about what is happening to the Club.

To suggest that the RSGB is directly responsible for the eviction of MKARS from Bletchley Park would, of course, be unreasonable. But, from the moment they decided to locate the NRC at the Park, where MKARS had been the resident radio society for almost 20 years, the RSGB had a moral responsibility, as a our national radio society (and, by the way, one to which MKARS has been affiliated for many years) to act in the best interests of MKARS. I will leave your readers to draw their own conclusions about whether the RSGB has done that.

The NRC has already become a mainly static exhibit, although due to the efforts of a small number of volunteers who have persevered regardless, GB3RS is occasionally on the air from Bletchley Park. Sadly, after 17 years of almost continuous operation, GB2BP will, from December 2012, only appear as an occasional special event station, if MKARS is invited on to the Park to operate it.

There has, in fact, been a radio club at Bletchley park since the 1950s (the RAF Amateur Radio Society in the 1950s and 1960s, the Civil Aviation ARS in the 1970s and 1980s and MKARS since the early 1990s). It would be sadder still if the NRC fails, or becomes entirely static, because Amateur Radio operations at Bletchley Park will cease after some 60 years. Perhaps, the RSGB might want

to ask itself whether, by its actions at Bletchley Park, it has furthered the cause of Amateur Radio in this little corner of our green and pleasant land – or has damaged it.

**Andy Brown 2E0VPX**  
**Leighton Buzzard**  
**Bedfordshire**

### **The RSGB's General Manager Replies**

Dear Editor,  
I write as the not so new General Manager of the RSGB. Whilst I have been in post for just 5 months, I have been engaged with members of the MKARS committee during that time, a period in which MKARS has had a fundamental change in its circumstances thrust upon it.

I regret that Andy feels that the RSGB has let down MKARS in the past since, by his own admission, there has always been a close working relationship between ourselves and nothing has happened during my tenure to alter that. I am therefore saddened that Andy writes in the way that he has.

May I emphasise that The RSGB has been, and continues to be, unwavering in its support of MKARS and its considerable achievements.

The RSGB has considerable sympathy with the position that MAKRS find itself in, a situation that was not envisaged at the time when the NRC was being developed.

I was personally involved in discussions with Club officials about using the callsign GB2BP at the NRC. We were close to an agreement on that, awaiting final approval from MKARS when Bletchley Park Trust announced its decision that permanent accommodation could no longer be provided for MKARS.

The NRC has already established itself as a world class radio communications education centre. It is a showcase for radio communications technology with interactive displays and "hands on" experiments as well as a state of the art amateur radio station. This success is thanks, in no small measure, to the efforts of some MKARS members who are part of the volunteer team that operates the station at the centre. The RSGB will continue to support MKARS, and indeed all other clubs, in our shared goal of furthering the cause of Amateur Radio.

**Graham Coomber G0NBI**  
**General Manager RSGB**  
**3 Abbey Court**  
**Fraser Road**  
**Priory Business Park**  
**Bedford MK44 3WH**





# News & Products

Send your info to:

Newsdesk, PW Publishing Ltd., Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW

E-mail: [newsdesk@pwpublishing.ltd.uk](mailto:newsdesk@pwpublishing.ltd.uk)

## Paul Cullen G4KTZ Of Linear Amplifier UK Plans To Retire!

The driving force behind **Linear Amp UK – Paul Cullen G4KTZ** – contacted *Newsdesk* with some news and a request to interested partners; “After running *Linear Amp UK* for the last five years it is time for me to think about retirement. Therefore, *Linear Amp UK* is looking for a new owner. It’s a nice steady little business with a good reputation that can easily be run from home. Improvements I have made over the last five years – means everything runs very smoothly and works well. If you think you may be interested in taking over from me, please get in contact”.

**Paul Cullen G4KTZ**  
5 Swaledale Gardens  
Fleet  
Hampshire GU51 2TE  
Tel: (01252) 811370  
E-mail: [linampuk@aol.com](mailto:linampuk@aol.com)  
Website: [www.linamp.co.uk](http://www.linamp.co.uk)

## Military Wireless Museum Receives Permanent Special Event Callsign GB0MWM

A delighted **Ben Nock G4BXD** – *PW* columnist and Curator of the **Military Wireless Museum** in Kidderminster, Worcestershire contacted *Newsdesk*: “Hello all supporters of the Military Wireless Museum. Good news, we have GB0MWM allocated to us and we’ll be on the air very soon!” Ben G4BXD, Curator.

Further information via E-mail:  
[Military1944@aol.com](mailto:Military1944@aol.com)  
Website: <http://www.qsl.net/g4bxdl/introduction.htm>

## New Products From Pro Antennas

**Carl Kidd G4GTW** has announced two new variations of his Dual Beam Pro and I-Pro Home multi-band antennas. The original product specification remains the same, the new added variation is specified as follows: “The new High Power Dual Beam Pro & I-Pro Home covers 20,17,15,12,11 and 10m. They now also come with 6m

## Newark Notes

**Tex Swann G1TEX** the *PW Publishing Ltd.* Group Technical Editor and Photographer found time to go on a ‘Walkabout’ at the Newark Amateur Radio show in September. One of the new items of interest was the new DCA-Pro that’s to be launched in December. The Peak press release notes that, “*The Atlas DCA PRO Transistor tester* offers unrivalled functionality and style. The analysis portfolio is bigger than even the DCA55, offering enhanced message display and intelligent component identification. This superb instrument displays incredibly detailed information in scrollable pages. The Atlas combines an impressive analysis portfolio with unequalled ease of use. Connect your component any way round and let the Atlas do the rest. It will measure the gain of transistors, the threshold voltage of m.o.s.f.e.t.s, and semiconductor voltage drops. This product has additional component testing capability than the DCA55, but also offers full curve tracking which is downloadable to an MS Excel via a USB cable. This allows more in depth analysis of components than was possible before.” Peak Electronics website <http://www.peakelec.co.uk>

Tex’s camera lens also spotted **Martin Lynch G4HKS** at his stand during the show discussing the latest Flex Radio product with **Klaus Lohman**, the factory representative for Flex Radio Systems located in Germany. See ML&S website <http://www.hamradio.co.uk>



Jez Siddons - Managing Director and Engineer of Peak Electronics meeting customers.



and a power handling capability of 1kW p.e.p., dimensions of the high powered model remain the same as the original product. Prices and full details are available on the Pro Antennas website.

**Carl Kidd G4GTW**  
**Pro Antennas**  
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Hedge End  
Southampton  
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Tel: (01489) 789960  
E-mail: [sales@proantennas.co.uk](mailto:sales@proantennas.co.uk)  
Website: <http://www.proantennas.co.uk>



the use of amplitude modulation (a.m.) and single sideband on CB frequencies. Further information are available (with lengthy details and notifications) via the Ofcom website link:

<http://stakeholders.ofcom.org.uk/spectrum/spectrum-management/licence-exempt-radio-use/citizens-band-radio/notices/ecc-decision/>

## Stop Press News! Martin Lynch G4HKS Invites PW Readers To His Open Day

As *PW* closed for press **Martin Lynch G4HKS** contacted *Newsdesk* to confirm that his annual **Open Day & Hog Roast** is ‘on’ for **Saturday December 1st** at his Chertsey salesrooms. Sponsored by Yaesu, Kenwood UK and Icom UK, the event attracts many visitors and although it might be cold – you’ll really warm up with a hot roast pork roll!

## Citizens’ Band Harmonisation Regarding AM & SSB

The UK spectrum regulator – Ofcom – have announced the ECC decision and harmonisation plans regarding

## CubeSats Successfully Deployed From The International Space Station

Radio Amateurs around the world have been listening for signals from the four new Amateur Radio CubeSats that were deployed from the International Space Station (ISS) on Thursday October 4th 2012.

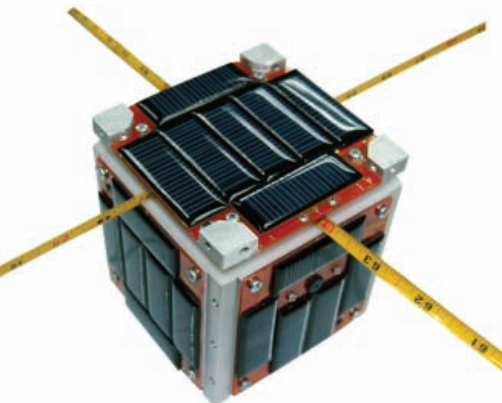
The small satellites were transported to the ISS in the HTV-3 (*Kounotori 3*) cargo vessel that blasted off on an H-IIB rocket from the Tanegashima Space Centre on Saturday July 21st at 0206 GMT.

The cargo vessel arrived at the ISS on July 27th and the ISS Canadarm2 robotic arm was used to install the HTV-3 to its docking port on the Earth-facing side of the Harmony module at 1434 GMT. The CubeSats were then unloaded by the Expedition 32 crew.

The CubeSats were mounted in a JEM-Small Satellite Orbital Deployer (J-SSOD). In one pod were TechEdSat, F-1 and FITSAT-1 while in the second pod were WE-WISH and a scientific CubeSat RAIKO.

Japanese astronaut **Akihiko Hoshide KE5DNI** put the J-SSOD into an airlock, which was de-pressurised and exposed to the vacuum of space via an automatic door. The Kibo robotic arm was then be used to grapple the J-SSOD in the airlock and move it out away from the station so the satellites could be deployed. The WE-WISH and RAIKO cubesats were first to deploy at 1437 followed by TechEdSat, F-1 and FITSAT-1 at 1544 GMT. They could have a life-time of four or five months before they burn-up in the Earth's atmosphere.

More details on the AMSAT-UK Website <http://www.amsat-uk.org/>  
**Trevor Hawkins M5AKA**  
E-mail: [m5aka@yahoo.co.uk](mailto:m5aka@yahoo.co.uk)



The cubesats employ simple antennas made from an ingenious source we will all be familiar with!

## InnovAntennas New Multi-band Rotating Dipoles

*Justin Johnson G0KSC of InnovAntennas E-mailed Newsdesk; "We have combined open sleeve technology with the OP-DES driven element to produce a shortened rotating dipole which no matching devices, no traps, coils or loading which means – maximum radiating efficiency!*

*"A 21/28/50MHz version has the same footprint as a 28MHz rotating dipole. Needless to say, they are built to last, with winds in excess of 100m.p.h. (160kph) and with marine grade stainless steel throughout. On this particular version (and those larger) a guy/spacer is installed to hold all elements straight and in-line to ensure a perfect tune across each band. This version provides 1.6:1 s.w.r. coverage across the whole of 21MHz, 2:1 s.w.r. coverage between 28 and 29MHz and 1.2:1 s.w.r. coverage from 50 to 50.5MHz.*

*"As with all of our antennas, excess power will not be an issue due to not having any power-sapping devices (loadings) in-line. 5kW is handled without any issues at all on all of these models. Additionally, 7 and 10MHz versions and up will be available in the new range due to be online as of January 2013. However, if any *PW* readers have any pre-release interest or orders to be placed, let us know soonest!*

**Justin Johnson G0KSC**  
**InnovAntennas Ltd.**  
**Unit 1, Point Industrial Estate, Point Road,**  
**Canvey Island**  
**Essex SS8 7TJ**  
Tel: **0800 0124 205**  
E-mail: [justin@innovantennas.com](mailto:justin@innovantennas.com)  
Website: [www.InnovAntennas.com](http://www.InnovAntennas.com)

The rotary dipole antenna in its fullness held by Luke with one hand to show it really is not as heavy as perhaps it looks!



## Gloucester County Raynet Support Cancer Research Walk



Members of Gloucestershire County Raynet recently supported the annual Cancer Research 'Walk in the Cotswolds' centred on the picturesque village of Guiting Power near Stow on the Wold. The absence of mobile 'phone coverage in the area concerned meant the team kept the control station informed of progress with a 'sweep walker' at the rear of the course. One of the participants this year was local farmer the BBC's *Countryfile* presenter **Adam Henson** pictured with **Raynet Group Controller George Hayter G0AZD**. The Group have also put on a JOTA

station in the Forest of Dean, and operated a demonstration station on behalf of the County Council Civil Protection Team at the open day of the new Gloucester North fire station. Summer months were involved in supporting back up communications for the CPT at the RAF Fairford Air Tattoo, an overnight Scout walk on the hills above Cheltenham, and the Olympic Torch Relay in the north Cotswolds. The Group's website is [www.glosraynet.org.uk](http://www.glosraynet.org.uk) where contact information and further details are located.

Further details from;  
**Max White M0VNG**  
**Group Secretary**  
**Gloucestershire County Raynet**  
E-mail: [bmews@hotmail.com](mailto:bmews@hotmail.com)



Tim Kirby G4VXE takes a break from his *World of VHF* column to review the latest exciting arrival from China.

# The Wouxun KG-UV920R

## Twin Band 144/432MHz Mobile/Base Transceiver



The KG-UV920R mobile has been rumoured for a long time and indeed, seemed to be close to coming to market about 18 months ago, but ended up being re-designed. So, I was excited when the Editor offered me the chance to have a look at the

rig. Why? Wouxun have developed a reputation, along with some of the other Chinese manufacturers for producing equipment that's good quality – but at a reasonable price. So, I wondered – would the KG-UV920R follow this trend?

### Paraphrased Manufacturer's Overview

At this stage in the review I normally include the manufacturers overview of the rig. I've paraphrased it slightly, as if we print it verbatim, you'll think that we have made a lot of grammatical errors. (More on this later).

#### Overview of functions;

- Twin-band transmit.receive.
- Features v.h.f. transmit – u.h.f. receive or u.h.f. transmit – v.h.f. receive.
- Dual-band, simultaneous reception.
- 999 memory channels.
- Dual Display – large liquid crystal display display – (l.c.d.) with independent control for v.h.f. and u.h.f. radios
- Remote head mounting capability.
- Cross-band repeat.
- Output 50W v.h.f. and power output 40W at u.h.f.
- Multiple speaker configurations.
- Includes DTMF encoding and decoding.
- Priority channel scanning.
- Voice guide.

### First Impressions

On unpacking the radio, the first impression was of a solidly constructed radio of a decent size and weight. It didn't feel flimsy.

The front panel boasts an excellent sized display, which I guessed would be easy to read in the car – it certainly was in the shack when I connected it up on arrival! There are quite a few controls on the front panel and I wondered whether it would be a bit 'busy' and whether some of the buttons would be a bit small when using the rig mobile. Actually, this proved not to be the case.

The display defaults to an easy to read blue background but you can make it change colour when you are transmitting or when a signal is received. Perhaps this would be useful if you were monitoring a frequency for a transmission with the volume turned down?

The volume on the rig is actually quite loud, even at low settings and in the shack, I found that a setting of 1, on a scale of 1 to 10, was quite adequate. **Note:** Interestingly, in his blog, **Jeff Dale VA3ISP** describes some modifications that he has made to reduce the audio level.

If you have used the Wouxun hand-held radios, you'll find the method of configuring repeater splits, setting the Continuous Tone Coded Squelch System (CTCSS) tones and so on very familiar – the menu operation is almost identical on the KG-UV920R to the hand-helds. Nevertheless, I did resort to the instruction manual straightaway as the rig was not pre-programmed with repeater shifts (which is not a criticism, as particularly on 433MHz, both 1.6 and 7.6MHz splits are in use in the UK – so you might well have to change the setting in any case).

Perhaps this is an opportune moment to mention the manual. It's attractively produced and someone has obviously made an effort to make the style and tone 'friendly'. Under the section 'First QSO' it starts, "Do you want to hurry up and use your transceiver?" After reading these chapters and sections you will know how to broadcast your voice out into the sky". You can't read that and not smile, can you?

All the information that you need to operate the radio is contained in the manual – but the manual isn't very logically organised and some of the descriptions of the functions aren't very clear. So, if you are the sort of person that likes things just so and clearly documented – this may not be the radio for you. However, if you are willing to work with it, experiment a little and perhaps use the wealth of information about the rig on the Internet – then you'll be just fine.

My initial adjustments were to turn off the 'voice guide' and the beep function – I didn't feel I needed audio confirmation of each change that I made to the settings. However, I do of course realise that these same features could be a blessing and a boon to some users, so I'm pleased to confirm that they work well. I also made sure that the **Time Out Timer** was set to a suitable value. While these timers are obviously useful for Private Mobile Radio (PMR) usage, they can be more of a nuisance than a value in most Amateur applications.

### A First QSO

Having connected the rig to a power supply and an antenna (the connector is an SO-239) I had a quick tune around both 144 and 433MHz. The receiver was clearly very sensitive. Certainly the S-meter – which is a bargraph type indicator – has a tendency to read high, but actually as I've already noted, the receiver seemed very sensitive. The GB3UK repeater on the Cotswolds some 54km (40 miles) away was noticeably stronger on the Wouxun than on the Yaesu FT-7900 that I routinely use in the shack. **Ian Hopkins G4WUH** who has also been using a KG-UV920R for a few weeks confirms this.

For a first QSO, I programmed up the offset and CTCSS tone for GB3UK and put a call through the repeater. **Ken Easty G3LVP** kindly responded and confirmed that I was a good solid signal into the repeater. Initially, Ken reported that my audio did not sound very good. By way of a comparison, I switched over to another rig which Ken said sounded the same. It was at that stage that we realised the problem was that I had a



Unusually for a mobile transceiver the microphone supplied with the KG-UV920R is fitted with a small loudspeaker.

heavy cold and in fact the Wouxun was providing suitably good audio quality to make this apparent! In subsequent QSOs after my cold had subsided, Ken and other stations were able to confirm that the audio from the Wouxun was excellent quality!

The next job was to program up some memories so that I could try the rig for a few days in the car on my commute from home to the railway station. I programmed up a handful of repeaters on both 144 and 433MHz at various distances to give the rig a fair trial.

Programming the memories was relatively straightforward – although some users have said that it's much easier to use a computer and a programming lead. However, I didn't test this as I don't have a programming lead. Despite this I was easily able to store the frequencies I needed and then to be able to move through them in memory channel mode.

### In The Car

The first bit of good news was that the rig was easy to fit in the car. It readily fitted in the centre console of my VW Polo. I should also add that the head of the rig can be separated from the body and the two connected with a separation cable which was supplied. In my car I did not need to try this out, but it was pleasing that the cable was supplied.

Another flexibility one of the 'user friendly' aspect with the rig is that there are two speakers on the rig itself and there's also a speaker built into the microphone. This means that if you have fitted the body of the rig under the seat in your car, you can easily use the microphone as an extension speaker

rather than having to arrange another speaker.

I did find that the receive audio in the car was a little disappointing. Because I'd had to turn up the volume on the rig to overcome the vehicle noise, I found that some 'well modulated' signals were too much for the internal loudspeakers in the rig. But I think an external speaker would help here and I found some improvement by enabling the audio from the speaker in the microphone.

The rig worked well generally and I enjoyed having it in the car for a few days. Other Amateurs reported good signals from me and I found the excellent receive performance useful on some of the weaker u.h.f. repeaters that I use from time to time. For example, GB3TD (south east of Swindon) is quite weak at the far end of my commute – but it was noticeably easier to copy on the KG-UV920R than on the Yaesu FT-8900 which I normally use in the car. The power levels are useful and sensible; 50/20/10/5W on v.h.f. and 40/20/10/5W on u.h.f. which I found covered most eventualities.

Twice, I noticed that the 145MHz receiver 'collapsed' with r.f. overload at the time I was close to some masts, so I suspect that a strong nearby transmission caused some problems. The flip side of this is that the receiver has wide coverage and I was able to monitor the Marine band as well as PMR446 channels, which you may well find of interest or use.

The microphone supplied with the KG-UV920R is quite sizeable and has a dual-tone multi-frequency (DTMF) keypad. The keypad 'repeats' the majority of the rig's front panel controls which I found was quite useful. The microphone connection is different on the Wouxun to the Yaesu that I normally use, so I wasn't able to use my normal hands-free microphone kit which was disappointing.

I've no doubt however, that you'll either be able to construct your own adapter cable or source a hands-free kit configured for the KG-UV920R. Because the microphone is quite large (my wife **Julie** compared it to a Blackberry smartphone, which isn't wholly unfair), I found extended transmissions a strain on the thumb! A welcome reminder to be brief perhaps!

The rig contains a Band II f.m. radio (88-108MHz) and I found I could leave one side of the radio on a repeater with the other side tuned to the local radio station on Band II. When the repeater came into use the Band II station was muted (excellent facility!) and the broadcast receiver will also store 20

Band II stations in its memories.

The rig also features a cross-band repeater feature which worked fine – with the limitation that I found that I found that the transceiver would not transmit on a repeater channel. I set the input frequency on 433MHz and wondered if I could use the cross-band repeater to monitor the GB3WH 145MHz repeater (I couldn't). However, the rig was quite happy to cross-band to a 145MHz simplex channel. I've never used cross-band repeat on any rig I've had although I know it's a feature of interest to those readers who work with the Radio Amateur Emergency Network (RAYNET).

### Overall Impressions

My overall impressions? I enjoyed using the Wouxun KG-UV920R, particularly in the shack. Using it mobile, I found the the handling of high volume audio a little lacking on the internal speakers. The receiver is particularly sensitive which was useful, but this comes at the cost of susceptibility to strong local transmissions, particularly at v.h.f. Output power levels are useful and adequate. The dual-receiver/dual-display worked well and was particularly easy to see when mobile.

Wouxun's reputation has been built on providing good quality, simple to use equipment at the right price. I feel that they have set the price a little high on this rig (this is not a criticism of UK dealers, as it is similar across worldwide markets). At £230 it is only just cheaper than a Yaesu FT-7900 dual-band model, for example. Admittedly this doesn't feature dual-receiver/dual-display. If the KG-UV920R was priced a little more competitively, in the way that the Wouxun hand-helds were, then I feel it would represent an even more attractive proposition.

In summary, I think that if you are looking for a dual-band v.h.f./u.h.f. rig to have in the shack or in the car – this is definitely one to consider. Our thanks to Martin Lynch and Sons for providing the review rig and on the same day that the shipment arrived from China. Thank you Martin!



### Specifications

Frequency range:	136-174MHz and 400-480MHz
Frequency step:	5/6.25/10/12.5/20/25/30/50/100kHz
Memory channels:	999
Operating temperature:	-20°C to 40°C
Antenna impedance:	50Ω
Power requirement:	13.8V d.c. ±15% (negative ground)
Weight:	1.437kg (including microphone)
Dimensions:	140 x 44 x 207mm

#### Transmitter

	Wide bandwidth	Narrow bandwidth
Adjacent channel power	>70dB	>60dB
S/N Ratio	>40dB	>36dB
Spurious	>60dB	>60dB
Max deviation	±5kHz	±2.5kHz
Frequency stability	±2.5ppm	
Audio distortion	<5%	
Output power	v.h.f. 50/20/10/5W u.h.f. 40/20/10/5W	

#### Receiver

	Wide bandwidth	Narrow bandwidth
Adjacent channel sensitivity	>70dB	>60dB
Intermodulation	>65dB	>60dB
Spurious response	>70dB	>70dB
S/N Ratio	>45dB	>40dB
Audio distortion	<5%	
Audio power	Transceiver <3W Hand microphone <1W	
Sensitivity	v.h.f./u.h.f. 0.25µV	

**Reviewed:** The Wouxun KG-UV920R Twin Band 144/432MHz Mobile/Base Transceiver

**Supplier:** Martin Lynch & Sons Ltd.

**Pros:** Versatile – and an excellent size display – if you are looking for a dual-band v.h.f./u.h.f. rig to have in the shack or in the car – this is definitely one to consider.

**Cons:** All the information that you need to operate the radio is contained in the manual – but the manual isn't very logically organised and some of the descriptions of the functions aren't very clear.

**Price:** Usual price is £229.95 but for *PW* readers only it is £219.95 with free UK carriage. Please confirm Code PW12 offer when ordering.

**Contact details:**  
**Martin Lynch G4HKS**  
**ML&S Martin Lynch & Sons Ltd.,**  
**Outline House**  
**73 Guildford Street**  
**Chertsey**  
**Surrey KT16 9AS**  
 Tel:  
**0345 2300 599**  
 E-mail:  
**Martin@MLandS.co.uk**  
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The most popular wire antenna available in different grades to suit every amateur .... All from just £24.95!

- G5RV-HSS** Standard Half Size Enamelled Version, 51ft Long, 10-40 Metres ..... **£24.95**
- G5RV-FSS** Standard Full Size Enamelled Version, 102ft Long, 10-80 Metres ..... **£29.95**
- G5RV-DSS** Standard Double Size Enamelled Version, 204ft Long, 10-160 Metres ..... **£54.95**
- G5RV-HSH** Half Size Hard Drawn Version, pre-stretched, 51ft Long, 10-40 Metres ..... **£29.95**
- G5RV-FSH** Full Size Hard Drawn Version, pre-stretched, 102ft Long, 10-80 Metres ..... **£34.95**
- G5RV-HSF** Half Size Original High Quality Flexweave Version, 51ft Long, 10-40 Metres ..... **£34.95**
- G5RV-FSF** Full Size Original High Quality Flexweave Version, 102ft Long, 10-80 Metres ..... **£39.95**
- G5RV-HSP** Half Size Original PVC Coated Flexweave Version, 51ft Long, 10-40 Metres ..... **£39.95**
- G5RV-FSP** Full Size Original PVC Coated Flexweave Version, 102ft Long, 10-80 Metres ..... **£44.95**
- G5RV-HSX** Half Size Deluxe Version with 450 Ohm ladder, 51ft Long, 10-40 Metres ..... **£49.95**
- G5RV-FSX** Full Size Deluxe Version with 450 Ohm ladder, 102ft Long, 10-80 Metres ..... **£54.95**

**Accessories**

- G5RV-IND** Convert any half size G5RV to full with these great inductors, adds 8ft on each leg ..... **£24.95**
- MB-9 Choke Balun** for G5RV to reduce RF Feedback ..... **£39.95**
- TSS-1** Pair of stainless steel springs to take the tension out of a G5RV or similar ..... **£19.95**

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

- SPX-100** 9 Band plug n' go portable, 6/10/12/15/17/20/30/40/80m, Length 165cm retracted just 0.5m, Power 50W complete with 38<sup>th</sup> PL259 or BNC fitting to suit all applications, mobile portable or base ... brilliant! ..... **£44.95**
- SPX-200** 6 Band plug n' go mobile, 6/10/15/20/40/80m, Length 130cm, Power 120W, 3/8<sup>th</sup> fitting ..... **£39.95**
- SPX-200S** 6 Band plug n' go mobile, 6/10/15/20/40/80m, Length 130cm, Power 120W, PL259 fitting ..... **£44.95**
- SPX-300** 9 Band plug n' go mobile, 6/10/12/15/17/20/30/40/80m, Length 165cm, High Power 200W, 3/8<sup>th</sup> fitting ..... **£54.95**
- SPX-300S** 9 Band plug n' go mobile, 6/10/12/15/17/20/30/40/80m, Length 165cm, High Power 200W, PL259 fitting ..... **£59.95**
- AMPRO-MB6** 6 Band mobile 6/10/15/20/40/80m, length 220cm, 200W, 3/8<sup>th</sup> fitting, (great for static use or even home base - can tune on four bands at once) ..... **£74.95**

**DIAMOND Yagi Antennas**

Diamond performance from the superb Diamond factory

- A502HB** 6m 2 Elements, Power 400W, Gain 6.3dB, Radial Length 3m ..... **£99.95**
- A144S10R** 2m 10 Elements, Power 50W, Gain 11.6dB, Boom Length 2.13m ..... **£86.95**
- A144S5R** 2m 5 Elements, Power 50W, Gain 9.1dB, Boom Length 95cm ..... **£47.95**
- A430S15R** 70cm 15 Elements, Power 50W, Gain 14.8dB, Boom Length 224cm ..... **£69.95**
- A430S10R** 70cm 10 Elements, Power 50W, Gain 13.1dB, Boom Length 119cm ..... **£52.95**

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**MOONRAKER HF Mobiles**

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

- AMPRO-10** 28MHz, Length 220cm, 38<sup>th</sup> fitting (slimline design) ..... **£19.95**
- AMPRO-12** 24MHz, Length 220cm, 38<sup>th</sup> fitting (slimline design) ..... **£19.95**
- AMPRO-15** 21MHz, Length 220cm, 38<sup>th</sup> fitting (slimline design) ..... **£19.95**
- AMPRO-17** 18MHz, Length 220cm, 38<sup>th</sup> fitting (slimline design) ..... **£19.95**
- AMPRO-20** 14MHz, Length 220cm, 38<sup>th</sup> fitting (slimline design) ..... **£19.95**
- AMPRO-30** 10MHz, Length 220cm, 38<sup>th</sup> fitting (slimline design) ..... **£19.95**
- AMPRO-40** 7.0MHz, Length 220cm, 38<sup>th</sup> fitting (slimline design) ..... **£19.95**
- AMPRO-80** 3.5MHz, Length 220cm, 38<sup>th</sup> fitting (slimline design) ..... **£24.95**
- AMPRO-160** 1.8MHz, Length 220cm, 38<sup>th</sup> fitting (heavy duty design) ..... **£59.95**
- ATOM-20S** 14MHz, Length 130cm, PL259 fitting (compact design) ..... **£24.95**
- ATOM-40S** 7.0MHz, Length 165cm, PL259 fitting (compact design) ..... **£26.95**
- ATOM-80S** 14MHz, Length 165cm, PL259 fitting (compact design) ..... **£29.95**

**MOONRAKER VHF/UHF Mobiles**

- GF151** Glass Mount 2/70cm, Gain 2.9/4.3dBd, Length 78cm complete with 4m cable and PL259 ..... **£29.95**
- MRM-100** MICRO MAG 2/70cm, Gain 0.5/3.0dBd, Length 55cm, 1" magnetic base with 4m coax and BNC ..... **£19.95**
- MR700** 2/70cm, Gain 0/3.0dBd, Length 50cm, 3/8 fitting ..... **£9.95**
- MR777** 2/70cm, Gain 2.8/4.8dBd, Length 150cm, 3/8 fitting ..... **£19.95**
- MRQ525** 2/70cm, Gain 0.5/3.2dBd, Length 43cm, PL259 fitting (high quality) ..... **£19.95**
- MRQ500** 2/70cm, Gain 3.2/5.8dBd, Length 95cm, PL259 fitting (high quality) ..... **£26.95**
- MRQ750** 2/70cm, Gain 5.5/8.0dBd, Length 150cm, PL259 fitting (high quality) ..... **£36.95**
- MR2 POWER ROD** 2/70cm, Gain 3.5/6.5dBd, Length 50cm, PL259 fitting (fibreglass colinear) ..... **£26.95**
- MR3 POWER ROD** 2/70cm, Gain 2.0/3.5dBd, Length 50cm, PL259 fitting (fibreglass colinear) ..... **£32.95**
- MRQ800** 6/2/70cm Gain 3.0dB/5.0/7.5dBdBd, Length 150cm, PL259 fitting (high quality) ..... **£39.95**
- MRQ273** 2/70/23cm Gain 3.5/5.5/7.5dBdBd, Length 85cm, PL259 fitting (high quality) ..... **£49.95**

**MOONRAKER GP2500 All Band HF Vertical**

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

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

All at an amazing **£229.95!**

**GP2500F** fibreglass version of above .... **£279.95**

**Magnetic Loop**

- MFJ-1788X** ..... **£479.95**  
Frequency 7 - 22MHz (40 - 15m) • Size: <1m (36in) loop • Feeder: 50 Ohms • Power: 150W • Remote control included • Auto band selection • Dual Fast/Slow tune buttons • Built-in cross-needle VSWR/Wattmeter ..... **£439.95**
- MFJ-1786X** ..... **£384.95**  
Frequency 10 - 30MHz \* Size: <1m (36in) loop • Feeder: 50 Ohms • Power: 150W • Remote control & PSU included \* Auto band selection • Dual Fast/Slow tune buttons • Built-in cross-needle VSWR/Wattmeter
- MFJ-1782X** ..... **£384.95**  
Frequency 10 - 30MHz • Size: <1m (36in) loop • Feeder: 50 Ohms • Power: 150W • Control box does not have SWR/PWR metering • No automatic band selection



**MOONRAKER Dual and Triband Colinear Verticals**

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

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- SQBM100N** 2/70cm 3.00/6.00dBd, RX 25-2000MHz, Length 100cm N-Type ..... **£54.95**
- SQBM200P** 2/70cm, Gain 4.5/7.5dBd, RX 25-2000MHz, Length 155cm, SO239 ..... **£54.95**
- SQBM200N** 2/70cm, Gain 4.5/7.5dBd, RX 25-2000MHz, Length 155cm, N-Type ..... **£59.95**
- SQBM500P** 2/70cm, Gain 6.8/9.2dBd, RX 25-2000MHz, Length 250cm, SO239 ..... **£74.95**
- SQBM500N** 2/70cm, Gain 6.8/9.2dBd, RX 25-2000MHz, Length 250cm, N-Type ..... **£79.95**
- SQBM800N** 2/70cm, Gain 8.5/12.5dBd, RX 25-2000MHz, Length 520cm, N-Type ..... **£139.95**
- SQBM1000P** 6/2/70cm, Gain 3.0/6.2/8.4dBd, RX 25-2000MHz, Length 250cm, SO239 ..... **£84.95**
- SQBM1000N** 6/2/70cm, Gain 3.0/6.2/8.4dBd, RX 25-2000MHz, Length 250cm, N-Type ..... **£89.95**
- SQBM223N** 2/70/23cm, Gain 4.5/7.5/12.5dBd, RX 25-2000MHz, Length 155cm, N-Type ..... **£74.95**





### Cable



RG58 Standard, 5mm, 50 ohm, per metre	£0.35
RG58-DRUM-50 Standard, 5mm, 50 ohm, 50m reel	£14.95
RG58-DRUM-100 Standard, 5mm, 50 ohm, 100m reel	£24.95
RG58M Mil spec, 5mm, 50 ohm, per metre (best seller)	£0.60
RG58M-DRUM-50 new 50m reel of mil spec RG58 in a great handy size. only	£24.95
RG58M-DRUM-100 Mil spec, 5mm, 50 ohm, 100m reel	£44.95
RGMINI8 Mil spec, 7mm, 50 ohm, in grey per metre (amateur favourite)	£0.75
RGMINI8-DRUM-100 Mil spec, 7mm, 50 ohm, in grey 100m reel	£64.95
RG213 Mil spec, 9mm, 50 ohm, per metre	£1.30
RG213-DRUM-50 Mil spec, 9mm, 50 ohm, 50m reel	£59.95
RG213-DRUM-100 Mil spec, 9mm, 50 ohm, 100m reel	£109.95
WESTFLEX103 Mil spec, 10mm, 50 ohm, per metre	£1.75
WESTFLEX-DRUM-50 Mil spec, 10mm, 50 ohm, 50m reel	£79.95
WESTFLEX103-DRUM-100 Mil spec, 10mm, 50 ohm, 100m reel	£149.95
300-20M Ladder Ribbon, best USA quality, 300 ohm, 20m pack	£17.95
300-DRUM Ladder Ribbon, best USA quality, 300 ohm, 100m reel	£69.95
450-20M Ladder Ribbon, best USA quality, 450 ohm, 20m pack	£19.95
450-DRUM Ladder Ribbon, best USA quality, 450 ohm, 100m reel	£79.95

### Antenna Wire

Perfect for making your own antennas, traps, long wire aerials etc.

SEW-50 Multi stranded PVC covered wire, 1.2mm	£19.95
SCW-50 Enamelled copper wire, 1.5mm	£24.95
HCW-50 Hard Drawn bare copper wire, 1.5mm	£29.95
CCS-50 Genuine Copperweld copper clad steel, 1.6mm	£29.95
FW-50 Original Flexweave bare copper wire, 2mm	£34.95
FWPVC-50 Original clear PVC covered copper wire, 4mm	£44.95
FW-100 Original high quality flexweave antenna wire, 100m reel	£59.95
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### PAM-KIT

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



.....just **£59.95** complete

### Rigging Accessories

Get rigged up, for full list of all options visit our website!

PULLEY-2 Adjustable pulley wheel for wire antennas, suits all types of rope	£24.95
GUYKIT-HD10 Complete heavy duty adjustable guying kit to suit upto 40ft masts	£54.95
GUYKIT-PT10 Complete light duty/portable guying kit to suit upto 40ft masts	£39.95
SPIDER-3 Fixed 3 point mast collar for guy ropes	£5.95
SPIDER-4 Fixed 4 point mast collar for guy ropes	£6.95
PTP-20 Pole to pole clamp to clamp up to 2" to 2"	£5.95
DPC-W Wire dipole centre to suit either 300 or 450ohm ladder line	£5.95
DPC-S Wire dipole centre with SO239 to suit cable feed connections	£6.95
DPC-A Dipole centre to suit 1/2 inch aluminium tube with terminal connections	£7.95
DPC-38 Dipole centre with SO239 socket with two 3/8" sockets to make mobile dipole	£6.95
DOGBONE-S Small ribbed wire insulator	£1.00
DOGBONE-L Large ribbed wire insulator	£1.50
DOGBONE-C Small ceramic wire insulator	£1.20
EARTHROD-C 4ft copper earth rod and clamp	£24.95
EARTHROD-CP 4ft copper plated earth rod and clamp	£16.95
G5RV-ES In-line SO239 replacement socket for 300 or 450 ohm ladder line	£6.95
AMA-10 Self amalgamating tape for connection joints, 10m length	£7.50

### Mounting Hardware & Clamps

We have all the mounting brackets you could possible want - for all options see our website

TRIPOD-HDA Free standing, heavy duty, fold away tripod, which adjusts from 50-65mm	£149.95
TRIPOD-25L Free standing heavy duty tripod to suit masts 65mm or less	£79.95
TRIPOD-20L Free standing heavy duty tripod to suit masts 2 inch or less	£74.95
TRIPOD-15L Free standing heavy duty tripod to suit masts 1.5 inch or less	£69.95
TK-36 Heavy duty galvanised pair of T & K brackets, 36 inches total length	£49.95
TK-24 Heavy duty galvanised pair of T & K brackets, 24 inches total length	£29.95
TK-18 Heavy duty galvanised pair of T & K brackets, 18 inches total length	£24.95
TK-12 Heavy duty galvanised pair of T & K brackets, 12 inches total length	£19.95
SO-9 Heavy duty galvanised single stand off bracket, 9 inches total length	£9.95
SO-6 Heavy duty galvanised single stand off bracket, 9 inches total length	£6.95
CHIM-D Heavy duty galvanised chimney lashing kit with all fixings, suitable for upto 2 inch	£24.95
CAR-PLATE Drive on bracket with vertical up stand to suit 1.5 or 2" mounting pole	£24.95
CROSS-2 Heavy duty cross over plate to suit 1.5 to 2" vertical to horizontal pole	£14.95
JOIN-200 Heavy duty 8 nut joining sleeve to connect 2 X 2" poles together	£19.95
PTM-S Pole mounting bracket with SO239 for mobile whips, suits upto 2" pole	£19.95

### "NEW" SWR-270 Dual Band VSWR & Power Meter

- Frequency: 120-500MHz ● Impedance: 52 Ohms
- Power: 0-100W ● Measures forward/reflected power + VSWR ● Sockets: SO239

Brilliant small and compact VSWR meter, at an amazing price and this month only **£27.95**



### Telescopic Masts

TMA-1 Aluminium mast ★ 4 sections 170cm each ★ 45mm to 30mm ★ Approx 20ft erect 6ft collapsed	£149.95
TMA-2 Aluminium mast ★ 8 sections 170cm each ★ 65mm to 30mm ★ Approx 40ft erect 6ft collapsed	£249.95
TMF-1 Fibreglass mast ★ 4 sections 160cm each ★ 50mm to 30mm ★ Approx 20ft erect 6ft collapsed	£149.95
TMF-1.5 Fibreglass mast ★ 5 sections 200cm each ★ 60mm to 30mm ★ Approx 30ft erect 8ft collapsed	£199.95
TMF-2 Fibreglass mast ★ 5 sections 240cm each ★ 60mm to 30mm ★ Approx 40ft erect 9ft collapsed	£249.95
TMF-3 Fibreglass mast ★ 6 sections 240cm each ★ 65-23mm ★ Approx 50ft erect 8ft collapsed	£299.95



### 20ft Mast Sets

(5ft Sections)

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

MSP-125 4 section 1.25inch OD mast set	£39.95
MSP-150 4 section 1.50inch OD mast set	£44.95
MSP-175 4 section 1.75inch OD mast set	£49.95
MSP-200 4 section 2.00inch OD mast set	£59.95
MSPX-150 4 section 1.50 inch 5mm scaffold gauge (very heavy duty)	£69.95

### Portable Telescopic Masts

LMA-S Length 17.6ft open 4ft closed 2-1" diameter	£79.95
LMA-M Length 26ft open 5.5ft closed 2-1" diameter	£89.95
LMA-L Length 39ft open 7.2ft closed 2-1" diameter	£99.95
CARPLATE-HDT brilliant drive on plate with tilt - ideal to be used in conjunction with the portable telescopic masts and only	£44.95
CARPLATE-HD without tilt	£24.95



### Patch Leads

PL58-0.5 1/2m Standard RG58 PL259 to PL259 lead	£3.50
PL58-10 10m Standard RG58 PL259 to PL259 lead	£8.95
PL58-30 30m Standard RG58 PL259 to PL259 lead	£16.95
PL58M-0.5 1/2m Mil Spec RG58 PL259 to PL259 lead	£4.50
PL58M-10 10m Mil Spec RG58 PL259 to PL259 lead	£12.95
PL58M-30 30m Mil Spec RG58 PL259 to PL259 lead	£27.95
PL213-10 10m Mil Spec RG213 PL259 to PL259 lead	£18.95
PL213-30 30m Mil Spec RG213 PL259 to PL259 lead	£39.95
PL103-10 10m Mil Spec Westflex 103 PL259 to PL259 lead	£29.95
PL103-30 30m Mil Spec Westflex 103 PL259 to PL259 lead	£69.95

(All other leads and lengths available, ie. BNC to N-Type, etc. Please phone for details)

### Connectors

PL259-6mm Standard plug for RG58	£0.99p
PL259-9mm Standard plug for RG213	£0.99p
PL259-7mm Standard plug for Mini8	£1.25p
PL259-6C Compression type for RG58	£2.50p
PL259-9C Compression type for RG213	£2.50p
N1YPE-6 Compression type plug for RG58	£3.95
N1YPE-9 Compression type plug for RG213	£3.95
N1YPE-103 Compression type plug for westflex 103	£6.00
BNC-6 Compression type for RG58	£1.50
BNC-9 Compression type for RG213	£3.50
SO239-N Adapter to convert PL259 to N-Type male	£3.95
N1YPE-PL Adapter to convert N-Type to PL259	£3.95
BNC-PL Adapter to convert BNC to PL259	£2.00
BNC-N Adapter to convert BNC to N-Type male	£3.95
BNC-SMA Adapter to convert modern SMA radio to suit BNC	£3.95
SO239-SMA Adapter to convert modern SMA radio to suit SO239	£3.95
PL259-38 Adapter to convert SO239 fitting to 38" thread	£3.95

### MFJ Antenna Tuners

See our website for full details.

<b>AUTOMATIC TUNERS</b>	
MFJ-925 Super compact 1.8-30MHz 200W	£174.95
MFJ-926 remote Mobile ATU 1.6-30MHz 200W	£299.95
MFJ-927 Compact with Power Injector 1.8-30MHz 200W	£254.95
MFJ-928 Compact with Power Injector 1.8-30MHz 200W	£203.95
MFJ-929 Compact with Random Wire Option 1.8-30MHz 200W	£214.95
MFJ-991B 1.8-30MHz 150W SSB/100W CW ATU	£214.95
MFJ-993B 1.8-30MHz 300W SSB/150W CW ATU	£254.95
MFJ-994B 1.8-30MHz 600W SSB/300W CW ATU	£349.95
MFJ-998 1.8-30MHz 1.5kW	£664.95
<b>MANUAL TUNERS</b>	
MFJ-16010 1.8-30MHz 20W random wire tuner	£71.95
MFJ-902 3.5-30MHz 150W mini travel tuner	£102.95
MFJ-902H 3.5-30MHz 150W mini travel tuner with 4:1 balun	£127.95
MFJ-904 3.5-30MHz 150W mini travel tuner with SWR/PWR	£132.95
MFJ-904H 3.5-30MHz 150W mini travel tuner with SWR/PWR 4:1 balun	£152.95
MFJ-901B 1.8-30MHz 200W Versa tuner	£109.95
MFJ-971 1.8-30MHz 300W portable tuner	£122.95
MFJ-945E 1.8-54MHz 300W tuner with meter	£134.95
MFJ-941E 1.8-30MHz 300W Versa tuner 2	£144.95
MFJ-948 1.8-30MHz 300W deluxe Versa tuner	£164.95
MFJ-949E 1.8-30MHz 300W deluxe Versa tuner with DL	£184.95
MFJ-934 1.8-30MHz 300W tuner complete with artificial GND	£204.95
MFJ-974B 3.5-54MHz 300W tuner with X-needle SWR/WATT	£194.95
MFJ-969 1.8-54MHz 300W all band tuner	£219.95
MFJ-962D 1.8-30MHz 1500W high power tuner	£299.95
MFJ-986 1.8-30MHz 300W high power differential tuner	£359.95
MFJ-989D 1.8-30MHz 1500W high power roller tuner	£399.95
MFJ-976 1.8-30MHz 1500W balanced line tuner with X-needle SWR/WATT	£479.95

### MFJ Analysers

MFJ-229 UHF Digital Analyser 270-480MHz	£209.95
MFJ-249B Digital Analyser 1.8-170MHz	£264.95
MFJ-259B Digital Analyser 1.8-170MHz	£269.95
MFJ-269 Digital Analyser 1.8-450MHz	£369.95
MFJ-269PRO Digital Analyser 1.8-170/415-450MHz	£389.95
NEW MFJ-266 Digital Analyser 1.5-490MHz in stock now	£339.95

### LDG Tuners

LDG Z-817 1.8-54MHz ideal for the Yaesu FT-817	£119.95
LDG Z-100 Plus 1.8-54MHz the most popular LDG tuner	£134.95
LDG IT-100 1.8-54MHz ideal for IC-7000	£159.95
LDG Z-11 Pro 1.8-54MHz great portable tuner	£159.95
LDG KT-100 1.8-54MHz ideal for most Kenwood radios	£174.95
LDG AT-897Plus 1.8-54MHz for use with Yaesu FT-897	£179.95
LDG AT-100 Pro 1.8-54MHz	£199.95
LDG AT-200 Pro 1.8-54MHz	£209.95
LDG AT-1000 Pro II 1.8-54MHz continuously	£469.95
LDG AT-600Pro II 1.8-54MHz with upto 600W SSB	£299.95
LDG YT-450 designed for FT-450 & FT-950 in stock now	£224.95

### AVAIR SWR Meters

AV-20 (3.5-150MHz) (Power to 300W)	£39.95
AV-40 (144-470MHz) (Power to 150W)	£39.95
AV-201 (1.8-160MHz) (Power to 1000W)	£49.95
AV-400 (14-525MHz) (Power to 400W)	£49.95
AV-601 (1.8-160/140-525MHz) (Power to 1000W)	£69.95
AV-1000 (1.8-160/430-450/800-930/1240-1300MHz) (Power to 400W)	£79.95

### MOONRAKER Power Supplies

PS30SWII 25A continuous switch mode PSU with variable output voltage and cigar socket also includes noise offset function. All for just	£89.95
QJ-PS30II 30A continuous, includes lovely large meter displays and large rear terminals for that thick power cable on high powered rigs. Amazing at just	£79.95
QJ-PS50II 50A continuous, same as above with lovely large displays and large rear terminals for that thick power cable on high powered rigs	£109.95

### NEW 50m Coax Drums

Perfect size reels of cable at the perfect price - why have they not been available before!

From stock we have the following:-	
RG58 Standard	£14.95
RG58 Mil spec	£24.95
MINI8 Mil spec	£34.95
RG213 Mil spec	£59.95
WESTFLEX 103	£79.95





# Pitcairn Islands – First Call!

For the past year or so I've been running a doublet, cut for 1.8MHz (160m) and fed with open wire feeder. It's a long antenna and squeezing it in was a challenge. Sitting with the apex at 10m high it's been a reasonable performer for short skip work, but performance on 1.8MHz was poor and some of the higher bands didn't perform much better either.

I thought this was probably as good as it could get really, until a short skip c.w. conversation on 7MHz (40m) with a long doublet enthusiast persuaded me otherwise, by letting me in on a well kept secret!

It will probably come as no surprise to learn that the secret is height. We are all informed, by instruction, by fellow Amateur folklore, by technical books and by elaborate mathematic analysis, that the higher the antenna the better it will work. But how do you get the antenna higher without a tower or serious mechanical works that rob the doublet of its simplicity and cheapness. More importantly, will the extra height really make a difference operationally? I decided to find out.

## Aiming High

Getting wire antennas up and aiming high isn't easy! I've done a fair bit of tree climbing and hurling of stones with strings attached in the past, with a reasonable amount of success, but these methods are hardly to be recommended.

Virtually every year we hear of somebody falling from a height while working on an antenna and I didn't want to add to the statistics. So I began looking for ways of getting an antenna up high that didn't involve me getting exposed to any form of danger.

I'm blessed with having some substantial trees on the boundary of my garden, so they seemed an obvious choice as a support, but tall, high reaching trees have large wide spread branches and leaf canopies and the obvious way of getting myself high by using a cherry picker or some



Charles G4JQX demonstrates the imported American EZ Hang catapult.

other elevation machine meant that the highest part of the tree couldn't be reached. What was needed was a way of getting well over the height of the tree – and a couple of these trees seemed to be approaching 20m or more in height.

## Fishing For A Solution

Searching the internet eventually came up with the "EZ Hang" an extraordinary name for a very unusual device. Produced in the USA by EZ Hang Inc. (see [ezhang.com](http://ezhang.com)) the EZ Hang advertising shows that it is essentially a sling shot, but cleverly designed and fabricated in such a way that it makes hanging antennas from very high locations feasible – and safe.

The answer to my prayers it seemed, so I promptly ordered one directly over the Internet and four days later the postman delivered my equipment. That's when it became very interesting!

On first inspection the EZ Hang looks like a contraption that belongs in the *Dangerous Book for Boys* Christmas special edition. Looking like a cross between a cut down fishing rod and a stone slingshot, accompanied by a roll of brightly coloured string and some yellow lead weights, it didn't do a lot to inspire confidence that my carefully cut doublet antenna could soon be high up

in a tree! However, I soon discovered that actually, this equipment was a subtle and clever mix of idea, invention and cunning.

Not reading the instruction booklet was probably my first, but usual, mistake. Like most people I assumed I knew how to use a slingshot having led a mischievous life when young! But using a professional one 'is something else'.

I rapidly deduced that the general idea was to attach a bright yellow lead weight to the fishing line, release the line spool and then fire the yellow lead weight into the air. The weight would carry the line behind it pulling it out from the "fishing rod" spool – so I went into the garden contemplating that firing a small lead weight into the air trailing a long length of nylon fishing line behind it wouldn't be much of an issue – after all anglers don't seem to cast their lines far!

## First Go!

The first shot I fired into the air without much effort saw the special metal weight and line clear the house, garden, the adjacent road, the farmer's empty pasture field and into a very distant hedge some 300m away. It took some considerable time for my dog and I to recover it all! It was time to read the instructions – I realised this wasn't

a device to be meddled with!

The basic concept of the *EZ Hang* is that a nylon fishing line attached to the bright yellow lead weight is fired into the air, over the top of a tree and recovered on the other side. The lead weight is easy to find because its bright yellow and it flies through foliage because of its pear drop shape. The slingshot is then left on the ground, the lead weight found and the bright orange recovery line is attached.

On returning to the slingshot the nylon fishing line is reeled back in (as you would with a fishing rod) and the orange recovery line is 'reeled' in using its own cleverly designed ground-mounted spool, which ensures there are no tangles.

The line is then detached from the slingshot. The orange line is then used to haul the antenna centre high up into the tree. This two stage process is important – the light nylon fishing line allows for high firing of the lead weight. It won't support the weight of the antenna – but the fishing line will allow you to 'pull through' a hauling line that will take the weight.

As I've already mentioned, it's cleverly thought out and very well designed from a practical aspect.

The only thing I would recommend is that wearing a helmet is a good idea – a small piece of lead bouncing and ricocheting off a tree branch could leave an unpleasant head wound.

You can always try to make one of these yourself (try [surplusandoutdoors.com](http://surplusandoutdoors.com) for ideas) but getting the fishing line reel bit to work is probably a challenge, especially if you are like me (not a fisherman!) – but I've no doubt it's possible. I have certainly made a note in my home-brew ideas book for a rainy day – I'll let you know how I get on.

### Two Stage Process

The two stage process is repeated for either end of the doublet and within a couple of hours I had my entire 160m doublet up at around 25m. I had to lower it twice to add more open wire feeder line, as I hadn't expected it to go up so high. At this height, the antenna simply disappears – and the reason why the hauling line is such a vivid orange colour becomes obvious – you could easily lose the antenna if it wasn't highly visible!

Excited at the prospect of firing the antenna up, I laid out yet more open wire feeder back to the shack and realised now why doublets are so useful. An ordinary dipole fed with 50Ω coaxial cable, with appropriate balun



The EZ Hang kit shows how simple it is in practice. However, using it takes practice and Charles recommends reading the instruction manual!

would be a heavy weight up high in the tree and the costs of the coax cable would start getting excessive.

Whilst not a big problem at h.f., I have no doubt the losses are building up too. I now had some 150m of open wire feeder running from trees to the house – no loss problems here.

### Bathroom Shack

My shack is built in what was the original bathroom. When the house was renovated I got the builders to replace the old soil pipe through the wall with a length of new plastic pipe and fill it with that clever expanding foam (that goes everywhere you don't want) when you use it yourself.

Its great for open wire feeder – push the two wires through the foam the right distance apart and you are done, it's self-supporting as it comes into the house. It certainly beats trying to persuade the double glazed window frame to accommodate the feeder when you close the window on it, which used to be my preferred but unpopular approach.

Incidentally, I had the builders leave the old overflow in place as well. That route takes my solid copper earth cable out the shack to the rod in the garden. At the end of the renovation, my enthusiasm had rubbed off on to my builder – and he's become a budding amateur. I also feared the renovation would never get finished, but that's another story!

### Straight To Pitcairn Island!

Readers may well ask – did the antenna work? My answer is – You bet it did! Firing up the trusty IC-756 on 10MHz late morning left me hearing **JJ8DEN** working from Pitcairn Island as VP6PR on low power calling "CQ" with no takers. So, **Yoshitake Izumi** was in the log first call at 50W, with the IC-756 auto tuner sorting out the matching for me.

Pitcairn Island was a new entity for me – and with a very big smile on my face I then sat and listened to Yoshitake calling "CQ" for the next 10 minutes with no other takers on what was a busy band. So, something about this antenna was working. During the day I worked A45, VE1, TF3 and finally to with a flourish, 6W in Senegal, all first call through varying size pile-ups.

Going from 10m to 20m in height was a revelation to me. The antenna has been transformed from an average performer to an excellent performer – and although a horizontal antenna will never outrun a vertical on 1.8MHz, I now regularly work into W and VE. What's more, the antenna has disappeared – it simply cannot be seen, whereas in its previous location it was a visual nuisance.

Try it – keep your health intact by trying what I did and use a helmet. And keep your wealth intact by keeping your antennas as high and as simple as possible!

# The Fredbox and Sixbox Stories

Roger Laphorn G3XBM looks at two very simple a.m. transceivers for v.h.f. that were built 35 years apart.

This is the story of two simple, home-made, low powered very high frequency (v.h.f.) amplitude modulated (a.m.) transceivers that were built 35 years apart. The Fredbox, was a rig that first saw the light of day back in 1974. In the last few years it has been restored to full working order to enjoy the renewed interest in a.m. operation on 144MHz (2m) in the UK. (More on the SixBox later).

## In The Early 1970s

In the early 1970s I'd worked local stations with a simple very low power 10mW 144MHz a.m. transmitter. This consisted of a 36MHz oscillator/multiplier followed by another multiplier stage and power amplifier. The last two stages were series modulated.

The transmitter was used in conjunction with a super-regenerative receiver based on the CQ2 design that first appeared in *Practical Wireless* in the late 1960s, but with an radio frequency (r.f.) amplifier stage added, to

provide isolation. Incidentally, the CQ2 design was republished in *PW* not long ago.

The transmitter and receiver were built 'ugly-style' on a piece of copper clad printed circuit board (p.c.b.), with just a toggle switch supply change-over. For some time the antenna changeover consisted of unplugging the antenna from the receiver then plugging it into the transmitter and vice versa, which took a few seconds!

The antenna at that time was a small dipole or indoor beam mounted on a bamboo cane fixed to a dining chair with masking tape and rotated by hand! Some quite amazing contacts were made with this total lash-up, so I decided to put these in a small enclosure as a hand-held transceiver.

## The Fredbox PCB

Combining these two circuits back in 1974 took only a couple of weeks. I etched a small p.c.b. drawn out by hand after a suitable box was found. The



Two rigs (35 years apart) and two versions of G3XBM!

size-reduced circuit worked first time.

People working alongside me were so impressed by its small size that very soon three other copies were made. At the time it was far smaller than anything commercially available for 2m. The first Fredbox-to-Fredbox QSO was over about 300m.

The odd shaped board was to allow a 9V PP3 battery to be put inside the box as well as the microphone and transmit-receive switch. The battery took about 40% of the space. A crystal earpiece was used on receive in the interests of low current drain. The power consumption on both receive and transmit were very low – so the battery would run the unit for several days.

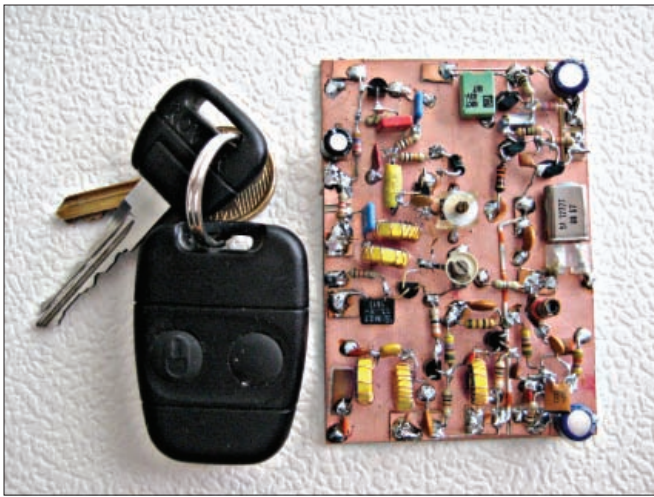
Plenty of local hand-held contacts were made around the Cambridge city area, mostly from inside our modest first floor flat. Contacts were made on 145MHz, which was the mobile calling channel at that time. A great number of these contacts were with a local disabled amateur **Fred Walker G8BWI**; a call at almost any time would be answered by dear old Fred.



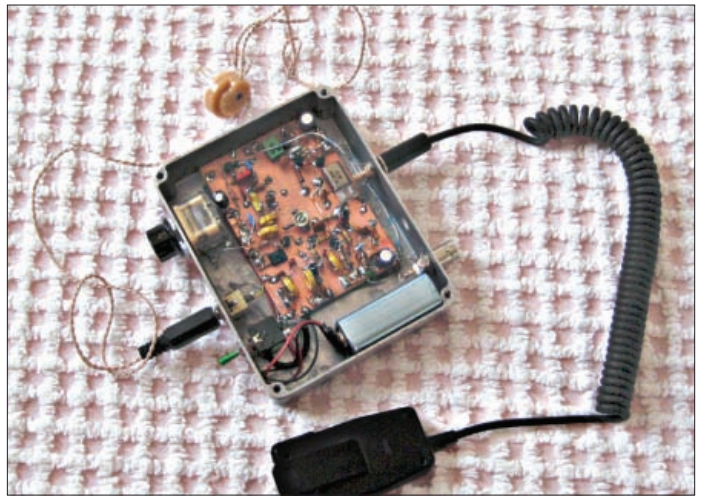
External view of the original Fredbox for 144MHz.



Internal view of the Fredbox clearly demonstrating how much space the battery takes up.



Roger G3XBM's breadboarded modern prototype of the Fredbox.



The modern version fitted into a suitable case.

But how Fred could talk! Sometimes you'd start a contact, then hand over to Fred, have your tea and he'd still be talking away when you got back. Because of this, the little box became known locally – and affectionately – as the 'Fredbox'.

### Exciting Results

The most exciting results took place away from my home in Yorkshire and on the coast of South Devon. In Yorkshire the Fredbox was regularly used to make QSOs from my parents-in-law's home in Barnsley up to Leeds – about 35km to the north.

In Devon, the Fredbox was used to make several solid contacts from Start Point to Portland Bill in Dorset – some 90km to the east, all with just the rig used hand-held with a whip antenna. Then, on one occasion the best result of all: a 160km contact from Bolberry Down across to a mobile station on the north coast of Brittany in France. Again I using the Fredbox as a hand-held, but using a half-wave end-fed whip.

Gradually the 144MHz band became busier and people moved over to narrow band f.m. (n.b.f.m.) and single sideband (s.s.b.). The a.m. mode all but died out on the band, so the Fredbox was consigned to the cupboard and rarely saw the light of day again until a couple of years ago.

With a small revival in a.m. operation on 144MHz the Fredbox was rebuilt into the very same box. Luckily I still had the box and the built p.c.b. It has again been on the air in the Cambridge area and was heard at 76km away by **Kevin Ravenhill** (formerly **G1HDQ** now **ZL3KE**), using a whip antenna too, when I was down in Devon not long ago. It still works!

### The Sixbox

On to the Sixbox next! For some time I had wanted to build a very simple

transceiver for 50MHz (6m). My real intention was to build a double sideband (d.s.b.) transceiver using a direct conversion (DC) receiver but initially I thought I would have a go at a 6m version of the good old Fredbox, albeit in a different form.

Once again the starting point was the old CQ2 design from the 1960s using an MPF102 f.e.t. as a detector with another as an r.f. amplifier/isolation stage. Using T37-6 yellow toroids for tuned circuits was an experiment, but they performed well at this frequency. Using a small polyvaricon tuning capacitor it was possible to tune the receiver from about 49 to 54MHz, which was ideal, with a 15pF capacitor in series with it.

Bear in mind that although a super-regenerative receiver is very simple it's very sensitive, but lacks decent selectivity. Once set up, the regeneration level does not need adjusting, unlike a high frequency (h.f.) regenerative design. You can tell when this is set correctly as the background hiss is quite loud, but this quietsens on receiving a signal.

Unless the band is very crowded the super-regenerative receiver is quite usable. Theoretically this receiver, like any regenerative receiver in oscillation radiates a small signal but with the

Fredbox and the Sixbox this level is very low indeed.

### Third Overtone Crystal

The r.f. part of the transmitter uses a 3rd overtone crystal oscillator followed by a buffer and p.a. stage, both of which are series modulated. The series modulator design was similar to the Fredbox one, consisting of three transistors.

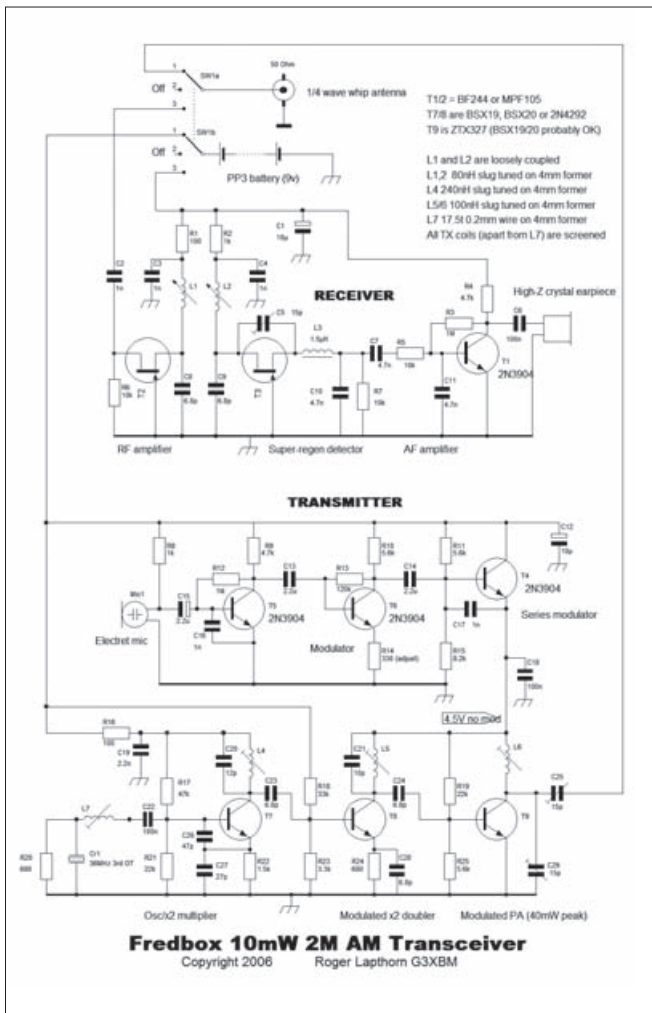
Every transistor in the transmitter and in the receiver audio stages is the ubiquitous, and very inexpensive, 2N3904. The Sixbox produces around 40mW when run from a 12V supply. From an internal 9V battery it produces around 20mW. Both the Fredbox and Sixbox use only commonly available discrete parts and there are no integrated circuits (i.c.s).

The same basic design would readily scale to 70MHz (4m) using a 5th overtone oscillator, although the T37-6 toroids used throughout on the Sixbox would be marginally acceptable this high in frequency. However, I was surprised how well they worked at 50MHz from my home in Burwell in Cambridge.

The whole rig was first breadboarded on quite a large piece of blank p.c.b. material. Once the circuit was working okay I repackaged it onto a smaller piece of board, but still built



Roger's Fred Sixbox ready for use on 50MHz. The earphone and microphone provides an idea of the physical size of the rig.



The receiver section of the Fredbox 144MHz transceiver is based on a PW design.

'ugly style'. A p.c.b. should be quite straightforward, but I thought it was unnecessary for a one-off design. The re-housed electronics were then put in a small die-cast box.

### Works Well!

The Sixbox works well and goes to prove that Radio Amateurs don't have to spend much money or work very far to have fun! In fact a recent 16km portable contact with this rig gave me as much buzz as I get while working sporadic-E DX with a 5W s.s.b. rig.

The 16km 'DX' QSO was to a station using a V2000 triband vertical, which appears to have less than unity gain on 50MHz. Considerably further distances would be possible with a small beam at each end.

Another QSO, this time with **Terry Chapman G3PTQ** 6km away in Bottisham, Cambridgeshire, was achieved despite Terry only having a low horizontal dipole. These QSOs and some respectable reports (up to 59) have proved the rig is a viable one for cross-town/inter-village nattering.

The receiver works well for something this simple and copies 0.5mW output a.m. signals from

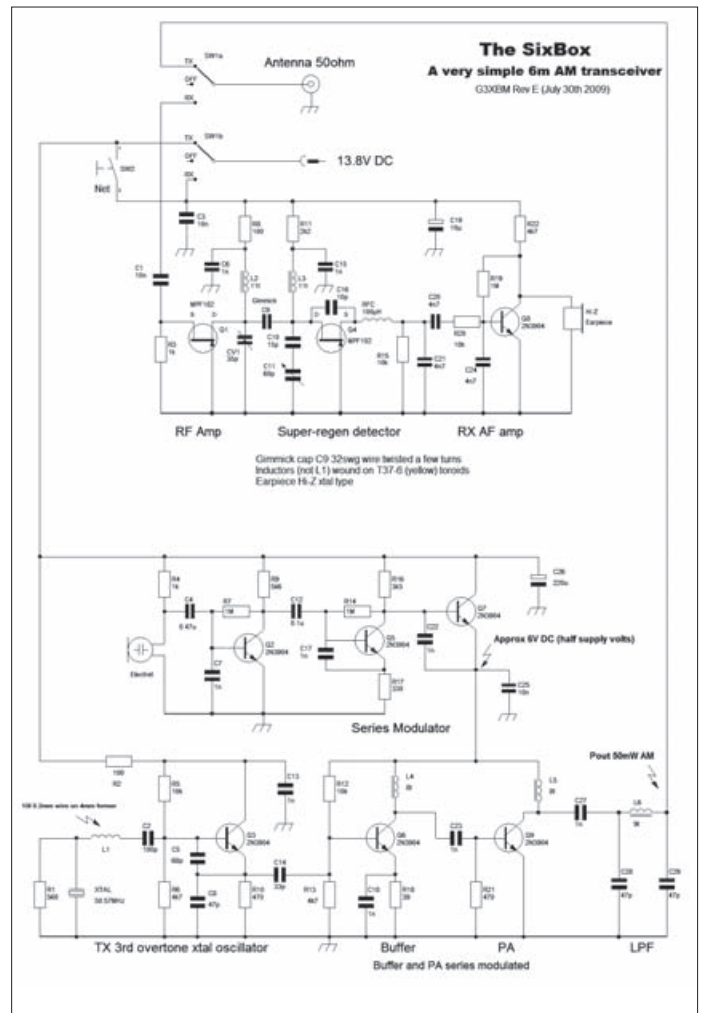
**Andrew Burge G6ALB** located 3km away across the fields in Swaffham Prior near Cambridge. It also makes a useful band monitor: 49MHz equipment, 6m s.s.b. signals (slope envelope detected) and DX TV video signals can be received when tuning around.

### Similar Versions

Similar versions for 28 and 70MHz could be easily designed and they could make useful local natter-boxes for these bands when there's no DX activity about. Clearly, increasing the power with a small linear would help but the low power does reduce battery requirements and allows QSOs to be made without too much effort, locally at least!

No design I have ever built is ever 'finished'! The Sixbox is certainly in this category and I have no doubt there are lots of things that could be improved. This circuit was designed using very basic test equipment in the back of the garage and I encourage you to try something similar just for the enjoyment of it. If you build one be prepared to try different values and experiment.

A d.s.b. version of this would be a



The 50MHz version also uses a PW design receiver. The transmitter is series modulated.

better bet for more serious 6m band use. Indeed, 200mW pep of d.s.b. (equivalent to 100mW s.s.b.) would be quite a useful power and would certainly work some European DX in the sporadic-E season. My next project is to complete the d.s.b. version, either for 28 or 50MHz.

### New & Old Enjoyed

Although, like many, I enjoy using new digital techniques such as PSK31, JT65 and WSPR, a lot of fun can still be had playing around with simple older a.m. equipment such as the examples shown here. The 50MHz band is ideal for such experimentation, especially in the cold winter nights when sporadic-E DX is many months away. So, maybe it's time to have a go at something similar, and very simple?

More details of both the Fredbox and the Sixbox, including schematics, may be found on my website <http://www.g3xbm.co.uk> A Google search will throw up several other versions of the Fredbox made by others over the years. One was even made as a handheld with a small loudspeaker. A p.c.b. for this version was designed as a club project.

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## Mike Richards G4WNC's Data Modes

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# Norse Gods, Pub Games and Fruit!

This month in *DataModes*, Mike Richards G4WNC looks at Domino and Thor, two modes as yet not covered – and also provides a Raspberry Pi Update.

Welcome to *Data Modes (DM)*! You may recall from my previous data modes that multi-frequency shift keying (MFSK) signals are particularly good at surviving ionospheric effects on the high frequency (h.f.) bands. Modes such as ROS, MFSK16 and Olivia do particularly well in the bands from 10MHz upwards.

However, each of the above modes relies on accurate tuning of the receiver, so that specific tones can be extracted and used to rebuild the original data. The operating technique for these modes is also generally perceived as being rather slow and cumbersome when compared to the slick operation you can enjoy with good old radio teletype (RTTY) mode!

### So – What's New?

You could be forgiven for thinking that there can't be anymore modulation systems to describe – so what's new? Although we've covered a huge range so far – there are more to come! So, to begin let's look at the inner secret of both Domino and Thor and their use of Incremental Frequency Shift Keying (IFK). In this system the absolute frequency of each tone is not

as important as the difference between successive tones.

But why is the incremental shift important? Well, the answer lies in the fact that on the lower frequency bands, Doppler shift can be a problem as this can cause the received tone to be shifted away from their expected frequency. In extreme cases it can result in the completely wrong tone being decoded.

With IFK, all the tones are likely to suffer similar Doppler effects. So, while their absolute frequency may well change, the difference between the tones will remain fairly constant so the IFK demodulator will still be able to track the modulation accurately.

The other critical effect is that of multi-path propagation, which can result in tones being delayed or extended by significant amounts. To combat these problems, Domino ensures that successive symbols do not use the same frequency. As a result, there's no risk of an extended or delayed tone being interpreted as a second symbol. It's these two features that significantly increase the resilience of Domino on lower frequency bands where multi-path

and Doppler shift effects can be more prominent.

To prevent the same tone being sent in consecutive symbols the original Domino system employed two independent tone sets, which are alternated for each symbol. This technique creates a very clear demarcation between each symbol and was also very useful for synchronisation. The downside was that the system used twice as much bandwidth as really necessary and that's never a popular move.

The next step in the evolution came from suggestions by 'Nino' Porcino **IZ8BLY** and Murray Greenman **ZL1BPU** that using the IFK+ algorithm would be better. In this system a single tone set is employed. However, before I go on to describe it in detail I ought to remind you of the difference between symbols and data bits.

### Data & Symbols

In communications systems, a symbol is defined as a single waveform or signal event. A common example would be a mark or space tone in a simple RTTY signal or phase change in a PSK signal. In many of the simpler systems, such as RTTY and PSK, there is a direct correlation between the input bit being a 1 or a 0 and a space or a mark being transmitted.

However, when we use transmission systems with multiple tones such as MFSK-16 or other high capacity systems, each change in the tone or symbol can represent more than just a simple 0 or 1. In the case of MFSK-16 each symbol can represent one of 16 choices. In binary terms that means each tone represents four bits of information. So, instead of each signalling event (symbol) representing one bit as in RTTY, each symbol represents four bits under MFSK-16 – see **Table 1**.

The important principle to note, is that a single symbol can represent multiple bits of data. Another point to be aware of is the way in which the different bits are used. While some systems may try to make use of every available bit to carry message data, most of the advanced systems use much of the additional capacity to carry 'Forward Error Correction' (FEC) information, designed to make the systems more robust. With this in mind let's get back to Domino and Thor.

Table 1 – MFSK-16 tones and data allocations

Tone No	Data Allocation (Weighting)	Tone No	Data Allocation (Weighting)
0	0	8	1100
1	1	9	1101
2	11	10	1111
3	10	11	1110
4	110	12	1010
5	111	13	1011
6	101	14	1001
7	100	15	1000



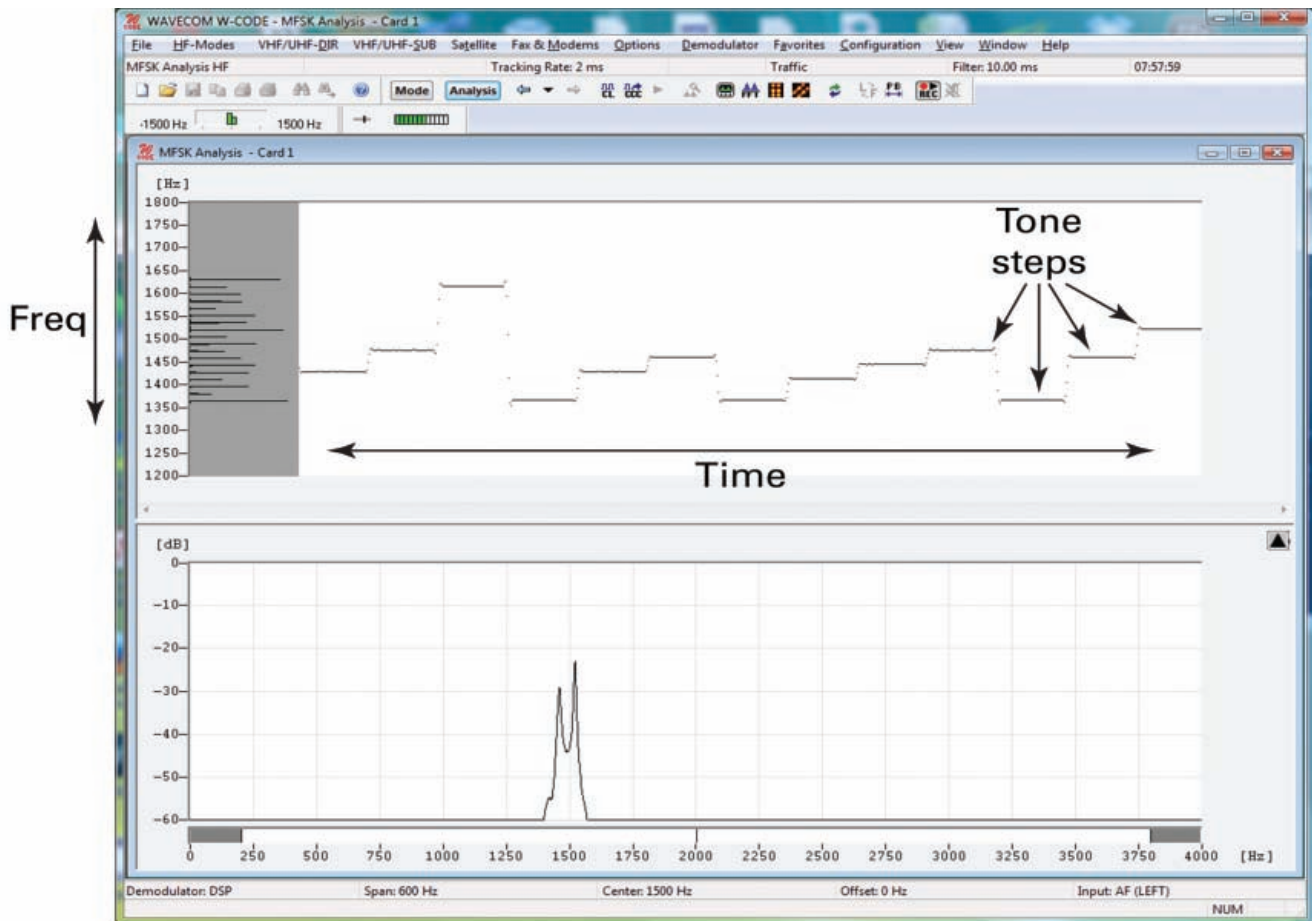


Fig. 1: Analysis of DominoEX showing the clean waveform in the lower trace and the tone steps in the upper trace. Note that each successive tone is different. (Analyser used is: Wavecom W-Code v8).

### Domino & Thor

To overcome propagation delays and multi-path effects that can cause overlap between successive tones, Domino employs active tone management. This process ensures that each successive tone is incremented by two from the previous tone, thus eliminating the risk of confusion between successive tones – see Fig. 1.

In this tone management scheme, each successive tone is incremented by two using a system known as IFK+. To accommodate the +2 shift at the top end of the tone range, two extra tones are added making a total of 18 tones with a slight increase in bandwidth. However, this modulation technique provides excellent resilience to the propagation effects commonly found on the lower h.f. and l.f. bands so, the slight increase in bandwidth is a good trade-off.

One other advantage of IFK+ is the ability to retune your receiver during reception to move away from interference. This is possible because the decoder is only tracking the difference between successive tones not the specific frequency. This means that so long as the signal remains within the receiver's passband, the decoder

should continue with near unbroken copy.

### Character Coding

While the basic 18-tone IFK+ modulation system handles communication in four-bit batches, there's more that needs to be done to convert the keyboard typed (ASCII) text message so that it's ready for transmission. Four-bits are nowhere near enough to handle even the simplified ASCII character set, the basic character set, as implemented on most

computer keyboards, needs at least seven bits of data.

The solution to the encoding problem, is to employ a customised Varicode alphabet. In Varicode alphabets the characters and codes are assigned in a way that ensures the most common letters have the shortest codes. Morse Code is a useful illustration of a Varicode, as here you'll find that the most common letter 'e' is represented by a single dot, while less common letters such as Z have a much longer code.

Letter	Varicode value	Symbol 1 bits	Symbol 2 bits	Symbol 3 bits
a	4	0100	-	-
j	2, 10	0010	1010	-
{	0, 10, 12	0000	1010	1100
(	0, 8, 12	0000	1000	1100

First symbol bits always start with 0

Following symbol bits always start with 1

Fig. 2: Showing how the Most Significant Bit (MSB) is managed in DominoEX transmissions.

I've shown some examples of Domino Varicode in **Table 2**. One of the aims of Domino was to create a reliable system that also allowed slick changeovers rather like RTTY and PSK-31. Many of the more complex modes include sophisticated FEC techniques that provide great resilience but also cause delayed changeovers when compared to RTTY.

One of the first requirements of a fast system is a simple synchronisation process. To achieve a fast changeover, Domino needs to be able to synchronise to a new transmission very quickly and this is achieved using a special bit pattern for each of the 4-bit symbols.

Looking at Table 2, you'll see that some characters use a single 4-bit symbol but others require two or three symbols. In order to achieve a quick synchronisation, the decoder needs to be able to distinguish between the first symbol and the subsequent ones.

The solution employed in Domino is to set the most significant bit (MSB) of the first symbol to 0 and force the MSB of subsequent symbols to 1. Although this limits the range of codes available, the benefits of quick synchronisation are more than worth it. I've shown examples of this working in a few letters in **Fig. 2**

### The Thor Mode

Next, I'll turn to the Thor mode. Very simply, Thor is Domino with forward error correction added. The technique employed with Thor's FEC encoding is 'Convolutional coding' using the standard NASA Voyager constraint = 7 and rate 1/2 code. Using this FEC data technique halves the effective speed of the link and slows the changeover from transmit to receive but provides excellent resilience.

### Operational Modes

To provide flexibility to deal with a wide range of operating conditions, Domino has six operating speeds as shown in **Table 3**. You will note that the Baud rates are all remarkably slow and that's possible because each Symbol conveys four bits of data, thus enabling the 11Baud standard rate to deliver an equivalent typing speed of 70 words per minute! If you're in a QSO and the going's getting tough, you can drop down to one of the slower Baud rates and you should see a useful improvement.

If you want to try these modes there's plenty of software available including the following: *FLDIGI*, *MultiPSK* and *Ham Radio Deluxe*. As with many of the more advanced modes there's not a lot of activity and weekends are probably

**Table two – Domino Varicode Example**

Character	ASCII Code	Domino Varicode
a	97	4
b	98	1, 11
c	99	0, 12
d	100	0, 11
e	101	1
f	102	0, 15
g	103	1, 9
h	104	0, 10
i	105	5
j	106	2, 10
k	107	1, 14
l	108	0, 9
m	109	0, 14
n	110	6

**Table 3 – Domino Modes**

Mode speed	Baud Rate	Bandwidth	Effective typing
DominoEX 4	3.90625	173Hz	25 wpm
DominoEX5	5.3833	244Hz	31 wpm
DominoEX8	7.8125	346Hz	50 wpm
DominoEX11	10.766	262Hz	70 wpm
DominoEX16	15.625	355Hz	100 wpm
DominoEX22	21.533	524Hz	140 wpm

the best times to look. Domino does not have allocated frequencies but the best place to look is in the RTTY sections of each band. As DominoEX is best suited for use at 10MHz and below, those are the places to try first. For more information see the excellent resources at: [www.qsl.net/zl1bpu/MFSK/DEX.htm](http://www.qsl.net/zl1bpu/MFSK/DEX.htm)

### Raspberry Pi Update

A digital modes decoder on the Raspberry Pi (Raspi) single-board computer, seems to be getting nearer. The most likely software is *FLDIGI* as this is available from the Debian repository. The latest development that's brought us tantalisingly close is the introduction of the Raspi 'Turbo mode'. While the Raspi running at its native 700MHz is pretty respectable, the new turbo mode provides for 'overclocking' and 'overvolting' within safe limits that have been approved by the Raspberri Pi foundation.

When the turbo-mode is activated, the Raspi will step the processor up to 1GHz during periods of heavy demand. To use the turbo mode you will need to download the latest *Raspbian Wheezy* operating system dated 2012-09-18 or later.

The first time you sign-in to the new system you will see a message reporting that the software has not been fully configured. At this point you run the

configuration file by typing the command: 'sudo raspi-config'. On running this, you will be presented with a menu that allows you to change a variety of parameters.

Step down to the 'overclock' entry and hit 'Enter' and then note the warning and hit 'Enter' again. On the next screen, step down to highlight the 'Turbo' preset and use the <Tab> key to move down to the 'OK' button and hit 'Enter' again.

Those few steps complete the process and your Raspi will re-boot and activate the turbo mode, giving you more speed when you need it. If you need to make any other changes or want to revert to standard, just enter the 'sudo raspi-config' command again.

Installing *FLDIGI* is very easy providing you have your Raspi connected to the Internet. Open up an *LXterminal* window and type the command: 'sudo apt-get install fldigi' and the system will find the package and download all the dependencies. On completion you will find *FLDIGI* in the Amateur Radio section of the main menu system.

When using the turbo-enabled Raspi, *FLDIGI* runs without blocking-out the processor but there's still more work to do to get this software running properly. One final point, you do need to make sure you have an adequate power supply when running in Turbo mode or you may get random crashes and lock-ups. See you next month!

# In the Blink of an (electromechanical) Eye!

If you're less than 50 years of age, and you don't tinker with vintage radios or antique test equipment, you're probably unfamiliar with the magic-eye tube (you call them valves in the UK!). Pity, because you've missed out on seeing one of the neatest display devices ever produced!

Back in the 1930s, radio manufacturers were interested in providing consumers with a tuning indicator, something that would indicate relative signal strength. Magic-eye valves were conceived as an alternative to then-expensive and difficult-to-manufacture meter movements.

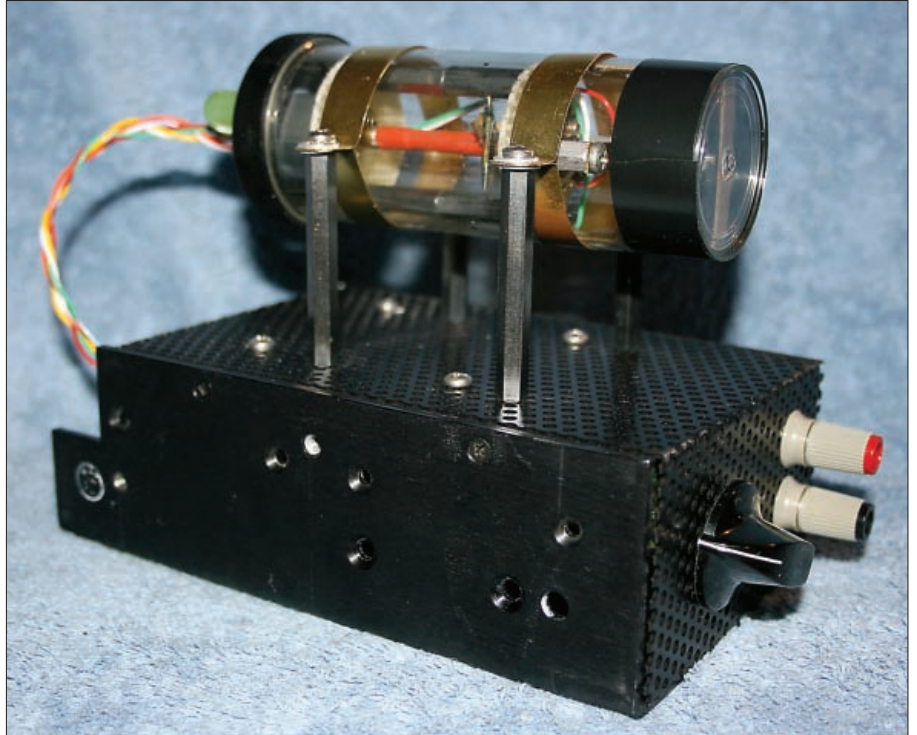
## Cathode Ray Tube

The magic-eye valve, Fig. 1, is in fact, a small cathode ray tube (c.r.t.), a cousin to the more sophisticated picture tubes found in television sets and computer monitors. Shapes and styles have varied over the years, but the most common magic eye valve had a small circular screen with a dark round electrode at its centre.

Electrons, emitted from beneath the center electrode, played onto the screen causing it to glow a rich, hypnotic green colour. In viewing the tube in operation, one gets the impression that they are staring into the all-seeing eye, Fig. 2, of some strange beast, hence the name of the device!

Additional electrodes in the valve shaped the beam of electrons striking the screen, resulting in the appearance of one or more glowing 'wedges' or 'vanes' of light. By varying the signal on the control electrodes, these vanes could be made to expand or contract proportionately.

Magic Eye valves have been used to indicate radio signal strength in receivers, audio levels in tape recorders, and continuity, voltage, and capacitor values in various pieces of test equipment. They were extremely popular in domestic radio receivers.



Peter Friedrichs AC7ZL describes how to make an electromechanical version for the fascinating 'magic eye' tuning indicator valves.

## Finite Life Span

Unfortunately, magic eye valves have a finite life span and they have been out of production for many decades. These two facts have conspired to make them rare and difficult to obtain. When samples are found, they often command high prices.

In contemplating the situation one afternoon, it occurred to me that it might be possible to fabricate a simple contraption that emulates eye-

tube behavior. Besides its intrinsic entertainment value, such a device might prove useful in the restoration of vintage radios in the future, when there are no more magic eye valves to be had at any price.

## Fooling The Eye

I have long been interested in John Logie Baird's mechanical television system, developed in the 1920s. The operation of the mechanical scanning TV system works mainly because of a biological



Fig. 1: An original thermionic indicator valve.

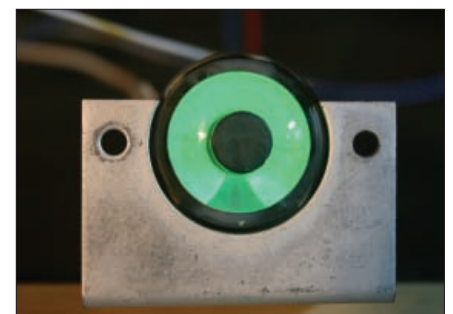


Fig. 2: The green display on the original valve is quite hypnotic in operation!

phenomenon called ‘persistence of vision’.

Persistence of vision, or POV, allows a discrete series of frames, displayed in rapid succession to be perceived as smooth, continuous imagery (the spokes on a rotating bicycle wheel seem to disappear for the same reason). Likewise, any light source, moved rapidly enough, will appear to an observer as a continuous streak of light. I hoped to take advantage of this effect to fabricate my magic eye valve analog.

I envisioned a light emitting diode (I.e.d.), mounted on the face of a disk, spun by a small electric motor, **Fig. 3**. By turning the I.e.d. on and off at precise times during its orbit, I expected to be able to produce an ‘eye’ pattern, complete with expanding and contracting vanes.

The trick is to vary the timing of the I.e.d. as an input signal varies. As it turns out, I was able to produce a magic eye valve-type effect with surprisingly simple electronics, composed entirely of junk-box parts.

### The Circuit

My prototype display consists of two green I.e.d.s, mounted to a rotating disk. For the time being, I’ll ask that you disregard the matter of how power is actually delivered through the rotating parts. I’ll address that in more detail shortly.

The display disk is attached to a shaft, and that shaft is driven by a small direct current (d.c.) motor. Refer no to the circuit of **Fig. 4**. Since the display behavior is dependent on timing, I used an LM7805 (IC2) to regulate the voltage feeding the motor. Another LM7805 (IC1) is used to regulate power for the rest of the circuitry.

Timing signals are generated with the 1 $\mu$ F capacitor, C6. This capacitor is charged from the 5V supply rail through timing resistor R5. Mounted on the rotating shaft of the display is small magnet, which is oriented to whirl past the face of a glass reed switch.

Once every revolution of the display disk the reed switch is closed and C6 is shorted to ground. This resets it to zero volts, after which it begins to charge up again. If you probe the junction between R5 and C6 with an oscilloscope as the apparatus is running, you will find a signal that looks more or less like a sawtooth waveform.

The control or input signal to the device is attenuated by the 10k $\Omega$  potentiometer R2. A clamp composed of R1 and D5 follow, and are used to protect downstream circuitry from

the accidental application of negative voltages. Following the clamp, the signal is buffered by a unity-gain amplifier composed of one amp (IC3b) from an LM324 quad op amp package.

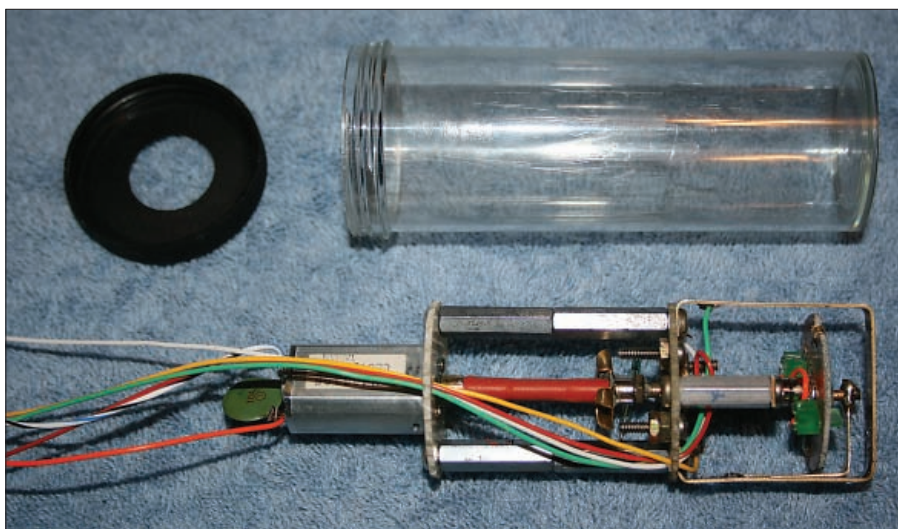
A second amplifier (IC3d), is configured as a comparator. This is used to compare the amplitude of the incoming control signal with the saw tooth produced by R5 and C6. If the output of the comparator goes high, the I.e.d.s in the display are turned on. If the comparator output goes low, the I.e.d.s are turned off. R3 limits drive current into the 2N2222 driver transistor Tr1. The resistor R4 limits the static I.e.d. current.

by the rotating I.e.d.s depends upon the length of time that the I.e.d.s are actually turned on **Fig. 6**. The length of time the I.e.d.s are on depends upon the time it takes for C6 to charge up to the level of the control signal.

The higher the control signal, the longer it takes C6 to charge up to that level, and the longer the arcs of light produced by the rotating I.e.d.s. Thus, the length of the glowing arcs produced by the display is proportional to the magnitude of the control signal.

### Mechanical Details

The mechanical details of my eye tube are as simple and straightforward as the



**Fig. 3:** Peter’s prototype was neatly mounted into a clear plastic tube.

### The Circuit In Operation

Next, let’s explore the operation of the circuit when everything is in motion. I’ll assume for the moment that the applied input signal is 4V and that the attenuator R2 is in mid-position. Furthermore, let’s assume that the reed switch, triggered by the magnet on the display shaft, has just closed and has discharged C6.

So under the conditions I’ve outlined, the voltage on pin 12 of (IC3d) will be 2V, and the voltage on pin 13 will be zero. Because the signal on pin 12 is greater than the signal on pin 13, the output of the comparator at pin 14 goes high, which turns on the I.e.d.s.

As time passes, and the display disk rotates, the illuminated I.e.d.s prescribe an arc of light. Also, as time passes, C6 charges up, and the voltage at pin 13 of (IC3d) will rise. When the voltage on C6 exceeds the input signal voltage, the output of the comparator (IC3d) will go low, turning the I.e.d.s off.

With every rotation, C6 is reset by the reed switch, and so the process repeats.

The apparent length of arc produce

circuitry, though a few comments are in order.

Since the idea of the project was to come up with a replacement for magic eye valves, I thought the unit should take the basic form of the tube. This suggested a long, cylindrical layout that would be suitable for insertion into some kind of tubular enclosure. I found a clear plastic jar with a screw-on lid that seemed to fit the bill. With the enclosure in hand, the rest of the display components were sized to fit inside.

The display disk is a piece of fiberglass printed circuit board (p.c.b.) material. Soldered to the disk is a small brass collar fitted with a set screw. This provides an easy way to attach the disk to a rotating shaft. Such collars can be made from scrap, or purchased at hobby stores that carry supplies for radio-controlled aircraft.

The disk is fitted onto a short length of brass rod, which serves as a drive shaft. A piece of brass tubing forms a bearing in which the shaft may turn. Also on this shaft is brass arm, soldered to a collar with a set screw, to which we may glue a magnet. This is used to actuate the reed switch that periodically resets

capacitor C6. An excellent source of tiny but powerful magnets is a dead CDROM drive. If you dissect the tiny mechanism that focuses the laser beam, you'll find one or more pill-sized rare-earth magnets.

Likewise, the motor that drives the display is small permanent magnet motor that was salvaged from the drawer mechanism of a dead CDROM drive. Any number of similar motors will do just as well.

The shaft of the display is coupled to the motor shaft with a piece of rubber tubing. The compliant nature of the rubber tubing will compensate for minor errors in shaft alignment.

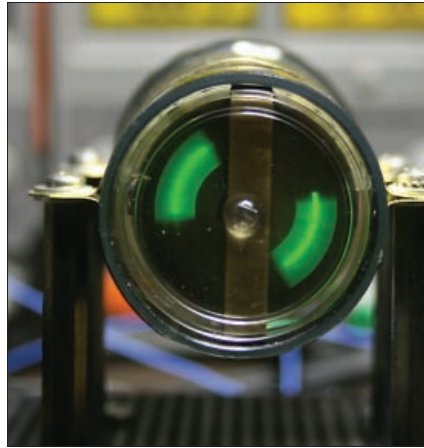


Fig. 5: Showing the display developed by Peter's modern replica.

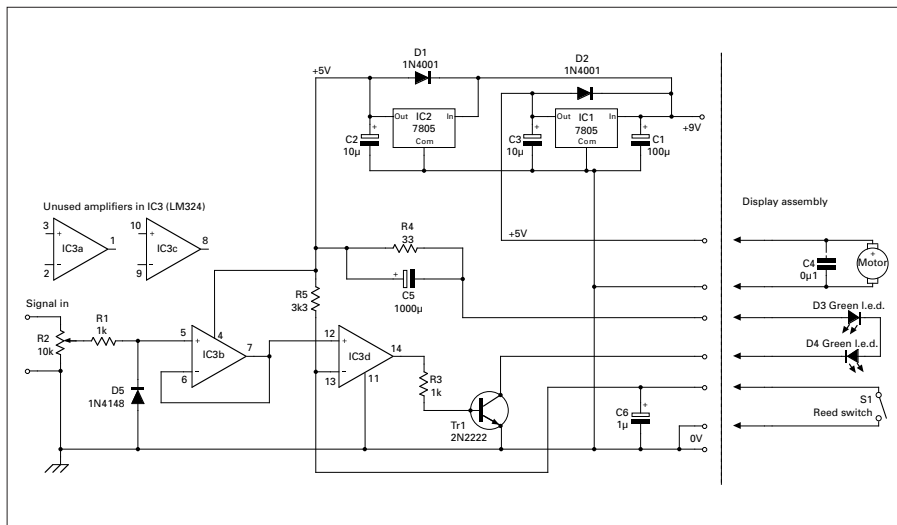


Fig. 4: The circuit of the modern replica 'magic eye' tuning indicator.

The remaining issue is how to deliver power to the rotating I.e.d.s. This is accomplished in two ways. One I.e.d. terminal is soldered to the collar on the display disk. Current flows through the collar to the shaft, and through the shaft to the brass tube comprising the bearing. A wire can be soldered to the brass tube.

The second I.e.d. terminal is connected to a piece of brass soldered to the front side of the display disk. A curled piece of brass shim stock acts as a brush to pick up current and complete the circuit.

### Design Modifications

I'm particularly fond of modification-tolerant designs that can be constructed

with scrap and spare parts. There is ample opportunity here for further experimentation and improvement. However, before I set you on your way, let me share a few thoughts.

My first prototype was constructed with an old computer central processor unit (CPU) fan. There are some challenges with using a motor of this type, but there are also significant advantages.

Most CPU fans are brushless motors that run very quietly. Without brushes, they don't produce sparking that might cause problems if the mechanical eye valve replica was deployed in an old receiver.

In addition, CPU fan motors often have a speed-output line. This is an

open-collector transistor that pulls the speed line to ground a couple of times per revolution of the fan. I've used this signal to directly reset capacitor C6, which eliminates the need for the rotating magnet and reed switch.

Original eye tubes came in different 'flavours'. Some had one vane that moved, some had two, some had four. You can change the number of vanes produced by the mechanical eye tube by adding more I.e.d.s, or by increasing the number of times that C6 is reset per revolution. Proper operation may require adjustments to R5 and C6.

Spinning the I.e.d.s produces the brightest display, but this approach has the disadvantage that rotating contacts must be employed. A far simpler design is to use a set of fixed I.e.d.s mounted behind a rotating disk that has a view-slot cut into it. I have tried this alternate approach to scanning, and it works well, too.

It's desirable to drive the I.e.d.s as hard as possible, so as to produce the greatest amount of light. Yet, I.e.d.s are prone to damage if current limits are exceeded. I selected R4 to limit the maximum current to my I.e.d.s to about 17 mA. However, since the I.e.d.s are being flashed on and off, the effective current is always less, and so is the light produced. By bypassing R4 with a large electrolytic capacitor, I could deliver more current to the I.e.d.s when the display disk was spinning, yet still protect them from over-current if the reed switch or comparator should ever fail to turn the I.e.d.s off.

### Final Thought

One final thought! Both original magic eye valves and my mechanical equivalent are dynamic display devices **Fig. 6**. It's impossible to do them justice with static photos in the pages of a magazine. For this reason, I invite you to view a short video that I've posted to Youtube that allows you to see these devices in operation. You can visit Youtube and search for my call sign, AC7ZL, or go directly to this URL: [www.youtube.com/watch?v=QFTDOZz-LIE](http://www.youtube.com/watch?v=QFTDOZz-LIE) I hope you enjoy the project!

### Useful references:

#### What Where

- AC7ZL's Home Page
- AC7ZL's Youtube video
- Philip Rheinschild's magic eye catalog
- Wiki entry on magic eye tubes
- Howard's magic eye tube page
- Educyclopedia entries for magic eye tubes

- [www.hpfriedrichs.com](http://www.hpfriedrichs.com)
- <http://www.youtube.com/watch?v=QFTDOZz-LIE>
- <http://www.akh.se/tubes/eyes.htm>
- [http://en.wikipedia.org/wiki/Magic\\_eye\\_tube](http://en.wikipedia.org/wiki/Magic_eye_tube)
- <http://www.magiceyetubes.com/>
- <http://www.educyclopedia.be/electronics/tubesspecial.htm>

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Previously called the GAREX JIMP and is a portable version of the Slim Jim. Gain is 1.8dB over a vertical dipole. The main element is 300 Ohm twin feeder with a matching section in a plastic housing 18cm long. Overall length is 1.55m (61") and there is 4m of coax cable which can be supplied with either a BNC or PL259 connector. **Price £20.00 plus £3.50 P&P.**



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**Box built £36 UK, £36.50 EU, £38 rest of World.**

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## Tony Nailer G4CFY's Technical for the Terrified

PW Publishing Ltd., Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW

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# Antenna & Feeders – Some Feedback!

Tony Nailer G4CFY had hoped to bring the antenna and feeder topic to a close with the October *Technical For The Terrified* column, but there has been feedback from readers!

Welcome to *Technical for the Terrified (TFT)*! I'm starting off this month by mentioning an E-mail from **Don Pinnock G3HVA** about my October column. Don took issue with the section under the heading **Random Wire Antennas**, when I stated "it seems to be a common myth that an antenna needs to be connected to coaxial cable, usually prior to entering the home." Also under the section **Best Recommendation** I'd said "The best solution is to bring the antenna wire all the way into the house and to the shack and connect it directly to a receive antenna tuning unit, (a.t.u)."

**Don** says this is patently untrue because the majority of domestic and other premises are sources of electrical noise and the outer screen of coaxial cable provides considerable protection in this respect. In stating this Don is quoting the orthodox view.

### The Orthodox View

The orthodox view is best described by the section on **Transmission Lines** on page 24-1 of the 1988 **ARRL Antenna Handbook**. With regard to coaxial cable it states; "*The current flowing on the inner conductor is balanced by an equal current flowing in the opposite direction on the inside surface of the outer conductor. Because of the skin effect, the current on the inner surface of the outer conductor does not penetrate far enough to appear on the outside surface. In fact, the total electromagnetic field outside the coaxial line as a result of the currents flowing in the conductors inside is always zero, because the outer conductor acts as a shield at radio frequencies.*"

### The G4CFY View

The orthodox view is largely correct with respect to signals injected onto the inner with respect to a properly grounded outer at the source end. The coaxial cable can only function properly if the screening is so good that none of the electric and magnetic field emanating from the inner conductor is able to escape through the outer braid. The cable only looks like non-reactive transmission line with constant characteristic impedance if, and only if, it's properly terminated with a non-reactive load at the far end.

Although an antenna properly trimmed can present a non-reactive load at a single frequency, as you move away either side from this it exhibits either capacitive or inductive reactance. This mis-match now makes the coaxial cable into a transformer, where its actual length as a proportion of the operating wavelength determines the transformation ratio. Indeed this property is exploited with lengths of coaxial cable being used as matching stubs.

### Coaxial Cable Noise Pick-up

The outer screen of a coaxial cable acts as an excellent antenna to pick up noise, although the majority of which does not get to the inner conductor. As it arrives at the receiver end, there's a large noise differential between inner and outer of the cable.

The cable run is also very good at picking up high frequency signals transmitted by a nearby Amateur. This is one of the primary causes of television interference by Amateurs, and one, which often can be cured by a braid breaker style of filter.

However, I have to agree with Don that the theoretically ideal situation is for an antenna wire to be terminated with an a.t.u where it enters the house. Thereafter coaxial cable can be run all the way to the shack. Unfortunately, this is often the most impractical solution.

### Cable Radiation

Only at the frequency where the antenna provides a perfect non-reactive match to the coaxial cable will all of a transmitted signal be delivered into its feed-point. At frequencies away from this frequency, the transformer effect occurs again with waves forming along the outer conductor.

Waves passing up the inner and coming back down the outer add in some places and cancel in others to give rise to standing waves. They are measured by means of a standing wave ratio (s.w.r.) meter.

Where a standing wave exists on a coaxial cable, then a transmitted signal is not confined within the coaxial cable and only appearing at the feed-point of the antenna. The signal is also being radiated from the 'hot' spots along the line, giving rise to large near-field signals and coupling to any, and all, cables nearby. It's also well known and documented that coiling up coaxial cable creates a balun effect due to the cumulative effect of the leakage magnetic field from the screen.

Further more, the s.w.r. problem is an argument for the a.t.u to be located remotely at the far end of the coaxial cable, where it joins with the antenna. In that way any reactive component of the antenna at that frequency can be tuned out and at the same time adjusted to match the characteristic impedance of the line. This then would minimise any standing waves on the feeder and would dramatically reduce the potential to radiate into other household wiring.

### Shortening Factors

Another interesting E-mail was received from **Ken Hough 2E0HOK** regarding the shortening factors for antennas. He



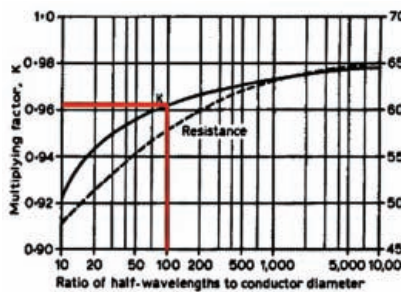


Fig. 1: Reproduced here, and taken from the *ARRL Antenna Handbook* page 2-2 is the shortening factor. Courtesy of the ARRL.

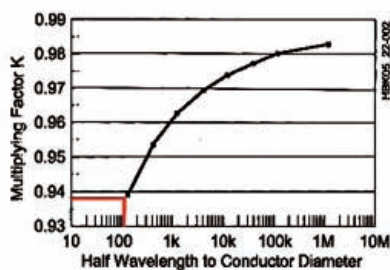
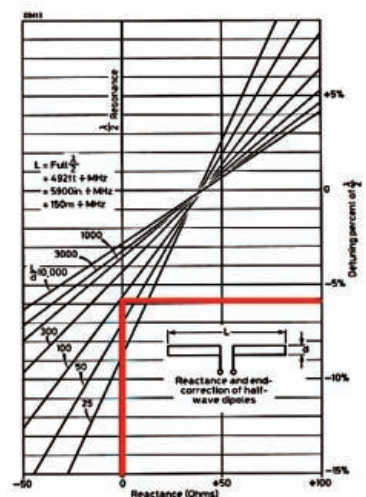


Fig. 2: Ken Hough 2E0HOK found a new graph of shortening factor in the 2009 *ARRL Handbook*, shown here. Courtesy of the ARRL.

Fig. 3: From the *RSGB Radio Communications Handbook* and similar to the ARRL graph except that it's rotated 90°. The additional lines agree with the 94% length for 'l/d' of 100 in Fig. 2. Courtesy of the RSGB.



wished to make a couple of Yagi antennas for use at very high frequency (v.h.f.).

The old fashioned method is to cut the driven element according to the shortening factor graph given in my last *T4T* (as Fig. 2) and reproduced here as **Fig. 1**. You would then make directors progressively 5% shorter and positioned at intervals of between 0.15 and 0.2 wavelength in front of the driven element along the boom. Then you would make a reflector 5% larger than the driven element and usually placed at 0.15 wavelength behind the driven element.

Ken has also found a neat, little on-line program called *Yagi Calculator*, a free program available at: <http://www.vk5dj.com/yagi.html> When Ken compared the dimensions from the 'old fashioned' method, with those from the *Yagi Calculator* the former method's elements were very much longer.

So, after undertaking some literature searches, Ken found a new graph of shortening factor in the 2009 *ARRL Handbook*, shown here as **Fig. 2**. By comparison of the two graphs for a half wavelength to diameter ratio of 100, the old graph gives just a multiplication factor of over 0.96 and the new graph just under 0.94.

Furthermore, the new graph agrees with the *Yagi Calculator* program and when constructed to those dimensions, Yagi antennas operate well on the correct frequencies.

## Tuning & Reactance

Before leaving this subject **Ken** also brought to my attention a more elaborate graph of Tuning and Reactance of half-wave dipoles. This is included in probably all the *RSGB Radio Communications Handbooks*. It's similar to the ARRL graph shown as in the last *T4T* (as Fig. 1), except that it's rotated 90°.

The RSGB illustration is included here as **Fig. 3** and Ken has added a bold line from zero reactance on the x-axis to intercept with the 100 'l/d' line. Then across to the y-axis gives a shortening value of 6%. This then agrees with the 94% length for 'l/d' of 100 in Fig. 2.

I'm grateful to Ken for moving this information forward to a point where design details give a more predictable result.

## Active Antennas

I receive a lot of 'phone calls and E-mails from many radio listeners, about active antennas with short whips. So – let's take a look at the subject of active antennas.

A typical active antenna is usually a short whip mounted on a box containing a wide-band amplifier. They are quite popular with flat and apartment-dwelling radio listeners as a solution to not having a garden. They may not be the best solution though, as the efficiency of an antenna falls approximately as the square of the reduction in length, compared with a quarter-wave long antenna.

I'll consider a quarter-wave antenna for (let's say) say 28MHz, which should be about 2.57m, (or 8ft 5in). Assume that we are using a telescopic whip, fully extended at 0.64 metres, (25in). This is a quarter the length it should be and according to my rule of thumb it will be about one sixteenth as effective as a full quarter wavelength.

While a shortened antenna becomes less efficient at picking up the wanted frequency – strangely it still seems effective for picking up noise. So we can expect that shortened antennas exhibit worse signal-to-noise ratios than full length ones. By adding a wide-band amplifier we might make the signal stronger and possibly readable – but the noise is also equally amplified.

My advice here is that whatever length of wire can be put up (even indoors) – the longer the better. Such an active antenna will give more 'wanted signal' and a better signal-to-noise ratio if the receiving wire is as long as possible.

However, you must be aware that wide-band amplifiers with high gain can easily be overloaded with strong broadcast stations. Additionally, there's not only the noise but also intermixing of the strong stations with all the others! The solution is to have the amplifier with a gain control. With a long pick up wire the gain should be reduced so overloading doesn't occur. Conversely with a short pick-up wire a higher gain can be used.

## Final Words

It seems fitting to finally conclude these various issues on antennas and feeders with including the orthodox view of how coaxial cables work. I also was keen to give my view, which mirrors not only my own experience but the accumulation of information coming back to me from Amateurs and radio listeners alike.

My reason for advising that a random wire be brought direct to the shack – rather than somehow terminating in coaxial cable immediately before or after entering the house is as follows. It's because a mismatch at many frequencies is liable to cause a greater reduction in the wanted signal and worsening of the signal-to-noise ratio than is due to the increased noise pick up within the house.

Listeners can also help themselves in this respect by getting rid of household sources of noise. Switch-mode power supplies, low energy light-bulbs, fluorescent lights and plasma televisions!

It is my intention now to leave antennas and feeders for a good while and return to radio theory and practice. So, if you wish to E-mail me regarding anything except antennas and feeders I may be contacted on; [tony@pwpublishing.ltd.uk](mailto:tony@pwpublishing.ltd.uk)

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# Rallies

## Send your rally info to:

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E-mail: [newsdesk@pwpublishing.ltd.uk](mailto:newsdesk@pwpublishing.ltd.uk)

Radio rallies are held throughout the UK. They're hard work to organise so visit one soon and support your clubs and organisations. PW Publishing Ltd. is attending at rallies marked \*. Please check with the organisers that the rally is 'on' before leaving home.

## NOVEMBER

### November 10th

#### The Rochdale Rally

The Rochdale & District Amateur Radio Society will be holding their Traditional Radio Rally at the St Vincent de Paul's Church Hall, Caldershaw Road, off Edenfield Road (A680), Norden, Rochdale OL12 7QR. The doors will open at 10.30am (10.15am for the disabled) and admission will cost £2.50 (with concessions for the under 12s and the over 65s). There will be talk-in on S22, a Bring & Buy and catering will be available.

#### Dave G0PUD

Tel: 01706 346517

E-mail: [dave.shaw1@sky.com](mailto:dave.shaw1@sky.com)

[www.radars.me.uk](http://www.radars.me.uk)

### November 11th

#### The Kempton Rally

The West London Radio & Electronics Show will be held at Kempton Park Racecourse, Staines Road East, Sunbury-on-Thames, Middlesex TW16 5AQ. The doors open at 10.00am (9.50am for the disabled) and car parking will be free. There will be talk-in, trade stands, a flea market, a Bring & Buy, special interest groups, lectures, a prize draw, catering and facilities for the disabled.

#### Paul M0CJX

Tel: 08451 650351

E-mail: [info@radiofairs.co.uk](mailto:info@radiofairs.co.uk)

[www.radiofairs.co.uk](http://www.radiofairs.co.uk)

### November 17th

#### The Halton Radio Rally

The Halton & District Amateur Radio Rally will be held at The Heath Business and Technical Park, Heath Road South, Runcorn, Cheshire WA7 4QX. The doors will open at 10.30am (10.15am for the disabled) and admission will be free. There will be car parking, trade stands (pitches free), a Bring & Buy, special interest groups, catering, a cash machine and facilities for the disabled.

#### George G0RLF

Tel: 01928 897591 (Daytime Only) or

07919 935725

E-mail: [g0rif@talktalk.net](mailto:g0rif@talktalk.net)

### November 24th

#### The North Wakefield Rally

The North Wakefield Radio Club Rally will be held at Drighlington Community Hall, Moorland Road, Drighlington, Leeds BD11 1JZ. The doors will be open from 10.30am to 2.00pm and admission will cost £2.00 (under 14s free). There will be trade stands and refreshments will be available. Traders will have access to the venue from 8.00am and tables will cost £6.00.

#### Tony G0JVI

Tel: 07740 003159

E-mail: [tonymawson@btinternet.com](mailto:tonymawson@btinternet.com)

### November 25th

#### The CATS Radio & Electronics Bazaar

The 34th Coulsdon Amateur Transmitting Society (CATS) Radio & Electronics Bazaar will be held at the headquarters of the 1st Coulsdon Scout, Richmond Hall, Lion Green Road Car Park,

Coulsdon CR5 3BP. The event will run from 10.00am to 1.00pm and admission, which includes a cup of tea, will be £1.00. There will be free car parking, a Bring & Buy, catering and facilities for the disabled.

#### Glenn G4FVL

E-mail: [chairman@catsradio.org](mailto:chairman@catsradio.org)

### November 25th

#### The Plymouth Rally

The Plymouth Radio Club Rally will be held at Harewood House, The Ridgeway, Plympton, Plymouth PL7 2AS. The doors will open at 10.00am and admission will cost £2.00. There will be talk-in, car parking, trade stands, a Bring & Buy and catering will be available.

E-mail: [g7nhb@hotmail.co.uk](mailto:g7nhb@hotmail.co.uk)

### November 25th

#### The ARVM Radio Fair

The Moscovide Amateur Radio Association in Portugal will be holding a radio fair at the Instituto Português para a Juventude, the Expo Village, near Moscovide, Lisbon – details of the venue can be found on the event website. The doors will be open between 10.00 and 5.00pm.

[www.arvm.org/fr2012.html](http://www.arvm.org/fr2012.html)

## DECEMBER

### December 2nd

#### The Bishop Auckland Rally

The Bishop Auckland Radio Amateurs Club Rally will be held at the Spenny-moor Leisure Centre, County Durham DL16 6DB. The doors will open at 10.30am (10.15am for the disabled) and admission will cost £2.00 (under 14s free). There will be talk-in on S22 (V44), car parking, trade stands, a Bring & Buy, family attractions, catering, a licensed bar and facilities for the disabled.

#### Mark G0GFG

Tel: 01388 747497

### December 8th

#### The South Lancs Radio Rally

The South Lancs Amateur Radio Club will be holding their inaugural Radio Rally at the Bickershaw Labour Club, Bickershaw Lane, Bickershaw, Wigan WN2 5TE. The doors will be open from 10.00am (9.30am for the disabled) to 2.30pm and admission will cost £1.50, with concessions for those in receipt of the State Pension. There will be talk-in, car parking, trade stands, a Bring & Buy, displays, special interest groups, catering and facilities for the disabled. A limited number of 2 x 2 metre pitches will be available (£8.00 if booked in advance or £10.00 on the day and stallholders will have access from 8.00am).

#### Allan 2E0RAG

Tel: 07533 970841

E-mail: [a2e0rag@yahoo.co.uk](mailto:a2e0rag@yahoo.co.uk)

## JANUARY 2013

### January 13th

#### The Red Rose Radio Rally

The Red Rose Winter Radio Rally will be held at the George H Carnall Leisure Centre, Kingsway Park M41 7FJ (M60 Junction 9, opposite the Trafford Centre).

The doors will open at 11.00am and there will be free car parking, trade stands, a Bring & Buy, special interest groups, an RSGB bookstall, catering and facilities for the disabled.

#### Steve

Tel: 07502 295141

[www.wmrc.org.uk/carnall.htm](http://www.wmrc.org.uk/carnall.htm)

### January 20th

#### The Dover Rally

The Dover Amateur Radio Club Rally will be held at Whitfield Village Hall, Sandwich Road, Dover CT16 3LY. The doors will be open between 10.00am and 1.00pm and admission will cost £2.00. There will be an auction at 12.30pm.

[www.doverradiorally.com](http://www.doverradiorally.com)

## FEBRUARY

### February 3rd

#### The Canvey Rally

The 28th Canvey Radio and Electronics Rally will be held at the Paddocks Community Centre, Long Road, Canvey Island, Essex SS8 0JA (the southern end of A130). The doors will open at 10.30am and there will be free parking, trade stands, catering and facilities for the disabled.

#### Vic Rogers G6BHE

Tel: 01702 308562

E-mail: [nvr@blueyonder.co.uk](mailto:nvr@blueyonder.co.uk)

[www.southessex-ars.co.uk](http://www.southessex-ars.co.uk)

### February 3rd

#### The RadioActive Radio Rally

The Mid Cheshire Amateur Radio Society will be holding the RadioActive Radio Rally at Nantwich Civic Hall, Market Street, Nantwich, Cheshire CW5 5DG. The doors will open at 10.30am and there will be car parking, trade stands, a Bring & Buy, catering and facilities for the disabled.

#### Simon G8ATB

Tel: 01270 841506

E-mail: [simon@G8ATB.co.uk](mailto:simon@G8ATB.co.uk)

[www.midcars.org](http://www.midcars.org)

### February 10th

#### The Harwell Rally

The Harwell Radio and Electronics Rally will be held at the Didcot Leisure Centre, Mereland Road, Didcot, Oxfordshire OX11 8AY. The doors will open at 10.30am (10.15am for the disabled) and admission will cost £2.50 (under 12s free). There will be talk-in on S22, free car parking, trade stands, a flea market, special interest groups, catering, a licensed bar and facilities for the disabled.

#### Ann G8NVI

Tel: 01235 816379

E-mail: [rally@g3pia.org.uk](mailto:rally@g3pia.org.uk)

[www.g3pia.org.uk](http://www.g3pia.org.uk)

## MARCH

### March 3rd

#### The Rainham Radio Rally

The Bredhurst Receiving and Transmitting Society Rainham Radio Rally will be held at Rainham School for Girls, Derwent Way, Rainham, Kent ME8 0BX. The doors will open at 10.00am (9.30am

for the disabled).

#### Trevor G6YLW

Tel: 07717 678795

E-mail: [trev@wig1.co.uk](mailto:trev@wig1.co.uk)

[www.brats-qth.org](http://www.brats-qth.org)

### March 3rd

#### The Spring Hangar Sale

The Spring Sale of all things military including radio and electronic items, clothing and vehicle equipment, together with amateur radio and an ever-growing amount of vintage radio/electronic gear will take place at the Hack Green Secret Nuclear Bunker, French Lane, Nantwich, Cheshire CW5 8BL. The gates will open at 10.00am and catering will be available in the Hangar.

#### Rod Siebert

Tel: 01270 623353 (Traders)

E-mail: [coldwar@hackgreen.co.uk](mailto:coldwar@hackgreen.co.uk)

[www.hackgreen.co.uk](http://www.hackgreen.co.uk)

### March 10th

#### The Wythall Rally

The Wythall Radio Club Radio and Computer Rally will be held at the Woodrush Sports Centre, Shawhurst Lane, Hollywood, nr Wythall, Birmingham B47 5JW. The doors will be open between 10.00am and 3.00pm and admission will cost £2.50. There will be talk-in on S22 (V44), car parking, trade stands, a Bring & Buy and catering will be available.

#### Chris G0EYO

Tel: 07710 412819

E-mail: [g0eyo@blueyonder.co.uk](mailto:g0eyo@blueyonder.co.uk)

[www.wrcrally.co.uk](http://www.wrcrally.co.uk)

## APRIL

### April 7th

#### The South Gloucestershire Radio Rally

The South Gloucestershire Amateur Radio Rally will be held at the Scout Activity Centre, Woodhouse Park, Almondsbury, Bristol BS32 4LX. The doors will open at 10.00am. There will be talk-in on S22 (V44), car parking, a Bring & Buy, a car boot sale, catering and facilities for the disabled.

#### Mike M1DPB (Rally Coordinator)

Tel: 07806 310095

E-mail: [southglosradiorallycoordinator@gmail.com](mailto:southglosradiorallycoordinator@gmail.com)

[www.southglosradiorally.org.uk](http://www.southglosradiorally.org.uk)

### April 7th

#### The Norbreck Rally\*

The Northern Amateur Radio Societies Association Exhibition (formerly known as the Blackpool Rally) will be held at the Norbreck Castle Hotel Exhibition Centre, on Queens Promenade, North Shore, Blackpool FY2 9AA. The doors will open at 10.30am (10.15am for the disabled) and admission will cost £5.00 (under 14s free). There will be talk-in, car parking, trade stands, a Bring & Buy, special interest groups, Morse tests, an RSGB bookstall, a licensed bar, catering and facilities for the disabled.

#### Dave M0OBW

Tel: 01270 761608

E-mail: [dwilson@btinternet.com](mailto:dwilson@btinternet.com)

[www.narsa.org.uk](http://www.narsa.org.uk)



# Time for the Christmas Break in the Workshop!

It's time for the Rev. George Dobbs G3RJV to present his annual Christmas project to keep you, the family and the grandchildren busy – after you've read the most appropriate quotation!

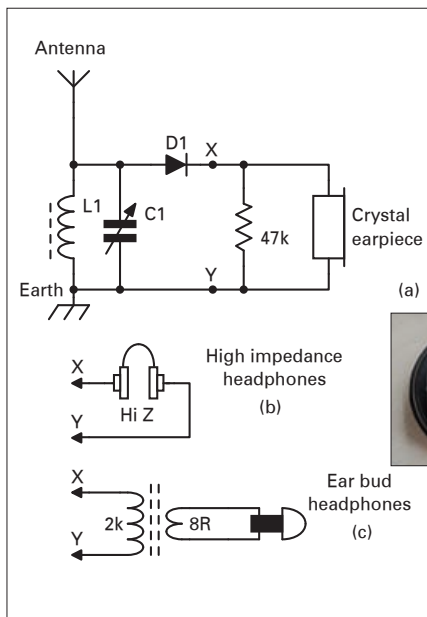
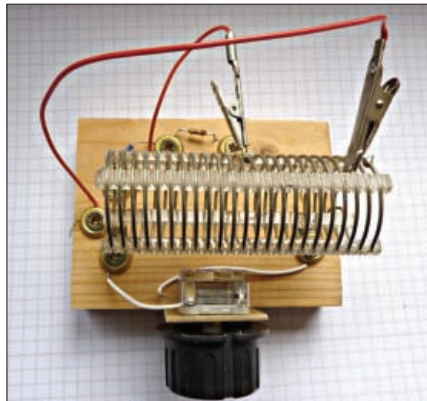
*What are the wild waves saying,  
Sister, the whole day long,  
That ever amid our playing  
I hear but their low, lone song?*  
John Bartlett (1820–1905)

Welcome to the Christmas edition of *Carrying on the Practical Way (CotPW)*! This month's appropriate quotation *What are the wild waves saying* – a popular song at the end of the 19th century – was soon to find its title used as a branding logo in the emerging domestic radio industry. Many years ago I was bequeathed a vintage crystal radio. A fine looking thing it is too, with a set of plug-in basket woven tuning coils.

The coils are the famous Igranic Electric Honeycomb Coils that bear the logo *What are the wild waves saying*. From time to time I listen to the wild waves, scratching along a piece of Galena crystal with the cat's whisker to find what the old timers called the "sweet spot". A journey back in time!

Some years ago I started a tradition in this column of devoting the last column of each year to projects that could be shared with children. The idea being that during the Christmas holidays a bored child or grandchild could be entertained by being helped to build a simple radio project.

Several times these projects were variants of the crystal radio. So this year I thought I would return to a few ideas on the theme of a crystal set radio with the aim of sharing these with a young person. I'll begin by describing typical



**Fig. 1: Circuit of the classic 'crystal set' – which can still provide fascinating results.**

crystal radios. Running through the basics of the crystal radio will set the scene for what follows.

## The Classic Crystal Set

The diagram, **Fig. 1(a)** shows the classic crystal set. It's simple and uses very few components. The radio is powered by the very radio signals it is receiving so an efficient antenna (aerial) is required. Usually this is a length of wire, as long as possible, mounted as high as possible.

We need the antenna to gather as much of the radio signal as possible. In most cases this can be aided by adding an earth (or ground) system. If you have metal plumbing, a connection to the cold water system often works well. Some crystal set users connect the earth to the domestic electrical earth or central heating pipes – but using gas supply piping is unwise.

The two main circuit elements are the tuned circuit and the detector circuit. The tuned circuit (C1 and L1) tunes the desired radio stations and reduces the input signal from other stations. The tuned circuit gives the radio its selectivity, which is the ability to tune in to the required station and 'reject' the unwanted ones. Keen crystal radio enthusiasts spend a lot of time getting the optimum results from the tuned circuit often by complex coupling between the antenna and the detector.

The diode (D1) acts as the detector, it converts the radio signal into an audio (sound) signal. Crystal radios are at their best when receiving amplitude modulated (a.m.) signals. In this modulation method, the sound waves at the radio transmitter are imposed on the radio signal so that the amplitude (strength) of the radio signal varies with the audio signal. The diode (D1) allows current to flow better in one direction than in the opposite direction. The detector converts the alternating current (a.c.) radio signal to a varying direct current, varying in sympathy

with the modulated signal and this can be converted to sound by an electric current to sound transducer (earphone or loudspeaker).

Incidentally, I bet that most of the joggers I see running around the lake and footpaths just down the road from our house don't know that they are wearing transducers! Their iPods or mp3 players are connected to ear 'buds'; little headphones (usually

white) pushed into their ears. Any radio receiver or music player requires a transducer; the bit at the end of the circuitry that converts the electrical signals into an audible signals. The section of the circuit to the right of 'X' and 'Y' is where the transducer goes and I offer three alternatives.

The diagram Fig. 1(a) shows a common alternative for those building crystal sets these days. It uses a crystal earpiece and converts the electrical signal to sound by making use of the piezoelectric effect. When electric current is applied to some crystalline material the shape of the crystal distorts. This is called the piezoelectric effect. The crystal is attached to a thin metal, or plastic, diaphragm to enable the changes in the crystal shape to be heard as sound.

Crystal earpieces are commonly available as single earplugs. The impedance of these earpieces is very high – usually in the order of 20MΩ or greater. This is much higher than the output impedance of the detector at X and Y which is a few thousand ohms. A 47kΩ resistor has been added at X and Y to make a load resistor and the crystal earpiece is connected across this resistor. Constructors of this circuit might like to experiment with the value of the resistor for maximum output.

The diagram, Fig. 1(b) shows the classic output circuit for crystal radios in their heyday. A pair of high impedance headphones is connected across X and Y. Pictures of early crystal sets in use usually show a pair of heavy headphones being worn by the listener. These have an impedance of 2,000 to 4,000Ω. Inside each headphone is an electromagnet with a soft iron core with many turns of wire wrapped around it.

### Horse-Shoe Core

A common configuration of the high-impedance headphone is a horse-shoe shaped core with the wire winding being shared between both sides of the horse-shoe. The core has a thin metal diaphragm placed over it (there's a tiny air gap) and the diaphragm moves in sympathy with the current flowing through the electromagnet. Such headphones are usually beautifully engineered and very sensitive – but these days they are difficult to get hold of and old high impedance headphones do sell for high prices.

The diagram, Fig. 1(c) uses a transformer to match the detector output to modern ear bud headphones; the sort used in mp3 players and similar applications. The ear buds usually have an impedance of eight to 32Ω and the

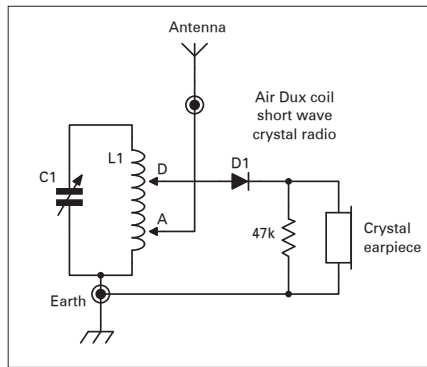


Fig. 2: George used his 'Air Dux' basket weave coils in this circuit. Note the tappings on the inductance.

transformer needs to match this to a few thousand ohms from the detector. In the early days of transistor radios, before the time when integrated circuit (i.c.) chips become common, the output stage of most radios was a push-pull amplifier using transistors.

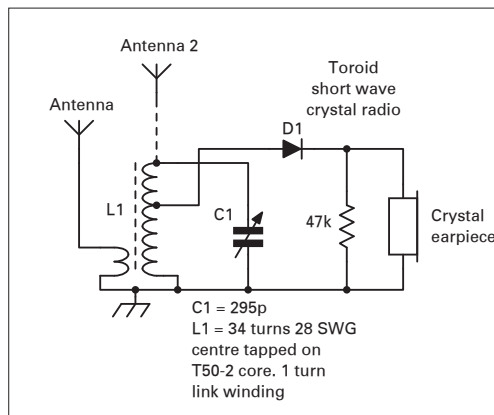
A push-pull output transformer was used to match the amplifier to the loudspeaker. These usually had a 2kΩ centre tapped primary winding and an 8Ω secondary winding; ideal for the transformer shown in Fig. 1(c). These could often be culled from old radios.

Thankfully, such transformers are still available and the commonest of these is the LT700 transformer still sold by several component suppliers. The LT700 has three wires from one side (centre tapped 2kΩ winding) and two wires from the other side (8Ω winding). The two outer wires on the three wire side connect to X and Y and the opposite pair of wires connect to the ear bud headphones.

Ear bud headphones vary in their sensitivity, usually the cheapest are the worse, but the arrangement in Fig. 1(c) can be better than that of Fig. 1(a). A decent pair of high impedance headphones is best of all!

### Diode Choice Critical

The choice of diode is also critical. Ideally D1 should be a diode with a low voltage drop. The common silicon diodes drop about 0.6V and give poor results in a crystal radio.



Point contact Germanium diodes, with a voltage drop of around 0.2V are commonly used in crystal radios. Common examples are the OA85, OA91, 1N34A etc. Many constructors favour the Schottky diode with its low voltage drop and predictable properties. I used the 1N5711 Schottky diode in all the radios described here and have obtained good results.

In the past I had never attempted to build a short wave crystal radio so I thought I would give it a try. In theory all I had to do was choose values for L1 and C1, in Fig. 1, which would tune short wave frequencies. This certainly works but the selectivity is usually very poor, because of the mismatches between the antenna and the diode. The problem is to configure the tuned circuit so it matches well into the antenna and the diode. There are many available short wave crystal radio circuits but these tend to have very complex configurations for L1.

Over the years my junk box has acquired several pieces of Air Dux coil. Air Dux is a trade name for an "air wound" coil using bare wire supported by Perspex ribs. The picture shows the arrangement. It is possible to use clips to tap up and down the windings.

The coil I used for the receiver in Fig. 2 has 22 turns of wire wound with a diameter of 1in (25mm). This gives the coil an inductance value of around 4.7μH. The antenna terminates with a clip (A) and the diode also has a clip (B). My tests were with a W3EDP antenna; 27m (84ft) of wire plus a 4.8m (16ft) counterpoise wire.

The best approach is to start with clip D at the top of L1 and adjust A for the best signal strength. I found the using the W3EDP with an antenna tuner gave the best results with clip A three turns up from the bottom of L1. Just using the W3EDP wire, the signals were best about six turns up from the bottom of L1. The next stage is to adjust the placement of clip D. The selectivity improves as D goes down the coil but the signal strength decreases.



Fig. 3: Regular PW author Roger Laphorne G3XBM's circuit uses a toroidal core.

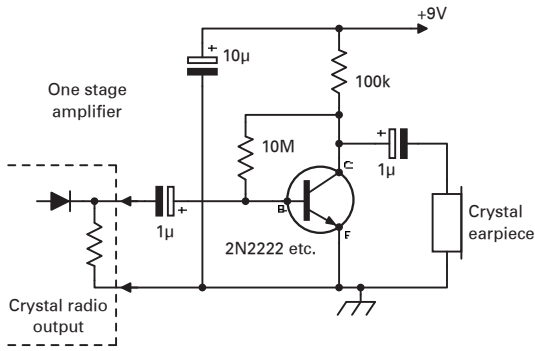
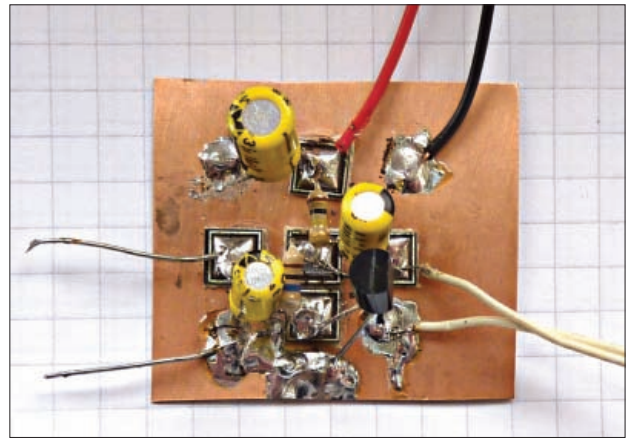


Fig. 4: A very simple one-stage audio amplifier that can use any small signal silicon transistor. George's 'ugly' style project is shown on the right in the photograph.



The stations are easier to separate but their strength gets less. Results are all about compromise but I heard several strong broadcast stations in the evening on the 31m h.f. broadcast band. Readers are unlikely to have an Air Dux coils but home-made alternatives are possible perhaps using wire wound around a suitable former. A thin strip of square section wood can be laid between the windings and the former to hold out the wire to accept the clips.

### Roger Laphornes' Arrangement

The circuit in Fig. 3 is a much simpler arrangement described by Roger Laphorn, G3XBM. Roger uses a coil wound on a toroidal core with a link winding to the antenna. My version differs in that I use a centre tap for the diode connection whereas Roger connected the diode to the top of the coil. The tapping did help with selectivity – but the signals were quite faint and I needed the antenna tuner for any reasonable results.

The tuner is connected to the link winding. A long wire antenna could be connected to the top of the coil (Antenna 2). My version used a high value polyvaricon capacitor for C1. These are available from Spectrum Communications and the G QRP Club members sales. **Note:** This radio only heard decent signals in the evening.

The main problem is trading selectivity for sensitivity. One easy solution is to add a small transistor amplifier to the output. This takes me back to my first use of a transistor in the late 1950s when I ran a crystal radio amplified by a germanium transistor. The circuit in Fig. 4 is a very simple one stage amplifier using almost any small signal silicon transistor.

The amplifier input is connected to the load resistor as shown, but if high impedance headphones or a matching transformer have been used, these

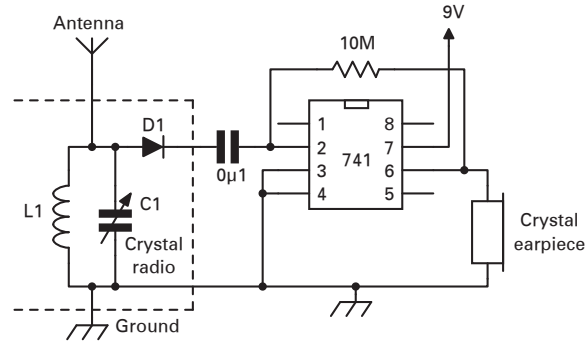
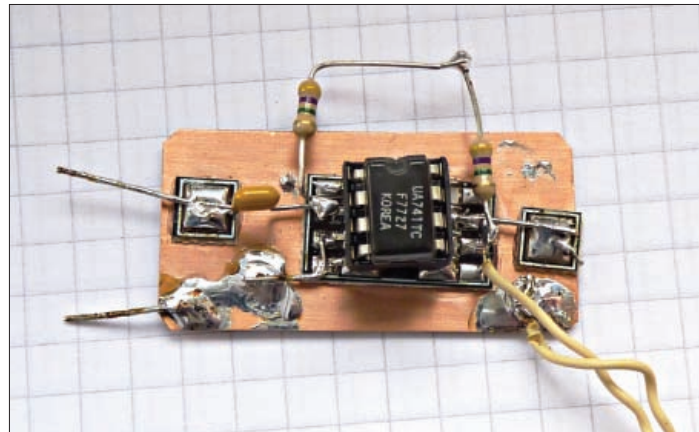


Fig. 5: This circuit, using an 'op amplifier', and has proved to be a very popular amplifier over many years and gives excellent results. Completed project shown below.



must be removed and replaced by a suitable resistor. The circuit in Fig. 4 proved to be a useful addition to a crystal radio.

### Operational Amplifier

The circuit, in Fig. 5, has been around for many years and uses a 741 operational amplifier (op amp). This really does offer a useful amount of gain. I've drawn the circuit to show the layout around the pins of the 741 chip. There's a large 'family' of 741 type op amps made by various manufactures – any of which should work in this circuit.

The photograph of my prototype shows two resistors in series between pins 2 and 6. This is because I ran out of 10MΩ resistors and used two 4.7MΩ resistors. In fact I could have used just

one 4.7MΩ resistor. The op amp worked well with all the radios described above. The Air Dux radio fed by my antenna tuner with the op amp received many short wave broadcast stations and I found myself back in the 1950s listening to Moscow Radio – now called the Voice of Russia – and still being able to hear the signal as I pulled the earpiece out of my ear.

Some of the above is speculative because it depends upon what parts are to hand and what antenna is being used. But experimenting with crystal radios on the short wave bands is great fun ... and worth sharing with a young person or any interested member of the family. Have a very happy Christmas at home and in the shack

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AT-200proll	Designed for new generation of rigs .....	£209.95
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AT-897Plus	Bolt-on Alternative Auto Tuner for the FT-897.....	£179.95
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IC-7410..... £1599.00	<b>Icom V/U Products</b>	IC-E90/4m ..... £299.95	IC-910X..... £1549.95
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**New Base Station from Kenwood!**

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See web for more details

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**Palstar**

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"Hello from GA. I picked up an AT2KD last Thursday. Hooked it up on Thursday night and it's the best antenna tuner I have ever used. Bought an MFJ 986 about a year ago and had to send it back 3 times for service. Have owned others over the years as I've been a ham for 51 years. Wish I had bought a Palstar sooner!!! It works great. Thanks and 73, Louis Hernandez, N4MWR-Augusta, GA.

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<b>AT-500</b>	600W PEP Antenna Tuner .....	£409.95
<b>AT-1500DT</b>	1500W Differential Antenna Tuner .....	£449.95
<b>AT-2K</b>	2000W Antenna Tuner .....	£479.95
<b>AT-4K</b>	2.5kW Antenna Tuner .....	£789.95
<b>AT-5K</b>	3.5kW Antenna Tuner .....	£999.95
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## New Model! FUNcube Dongle Pro+

This remarkable memory stick-sized device was conceived, designed, built and bought to market by its inventor, Howard Long G6LVB.

- Coverage is from 150kHz (yes, that's kHz) to 2GHz. 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!

After the worldwide success of the FUNcube Dongle, many of you have noticed that we've been out of stock and waiting for new deliveries. Howard Long, the FUNcube inventor decided to take into account feedback by many FCD users with a redesign he is calling the FUNcube Dongle Pro+. Howard thinks that you will find that the results are very worthwhile (actually so do we!). There are many enhancements both in performance, extended range and features.

### INTRODUCING THE EXTENDED RANGE VERSION, the FUNcube Dongle Pro+.

Not only has it got a frequency range of 150kHz-250MHz & 410MHz-2GHz but this new design has on board filters for the lower frequencies.




**The price is only £149.99**  
For a full review, see RadioUser December 2012 issue.  
And for more details see:  
[www.hamradio.co.uk/funcube](http://www.hamradio.co.uk/funcube)

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## MFJ Products

Lots more MFJ stocked! See web for details



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MFJ-974	as above but without 160m	<b>Special! £179.95</b>
MFJ-16010	Random Wire ATU 160-10M	£69.95
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MFJ-969	Manual Roller ATU Metered 1.8-54MHz, 300W	£209.95
MFJ-993B	Auto ATU Metered 1.8-30MHz, 300W	£249.95
MFJ-1786X	Magnetic Loop 10-30MHz, 150W	£429.95
MFJ-1788X	Magnetic Loop 7-22MHz, 150W	£469.95
MFJ-259B	Antenna Analyser 1.8-170MHz	£259.95
MFJ-269B	Antenna Analyser 1.8-450MHz	£349.95
MFJ-260C	Dummy Load 300W SO-239	£44.95

## The Flex Store at ML&S



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**The word is finally out!**

**FLEX add the ULTIMATE SDR to their product range - The FLEX-6000 Signature Series - due end 2012.**



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<b>Flex-6700R</b>	as above, Receiver only	£4799.95

**Deposits being taken now - call or see web.**


**Flex 1500 SDR** Low cost SDR Transceiver, connect via USB & you have 5W 160-6m! **£579.95**  
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**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 30Amp 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**



**Two-year warranty on all MyDEL PSUs**


**Yaesu FP-1030A**



25-30Amp 13.8V fixed DC PSU, Twin meters, near silent running. **£189.95**


**MyDEL MP-9626**  
120A, 13.8V DC power supply, switch mode. **£399.95**  
**Now £369.95**  
October/ November Only.

**Ideal for FT-817ND or most handhelds.**



**MyDEL MP-6A**  
13.8V DC, 6A power supply. **£29.95**

**New! BlueCAT Repeater Controller**  
Want to control your Yaesu FT-817, FT-857 or FT-897 via your Android phone for repeater use via Bluetooth? The remarkable tiny interface designed and built in the UK by Z2BM is available at an intro price of only **£49.99 inc VAT**. See our website for more details.




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PC Based Analyser 100kHz-180MHz **£249.95**

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For Pro only, extends range to 1500MHz **£289.95**





## Phil Cadman G4JCP's Valve & Vintage

21 Scotts Green Close, Scotts Green, Dudley, West Midlands DY1 2DX  
E-mail: phil@g4jcp.freemove.co.uk

# Mobile Memories Using 'Ancient Modulation'!

The traditional brown dustcoat that he's wearing is clear evidence that it's Phil Cadman G4JCP who is the 'Duty Manager' of the *PW* vintage 'shop' this month. And the good news is that the 'mystery gentleman in the photograph has been identified!

Welcome to a rather damp *Valve & Vintage* 'shop'. I shouldn't have mentioned summer and mobile rallies last time, because for the last few weeks I've been huddled inside, sheltering from the rain! The weather here in West Midland and the UK in general – has been awful.

Before moving on, I want to thank everybody who contacted me regarding the subjects raised in my last column. Thank you! Your stories, comments, information and suggestions are most welcome and very much appreciated. I'm sorry there isn't room to mention you all individually.

Regarding mobile operation in the late 1960s, **Mike Caddick G8NWS** tells me that in 1967, around the time Codar mobile sets became very popular, **Frank Pardy GW3DZJ** designed the **G Whip** centre loaded mobile antenna system. This system had antennas that for worked from 1.8MHz to 28MHz (see [www.gwhip.co.uk/multi.pdf](http://www.gwhip.co.uk/multi.pdf)). However, Mike recalls that in the early 1960s all the mobile antennas he came across were home-made.

**Rod Johnston GW7RDV** E-mailed to say that he enjoyed a spot of mobile operation long before he was licenced. In the early 1960s, his Father – a

Veterinary Surgeon – had a mobile telephone in his car. There was no direct dialling like today, you first had to contact an operator who would then connect you with the person you wanted to speak to. Rod remembers the calls cost 2/6d (12.5p) per minute: that's equivalent to almost £2 per minute today. Ouch!

While **Paul Beaumont G7VAK** remembers Codar kit was generally of high quality, he didn't think much of their CR70A receiver, to say the least! And he remembers seeing a Codar AT5/T28 pairing in a car in Croydon in 1968.

Paul owned a Codar PR-30 pre-selector and RQ10 Q-multiplier, which he used with his Murphy B40B naval receiver. Like Paul, I too had a B40, but mine was an original B40 which had been re-built to the B40D specification. Can you imagine a manufacturer re-building a receiver like that today?

### Mystery Gentleman Identified!

I'm very pleased to say that the mystery gentleman pictured in the photograph in my last Column (page 35, July), has been identified. **Alan Grove G8BJG** E-mailed to say that the picture was of the much respected **Harry Bellfield G3SBV**, who is now sadly a Silent Key. Harry lived in Streatham in London for many years, and Alan first worked him in the late 1960s on 144MHz a.m. Many QSOs followed and he got to know Harry well.

After retiring, Harry moved to Lympne in Kent where he remained active. The photograph belongs to the **Reading & District Amateur Radio Club**, and is one of many wonderful old photographs that can be found on their web site. The specific page is: [www.radarc.org/History\\_1960s.htm](http://www.radarc.org/History_1960s.htm) My thanks to **Vin Robinson G4JTR** and **Min Standen G0JMS** of the Reading club for help with the photograph of Harry.

Finally, the car in the photograph was indeed a Rover P4, a 95 or 110 model of 1962/63, according to **Steve Jones**, who also thinks that the car in front may well be a Jaguar MkV. I must admit to being rather jealous of Steve, because he tells me he's owned several Rover P4s!

Like modern receivers, modern cars may be efficient, have great performance and have a huge number of 'bells and whistles', but they certainly don't have the character of older



Relaxing for a moment – before the next 'customer' at Gripton's Radio Store at the Black Country Living Museum in Dudley, West Midlands.

cars. Oh, by the way – the right-hand dashboard ‘cupboard’ was where the factory supplied broadcast radio would be fitted. Early car radios – perhaps a future subject for the V&V Column? My grateful thanks to Steve, Alan, Paul, Rod and Mike, and everybody who wrote to me.

### Gripton’s Radio Shop

Some time ago I mentioned that a pre-war radio shop was being resited at the Black Country Living Museum here in Dudley. In fact, the shop - **Gripton’s\*** - is one of four buildings that were originally located in Birmingham Street, Oldbury, and were moved, brick by brick, to the Museum. All four shops are set in the late 1930s with Gripton’s being specifically set in 1939.

At the beginning of the project there had been some discussion as to exactly what year in which the shop should be set, and I was pleased to learn that 1939 had been selected. For such an exhibit, 1939 is ideal. Following the outbreak of war and the involvement of radio companies with war work, no new sets were marketed for several years. (That’s excluding the Government sponsored Wartime Civilian Receiver, of course.)

But there had been great advances in both set design and technology over the previous decade. All four shops have been open to the Public for over a year now and the radio shop is proving justly popular with visitors.

A friend of mine and local Radio Amateur – **Phil Harris G4SPZ** – works in the shop’s workshop on alternate Mondays. Phil is a keen restorer of vintage wireless sets and he’s restored and refurbished all the test equipment that’s used in the workshop, as well as some 1930s radios.

Such is the desire for authenticity, all the test equipment and tools (and just about everything else) in the workshop are pre-Second World War. The only concession to modern times is a 12V soldering iron and resin cored solder. And that’s all to do with ‘Health & Safety’ – no large and lumpy copper soldering irons to be heated over open gas flames!

Unfortunately, Phil has had little time to work on the shop’s wireless sets of late due to the steady stream of questions asked by members of the Public. Apparently, people are surprised at how well the restored display sets work, and even more surprised at how relatively easy they are to repair. Such is the pervasiveness of the ‘Throwaway Society’.

*\*It’s well worth a visit readers and*



Phil Harris G4SPZ has restored all the vintage test equipment used in Gripton’s shop at the Black Country Living Museum in Dudley.



The workshop really does provide a ‘period atmosphere’ and the only thing missing is the occupant of the chair!

*1930s PWs are on show – out of reach! I enjoyed my recent visit very much.*

**Editor.**

### The Black Country Bugle

Continuing with a Black Country theme for a while, there’s a nostalgia ‘newspaper’ published locally that has articles on all aspects of life and work in days gone by. Called **The Black Country Bugle**, the 28th June issue had a short article about early radio. What particularly interested me was a picture QSL card featured in the article showing four local Radio Amateurs. I had known three quite well but the fourth – **Archie Davies G4JY** – I had met only briefly.

Unfortunately, Archie is now a Silent Key. Turning to some local Radio Amateurs who may have known him, I was directed an Internet web site: [http://hamgallery.com/Tribute/Early\\_](http://hamgallery.com/Tribute/Early_)

**Birds!** At the top of the page there is a photograph of some Old Timers, one of whom was G4JY. The page is all about the **RAF Civilian Wireless Reserve (CWR)** as told by **John Wightman ZL1AH** (formerly G3AH).

Briefly, the formation of the CWR was announced by the Air Ministry at the end of August 1938. The aim was to address the serious shortage of wireless operators at that time. Calls for Radio Amateurs – particularly those who held transmitting licences – to join the CWR were publicised in the Press.

Over the following twelve months many Radio Amateurs did join – 1,300 in the first six months – and it was they who were sent into Europe at the outbreak of war to help provide radio communications. The action resulted in the Radio Society of Great Britain (RSGB) giving them the name ‘**Early Birds**’, and the photograph on the web

page shows some of these Early Birds at a 25th Reunion Dinner held in 1964.

It seems to me that the work of the Early Birds has been overshadowed by the work of the Voluntary Interceptors (VIs) who kept the code breakers at Bletchley Park supplied with messages. In fact some (many?) members of the CWR were recruited to become VIs following their return to Britain.

Perhaps the work of the Early Birds wasn't as significant or as prolonged as that of the VIs, but their success surely proved that Radio Amateurs could be trusted to perform valuable war work. A point not lost on the Authorities when they went looking for potential VIs.

By the way, one of the first (if not the first) TV documentaries about the VIs was broadcast on the BBC in 1979. The programme features several prominent Radio Amateurs who were involved with the interception of messages and with direction finding of enemy transmissions. The programme can be viewed by visiting the excellent web site of the East Anglian Film Archive at: [www.eafa.org.uk](http://www.eafa.org.uk) The programme's URL is: [www.eafa.org.uk/catalogue/5108](http://www.eafa.org.uk/catalogue/5108)

### Another Significant Connection

There's another significant connection between Amateur Radio and the Services, one which began in the year immediately prior to the outbreak of the Second World War. On the 15th of November 1938 the first edition of *The Amateur Radio Handbook* – published by the RSGB – appeared. The first print run ran to 5,000 copies and at the time was viewed as a bit of a gamble for the Society. The book had 240 pages yet cost only 2/6d (12.5p), quite a bargain at the time. Even so, there were worries that it might not prove popular.

Such fears were totally unfounded and the first print run rapidly sold out. A second printing of 3,000 copies was ordered and they were delivered to RSGB Headquarters the day before war was declared. Of course, all Amateur Radio stations were then officially ordered to close down, and the RSGB apparently faced the prospect of many copies remaining unsold.

Fortunately, orders for the book began to arrive in increasing numbers from RSGB members who were in the Services. Such was the demand that a Second Edition was prepared and an initial print run of 4,000 copies ordered.

Published in July 1940 and priced

at 3/6d (17.5p), all 4,000 copies of the Second Edition rapidly sold out. The unexpected demand for the *Handbook* came not just from Radio Amateurs but also from the many Service Personnel who were attending Signals Schools.

It seems the *Handbook* had very quickly become a technical manual for the Services – indeed **Rob G3XFD** told me it was still used in 1961 in the Royal Navy! More print runs were ordered but at one point problems arose due to the shortage of paper. However, the wartime Paper Controller received supporting evidence from all three Services as to the value of the *Handbook* to the war effort and gave the all clear for printing to continue.

In total, through the years 1940 to 1944, there were 11 print runs of the

Second Edition totalling 151,500 copies. A truly remarkable number. After the war had finished, a 12th - and final - print run of another 30,000 copies was published in June 1946, making a grand total of 181,500 copies. And that's not all. Over the winter of 1941/42, a companion volume to the *Handbook* – called *The Radio Handbook Supplement* – was prepared, the first copies appearing in March 1942.

### The Supplement

The *Supplement* had chapters on Radio Mathematics, Cathode Ray Tube Techniques, Direction Finding, Radio Fundamentals and Data and Formulae. There was also a chapter entitled *A Service Operator's Vade Mecum*, which gave advice on how to keep equipment working when spares and components were in short supply. From 1942 to 1945, the *Supplement* had five print runs totalling 115,000 copies, another astonishing number for a technical book.

By 1939, it was fortunate indeed that there were so many seasoned Radio

Amateurs who could help with the war effort, and the use of radio in times of peace and war was fully appreciated. And yet less than 20 years earlier things had been so different!

As recently as the summer of 1920, Amateurs had begun to speculate whether the Atlantic could be bridged on wavelengths of 200m or less. And it was not until late in 1921 that signals

from American Amateurs were positively identified in the UK. It was 1922 when

the Atlantic was finally bridged by Radio Amateurs.

In contrast to the wartime exploits of Radio Amateurs, there's one Amateur who is best known for his peacetime international broadcasts. The station 2MT from Writtle had shown just how popular broadcast radio could be within the UK, and directly led to the creation of the BBC station 2LO. But there was no official desire for international broadcasts. However, there was one Amateur who thought people in the British Empire would be similarly appreciative of broadcasts from the UK, he was **Gerald Marcuse 2NM**.

In 1927, Marcuse received a high power licence to enable him to transmit speech and music overseas, so he could begin his Empire Broadcasting Service

on 32.5m. Even before he began his transmissions, interest had been building, particularly in the more far flung parts of the British Empire.

And although I hate to mention the Internet yet again, but there are an increasing number of newspapers being scanned and are available for viewing on various web

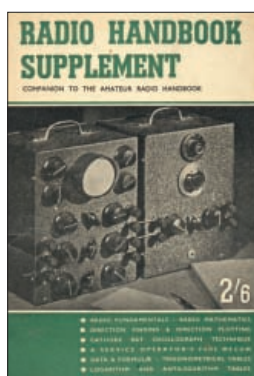
sites. What makes this resource so important is that it is searchable.

For instance, a Google search for 'Gerald Marcuse' led me to a short piece about his broadcasts published in the August 24th, 1927 edition of the *Sydney Morning Herald*! It is fascinating to read about the early days of radio as reported in the Press at the time. Another piece in the August 22nd, 1925 edition of *The Southeast Missourian* tells how Gerry Marcuse enabled an American reporter to interview – by radio – the Commander of a United States battleship.

What made the interview so unusual was that the ship was anchored 14,000 miles away in Wellington, New Zealand. The contact took place at 6.30 in the morning on 45m, with 2NM running 500W from his home in Sussex. Apparently, the reporter was able to ask his questions by voice, while the answers from the ship were sent in Morse Code.

### That's The Lot!

Well, that's more than enough history for now, so I'd better be history too! Please remember that you can get in touch either via E-mail to: [phil@g4jcp.freemove.co.uk](mailto:phil@g4jcp.freemove.co.uk), or by mail to: **21, Scott's Green Close, Scott's Green, Dudley, West Midlands DY1 2DX.** 73 Phil.





## Roger Cooke G3LDI's Morse Mode

PW Publishing Ltd., Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW  
E-mail: roger@g3ldi.co.uk Packet: g3ldi@gb7ldi.#35.gbr.eu

VK4MIK's morse collection as in July 2012

# Morse Mode

Roger Cooke G3LDI has some news from Australia and replies to an E-mail challenging his approach to training c.w. operators. Perhaps it'll be 'Morse Keys' at dawn?



A Happy and 'Morsey' Christmas to all and welcome to *Morse Mode (MM)* – covering the world of Amateur Radio on the key!

Recently, I reported some news from **Mike Patterson VK4MIK** from the Atherton Tableland area in Queensland, Australia. This was in my October column and part of Mike's collection of Morse keys is shown in **Fig 1**.

Mike writes: "I live on the Atherton Tablelands and belong to the Tableland Radio Group and we enjoy going camping and visiting the areas of Northern Queensland and learning its history. We also set up a radio base during these trips and have managed to get out on the various nets using c.w., s.s.b. and digital modes. We also participate in the **International Lighthouse & Lightship Weekend** at Grassy Hill Lighthouse at Cooktown, named after Captain James Cook RN who did some repairs to his ship after finding a coral reef while surveying in the Great Barrier Reef.

"My Morse key, bug and paddle collection has just grown over the years and I both enjoy using them but also learning the history of the various keys.

"We are lucky here in Australia as we have quite a few who enjoy Morse and get on the early morning net on 3.599MHz c.w. each morning to talk in Morse then switch over to I.s.b. at 0630 local time. **Rob Muller Honda VK4ARQ** usually runs it but **Ross Anderson VK4AQ** also takes a turn as does **Keith Searle VK4BKS** when Rob isn't available.

"Thanks very much for your Morse section in *PW* as quite a few of us in Australia enjoy the read and see/hear about what is going on around the world".

Thanks for your feedback Mike!

Incidentally readers, Mike says that all his keys are operational and he is always on the look-out for keys to add to the collection. Also interested in keys is **Lyn Battle VK4EI**.

Incidentally, Lyn lives on Sweers Island in the Gulf of Carpentaria, IOTA OC-227. This is quite rare and she can often be found on the Anza net on 14.183MHz on Friday mornings. Lyn is looking for spare parts for her Clipsal key. I've not heard of a Clipsal, so perhaps you could provide more details please Lyn – and a picture for the column?

### Training For CW

As an experienced c.w. operator – of some 50 plus years – I'm always preaching that training and practice are essential before using Morse on the air. However, I received this from **David Rowntree M6DRQ**:

*"Given the apparent appetite of those in the hobby to attract new blood, it seems to be counter-productive to suggest, as Roger Cooke did in his 'Morse Mode' column (PW August 2012), that newcomers to the mode should sign up for months of Morse training before venturing onto the air. I suggest that the real situation is this:*

*"Have a go! It's fun!*

*"1: All licensed Amateurs, whether beginners, improvers, or experts such as Mr. Cooke, have an equal right to use the spectrum within their license conditions;*

*"2: Experienced operators, when finding themselves in communication with a novice, might simply slow their pace to match, be tolerant of mistakes, and use the opportunity to explain how much they enjoy CW operation;*

*"3: If unable or unwilling to do this, they can always sign off, spin the dial,*

*and find someone else to talk to.*

*"Mr Cooke says he hopes he has encouraged some newcomers to the mode. On the contrary, I am determined not to let him put me off.*

David is correct in what he says in that we all have the same rights to the spectrum. However, saying that somebody who has just passed a Foundation test can be let loose on c.w. with **No** training is tantamount to giving the keys of your car to somebody who can't drive and saying "There you are, go and have fun".

I would suggest that fun would be the last thing he would have without training. If this were to happen with c.w., I hate to think what the Morse would sound like, much less the ability of the 'newbie' to copy anything! I doubt whether an operator is going to stand by for the newbie to use his crib sheet for every letter!

Training is essential, as is a lot of practice. It won't happen in a week or even a month, so please do not look for easy options. There are none! I would encourage you to join your local Club, the GB2CW Morse scheme, learning code from the basics up to around 12w.p.m. at least before even considering going on the air.

I think you must be able to copy in order to ascertain what is happening on the band, to avoid causing grief and QRM to others and to have basic knowledge of procedures, abbreviations and QSO format. This all takes time, learning and practice. Morse is a mode which good operators take pride in using their skills and strive to attain and maintain high standards. For that to happen, training and practice are mandatory – 73 and May the Morse be with you! Roger G3LDI.



## Tim Kirby G4VXE's World of VHF incorporating VHF DXer

Willowside, Bow Bank, Longworth, Oxfordshire OX13 5ER

E-mail: [tim@g4vxe.com](mailto:tim@g4vxe.com) Twitter: [g4vxe](https://twitter.com/g4vxe)

# More on the Budget SDR Receivers!

Tim Kirby G4VXE has had an enthusiastic response from his readers regarding the budget SDR receivers and provides an up-date to the fascinating dongles before looking at your v.h.f. activity reports.

Welcome to the *World of VHF (WoVHF)* My recent item on using the TV/ DAB USB dongles to make a budget v.h.f./u.h.f. software defined radio (SDR) receiver brought an enthusiastic response from readers. **Pete Marsh M0FMT** (Hitchin, Hertfordshire) in particular had enjoyed a lot of experimentation with the budget sticks which as you may remember are available for as little as £10. Pete had built an up-converter with a local oscillator at 60MHz, thus giving continuous coverage from near to v.l.f. to 1700MHz all in one box!

Pete drew my attention to an Australian Amateur – **Balint Seeber VK2FUNK** who has a fascinating website at <http://spenchnet.net> Balint has done some great work including building aviation tracking devices monitoring ADSB-B transmissions at 1090MHz – based on the USB dongles. Balint's work has received some excellent publicity across the world and his website is well worth a look.

**Dave Robinson G4FRE** (Malvern, Worcestershire) has also been experimenting with the dongles. Initially, he had used the *Windows ZADIG* driver

that I described earlier and ran the *SDR#* software. He was then persuaded to try some of the applications that are available to use the dongle interfaced to a computer running one of the *Linux* operating system variants.

Dave had not used Linux before, but was able to install Ubuntu onto a spare disk for his laptop. He documents on his website (<http://g4fre.blogspot.com>) his installation and how he configured the software to act as an ADSB-B receiver monitoring the positions of aircraft. Dave says that the dongle wasn't quite as sensitive as a dedicated ADSB-B receiver – but it was quite adequate to map the positions of aircraft within a reasonable radius of his home.

Although I don't think Dave had tried it yet, he mentioned that under *Linux* it's possible to program the dongles to receive GPS satellite transmissions. I have been somewhat reluctant to delve into the world of *Linux*, but applications like these with budget hardware – do make it a tempting proposition.

**Tony Jaques G3PTD** (Manchester) had experienced some problems getting the *SDR#* software to run, but this turned out to be because some of the software required by *SDR#* (the appropriate level of the *.Net* framework) to run wasn't present on Tony's computer.



Johanne Reinolda WG7J's *GridMapper* program in operation.

Tony said that he could have solved the problem by upgrading his computer – but that might have been more expensive than buying a commercial scanning receiver! Very true – I hope you were able to get it running Tony – it sounded as if a cheaper solution ought to be possible!

Of course, the problems highlights that – for a good functioning software defined radio set-up – your computer needs to be adequate at a hardware level and running all the required level of software. Under both *Windows* and *Linux*, this may not be an entirely straightforward proposition, but if you enjoy playing with computers and radio, then it can make for a very interesting time with an excellent end result!

### Mapping The Squares

Do you remember those nice grid squares maps that you used to be able to put up on the wall and colour in when you worked a new one? I had one for each of the v.h.f. bands in my first shack in my parents' house. Nowadays, it's all on computer – although I do occasionally see the maps available! However, I recently came across mention of **Johanne Reinalda WG7J's GridMapper** program.

The program is actually a web page, to which you upload an Amateur Data Interchange Format (ADIF) file created by your logging program. You select a band that you're interested in, configure a few simple parameters to change the look of the map, the labelling and so on. You then press **Upload** and **Show** and decide whether you want to create a web-based Google Map, or (as I found) – the nicest option was to create a KML file which can be displayed in Google Earth.

What's particularly nice is that you can filter by **Band** and by **Year** if you want to. If you click on the star in the middle of a grid square, it will display a list of the stations that you've worked in that square. You can also configure the program so that if you click on the call sign in the list, it will go off to a call sign server such as *QRZ.com* and give you details about that station.

If like me, you love maps and you love DX, you'll certainly enjoy WG7J's *GridMapper*. It's free! And I say 'thank you very much to' Johannes WG7J for making this software freely available.

### The 50MHz Band

On to your v.h.f. reports next, starting with 50MHz and it was great to hear from **Ernie Stagnetto ZB2FK** (Gibraltar) who made some nice contacts on September 30th via trans-

equatorial propagation (t.e.p.). The opening was quite brief, at around 10 minutes, but Ernie worked LU5FF, LU4UPZ and LU4FW as well as C5YK.

What's particularly interesting is that Ernie mentions that the South American signals were very fluttery. This is classic indication of t.e.p. – however, C5YK in The Gambia was a very solid signal.

The report made me wonder whether Ernie was getting some E layer propagation to The Gambia and then t.e.p. from there to South America? It's late in the season, and (as Ernie notes), late in the day at 2200z, for Es so, perhaps it may have been some F2 component there as well? Ernie uses a V2000 vertical for 50/144/432MHz so these contacts represent some really nice DX with a simple set-up and a good operator!

**Paul Bowen M0PNN** (Newport, Shropshire) seems to have found a good number of short Es openings during the month and made the best of them. On September 8th he worked HA, and EA, on September 13th SP, on September 14th HA and on September 21st, he managed to work I.

A welcome new square via meteor scatter using the JT6M mode on September 22nd was LA6Q (JP62). Back on Es that day, Paul worked OK, YU, HA, OM and S5 and finally on the 23rd, DL.

Thank Paul – it was a really interesting log – and it just shows what's possible if you don't desert the band once the really big, long openings have subsided. Incidentally, this is one of the really exciting aspects of v.h.f./u.h.f. propagation to me, the way that brief openings can come up out of nowhere – and it's really magical to be able to catch them!

**Mark Marment CT1FJC** (Algarve, Portugal) had a good month. He found that there was t.e.p. into Africa most days with C5YK, V5/DK2UU, 6V7SIX, 5N7M, V5/HB9BHJ and UR5FA/MM (IJ19 and IK03) – all worked with good reports. He then worked TY2BP (JJ16) on September 15th and it was a new DXCC entity for Mark. From mid-September, there have been more southern Africans; V51YJ, ZS6WN, ZS6A, Z21LV and ZS6DEK as well as PY4OG, PT9IR, PP7JR all worked with a combination of c.w. and s.s.b. Mark missed out on CP6UA, whom he heard but could not work.

However, Mark worked another new one; TT8TT (JK72) on the afternoon of October 4th and then next day he worked 5U6E. Mark says that 5U6E was actually S9+20db at one stage, but Mark had to get through the wall of

European stations calling. Thanks Mark – great contacts and really exciting to hear about all the DX that is available on the band.

Here at **G4VXE** in Oxfordshire I found a good Es opening on September 14th with LY, 9A, OK, HA, OM, SP and S5 (all worked). On the following weekend – September 22nd – there was a very intense opening with some quite short skip into Germany. This was quite productive and gave me some new squares (JO31, JN58 and JN68) all of which are quite awkward distances from here – particularly as I don't have a beam antenna.

### The 70MHz Band

During the intense opening on September 22nd, I heard a number of OK stations and was pleased to work OK1VBN (JN78) and the best DX, YO2LAM (KN05). The selective nature of Es was once again highlighted, as I switched on the transverter and could hear **Ken Easty G3LVP** (Cheltenham) working OKs that I couldn't hear.

Initially, I put this down to Ken having a much better antenna system than me (which he does!), however, in the space of 3 or 4 minutes the propagation had changed and Ken, some 60km from me was losing them and signals were picking up with me. During the *Practical Wireless* 70MHz contest on September 23rd, conditions didn't seem very good, but I was pleased to work G5RS/P (JO00) for what I consider a decent tropo distance using my vertical antenna.

It was exciting to hear, via **Justin Johnson G0KSC** (Canvey Island) that **Leo Fiskas SV2DCD** (Kastoria, Greece) had some exciting QSOs via t.e.p. to South Africa on 70MHz. The report says that ZS6NK was worked as was ZS6JON and Justin was kind enough to send me some audio files so I could hear the QSOs for myself. Fascinating! The flutter is extremely noticeable on s.s.b. to the extent that it was quite difficult to copy and the c.w. with quite a rough note, very reminiscent of an aurora. More so, I think, than on 50MHz – although it's a good few years since I heard a good t.e.p. opening for myself on the band.

When I heard about these openings, I E-mailed Mark CT1FJC to see if he thought he would have any chance of a QSO to the south on 70MHz. Mark says that he has quite a large hill directly to the south of him and although he does well on 50MHz, he feels that the signals are arriving at higher angles – and because of this it might be tough going on 70MHz. (Fingers crossed though!).



Marc Opdecam ON5VW, is very impressed with his new Innovantennas' 8 element LFA for 70MHz, saying that he'd had a QSO with M0XTA at S9+5 both ways.

### The 144MHz Band

Paul Bowen M0PNN had a good time in the 144MHz Trophy contest on September 1st/2nd and worked PA6NL (JO21), TM2K (JO10), F5SGT/P (IN88), PA1T (JO33), G0VHF/P (JO01PU), PI4AMF/P (JO22) and EI0W (IO63). Paul caught an aurora on September 3rd and worked GM4VVX (IO78) and GM4ILS (IO87). Back on tropo on September 7th and 8th, Paul worked GU6EFB, DL6YBF (JO31), F6BGR (JO00), ON5GS (JO21), DL2OM (JO30) and F0FIG/P (JO10).

Sadly, there's only f.m. activity to report at G4VXE this month, although the new 6-element LFA Yagi from Innovantennas has arrived and been built. It's lovely and solid and I'm really looking forward to getting it up on the mast. Some initial tests with grotty piece of coaxial cable in the back garden on a short pole have proved very positive.

It was nice, though, having featured the piece on the Central Radio Circle in a recent column, to hear MX0PPC calling "CQ" on 145.500MHz on September 29th from Barr Beacon near Birmingham. It was great to be able to work them over quite a nice path for 145MHz f.m. simplex.

Another interesting f.m. simplex QSO was with **Tim Hague M0AFJ** (Milton Keynes, Buckinghamshire). Although we're not that far apart, it was interesting to note quite a lot of variation in signal strength owing to aircraft scatter – with vertical antennas – the reflected signals

can come at you from all angles and cause some quite interesting effects.

### The 432MHz Band

At G4VXE the most exciting contacts of the month were on the morning of September 16th. I was alerted on Twitter by **Steve Bunting M0BPQ** (Palmer's Green London) that the band was good into Southern France. I was doubtful (as I usually am!) that I would hear anything, but I went up to the shack to investigate. Initially, I heard some loud signals from Normandy, but nothing very distant.

Then I came across F6FZS/P operating close to the s.s.b. calling frequency, 432.200MHz. He was S9 and sounding like a local – I almost tuned across him. However, I was glad that I didn't when he announced his locator as being IN93OA (in the Pyrenees!). I was delighted to work him. Next, F8BRK IIN99) and F1CBC/P (JN09) were both worked easily and then I came across F2JR/P (JN03).

The French stations had quite a pile-up going and it took a few minutes of calling, but the QSO was completed ok and they seemed as pleased as me to make the contact. It was interesting to note the difference in the signal level as they turned their array towards me, away from northern France/Belgium where most of their callers were. There was quite a difference and it wasn't until I looked at a map, I realised that the beam heading is quite different.

**Reg Woolley G8VHI** (Nuneaton, Warwickshire) also enjoyed the opening and worked a good number of stations in JN03 square, with many of the QSOs over a distance of 1000km – great going for 432MHz.

Closer to home, I was working **Ian Hopwood G0EDT** (Stratford on Avon, Warwickshire) via the Edge Hill repeater **GB3EH** when he told me that there are plans to replace the ageing equipment at GB3EH with newer Tait-based gear. Incidentally, GB3EH is one of those excellent 432MHz repeaters with great coverage which deserves a lot more use than it gets. I include it and GB3AW as local examples to me of this – I hear them very well over a wide geographical area, but rarely hear them active with QSOs.

### That's All Folks!

That's it for this month! A quick reminder to remember the Geminids meteor shower peaking on December 13th/14th. Although not one of the spectacular showers, it's quite useful from a meteor scatter perspective, so it might be a good time to try out FSK441, ISCAT or JT6M (all in the WSJT program suite of modes).

Happy operating on v.h.f./u.h.f and enjoy the run up to the Christmas period. See you next month! Please keep your news coming – it's always appreciated and enjoyed.



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Don't forget – all reports to Carl by the 15th of each month please!

# Hot Topics! Possible changes to the Foundation Licence

### Carl Mason GW0VSW discusses the Foundation Licence and – as usual – presents your monthly reports of activities on the h.f. bands.

Welcome to this month's *HF Highlights (HFH)* and I begin with an E-mail from **Bob Taylor G1WEX** who responded to the thoughts of **Terry Martin G0CLH**, mentioned in the June *HFH* regarding the problems surrounding the current licence system mainly at the Foundation Licence level. Bob said "First off, I'm in full agreement with what Terry discussed but there are one or two areas that I feel may need to be made clearer or even taken a little bit further!

"One idea not mentioned is putting a 'time limit' in place before advancement needs to be made. I believe two years is a fair amount of time for this and anybody with a true interest in the hobby should not find this an issue. Terry mentioned restricting operations to 'sub-bands'. I would suggest the Foundation Licence should only allow operation on the Amateur Bands above 30MHz using only F3E (f.m.).

Low power restrictions could also be put in place but, because they are almost impossible to police and open to abuse, there's little point in this. Why not limit power to 100W as a lot of mobile/base v.h.f./u.h.f. transceivers run close to this output anyway?"

Bob went on to suggest, "If the Intermediate exam is attempted but failed then more attempts should be allowed if done so within the two years. This would encourage advancement without a long delay and therefore still allow a breathing space 'just in case'. If no attempt as been made or advancement has not been achieved within this time period the Licence should be revoked and the Foundation exam will have to be sat again.

"Once the Intermediate Licence qualification is reached, lift the restrictions to include h.f. operation on the lower allocations 1.8, 3.5 and 7MHz

up to 100 watts with full multimode access for these and all other bands above 30MHz. Place no time limit to obtain the Advanced/Full Licence. All restrictions can then be lifted once the Advanced is reached allowing operation on all bands and modes up to the 400W (current) maximum power limit.

"I'm sure some of my ideas will not be popular – but it's a question of Standards and what Amateur Radio represents. Unless the Licence system is debated in full to rectify these issues the hobby is in jeopardy from within our own ranks. The other problem that remains is if there were to be a change to the current Licence system, how do you make it retroactive?"

Thanks for your comments Bob. I'm sure that Bob's comments will encourage some debate – so please let us know what you think!

### Special Events

The Steamship (SS) *Flying Enterprise* was a 6,711 ton cargo ship which left Hamburg on December 21st 1951 under the command of **Henrik Kurt Carlsen W2ZXM**. She was heading for the USA carrying a variety of cargo including pig iron, coffee and VW cars, antiques, musical instruments, typewriters and ten passengers. Four days later on Christmas night she encountered a heavy storm in the Western Approaches to the English Channel and suffered severe structural damage.

The cargo then shifted and as she was listing 45° to port a SOS call was transmitted on December 28th. Several ships responded and a day later the crew and passengers were evacuated with the loss of one life while Captain Carlsen decided to remain on board. On the 2nd January 1952 the warship the USS *John W Weeks* arrived, relieved the attending merchant ships and was joined the following day by the His Majesty's Rescue Tug (HMRT) *Turmoil* guided by the warship's searchlights.

Three days later a tow



Fig. 2: The GB50WVR QSL card.



Fig. 1: The GB4FE Special Event QSL card.



Fig. 3: Kevin M0XLT operating GB50WVR.



Fig. 4: Mark Proctor G1PIE with his WAB award for working 'Q' stations.

line was finally attached to the ship about 300 nautical miles (560km) from Falmouth, Cornwall. The line held for a few days as the ship was towed back to the nearest port but unfortunately it did not last, breaking at 0130 on 10th January with the ship just 31 nautical miles (57km) south of The Lizard and 41 nautical miles (76km) away from safety in Falmouth. More tugs arrived to help but at 1522 Captain Carlsen and a 'mate' who had gone onboard to assist the tow, finally abandoned ship.

The SS *Flying Enterprise* sank at 1610 hrs to whistle, siren and foghorn salutes from all the vessels which had gone to assist it. To mark the 60th anniversary of this event **Geoffrey Powell M1EDF (c.w.)** and **Chris Darlington M0DOL** with **Gary Bansil M0NNH (s.s.b.)** will be operating a special event station **GB4FE (Fig. 1)** in December and January operating on 3.5, 7, 10 and 14MHz from 0830UTC every day.

Back to dry land and on to railways next! The **GB50WVR (Fig. 2)** team had a good weekend celebrating the 50th anniversary of the formation of the **Keighley & Worth Valley Railway** in 1962 <http://www.kwvr.co.uk> with some large pile-ups. The callsign was first used in February for the winter steam gala where six engines were running.

The sound of the steam locomotives passing by as the team operated drew many comments from Amateurs keen to work the Special Event – although they missed out on the lovely smell of 'live' steam! The event was so successful that the team decided to operate once again during the **Railways on Air Weekend** in September using a Yaesu FT-990 and home-brew 7MHz dipole antenna.

The GB50WVR team were outside in some very cold weather operating near

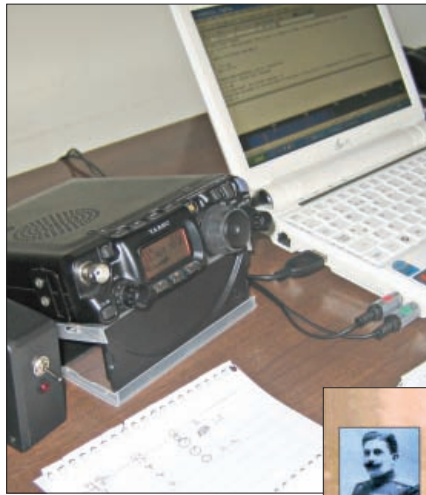


Fig. 5: Pete Walton MW0RSS's QRP station.

the main running line next to the Museum of Rail Travel in Ingrow yard. The team consisted of **Jack Proctor G0FQN**, **Kevin Jackson M0XLT (Fig. 3)** and **Mike Smith M3GNS** and although they managed to keep going for some time the heavy rain finally got the better of them and the 'station' closed early with 240 QSOs logged. The call will be aired once again in November so you still have a chance to work it and QSL manager **Pam Proctor 2E1HQY** is already busy dealing with the first card requests. I must also mention husband **Mark Proctor G1PIE** who managed to get the **Worked All Britain** award (**Fig. 4**) for collecting 80 'GB' calls during 2012 using s.s.b. (Well done Mark!).

### Your Reports

On to your reports now, and the first is from **Panos Dadis SV1GRN** in Athens, Greece who used 100W s.s.b. on 7MHz and logged TA3ATA (Turkey) 0817, SV8/SV11XP (Greece) 0819, IZ8KNW/P (Italy) at 0831UTC.

### The 14 & 18MHz Bands

Moving to the 14MHz band Panos found UR5QW (Ukraine) 0842, PE1MMZ (Netherlands) 0843 while his 30W PSK31 found SQ9EJ (Poland) 0844, F5TJV (France) 0846 and K2PSD (USA) in Randolph, New Jersey at 0850UTC. Panos was using an Icom IC-756ProIII and G5RV antenna.

Also operating on 14MHz was **Peter Walton MW0RSS/A** who worked QRP from a temporary station at his mother's home in the village with the famous **llanfairpwllgwyngyllgogerychwyrndrobwilllantysiliogogochuchaf** name. (Try giving that as your QTH!) in Anglesey, North Wales. This is where he took the opportunity to do some op-

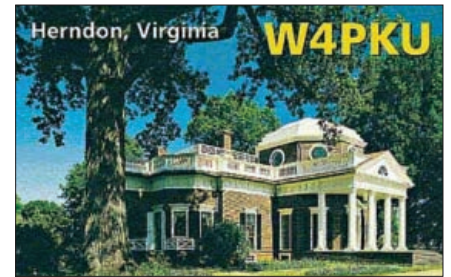


Fig. 6: Peter Walton MW0RSS worked W4PKU on 14MHz using QRP s.s.b.



Fig. 7: Steve Wellon M0SAS worked YU100SAF on 14MHz s.s.b.



Fig. 8: Steve Wellon M0SAS received this QSL card from A61ZX after a 14MHz s.s.b. QSO.

erating from his old bedroom where he began the hobby as a short wave listener (s.w.l.) number A9002 in the early 1970s and managed to send in a few listener reports to *PW*.

Peter passed his Morse test and RAE in 1976 at the age of 14 – but it took a further 35 years before he finally got on the air! Using a Yaesu FT-817, MFJ-16010 random wire antenna tuner unit (a.t.u.) and Spectrum Comms PSK interface kit (**Fig. 5**) and a 10m length of wire tied through the window to a small 'crab apple' tree at about 45°.

The results were better than expected at just 2.5W output as Peter worked CT1EFL (Portugal) 1033, TF3ARI (Iceland) EU-021 at 1119, SM6FMB (Sweden) at 1128. Then came W4PKU (USA) – **Fig. 6** – in Herndon, Virginia at 1419 and SP4XDC (Poland) at 1538UTC.

Also on the band was **Mike Devine G1HZJ** who operated from a caravan on holiday in Slingsby, North Yorkshire. Using a Yaesu FT-817ND with Miracle

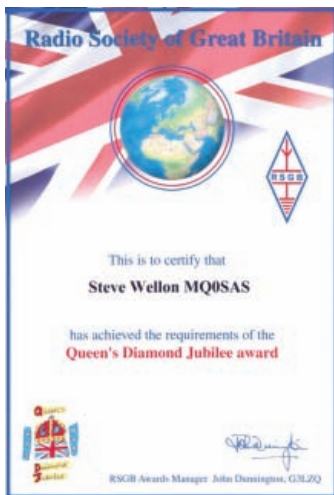


Fig. 9: The M0SAS Diamond Jubilee Award.

tuner and end fed wire he made s.s.b. QSOs with EW1MM (Belarus) 1200, IS0FDW (Sardinia) EU-024 at 1545, YT9M (Serbia) 1700 and EA6/DF8NY (Balearic Islands) Majorca EU-004 at 1715. Then came 9A6XX (Croatia) 1830 and CN8QN (Morocco) at 1845UTC QSL via EA7FTR. The bands were in good shape as he also heard LA1H (Norway) above the Arctic Circle, JI3MJ (Japan) and several US stations (mainly from Florida!).

In Farnborough, Hampshire **Tom Hutton G0HUT** managed two Special Event stations on the band working HG1912PTTT (Hungary) at 1330 with 30W PSK31. They were celebrating the 100th anniversary of 'Puskas Tivadar' Telecommunications Technical High School (QSL via HA5LGO for Digimodes and HA5AUC for c.w. and s.s.b.). He also worked HA100CGCDH, which was celebrating the Greek Catholic Diocese of Hajdudorog (QSL via HA0MO) using a Yaesu FT-450AT and 100W s.s.b. to a Cobra vertical antenna.

In Lyppard Bourne, Worcestershire **Steve Wellon M0SAS** used his new Kenwood TS-2000 and Cushcraft MA-5 mini beam to work s.s.b. stations YU100SAF (Serbia) (Fig. 7) at 2033 celebrating 100 years of the Serbian Air force (QSL via YU5CW). Then came A61ZX in the United Arab Emirates (UAE) – Fig. 8 – at 2117 and A65EE at 2255UTC. Steve was also pleased to receive his award for working 100 'Q' Jubilee stations (Fig. 9) this year.

New reporter **Trevor Mitchell G1JZY** in Manchester (north west England) enjoys the digital modes (Fig. 10) judging by his log. This included PSK31 contacts with CU3EM (Azores) EU-003 at 0657, CR6LH (Portugal) 1518 Farol do Cabo da Roca or Cape of Roca Lighthouse, the westernmost point of Europe (QSL via CT1GZB). Then came 6Y5WJ (Jamaica) NA-097 at 2209, N2GVB (USA) in Bainbridge, New York at 2249 and UR6IM (Ukraine) 2258. While using the OLIVIA

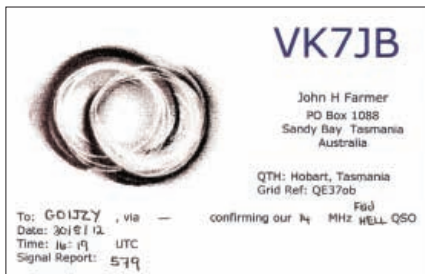


Fig. 10: Trevor Mitchell G1JZY received the VK7JB QSL card following a Field Hell QSO on 14MHz.



Fig. 11: Dave M0FAZ operating mobile at Thorncliffe in North Staffordshire.

mode he found F1ABE (France) 0711, IK4IDF (Italy) 1337, HK4QMH (Columbia) at 2233 (QSL via EA5KB). Next came KD8OTT (USA) in Muskegon, Missouri at 2303 and JE4CIL (Japan) AS-007 with PSK63 at 2202UTC using an Icom IC-706MkIIIG and 40W to a 20m wire dipole.

Previously licenced as M6EWD and 2E0PAT **Graham Dobson M0PTD** in Orpington, Kent is using a Yaesu FT-2000D with matching VL-1000 amplifier and a G5RV antenna 7m high, running North/South. After a few weeks operating away at 2012L run by members of **Cray Valley Radio Society** and located at the Avery Hill Scout Activity Centre in New Eltham (which is in the Royal Borough of Greenwich) he returned to his home station and worked VP8LP (Falkland Islands) SA-002 at 2240UTC using 400W s.s.b.

In Kitchener, Ontario in Canada, **Dennis Upton VE3UTN** got his first contact with New Zealand (OC-134) when he worked **Brian Cook ZL4AD** in South Canterbury with just 10W PSK from his Yaesu FT-857 and indoor Crown wire indoor loop which he says "Still amazes me to this Day!"

### The 21 & 24MHz Bands

On the 21MHz band **George Davis G3ICO** in Yeovil, Somerset was busy using his Elecraft K2 at 5W to a doublet

antenna. George logged c.w. stations JG3GNU (Japan) at 1203, V85TL (Brunai Darussalam) OC-088 at 1346, K3RA (USA) in Elkridge, Maryland at 1422 and VU2NXM (India) at 1514UTC.

Operating mobile (Fig. 11) on the 21MHz band was **Dave Fower M0FAZ** used his Yaesu FT-857 at 100W to a ATAS120 vertical antenna mounted on his car. He had s.s.b. contacts with VY2ZM (Canada) at 1845, N1TA (USA) 1852 in Feeding Hills, Maryland at 1852 and PW7T (Brazil) – the Fortaleza DX Group FORDX – at 1924UTC (QSL via PT7WA) from Stanley Head, North Staffordshire.

The 24MHz band saw **Eric Masters G0KRT** in Worcester Park, Surrey working s.s.b. stations SP5EAQ (Poland) at 0932, OE5GYL (Austria) at 0934, 5B4AHL (Cyprus) AS-004 at 1141 (QSL via M0URX). Then came TC6ILH (Turkey)



Fig. 12. The V55V QSL card received by Nick Phillips for a 28MHz s.s.b.

at Sinop Inceburun Lighthouse at 1406 and then came R7AY (European Russia) at 1408 UTC. All were achieved using a Kenwood TS-570 and 100W to a modified W3EDP antenna tuned with an SG-230 smart tuner.

### The 28MHz Band

Finally, on 28MHz **Nick Phillips 2E0PBU** in Croydon worked V55V (Namibia, southern Africa) – Fig. 12 – (QSL via DJ8VC) and was so excited he forgot to log the time! Then came W3FV (USA) in Easy Greenville, Pennsylvania at 1726, VE3AT (Canada) 1901 and PW2D (Brazil) at 1940 (QSL via M0OXO). All were achieved using a Icom IC-703 and 7W to a 30m (100ft) doublet antenna.

### Signing Off

Well that's it for this month – and it was a tight squeeze fitting in all the DX our reporters worked! Everyone mentioned how pleased they were that the bands seemed to be in much better shape and fingers crossed they will remain that way. As usual my thanks go to **Maurio Pregliasco I1JQJ/KB2TJM** editor of the **425 DX Newsletter** for all the DX information and to all our reporters for their logs. So, until next time I wish you all good DX – 73, Carl GW0VSW. ●

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## Colin Redwood G6MXL's What Next?

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# From the Intermediate to the Full Licence – Striding Onwards!

Colin Redwood G6MXL takes a look at the enjoyable and fulfilling challenges that come with preparing for the Full Licence examination.

Welcome to *What Next?* (WN?) where this month I'm looking at what is involved in moving from an Intermediate Licence to a Full (sometimes called Advanced) Licence. But you may ask the question "Why upgrade from Intermediate to Advanced?" To answer, let's dig deeper!

A Full Licence enables operation in many other countries under the CEPT arrangements. It also allows holders to apply for Special Event call signs such as for JOTA that I described in the September 2012 issue of *PW*.

Finally, it allows operating at up to 400W on many bands in the UK.

I suspect that one of the extra privileges will be the driver for most Amateurs who decide to upgrade. However, at this point I should make it absolutely clear that there's no necessity or requirement to move up to a Full Licence.

To take the Advanced Examination, you must have passed the Intermediate Exam. There is no need to have actually applied for your Intermediate or Foundation Licence, but I would recommend doing so,

as getting on the air will help with a number of aspects of the Advanced Course. Unlike the Foundation and Intermediate Licences, there's no practical element in the Advanced Course.

### Comfortable With Calculations?

Those embarking on the Advance course will need to be reasonably comfortable with handling mathematical formulae. There's a *Maths Primer* which may help candidates who are struggling with the necessary mathematics and manipulation of formulae for the Advanced exam. This can be downloaded free from the RSGB web site at <http://www.rsgb.org/tutors/advanced/mathshelp.php>

For those not used to using a scientific calculator, there's an excellent workshop from the Open University, which I think many will find really useful at [http://openlearn.open.ac.uk/course/view.php?name=MU123\\_1](http://openlearn.open.ac.uk/course/view.php?name=MU123_1) It's part of a course on basic mathematics, which will also help students if their maths is a little rusty.

Incidentally, just because it is from the Open University doesn't mean it is degree level maths – I would expect most teenagers would be familiar with most of the material. See <http://openlearn.open.ac.uk/mod/oucontent/view.php?id=398376>

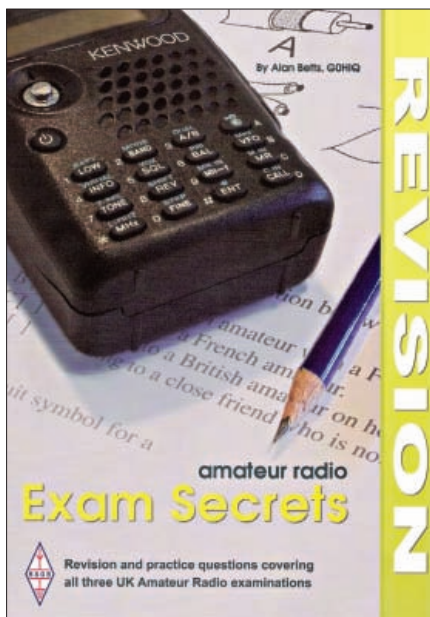


Fig. 1: The RSGB's *Amateur Radio Exam Secrets* – Revision book covers all three exams (Foundation, Intermediate and Advanced).

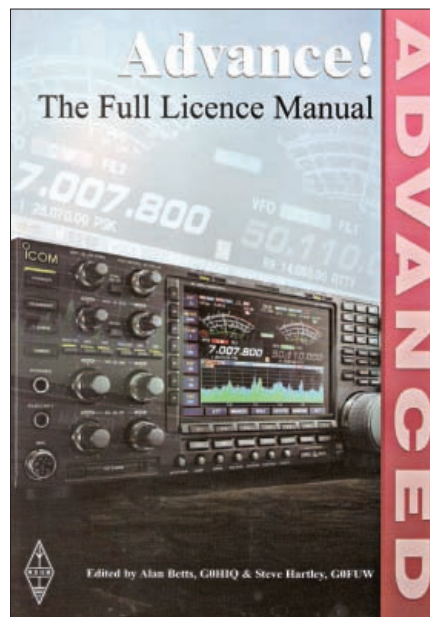


Fig. 2: The RSGB's *Advanced Book* – the essential book for Advanced students.

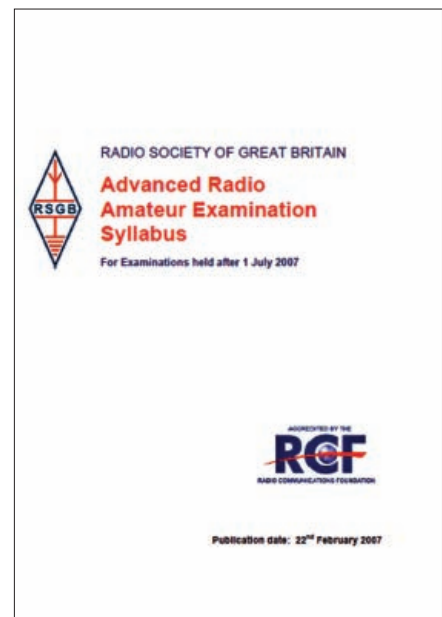


Fig. 3: The Advanced Syllabus which can be downloaded.



In the exam a formula sheet is provided. This sheet just contains formulae, with no assistance in knowing which one to use or how to manipulate them. An example of the sheet is included in the RSGB's *Amateur Radio Exam Secrets Revision book* (Fig. 1).

### Need To Understand

If there's one thing that distinguishes the Advanced syllabus from the syllabus for the Intermediate and Foundation exams, it's the need to **understand** many of the topics. Just recalling facts is not sufficient at Advanced level. Many of the topics covered in the Advanced syllabus build on knowledge that was acquired at Intermediate and Foundation levels.

To help, I would suggest reading through the Foundation and Intermediate Licence books and any notes you may have from your previous courses. You can then to remind yourself of the basics, before moving on to the *Advanced Book* (Fig. 2).

### The Syllabus

Let's now look at the syllabus. Occasionally, I hear of candidates complaining that they have been asked a question in an exam or mock exam that they hadn't covered in their studying. It's difficult for any training course or book to be 100% certain of covering everything, so I recommend those planning to take the Advanced exam to download a copy of the syllabus (Fig. 3) from [www.commsfoundation.org/rce/pdf/advancedsyllabus.pdf](http://www.commsfoundation.org/rce/pdf/advancedsyllabus.pdf) This is the best guide of what you need to understand or know (recall).

I don't have space to reproduce the entire syllabus (termed specification) for the Advanced Exam, so instead I have tried to summarise it. In this way readers can see how it builds on the knowledge already picked during the Foundation and Intermediate courses and exams.

### Licence Conditions

As I've already mentioned, there are a number of additional privileges – higher power on most bands, more bands and being able to operate abroad in a number of other countries are amongst the main ones – that come with a Full Licence. In the exam candidates will have a copy of the Full Licence terms, conditions and limitations to refer to along with the Advanced Licence schedule.

So, although candidates don't

need to learn them, they need to be very familiar with their content. Just to prove the point, it's worth bearing in mind that in 2011, 17% of licence conditions exam questions were incorrectly answered. This is a prime example of the need to really understand and be familiar with the licence conditions. Reading through them for the first time ever in the exam is too late!

It's very important to read and fully understand the question being asked. As an example, I am amazed how many candidates using my local club's mock exam paper fail to spot that when a station with the callsign

potential difference (p.d.) and electromotive force (e.m.f.), potential dividers, capacitance, inductance, direct current (d.c.) and alternating current (a.c.) circuits, tuned circuits, transformers, filters, screening, effects of temperatures and commonly encountered semiconductors. In addition, Decibels (dBs) and mains power supplies are covered. And while many of these were introduced at Intermediate level, at Advanced level the exam will generally be accessing your understanding.

If what you have just read fills you with dread – please don't worry! When explained in a training course,

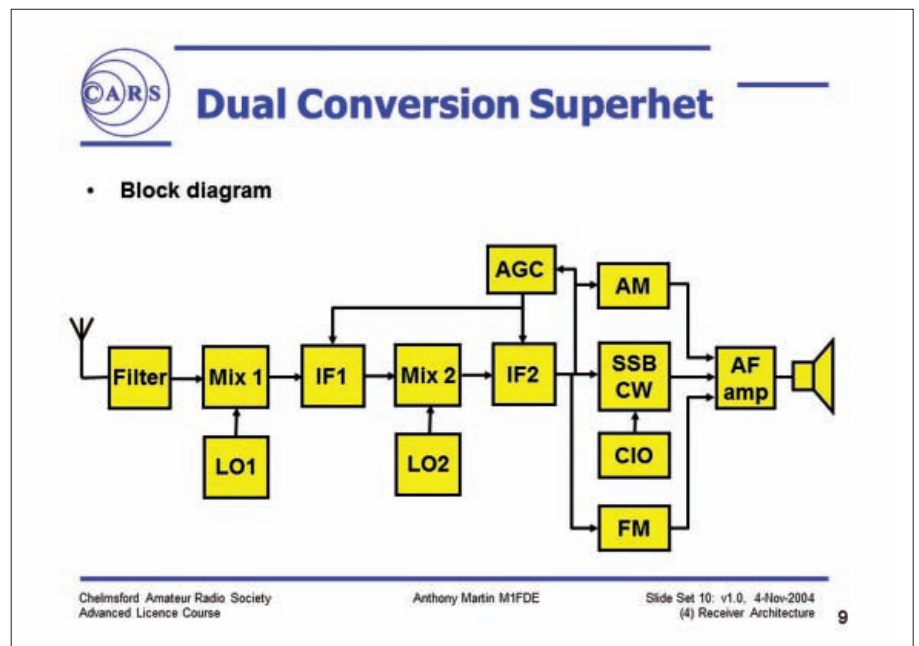


Fig. 4: A slide from the Chelmsford Club's useful set of slides showing the block diagram of a double conversion superhet receiver.

**MM0XYZ** (Scotland) operates from a temporary location in Liverpool in England, then the station should use the call sign **M0XYZ/P** and **not** MM0XYZ/P.

### Technical Aspects

The technical aspects – Electronics – at Advanced level are one of the two areas that many candidates find hardest. If you found this area difficult at Intermediate level, please make sure that you devote plenty of time to studying this part of the syllabus.

Please bear in mind that even though you're on an Advanced training course – you can't rely on just your attendance for a couple of hours a week to be sufficient. Don't rush through the material, instead concentrate on one section at a time so that you gain a real **understanding**.

Topics covered include understanding the difference between

this section of the course really isn't as difficult as the syllabus can make it look!

### Transmitters & Receivers

At Advanced level a real understanding of the various stages of transmitters and receivers is needed. In particular, the modulation and demodulation and filtering stages for each of the main modes need to be understood. In essence these are the differences that happen inside your transceiver when you switch from single sideband (s.s.b.) to continuous wave (c.w.) or from amplitude modulation (a.m.) to frequency modulation (f.m.).

For receivers, understanding of selectivity and the shape of the selectivity's 'skirt' over its -6 to -60dB bandwidths is needed, along with the block diagrams of superhet and double-superhet receivers (Fig. 4). If you want a simple way of assessing

whether you have grasped what you need to know about receivers, have a look at the specification of the receiver parameters of a commercial receiver or transceiver. If you can explain what most of these mean, then you're well on the way.

From a practical point of view, understanding transmitter and receiver parameters is really helpful if you want to compare specifications before purchasing a transceiver. The knowledge will be most useful!

It's not uncommon during this section of the syllabus for candidates to have what I call a 'eureka' moment. This is when they realise that everything they have been studying suddenly joins up in their mind and makes sense and they can relate it to their transceiver.

### Feeders & Antennas

At Advanced level, additional types of antenna are introduced such as the trapped dipole, folded dipole and the cubical quad. The feed-point impedance needs to be learned, for not only these newly introduced antennas, but also for the antennas covered at previous levels. A number of types of baluns are covered along with several designs of antenna matching units (a.m.u.s) – also known as antenna tuner units (a.t.u.s).

The concepts of velocity factor in feeder and return loss are also covered. An understanding of how feeder loss can affect standing wave ratios (s.w.r.) when measured at the transmitter is also required. (Those who like to play with antennas will find this very useful!).

### Propagation Explored

Propagation is explored in a little more depth than at Intermediate level, introducing the split of the F layer into the F1 and F2 layers. As with many aspects of the course, experience of operating and listening on the bands will be helpful to bring these topics to life. **Note:** It's important to be clear which bands a particular means of propagation applies to.

The concepts of power flux density and field strength are introduced here. In the section on Electromagnetic Compatibility (EMC) these are covered in more detail.

### Operating Practices & Procedures

The ease with which you find the Operating Practices and Procedures section of the syllabus will depend a lot on how active you are on a variety of h.f. and v.h.f. Amateur bands and modes. For example, if you use repeaters on the 144MHz (2m) and

**Table 1**

Dates and times when it will be possible to sit the Advanced Exam in late 2012 and 2013. You will still need to find an exam venue (see text).

Date	Time
Wednesday December 5th 2012	19:00
Wednesday January 30th 2013	19:00
Saturday March 2nd 2013	14:00
Thursday May 2nd 2013	19:00
Monday July 1st 2013	19:00
Tuesday August 20th 2013	19:00
Sunday October 13th 2013	10:30
Friday December 6th 2013	19:00

430MHz (70cm) bands, you'll probably find the repeater section quite easy.

**Note:** I covered repeaters in the September 2011 *What Next?* column.

Probably the most technical part of this section is the section on intermodulation and this is a topic I'm planning to return to on another occasion. Band plans for the 14MHz (20m) and 144MHz (2m) bands are provided for any questions, although as usual, it makes sense to be familiar with these in advance of the exam.

### Safety Important

As ever, safety is an important consideration, with the emphasis this time on safety associated with high voltage equipment and high power radio frequencies. The section also covers protection from lightning and protective multiple earthing.

### Electromagnetic Compatibility

Once you have an Advanced Licence, you can run up to 400W on many bands, into high gain antenna systems and EMC has to be considered. With high effective radiated power (ERP) comes a greater risk of EMC issues, and determining the field strength is an important starting point.

Not surprisingly, the EMC section of the syllabus covers the routes of entry of Amateur transmissions into domestic equipment in some depth, before exploring the use of filters and other ways of reducing the likelihood of EMC issues. The EMC issues for mobile installations are also considered.

### Measurements

It's important to understand that when making measurements in circuits, the equipment used to take the measurements can affect the operations of the circuit being measured – and so change the values being read. The results of measurements can also be masked by the accuracy of the measuring

equipment being used to make those measurements. For example, if a meter has an accuracy of  $\pm 5\%$  of a reading, then an accurate 10V could show a reading anywhere between 9.5 and 10.5V and still be correct!

### The Exam

The two hour exam consists of 62 multiple choice questions, in a style similar to the Foundation and Intermediate exams. For the Advanced level exam the pass mark is 37.

The Advanced exam can only be taken on seven specific occasions each year (**Table 1**). Remember also that it can take three or four weeks to arrange for papers to be sent for an exam. This is in addition to the time a local club may need to book a hall and arrange invigilators.

Some clubs welcome 'external' candidates to sit the exam at the same time as their own students. But don't assume that this will always be possible without checking first. Many clubs rent halls with a limited capacity so they may only have a finite number of spaces available.

Don't forget that clubs may be able to facilitate the exam – even if they're not running a course. In this situation you're likely to be required to pay the cost of any room hire and perhaps some other incidental costs in addition to the cost of the exam. So it is important to plan well ahead.

**Note:** Please don't assume this is always possible. Availability of halls that are already approved venues, particularly at relatively short notice and availability of invigilators cannot be taken for granted.

I'd suggest that clubs that are able to offer places to external candidates do so and publicise this facility. Probably the best places to do this are the RSGB's website, the **Southgate Amateur Radio Society's** website at [www.southgatearc.org/](http://www.southgatearc.org/) and the RSGB Yahoo Tutors Group. ●

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- **Scanning Scene** Bill Robertson offers guidance on GMDSS decoding, monitoring digital mobile radio and an explanation of CTCSS sub-tone
- **Decode** Mike Richards looks at time signal station data and radio clock decode software
- **Competition** Your chance to win copies of The Utility DXer's QSL Address Handbook and Just The Fax! A Shortwave Radio Listener's Guide to Weather Facsimile
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- **Maritime Matters** Robert Connolly reports on the Dublin Tall Ships Festival and the Northern Ireland International Airshow and then previews the Icom IC-M323 transceiver
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- **Mode-S Virtual Radar** Pat Carty announces his competition winner, explains how to upload operator flags to PlanePlotter and reports on upgrades and new products from Kinetic
- **Radio Related Websites** Chrissy Brand responds to readers' questions and brings you links to local and international radio stations
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- **Comms from Europe** Simon Parker looks at two new mobile antennas, the Allam4t 409 transceiver and three new products from Maas
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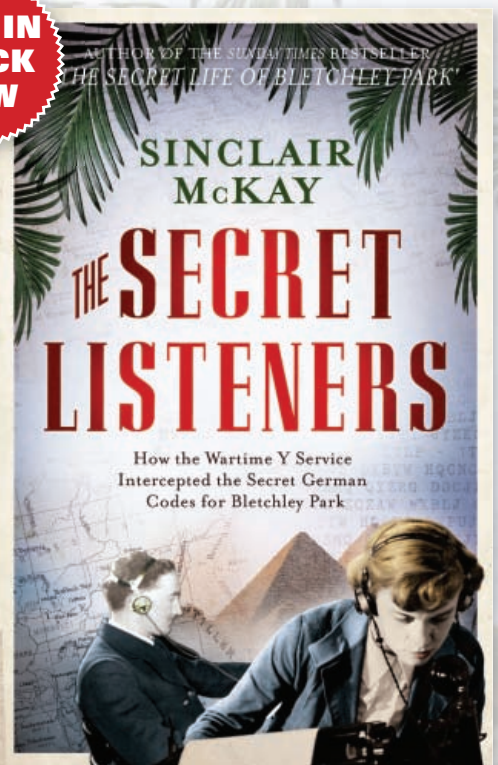
### THE SECRET LISTENERS

How the Wartime Y Service Intercepted the Secret German Codes for Bletchley Park

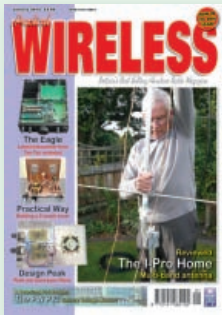
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## Harry Leeming G3LLL's In the Shop

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# Harry Says...

**“a good r.f. signal generator is a valuable asset in the workshop!”**

**Harry Leeming G3LLL looks back at his days running a very busy radio and electronics business in the north west of England. This time he gives some advice on vital test equipment.**

Welcome to *In The Shop (ITS)* where I'm starting off this month by mentioning that a good radio frequency (r.f.) signal generator is a valuable asset in the radio workshop. I think that no experimentally inclined Radio Amateur should be without one! Over the last 20 or 40 years many new low-priced signal generators and kits have been marketed, but most of these arrive with three basic shortcomings.

The shortcomings can be that the signal generator's frequency dial isn't particularly accurate, the generator drift, and the attenuator and output level isn't accurate. However, if a generator is a little off frequency, this is no great worry as you can connect a frequency

counter to it, and use this as a 'digital dial', or even check its frequency with an accurately calibrated receiver.

If a generator drifts this can be a nuisance, but at least you can let it warm up for an hour or so and then correct the frequency. If however, the generator leaks out a strong signal when it's set for zero output – this makes it useless when it trying to measure the sensitivity of equipment, or when adjusting a receiver for the best weak signal performance.

Designing a signal generator that can generate signals in the region of a microvolt, requires that they are very well screened, and filtered. This is why the older valve operated 'portable'

generators, such as those made by Marconi, were extremely heavy due to the extra filtering and screening.

I can still remember 50 odd years ago, the instructor at Blackburn Technical College, staggering into the room, red in the face, as he placed one on the bench! Transistorised units are of course somewhat lighter but still there's still a need for effective screening and filtering – so treat any lightweight generator with suspicion.

There doesn't seem to be a lot of demand for the older heavyweight generators. Some second hand units made by companies like Marconi, that are well screened with an accurate attenuator and reasonably stable in frequency, can go at bargain prices at surplus sales.

The older analogue generators are basically quite simple items, and if you can get the matching manual (ask about this before parting with your cash) you should be able to carry out any necessary repairs and clean the switches and controls without too much difficulty. The older valve units may be full of 'leaky' wax-paper capacitors but if you have time and patience this should cause no great problem, as replacements are easy to come by.

To tell the truth I had three very impressive looking models in prominent positions in the shop. They cost me a total of not much more than £100 and yet people looked at them and made comments about "the expensive equipment, that was needed to carry out repairs." I didn't trouble to correct them!

Once you have serviced a generator it's advisable to check the output level – you'll then know that when you set it to give (let's say 50µv output), this is what it gives. Providing that the unit has not been transmitted into (yes - it could happen!), or abused in some other way, you can probably take it that the attenuator steps are okay, so all you need to check is the calibration of the maximum output level.

Checking the output level can be quite simple if you can find a signal generator that covers down to the top end of the audio range – like my TF2002B shown in **Fig. 1**, for which I paid £25. This covers 10kHz to 88MHz, and can be calibrated with an ordinary AVO 8, as fortunately this has an accuracy of within a few percent at 10kHz. Once the generator is fed into a 50Ω load, and its output meter set to



Fig. 1: Harry's trusty TF2002B covers down to the upper audio band as well as its r.f. option.



be accurate at say 1V with reference to the AVO at this frequency, it will be 'near enough' on the other ranges.

The TF2002B can then be set to give – let's say 20 $\mu$ V output – into a receiver tuned to a frequency within the higher end of its range and the S-meter reading noted. If a v.h.f./u.h.f. generator that needs checking, when it's set at 20 $\mu$ V on the same frequency it should give the same reading. This might not be an accepted way of calibrating equipment to laboratory standards – but at least it gives you a good idea that the output is reasonably accurate.

### Protecting Your Investment

So, you've purchase your unit – it's an investment really – you've cleaned it up, and swapped half a dozen leaky capacitors. Your pride and joy will then look like something from Star Ship *Enterprise* and will be the envy of any visiting Amateur. When used in an Amateur Radio radio shack however, the precision parts which determine the output level (such as the attenuator) are at very grave risk of being damaged.

Once or twice when I've been testing the receiver section of a transceiver with my generator, I have accidentally pressed the wrong button or keyed the microphone. Don't think this won't happen – it will! And when it does you'll almost certainly damage the attenuator, possibly beyond repair if you don't install some kind of protection. My protection unit is a modified CB standing wave ratio (s.w.r.) meter as shown in **Fig. 2**.

The printed circuit board (p.c.b.) track connecting the two SO-239 sockets has been cut and the break bridged by a small 6V-100mA lamp. I leave this protection device permanently connected to my generator, and should I accidentally transmit when the generator is connected to a rig – the lamp blows and protects my invest. My protection unit has a measured loss of about 4dB on the h.f. bands and so it's easy to take this into account when making measurements.

### The FT102 & Relays Again

I really appreciate the way that so many readers freely share their experiences and in response to the saga about the Yaesu FT-102 relays. **Chris Hoare** sent me an E-mail which referred to **Peter Chadwick G3RZP**'s modifications for the rig. I contacted Peter, and he kindly gave me permission to publish his step-by-step instructions

Over a length of time any switch or relay contact will develop resistance, as it gathers dust and oxide, but small

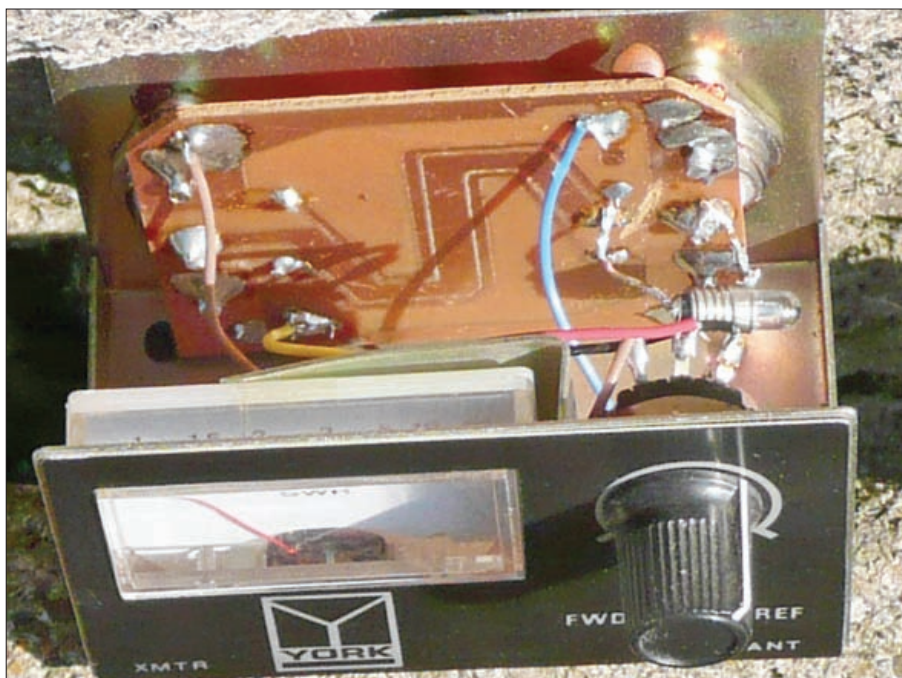


Fig. 2: A modified CB standing wave ratio (s.w.r.) meter, can serve as a protection unit for the output attenuator of a signal generator.

amounts of contamination do not matter, if there's sufficient voltage across the contacts to break down the resistance of the barrier. The problem with the FT-102 is that many of its relays only switch microvolts of signal levels and hence only the slightest layer of pollution or oxide is needed to upset their operation.

Many years ago it was muted that 'd.c. wetting' i.e. adding a few volts of d.c. to the signal path should cure the trouble. Indeed, I did once sketch out a possible circuit, but lacking a scrap FT-102 to experiment with I took the matter no further. However, Peter G3RZP went ahead and has had great success. He must have done something right, as once he'd completed the modification he's never needed to replace the relays. Chris Hoare followed his instructions and he was also able to retain the 30 year old relays.

### Modifying the Yaesu FT-102 Relays (by Kind permission of Peter Chadwick G3RZP).

*"You have to get at the bottom of the r.f. board, (remove the a.f. board) but you don't need to remove the r.f. board itself or the relays. You cut one track and put in a capacitor: otherwise, it's simply a matter of adding components on the underside of the board.*

1. Cut track from J64 pin2 (antenna input) to junction T01 and T02. Bridge the gap with a capacitor - 0.01 or 0.1 $\mu$ F disc ceramic, 50V.
2. Connect a 150k 350V rated, 1W resistor across C22. That fixes RL02! You can go up to 470k 0.5W if it's easier to find.
3. Connect a 470 $\mu$ H or thereabouts

*choke from the junction of RL01 and C04 to ground.*

4. Connect a 470 $\mu$ H or thereabouts choke from the junction of RL02 and C25 to ground.

5. Connect a 8.2k resistor from the junction of R09 and C30 to the junction of T01 and T02.

6. Connect a 8.2k resistor from the junction of L03 and C48 to junction C56 and RL05.

7. Connect a 2.2k resistor from the junction of R09 and C31 to junction C24 and RL03.

8. Connect a 8.2k resistor in parallel with C32"

To help I have marked the approximate location of the various stages on the circuit diagram **Fig. 3**.

Unfortunately, I don't have an r.f. board layout which is good enough for publication, but if you're stuck please E-mail me and I will reply and send you a copy of my rather tattered and scribbled on circuit. I would be very interested to hear from anyone who tries the modification out, as the work involved (while not simple) sounds much easier – and a lot cheaper – than swapping the relays. Again unfortunately, as I'm now clearing my workshop and no longer do repairs I'm unable to carry out the work myself

### Yaesu FT-747 Switching Problem

'Terry' E-mailed me about a difficulty he was having with his Yaesu FT-747. Sometimes when he pressed the **On/Off** button, there was a slight click but the rig remained completely dead. He had checked all his leads and even cleaned the switch but he still had to

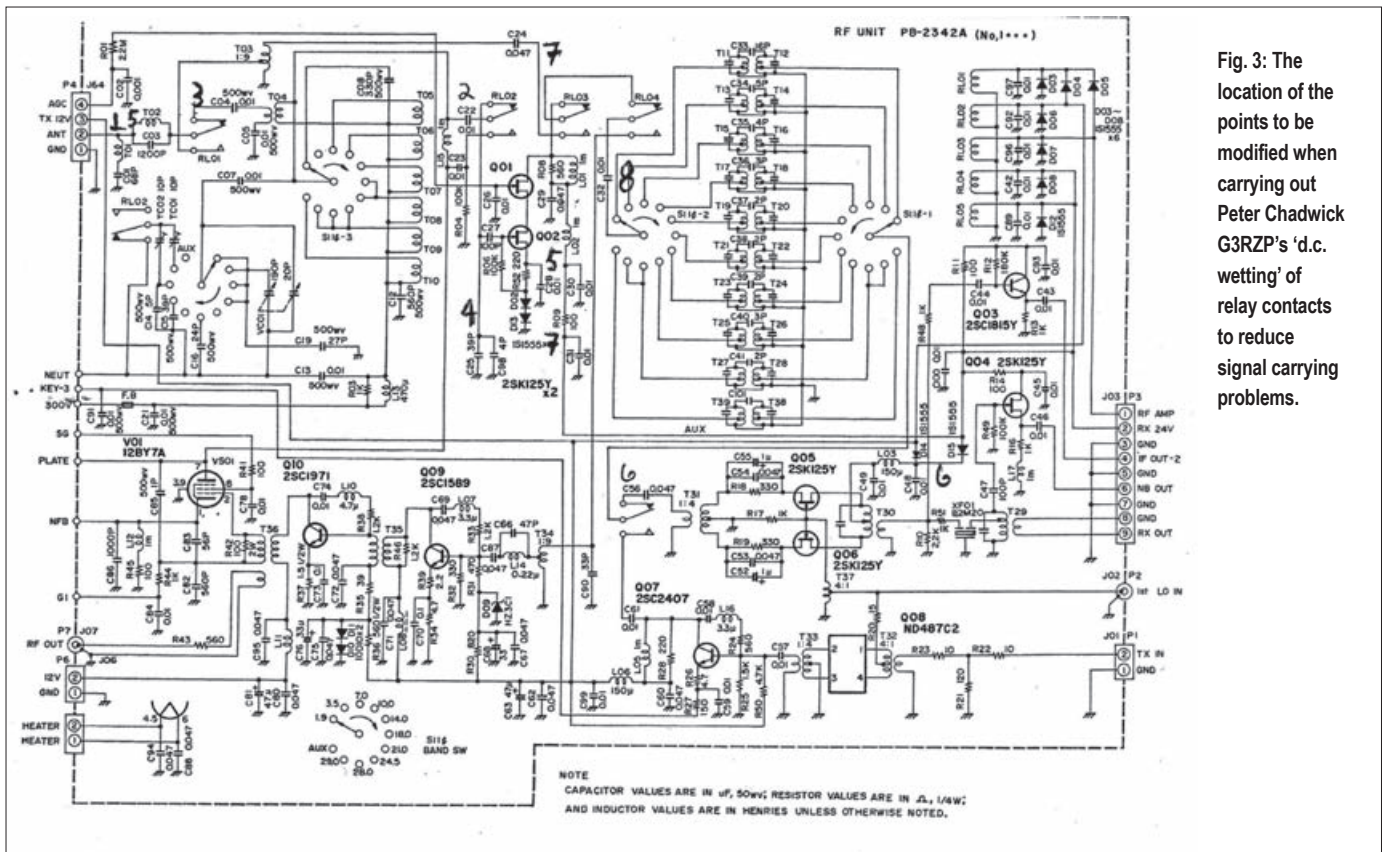


Fig. 3: The location of the points to be modified when carrying out Peter Chadwick G3RZP's 'd.c. wetting' of relay contacts to reduce signal carrying problems.

press the switch a few times to get the rig to fire up.

Let's look at the problem; the FT-747 has a somewhat unusual power switching circuit. The On/Off switch on the front panel doesn't itself power the set up, instead it connects the 13.5V feed by energising a relay that's on the 100W power amplifier board. Intermittent failure to switch on can usually be traced to either dirty contacts on this relay, or a dry joint on its connections – simple when you know. Terry applied a little switch cleaner, pulled a feeler gauge through the contacts a few times and all was well.

### The Hara Kiri 13.5V Socket

In the repair trade I often spent hours trying to trace some elusive fault. In the end some turned out to be only a dry joint, or something else that was so simple that I couldn't possibly charge for a fraction of the time involved. To compensate for this there were complicated looking faults, which once you knew the answer to, could be cleared in minutes. In cases like that I made up for lost time and charged for my 'experience'. The FT-747 had one of these!

'Tom' brought his FT-747 into me complaining that it was dead in transmit and receive and that also as soon as he switched the rig on the S-meter went hard over – I knew at once what it was the dreaded 'Hari Kari 13.5 Volt socket'

In the motor trade mechanics refer to 'paying faults' – supposedly weak parts,

or stupid mistakes in the manufacture of cars which help to keep them in business! And so just to fill the service Engineer's pockets Yaesu fitted the 13.5V output socket on the FT-747. A 13.5V output socket can be very convenient, its use avoids running extra leads from the power supply unit (p.s.u.) to such items as a speech processor, or digital interface units – but there's a catch!

The 13.5V socket on the FT-747 is fed from the main circuit board by a thin strip of p.c.b. track and isn't fused. If the plug that's inserted, or the lead that's connected has a short circuit on it then the a whole strip of printed circuit acts as the fuse and the FT-747 stops working.

With the FT-747 a repair hopefully only requires the missing track to be bridged across. But how much better it would have been (for everyone except the repair man) if Yaesu had fused the socket? You can of course use an external fuse but even then this doesn't protect the rig if the plug shorts out. So, my advice is to never use the 13.5 volt output socket on the FT-747.

### Beyond Belief

We were in the local branch of a large national grocery/ departmental store, and while **Brenda** looked round the lady's fashions, I went to the computing and electrical department. I looked at the display of TVs but unfortunately they were only displaying a pre-recorded demo-disk. This meant that the sets

were acting as little more than computer monitors, and so I asked to see them connected to an antenna, so that I could compare ITV and BBC picture quality in both normal and high definition.

I was told, "Sorry this was not possible as the branch does not have a TV licence!" I couldn't believe it, and so when I got home I E-mailed their head office, and got the following reply. "Dear Mr. Leeming, Thanks for your E-mail. I'm sorry that you were unable to see the BBC and ITV on the TVs on display in the Morecambe store. I can understand your frustration as picture quality is an important aspect when buying a TV.

"We're proud of the service we provide. That's why it's disappointing to hear how let down you were at the Morecambe store recently. As explained, it would be illegal for us to connect the TV to a terrestrial antenna without a TV licence." Did I laugh or cry? See you soon!

### Problems

I like to hear about problems with older equipment, particularly pre-1990 Yaesu rigs. Please E-mail me, (add some radio related term in the subject heading, to differentiate against spam), or write and enclose a stamped addressed envelope. Remember that electricity is dangerous, if you are not familiar with safety precautions you must never work on your equipment whilst it is plugged into the mains. (Switching off at the wall socket does not necessarily make equipment safe).

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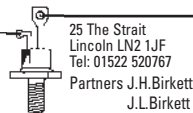
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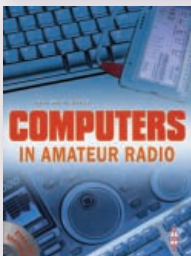
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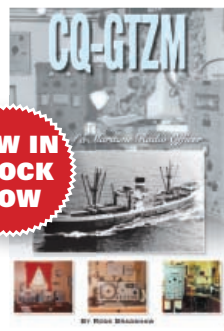


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**Rob Mannion G3XFD/EI5IW's**

# Topical Talk

The Editor discusses an interesting E-mail from Martin Cox M0GQB, mentions details of new offices for PW Publishing Ltd., announces the availability of the first *Promoting Amateur Radio* PDF document and news of the GB80PW QSL card situation.

The E-mail from **Martin Cox M0GQB**, Chairman of the **Halifax & District Amateur Radio Society** (H&DARS) – *Letters* in this issue – really set me thinking regarding the fate of unwanted technical textbooks. Martin's letter was full of good ideas and suggestions and I agreed with his concern that many useful technical books are pulped unnecessarily.

I was reminded of a small charity I was involved with for a number of years. It sent second-hand English language medical books to former Communist Bloc countries who wished to have a better choice of medical books, as they'd previously been limited to Russian language books.

Of course, the local Amateur Radio club should be involved in the saving of, and re-use of technical books for use in the hobby. Perhaps – by also selling the second-hand books for a reasonable price – new books could be purchased for the club library.

Martin's club already has its own library. Many other clubs have libraries too but if your club doesn't – why not start one yourself?

However, I think it would be a marvelous idea for enthusiastic Amateurs to organise distribution of otherwise unwanted secondhand books. Indeed, I've got a number of older (but still relevant) technical books I would be pleased to donate to a centrally-organised technical reference hobby-radio related library idea.

Unfortunately, postage within the UK is very expensive and most technical books aren't lightweight! Despite the very high cost of the postal service I'm sure

that there could be ways and means of getting books – perhaps to help a fledgling club start its own technical library – delivered to them successfully.

I may now have given *Topical Talk* readers ideas of their own – If so, let's hear from you! In the meantime perhaps we should approach local charity shops to see what their approach is with slow-to-sell technical books they have on their shelves. Most towns and cities have a great number of Charity Shops and they're not all owned by national charities. Some are purely local in nature and most likely to be fully organised by volunteer staff, rather than professional, salaried managers. They may have more freedom to negotiate with someone willing to take slow-selling technical books. Let me know how you get on!

## New Offices For PW Publishing Ltd.

After almost 20 years PW Publishing Ltd. is moving from the Broadstone, Poole offices to new facilities in Westbourne, Bournemouth. We're hoping that there will be minimum disruption for our readers but **Steve Hunt**, **Alan Burgess** (Accounts Manager) **Peter Eldrett** (Advertising make-up) and **Tex Swann G1TEX** will be extremely busy for a week or so! Because of the office move I'm afraid we cannot attend the Kempton Park rally on Sunday November 11th.

## The Promoting Amateur Radio Clubs PDF

Preparing the promised PDF document filled with notes aimed at helping local Amateur Radio clubs promote

themselves and their activities more effectively – took me longer than expected! However, the PDF was completed in mid October and (I hope!) I have sent copies to everyone who requested a copy.

If you requested a copy and have not yet received it – please E-mail me at **rob@pwpublishing.ltd.uk** I'm also planning to up-date the document occasionally and include ideas that come my way from clubs. I like to think of the initiative as a team effort on behalf of Amateur Radio.

## The GB80PW QSL Cards

By the time this issue of *PW* is published I should have cleared the backlog of QSL cards for GB80PW. I'm grateful for the patience of everyone who has been waiting. However, the local Royal Mail (RM) delivery office has tried 'blackmailing' me again by refusing to deliver a number of envelopes (marked obviously as QSL cards for GB80PW) until I pay an extra fee because of 'incorrect postage' by the sender.

I've always objected to the extra charge but was prepared to pay the postman on the doorstep – but since the RM management have adopted the 'refusal to delivery until payment has been made' – affected mail has been left uncollected – to be return to the sender. So, please help me avoid the clutches of the Royal Mail 'blackmail' tactics by ensuring you've applied the correct price postage stamps!

**Rob Mannion G3XFD/EI5IW**

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## New Series! Exploring Microwaves – The Practical Approach

Following on from his popular introductory articles, as he became operational on the microwave bands, **John Cooke GM80TI** starts his new series where he'll be presenting constructional projects and ideas to help you become operational on the bands with exciting equipment and antenna projects.

## Colin's Scrap Heap Challenge Radio!

**Colin Shaw M5FRA** is an inveterate 'make and mend' designer and constructor and describes one of his successful projects. In his article Colin discusses how his eminently practical skills adapt and adopt electronic 'waifs and strays' that eventually end up providing him with a multi-band c.w. transceiver. You may remember his letter on the topic in *PW* – now you can share his building experience!

## Buying Second-hand

Many *PW* readers will remember and may have built Heathkit projects over the years – but have you ever considered buying a project that another enthusiast has assembled? **Chris Lorek G4HCL** discusses how to get the 'wise buys' and what to look for. And it turns out that Chris has a few Heathkit projects himself and that he's on the look-out for assembled kits he regrets parting with years ago!

## The G3XFD Antenna Experience

**Rob Mannion G3XFD** shares the experience he's had with the new multi-band 3.5 to 29MHz balanced feeder-fed inverted dipole – supported by his Tennamast (Scotland) lightweight tilt-over mast that's proved so successful for use with GB80PW and DX chasing. Rob also discusses the advantages he's discovered by incorporating a 7 to 29MHz vertical antenna to provide antenna diversity.

## Doing it By Design

**Tony Nailer G4CFY** presents the final production design of his 2 to 32MHz active pre-selector project. Get your soldering irons ready for the off!

Plus all your favourites including *Carrying on the Practical Way*, *Data Modes*, *World of VHF*, *HF Highlights* and much, much more in the UK's friendliest and most practical 'hands on' Amateur Radio magazine!

Contents subject to change.

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Very solid VHF-UHF FM Amateur Radio transceiver, Dual Band, Dual Frequency, Dual Display and Dual Stand-by. Work mode : V-U, U-V, V-V, UU., 128 channels, PC programmable (with optional PC Cable). Professional construction with die cast aluminium chassis. 5W/4W RF power (Hi/Mid/Low selectable). Extra high capacity Li-Ion Battery (2200 mAh), VOX, 50 CTCSS / 105 DCS, selectable Wide/Narrow mode. Multi display function, multi function Scan. Selectable frequency step (5/6.25/10/12.5/25/37.5/50/100 KHz). FM Radio (88-108 MHz). Offset frequency setting (0-69.950 MHz). Backlit dot matrix LCD display with digital S/R/F meter. Freq. shift direction setting, Key Lock, Busy Channel Lockout, Squelch tail elimination, Power-on password, Wire Clone, Power-on message display. Comes complete with main unit, SMA antenna, 2200mAh battery pack (LN-2200K) and quick charger



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VHF FM marine (156-162 MHz) handheld radio PC programmable (with optional PC cable). Backlit wide 4-lines 1.8" LCD, digital S/R/F meter, channel and 6-digit frequency readout. All enabled functions are indicated by the LCD. All US, Canada, International and Weather channels, 100 memory channels and 120 private channels programmable. Transmitter power adjustable (3 levels). Manual or auto squelch. SCAN, Dual Watch, Triple Watch, CH16, priority channels, key lock, ATIS/alert. Battery level meter. Comes complete with 1500mAh Ni-MH batteries and charger



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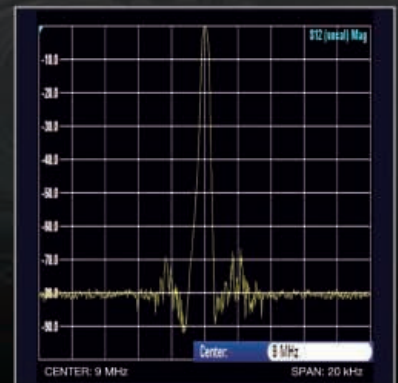
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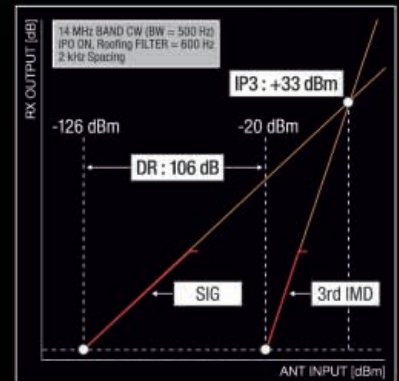
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