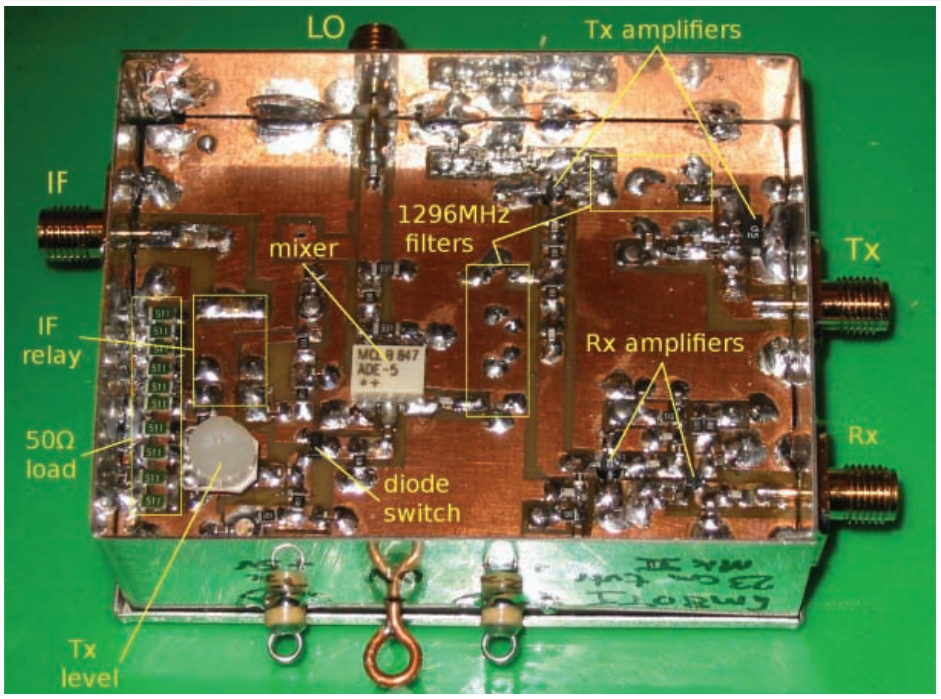
April 2012 £3.50 ISSN 0141-0857

NOW IN ITS 80th YEAR!

Practical WIRELESS

Britain's Best Selling Amateur Radio Magazine

Microwave Home-Brew



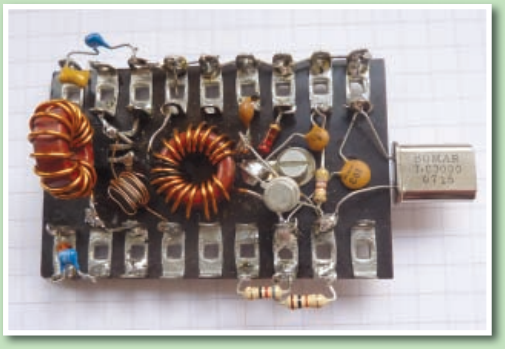
Improving the 1.3GHz portable transverter

What Next?

What's involved in moving from a Foundation Licence to an Intermediate Licence.

Practical Way

Remembering Steve Ortmayer G4RAW



In the Shop

Drivers & power amplifiers

Valve & Vintage

Spread the word – save that old valved set!

9 770141 085105 04

WATERS & STANTON

UK's Lowest Prices!

Orderline
01702 206835

Online Catalogue
www.wsplc.com

HF - UHF Antennas

LFA Antennas - The Ultimate in Performance!

Low Noise Designs up to 5kW with Models from 30m to 70cms

Check our web site for the full range of LFA antennas from 3 elemenys on 40m to 22 elements on 144MHz. The complete range from stock or on VERY SHORT delivery.

Invest in the best

Are you In The Loop?

LFA antennas use an exclusive horizontal loop driven element. This provides a "natural" 50 Ohm balanced feed with low noise and at least 3kW power handling. Mechanical integrity and accuracy is achieved by hand building using the most advanced computer generated design data.

Get Ready for 50MHz Season! With this Ultra Compact Yagi

This year 50MHz should really come alive with DX. The new LFA-2 element Yagi has a boom of jut 2ft 5" and turning radius of 6ft 6". You get almost 7dB gain and 14dB F/B.

Just £89.95 C

4-LFA-28	4 element 28MHz yagi 4.5m long 5kw	£299.95 C
5-LFA-144	5 element 144MHz yagi 1.789m long 5kw	£89.95 C
6-LFA-144	6 element 144MHz yagi 2.407m long 5kw	£104.95 C
7-LFA-144	7 element 144MHz yagi 2.894m long 3kw	£134.95 C
8-LFA-144	8 element 144MHz yagi 3.729m long 3kw	£164.95 C
9-LFA-144	9 element 144MHz yagi 4.403m long 3kw	£194.95 C
12EL-432-LFA-SQ	12 element 432MHz yagi 2.332m long 3kw	£99.95 C
13EL-432-LFA-SQ	13 element 432MHz yagi 2.579m long 3kw	£105.95 C
14EL-432-LFA-SQ	14 element 432MHz yagi 2.874m long 3kw	£119.95 C
15EL-432-LFA-SQ	15 element 432MHz yagi 3.173m long 3kw	£129.95 C
16EL-432-LFA-SQ	16 element 432MHz yagi 3.468m long 3kw	£139.95 C

NEW From AirNav Systems!

SHIPTRAX See the exact position of Ships Worldwide! NEW

ShipTrax is an advanced Windows based Ship Tracking application. It receives ship data from various sources (AIS, TCP/IP, AIS Nees tworks) allowing you to track ships worldwide in real-time. Just plug the supplied receiver into the USB port of your PC and load the software. The supplied miniature antenna picks up the data - LIVE!
Data displayed on maps includes Vessel name, Position, Photo, Location, Speed, Track, IMO.MMSI, Call sign, Vessel type, Length and voyage details. Also includes personal log book. Now you can track your favourite cruise liner wherever it goes!

ShipTrax-Pro £399.95 C

The standard system that includes receiver, antenna and software. It provides a flat display on your PC/ laptop screen and is ideal for normal use.

ShipTrax-3D £489.95 C

The 3D version adds the dimension of Google 3D mapping systems that gives the most realistic views possible in great detail and is particularly effective for river traffic and docks.

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 performamnce 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 and 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 compact HF transceiver that delivers 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

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-DX5000D + 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 £3299.95 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

TEN-TEC **OMNI-VII** HF Transceiver

Fire it up and you immediately know you are driving something different. The receiver is a delight and the transmitted audio is superb. This 100 Watt transceiver that covers 160m - 6m. Ethernet remote control ready.
IN STOCK £2699.95 D

Sofware Defined Transceivers

FLEX-1500 HF Transceiver

HF - 6m All Modes All Bands

This most amazing transceiver mates up with your laptop to bring you an advanced 5W transceiver that no other manufacturer can match at the price. Filters down to 50Hz, Tx audio equalizer, Incredible DSP noise reduction, ultra sensitive receiver, Live Panoramic display and just one USB cable! Plug, Play, Enjoy! IN STOCK £589.95 D

FLEX-3000 HF Transceiver

100 Watt HF - 6 with Auto ATU!

It's all you need, apart from a PC. The firewire connection makes setting up easy. Experience performance & features, no hardware design can match even at twice the price! You get the ultimate in flexibility, selectivity and usability. Uses Yaesu mic wiring and requires 12v at approx. 20 Amps peak. Call for more info.
IN STOCK £1399.95 D

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

WATERS & STANTON
Head Office & South
Spa House, 22 Main Road,
Hockley, Essex, SS5 4QS.

Enquiries: 01702 204965
Fax: 01702 205843
Email: sales@wsplc.com
Opening Hours:
Mon-Sat 9am-5.30pm

JAYCEE
Scottish Store W&S @
Jaycee, 20 Woodside Way,
Glenrothes, Fife, KY7 5DF.

Phone: 0845 5050128
Fax: 01592 610451
Email: jayceecoms@aol.com
Opening Hours: Sat 9am-4pm
Tue-Fri 9.15am-5pm Closed Monday

Fast Same Day Despatch Service!
Orders Received Before 3pm

Buy Now Pay Later Available!

Get The Latest News First
Follow @wsplc on twitter!

HF Linear Amplifiers

Alpin-100mkII 160m - 6m 1.3kW

The Alpin 100 desktop linear will deliver up to 1.3kW output from this desktop design. It covers 160m - 6m and has full tune up protection. The panel control display tells you exactly what is happening and makes operation simple. If you are looking for something rugged with full safety features at a sensible price - this is it!

£2499.95 D

AMERITRON AL-811XCE 160m - 10m 600W

This Ameritron design gives a sensible power gain for a very reasonable price. It has a hunky built-in power supply with full monitoring of operation conditions. It uses three low cost 811A tubes to achieve the power output running from a 1500volt HT line. This desktop design can easily be accommodated. 350 x 210mm Weight: 14.51k8

£899.95 D

QRP HF Transceivers

YAESU

FT-817

A take anywhere all mode transceiver. 2.5 Watts from 1.8 - 70cms from internal batt. Or 5W from external 12v DC. This radio has stood the test of time and comes with its own battery cell pack and AC charger, plus mic. and telescopic whip. A complete all-mode all-band station.

IN STOCK £539.95 D

HB-1B HF

This little CW 80, 40, 30, 20m transceiver runs 6 Watts from ext. 12v or 4W from optional internal lithium cells. Has tunable filter 400Hz-3kHz, electronic keyer, programmable auto CQ, 30 memories, switched tuning speeds. Also receives SSB from 3.4 - 16MHz.

IN STOCK £249.95 D

High Performance Receivers

AOR *We are UK Distributors*

AR-MINI

This amazing little radio covers 100kHz - 1.3GHz AM FM & WFM. 1000 memories, over 30 programmable features inc. CTCSS & DCS. Alphanumeric memories give meaningful channels and there is a built-in bar antenna covering 100kHz - 5MHz. Inc. NiMH pack & charger. FREE software database for PC loading via h.

£169.95 D

AR-8200-MKIII

The famous scanner with the quality performance. 530kHz - 3GHz AM FM FMW & SSB. Inc batts, charger + cigar lead. If you are looking for a truly wide-band great performer this is the best in its class!

£499.95 D

AR-8600MKII Base or Portable

The AR-8600MKII is a base or portable station receiver covering 530kHz - 3GHz. All modes AM FM FMW & SSB with standard rotary tuning. Requires external 12V or optional internal batt pack. A great station accessory for general listening or extra receiver.

£699.95 D

VHF UHF Mobiles

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

INTEREST FREE CREDIT ON ORDERS OVER £200

0%!

Beat the price increases and get the rig you want today. Spread the cost over 6 or 12 months*

W&S are licensed credit brokers. Subject to terms & conditions, and accpetance. Ask instore, email or call 01702 206835.

*If paid over 12 months there is an additional £29 admin fee.

Model	Our Price	6 Month Deal	12 Month Deal	Total You Pay	APR
TS-590S	£1329.95	£221.65	£110.82	£1329.95*	0%
TS-2000E	£1549.95	£258.32	£129.16	£1549.95*	0%
IC-7410	£1695.95	£282.65	£141.32	£1695.95*	0%
IC-9100	£2899.95	£483.32	£241.66	£2899.95*	0%
IC-7000	£1189.95	£198.32	£99.16	£1189.95*	0%
FT-DX5000D	£4939.95	£823.32	£411.66	£4939.95*	0%
FT-450D	£839.95	£139.99	£69.99	£839.95*	0%

For other radios simply divide price by 6 or 12 to calculate payments - NO DEPOSIT!

Handheld Transceivers

VX-3E 2m / 70cm Handheld Wideband receive

£169.95 D

VX-6E *Offer!* 2m/70cms handy, 5W. +FREE Case ~~£249.95~~

£214.95 C

FT-60E 2m/70cms, 5W handy Wideband Receive

£129.95 C

VX-8GE Dualband 2m/70cm 5W + GPS Antenna

£349.95 D

VX-7R Waterproof dualband handy (silver/black)

£299.95 C

VX-8DE Triple Band 6/2m/70cm Upgraded APRS

£369.95 D

IC-E80D Dual band 2m/70cm D-Star CTCSS & DTCS GPS Compat.

£329.95 D

IC-E90 Triple band 2m 6m 70cm + wideband receive 500kHz-1GHz

£244.95 D

IC-E92D Dual band 2m/70cm waterproof fitted D-Star. Rugged radio.

£387.95 D

TH-F7E Dual band 2m/70cm + wideband receive inc. SSB

£236.95 D

TH-D72E Dual band 2m/70cm with GPS & TNC + SiRF

£426.95 D

TG-UV2 Dual band 2m/70cm with CTCSS DCS & LED torch!

£81.95 D

NEW from Kenwood!

NEW TM-281E

2m FM 65/25W Mobile Transceiver

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

£169.95 D

NEW TH-K20E

** TX 144-146MHz * RX 136-174MHz * 5.5W Max Output * 200 Memory channels*

£119.95 D

NEW TH-K40E

** TX 430-440MHz * RX 400-470MHz * 5W Max Output * 200 Memory channels*

£119.95 D

Hygain Vertical Antennas

AV-6160	6-160m aerial 43 feet self supporting 1500 Watts	£434.95 D
AV-6110	160/80m high effi ciency matching network	£279.95 D
AV-12AVQ	10-15-20m Vertical 1.5kW 13ft	£169.95 D
AV-14AVQ	10-15-20-40m Vertical 1.5kW 18ft	£209.95 D
AV-14RMQ	Roof mount kit : baseplate/mast & radials	£109.95 D
AV-18AVQ11	10-15-20-40-80m vertical 1.5kW 18'	£279.95 D
AV-18HT	10-12-15-20-40-80m Vertical 1.5kW 53ft	£1,089.95 D
AV-18HTJR	10-15-20-40-80m 5kW Vertical 39ft	£399.95 D
AV-18VS	10-12-15-17-20-30-40-80m vertical 1.5kW 18'	£134.95 D
AV-620	6-20m Vertical inc WARC 1.5kW, 22.5' long	£329.95 D
AV-640	6-40m Vertical inc WARC 1.5kW 25.5' long	£479.95 D
DX-77A	10-12-15-17-20-30-40m vertical 1.5kW 29'	£479.95 D
DX-88	10-12-15-17-20-30-40-80m Vertical 1.5kW 25'	£409.95 D
KIT-160-88	160m add on kit for DX-88	£209.95 D
GRK-88	Ground radial system for DX-88	£109.95 D
RRK-88	Roof radial system for DX-88	£109.95 D
LC-160Q	160m mod kit for AV-18HT 150 W	£124.95 D
MK-160A	160m mod kit for AV-18HT 1 KW	£135.95 D
MK-6	6m add-on kit for most HF yagis & rotatable dipoles	£49.95 C
MK-17	17m add-on kit for AV-14AVQ	£99.95 D
MK-80	80m add-on kit for AV-14AVQ	£94.95 D

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

WATERS & STANTON

Orderline
01702 206835

Online Catalogue
www.wsplc.com

YouKits FG-01 Antenna Analyser

With Graphic Colour Display!

Get an instant Graphic display of both VSWR and impedance curves!

A graphic antenna analyser that covers the complete HF spectrum and gives a clear picture of your antenna resonance and performance. Covers 1.8 - 60MHz with adjustable scan range. Operates from battery or external 12V. Provides dual VSWR and Impedance traces. An opptional Lithium cell pack and AC charger is available - phone..

£229.95 C

MFJ Automatic HF Antenna Tuners

MFJ-927

Weather protected remote auto tuner for coax / wire ant, includes MFJ-4116 Power Injector. This enables you to power the ATU down the coax lead feeding the tuner. This is a fit and forget item.

£259.95 C

MFJ-928

If you are looking for a simple auto ATU that does the job without fuss and matches all your antennas, whether wire, coax or balanced, then this may be what you have been looking for. It is very similar to the MFJ-929 but minus the LCD readout and the manual tune buttons.

£203.95 C

MFJ-929

IntelliTuner-Compact™ lets you automatically tune any coax fed or random wire antenna 1.8-30 MHz at full 200 Watts SSB/CW. It can match 6-1600 Ohms (SWR up to 32:1) - - that's a 50% wider matching range at a higher power level than lesser competing products.

£214.95 C

MFJ-991B

World's First dual power level tuner -- Select 300 Watt SSB/CW and match 6-1600 Ohm antennas Or select 150 Watt SSB/CW and match extra wide-range 6-3200 Ohms. New 10,000 VirtualAntenna™ Memories. Like MFJ-993B, less digital SWR/ Wattmeter/ LCD display, audio SWR meter/audio feedback, antenna switch or 4:1 current balun.

£214.95 C

MFJ-994B

600 Watt Intelli-Tuner™! automatic antenna tuner with new 10,000 VirtualAntenna™ Memories. It easily handles 600 Watts SSB/CW, and matches 12-800 Ohms. This is a great companion for lower powered linear amplifiers.

£349.95 C

New Icom ID-31E

NEW

- Built-in GPS receiver
- IPX7 submersible
- D-STAR DV mode
- Micro SD card slot
- Full dot-matrix display & directional keypad
- Auto repeater list function
- 1252 memory channels
- 5W output power
- Multiple scan functions
- CS-31 cloning software
- External DC power jack
- Built-in CTCSS/DTCS encoder & decoder
- 16 DTMF memory channels
- Full Analogue facilities

£349.95 D

Introductory Offer FREE 2GB SD Card!
Offer subject to availability.

For More Bargains - CLICK IT!

eBay

Go to www.wsplc.com then click on the link to our ebay shop.

Watson Power Supplies

Power-Mite-NF

Back In Stock! The original Mini 25A PSU. 25A Peak, 22A Cont. with Noise Offset.

£79.95 C

Power-Max-45-NF

38 Amp cont, 45 Amp Peak, Switch Mode PSU with variable voltage, V/A meters, & noise offset.

£129.95 C

Power-Max-65-NF

65 Amp Low Noise PSU. Patented Noise Control that permits you to move any noise away from the operating frequency.

£239.95 D

POWER-MAX-25-NF 22A PSU £89.95 C
W-5A 5A Analogue fixed 13.8V £33.95 C
W-10AM 10A Analogue variable £64.95 D

MFJ Antennas & Accessories

MFJ Vertical HF Antennas. Ideal for small gardens.

MFJ-1796 A 1.5kW40m - 2m self supporting vertical. Requires no radials. Height 3.65m **£244.95**

MFJ-1798 An 1.5kW 80m to 2m vertical that is self supporting and needs no radials. Height 6.7m **£309.95**

MFJ-1625 Window Ant + Tuner £204.95 D
MFJ-1796 40m-2m vertical £244.95 D
MFJ-1798 80m-2m vertical £309.95 D
MFJ-1908H 43ft fibre glass mast £249.95 D
MFJ-1922 Digital screw driver control £101.95 D
MFJ-1924 Prog. screw drvr control £142.95 C
MFJ-1925 ATAS-100 controller £84.95 C
MFJ-202B Receiver noise bridge £82.95 C
MFJ-250X 1kW dummy load (x-oil) £56.95 C
MFJ-260C 300W dummy load £45.95 C
MFJ-261 100W dummy load £33.95 C
MFJ-265 2.5kW load fan cooled £209.95 C
MFJ-403 Micro CW keyer £64.95 C
MFJ-403P Micro travel iambic £79.95 C
MFJ-4103 PSU for FT-817 £53.95 C
MFJ-417 Pocket morse tutor £73.95 C
MFJ-442 Slim electronic keyer £199.95 C
MFJ-461 Pocket morse reader £99.95 C
MFJ-4726 6-way remote ant switch £164.95 C
MFJ-490 Memory keyer + paddle £234.95 C
MFJ-495 Memory keyer £179.95 C

Heil Microphones

Pro-Set-Elite-6 NEW

Modelled on the ProSet-6 but adds phase reversal switch which offers a spatial awareness.

Pro-Set-Elite-6 £179.95 C
Pro-Set-Elite-IC £189.95 C
AD-1 Rig adaptor leads £22.95 C

NEW Genesis HM-12

The HM-12 Genesis mic from Heil is the latest dynamic design with cleverly sculptured frequency response to suit modern radios. If your radio has an EQ adjustment, then this is the mic to use for that distinctive, crisp, Heil sound. Then look at the price!

£69.95 C

NEW Mic Desk Stands

K-601 Foldable Tripod with clip £9.95 C
K-701 Gooseneck Desk Stand £14.95 C
K-901 Desk stand with Boom £29.95 C

New Avair Duplexers

These are high quality, well engineered duplexers. A duplexer splits a tx/rx signal dependant on it's frequency.

AV-22C-NNNM 1.6-150MHz & 400-460MHz, N Socket to 2x N Plugs **£40.95 C**
AV-32C-NMNM 1.6-56MHz & 140-170MHz, N Socket to PL-259 & N Plug **£51.95 C**
AV-35C-NMNM 1.6-30MHz & 49-470MHz, N Socket to PL-259 & N Plug **£52.95 C**

Avair Power SWR Meters

All models have 12V backlight and include DC Cable.

AV-201 1.8-160MHz, 5/20/200/1kW **£49.95 C**
AV-400 140-525MHz 5/20/200/400W **£49.95 C**
AV-601 1.8-160MHz / 140-525MHz **£69.95 C**
AV-1000 1.8-1300MHz. **£79.95 C**

Cross Needle Models - Even Lower Prices!

AV-20 30W / 200W, 3.5-150MHz **£39.95 C**
AV-40 15W, 0-150W, 144-470MHz **£39.95 C**

Create Rotators

RC5-1 Medium Duty Rotator

*Rotating torque: 6kg/m
*Braking torque: 80kg/m
*Mast size: 48-63mm
*Vertical load 400kg
*Horizontal load 800kg
*Rotation speed: 60-150sec/50Hz *Power: 230V AC 80VA *Weight: 5kg *Cable: 7-core cable (not supplied) *Requires MC-2 lower mast clamp if mounting on pole

£619.95 D

RC5-3 £779.95 D

Same as above but with preset control.

bhi DSP Audio

NEW MINI-SWITCH

2-Way Switch Box, connect 2 radios to your bhi noise cancelling product.

£19.95 A

NES10-2MK3

Speaker & programmable DSP unit. Dramatic noise reduction. **£112.95 C**

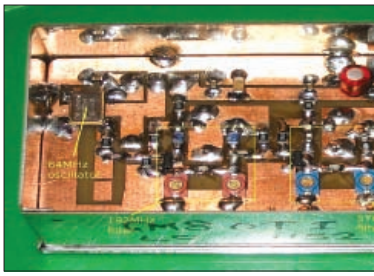
NEIM-1031MKII £142.95 C
Noise Eliminating In-Line Module.
NEDSP-1061-KBD £101.95 C
Noise Eliminating DSP module for FT-817
NEDSP-1062-KBD £106.95 C
Noise Eliminating DSP module for speaker.
ANEM-MKII £127.95 C
In-Line "Noise Away" amplified DSP module.
DSPKR £154.95 C
Noise Eliminating DSP Ext. Speaker 10W.
DTNA £154.95 C
Amplified DSP Noise Cancelling Desk Speaker.
RADIOMATE £89.95 C
Compact keypad for Yaesu FT-817/857/897.
CAT-MATE £49.95 C
Electronic Y Splitter for Yaesu CAT Interface.

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

Practical Wireless April 2012

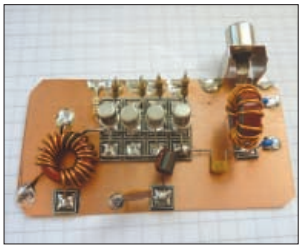
contents

Volume 88. Number 4. Issue 1259. On sale 8th March 2012

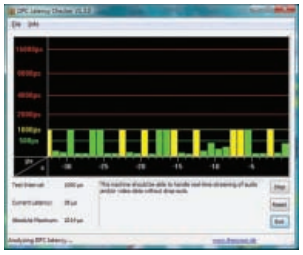


16

20



26



36

42

53

Front cover design by **Steve Hunt.**

Editor's apology: Due to circumstances beyond our control the Baofeng review will not be published.

Published on the second Thursday of each month by PW Publishing Ltd., Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW. Tel: 0845 803 1979. Printed in England by Holbrooks Printers Ltd., Portsmouth P03 5HX. Distributed by Seymour, 2 East Poultry Avenue, London EC1A 9PT, Tel: 020 7429 4000, Web: http://www.seymour.co.uk. Sole Agents for Australia and New Zealand - Gordon and Gotch (Asia) Ltd.; South Africa - Central News Agency. Subscriptions INLAND £38, EUROPE £47, REST OF WORLD £57, payable to *Practical Wireless*, Subscription Department. PW Publishing Ltd., Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW. Tel: 0845 803 1979. *Practical Wireless* is sold subject to the following conditions, namely that it shall not, without written consent of the publishers first having been given, be lent, re-sold, hired out or otherwise disposed of by way of trade at more than the recommended selling price shown on the cover, and that it shall not be lent, re-sold, hired out or otherwise disposed of in a mutilated condition or in any unauthorised cover by way of Trade, or affixed to or as part of any publication or advertising, literary or pictorial matter whatsoever. Practical Wireless is Published monthly for $50 per year by PW Publishing Ltd., Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW, Royal Mail International, c/o Yellowstone International, 87 Burlews Court, Hackensack, NJ 07601. UK Second Class Postage paid at South Hackensack. Send USA address changes to Royal Mail International, c/o Yellowstone International, 2375 Pratt Boulevard, Elk Grove Village, IL 60007-5937. The USPS (United States Postal Service) number for Practical Wireless is: 007075.

Rob Mannion G3XFD/EI5IW's

Keylines

The Editor discusses the first Saturday operation of GB80PW and some adjustments he's made to the main antenna at G3XFD.

Our decision to change the operating days to Saturday for GB80PW seems to have been the correct one! Once I handed over the microphone at 10am on Saturday February 11th to Phil Ciotti G3XBZ – the cacophony on and around 7.130MHz as we were being called had to be heard to be believed! Phil and I were soon joined by **Tex Swann G1TEX** – but unfortunately, **Jim Lee G4AEH** had developed a croaky voice – so he wisely postponed his trip down to Dorset – and plans to join us later in the spring. We look forward to you joining us Jim!

As expected, our choice of 7MHz was a good one except that February 11th coincided with a Dutch h.f. contest and there were some co-channel problems. The GB80PW team had discussed the obvious possibilities that we'd would meet up with h.f. contests on 7MHz on occasions through the year – but I was pleased that there were only a few difficulties.

My thanks go to everyone we worked – some waited for three hours or so to achieve a QSO with our celebratory station – for their wonderful patience. We were particularly impressed with the response from everyone whenever we attempted to help Foundation and Intermediate Licencees achieve their QSOs.

The good-natured event was thoroughly enjoyed by everyone and it was great to chat – albeit briefly – to *PW* friends who were determined to help celebrate 80 years of their favourite magazine. We were also delighted when **EI80IRTS** – the official 80th anniversary station of the **Irish Radio Transmitters Society** (IRTS) – operated by **Ger McNamara EI4GXB** – called to offer congratulations. I reciprocated the greeting to Ger and wished the IRTS well for their own 80th year celebrations.

We were also called by the **Royal Signals Amateur Radio Society** 50th anniversary station **GB50RSARS** – and I was delighted to return our own congratulations to the members of this very active club.

The special QSL cards should be available soon. I'll try to get the envelopes that are already piling up – back to the senders as quickly as I can.

Finally, I'm pleased to say that Tex Swann G1TEX is planning to activate GB80PW on PSK31 on 14MHz next month. I'm also hoping to be on PSK31 on 3.5MHz during the evening and we're planning to operate GB80PW on c.w. as well. Note: If you're interested in working us on other modes, please E-mail me on **rob@pwpublishing.ltd.uk** and I'll keep you up-dated.

Successful Antenna

Many stations who worked GB80PW commented on the signal strength from my modest station – around 80W from my Alinco DX-SR8 – and it appears that recent changes to my main h.f. antenna have been most successful. Indeed, listening to GB80PW transmissions via the Dutch based web receiver at **http://www.nachtuilen.net/** adequately proved that the GB80PW signal was much stronger than it had been during our first operations on January 12th.

The modifications I carried out on the G3XFD antennas were very simple and if you have read my review of the MFJ-974B balanced feeder antenna tuning unit (a.t.u.) you'll remember I'm using the balanced twin feeder from **Spectrum Communications**.

Even though my inverted V dipole was giving excellent results with the feed-point angle at much less than the recommended minimum of 90° (it was actually around 75°) and was providing very good results to the east (as explained in my review) I was anxious to work more stations to the south and west.

I've now opened the feed-point angle up to approximately 115° by running one leg of the dipole down our driveway - using a convenient tree to anchor it. Getting the wire up and over the tree next to my shack was no problem – a plastic coathanger taped to a 10m roach pole type fibreglass mast (to form a wide V shape for the wire to be guided) worked a treat getting it up over the top of the tree and down to the driveway. I'd seen this very effective technique used by Tex G1TEX when he erected antennas for **GB75PW** at the **Poole Amateur Radio Society**'s clubroom – and the results have been worth the effort! We hope to work you soon!

Rob Mannion G3XFD/EI5IW

Practical Wireless
PW Publishing Limited
Arrowsmith Court
Station Approach
BROADSTONE
Dorset BH18 8PW

Tel: 0845 803 1979
Fax: 01202 659950

Editor
Rob Mannion G3XFD/EI5IW
rob@pwpublishing.ltd.uk

Technical Editor
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

Our 0845 numbers are charged at the BT Standard local Rate. Callers with an appropriate BT inclusive call package can call this number free!

Directors: Stephen Hunt & Roger Hall

Subscription Administration
Webscribe
Practical Wireless Subscriptions
Unit 8, The Old Silk Mill
Brook Street
Tring
Hertfordshire HP23 5EF
pw@webscribe.co.uk
www.mysubcare.com
☎ 01442 820580
Fax: 01442 827912

Subscriptions
Subscriptions are available at £38 per annum to UK addresses, £47 Europe Airmail and £57 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, Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW, 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 Broadstone 0845 803 1979. An answering machine will accept your order out of office hours and during busy periods in the office. You can also FAX an order, giving full details to Broadstone 01202 659950.
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: pwletters@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**.

£20 Star Letter

Happy 80th Birthday To Jack & *PW*!

Dear Rob,
Your special event station certainly woke-up 40m yesterday Saturday February 11th and made a lot of *PW* readers very happy in the process. Certainly 1932 was a very important year for both the magazine and myself – so I very much enjoyed our brief chat. As an additional bit of information which can only be sent by this means I thought you might like to see the very nice birthday cake which was made for me by my very talented sister-in-law, **Margaret**. It arrived on Thursday February 9th – my birthday – as a complete surprise.

I hope to repeat the contact in September for the actual 80th anniversary of *PW*, but I think I will find it even harder work to break the pile-up! Many thanks to you, **Phil G3XBZ** and **Tex G1TEX** for giving so much time and hard work to put-on the station. Very best wishes for many more years of publication.

Jack Hardcastle G3JIR
Rainford
St. Helen's
Merseyside

Editor's comment: *We were delighted to work you Jack and there were smilers all round in my shack as Tex. Phil and I joined in with you as we helped celebrate your birthday. I hope you enjoyed the cake and we hope very much that we manage to have another QSO with you on* ***Thursday September 13th*** *– the only Thursday that GB80PW will be on the air – to celebrate the actual 80th anniversary of the first publication of* PW.

Roy's 'Hooked' On Web Receivers!

Dear Rob,
since your mentioned in *Keylines* mention of **www.nachtuilen.net** in the March edition of *PW* I have been 'hooked' on the concept of listening to remote SDR receivers via the internet.

I have had a couple of (low priced but effective) single band SDR receivers in the shack for a year or more so I am aware of the technology but, like many Amateurs I am constrained by the location of my QTH and the limitations imposed by my antennas. Using the Dutch remote SDR facility and the other website which Tex Swann G1TEX told me about, **www.websdr.org** I have had many interesting and rewarding hours of 'remote' operation. The furthest DX I have netted, listening from Holland is Argentina (LU).

The purists will argue that this is 'not Amateur Radio' I would say that I am using the system to further my education, as I am enjoined to do by my licences. Thanks to you both for helping to add another interesting aspect to my hobby.

Roy Walker 2E1RAF
Old Hutton
Kendal
Cumbria

Editor's comment: *It's an extremely useful service Roy (see* Keylines *this month) and In have attempted to make contact with the people who operate the receiver to get more details and to thank them for the facility. I have no answer from them yet but Tex G1TEX tells me it's based at a Dutch University. If any readers can provide any more information I would be most grateful to hear from them.*

Researching The History Of Osmore Radio Products Ltd.

Dear Rob,
I'm writing to *PW* in the hope that your readers can help me in researching the history of **Osmor Radio Products Ltd,** the well known coil and coil pack manufacturer. I wonder if any *PW* readers have any early recollections of the company, especially from the pre- and immediate post-war years, or references to the history of the company that may have already been published elsewhere. Does anyone know, for example, when, where and by whom the company was formed? Please contact me at: **stef@altera.com** or via post. Thank you.

Stef Niewiadomski
59 Faringdon Road
Stanford in the Vale
Oxfordshire SN7 8NN

The Useful Nachtuilen Website & GB80PW

Dear Rob,
In *Keylines* in *Practical Wireless* March 2012 you mentioned the **http://www.nachtuilen.net/** website. As I'm not active from the home QTH at the moment, I thought I'd take a look at the website and was pleased to note that there was a 40 and 80m receiver

to listen to. I was quite surprised when tuning around February 11th on 40m – to come across **GB80PW** and who should be working the station but G3XFD! It was great to hear you on the air and while operating you made reference to your forthcoming Rail Tour over the Settle & Carlisle and also the Furness Line. I had a trip last October behind 46115 *Scots Guardsman* over the S&C, a fantastic day out; I hope you enjoy your trip as much as I did!

I'm currently in the process of building a 'Radio Shack' that will also be housing my proposed EM Gauge Model Railway Layout of Moretonhampstead in Devon. I'm planning to complete the constructional work by the autumn. I also hope to work you personally on 40 or 80m. Apparently, according to my log we last worked on December 5th 1982 – so think it's about time we had another QSO! Thank you for a great magazine – I'm really pleased with my subscription and I will see if I can do a write-up on my shack/ antennas later in the year. 73.
David Higgs G4NVB
Bletchley
Milton Keynes

Editor's comment: *Thank you David! Quite a few readers have written in to say how useful the website is (see my comment after Roy Walker 2E0RAF's letter). We would be very pleased to see the photograph of your finished shack when it's completed. We never get enough of this type of photo for use in* PW. *I also have no doubts whatsoever that I shall meet other Radio Amateurs on the Cumbrian Coast trip on February 25th and I'm sure it will be a super day out.*

Towers & Beams Are A 'No-No' At My QTH!

Dear Rob,
Replying to your request for information on the antennas used by *PW* readers – I'm writing to say that I have a reasonably-sized garden but I'm surrounded by neighbours – so I judge that towers and beams are a no-no. I've tried various multi-band wire antennas and the one I have now is the best – so far!

My present antenna a 132ft long off-centre fed dipole, which goes around three sides of the the garden about 20ft up. The feeder is at 44ft from one end and is 11ft of 450Ω ladder feeder line, terminated at the ground end by a home-made 4:1 current balun. It covers all bands from 6m to 80m. If I need 160m, I tie the two feeders together and feed them against ground. I have a battery operated automatic antenna tuner at the bottom of the feeder which gives me pretty much 1:1 in the coaxial feeder to the rig.

The feeder radiates, as does the horizontal 132ft section, so I've found it to be an excellent combination of vertical and horizontal radiation. Because the horizontal section is around most of the garden, it is pretty well omnidirectional.

Some people find that offset current fed dipoles are very noisy, but I haven't found this one so. It could definitely be improved by getting the whole lot up to about 30ft and using a 22ft feeder – a summer project for me! 73 and best wishes.
Bob Towers MM0RKT
Hamilton
South Lanarkshire
Scotland

Editor's comment: *Very interesting Bob - and although it will be difficult to photograph your antenna – I would like to see just what your antenna looks like in practice.*

The Editor Has Opened A Can Of Worms!

Dear Rob,
As the Editor of *PW* – you obviously like to live dangerously and you have opened a can of worms by asking (in *PW's Topical Talk*) to hear from readers about the antenna they prefer! But joking apart – it was great to work you on Saturday February 11th on 40m during the GB80PW activities.

I have a long narrow garden and live on an Estate hence no large arrays or towers for me! For the past seven years I have been using the standard G5RV running north–south along the garden, I have worked to date 32 of the 40 CQ zones using it and along with a recent purchase a basic SX80 antenna from **Snowdonia Radio** (think they have since closed down) have worked another two zones I didn't reach with the G5RV.

I know antennas are a very controversial love-it-or-hate-it topic but it works with me and i am more than glad to advise the use of a G5RV to anyone. Best Regards.
Ian Reichenfeld M0RGI
Liphook
Hampshire

Editor's reply: *Good to hear from you Ian! – and although I might have been risking it a bit by asking for feedback regarding favourite antennas – we've already had some very interesting and very good natured feed-back – including your own information. And although the E-mails and letters have only been arriving for a short while – it's good to learn just how successful some readers have been – even when using simple antenna systems and relatively low power in less than ideal locations. Hopefully, we'll get a large selection of letters on the subject and – if the writers provide a good impression of their QTH and the conditions they operate under – I'm sure we'll all learn a great deal.*

Great To Work GB80PW & Ideas To Encourage Youngsters

Dear Rob,
I enjoyed my 40m QSO with GB80PW on Saturday February 11th, and I think it's great that you were able to listen to opinion and open up the station on weekends. Well I must confess I have not read *PW* during all my time, I used to get *Shortwave Magazine* as a teenager in the 1970s and then went on to become a TV Service Engineer. But nowadays more often than not, I purchase *PW*, congratulations on the 80 years, and the magazine has contributed a lot to the hobby.

There is of course a challenge to be faced that of attracting the young to the hobby,and in this world a difficult challenge indeed with all the challenges of technology and the seemingly compulsory membership of Social Networking Sites. Even then the hobby has much to offer with D star and Data modes and there is probably more to come. I wonder if *PW* could launch a mentor scheme for the young where they could be helped through foundation and on to intermediate level etc by experienced licence holders and showcase their progress along the way? Perhaps

Listening To GB80PW – & Enjoying The Experience!

Dear Rob,
I'm writing to you because I've just been listening to the GB80PW 'pile-up' on 40m and – for someone who normally tunes away from pile-ups – I have to say I enjoyed the experience (apart from the minority of 'Lid' interfering stations). I especially enjoyed hearing you talk with **EI80IRTS** – the IRTS 80th anniversary station – which seemed somehow especially poignant.

It was quite obvious from "reading the mail" that the Amateur Radio community in this country have an enormous affection for *PW*, as indeed do I, although it is many years since I've been a regular reader. I'll explain.

I have this problem in that I find it extremely difficult to throw anything away, hence I try to avoid buying new stuff where I can, otherwise magazines just keep piling up and piling up and...(you can guess some of the comments my long-suffering wife makes!). However, I recently purchased the CDROM of 2010's issues!

I was also intrigued to your comments about "Ridge Hill" TV transmitter which you made to one station in Gloucester. I suspect that at some time you have been involved in QRO broadcast transmission and this has been my profession since the end of the 1970s, and I had the dubious honour of being involved in the commissioning of some of the new digital TV kit at Ridge Hill just before Christmas 2010 where we christened the site "Fridge Hill", as it was just a bit parky where we were working!

It is not an exaggeration to say that "*PW* changed my life" as the chance purchase of an issue in the early 1970s channelled my hobby interests in the direction of radio, and those hobby interests eventually became a career, and 30+ years later I am still QRV in both the hobby and that profession.

I have recently revisited an old G3OGR project from 1973, believe it or not! (It actually works!). And it's clear to me that the standing *PW* has in the world is due in large part to your vision and leadership and thought I would let you know that these matters don't go un-noticed! With very best wishes for the future.
Martin Rigby G4FUI
Penrith
Cumbria
www.g4fui.net

Editor's comment: *Thanks for your comments Martin – the* PW *Team enjoy serving readers. Martin and I have since exchanged a number of E-mails and it seems he too has enjoyed the famous 'Much Marcle Juice' produced by Weston's Cider Factory that has to be passed (honestly – it really is on the route to the transmitter!) when access to the Ridge Hill Transmitter is needed. It was a 'required stop' for IBA staff – although, of course, we never drank the apple and pear products while on duty! I now ask everyone to join me on the* Topical Talk *page for comments on deliberate interference to QSOs.*

a schools visit programme or just a demonstration to science classes? I would be interested to hear your thoughts, keep up the good work.
Stephen Day M6HES
Ossten
Ipswich
Suffolk

Editor's comment: *Thanks for your feedback Stephen – I shall be discussing your topics in* Keylines *soon. Watch that space!.*

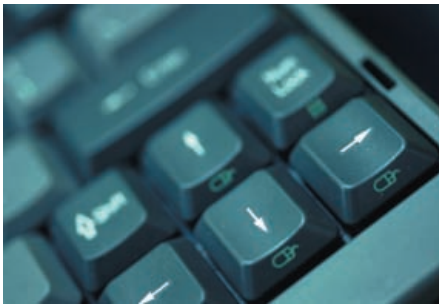
A Welsh Listener Reports On GB80PW

Dear Rob,
I just wanted to let you know I came across the GB80PW pile-up on Saturday morning February 11th at around 7.130MHz. I have enjoyed playing with various shortwave receivers since the mid 1980s and I often buy *PW*. I enjoy the letters, *Valve & Vintage* and **Harry Leeming G3LLL**'s *In The Shop*.

My current receiver is a Kenwood R-2000 with a random wire running through the attic and out into our tiny back garden. I have a switchable ground wire attached to the bedroom radiator which helps a lot on 40m. I also have an Eddystone 840C which is fun to play with.

I tuned in around 1055 hours, GB80PW was coming in around S9 just above my local noise and was in QSO with **M0VEY**. I often enjoy listening in on the Amateur bands when there's nothing on the broadcast wavelengths of interest. Congratulations to you and the *PW* team past and present on 80 years of service, all the best for the next 80 years! 73.
Ian Evans
Ebbw Vale
Gwent
South Wales

Editor's comment: *Nice to know you're listening in Ian! We'll be delighted to have more s.w.l. reports – and I'll send you your GB80PW card as soon as they arrive from the printer's.*



A great deal of correspondence intended for 'letters' now arrives via E-mail, and although there's no problem in general, many correspondents are forgetting to provide their postal address. I have to remind readers that although we will not publish a full postal address (unless we are asked to do so), we require it if the letter is to be considered. So, please include your full postal address and callsign with your E-Mail. All letters intended for publication must be clearly marked 'For Publication'. **Editor**

MOONRAKER

Manufacturers of radio communication antennas and associated products

We now accept PayPal payments online

SALES LINE 01908 281705

E-mail: sales@moonraker.eu

Web: www.moonraker.eu

KENWOOD

Authorised dealer

Hand-helds

TH-D72E Dual band 2/70cm with GPS & APRS **£429.95**

TH-F7E Dual band 2/70cm RX 0.1-1300MHz **£239.95**

New TH-K20E 2m FM Handheld, with 136-174 MHz RX and 5.5W output for only **£119.95**

New TH-K40E 70cm FM Handheld, with 400-470 MHz RX and 5.5W output for only **£119.95**

Mobiles

TM-D710E Dual band 2/70cm with APRS RX 118-524MHz & 800-1300MHz, 50 Watts **£444.95**

TM-V71E Dual band 2/70cm with EchoLink RX 118-524MHz & 800-1300MHz, 50 Watts **£299.95**

TM-271E Single band 2m, 60 Watts **£169.95**

Base

TS-590S HF & 6m 100W all mode transceiver **£1,339.95**

TS-2000X All mode transceiver HF/50/144/430/1200MHz 100 Watts All mode transceiver **£1,799.95**

TS-2000E All mode transceiver HF/50/144/430MHz 100 Watts All mode transceiver **£1,549.95**

TS-480HX HF/6m 200 Watts Transceiver **£879.95**

TS-480SAT HF/6m 100 Watts Transceiver **£779.95**

Accessories

PS-60 25amp power supply unit ideal for the new TS-590S **£329.95**

SP-23 External speaker **£74.95**

SP-50B Mobile speaker **£29.95**

MC-90 Deluxe desk microphone suitable for DSP transceivers **£204.95**

MC-60A Desk microphone with pre-amplifier **£129.95**

HS-5 Deluxe headphones **£56.95**

WOUXUN

Authorised dealer

Handhelds

KG-UVD1PL New fab dual band 4m/2m handie just **£99.95**

New KG-UVD6 improved version of KG-UV handie at under a ton – amazing **£94.95**

KG-679E Superb single band 2m **£59.95**

Accessories

WO/ELO-001 Battery eliminator **£10.95**

WO/CCO-001 12v Car charger **£10.49**

WO/SMO-001 Speaker microphone **£15.95**

WO/PSO-110 Programming software **£20.49**

WO/CASE Leather case **£10.49**

TYT

TYT-800 2m 144-146MHz 5 watts 199 channels amazing **£49.95**

TYT TH-UVF1 2/70 5 watts 128 channels **£99.95**

Accessories

TYT-BE Battery eliminator **£14.95**

TYT-SP Speaker microphone **£14.95**

TYT-EP Ear piece **£7.95**

MOONRAKER

HT-90E 2m single band transceiver with full 5 watts output just **£59.95**

The HT-90E is a brilliant compact radio, perfect for beginners to the hobby. Comes complete with battery, belt clip, antenna, and rapid charger all for under £60 quid! Everything you need to get on air is in the box!

ICOM

Authorised dealer

Hand-helds

IC-E80D D-Star dual band 2/70cm handheld with wideband RX 0.495-999.99MHz **£329.95**

IC-E92D Dual band 2/70cm RX 0.495-999.9MHz with built in DSTAR **£389.95**

IC-E90 Tri band 6/2/70cm RX 0.495-999.9MHz **£239.95**

IC-T70E dual band 2/70cm handheld with 5W Tx & 700mW loud audio **£159.95**

IC-V80E single band 2m handheld with 5.5W Tx & 750mW loud audio **£104.95**

Mobiles

IC-7000 All mode HF/VHF/UHF 1.8-50MHz, 100 Watts output **£1,189.95**

ID-1 Single band 23cm 1240-1300MHz digital and analogue DSTAR transceiver **£719.95**

IC-E2820 + UT123 Dual band 2/70cm with DSTAR fitted, 50 Watts output **£699.95**

IC-E2820 Dual band 2/70cm DSTAR compatable, 50 Watts output **£499.95**

ID-E880 D-Star ready dual band with wide band RX 0.495-999.99MHz **£439.95**

IC-2200H Single band 2m 65 watts **£229.95**

Base

IC-9100 HF/VHF/UHF All in one transceiver to 23cm (optional) – amazing! In stock NOW **£2,899.95**

IC-7800 HF/6m All mode 200 Watts Icom flagship radio **£8,999.99**

IC-7700 HF/6m 200 Watts with auto ATU transceiver **£6,349.95**

IC-7600 HF/6m 100 Watts successor to the IC-756 ..... **£3,299.99**

IC-7410 HF to 6m 100W all-mode **£1,695.95**

IC-7200 HF/VHF 1.8-50MHz RX 0.030-60MHz, 100 Watts output (40w AM) **£839.95**

IC-718 HF 1.8-30MHz RX 300kHz-29.999MHz, 100 Watt output (40w AM) **£599.95**

AnyTone

Authorised dealer

AT-588 2m 60W mobile RX 136-174 MHz **£149.95**

AT-5189 4m 25W mobile RX 66-88MHz **£149.95**

AT-5555N 10m 12W mobile RX 25-30 MHz..... **£149.95**

AT-5189PC programming software and lead for AT-5189 ..... **£14.95**

AT-5555PC programming software and lead for AT-5555N **£14.95**

QUANSHENG

TG-UV2 dual band 2/70cm 5 Watts with 200 memories ..... **Only £81.95**

TG-UV2-ELEM Battery Eliminator **£9.95**

TG-UV2-SPK Speaker microphone **£9.95**

TG-UV2-CASE Leather case **£9.95**

TG-UV2-PROG Programming cable and software **£19.95**

YAESU

Authorised dealer

Hand-helds

VX-8DE Triband same spec as VX-8E but with enhanced APRS **£369.95**

VX-8GE Dual band with built-in GPS antenna and wideband 100-999.90MHz Rx **£349.95**

VX-7R Tri band 50/144/430MHz RX 0.5-900MHz, 5 Watts outut **£299.95**

VX-6E Dual band 2/70cm RX 1.8-222/420-998MHz, 5 Watts output **£249.95**

FT-60E Special offer ~~£179.95~~ ..... now **£129.95** massive £50.00 saving

VX-3E Dual band 2/70cm RX 0.5-999MHz, 3 Watts output **£169.95**

VX-170E Last few at this price **£99.95**

FT-270E Single band 2m, 144-146MHz, 137-174MHz Rx **£109.95**

Mobiles

FT-857D All mode HF/VHF/UHF 1.8-430MHz, 100 Watts output **£699.95**

FTM-350 Dual band with Bluetooth, GPS & APRS **£479.95**

FT-8900R Quad band 10/6/2/70cm 28-430MHz, 50 Watts output **£389.95**

FT-8800E Dual band 2/70cm RX 10-999MHz, 50 Watts output **£339.95**

FTM-10E Dual band 2/70cm, 50 Watts output **£309.95**

FT-7900E Dual band 2/70cm 50/40 Watts with wideband RX **£239.95**

FT-2900E Single band 2m 75 Watt heavy duty transceiver **£139.95**

FT-1900E Single band 2m 55 Watt high performance transceiver **£129.95**

Portable

FT-897D HF/VHF/UHF Base/Portable transceiver 1.8-430MHz 100 Watts HF+6, 50 Watts 2M, 20 Watts 70cm **£809.95**

FT-817ND HF/VHF/UHF Backpack Transceiver RX 100kHz – 56MHz 76-154MHz 420-470MHz 5 Watts **£539.95**

Base

FT-2000D HF/6m All mode 200 Watts transceiver RX: 30kHz – 60MHz **£2,899.95**

FT-2000 HF/6m All mode 100 Watts transceiver RX: 30kHz – 60MHz **£2,249.95**

FT-950 HF/6m 100 watt transceiver with DSP & ATU RX 30kHz – 56MHz **£1,259.95**

FT-450 Compact transceiver with IF DSP, HF+6m 1.8-54MHz, 100 Watts output **£649.95**

FT-450D "New" model compact transceiv er with built-in ATU **£839.95**

RANGER Communications Inc.

Authorised dealer

Mobiles

RCI-2970N2 All mode 10/12m with a massive 100 Watts output **£399.95**

RCI-5054DX-100 All mode 6m 50-54MHz with 50 Watts output **£299.95**

RCI-2950DX3 All mode 10/12m with 10 Watts output **£299.95**

MOONRAKER Yagi Antennas

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

YG27-4 Dual band 2/70 4 Element (Boom 42") (Gain 6.0dBd) **£59.95**
YG4-2C 2 metre 4 Element (Boom 48") (Gain 7dBd) **£29.95**
YG5-2 2 metre 5 Element (Boom 63") (Gain 10dBd) **£59.95**
YG8-2 2 metre 8 Element (Boom 125") (Gain 12dBd) **£79.95**
YG11-2 2 metre 11 Element (Boom 185") (Gain 13dBd) **£119.95**
YG3-4 4 metre 3 Element (Boom 45") (Gain 8dBd) **£69.95**
YG5-4 4 metre 5 Element (Boom 104") (Gain 10dBd) **£79.95**
YG3-6 6 metre 3 Element (Boom 72") (Gain 7.5dBd) **£69.95**
YG5-6 6 metre 5 Element (Boom 142") (Gain 9.5dBd) **£89.95**
YG13-70 70 cm 13 Element (Boom 76") (Gain 12.5dBd) **£54.95**

MOONRAKER ZL Special Yagi Antennas

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

ZL5-2 2 Metre 5 Ele, Boom 95cm, Gain 9.5dBd **£59.95**
ZL7-2 2 Metre 7 Ele, Boom 150cm, Gain 11.5dBd **£69.95**
ZL12-2 2 Metre 12 Ele, Boom 315cm, Gain 14dBd **£99.95**
ZL7-70 70cm 7 Ele, Boom 70cm, Gain 11.5dBd **£39.95**
ZL12-70 70cm 12 Ele, Boom 120cm, Gain 14dBd **£49.95**

MOONRAKER HB9CV

Brilliant 2 element beams ... ideal for portable use

HB9-70 70cm (Boom 12") **£24.95**
HB9-2 2 metre (Boom 20") **£29.95**
HB9-4 4 metre (Boom 23") **£39.95**
HB9-6 6 metre (Boom 33") **£49.95**
HB9-627 6/2/70 Triband (Boom 45") **£69.95**

MOONRAKER Halo Loops

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

HLP-2 2 metre (size approx 300mm square) **£24.95**
HLP-4 4 metre (size approx 600mm square) **£34.95**
HLP-6 6 metre (size approx 800mm square) **£39.95**

MOONRAKER G5RV Wire Antennas

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

G5RV-HSS Standard Half Size Enamelled Version, 51ft Long, 10-40 Metres **£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 Trapped Wire Dipole Antennas

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

MDT-6 FREQ:40 & 160m LENGTH: 28m POWER: 1000 Watts **£79.95**
MTD-1 (3 BAND) FREQ:10-15-20 Mtrs LENGTH:7.40 Mtrs POWER:1000 Watts **£69.95**
MTD-2 (2 BAND) FREQ:40-80 Mtrs LENGTH: 20Mtrs POWER:1000 Watts **£79.95**
MTD-3 (3 BAND) FREQ:40-80-160 Mtrs LENGTH: 32.5m POWER: 1000 Watts **£129.95**
MTD-4 (3 BAND) FREQ: 12-17-30 Mtrs LENGTH: 10.5m POWER: 1000 Watts **£69.95**
MTD-5 (5 BAND) FREQ: 10-15-20-40-80 Mtrs LENGTH: 20m POWER:1000 Watts **£119.95**

(MTD-5 is a crossed dipole with 4 legs)

MOONRAKER Multiband Mobile

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

SPX-100 9 Band plug n' go portable, 6/10/12/15/17/20/30/40/80m, Length 165cm retracted just 0.5m, Power 50W complete with 38th PL259 or BNC fitting to suit all applications, mobile portable or base ... brilliant! **£44.95**
SPX-200 6 Band plug n' go mobile, 6/10/15/20/40/80m, Length 130cm, Power 120W, 3/8th fitting **£39.95**
SPX-200S 6 Band plug n' go mobile, 6/10/15/20/40/80m, Length 130cm, Power 120W, PL259 fitting **£44.95**
SPX-300 9 Band plug n' go mobile, 6/10/12/15/17/20/30/40/80m, Length 165cm, High Power 200W, 3/8th fitting **£54.95**
SPX-300S 9 Band plug n' go mobile, 6/10/12/15/17/20/30/40/80m, Length 165cm, High Power 200W,PL259 fitting **£59.95**
AMPRO-MB6 6 Band mobile 6/10/15/20/40/80m, length 220cm, 200W, 3/8th fitting, (great for static use or even home base – can tune on four bands at once) **£74.95**
ATOM-AT4 10/6/2/70cm Gain 2m 2.8dBd 70cm 5.5dBd, Length 132cm, PL259 fitting (perfect for FT-8900R). **£59.95**
ATOM-AT5 5 Band mobile 40/15/6/2/70cm, Length just 130cm, 200W (2/70) 120W (40-6M) PL259 fitting, (great antenna, great price and no band changing, one antenna, five bands) **£69.95**
ATOM-AT7 7 Band mobile 40/20/15/10/6/2/70cm, Length just 200cm, 200W (2/70) 120W (40-6M) PL259 fitting, (Brilliant antenna HF to UHF with changeable coils) **£79.95**

DIAMOND ANTENNA Yagi Antennas

Diamond performance from the superb Diamond factory

A502HB 6m 2 Elements, Power 400W, Gain 6.3dBi, Radial Length 3m **£109.95**
A144S10R 2m 10 Elements, Power 50W, Gain 11.6dBi, Boom Length 2.13m **£99.95**
A144S5R 2m 5 Elements, Power 50W, Gain 9.1dBi, Boom Length 95cm **£59.95**
A430S15R 70cm 15 Elements, Power 50W, Gain 14.8dBi, Boom Length 224cm **£79.95**
A430S10R 70cm 10 Elements, Power 50W, Gain 13.1dBi, Boom length 119cm. **£59.95**

MOONRAKER HF Mobiles

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

AMPRO-10 28MHz, Length 220cm, 38th fitting (slimline design) **£19.95**
AMPRO-12 24MHz, Length 220cm, 38th fitting (slimline design) **£19.95**
AMPRO-15 21MHz, Length 220cm, 38th fitting (slimline design) **£19.95**
AMPRO-17 18MHz, Length 220cm, 38th fitting (slimline design) **£19.95**
AMPRO-20 14MHz, Length 220cm, 38th fitting (slimline design) **£19.95**
AMPRO-30 10MHz, Length 220cm, 38th fitting (slimline design) **£19.95**
AMPRO-40 7.0MHz, Length 220cm, 38th fitting (slimline design) **£19.95**
AMPRO-80 3.5MHz, Length 220cm, 38th fitting (slimline design) **£24.95**
AMPRO-160 1.8MHz, Length 220cm, 38th 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 Ground Plane Free Colinear Verticals

You've have always wanted antennas without radials, without the compromise of performance – well now you can.

SQBM110P 2/70cm, Gain 3/6dBd, RX:25-2000MHz, Length 100cm, SO239 fitting **£54.95**
SQBM1010P 6/2/70cm, Gain 1.5/2.0/5.0dBd, RX25-2000MHz, Length 140cm, SO239 fitting **£84.95**
SQBM1010N 6/2/70cm, Gain 1.5/2.0/5.0dBd, RX25-2000MHz, Length 140cm, N-Type fitting **£89.95**
SQBM225P 2/70/23cm, Gain 2.5/5.0/8.5dBd, RX25-2000MHz, Length 130cm, SO239 fitting **£79.95**
SQBM225N 2/70/23cm, Gain 2.5/5.0/8.5dBd, RX25-2000MHz, Length 130cm, N-Type fitting **£84.95**

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!

NEW GP2500F fibreglass version now in stock **£279.95**

MOONRAKER All New MP2500 HF Base Loaded Mobile Antenna

TX 40-6m & RX 3-100MHz VSWR 2:1 (atu recommended for best results) length 2m power 120W SSB

intro price just £199.95

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 3.0dBi/5.0/7.5dBdBd, Length 150cm, PL259 fitting (high quality)	**£39.95**
MRQ273	2/70/23cm Gain 3.5/5.5/7.5dBdBd, Length 85cm, PL259 fitting (high quality)	**£49.95**

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

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**

CHAMELEON ANTENNA™ New appointed UK dealer! New lower prices on these smash hit antennas from the U.S.

Chameleon V1 HF/VHF/UHF 11 bands 80-70cm multiband base antenna 500W SSB **£149.95**

Chameleon V2 HF/VHF/UHF 11 bands 80-70cm multiband mobile antenna 200W SSB **£99.95**

Chameleon V3 HF/VHF/UHF 160-70cm ultimate portable antenna 250W SSB **£349.95**

Chameleon V4 HF/VHF 20-6m Ultra portable antenna, dipole or end fed 250W SSB **£109.95**

Moonraker Retail Shop & Mail Order
Cranfield Road, Woburn Sands,
Bucks MK17 8UR
Tel: 01908 281705
Open Mon-Fri 9-5:30pm

Moonraker Satellite Shop
@ M5 Communications
Moto Services Area, Junction 30 M5 South
Exeter EX2 7HF. Tel: 01392 367097
Open Mon-Thur 9-6pm Fri 9-4pm

News & Products

Send your info to:

Newsdesk, PW Publishing Ltd., Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW
E-mail: newsdesk@pwpublishing.ltd.uk

Vega VV01's Victorious Launch

The first Vega, flight VV01, lifted off at 1000UTC on Monday February 13th from the ESA Spaceport at Kourou in the Caribbean. It was carrying eight student-built Amateur Radio satellites and the LARES Laser Relativity Satellite into orbit.

At 1153UTC **Drew Glasbrenner KO4MA** reported hearing signals from the satellites as they were over Florida. Signals were first heard in the United Kingdom at around 1207UTC.

In Germany **Mike Repprecht DK3WN** copied the satellites at an elevation of just 3° at 1209 UTC, see **www.dk3wn.info/p/?cat=83**

A recording of PW-Sat made by **Wouter Weggelaar PA3WEG** at 1207UT can be heard at **www.pa3weg.nl/pa3weg/recordings/PW-SAT%20recording%20PA3WEG%2013-02-2012_1207UTC.mp3**

In the Czech Republic **Mirek Kasal OK2AQ** received strong signals from Masat-1 **www.urel.feec.vutbr.cz/esl/files/Othact/masat1_rev5.wav**

Nittin Muttin VU3TYG received PW-Sat at 1246UTC as it travelled over India, his recording can be found at **http://vu3tyg.addr.com/pwsat/pw_sat-%20Feb%2013th.mp3**

In Sudan Nader ST2NH received signals from AlmaSat-1 and Masat-1.

As of Monday evening signals had been reported from AlmaSat-1, Goliat, Masat-1, PW-Sat, UniCubeSat and XaTcobeo.

International Amateur Radio Union

All the Vega Amateur Radio satellite project teams used the IARU Amateur satellite frequency coordination panel service. A benefit of IARU coordination was that all the different u.h.f. satellite signals could be simultaneously captured within the typical 192kHz bandwidth of a modern Software Defined Radio (SDR).

The PW-Sat is the only satellite with a downlink in the 145MHz band. Its 1200bps BPSK signal on 145.900MHz is receivable with an s.s.b. radio and an omni-directional antenna.

When PW-Sat has finished its primary scientific mission it will be reconfigured as a 435/145MHz f.m. to d.s.b. transponder for general Amateur Radio communications. The f.m. to Double Sideband transponder was first pioneered by Amateurs on the satellite AO-16.

The other amateur radio satellites have downlinks in 437MHz. A small 430 MHz band Yagi antenna may be used to receive the signals. Further information on UKAMSAT is available from **Trevor Hawkins M5AKA** via **m5aka@yahoo.co.uk**

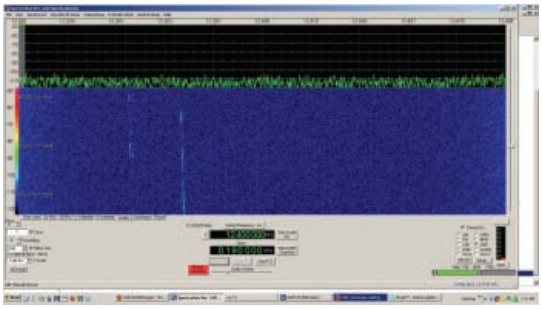
The Masat Cube Satellite.

The first Vega, flight VV01, lifted off at 1000UTC on Monday February 13th from the ESA Spaceport at Kourou in the Caribbean.

Roy Lisle G0SLR Wins The Heil HM-12b Microphone!

The 'Win A Heil Genesis HM-12 Microphone and Lead – Worth £109!' competition sponsored by **Bob Heil K9EID** of **Heil Sound Inc.** and **Waters & Stanton PLC** – has been won by **Roy Lisle G0SLR** who lives in **Penketh**, **Warrington**, in Cheshire. His was the first fully correct entry drawn out of the *PW* Editor's outsize hat on Monday February 20th – and Roy will receive his prize directly from W&S. We expect to eventually hear a superb transmission from G0SLR whenever he transmits in the future! Congratulations Roy and thank you also to the very large number of readers who entered our free competition. **Editor**.

Bob Heil K9EID's HM-123b Microphone prize has been won by Roy Lisle G0SLR.



Drew Glasbrenner KO4MA's screenshot of the Vega CubeSats signals as recorded at his QTH.

Martyn Medcalf G1EFL – Chelmsford ARS Amateur Of The Year

A very proud Martyn Medcalf G1EFL poses with his Chelmsford Amateur Radio Society Amateur of the Year Award.

An extremely pleased **Martyn Medcalf G1EFL** contacted *Newsdesk* to explain the reason why! "I was so surprised to be picked for this Chelmsford Amateur Radio Society Amateur of the Year Award. It was presented to me my **Carl Thomson G3PEM** our President. The wording was as follows; *For Long Term Commitment to CARS Training and continued Management of CARS*.

Martyn then chatted to *Newsdesk* to give us his background. "I'm a 55 year old local chap born and bred in Chelmsford and now retired after working in the water industry for 30 years. This year I will have also held my Amateur Radio licence for 30 years. For the past few years I have been in charge of obtaining various items of merchandise for CARS i.e garments, mugs, stickers etc and selling these items to club members. I have been involved with the CARS training team for some time where I have in the past presented on safety and help out on the various bases on the Foundation Licence course. I have invigilated on both the foundation and intermediate courses. We have just finished the 25th Foundation Course with the club.

"I have been married to **Val** for 14 years and have tried to get her interested in Amateur Radio – but without success so far! Although she has helped me in the past when I have put up antennas and with checking the s.w.r., etc."

Congratulations Martyn from the *PW* team! Editor.

Martin Lynch Launches MyDEL-Surman Antennas

Martin Lynch G4HKS of Chertsey-based ML&S contacted *Newsdesk* with news of new products, "With the unfortunate demise of **Hokushin-Maldol** antennas several years ago and with the ever increasing costs of the Japanese brands, we thought that customers wanted a budget-friendly alternative in this current 'careful what you spend' market.

"We've proved that low cost doesn't mean low quality. Wouxun is now the best selling hand-held manufacturer in Europe, not just because of the very low price – but because the brand offers excellent quality and features per £. We know customers will view MyDEL-Surman Antennas in the same way. With mobile dual band 'mag-mounted' antennas starting at only £12.95 and innovative dual-band mobiles with built-in radials for dual purpose home use at only £29.95, the range will cause quite a stir in the Amateur Radio market."

ML&S Martin Lynch & Sons Ltd.,
Outline House
73 Guildford Street
Chertsey
Surrey
United Kingdom KT16 9AS
Tel: (01932) 567333
FAX (01932) 567222
E-mail: **Martin@MLandS.co.uk**
Website: **www.MLandS.co.uk**

Bournemouth Radio Society Rally Cancelled

John Bales G0HAT contacted *Newsdesk* with the announcement; "It is with great regret that the **Bournemouth Radio Society** have unfortunately had to cancel the club's annual rally on Sunday March 11th at the Kinson Community Centre at Pelham's Park, Bournemouth – due to circumstances beyond our control. We're hoping to mount the rally next year in March as usual. Our apologies go to everyone who was hoping to attend this year."

John Bales G0HAT (Organiser). E-mail: **johncbales@yahoo.co.uk**

Early TV Convention USA 2012 Convention

The 2012 Early Television Convention, co-ordinated by the **Early Television Museum** (USA), will be held from Friday May the 4th to Sunday May 6th, in Hilliard, in Village Church Ohio, USA. This is about six blocks away from the Early TV Museum 5396 Franklin St., Hilliard, OH 43026. The organisers say that this annual event has probably become the world's foremost convention of television history!

There will be the usual socialising among collectors and historians on Friday evening. Saturday will have a swap meet and auctions followed by presentations in the afternoon. This year, the presentations currently include: Contributions of Hazeltine Research to the Development of NTSC and PAL; The evolution of the TV Camera; RCA Prototype Color Sets; The CPA Prototype Color Set – with the possibility of additional presentations to be added!

There will be both a luncheon and a banquet. On the Sunday, there will be a meeting of the group planning to add cathode ray tube (c.r.t.) rebuilding to the program of the Early Television Museum, and a TV restoration workshop.

On both Friday evening and Sunday, there will be opportunities for socialising among the convention visitors. For more information, go to **www.earlytelevision.org/2012_convention.html** and register online.

Further details from: **info@earlytelevision.org**

The RSGB's Previous General Manager

The March issue of *RadCom* – the **Radio Society of Great Britain's** monthly journal carries the following statement: "At a hearing on 11 January 2012 in the Bedford County Court, judgement in favour of the Society was granted against its previous General Manager in the sum of £40,038.80 plus fixed costs of £840, which sum is payable immediately. The judgement debt is to be repaid in full by 31 May 2012 after which the Society may take enforcement action to recover any outstanding sums. In the meantime, the Court has granted leave for the Society to apply for a charging order now to establish security for the debt." (From page 10, March 2012 *RadCom*).

Ofcom Consultation Addendum

Ofcom (The UK spectrum regulator) has published (on February 17th 2012) an addendum to the second consultation on assessment of future mobile competition and proposals for the award of 800MHz and 2.6GHz spectrum. The addendum clarifies proposals for the spectrum portfolios that would be available to opted-in bidders if "Everything Everywhere" (the Orange and T-Mobile consortium) was to divest its 1800MHz spectrum before the planned auction at the end of 2012. See **http://stakeholders.ofcom.org.uk/consultations/award-800mhz-2.6ghz/?utm_source=updates&utm_medium=email&utm_campaign=addendum-800mhz**

Two Consultations Launched By The RSGB

The **Radio Society of Great Britain (RSGB)** have announced that they will shortly be introducing two new consultations to draw Members into the RSGB policy creation process. Some topics will also be open to non-Members.

"The processes are being piloted on two issues and we hope that many people will feel able to contribute. The first consultation looks at the RSGB's Spectrum Strategy. The second seeks views on how we could celebrate the Queen's Diamond Jubilee with some form of QSO Party.

"The proposed Spectrum Strategy is being developed by the RSGB Spectrum Forum. It will take into account the outcomes of the current World Radiocommunication Conference, which is due to end on February 17th. It is expected that the Spectrum Strategy consultation will commence on 1 March. All UK Amateurs are invited to read and comment on the proposals and post their responses online.

"The Queen's Diamond Jubilee QSO Party consultation uses a different approach. People will be invited into an internet discussion list to seek a consensus on a proposed draft for the QSO Party. We have called this approach a Litmus Test. The QSO Party Litmus Test will go live on Wednesday February 15th."

Further information and access to the consultations can be found at **www.rsgb.org.uk/consultations**

Registering For Olympic QSL Cards & Marketing Licence

The registration scheme for QSL Cards To Mark the Olympic Games has been announced in an official Press Release by **Reloof Lirpa** – the Lithuanian born radio enthusiast who has volunteered his services to the **Olympic Services Promotional Remuneration Recovery Services** (OSPRRS).

Reloof, a keen athlete himself – he's a Marathon runner – has been active in Amateur Radio as a listener for many years in his Lithuanian homeland and hopes to get his UK Foundation Licence soon.

"But my Foundation licence has to wait", he told *Newdesk*, "as my task now is to recruit Radio Amateurs to help promote the Olympic Games and increase remuneration for the event". He then explained how Radio Amateurs can register with the OSPRRS to obtain the necessary Licence agreement to enable them to print their QSL cards. The Licence is available for a one-off fee of £100 and once the licence has been purchased this gives the Licensee the right to purchase the use of the officially sanctioned Five Ringed QSL design, which costs £150. The licence only remains remain actives from the date of purchase to the end of the Olympic Games and enables the individual OSPRRS Licensee to order as many copies of the QSL card from the printer of their choice.

Reloof explained, "Rather than for us to just print the QSL Card it was thought better to allow individual Licensees to find the printer themselves from the List Of Official Printers Enrolled (LOOPE) and then fund each print run. We expect that QSL cards to cost approximately £10 for 50 and the necessary (non-optional) Olympic sponsored commemorative envelope – each costing £1 – to be very popular because as part of the licence agreement they can only be posted direct (not via a QSL Bureau). So applicants are advised to apply immediately to the website for their Licence before the cut-off date, the day after **March 31st**. Full instructions are provided on the website and all unused QSL cards – after the Olympics have finished – must be returned to the Licensing Office where they will be recycled by the OSPRRS". (Return mailing labels are available at £5 each).

Reloof Lirpa can be contacted via his E-mail; **Lirpa.Reloof@fiveringsfunding.com**

Or via the Website **www.fiveringsfunding.com** where readers can register for their QSL cards.

Heard Island DXpedition Cancelled

Newdesk has been informed that the planned DXpedition to **VK0/H Heard Island** has been put on hold until further notice. The co-organisers, **Chris Dimitrijevic VK3FY** and **Steve Chamberlain VK6IR**, said the decision came in part due to the current global financial situation, the extremely high financial cost and it would take an estimated USD$500,000 for such a DXpedition.

Chris VK3FY and Steve VK6IR both wish to proceed to Heard Island, about 4100km south west of Perth in Western Australia, but the financial risks are far too great at this time. Earlier it was announced that planning was underway for a DXpedition in February in 2013 involving two weeks, on what was number five of the most wanted DX Entities worldwide.

For future up-dates on the DXpedition please see **Carl Mason GW0VSW**'s column *HF Highlights* in *PW*.

Rallies

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.

Send your rally info to:

PW Publishing Ltd., Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW
E-mail: newsdesk@pwpublishing.ltd.uk

MARCH

March 10th
The National Radio Flea Market
The Foundation Amateur Radio Club Bossche (BRAC) will be hosting the Dutch National Radio Flea Market at the Autotron Rosmalen, Graafsebaan 133, Rosmalen 5248, The Netherlands. The doors will open at 9.00am and admission will cost €7.00. There will be talk-in on S20 (V40), trade stands, a flea market, special interest groups and catering will be available.
E-mail: info@radiovlooienmarkt.nl
www.radiovlooienmarkt.nl

March 11th
The Bournemouth Annual Sale CANCELLED. An apology from the organisers has been placed in the news pages this month.
The Bournemouth Radio Society will be holding its 24th Annual Sale at the Kinson Community Centre, Pelhams Park, Millhams Road, Kinson, Bournemouth BH10 7LH. The doors will open at 9.30am and admission will cost £1.50.
John G0HAT
Tel: 07719 700771

March 11th
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
www.wrcrally.co.uk

March 25th
The Spring Hangar Sale
The Spring Militaria, Electronics and Radio Amateur Hangar Sale will be held at the Hack Green Secret Nuclear Bunker, Nantwich, Cheshire CW5 8AL. The doors will open at 10.00am and admission will be £2.50. There will be civil, military and vintage radio equipment plus vehicle spares and more.
Rod Siebert
Tel: 01270 623353
E-mail: coldwatr@hackgreen.co.uk
www.hackgreen.co.uk

March 25th
The Devon & Cornwall HAMFEST
The Devon & Cornwall HAMFEST will be held at The Engine House, Compton Park, Callington PL17 8EA. Compton Park is an open air venue that offers ample car parking. There will be trade stands, computer stalls, a car boot sale, special interest groups, a special event station, family attractions, catering and a licenced bar.
Dereck White M0YDW
E-mail: disco5live@btinternet.com

APRIL

April 1st
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.
Stan Goodwin G0RYM
Tel: 07833 517370
E-mail:
SouthGlosRadioRallyCoordinator@gmail.com
www.southglosradiorally.org.uk

April 1st
The Lough Erne Rally
The Lough Erne Amateur Radio Club will host the Enniskillen Amateur Radio Show at The Share Holiday Village, Smith's Strand, Lisnaskea, Co. Fermanagh BT92 0EQ. The venue is on the shores of Upper Lough Erne and can be accessed via the Shannon-Erne Waterway. The doors open at 11.30am and there will be car parking, trade stands, a Bring & Buy, catering, a licenced bar and facilities for the disabled.
Iain
Tel: 02866 326693
E-mail: iain@learc.eu
www.lougherneradioclub.co.uk

April 15th
The Norbreck Rally*
The 50th 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 11.00am (10.45am for the disabled) and admission will cost £5.00 (under 14s are free). There will be talk-in, car parking, trade stands, a Bring & Buy, special interest groups, a licensed bar, catering and facilities for the disabled.
Dave M0OBW
Tel: 01270 761608
E-mail: dwilson@btinternet.com
www.narsa.org.uk

April 15th
The Cambridge Rally
The Cambridgeshire Repeater Group Rally will be held at the Foxton Village Hall, Hardman Road, Foxton, Cambridge CB22 6RN. The doors open at 10.00am (7.00am for traders) and admission will cost £2.00. There will be talk-in on S22, trade stands, a Bring & Buy, catering and facilities for the disabled.
Lawrence M0LCM
Tel: 01223 711840
E-mail: rally2012@cambridgerepeaters.net
www.cambridgerepeaters.net

April 22nd
The 8th International DX Convention
The 8th International DX Convention will be held at Paestum, Salerno in Italy. Further information can be found on the convention website.
www.dxitalia.it

April 22nd
The Yeovil QRP Convention
The 28th Yeovil QRP Convention will be held at the Digby Hall, Hound Street, Sherborne, Dorset DT9 3AA (adjoining the central shopping car park). The doors open at 9.30am and there will be talk-in on S22, car parking, trade stands, a Bring & Buy, lectures, catering and facilities for the disabled.
Derek M0WOB
Tel: 01935 414452
E-mail: yarc-contact@tiscali.co.uk

April 22nd
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: inforadiofairs.co.uk
www.radiofairs.co.uk

MAY

May 6th
The Dambusters Rally
The Dambusters Radio Rally will be held at the Thorpe Camp Visitor Centre, Tattershal Thorpe, Nr. Coningsby, Lincolnshire LN4 4PE. The doors open at 10.00am and admission will cost £3.00 (under 12s are free). There will be talk-in on S22 (GB3FR), free car parking, trade stands (pitches will be free but their size will be limited if they are not pre-booked), a car boot sale and catering will be available. In addition, there is an RAF Heritage Centre on site.
E-mail: tcrm@hotmail.co.uk
www.qsl.net/gb4tcm/dambusters.html

May 7th
The Dartmoor Rally*
The Dartmoor Radio Club Rally will be held at Tavistock College, Crowndale Road, Tavistock, Devon PL19 8DD. The doors will open at 10.30am (10.15am for the disabled) and admission will cost £2.00. There will be free car parking, trade stands, a Bring & Buy, special interest groups, catering and facilities for the disabled. **Viv**
Tel: 01752 823427
E-mail: vivwatsondrc@aol.com

May 12th
The Rochdale Flea Market
The Rochdale and District Amateur Radio Society Summer Ham Radio Flea Market and Junk Sale will be held at St Vincent's R.C. Church Hall, Caldershaw Road, Norden, Rochdale OL12 7QL. The doors will open at 10.00am. There will be trade stands, a Bring&Buy, a car boot sale and special interest groups. Pitches will cost £7.50 and the first 22 bookings will get a free table.
G0PUD
Tel: 01706 346517
E-mail: dave.shawl@sky.com

May 18th/20th
The Dayton Hamvention
The Dayton Hamvention will be held at the Hara Arena, 1001 Shiloh Springs Road. Dayton, Ohio, 45415 USA. A three-day pass costs purchased in advance costs $20 or $25 on the door. There will be free parking behind the Salem Mall, trade stands, a flea market, a car boot sale, lectures, special interest groups, a prize draw, catering and facilities for the disabled.
www.hamvention.org

JUNE

June 2nd
Mini Ham Radio Convention
The Central Scotland Mini Ham Radio Convention will be held at Crofthead Farm Community Education Centre, Templar Rise, Livingston EH54 6DG. The doors will open at 10.00am (9.50am for the disabled). There will be trade stands, a flea market, a Bring & Buy, lectures, an RSGB bookstall, a prize draw and catering will be available.
http://uk.groups.yahoo.com/group/cshrc

June 3rd
The Spalding Rally
The Spalding and District Amateur Radio Society Annual Rally will be held at the Sir John Gleed Technology School, Halmer Gardens, Spalding, Lincolnshire PE11 2EF. The doors will open at 10.00am. There will be free car parking, trade stands, a car boot sale and catering.
John G4NBR
Tel: 07946 302815
E-mail: rally-secretary@sdars.org.uk
www.sdars.org.uk

June 10th
The Junction 28 QRP Rally
The 11th Junction 28 QRP Rally organised by the South Normanton, Alfreton and District Amateur Radio Club (SNADARC) in association with the G-QRP Club will take place in the Alfreton Leisure Centre, Church Street, Alfreton, Derbyshire DB55 7BD. This is ten minutes from J28 on the M1 and the A38. The doors will open at 10.00am and admission will cost £2.50. Talk-in on S21, trade stands, special interest groups, catering and a licensed bar.
Russell Bradley G0OKD
Tel: 01773 783658
E-mail: russell.bradleyg0okd@ntlworld.com
www.snadarc.com

Improving the 1.3GHz Portable Transverter

John Cooke GM8OTI – after completing the transverter that allowed him to get started in 1.3GHz home-brewing, decided that he should put together an improved portable station.

The new transverter I'm describing this month has several improvements. The local oscillator is much more compact and the main receive and transmit board has been simplified. There's also a better power amplifier which gives an output of a few watts, and there's a bandpass filter between the antenna switching relay and the antenna connector. And – for convenience – everything is now in a single box!

Local Oscillator

The first transverter was built with a 432MHz intermediate frequency (i.f.), making it easy to switch between two bands on the Yaesu FT-817 used as the i.f. rig. As the front antenna connection was used for the transverter, the rear connection was available for a 144MHz 'talk-back' antenna.

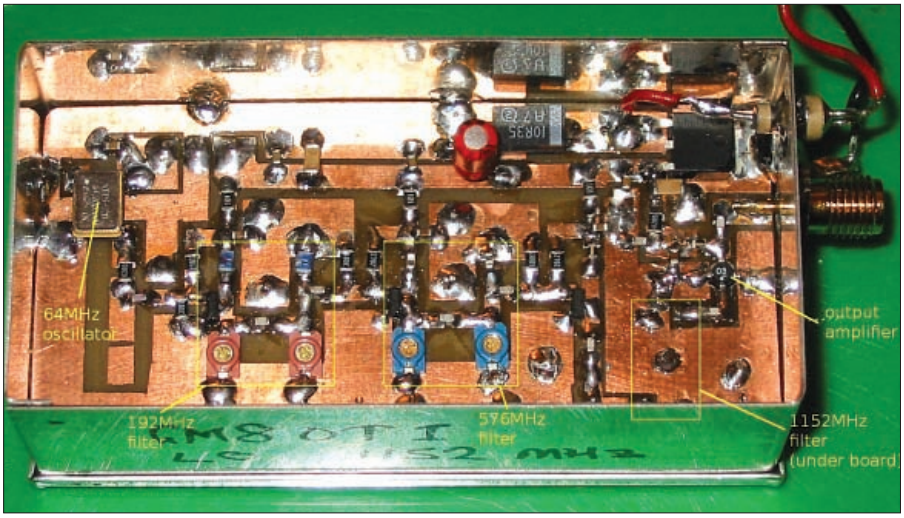


Fig. 2: Local oscillator board. The 64MHz oscillator module is top left; the pink trimmers adjust the 192MHz circuit, the blue trimmers the 576MHz circuit, and the 1152MHz circuit is tuned with a Toko helical filter mounted on the groundplane side of the board. The output amplifier (marked "03") is close to the SMA connector.

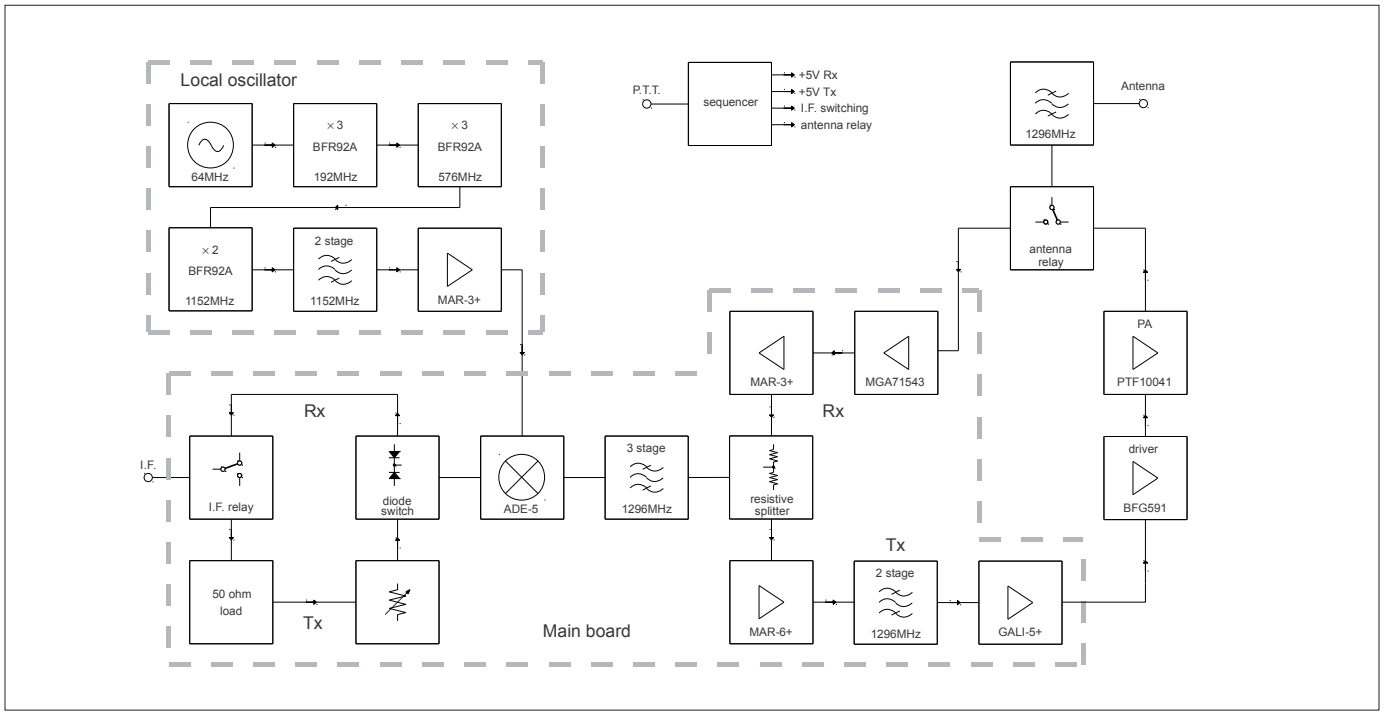


Fig. 1: Block diagram of the transverter.

However, in practice I have found that few people use talk-back to set up a contact, so this is not really needed – and I have picked up a second hand Trio TR-9130 rig for talk back anyway! As a result I decided to use a 144MHz i.f., rather than 432MHz.

I wanted to build a multiplier chain using compact surface mount device (s.m.d.) inductors, as used in the microwave signal source by **Sam Jewell G4DDK** in the **Radio Society of Great Britain**'s (RSGB) *RadCom* magazine, September 2008. To save space and time, a cheap (about €2) surface mount device (SMD) 64MHz crystal oscillator module is used rather than an oscillator constructed from discrete components.

The output from the oscillator is tripled to 192MHz, again to 576MHz, and then doubled to 1152MHz, which gives the required 1296MHz when mixed with 144MHz. During building of the first transverter, I found that the best results were obtained with the final multiplier as a doubler.

The multiplier design is straightforward, using a BFR92P transistor and two tuned circuits coupled by a small capacitor in each stage. The output at 1152MHz is taken through a Toko two stage helical filter and then amplified by a Mini-Circuits MAR-3+ monolithic microwave integrated circuit (m.m.i.c.) in order to provide enough power to drive the mixer.

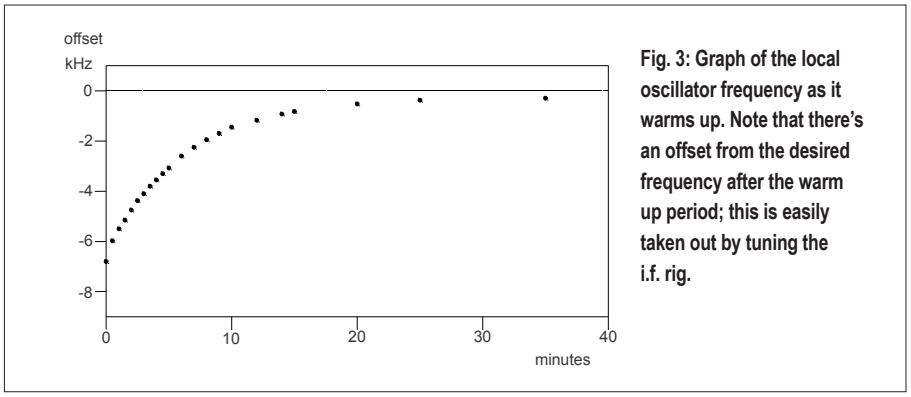


Fig. 3: Graph of the local oscillator frequency as it warms up. Note that there's an offset from the desired frequency after the warm up period; this is easily taken out by tuning the i.f. rig.

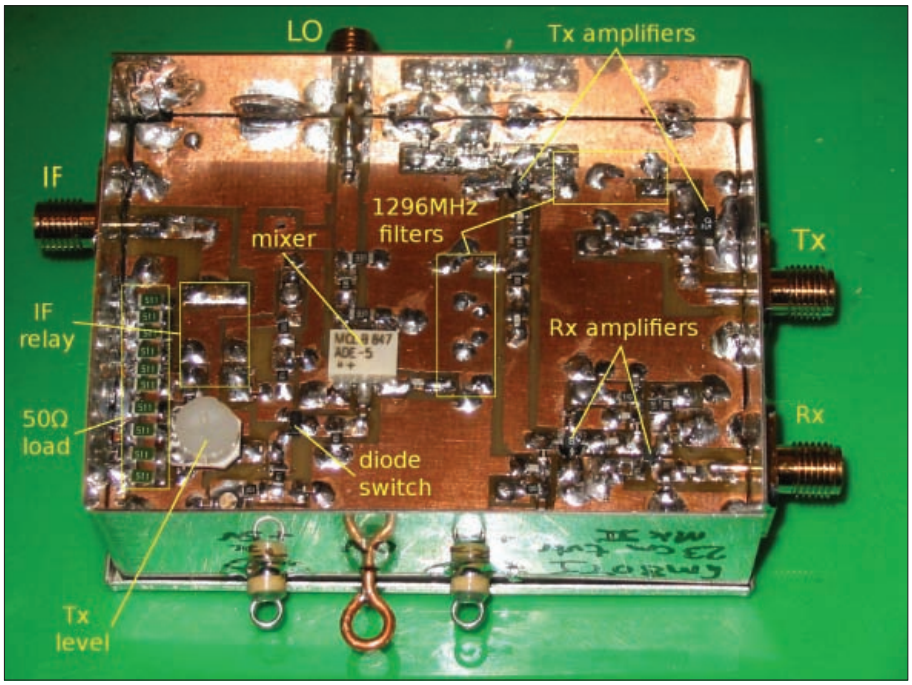


Fig. 4: The main board containing i.f. switching, the mixer, 1.3GHz filters, receiver front-end, and low level transmit amplifiers.

Single Board

The circuit is built using mostly s.m.d. components on a single board, 37 by 74mm in size; this fits in a standard size tinplate box. Apart from the 5V regulator and the Toko helical filter, all the components are mounted on the track side of the board (**Fig. 2**).

Once the board was installed in the tinplate box, I found I needed to add an extra 10µF capacitor on the power supply de-coupling. This was needed to get rid of an oscillation at approximately 60kHz.

The oscillator warms up reasonably quickly (**Fig. 3**). Even though there's no temperature control, it's good enough to use after a few minutes, and after half an hour is very stable indeed. This is probably because the crystal oscillator module runs quite warm and is inside a closed tinplate box, which is in turn inside the main enclosure.

The need for warm-up should be avoidable with the use of a temperature compensated crystal oscillator (TCXO) module. Fortunately, these are now available almost as cheaply as the ordinary type.

After warming up, because the crystal oscillator module is not adjustable, there will still be a small offset (likely to be a few kHz) from the desired frequency. This needs to be allowed for by tuning the i.f. rig, and the correction can easily be found by identifying a beacon signal or another transmission of known frequency.

Transverter Main Board

The original transverter had worked well so I felt there was no need to make major changes for the new design, but I wanted to make it simpler. Some changes were needed for the 144MHz i.f., and I had some more Mini-Circuits m.m.i.c. amplifiers to try out. As before, I used the *Mini-Circuits* ADE-5 double balanced mixer and 1.3GHz Toko helical filters.

When I was building the board, it was very pleasing to be able to hear the local beacon (I live in Edinburgh) **GB3EDN** using only a 60mm antenna straight in to the mixer, with no r.f. amplification. This confirmed that the local oscillator was driving the mixer satisfactorily.

I simplified the connection between the main filter and the receive and transmit sides by using a resistive splitter rather than the more complex (though less lossy) Wilkinson power divider used in my first transverter. The receive side at 1.3GHz uses a low-noise MGA71543 m.m.i.c., followed by a MAR-3+ into the splitter.

On the transmit side the splitter output drives a MAR-6+ followed by a two stage Toko helical filter, with a GALI-5+ bringing the output level up to about 20mW.

The i.f. is switched by a miniature relay at the input connector and two switching diodes at the mixer. On transmit, a 50Ω load sinks the output from the i.f. rig, and an input level control sets the power level to the mixer. On receive, the mixer output connects to the i.f. through a capacitor.

The transverter main board is 55 by 74mm in size which again fits in a standard tinplate box. The helical filters, power interconnections and i.f. switching relay are on the groundplane side of the board, with all other components on the track side (**Fig. 4**). Power connections

are all though 1nF feed-through capacitors, and r.f. connections through SMA connectors soldered to the tinplate box.

Output Amplifiers

I had acquired some suitable transistors for use as amplifiers at both 1.3GHz and 2.4GHz at up to about 10W from **R.F. Elettronica**. The supplier's website (**www.rfmicrowave.it**) has a possible design, but having used the *PUFF* microwave design tool for the previous transverter's output amplifier, I decided to try it again. I was not so lucky this time; I tried to put together a single board amplifier using a BFG591 bipolar driver amplifier with the PTF10041 m.o.s.f.e.t. power transistor, but the prototype wasn't stable.

I ended up splitting the driver and output amplifiers onto separate boards. The BFG591 driver amplifier is similar to the one used in the first transverter, although again I had stability problems which I cured this time by using an r.f. choke in the collector load rather than a quarter-wave choke (**Fig. 5**).

The output amplifier (**Fig. 6**) is roughly based on the R.F. Elettronica design, but tweaked with *PUFF* using the transistor parameters I had from the device data sheet. The transistor is soldered to a thin brass strip which is bolted down to a copper plate (as a heat-sink) under the circuit board; this in turn is bolted to the main enclosure.

With limited test equipment it is quite difficult to be sure of power measurements at these frequencies, but my estimate (from measurement of the current the power amplifier takes, and from r.f. measurements) is that the transverter produces between 3 and 5W at 1.3GHz.

Output Band-Pass Filter

The three stage helical filter and additional two stage helical filter in the transmit amplifier chain on the main transverter board should significantly reduce unwanted mixer products. The output amplifiers are tuned for 1.3GHz, which will act in the same way.

However, the receive front end is not tuned, and I want to see whether adding a filter makes any difference. A band-pass filter will also ensure that there will be less interference to the receiver when operating on hilltops not far from high powered broadcast or communications transmitters.

I had obtained a few piston trimmer capacitors from some surplus equipment bought cheaply at a rally. These trimmers have low loss for microwave use and the two selected

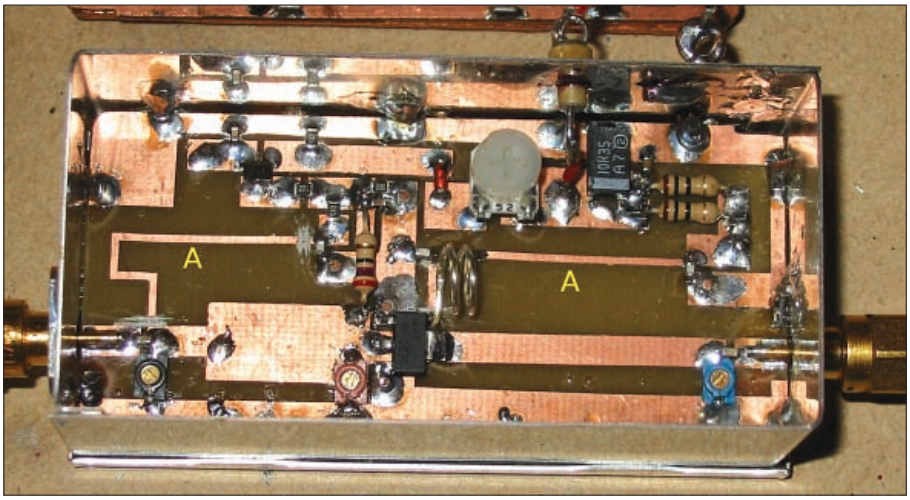


Fig. 5: The BFG591 transmit driver amplifier. To cure an instability problem, the quarter wave choke lines (narrow tracks marked 'A') were disconnected and replaced by a wire lead resistor on the base lead, and a two turn r.f. choke on the collector lead.

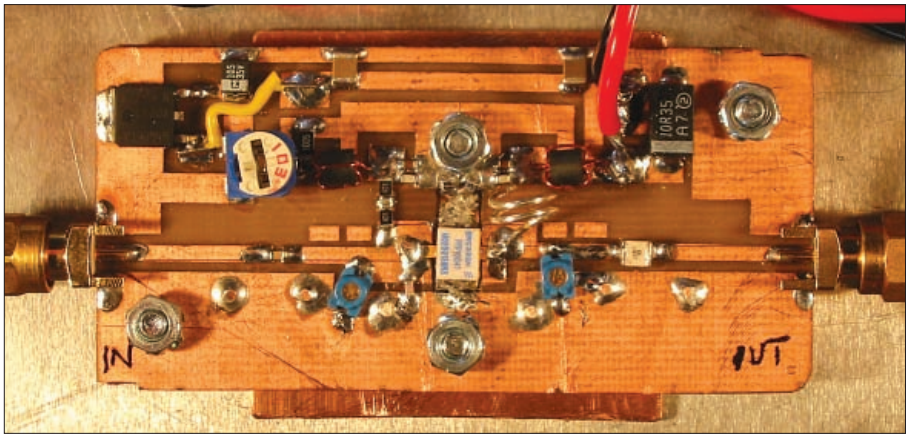


Fig. 6: The PTF10041 transmit power amplifier.

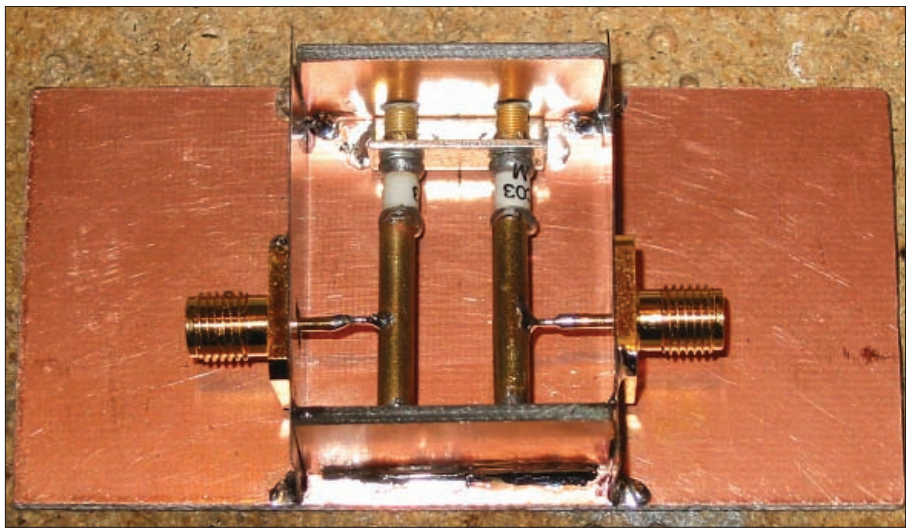


Fig. 7: Inside the 1.3GHz band pass filter.

were from a two stage 1.5GHz bandpass filter using microstrip lines. I found a design of a microstrip 1.3GHz filter in the RSGB *Radio Communication Handbook* (10th edition). Tuned lines suspended in air are less lossy than microstrip, so I thought it worth trying a filter made with these.

There is a design for a short tuned line filter for 144MHz in the RSGB *VHF/UHF Manual* (3rd edition) and I scaled the lines from this design to 1.3GHz, which gave a line length of 19mm. I had some 3mm brass tube, so calculated the inductance of a 19mm length of this, which I found would resonate with a 1.67pF capacitor. I guessed (and hoped – not having the specification!) that this would be within range of the piston trimmers.

The design worked well; I tried a prototype with adjustable input taps and found that the input and output tap positions on the lines weren't too

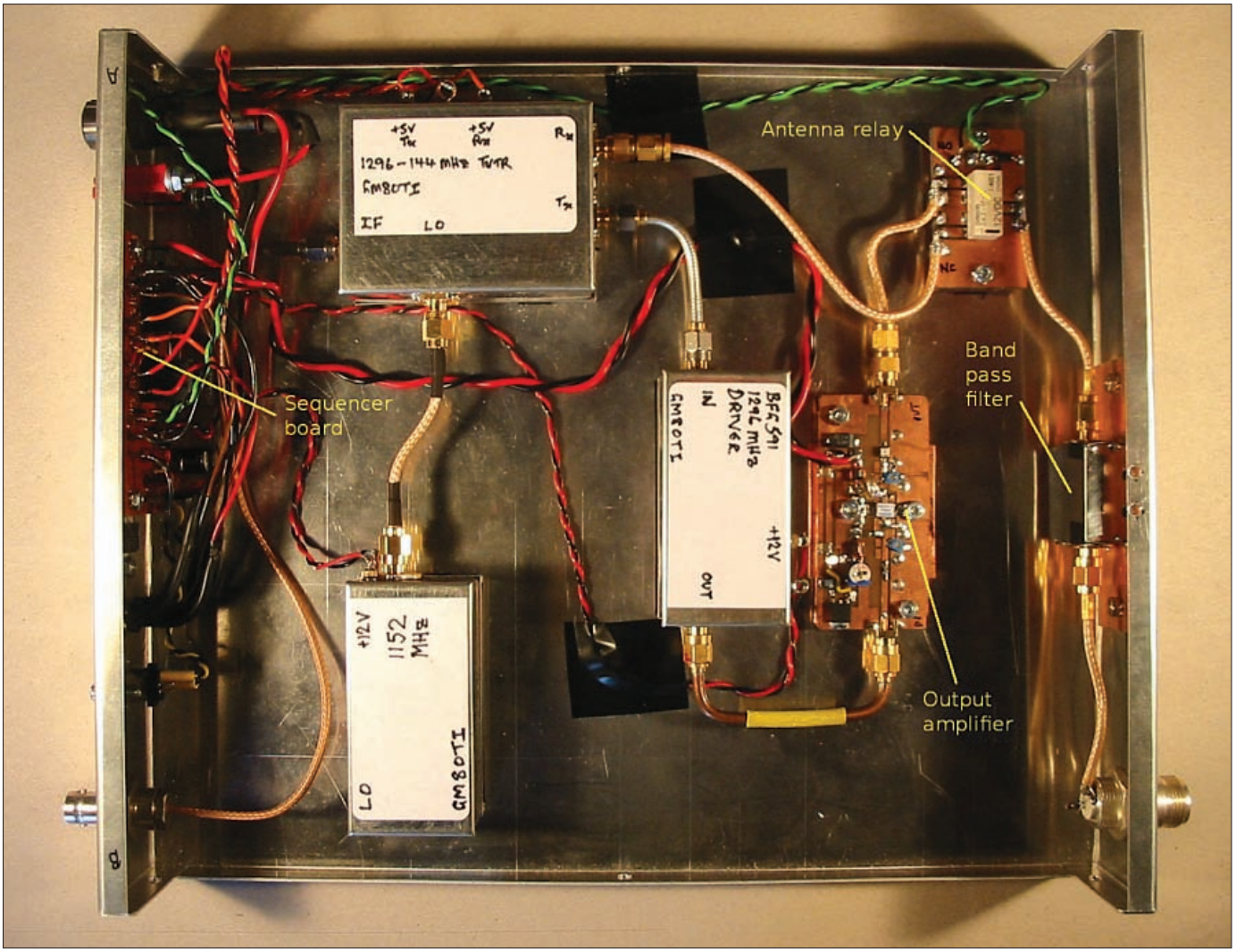


Fig. 8: Inside the completed transverter.

important. The final version has taps somewhat below the line centres (**Fig. 7**). I don't have the test equipment to make accurate measurements of the insertion loss of the filter and in fact once the filter is tuned, no significant loss is detectable with my home-brew through-line power meter.

Simple Sequencer

Although it is not really necessary at low output powers, I decided to build a simple sequencer to control the operation of the transmit side, receive side, and antenna relay. This controls the switching of power so that there is no chance of the high(ish!) power output signal being amplified by the sensitive r.f. receive amplifier.

The sequencer consists of transistor switches, which control relays that switch the power to the transmit and receive sides of the transverter, the antenna relay, and the power amplifier. The sequence is controlled by time delays set up by charging and discharging capacitors through resistors and diodes.

The various modules of the transverter are connected using good quality coaxial cable with SMA connectors. These can be expensive, but may sometimes be found cheaply at rallies or in offers from specialist suppliers on the web. They are very useful for microwave equipment though, as they make the testing and re-use of working modules much easier.

The antenna relay is a miniature Omron G6Z series surface mount relay, rated to 10W at up to 2.6GHz. This is mounted on a small printed circuit board (p.c.b.).

The complete transverter is assembled in a single aluminium box, 300 × 250 × 50mm. This is really too big (**Fig. 8**), but was the only suitable one in stock when I went into the local Maplin shop! One option I might try in the future is to mount modules on either side of a central chassis, which could make for a more compact layout.

Does It Work?

I think most likely question to come my way would be , "Does it work?" To answer, I have used the new transverter a few times in the RSGB Tuesday Evening UKAC events. It has much more punch than the first version, and performs well. Operators have commented on the clarity of the signal produced on single sidedand (s.s.b.). And mounted in a single box it's certainly much more convenient to connect up and use.

The oscillator warm-up time means that the first thing to do on arrival at the operating location is to connect the power to the transverter so the oscillator starts to warm up. By the time everything else is connected and the antenna set up, it is stable enough to use. My normal procedure is to check local beacons before operating, which confirms the frequency offset.

I hope that the ideas here inspire other readers to 'have a go' at microwave home-brew; it's more of a technical challenge for the home constructor than constructing for the short wave bands – but it's very satisfying to make something that works well.

What's Next John?

To answer the querstion "What's next John?"', now that I have an easy to use 1.3GHz set-up, I want to move up to the next band – 2.4GHz. So, I'm look forward to telling you more about my microwave experiences in the future. Cheerio until then.

●

Ian Dilworth G3WRT's Antenna Workshop
PW Publishing Ltd., Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW
E-Mail: antennas@pwpublishing.ltd.uk

A Nip of Gin For Your Antenna?

Ian Dilworth G3WRT discusses the problems facing us when we're planning antennas and then describes a practical Gin pole to help erect the system of our choice.

The practicalities and techniques of physically erecting and supporting antennas is a neglected subject in Amateur Radio literature. However, the mounting of antennas above the ground is an essential requirement from h.f. to microwave frequencies and therefore concerns all Radio Amateurs.

Commercial antenna support systems don't come cheaply and most require planning consent. Even the cheapest antenna support 'mast' is currently around £1000 or so. Many of us would like a 'pump up' pneumatic mast – but these are about three times more expensive if they're purchased new.

Budget Type Masts

For simple wire antennas and small v.h.f./u.h.f. beam antennas it's possible to mount such antennas on budget-priced 50mm (2in) diameter alloy tube, usually this also requires guy ropes to ensure safety, especially in strong winds.

Additionally, masts that are erected close to buildings, or use a building for support – can have interaction problems between them. In fact, there are many problems to consider when it comes to interactions – and it's rather a grey area with few published details..

The reason no one has done detailed studies is because it's difficult to model all the interactions. though this can be done with the latest computers and software tools. Now we are in the sunspot cycle maximum (we hope!) in the period 2012-2020, there's sure to be an increased interest in h.f. wire antennas.

A simple and cost effective way of mounting a simple 50mm pole on a typical UK house is to use stand-off brackets in the same manner as used for TV antennas. Using this technique the strength and height of the building become a useful support. Typically the height available is 8-10m (25-35ft) and the antenna pole can easily be up to twice that height.

Such a mounting is not cheap if carried out professionally. I was recently quoted for such an installation and was shocked at the £300 price tag!

The stand-off bracket method has is disadvantages, as it can be very difficult to make changes to the antenna and the antennas will be close to the building. A major problem these days is that broadband connections radiate and couple to locally-mounted antennas. This is almost certain to reduce the receive capability, due to close proximity of antennas to buildings and wiring that nowadays provide so much electrical noise. Indeed, the noise can be detectable even up to the the low v.h.f. bands.

So, obviously an antenna near a building isn't a good idea, because they can introduce problems. It's in our interests to site our antennas as far away from houses as far as practically possible.

Receive and transmit antenna experimentation is a key part of Amateur activity and learning experience in the course of a Radio Amateur's lifetime. It never really stops! There's no ideal

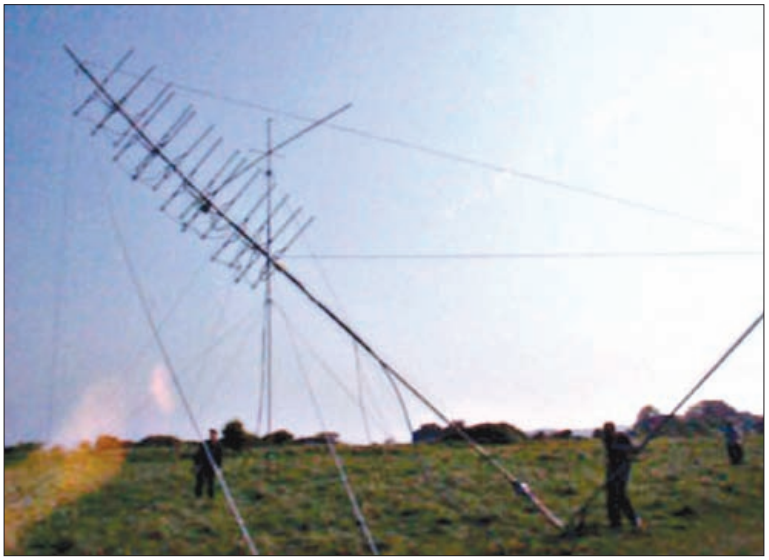


Fig. 1: The basic Gin Pole erection technique is illustrated here, a typical field day activity.

Fig. 2: Another view of the basic technique when using a Gin-pole.

Fig. 3: The practical Gin Pole is now grounded after raising the mast to vertical. The pole running out of the picture towards you, forms a stabilising pivoting point, keeping the mast from falling sideways.

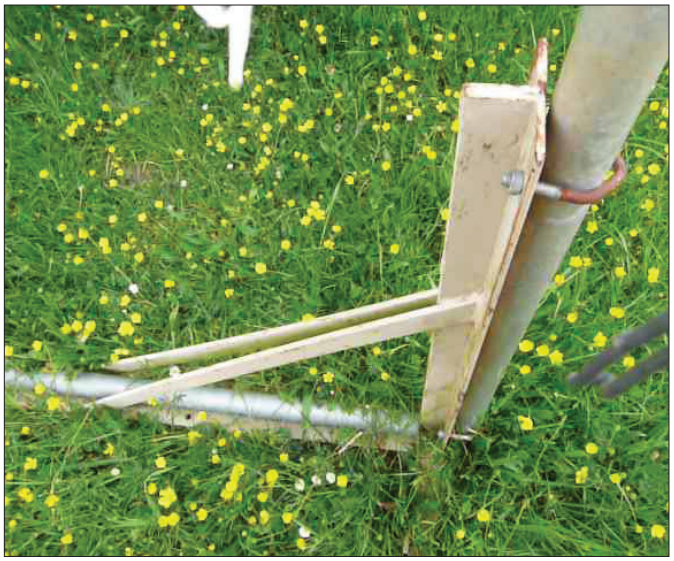


Fig. 4: The Gin pole also forms the supporting posts holding the antenna mast vertical after it has been raised.

antenna for everyone – and finding the best antennas for the location is a good and sensible aim. Tools, which allow experimentation, are therefore to be prized.

Simulation Tools

The modern computer tools that allow simulation of an antenna in its location are becoming increasingly useful. These and practical tests in parallel are complementary. Unfortunately, the computer software programs can't yet accurately predict the effect of the local terrain on antenna interaction and radio propagation over the range of Amateur bands.

For example – do you know the complex dielectric constant of your garden and antenna environment, so that it can be modelled? No? But don't worry – I didn't expect you to know it. And neither do I know my own! I have patches of clay within an essentially sandy soil. But to what depth and extent?

The questions continue! How big are the moisture retaining clay blobs (compared to which frequency)? What is their homogeneity? Or lack of that? What lies underneath and in the near field of the antenna? All these parameters are of relevance to the resultant antenna far field pattern. A computer aided design (CAD) system, needs detailed information to allow us to create an accurate model.

I'm fortunate at my QTH because that the far fields of my h.f. antennas reach a (shallow) valley to the west where there are many deciduous trees. This I know by experience and comparison with other directions helps my westward propagation at h.f.

Trees have more sap in summer than winter. This stand of trees is 'vertically' polarised – mostly – but the horizontal branches and leaves aren't to be ignored.

The combined effects of the surrounding are significant even at h.f. and the overall effect slowly changes with the season, as does the ionosphere. So, it's difficult to separate the two effects at times!

I also know at at u.h.f. and microwave frequencies trees and leaves are highly significant. In short here are many avenues of experimental observation to be explored. Radio Amateurs have a lot to contribute even today!

The connection between the wavelength, the antenna used, the local environment and the resultant propagation is intimately interdependent. You can be sure that these have an effect on propagation locally – even at h.f.

Antenna Experimentation

The purpose of this article is to illuminate in a practical way one tool, which can help in simple practical antenna experimentation. The 'Gin-Pole' is an often overlooked method of erecting antenna supports in Amateur Radio literature. And details for a practical arrangement, which can be permanent yet portable and instantly usable are almost impossible to find.

So, I designed and developed my own simple tool and it is described in this article. My requirement is specifically aimed at simple lightweight wire h.f./50MHz antennas. In fact it can help erect an antenna support up at 12-18m (40-60ft). I use standard 2-inch diameter poles either alloy or steel. At the top of the support a pulley is mounted which allows wires to be hauled up.

The basic Gin Pole erection idea is illustrated in **Fig. 1** and **2**. A typical field day activity. In this case it was a massive 1296MHz array!

Notice that there are several people involved and that they are using very heavy steel scaffold poles. Also note that their 'Gin Pole' is shown in the vertical position and that the pull ropes/guys are yet to be deployed. It must be unstable as photographed – and the antennas are thus presently vulnerable.

Single Handed Operation

I know from experience that single-handedly erecting antenna supports can be a real headache. Nevertheless, during the summer months I often find myself wanting to experiment with different types of antenna and so invariably wish to do antenna erection and also taking down frequently and single-handedly. Typically in the space of a single afternoons play. The ability to do this was a key requirement of the design I'm describing.

The essential idea can be seen by studying **Fig. 3** and **Fig. 4**. Steel 'L' shaped angle, about 6mm thick is used. It forms both a 'saddle' to grip the pole and a pivot point to help maintain the rising pole in a vertical plane. The parts can either be welded together or bolted. I had the assembly professionally welded from a sketch and it cost me £60. I then applied a layer of paint. After several years, it's already rusting… but it will definitely see me out before it significantly weakens!

Guy Ropes & Pegs

The guy ropes are not shown in the photographs but these should be cut to

length before erecting the antenna pole. Their length may be calculated from an assumption of their angle and the overall height of the support.

So, with a 60° angle and 12m height length of guy rope = 12/sin60° = it's a little under 14m – but remember to add enough extra to tie at both ends.

The location of the guying peg will be 12*cos60°, giving measurement of just over 7m away from the base. The number of guy ropes needs to be at least three and preferably four. So, in the case described above with four supports, you'll need around 75m of rope. That's allowing around one third extra for tying off. So, it's not an insignificant amount!

I've found that two sets of guys are required to support a 12m pole. One set near the top and one about half way up. If the ground anchors are adequately strong, the two set of ropes can be attached to the same anchor point.

However, to my shame (and to be truthful) I have used the arrangement with reduced top support, **Fig. 5,** for nearly three years now with no problems! A portion of the tension and stability is derived from the antenna wire at the apex. The actual antenna is a diamond shaped loop.

Obviously, my reduced support system isn't recommended, but it has proven adequate for a simple wire antenna support. The top alloy section started life as the bottom section. That is why it's slightly 'S' shaped, I learnt from experience that what goes up doesn't necessarily come down in the same shape. Hence my preference for lower supports made of steel.

There are readily available bolt-up sleeves for connecting 50mm diameter poles end-to-end. But in spite of the diameter of steel scaffolding poles being slightly smaller than alloy poles, the sleeve can be used to connect the two.

My preferred method of making up the complete length is, a lower section of steel scaffold pole, connected to an aluminium upper pole. I'd hate to recommend standard scaffold clamps, simply because I've never used them. So, I have no experience of them.

Please note I have never tried to make the support higher than 14m (around 45ft). I'm sure it can be done. Others will, no doubt disagree. But here are my reasons. Wavelength versus frequency are shown in **Table 1** together with values of a 12m pole height in terms of wavelength .

I know from my electromagnetic modelling experience that adding another 6m height can have little effect at h.f. on the far field radiation. It all depends on the location and where one starts. So, though height always helps, it's only important as a proportion of the wavelength.

To carry out your own experiments, a gin pole allows quick and often single-handed pole erection quite easy. So, let's have more experimentation and subsequent debate. Measurements rule! Antenna Modelling is second best. ●

Table 1

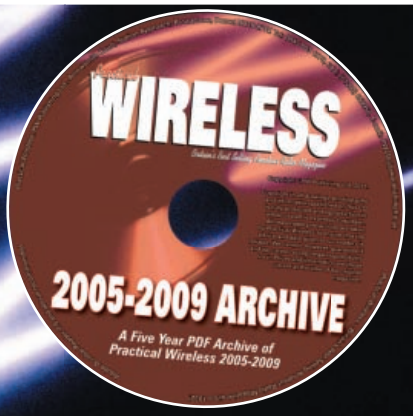
Frequency (**MHz**)	Wavelengths (λ)
1.80	0.072
3.5	0.14
7.1	0.28
10.1	0.41
14.2	0.57
21.2	0.85
29.0	1.16
51.0	2.04
70.25	2.81
145	5.8

As you can see at most h.f. frequencies, even a 12m high antenna is less than one wavelength above ground, reaching that point at around 28MHz and above. Even at 70MHz it's still less than three wavelengths high.

Fig. 5: Ian G3WRT has used a reduced stay system for some time now, utilising the tension in the antenna wire as one of the supporting tensioners. Not ideal perhaps, but it does work!

Available NOW

The *Practical Wireless* Archive 2005-2009



Each disc contains five years of *Practical Wireless* magazine

We are currently scanning our archives and, if there is enough demand, we will make volumes available right back to the 60s and before!

Each five-year archive will contain 60 issues of *PW* in a searchable PDF form. It's ideal for any computer running a PDF reader program.

Each *PW* five-year archive costs £24.99 plus p&p. Order TODAY to ensure your copy!

Please see page 75 for ordering details.

Earlier volumes coming soon!

The *Practical Wireless* Archive 2010 on CDROM is selling out fast! To ensure your copy, order now!

The 2010 *PW* archive is on a single CDROM and it's provided in a searchable PDF format. It's ideal for any computer running a PDF reader program – there should be no problems!

Once you've purchased the 2010 archives there'll be no need to search through a year's worth of paper magazines or struggle to hold a heavy set of issues in binders! The CDROM will make things so much easier!

Find the articles you want much quicker. Enlarge the article and circuit diagrams to suit your needs. Use your CDROM archive as much as you like and keep your paper magazines in pristine condition to be read and enjoyed when you've found what you need on the CDROM!

The CDROM *PW* archive for 2010 contains the complete *PW* – including the full editorial, adverts, etc. In other words – nothing is left out. No short change here – you get a fully readable archive of your favourite magazine in an amazingly compact and convenient form!

The *PW* 2010 Archive CDROM costs £14.99 plus p&p.

Please see page 75 for ordering details.

SHOWROOM & MAIL ORDER:
Unit 1, Purfleet Industrial Estate, Off Juliette Way, Aveley RM15 4YA

Haydon Communications

LOCAL TO GLOBAL

TEL: 01708 862524
FAX: 01708 868441

Mail Order & showroom open:
Mon-Thurs: 10.00am - 4.00pm
Friday: 10.00am - 3.00pm.
Our showroom is 5 mins from "Dartford River Crossing"
E&OE
(next day delivery available £12.50 mainland)

★ WANTED: USED EQUIPMENT FOR CASH OR PART EXCHANGE ★

TO ORDER ON-LINE SEE **www.haydon.info**

To contact our sales dept.
E-mail: admin_@haydon.info

PayPal · MasterCard · SWITCH · VISA

HF TRANCEIVERS

FT-950
HF + 6m IF DSP

Superb "I.F." DSP Rx
OUR PRICE
£1229.99

FT-897D
Includes DSP

OUR PRICE **£785.00**
OR FT-897 + MS-1228
£849.99

FT-857D DSP

HF + 6m + 2m + 70cm.
OUR PRICE
£685.00
OR FT-857 + MS-1228
£755.00

NEW FT-450D

This is the latest IF DSP marvel from Yaesu. HF + 6m (500/300 CW filters as standard). New design + ATU.
THE DSP ON THIS RECEIVER IS AMAZING!
£829.99

FT-450

Amazing Rx front end performance.
(IF DSP). HF + 6m (100W)
£629.99
or FT-450AT (+ ATU)..... £739.99
One customer claimed, "this is the best kept secret of the communications industry".

FT-817 ND

HF + 6m + 2m + 70cms. Incl's battery/charger + antennas.
£535.00
Optional case £22.00
Extra spare battery..... £50.00

STAR BUY - FT-817ND + extra battery + case.....£589.00

FT-2000D

FT-2000D 200W
£2799.99
MD-100A8 + FT-2000D.....£2895.00
FT-2000D + SP-2000.....£2939.99

FT-2000
(100W HF + 6m).
£2199.99

SPECIAL: FT-2000 + SP-2000.....£2339.99

MD-200

Broadcast quality dynamic mic. It sounds & looks superb. Fits 8-pin round & 8-pin modular radios. (Optional 6-pin modular adapter £19.99)
SALE PRICE **£235.00**
Yaesu MD-100A8X...£129.99

JUPITER 538B

£1575.00
With ATU fitted £1835.00
This model accepts standard keyboard

TEN-TEC EAGLE 599

£1730.00
With ATU fitted £1935.00

TS-590S

HF + 6m
Superb DSP Rx **£1265**

TS-480AT (HF-6m+ATU)	£769.99
TS-480HX (200W HF+6m)	£869.99
TS-480TS-2000E	£1469.00
TS-2000X	£1695.00

ICOM IC-7600

HF + 6m in stock.
Amazing DSP **£3150**

IC-7410 (HF + 6m)	£1589.99
IC-7000 (HF/6/2/70)	£116.99
IC-7200 (HF + 6m)	£825.00
IC-9100 (HF-6/2/70)	£2795.00

LDG PRODUCTS

YT-847 ATU for FT-847	£225.00
AT-100 PRO II 1.8-54MHz/125W	£184.99
AT-200 PRO II 1.8-54MHz/250W/10W	£209.99
AT-1000 PRO (1.8-54MHz) 1Kw	£499.99
AT-897 plus bolt-on ATU-897	£179.95
YT-100 ATU for 857/897	£177.95
Z-817 ATU for FT-817	£119.95
Z-100 plus ATU FT-817	£134.95
Z-11 PRO II (1.8-54MHz) 125W	£159.95
FT-Meter for 897/857	£44.95
FTL-Meter Large meter/above	£79.95
IT-100 ATU IC-7000	£159.99

PSUs

NISSEI MS-1228

28A at 13.8V yet under 2kgs. (H 57mm, W 174mm, D 200mm approx). Fully voltage protected. Cigar socket & extra sockets at front/rear. Ultra slim.
NISSEI HAVE BECOME RENOWNED FOR PUTTING QUALITY FIRST, YET MAINTAINING A GOOD PRICING STRUCTURE. A TRULY SUPERB POWER SUPPLY UNIT
'Smallest version to date' now with cigar socket.
QUALITY MADE PRODUCT **£89.99**

NISSEI PS-300

Features: ★ Over voltage protection ★ Short circuit current limited ★ Twin illuminated meters ★ Variable voltage (3-15V) latches 13.8V ★ Additional "push clip" DC power sockets at rear. Dim'ns: 256(W) x 135(H) x 280(D)mm.
A truly professionally made unit built to outlast most PSUs.
TRUE 'LINEAR' PSU
30 AMP/12 VOLT PSU
The goliath of PSUs
OUR PRICE **£179.99**

DIAMOND GZV-4000

Includes built-in extention speaker
40AMP/13.8V P.S.U.
SALE **£189.99**
GZV-2500 25 amp version of above. Sale price £129.99

DIAMOND GSV-3000

"Linear power supply". 30A @ 13.8V 1-15V variable. Diamond quality PSU
OUR PRICE **£179.99**

WATSON PSU

Power-Mite NF 22amp	£79.95
Power max (25A)	£89.95
Power max (45)	£125.00
Power max (65)	£225.00
W-5A 5A (7A max) linear	£33.95
W-10A 25A (10A linear)	£59.95
W-25AM (25A linear)	£99.99

ANTENNAS

INTRUDER II

11 band (80-10 6/2/70cm). PL-259 fitting. Collapses to 95cm (~ 3 ft).
£39.99
(2 for £70.00)

NEW INTRUDER III

13 band (80-10/6/2). PL-259 fitting. Includes WARC bands. 13 band version of Intruder II.
£59.99
(2 for £89.99)

ATAS-120A

Military spec mobile antenna – superbly made. Covers HF + 6m + 2m + 70cm. *Fully automatic. (*certain Yaesu radios).
SALE PRICE
£329.99

DIAMOND CP-6

A superb (diamond quality) 6 band trap vertical antenna with trap radials – "rotary" trap system allows "flat wall" mounting. 80m/40m/20m/15m/10m/6m. 200W SSB, HT 4.6m (15ft tall).
SEND SAE FOR DATA SHEET
OUR BEST SELLING VERTICAL
SALE PRICE **£339.99**

CUSHCRAFT BARGAINS

MA5B Mini beam 10/12/15/17/20m	£519.99
A3S 3 ele yagi (10-20m)	£599.99
A4S 4 ele yagi (10 - 20m)	£675.00
R-8E 40 - 6m verticle	£525.00

Standard & Deluxe G5RV

Half size 40-10m	£32.99
Full size 80-10m	£36.99
Half size Deluxe	£44.99
Full size Deluxe	£59.99
In-line choke balun for G5RV, etc	£39.99
Replacement dipole centres	£9.99

ACCS

WONDER WAND

1.8-450MHz BNC. Whip supplied. Ideal for FT-817
£129.99

SGC

SGC MAC-200	£259.99
SGC-239	£199.99
SGC-237	£309.99
SGC-230	£449.99
SGC-Smart lock	£69.99

MFJ-259B ANALYSER

1.8-170MHz
£259.99
Case 259B £29.99

MFJ-269 ANALYSER

1.8-170MHz + 70cm
OUR PRICE **£339.99**
Dip Coils 259/269£29.99 Case 269B £29.99

MFJ-269 pro version	£369.99
MFJ-260C 300W dummy load	£49.99
MFJ-901B ATU	£109.99
MFJ-969 Rollercoaster ATU (300W)	£219.99
MFJ-962D 1.5kW (metered) antenna tuner	our price £279.99
MFJ-994B (600W) intelli tuner	£319.99

MFJ-949E

£179.99
● 1.8-30MHz 300W ATU ● Large cross needle meter ● 30/300W PEP power meter ● VSWR ● 3-way antenna selector ● Internal balun + dummy load.

MFJ-993B INTELLITUNER

Easy to use ATU.
Fully automatic (1.8-30MHz). 300W SSB.
£254.99

VHF/UHF TX

YAESU VX-7R

6m/2m70cm + wide RX. An amazing 6W water proof hand-held. Case £19.99. Spk mic £32.99. Cigar lead £24.99. BNC adapter £6.00.
Silver or black **£289.99**

YAESU VX-8E

6m/2m/70cm. "APRS" with Rx:- 0.5-1GHz. Incl's battery & chgr.
£329.99
Latest YAESU VX-8DE with free extra battery.....£365.00

YAESU FT-60

2m + 70cm + wideband Rx. Includes battery/charger. ~~£179.99~~ **£129.99**

YAESU FT-8900 R

10m + 6m + 2m + 70cm. (up to 50W).
INCLUDES WIDEBAND RECEIVE AS STANDARD (PLUS DUAL RECEIVE)
INCLUDES REMOTE DTMF MIC WITH REMOTE FREQ/FUNCTION CONTROL.
SALE **£359.99**

YAESU FT-7900 R/E

2m + 70cm + wide Rx. (+ free in-car detatch kit).
Incls: Wide Rx + DTMF mic
£239.99

SALE: FT-2900 R/E

THE GOLIATH OF MOBILES
2m FM (75W). (Incl's free remote control DTMF mic)
£139.99

YAESU FTM-350

2m/70cm Tcvr with APRS & dual Rx (50W O/P). Includes wideband Rx.
Includes DTMF mic.
INCLS FREE GPS ANTENNA UNIT WORTH £70
£449.99

ML-5189

Compact FM mobile. 4m/25W
Incl's DTMF mic **£149.99**

NEW ML-5555

10m/12W mobile. Incl's mic.
£149.99

GIZMOS

NEW SANGEAN ATS-909X

The ultimate all-mode portable shortwave + FM (76-108). Fully loaded portable with improved Rx thanks to a "dsp" tuner. Includes PSU, antenna, case, etc.
£249.99 Del £10

WINRADIO EXCALIBUR

9kHZ-50MHz (all mode) receiver with spectrum analyser. Most manufacurers try to follow standards - WINRADIO sets them! WR-G3100C pack includes:- receiver + software + PSU + USB cable + BNC adapter. Requires PC.
ALL THIS FOR **£699.99**

D-72

2m/70cm + APRS
FREE MIC
£425.00

ALINCO DJ-596E

2m + 70cm Handie. Includes nickle metal N.M.H.I and charger.
SALE
Includes free speaker mic
£129.99

QUANSHENG TG-UV2

2m/70cm hand-held (SW 0/P) VOX/CTCSS/DCS 200 channels. Dual watch. Incl's battery and drop in charger.
IN CAR CHARGER..... £24.99
SPEAKER MIC..... £16.99
2 x TG-UV2 for £150.00
£81.99

WOUXUN HANDIES

all include battery, charger and antenna

KG-UVD1P (2m/70cm) Special offer £79.99	
UVD1P/L special 4m/2m	£99.99
USB lead + s/ware	£21.00
BNC adapter	£6.00
Car chgr	£9.99
Spkr/mic	£15.99
Spare batt	£19.99
AA batt box	£11.00
SO-239 adapter	£6.00

New UV-60 2m/70cm £94.99

AR301XL NEW MODEL

Quality rotator for VHF/UHF. Superb for most VHF-UHF Yagis, 3-core cable required. 3-core cable £1 per mtr. GS-050 stay bearing £39.99

OUR PRICE **£99.99**

YAESU G-450C

Heavy duty rotator for HF beams, etc. Supplied with circular display control box

WOW **£335.99** or £389.99 with 25m cable/plugs

G-650C extra heavy duty rotator..... £379.99 or £429.99 with cable
G-1000DXC extra heavy duty rotator..... £485.99 or £539.99 with cable
GS-065 thrust bearing..... £59.99
GC-038 lower mast clamps..... £35.99
Rotator cable & plugs:- 40m £94.99 20m £69.99

DIAMOND YAGIS

No tuning required

2m/5 element	No tuning required	SO-239 feed	£54.99
2m/10 element	No tuning required	SO-239 feed	£69.99
70cms/10 element	No tuning required	SO-239 feed	£59.99
70cms/15 element	No tuning required	SO-239 feed	£74.99
6m/2 element	No tuning required	SO-239 feed	£95.99

DIAMOND V-2000

6m + 2m + 70cm. 2 section (2.5m long) PL-259 fitting.

Superb quality. **£139.99**

Q-TEK COLLINEARS (VHF/UHF)

Del £10.00

X-30 GF 144/430MHz, 3/6dB (1.1m)..... £49.99
X-50 GF 144/430MHz, 4.5/7.2dB (1.7m)..... £64.99
X-300 GF 144/430MHz, 6.5/9dB (3m)..... £89.99
X-510H GF 144/430MHz, 8.5/11dB (5.4m) £149.99
X-627 GF 50/144/430MHz..... £99.99

DUPLEXERS & TRIPLEXERS

MX-2000 50/144/430MHz Triplexer..... £84.99
TSA-6011 144/430/1200MHz Triplexer..... £84.99
MX-72 144/430MHz..... £39.99
MX-72 "N" 144/430..... £42.99
MX-62M (1.8-56MHz + 76-470MHz)..... £79.99
MX-610 1.8-30MHz + 49-470MHz (S-239 conn's)..... £99.99

MOBILE ANTENNAS

Del £10.00

DB-7900 2m/70cm (5.5/7.2dB) 1.6m (PL-259)..... £44.99
DB-770M 2m/70cm (3.5/5.5dB) 1m (PL-259)..... £24.99
Diamond CR-8900 10/6/2m/70cm (1.26m)..... £99.99
Diamond AZ-506 2m/70cm – only 0.67m long..... £39.99
PL-62M 6m/2m (1.4m) PL-259..... £23.99
PL-627 6m/2m/70cm (1.7m) PL-259..... £44.99

RH-999 (new)

50/144/430/1200MHz. BNC (plus SMA adapter). 51cm long – amazing!

£89.99

RH-770H (BNC)

2m/70cm Tx + wide Rx. High gain up to 5.5dB.

£59.99

P&P £5.00

TWIN FEEDER/ LADDER LINE

300Ω Twin Feeder
£1/mtr £70/roll
450Ω Ladder
£1/mtr £70/roll (100m)

ALUMINIUM POLES (2")

20ft (collection only) £49.99
10ft (collection only) ..29.99
2.4m..... £29.99
5ft..... £14.99

DOUBLE THICK FERRITE RINGS

A superb quality ferrite ring with incredible properties. Ideal for "R.F.I". Width 12mm/ OD35mm. 6 for £16.99 P&P £4.00
12 for £26.99 P&P £5.00
20 for £40.00 P&P £10.00

COPPER ANTENNA WIRE ETC

Hard drawn (50m roll)..... £40.00 P&P £7.50
New: 50m roll, stranded antenna wire..... £16.99 P&P £7.50
Flexweave (H/duty 50 mtrs)..... £44.99 P&P £7.50
Flexweave H/duty (18 mtrs)..... £21.99 P&P £7.50
Flexweave (PVC coated 18 mtrs)..... £24.99 P&P £7.50
Flexweave (PVC coated 50 mtrs)..... £59.99 P&P £7.50
Special 200mtr roll PVC coated flexweave..... £180.00 P&P £10.00
Copper plated earth rod (4ft) + wire clamp..... £16.99 P&P £8.00
Copper plated earth rod (4ft) as above + wire..... £27.99 P&P £8.00
New RF grounding wire (18m pack) PVC coated..... £24.99 P&P £5

METALWORK & BITS (Del Phone)

2" mast-floor base plate..... £16.99
6" stand off brackets (no U-bolts)..... £8.99
9" stand off brackets (no U-bolts)..... £10.99
12" T & K brackets (pair)..... £19.99
18" T & K brackets (pair)..... £24.99
24" T & K brackets (pair)..... £29.99
36" T & K bracked (pair) galvanised..... £42.99

All our brackets are of high quality, British made and galvanised.

U-bolts (1.5" or 2") each..... £2.00
8mm screw bolt wall fixings..... £1.70
8-nut universal clamp (2" to 2")..... £9.99
2" extra long U-bolt/clamp..... £7.49
2" crossover plate with U-bolts..... £18.99
15" long (2") sleeve joiner (1.5" also available)..... £18.99
3-way guy ring..... £8.99
4-way guy ring..... £10.99
Heavy duty guy kit (wire clamp, etc.)..... £49.99
Set of 3 heavy duty fixing spikes (~0.7m long)..... £29.99
30m pack (4.4m) 480kg B/F nylon guy..... £15.00
Roll of self-amalgamating tape 25mm x 10mtr..... £8.99

HEAVY DUTY 30ft SWAGED MAST SET

5 sections, 2 inch x 6 foot long. Very heavy duty.

£89.99 PER SET (delivery £15)

TWO SETS FOR £150.00 while stocks last (delivery £18)

NEW SWAGED MAST SETS

24 foot mast. 1½" – 4 sections (6ft long).
£49.99 OR 2 SETS £84.99
SALE:- 3 SETS £99.99

24 foot mast. 1¼" – 4 sections (6ft long).
£46.99 OR 2 SETS £78.99
SALE:- 3 SETS £95.00

H/DUTY CAR BOOT MAST SET

18 foot (1½" dia).
18 foot – 6 x 3 foot (1½") slot together ally sections.
£49.99 per set.
SALE:- 3 SETS £99.99

TWO FOR £79.99 DEL £13.00

NEW CAR BOOT MAST SET

Superb 18 foot (6 x 3 foot sections) that slot together.
Dia: 1¼" ideal to take anywhere.

£39.99

2 for £74.99 3 sets £89.99

LIMITED STOCK

10m PNEUMATIC MAST

We have a small quantity of "military spec" pump-up masts (part of a Government order). All brand new in a crate and supplied with cover (close HT ≈ 6 foot). Anodised green finish.
40m guy kit pack..... £49.99
Ground fixing spikes (3-off)..... £35.00
2 foot all ground fixing kit..... £99.99
(Can be hand operated or by compressor/foot pump)

Del £40 10m MAST, ONLY **£1199.99**

NEW NOISE FILTER!

A superb TDK 'snap fix' ferrite clamp for use in Radio/TV/ Mains/PC/Phone etc.

Simply close shut over cables and notice the difference! Will fit cables up to 13mm diameter. Ideal on power supply leads/mic leads/audio leads/phone leads.

2 for £16.99 / 5 for £36.99 (P&P £4.00)

MAST HEAD PULLEY

A simple to fit but very handy mast pulley with rope guides to avoid tangling.

(Fits up to 2" mast) **£14.99** + P&P £4.50

30m pack (4.4mm) nylon guy rope £15.00
132m roll 4.4m nylon guy (480Kg b/f)..... £45.00 Del £7.50

NEW EASY FIT WALL PULLEY

Pulley will hang freely and take most rope up to 6mm. (Wall bracket not supplied).

£14.99 + P&P £4.50

Wall bracket, screws not supplied. Simply screw to outside wall and hang pulley on WALL BRACKET £2.99 P&P £1.00

30m pack (4.4mm) nylon guy (480kg)..... £15.00
132m (4.4mm) nylon guy (480Kg)..... £45.00

HANGING PULLEY

Heavy duty die-cast hanging pulley. Hook and go!

£26.99

BARGAIN WINCH

500kg brake winch. BARGAIN PRICE

£94.99 Del £10.00

(Now includes cable grip)

Winch wall bracket..... £22.99

YOU KITS FREE POST

FG-01

Analyser 1.8-60MHz

£225.00

HB-1B-Mk3

80-40, 30-20m 4-band QRP rig.

£249.99

LOW LOSS PATCH LEADS

£4.50 P&P

Connectors	Length	Price
PL-259 - PL-259	0.6m	£11.99
PL-259 - PL-259	1m	£14.99
PL-259 - PL-259	4m	£19.99
PL-259 - PL-259	20m	£49.99
BNC - BNC	1m	£12.99

MT-3302

Heavy duty universal mount.

Includes 5m cable **£34.99**

MT-6601

Adjustable roof rack/window bar mount

£19.99

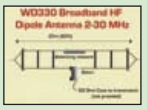
COAX BARGAINS

True military spec real UK coax

RG-58 Military spec x 100m.
£49.99 or 2 for £90.00
Coax stripping tool (for RG-58).....£8.99

RG-213 Military spec x 100m (10mm dia).
£149.99/100m or 2 for £260.00
WESTFLEX 103 (100m)..... £159.99

NEW DIAMOND WD-330



Amazing performance. Twin folded dipole. 2-30MHz – and it really works. No ATU required (25mts long). Supplied with 30 mtr PL-259 feeder – ready to go. If you want great transmission, look no where else. Japanees quality made product

WOW **£249.99**

NEW DIAMOND BB6W

2-30MHz (250W) 6.4m long. End-fed wire antenna. Icludes matching balun. Sling up & away you go.

BEST BUY **£199.99**

W-8010 DIAMOND SHORTENED DIPOLE

80-10m & only 19.2m long! (Up to 1.2kW) Includes 1:1 Balun. Bargain. Superb Japanese quality antenna system.

£169.99

Q-TEK PENETRATOR

"We've sold 100s all over Europe"

★ 1.8 - 60MHz HF vertical ★ 15 foot high ★ No ATU or ground radials required ★ (200W PEP).

£219.99

SEND SAE FOR LEAFLET

NEW Wire Penetrator 50ft long (1.8-70MHz)..... £189.99

CAROLINA WINDOM

CW-160S	(160-10m) 40m long	£175.99 P&P £10.00
CW-160	(160-10m) 80m long	£175.99 P&P £10.00
CW-80	(80-10m) 40m long	£150.99 P&P £10.00
CW-80S	(80-10m) 20m long	£150.99 P&P £10.00
CW-40	(40-10m) 20m long	£139.95 P&P £10.00
G5-RV	(80-10m) + balum	£74.99

TRAPS BACK IN STOCK

BALUNS & TRAPS (1kW)

Baluns 1:1 or 4:1 or 6:1..... £39.99 each P&P £4
Traps 80m or 40m or 20m or 15m..... £39.99 pair P&P £5

Q-TEK INDUCTORS

80mtr inductors + wire to convert ½ size G5RV into full size. (Adds 8ft either end)..... £34.99 P&P £4.00 (a pair)

NISSEI PWR/SWR METERS

RS-502 1.8-525MHz (200W)..... £79.95 P&P £6.50
RS-102 1.8-150MHz (200W)..... £59.95 P&P £6.50
RS-402 125-525MHz (200W)..... £59.95 P&P £6.50
TM-3000 1.8-60MHz (3kW) Incls mod meter..... £69.95 P&P £6.50
RS-40 144/430MHz Pocket PWR/SWR..... £34.99 P&P £5
DL-30 diamond dummy load (100W max)..... £29.99 P&P £5

D-308B DELUXE DESK MIC

(with up/down). Many amateurs (over 4000) have been pleased with it's performance. Includes 8-pin round Yaesu mic lead. Icom/Kenwood & other leads available. Phone (£22.99 each). Replacement foam windshield £3.00 + P&P.

8-pin modular plug converting to 8-pin round Yaesu adapter £19.99

£99.99

GENUINE COAX SWITCHES (P&P £6.00)

2 way CX-201 (0-1GHz) SO239..... £24.99
2 way CX-201 'N' (0-1GHz) 'N' £29.99
4 way CX-401 (0-500MHz) SO239..... £79.95
4 way CX-401 'N' (0-500MHz) 'N' £89.95

WATSON COAX SWITCHES

(POST £4.00)

CX-SW4N DC-1.5GHz (5xN)..... £59.99
CX-SW4PL DC-800MHz (5 x SO-239). £56.95
CX-SW3N DC-1.5GHz (4 x N) £49.95
CX-SW3PL DC-800MHz (4 x SO-239). £41.95
CX-SW2N DC-3GHz (3 x N) £32.95
CX-SW2PL DC-1GHz (3 x SO-239) £26.95

YAESU REPLACEMENT MICS

MH-IC8 8 pin Yaesu mic (8-pin round)..... £44.99 P&P £5
MH-4 4 pin fits older HF, etc. (4-pin round) ..... £39.99 P&P £5
MH-31A8J 8 pin modular ..... £39.99 P&P £5
MH-48 A6J 8-pin modular (DTMF) ..... £59.99 P&P £5

REPLACEMENT POWER LEADS

DC-1 Standard 6-pin/20A fits most HF..... £22.00 P&P £3
DC-2 Standard 2-pin/15A fits most VHF/UHF.... £10.00 P&P £3
DC-3 Fits Yaesu FT-7800/8800/8900, etc ..... £17.50 P&P £3

Q-TEK TRI-MAGMOUNT

Very heavy duty. Available:- SO-259 or 3/8 – specify.

£44.99

Rev. George Dobbs G3RJV's Carrying on the Practical Way
PW Publishing Ltd., Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW
E-Mail: pracway@pwpublishing.ltd.uk

Remembering Steve Ortmayer G4RAW

This month the Rev. George Dobbs G3RJV remembers a very special Radio Amateur who is fondly remembered in the *PW* offices.

Editorial tribute: *I was very saddened to hear that* ***Steve Ortmayer G4RAW*** *is now a Silent Key. He was such a keen – but simplistic constructor – and* ***Tex Swann G1TEX*** *and I were always amused when his circuit drawings arrived for use in* PW. *They were always drawn on the back of scrap planning forms from his local council offices (where he worked). Steve was the ultimate 'recycler', a great character and – from under a truly remarkable pair of eyebrows – this normally very serious looking personality could produce some wonderful stories and quips. We'll miss him very much indeed. Thanks for your support Steve!* ***G3XFD****.*

Blessed are those who give without remembering. And blessed are those who take without forgetting.
Bernard Meltzer
(American Lawyer 1916-1998)

Welcome to *Carrying on The Practical Way* (*CotPW*) where I have to start this time by mentioning that I was saddened to hear of the death, last November, of **Steve Ortmayer G4RAW** aged 69 years. For many years Steve wrote the *Novice News* column in *SPRAT*, the journal of the G QRP Club. He also wrote a number of articles for *PW* in the early 1990s. Steve lived in Hipperholme, a Penine village on the A58 not far from Halifax; a place with lovely stone houses and a remarkable collection of public houses!

A good, solid and straightforward, West-Yorkshire man Steve G4RAW produced a series of simple, easy-to-build, projects from the late 1980s onwards. His projects were the sort that encouraged beginners into radio construction. So, this month I intend to take you on a little tour of some of those projects as a tribute to Steve and his contribution to amateur radio. I've concentrated on simple QRP transmitters because Steve produced a lot of those!

Simple & Popular Designs

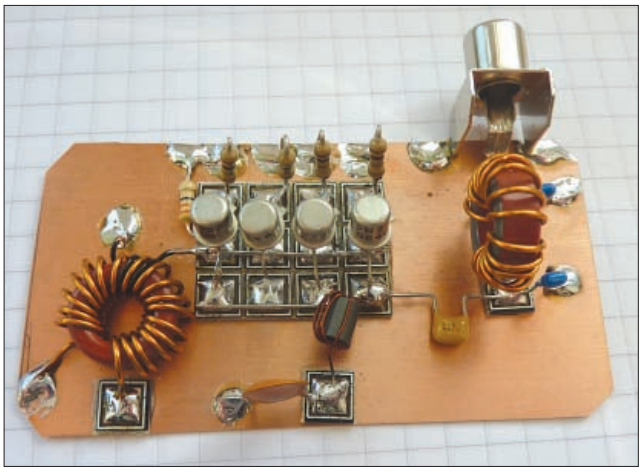
At the end of the 1980s several simple and popular QRP transmitter designs appeared in the Amateur Radio literature. Probably the most popular, and frequently built, was the ***Oner*** from **George Burt GM3OXX**.

The *Oner* was so called because it was built on a one inch square printed circuit board (p.c.b.). But it was far more than a novelty, being a viable transmitter capable of useful results on any chosen band from 3.5MHz (80) to 14MHz (20m).

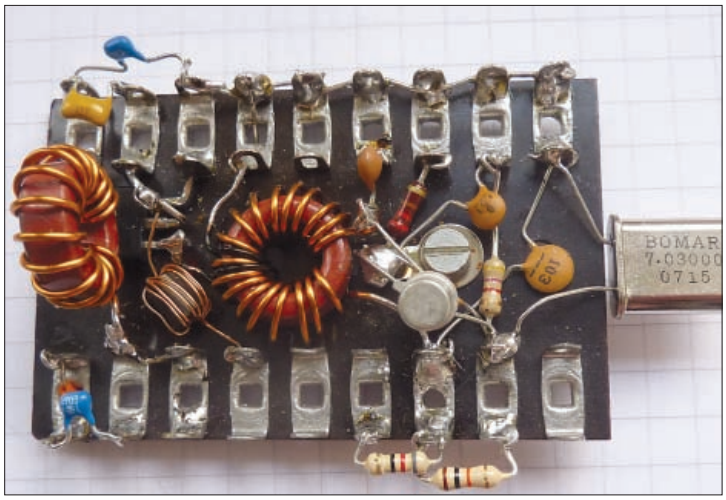
For several years **Kanga Products** produced a kit for the *Oner*. Several hundred kits were sold and most of them were built and used on the air. This led to some interesting challenges.

Some operators attempted to contact as many counties as they could with a *Oner*. Another challenge was to see how long it would take between opening the packaging of a *Oner* kit and making the first contact with the transmitter. The record became 15 minutes from the untouched kit to the first QSO with the assembled transmitter!

With this in mind G4RAW offered the readers of *Sprat* a simple design he called the *Ten Minute Transmitter* (*TMT*) with the intended aim of 10 minutes between having a pile of components on the work bench and making the first contact on the air. I'm not sure if this was ever achieved – but the circuit was popular and it still appears on a number of QRP websites. The circuit of the *TMT* is shown in **Fig. 1**.



Paralleling several transistors, gives a greater r.f. output. Up to 15 devices in parallel have been managed.



George's version of the Tag transmitter. It's very compact!

At this point I must add a caveat – the only frequency dependent component is the crystal. There are no tuned circuits and consequently no output filtering. Although the output is probably too low to make any harmonic radiation a nuisance to other band users – technically it's illegal to use an unfiltered transmitter on the Amateur bands. So I ought to add that well known warning 'Don't try this at home'. I'm including the *TMT* here because it became a classic G4RAW circuit.

Simple Circuit

The circuit of the *TMT* is very simple and based upon a Pierce crystal oscillator. In a Pierce oscillator the crystal is connected between the output and control sections of an active device. In this case the collector and base of a BFY51 transistor. The crystal provides the feedback path to maintain oscillation and determines the oscillating frequency.

The collector load is commercial moulded 100µH radio frequency choke (r.f.c.). If finding a suitable choke is a problem, 17 turns of 0.46mm (26s.w.g.) wire on an FT37-43 ferrite core would do the job.

The output arrangement is very simple. A 1000pF postage stamp trimmer couples the signal directly to the antenna. Postage stamp trimmers are compression type screw adjustable capacitors about the size and shape of a postage stamp. Steve's instructions for using the trimmer are as minimalist as the transmitter. He simply wrote, "Adjust the trimmer for the best note consistent with power output."

The *G4RAW Tag Transmitter*

A far more viable transmitter is the *G4RAW Tag Transmitter* shown in **Fig. 2**. This of one of a series of transmitters that Steve based on the *Universal Transmitter* by **Wes Hayward W7ZOI** published in *Solid State Design for the Radio Amateur*. The novel feature of this version was building the transmitter on a tag board.

Tag boards, sometimes called group boards or terminal strips, are insulated boards with a series of connector tags along two edges. They were frequently used in valved equipment in the 1950s and 1960s prior to the use of p.c.b.s. The use of a tag board offers a convenient and easy way to build the transmitter.

The *Tag Transmitter* uses a Colpitts oscillator with feedback via a capacitive divider (C1 and C2). A variable capacitor in series with the crystal enables the oscillator to run as a variable crystal oscillator (VXO) with a frequency swing of several kiloHertz. Almost any similar bipolar transistor (2N2222, 2N3904 etc.) could replace the BC108 device.

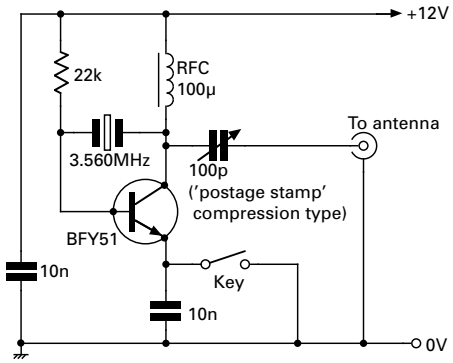


Fig. 1: The circuit of the very simplistic *Ten Minute Transmitter* from Steve Ortmayer G4RAW.

The tuned transformer (L1a and L1b) feeds the signal to a BD139 or BD131 power amplifier. A homemade r.f. choke wound on a ferrite bead provides the collector load, the collector being keyed. The output passes through a simple low pass filter . Using the values in Fig. 2 the transmitter is capable of about 2W of r.f. output power.

The circuit in Fig. 2 shows the 7MHz version of the *Tag Transmitter*. The 7.030MHz crystal is the QRP calling frequency for 40 metres. In the oscillator C1 is 68pF, C2 is 150pF, L1a is 18 turns of 22s.w.g. enamelled copper wire on a T50-2 core, L1b being a 2 turn link wound over L1a. The choke (r.f.c.) is 8 turns of enamelled copper wire wound through the center of a ferrite bead.

When winding r.f.c. take care not the scrape off any of the enamel coating of the wire on the sharp edges of the ferrite bead. This would risk shorted turns in the winding. In the low pass filter, L2 is 14 turns of wire on a T50-2 core with C3 and C4 both being 470pF.

The *Tag Transmitter* also works very well on 3.5MHz. The values for 80m are: 3.560MHz crystal for the QRP calling frequency), C1 - 270pF, C2 – 150pF, L1a - 38 turns of 26s.w.g. on a T50-2 core, L1b – 5 turns over L1, L2 – 22 turns 22s.w.g. on a T50-2 core, C3 and C4 – 750pF.

For the original layout of the *Tag Transmitter* G4RAW used a tag board with two rows of seven tags. Many years ago I built a *Tag Transmitter* and used it for several years as an example of a simple QRP transmitter when I did club talks. It was a useful low power transmitter. On the first evening I used it I contacted seven European countries on 7MHz.

I think Steve must have used a larger, more widely spaced, tag board than the one I could obtain. I found the layout rather cramped and the parts difficult to fit into the available space.

For the purposes of this article, I rebuilt the tag transmitter using a tag board with two rows of nine tags. This layout shown, allowed more space and was much easier to build. My latest version is shown in the photograph and produces an r.f. output just short of 2W.

One small niggle I had with the *Tag Transmitter* is that the key operates directly from the 12V supply. It's more common, and usually more convenient, to have one side of the key connected to ground on the circuit. Grounded keying is very easy to add to the transmitter with the circuit shown in **Fig. 3**. The circuit uses a switching transistor to key the 12V supply. Note that *Fig. 3* requires a *pnp* transistor.

The transistor should be capable of handling the current drawn by the p.a. transistor, such as the 2N4033, 2N3440 or similar medium power range transistors. When the base of the transistor is connected to ground, via the 1kΩ resistor, the transistor conducts and 12V appears at the collector.

The G4RAW 1.8MHz Transmitter

The diagram, **Fig. 4**, shows the G4RAW 1.8MHz (160m) Novice transmitter. The 1.8MHz allocation is often called 'Top Band' and Steve was keen to promote novice use of the band. Reading back through copies of *Sprat*, from the published comments – he appears to

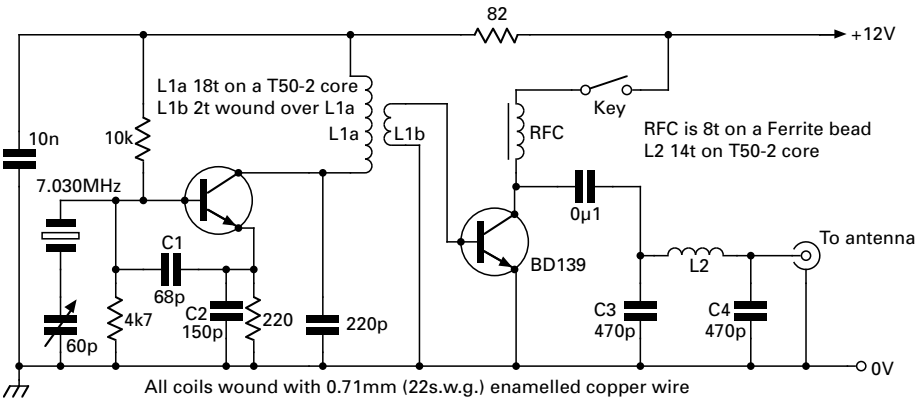


Fig. 2. The *G4RAW Tag Transmitter*, based on the *Universal Transmitter* by Wes Hayward W7ZOI published in *Solid State Design for the Radio Amateur*.

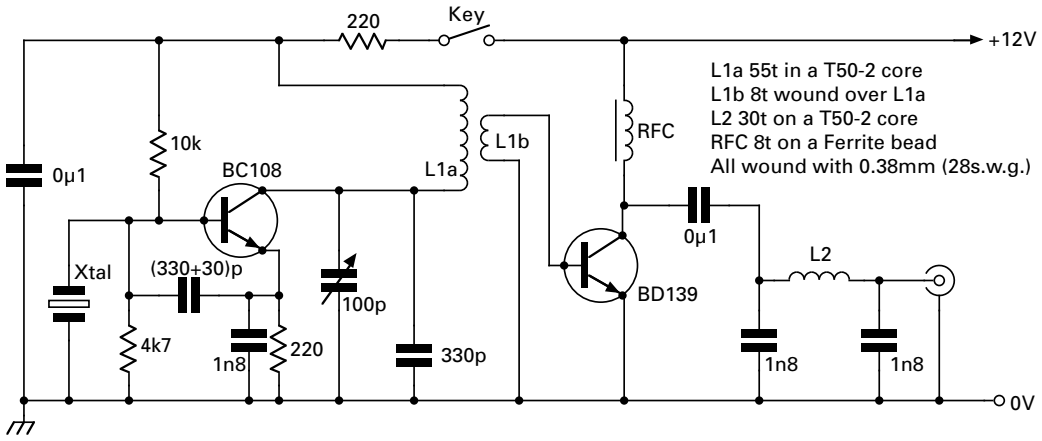


Fig. 4: This is the circuit of the *G4RAW* 1.8MHz (160m) Novice transmitter.

have been rather disappointed at the lack of use of the band.

Once again, the 1.8MHz transmitter is based on the W7ZOI universal transmitter. I have added Fig. 4 to clearly show the most substantive change; making the tuning of the driver transformer adjustable.

Inductor L1a is resonated using two capacitors, a variable 100pF and a fixed 330pF. Although the original drawing showed a variable capacitor, a 100pF trimmer capacitor can be used as once the value is adjusted, it may not require re-adjustment. The QRP calling frequency is around 1.836MHz and crystals are available from the G QRP Club.

Steve once came by a large number of 2N2222A transistors on a computer board and being a good Yorkshire man wanted to make full use of his free transistors! The *2N2222A Transmitter*, shown in **Fig. 5**, was his answer. He referred to an article in *Sprat 51* (summer 1987) where **Doug DeMaw W1FB**, that doyen of QRP circuits, presented an article entitled *Paralleling Small Transistors for QRP RF Power*.

Doug W1FB, explained how he used common, small signal, transistors connected in parallel for QRP power amplifier stages. Notice that each of the four transistors in the power amplifier stage has a 1Ω resistor in the emitter. These act as ballasting resistors. They prevent any single transistor drawing too much of the total current at the risk of burning out. In other words, these resistors tend to equalise the current flow shared by the four transistors.

Such an arrangement can enable common, inexpensive, devices like the 2N2222A or 2N3904 with high small signal gain (hfe) to be used in QRP amplifiers. Four 2N2222A transistors can provide about 1W of output with very low driving power. Although only four transistors are being paralleled in this circuit, higher output power can be obtained using more parallel transistors.

Using 15 Transistors!

Elsewhere Doug W1FB has a design using eight transistors and I recall a design by JA9MAT where he used 15 small signal transistors in a 7MHz linear power amplifier! It's recommended that the transistors have matching gain (as near as possible).

These days many digital multi-meters have the facility to measure transistor hfe by simply plugging in a transistor and reading the gain figure. Transistors from the same manufacturer (even better from the same batch) make the matching process easier.

The rest of the circuit in Fig. 5 uses an oscillator similar to the ones described above. The values given are for the 3.5MHz. I decided to look at a convenient layout for the amplifier and this is shown in the photograph. The four transistors are mounted on a matrix of four by three square pads. My pads are the "Me Pads" produced by **Rex Harper W1REX** of QRPMe, available from W1REX or the G QRP Club.

The base lead pads and the collector lead pads are joined to parallel the connections and each emitter lead pad goes to its own 1Ω resistor. It would be very simple to make a similar matrix of pads using a suitable piece of p.c.b. material and scoring the copper surface with a small hacksaw.

My little matrix board measures about 20 by 25mm. The layout is a bit tight so if making your own, make it a little larger. I have more little transmitters than I can cope with, so I have laid my amplifier board aside for later use.

We QRP fans will miss G4RAW and his little circuits and I hope the above has either reminded you of, or introduced you to, some of his work. George G3RJV. ●

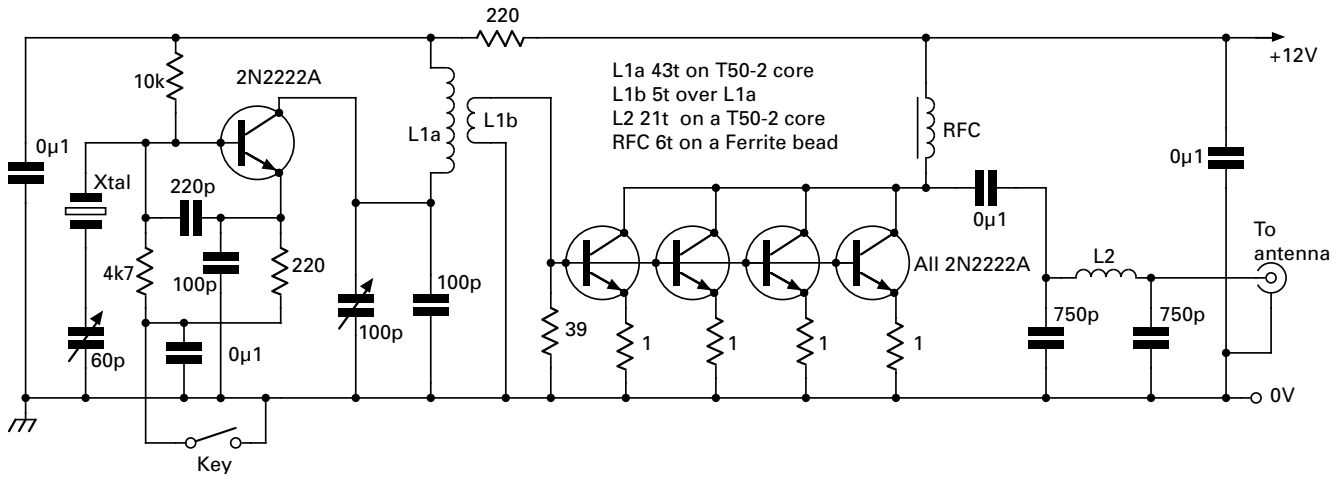


Fig. 5 The *2N2222A* Transmitter, from Doug DeMaw W1FB, appeared in an article entitled *Paralleling Small Transistors for QRP RF Power*. And, of course, Steve G4RAW had his version!

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

The Morse Mode

This time Roger Cooke G3LDI explains his humour – and brings you an unusual key before appealing for volunteers!

Welcome to *Morse Mode* (*MM*) where c.w. rules! In the Norfolk Amateur Radio Club (NARC), following my involvement with the RSGB's GB2CW project, we pride ourselves in our Morse tuition. Although I'm sometimes accused of using an almost 'blackmail' approach to this – I make no apologies for so doing. By that, I often say (with tongue-in-cheek) that nobody is a 'proper' Amateur until they master Morse.

Well, that comment was made in humour, and was born with Scorpio as a birth sign – but it did upset a few members! However, I'm not overly concerned about that few, because since that we have even more on our Morse course!

We're now running two Morse evenings, one for beginners, 0 – 15w.p.m. on Tuesdays and the other for advanced, 15 – 30w.p.m. on Thursdays. This is just a pre-amble that leads to my inference of 'more cheating'.

We now have other members, who would like to learn More but have not actually started for a variety of reasons. There's also a great interest in encouraging contesting and the RSGB Club Contests in particular. There are those who would like to take part in the c.w. events, but even those on training feel somewhat daunted by the prospect. So computer Morse programs were tried to see how effectual they could be and I was quite impressed with the overall results.

Morse Computer Programs

There are several Morse programs around on the Internet but the program that's preferred by those trying the computer teaching method is *CWGET*. Two club members used this program and one made 62 QSOs and the other an amazing 111. It's a result obviously enhanced by the fact that a lot of contesters use programs like *N1MM* – so they actually send very little c.w. on the key.

Almost all of the Morse output from the logging programs is well formed. (Quite how the readers would cope with badly sent Morse I'm not sure!). Have a look at:
www.dxsoft.com/en/products/cwget/

The *CWget* program is one you have to register and pay for (US$35). But for those of you that would prefer a slightly cheaper option – a free one – an option that seems to tick all the boxes is to be found at:
www.dxzone.com/cgi-bin/dir/jump2.cgi?ID=11874

The resulting download is a **NorCal QRP Club** project, and its author, **Grant Connell WD6CNF** says is a fully featured c.w. decoder. Grant's c.w. *Decoder XP* has been used in anger during contests. So, you don't really have to wait until you are proficient at 30w.p.m. before entering. Even if you use a program similar to these just to back you up, it all helps to provide confidence.

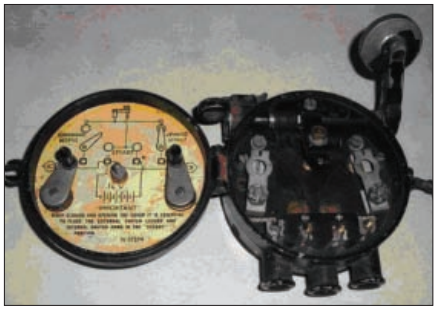


Fig. 1: Dave Gemmell ZS6AAW is an avid *PW* reader and found this unusual Morse key in the South African Air Force (SAAF) Museum. As you can see it's quite 'different' and has been hidden from view for far too long.

I'm not suggesting that complete reliance be placed on a decoder – instead it can be used merely to help pave the way to managing without it. Some very respectable scores have been made using the decoder and it could provide an entry into your learning Morse.

A Rather Special Key

Dave Gemmell ZS6AAW, is an avid reader and has sent along some pictures of a rather special Morse key which actually belongs to the South African Air Force (SAAF) Museum. As you can see it's quite unusual and has been hidden from view for far too long.

Looking at the two pictures that make up **Fig. 1**, you can see the Crown and 'AM' Air Ministry markings and it has the REF. No. 5c/372 and the title "Switchbox Identification, MARK III".

Note that the two 'switches' have 3 positions top = Morse, centre = OFF and bottom = STEADY which makes might mean that the navigation lights were involved. Note also that the left-hand switch is 'Downwards' whilst the right-hand one is upward!

Since receiving these pictures from Dave, there has been some more information on the FISTS reflector. Apparently this is called an Air Ministry Switch Box Identification Key, Type B. It's from the 1940s and was used in the *Spitfire* aircraft. Take a look at this site.
www.morsemad.com/air.htm

I found types, similar to my old Marconi type D Key on the site, although mine doesn't have the identification on it unfortunately.

Dave shares *Morse Mode* with two of his c.w. friends, **Andy Cairns ZS6ADY** who publishes the *SA Antique Wireless Association News Letter* and **Tubby Waldeck ZS5CQD** – an old timer from Amamzintoti, just south of Durban who is a c.w. enthusiast and historian.

It is nice to know that the column has an international appeal!

Looking For GB2CW Volunteers

The GB2CW RSGB voluntary service is still going strong and we're still looking for more volunteers, both instructors and assessors. If you have an hour or so a week to spare, why not hold a class for your local Club? Please E-mail me and I will add you to our list. 73 and May the Morse be with you! Roger G3LDI. ●

SPECTRUM COMMUNICATIONS

NEW and IMPROVED GAREX PRODUCTS

TARGET HF-3 COMMUNICATIONS RECEIVER. 30KHz to 30MHz, AM/LSB/USB, 10 memory channels. Fully synthesised in 1KHz, 10KHz, and 100KHz steps, plus +/- 1KHz clarifier. Large LCD frequency display and bar graph signal indicator. Fixed level output to drive a computer sound card. 500mW rms AF output. Supply requirement 12V DC at 300mA. Dimensions 18.5x6.5x19cm. Weight 1.8kg. **Price £215 inc delivery**.

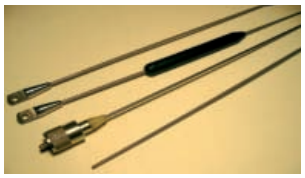
NOMAD WIDEBAND PORTABLE SCANNER AERIAL 25-1300MHz. For use as portable or permanent aerial where a conventional wire aerial cannot be used. The twin wire element is 1.2m (48") long and the matching unit is 18cm (7") long. It is fitted with 4m of 50 Ohm coax cable with a BNC male connector.
Price £18 plus P&P £3.50.

RECEIVE VHF PREAMPLIFIERS boxed built for connection between antenna and receiver. Black enamel painted steel box with BNC connectors, DC chassis plug and on/off switch. Supplied with BNC to BNC patch lead. Supply requirements 6-15V DC at up to 10mA. Box can accommodate a PP3 battery. Various frequency type available, AP-3 118-137MHz 15dB gain for Airband, WP-3 137-138MHz 25dB gain for Weather Satellite, MP-3 156-162MHz 15dB gain for Marine Band, MP-3/AIS 162-163MHz 25dB gain for AIS. Also GP 2m, GP 4m, & GP 6m for amateur bands.
PCB built £11.50 inc P&P, Boxed built with patch lead £36.50 inc P&P.

IMPROVED 4001 FM TRANSCEIVER. 70.2500 to 70.4875MHz in 20 channels in 12.5kHz steps. Now with improved audio quality and really effective noise squelch to give quite background effective weak signal reception. RF output 5W/25W switchable. Can also be preset to 1W/10W, approved for use by M3 and M6 operators. Sensitivity better than 250hV for 20dB SINAD. Audio output 500mW. Supply requirement 13.5V DC 4A on high 1.5A on low TX, 130mA on RX. **Price £172.50 including delivery.**

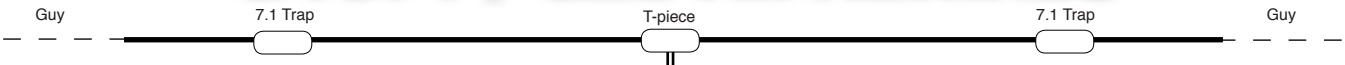
SLIM G 144-146MHz TRANSMIT & RECEIVE AERIAL. Previously called the GAREX JIMP and is essentially a portable version of the Slim Jim. The gain is 1.8dBd, which on 2m is 12dBd better than a 150mm rubber duck. The main element is 300 Ohm twin feeder with a matching section housed in a watertight housing. There is 4m of coax cable with a choice of BNC, or PL259 connectors. The 2m version is 1.55m (61") long and folds down to 25cm (10").
Price £20.00 plus £3.50 P&P.

GAREX WHIP AERIALS. Flexiwhip replacements for short rubber ducks offer with choice of connector. Loaded whips up to 50cm made for any frequency in the range 68 to 144MHz. **Price £25 inc P&P.** Shorter Flexiwhips made for frequencies in the range 144 to 440MHz. **Price £15 inc P&P**.



2m/70cm DUAL BAND MOBILE WHIP. 0dBd on 2m, 3dBd on 70cm. Choice of hinge adapter or 3/8" UNF stud or PL259. **Price £23.00 inc P&P.**

G4CFY / G2DYM AERIALS



TRAP DIPOLE for 80/40/20/15//&10m. 106 feet long. Supplied with 70 feet of low impedance twin feeder. 600W rated. Low TVI and low noise. 2 S-points quieter than a G5RV with same feeder length. PVC covered wires with lugs. Regular duty £164.50, strong £182.50, inc. carriage.

TWIN FEEDER 100 Ohm, 2kW rated, 24/0.2 in individual polyethylene sheaths with an outer cover of polyethylene. Solid construction to avoid water ingress. Good flexibility to overcome work hardening and fracture. Typically 0.5dB/m quieter than wide spaced 300 and 450 Ohm feeder and coax. Loss 0.04dB/m at 10MHz. £1/metre plus £3 P&P. 100m drum. £90 inc carriage.

1:1 BALUN 160-10m, 1kW rated. Loss under 1dB from 1.8 to 40MHz. Ideal for use with the G4CFY trapped dipole, or any other aerial fed with low impedance twin feeder. £43.00 inc P&P. Version with Marconi-T switching. £53.00 including P&P.

TRAPPED INVERTED L AERIAL 80/40/20/15 & 10m, for a small garden. Coax driven from far end of garden and tuned against ground. A good all round aerial with 6dB more gain than a 24 foot trapped HF vertical. That's 4 times power on TX and one S point extra on RX.
Regular duty £84.00, strong £99.00, inc. carriage.

12 WEATHERBURY WAY, DORCHESTER, DORSET DT1 2EF. Tel & Fax: 01305 262250

E-mail: tony@spectrumcomms.co.uk

Web site: www.spectrumcomms.co.uk
Web site: www.garex.co.uk

Prices inclusive of postage unless stated. Payment by credit/debit card or by cheque or Postal Order payable to Spectrum Communications.

TRANSVERTERS for 2 or 4 or 6 metres from a 10 metre rig, or 4 or 6 metre from a 2 metre rig. Includes new overtone local oscillator, and integral interface unit. 20dB receive gain, 25W transmit power. Low level drive dual IF versions **TRC2-10dL, TRC4-10dL & TRC6-10dL**, high level drive single IF versions **TRC2-10sL**, **TRC4-10sL**, **TRC6-10sL, TRC4-2sL, TRC6-2sL**, Complete kit **£179.00**. **Built £266.00.**

TRANSVERTERS for ICOM rigs, supplied with cables. Automatic with no cable switching. IC756Pro & II & III, 775, 781, 7600, 7700, & 7800 use type **TRC4-10L/IC1.** IC735, 761, & 765 use type **TRC4-10L/IC3. Built to order £280.00.**

STATION PREAMPS for 2 or 4 or 6metres. RF & DC switched. Adjustable 0-20dB gain. 100W power handling. **RP2S, RP4S, RP6S, PCB & Hardware kit £35.00, Ready Built £57.00**.

MASTHEAD PREAMPS, for 2 or 4 or 6meters. 20dB gain 1dB NF. 100W through handling. RF switched & DC fed via the coax. Heavy duty waterproof masthead box, and a DC to RF station box with SO239 connectors. **RP2SM, RP4SM, RP6SM, PCB & hardware kit £41.00, Ready Built £65.00**. **Masthead fitting kit £6.00**.

MASTHEAD PREAMPS 400W rated, for 2 or 4 or 6metres. RF switched. DC fed via a separate wire. 20dB gain 1dB NF. Heavy duty waterproof masthead box with SO239 connector. **RP2SH, RP4SH, RP6SH. PCB & hardware kit £42.50, Ready Built £65.00**. **Masthead fitting kit £6.00**.

TRANSMIT LINEAR AMPLIFIERS with receive preamps, on 6m 5W in 50W out, on 4m 7.5W in 50W out. Receive gain 10-20dB panel adjustable. 13.5V DC operation at up to 8A. Diecast box with SO239 connectors. TARP4SB or TARP6SB. Kit £92.00, Built £126.00.

OFF-AIR FREQUENCY STANDARD, crystal calibrator unit phase locked to Radio 4 using a two-loop system. Includes a monitor receiver to ensure Radio 4 is being heard loud and clear. Fixed outputs 10MHz at 2V p-p, and 1KHz at 1V p-p as oscilloscope CAL signal. Switched outputs 1MHz, 100KHz, 10KHz, and 1KHz at 6V p-p, into 500 Ohms. Single board design as featured in July & Sept 2008 PW. Background heterodyne whistle at 2KHz confirms lock condition. 12/13.5V DC operation at 65mA. **PCB kit with ferrite rod £50.00, PCB kit + drilled box and hardware complete £86.00. Ready built £131.50.**

NEW PRODUCT

WIDE RANGE POWER METER 1.8 to 52MHz, four ranges 1, 10, 100, and 200W with an accuracy of +/-5%. Thruline concept with toroidal current transformer sampling element. Kit includes assembled sampling element, drilled and trepanned box and scaled meter. **Boxed kit £53.50. Ready built £72.00. Prices inclusive of P&P.**

COMPONENTS

See our web-site or send A5 SAE for list.

TOROIDS & BINOCULAR CORES, dust iron types T37-2 25p, T50-2 50p, T68-2 60p, T37-6 30p, T50-6 50p. Ferrite types FT37-43 55p, FT50A-43 80p, FT37-61 55p, FT50-61 85p. BN0302-43 75p, BN1502-61 75p, BN0102-61 £1.00, BN3312-43 £4.00. P&P £1.00.

SPECTRUM 10mm COILS. Pin compatible with TOKO types. Coil values 0.6, 1.2, 2.6, 5.3 11, 22, 45, & 90uH. Low or medium Z secondary options. Full details of turns ratio etc on web-site. 1-24qty 80p each plus £1 P&P. 25-99 60p each plus £2.50 P&P.

CTCSS TONE ENCODER as described in PW July 2011. Nine Tones link or switch selectable. PCB size 67x55x12mm. PCB Kit excluding switch £21.00. PCB built excluding switch £30.00 9-way switch £2.00.

PSK31 INTERFACE KIT. Module as described in PW Feb 2009. Suitable for a variety of digital modes. PCB and components **£21.00**. Box kit complete with cables but excluding microphone plug **£35.50**.

PORTLAND VFO. A rock stable FET VFO. Meets the requirement for the Intermediate Licence VFO project. Modified to allow alignment to top and bottom of required band. Several versions available: 5.0 - 5.5Mhz for 20 & 80 metres; 7.0-7.2MHz for a direct conversion for the extended 40metre band; or 7.900 - 8.400MHz for use as part of a mixer-oscillator system as local oscillator for 4m RX or TX. Supplied with Buffer 2A to deliver 1.6V p-p into 50Ω with 2nd harmonic 40dB down. **PCB and component kit with potentiometer £18.00. Drilled Box and PCB kit with potentiometer and feedthroughs £27.00. Ready built £50.00**. State required frequency when ordering.

CLASSIC 20/80m SSB RECEIVER uses a 5.0-5.5MHz VFO and a 6 pole 9MHz ladder IF filter with a 70dB stopband. Minimum discernable signal 0.2uV. Fixed tuned bandpass preselector on 20m, tunable preselector on 80m. Logarithmic AGC and Signal meter response. Maximum signal handling 1mV. 500mW audio output. Supply requirement 13.5V at up to 250mA. **VFO with its drilled box, preselector and main board PCBs and component kits including crystals £92. Complete kit including box and hardware £147.00. Ready built £240.00.**

Tony Nailer G4CFY's Technical for the Terrified
PW Publishing Ltd., Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW
E-mail: tony@pwpublishing.ltd.uk

Mixing One to One

This time in Technical for the Terrified, Tony Nailer G4CFY discusses singly balanced mixers

It is time again to revisit mixers, as the previous times were in *PW* May, July & September 2005 in *Doing it by Design*, and in April 2009 in *Technical for the Terrified*.

A mixer does its job due to having a non-linear voltage and current characteristic. Often a small signal is mixed with a much larger one. The large one does the job of moving the operating point around the curve of a non-linear characteristic.

Linear Characteristic

Let me explain by considering first a pure resistance of say 100Ω. If you apply 0.1 volt across it you will get 1mA flowing through it. If you apply 0.2V across then 2mA will flow through it. 0.3V will give 3mA, etc, and at 1V it is 10mA. Any increase in voltage produces an equal increase in current flow. The relationship is described as linear, and is shown graphically as the diagonal line in **Fig. 1**. At every point along the line the ratio of V to I will give the resistance R of 100Ω.

Non-linear Characteristic

Consider now the forward current and voltage relationship of an OA91 Germanium diode is shown as the curved line in Fig. 1. At 0.1V it hardly allows any current to pass. At 0.2V the current is about 0.2mA. At 0.3V it is almost 0.5mA. At 0.4V the current is about 0.85mA. At 1V the current is 7mA.

If we calculate the resistance when 0.2V is applied and 0.2mA is flowing then R is 0.2/0.2mA = 1kΩ. At 0.3V applied the resistance is 0.3/0.5mA = 600Ω. At 0.4V applied the resistance is 0.4V/0.85mA = 470Ω. At 1V applied the resistance is 1V/7mA = 143Ω. It must be clear from this that the input to output relationship is non-linear.

Square Law Characteristic

The best characteristic for a mixer is a square law. If the diode characteristic was a square law and at 0.2V applied the current was 0.2mA, then with 0.3V applied the current would be the square of the increase of voltage. That is the $(0.3/0.2)^2$x 0.2mA = 0.45mA. Similarly at 0.4V the current would be (0.4/0.2) squared x 0.2mA = 0.8mA.

Finally at 1V applied the current would be $(1/0.2)^2$ x 0.2mA = 5mA. You will note that the OA91 diode is fairly close to a square law characteristic and hence should be quite efficient at mixing two signals together.

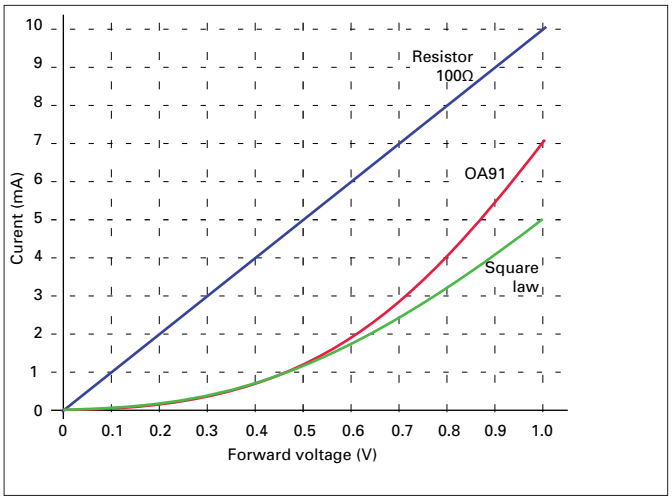


Fig. 1: Forwards voltage-v-current graphs of a 100Ω resistor, a typical Germanium diode (OA91) and a square-law curve.

Mixer Products

The simplest rule to remember is that the purpose of a mixer is to create the sum and the difference of the two frequencies fed to it. Rather than specifying the signals as f_1 and f_2 it is better to specify them as highest f_H and lowest f_L. What then we expect to get from the mixer is f_H+f_L and f_H-f_L.

Also though there will be residual amounts of f_H and f_L at the output as well as other signals referred to as intermodulation (intermod) products. These occur because the non-linear law distorts each of the original signals producing harmonics of them. Then mixing takes place between twice the lowest minus the highest and also twice the highest minus the lowest. Because they involve two of one and one of the other they are referred to as 3rd order intermods. Of course other harmonics give rise to 4th order, 5th order, etc, so the output can look a bit like a forest.

Singly Balanced Demodulator

The simplest singly balanced mixer is as shown in **Fig. 2**, which is configured as a receive demodulator. Some thought should always be given to which of the two signals need to be most balanced out. This will actually determine how the mixer functions. The purpose of a large oscillator signal is to switch the diodes on and off thereby chopping the signal at the oscillator rate.

If the large oscillator signal is applied at input 1 the top and bottom of the secondary will be anti-phase to each other, first

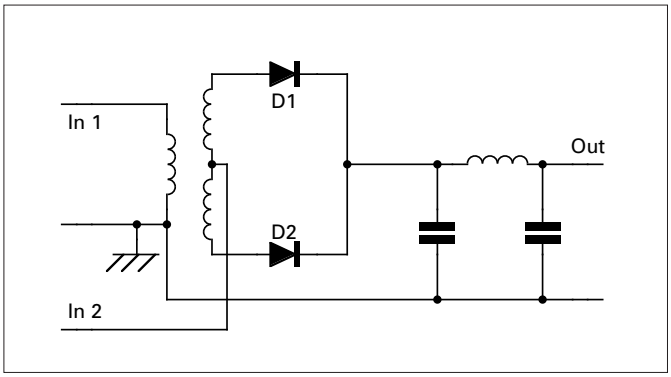


Fig. 2: A singly balanced diode mixer pair feeding a low-pass filter can produce outputs over a range of frequencies.

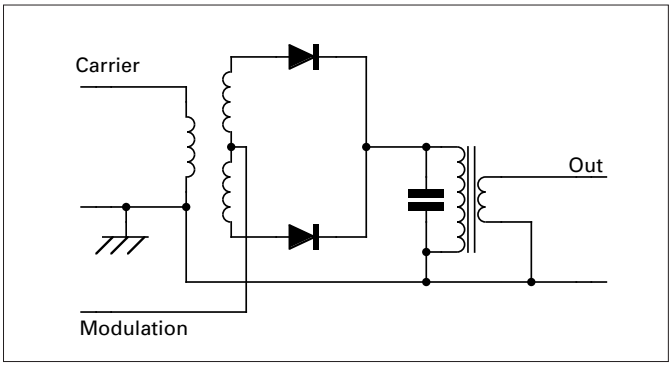


Fig. 3: When fed into a tuned circuit, the singly balanced pair finds use as a receive mixer.

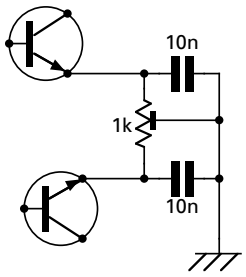


Fig 5: An option to Fig. 4, that allows some adjustment of the mixer's balancing.

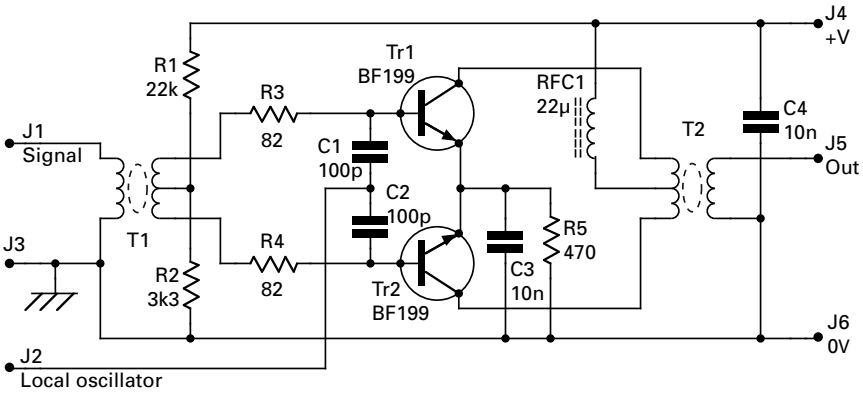


Fig. 4: Using two transistors as an active mixer, but still only singly balanced. Note the output is broad-banded.

in one direction then opposite. When the top is positive and the bottom negative the diodes will equally conduct. When the top is negative and the bottom positive neither diode will conduct.

Regardless of the phase at any time, the centre point of the transformer secondary and also the joint of the two diodes will not move provided the transformer is perfectly symmetrical and the diodes are perfectly matched. The mixer is balanced in respect of input 1.

If the large oscillator signal is applied to input 2 at the centre tap of the transformer then both ends of the transformer will be in-phase. This means that when the oscillator signal swings positive D1 will conduct but D2 will not. On the next half cycle D2 will conduct and D1 will not. Note that the full cycle of oscillator signal will be conducted to the output. The mixer is not balanced with respect to input 2.

Singly Balanced Modulator

The singly balanced diode modulator is shown in **Fig. 3** and only differs from the demodulator in the form of the output network. Configured like this the circuit is balanced in respect to the carrier signal and unbalanced in respect of the modulating signal.

The diodes are switched on alternately by the modulating signal, thereby chopping the carrier signal at the modulation rate. The coil in the parallel tuned circuit is effectively a short circuit at audio frequency but in conjunction with the resonating capacitor has a high dynamic resistance at the carrier frequency.

Singly Balanced Active Mixer

In *Doing it by Design* July 2005 I compared the diode singly balanced mixer with a two transistor active mixer, **Fig. 4**. The result of several tests revealed that the two transistor mixer required less local oscillator drive and provided gain instead of loss. The diode mixer achieved a carrier suppression of 40dB whereas the two transistor mixer only 24dB carrier suppression.

Presumably the poor carrier suppression would have been due to the devices being poorly matched. By modifying the emitter circuit to include a 1kΩ multiturn trimpot with each emitter separately decoupled it should be possible to achieve a balanced at least as good as the diode mixer. See **Fig. 5**.

Singly Balanced FET Mixer

The relationship between the gate voltage and drain current in a field effect transistor (f.e.t) is similar to the ideal square law characteristic. Hence an alternative to the two-transistor mixer is a similar circuit using a pair of field effect transistors, (f.e.t.s).

Such a circuit formed part of 'The Solid State Receiver' by William Sabin and published in *QST* magazine July 1970. A simplified version is shown in **Fig. 6**. Capacitors C3 and C4 resonate the primary of the output transformer at the intermediate frequency.

The same circuit is described in the 2012 Edition of the *ARRL Handbook* on page 10.27 where it is described as a high dynamic range mixer. It is also said to operate in common-source configuration. The interesting thing here is that it is common source with respect to signal input and mixer output but is common gate in respect to the local oscillator signal.

Circuit Enigma

Those readers who had a copy of the December 2011 *PW* might have read the discussion about equivalent circuits in *Technical for the Terrified*. If the same reasoning is applied to the Sabin mixer it must be reasoned that C1 10nF is a short circuit at the local oscillator frequency, thereby grounding the centre of the input transformer to a.c.

The f.e.ts are self-biased by the drain/source current flowing through R4 raising the sources above 0V. The source-

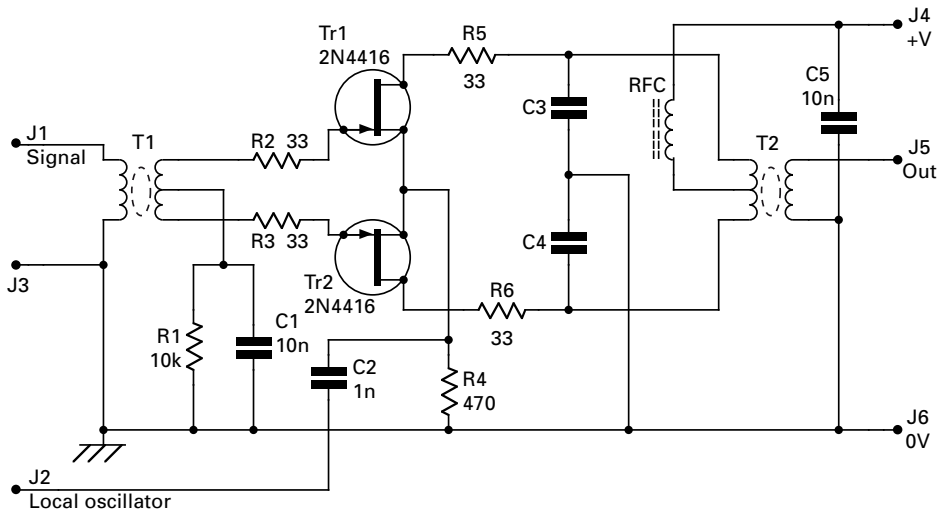


Fig. 6: Two junctions f.e.t.s can also be used as an active mixer, this is also a broad-banded output circuit like Fig. 4.

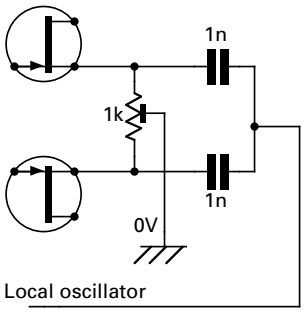


Fig. 7: A modification, to give some adjustment of Fig. 6's balancing. Note the different feed-point for the local oscillator this time.

to-gate junctions being effectively reverse biased silicon diodes have negligible gate current so there is no significant voltage developed across R1.

With no potential developed across R1, this means that the centre of the input transformer is also effectively at ground potential in respect of d.c. So why is the centre point just not grounded directly. I'm not sure so, I will have to build one of these and see what happens with and without R1 and C1 and also how well it performs at supply voltages between 8V and 13.5V.

Equivalent Devices

The devices specified by Sabin are 2N4416 are now unobtainable, except from vendors of obsolete components at excessive prices. I have recently researched a number of f.e.ts by comparison of drain current I_{dss} cut off voltage $-V_{gs}$ and forward transconductance Y_{fs}.

Whereas the 2N4416 is a metal can TO72 package, the J304 type is the plastic TO92 package containing the same die.I found that the *Siliconix FET design Catalogue* 1979 includes both devices and refers them both to curves NH. And I happen to have quite a large stock of J304 devices.

Circuit Balance

In respect of use as a high dynamic range receive mixer the suppression of the local oscillator signal at the output is not usually an issue. With this type of mixer the local oscillator signal driving back through the gates is in-phase at each end of the input transformer, so there is no potential difference across it. Emission back through the input then would be insignificant.

The local oscillator signal will swing both f.e.ts equally causing all three connections of the primary of the output transformer to move in-phase with the oscillator. This is why the centre connection is not decoupled to 0V and why a high impedance r.f. choke is used to supply the d.c. to the positive rail.

Most semiconductors, such as f.e.t.s vary quite widely in characteristics, even from the same batch so, for use as a balanced transmit modulator, or transmit mixer, a balancing circuit would need to be included. This could be done as shown in **Fig. 7**.

Final Remarks

Double balanced mixers also have their uses but in the majority of cases a mixer is operating on a signal of less than 1mV and an oscillator signal somewhere between 200mV and 2V. With a ratio between these two signals varying from 46dB to 66dB, it is usually important to be able to balance out the oscillator but usually unnecessary to balance out the signal.

It will be interesting, when time permits to experiment with the Sabin mixer and to see if it can be optimised as a transmit, as well as a receive mixer.

If you wish to contact me regarding this, or previous, articles I may be contacted on **tony@pwpublishing.ltd.uk**

Mike Richards G3WNC's Data Modes
PW Publishing Ltd., Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW
E-Mail: mike@pwpublishing.ltd.uk

Sound-Cards for SDR

In his *DataModes* column this month, Mike Richards G4WNC, explores sound-card requirements for SDR, after an apology to Joseph Fourier!

Welcome to *Data Modes* (*DM*) where I must offer an apology first! When I was explaining about fast Fourier Transforms (FFTs) in a previous *Data Modes* columns, I referred to 'Jean Fourier'. While Jean was his given first name, he was universally known as Joseph Fourier. My thanks for putting me straight, go to Jean Paul Yonnet F1LVT, who is a lecturer at Université Joseph Fourier in Grenoble and a long term *PW* reader!

Next we go straight to this month's topic of sound-cards for SDRs. One of the things I didn't cover last month, when dealing with software defined radio (SDR) receivers, was the choice of suitable sound-cards. Direct conversion (DC) designs such as SoftRock and Rocky, rely on the computer's sound-card to digitise the incoming analogue I and Q signals. So, the card's performance is the key to capability.

The sound-card quality also affects the image and central spur performance of these radios. Whilst modern sound-cards are generally very good, the use of a poor sound-card can make a hash of an otherwise decent receive system. So, let's look at what makes a good sound-card for SDR purposes.

Sample Rate

One of the first things to remember is that sound-cards are primarily designed to reproduce sound, i.e. frequencies between about 20Hz and 20kHz. When we use sound-cards for SDRs we expect them to operate from d.c. to well above the audio range, typically 45kHz or more.

The familiar Nyquist theorem shows that we need to sample the audio signal at twice the rate of the highest frequency, i.e. 40kHz or more. Most sound cards use either 44.1kHz or 48kHz as the standard sample rates for audio. In the quest for higher fidelity, sound-card manufacturers have introduced even higher sample rates of 96kHz and 192kHz plus a few in between.

The increase in sampling rate has been a boon for SDR users, because higher sample rates mean a wider 'tuning range' for the receiver. You may recall from previous *DataModes*, I showed that SDR receivers are able to use information in the two IQ signals to receive a bandwidth that is very close to the sound-card's sample rate.

That means a sound-card with a sample rate of 96kHz allows us to tune nearly 96kHz of spectrum. However, that is only true if the sound-card has a frequency response that is largely flat from d.c. to about half the sample rate. On the face of it, higher sample rates look like good news. Unfortunately, there's a snag in this simple assumption as we'll see later.

Sample Bits

The appearance of the first 16-bit sound-card marked the arrival of 'Hi-Fi' sound for computers. But you will now find that 24-bit cards are commonplace. At this point it's probably worth doing a quick refresh of the analogue to digital sampling process. I've shown in the diagram, **Fig. 1**.

Remember, when we digitise a signal we are turning our analogue information into a stream of numbers that capture the detail in the original signal. We do this by taking a voltage measurement at the sample rate I mentioned earlier.

So, for a 96kHz sample rate, the sound-card takes a voltage reading 96,000 times per second for each channel! It's at this point that the number of bits comes into play. Because computers only deal in the 'on-or-off' signals of the the binary numbering system to record these measurements.

The number of digits used for each sample, has a significant impact on the overall accuracy. The early sound-cards were 8-bit devices so each voltage measurement was converted to an 8-bit binary number which gave a maximum range of 256 steps between the quietest and loudest signal that could be sampled accurately.

If you convert that ratio to a dB value, it gives a dynamic range of just under 50dB, which is not very good for audio, let alone radio applications. The 16-bit cards come out very much better with 65,535 measurement steps giving a

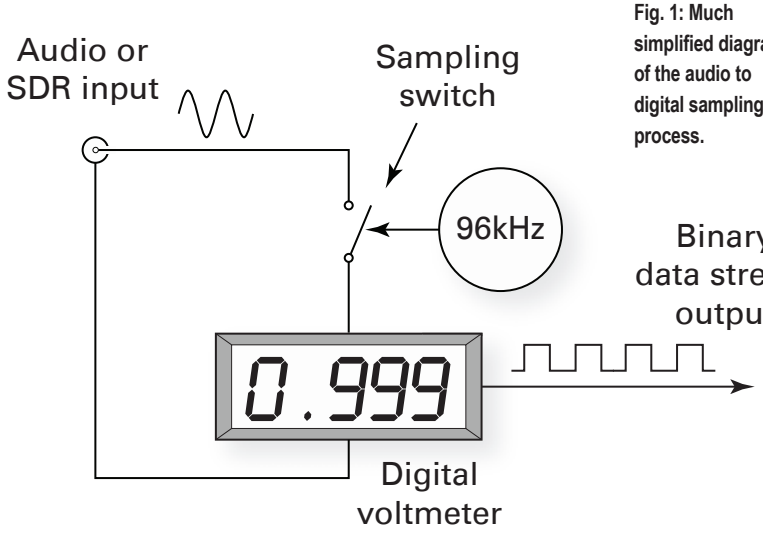


Fig. 1: Much simplified diagram of the audio to digital sampling process.

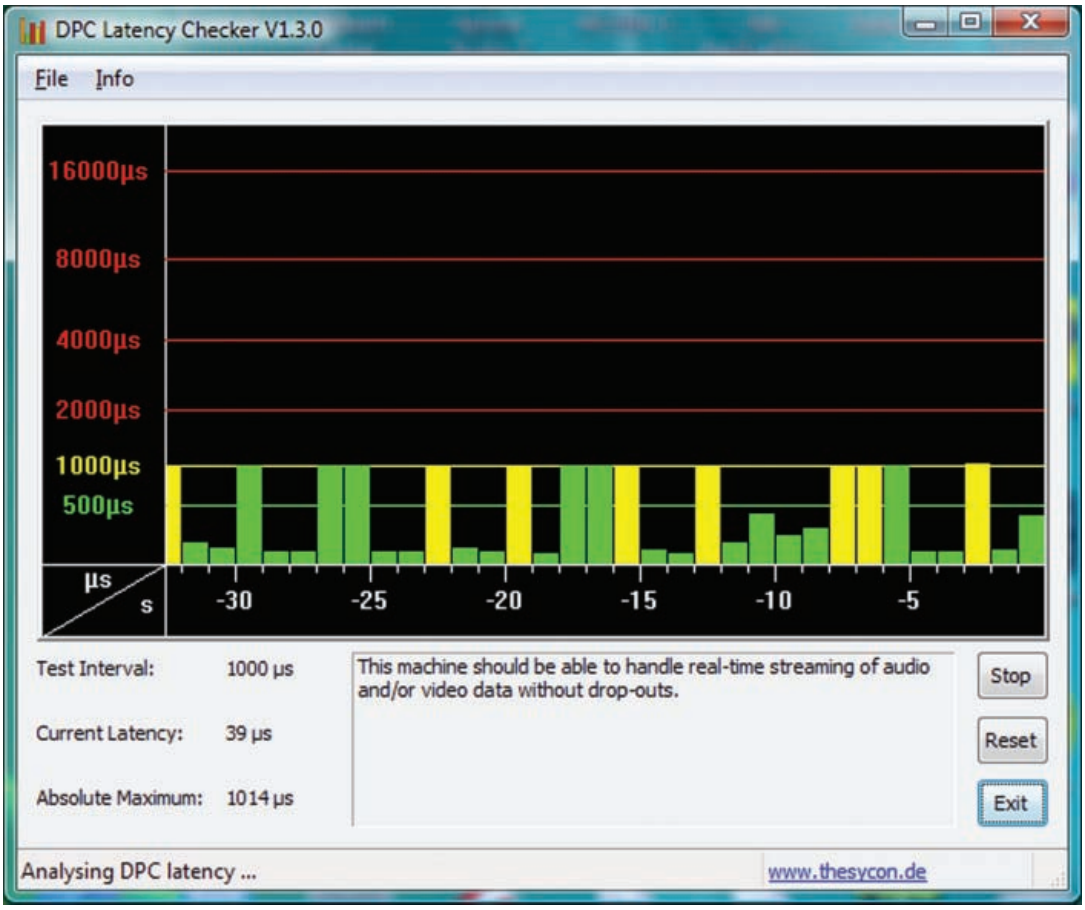


Fig. 2: A screen-grab of *Latency Checker* – a useful program to assess your PC's ability to handle streaming audio.

potential dynamic range of 96dB, which is fine for quality audio and most radio applications. However, the later 24-bit cards provide 16,777,216 measurement steps or 144dB, which exceeds the capabilities of most radio applications.

Processor Loading

So far it's seems clear that higher sample rates and more accurate measurements are a good thing – the more the merrier so to speak. However, we need to consider the amount of data that's being shifted around the computer.

If we use 24-bit measurements with a 96kHz sample rate as an example, we find that the data stream is leaving the sound-card at 96,000 x 24bits per second that's just over 2.3Mbits/second and we have two separate channels for the I and Q signals. That's a lot of data every second!

We're also expecting the processor to do significant work whilst analysing, filtering, displaying and demodulating the signal. Take the sample rate up to 192kHz and the data rates double so you have two 4.6Mb/s data streams to deal with! The point I'm making is that by increasing the sample rate and size, the load on the processor increases significantly.

In a *Windows* based PC that can cause a problem because *Windows* is a multi-tasking operating system which means it expects to be running lots of tasks at any one time. In order to handle a continuous stream of data, as in our SDR application, the sound-card delivers the data in blocks.

Putting the data block system simply, the incoming digital audio stream is fed into a sound-card buffer and when this gets to a critical point the sound-card emits an interrupt signal that causes *Windows* to collect the data and pass it on to the SDR application. This should all happen extremely rapidly so that the buffer in the sound-card never overflows and the SDR application always has data.

However, as you increase the sample rate and bit depth you can get to a point where your system doesn't get back to empty the buffer in time and the sound-card buffer overflows or the SDR application runs out of data. When running out of data occurs, you get what's known as a 'drop-out', a gap in the incoming data. If you are suffering drop-outs there are a number of things you can do to improve the situation.

Dealing With Drop-outs

If you are concerned about your system and not sure whether or not it will support a faster sound-card, there is a handy and free tool available that allows you to check your system's latency – see **Fig. 2**. You can download the *DPC Latency* tool from: **www.thesycon.de/eng/latency_check.shtml**

There's no need to install the program file *dpclat.exe*, as it is completely self contained so you can run the executable file from any location. Once running, *DPC Latency* will show a rolling bar chart displaying the current latency of your PC along with a comment as to whether or not you are likely to have a problem with data streams.

If you are unfortunate enough to have dropout problems, one of the first things to do is to close any unnecessary software that may be running. If that doesn't fix it, the next step is to speed-up *Windows* by disabling some of the visual effects. All the *Windows* systems include a number of processor hogging effects that make the desktop look better.

A good example of this processor hogging, is the transparency feature that allows you to see through the border of a window. And here's how to adjust for performance in versions of *Windows*:

In ***Windows XP*** and ***Vista*****:** Go to - Control panel > System > Advanced Settings > Performance > Settings > Visual Effects.

Windows 7**:** Go to - Control Panel > System and Security > System > Advanced system settings > Advanced > Settings > Visual Effects.

All three operating systems end up at the same selection box as shown in **Fig. 3**. Here you can choose the visual performance settings. For the greatest speed improvement, select 'Adjust for best performance' and you will find that most of the tick boxes in the lower section change to un-ticked.

Once you hit 'Apply', your screen will go through a number of transformations while it re-configures itself for the new settings – this can take several seconds to complete so don't panic! If the performance setting is a bit too severe

for you it's okay to experiment with the tick boxes in this section to find the best compromise between appearance and speed.

Laptop Users Beware!

Laptop sound-cards are generally to be avoided for SDR work – so beware. This is because manufacturers are forced to make all manner of compromises in order to produce a compact laptop computer that has a reasonable battery life. One of the areas that are frequently compromised is the sound-card functionality.

It's not unusual to find the recording side of the sound-card is mono only and noise performance is often dubious. That doesn't mean you can't use your laptop for SDR but you do need to consider using an external USB sound-card.

Choosing A Sound-Card

At this time I wouldn't recommend 'shelling out' lots of hard earned cash for a fancy sound-card unless you are planning on doing a lot of work with direct conversion SDRs. I say this because many of the newer SDR designs, that are appearing on the market are fitted with built-in sound-cards. So, they connect directly to the PC via a USB cable.

There are a number of advantages to this integrated sound-card approach. By including the sound-card chip within the receiver, the designer has full control over the selection of sound-card chip and its associated circuitry/configuration, so it can be optimised for SDR work. As a result of this control, image response and central spurs are likely to be much better controlled than when using a random sound-card.

It's an option that also leaves the PC sound-card free for other uses. As you can now get a complete USB sound-card in a single chip, incorporating the sound-card into new projects is relatively cheap and simple. However, if you do want to get a new sound-card there are a few tried and tested systems out there that are known to work well.

Most of the newer sound chips have been designed for high quality audio recording work so, making them good for radio work too. Personally I use an M-Audio Delta 44 which is a 96KHz, 24-bit device with four inputs and outputs and a remote patch panel. These are out of production now but can still be found on eBay often at a good price. (I seem to recall I paid about £50 for mine). The illustration of **Fig. 4** shows just how well matched the two channels are with make SDR operation much cleaner and more accuarate.

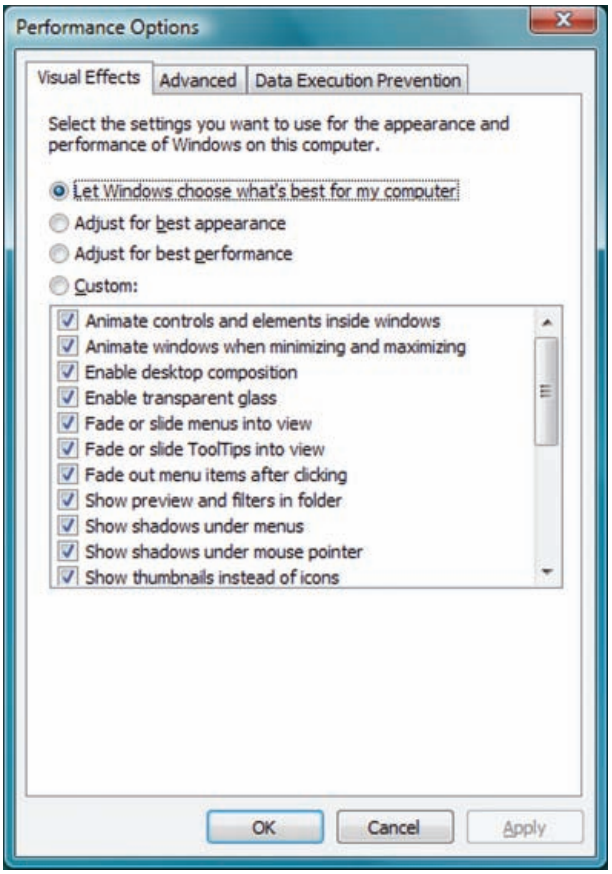


Fig. 3: Windows Visual Effects Settings adjustment.

The Edirol series are also very good though often more expensive than M-Audio. An alternative solution is the Creative E-MU 0202 or the later 0204. E-MU is the professional audio arm of Creative (the Soundblaster people) and puts in a very good performance.

The Use Of 192kHz Sample Rates

The use of 192kHz sample rates with 24-bit cards is very tempting as it has the potential to make about 180kHz of spectrum available to the SDR receiver. But, as I mentioned earlier, there seems to be a problem related to noise. A number of people have carried-out tests on good audio quality 192kHz/24-bit sound cards and some seem many suffer from a 20-30dB increase in the noise floor once you get above 20 to 30kHz.

For the intended audio users the increase in the noise floor isn't a problem – but it does compromise their use for SDR receivers. There's no point in gaining the extra spectrum if the weak signal performance is compromised. You can see one set of results by following this link: **http://goo.gl/9Fj8Y**

If you look closely at this report you will see that it compares the SDR-Widget with a number of sound-cards. The SDR-Widget, project has been created by an open source group that has designed and built a much improved sound-card specifically for SDR use and that shows through very well in the tests. You can find out more about this project at: **http://sites.google.com/site/lofturj/sdr_widget**

Cheerio for now – see you next month. ●

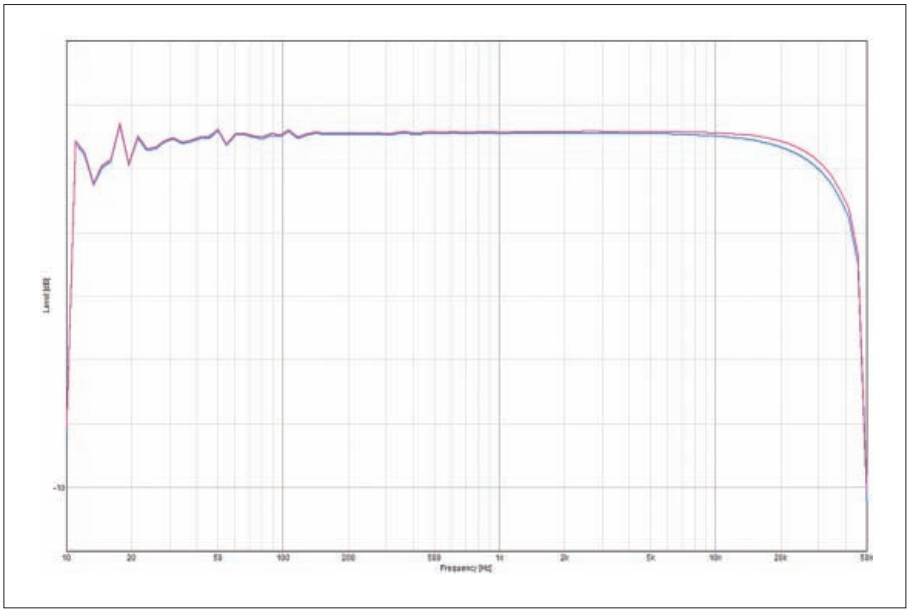


Fig. 4: The dual-channel frequency response of my M-Audio Delta 44. Note the very close matching of the left and right channels – each horizontal line is 1dB!

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

FRIENDLY, HELPFUL ADVICE
OUR ORDER HOTLINE
0345 2300 599

FT-950
Base Transceiver
Only £41.32 p/m!
£126.50 Deposit 36 x £41.32

A "proper size" HF/6m Base Station offering 100W output on all bands.

Add the MyDEL MP-925 power supply for only £1339.95 combined.

FT-dx5000
HF Base Transceiver
Price is £4399.95

FT-dx5000: Only £143.73 p/m! £440 Deposit 36 x £143.00
FT-dx5000D: £4699.95 **FT-dx5000MP: £5099.95**

SPECIAL WINTER OFFERS ON FT-dx5000!

All models in stock NOW. Best prices GUARANTEED. Call if you find one cheaper.

Yaesu FT-2000
The DX Choice of 3B7C
from only £73.12 p/m!
£225 deposit 36 x £73.12
FT-2000D: **£2799.95**

Yaesu FT-857D & ATAS-120A Package
160m-70cm HF Base/ Mobile.
Still our best selling HF Mobile Radio.

FT-857D Only £23.72 p/m!
£73 deposit 36 x £23.73

FT-857D + ATAS-120A: £999.95

New Yaesu FT-450D
Only £27.62 p/m! £85 deposit 36 x £27.62

Following on the success for the FT-450 original, the FT-450D has many improvements and comes fitted with the Auto ATU as standard.

Yaesu VX-8GE
2/70cm version of the VX-8DE. Fitted GPS, dedicated to APRS on 2/70.

Only £349.95!

IF-2000
IF Interface board for the FT2k & FT-950
£219.95
Both on DEMO at Chertsey
www.hamradio.co.uk/acatalog/RF_Space.html

Yaesu VX8DE
Triple Band 6/2/70 with enhanced APRS.
£379.95

Yaesu VX-8GE
Identical to VX-8DE but 2/70 only, fitted but APRS & GPS as standard.
£349.95

Yaesu VX-3E
Micro Handie 2/70 with scanner
£169.95

Yaesu FT-60E
Twin band handie
£179.95

Yaesu VX-6E
2/70 handie
£259.95

Yaesu VX-7R
Black or silver triple band handie
£309.95

Yaesu FT-270E
2M 5W Handie
£109.95

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

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

Yaesu FT-7900
with FREE YSK7800
£239.95

Yaesu FT-8800
Receive on 2m & 70cm simultaneously
£349.95

Yaesu FT-817ND
All Band All Mode Portable Transceiver
Only £17.87p/m!
£55 deposit 36 x £17.87

Yaesu FTM-10R
Compact 2/70- Mobile
£325.95

SPECIAL PRICE
£359.95
on current stock only

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

Yaesu FT-897D
High Power version of the FT-897. Use as a transportable, (20W) or as a base/ mobile (100W)
Only £26.00p/m!
£80 deposit 36 x £26.00

or with AT-897Plus Auto ATU £924.95

Yaesu VR-160
Miniature communications receiver
£199.95

Yaesu FTM-350E

Dual-Band APRS Mobile FM with Latest firmware & FREE FGPS-1 GPS Module
Only £14.95p/m!
£46 deposit 36 x £14.95

QUADRA (VL-1000) 1kW HF/6m Linear Amplifier with PSU & Auto-ATU
Only £159.25p/m!
£490 deposit 36 x £159.25

Finance example:
FT-950 at £1265.
Deposit of £126.50.
36 payments of £41.32.
T.A.P. £1614.02.
APR 19.9%.
Full written details available upon request. Offer subject to status. ML&S are a licensed credit broker.

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

DMU-2000
Data management unit for the FT-2000/FT-950
£1099.95

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

MD-100a8x
Base Station Microphone
£139.95

YAESU
ML&S

Officially Yaesu's largest dealer for over Ten Years! Quite a record and one that we are proud of. No other dealer comes close.

Martin founded his business buying and selling USED AMATEUR RADIO equipment? Twenty-one years later he's still buying UNWANTED EQUIPMENT at TOP PRICES!

Yaesu Rotators

ML&S always guarantee to have the largest stocks in the UK and, of course, the best prices. Cable extra.

G-450C Medium duty rotator - available today. **Only £339.95**

G-550 Elevation rotator for satellite operation £329.95

G-5500 Heavy-Duty PC Controlled Vertical rotator for satellite and EME applications £629.95

G-650C Medium duty with higher brake torque than the G-450 ..... £379.95

G-1000DXC This new, high-performance rotator is ideal for heavy-duty applications. Its slim-line constructions is ideal for many crank-up tower installations. Rotation range: 450°, with presets. £499.95

G-2800DXC Yaesu's top-of-the-line rotator is for extra-heavy-duty antenna installations. It includes Auto Slow Start and Auto Slow Stop features to avoid sharp jolts to the antenna array and tower. The G-2800A includes a mast clamp to simplify installation. Total rotation range: 450°, with presets. £949.95

GS-065 Mast Bearing £57.14
GC-038 Lower Clamps £34.95
Rotator Cable 25m with plugs fitted £69.95
Rotator Cable 40m with plugs fitted £123.95
Rotator Connector plugs £25.95

G-550

Got a Smart Phone?
Scan here for the unique ML&S QR Code

ACCESSORIES | AMATEUR RADIO | COMMERCIAL / PMR RADIO | AVIONICS | MARINE RADIO | RECEIVERS / SCANNERS | ANTENNAS

CONTACT US
Martin Lynch & Sons Ltd.
Outline House, 73 Guildford Street,
Chertsey, Surrey KT16 9AS
Web: **www.hamradio.co.uk**
E-mail: **sales@hamradio.co.uk**

OPENING HOURS
Monday to Friday: 9.00am to 5.30pm
Saturday: 9.30am to 4.30pm
Tel: 0345 2300 599

FRIENDLY HELPFUL ADVICE
We pride ourselves on our customer service. We believe that is has been instrumental in making us the number one choice for thousands of loyal customers.

SAFE ONLINE SHOPPING
Shopping online with ML&S is safe and secure. E&OE

FOLLOW US ON TWITTER
HamRadioUK

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

FRIENDLY, HELPFUL ADVICE
OUR ORDER HOTLINE
0345 2300 599

Announcing the new KG-UV6D "Pro-Pack"

For a **Limited Time Offer** the factory has bundled together all your favourite accessories and placed them inside a presentation box.

- ✓ KG-UVD6D New Dual Band Handie
- ✓ Desk Top Charger (110-234v & 12V input) & Power Cord
- ✓ Cigar Car Charger
- ✓ Headset with PTT & Mic Eliminator
- ✓ Remote Mic/Speaker
- ✓ Leather Case
- ✓ 1300mA Li-Ion Battery
- ✓ 1700mA Heavy Duty Li-Ion Battery
- ✓ AA Empty Cell Case
- ✓ PC Programming Lead
- ✓ PC Drivers & Software

In 2011, the Wouxun KG-UVD1-P was the best selling Handie in the UK.

In 2012, ML&S introduce the new improved **KG-UVD6D**.

Better still, **at only £159.95 including ALL the accessories**, you save yourself a massive £50.00!

New KV-UV920R
Low cost Dual Band, Cross-band Repeat High Performance 2/70 FM mobile Transceiver with wideband receive, remote head etc. Due soon.

Full range of Wouxun accessories are available.

For more detailed information see **www.WOUXUN.co.uk**

The World's only 4 and 2m Handie

KG-UVD1P/L
4m (66-88MHz) + 2m (136-174MHz)
ML&S Price: ONLY £99.99

The world's very first Twin Band Handie with the UK's two most popular bands in one!

Wouxun KG-679E/2M 2m FM Handie
Also available for 70cm!

ML&S Prices:
KG 679E/2M **£59.99**
KG-679E/U 70cm (400-470MHz) **£59.99**
or with Voice Scrambler
KG-689E/U **£69.99**

ICOM
Full Icom range always in stock!

The New Icom IC-9100
HF through to 23cms Base Transceiver

ML&S Price: £2899.95 available ex-stock
Or Plus 4 Pack only £3875*
Options:
UX-9100 23cm Module.....£623.99
UT-121 D-Star Board.....£180.00
FL-430 6kHz Roofing Filter.....£60.00
FL-431 3kHz Roofing Filter.....£60.00
*Plus 4 Pack includes all of the above.

Icom HF Products
IC-718.....£Call
IC-7200.....£829.95
IC-7000.....£1189.95
IC-7410.....£1599.00
IC-7600.....£3279.95
IC-7800..... £Call!
IC-PW1Euro £4699.95

Icom Receivers
IC-R9500 ..... £Call!!

Icom V/U Products
IC-V80E £105.00
IC-T70E.....£158.25
IC-E80D.....£329.95
ID-E880E £439.10
IC-E90 .....£239.95
IC-E90/4m £299.95
IC-E92ED.....£388.95
IC-E2820 .....£485.95
IC-E2820 +UT-123 .....£699.95
IC-910H £1296.96
IC-910X.....£1549.95

LDG Auto Tuner Range

Factory appointed distributor with the largest stock of LDG outside the US.

NEW! YT-450	Auto Tuner for the FT-450 & FT-950	£224.63
NEW! YT-847	Want a really good Auto ATU for your FT-847? Here it is!	£224.63
NEW AT-600pro	600W Auto ATU	£299.95
AT-100proII NEW	Desktop tuner covering all frequencies from 1.8-54 MHz	£199.95
NEW AT-200proII	Designed for new generation of rigs	£209.95
AT-1000Pro	1kw 160m-6m (1.8-54MHz) High speed Auto ATU, tuning range 6-1000Ω	£499.95
AT-897Plus	Bolt-on Alternative Auto Tuner for the FT-897. Wider tuning range and cheaper too!	£179.95
IT-100	New version of the AT-7000	£159.95
YT-100	NEW AUTO ATU for FT-897/857 or FT-100 with additional Cat Port Control.	£177.65
Z-817	Ultimate autotuner for QRP radios, including the Yaesu FT-817D	£119.95
Z-100Plus	Ultimate autotuner for Yaesu FT-817D	£134.95
Z-11ProII NEW	Portable compact & tunes 100mW to 125W	£159.95
RCA-14	4-way DC Breakout Box	£52.12
KT-100	Dedicated tuner for Kenwood radios	£173.57
RBA-1:1	Probably the best 1:1balun out there	£35.69
RBA 4:1	Probably the best 4:1 balun out there	£35.69
FT-Meter	Neat Analogue back-lit Meter for FT-897/857. S-meter, TX Pwr, ALC Etc	£44.95
NEW FTL- Meter	Jumbo version of the famous FT-Meter	£79.95

New TS-590S HF/6m Transceiver

Latest HF & 6M FULL DSP Base Transceiver from Kenwood
AVAILABLE FROM STOCK
£1339.95

Deposit only £134
then 36 x £43.55 per month
T.A.P. £1701.80. APR 19.9%. Full written details available upon request. Offer subject to status. ML&S are a licensed credit broker.

Add an MC-60A DESK MIC worth £119.95 for only £100!

TS-2000X
HF-23cm. All Mode Base Station

This really is a total shack in a box. **£1699.95!**

TS-2000E
HF-70cm Auto ATU Base
£1469.95

TH-F7E
Dual Band with all-mode scanner built in
£239.95

KENWOOD
Kenwood Ham Radio Dealer of the Year 2010-2011

TH-D72E
New FM dual band transceiver
£429.95

PS-60 Matching PSU for TS-590/2000
£299.95

TS-480SAT
100W HF+6m Auto ATU Mobile/Base
£779.95

TS-480HX
200W HF+6m Mobile/Base
£879.95

TS-2000X HF-23cm Auto ATU Base – "A complete shack-in the-box" **£1699.95**

TM-V71E 50W 2/70 Mobile
£299.95

TM-D710E
2/70 Mobile/Base with APRS & TNC. **£445.95**

MC-60A Deluxe Desk Microphone
£119.95

ML-5555
10m Multimode Transceiver
Available from stock:
£149.95

MyDEL
Latest all mode 12 Watt 10m Transceiver. Simple to use, entire 10m Band in one small box at a very low affordable price.

ML-5189
20W 4m Mobile
Only £148.95
Includes FREE DTMF Mic

Solid State Amplifiers from RM!

RM ITALY

BLA-1000 Flagship 1kW key down all mode HF Linear Amplifier with built in PSU. **£2799.95**

NEW BLA-350!
300Watt output key down HF Linear Amplifier with built in PSU.
Only £649.95

Palstar

The combination of affordable pricing and high quality construction and performance makes this the tuner of choice for many Hams. **Only £479.95**

Palstar AT-2KP **BACK IN STOCK!**

AT-500	600W PEP Antenna Tuner	£409.95
AT-1500DT	1500W Differential Antenna Tuner	£449.95
AT-2KP	2000W Antenna Tuner	£479.95
AT-2KD	The AT-1500DT and the AT-1KP have been combined into a new 2Kw Tuner	£449.95
AT-4K	2.5kW Antenna Tuner	£789.95
AT-5K	3.5kW Antenna Tuner	£999.95
BT-1500A	Balanced Antenna Tuner	£599.95
PM-2000AM	Power/SWR Meter	£159.95

Palstar Dummy Loads DL-1500 (1.5KW) £119.95 DL-2K (2kW) £259.95 DL-5K (5kW) £379.95

FUNcube Dongle *Pro* **This remarkable memory stick-sized device was conceived, designed and built by Howard Long G6LVB. Originally produced as part of AMSAT-UK's FUNcube satellite project, the FUNcube Dongle is the "ground segment", or a radio receiver designed to allow reception of satellites like FUNcube. However with a continuous coverage of 64MHz through to 1700MHz, the FUNcube has found many alternative applications! Only £118.80.**

Software Defined Receiver

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

Perseus VLF-LF-HF Receiver

PERSEUS is a VLF-LF-HF receiver based on an outstanding direct sampling digital architecture Only **£699.95**

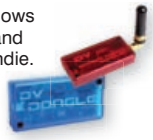
Perseus-FM+

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

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

DV-AP-Dongle The New DVAP allows you to walk away from your PC and remote control via your D-Star handie. **£219.95**

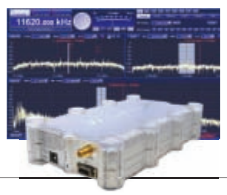
DV-Dongle A quick efficient way of gaining access to the D-Star network via your PC. **£169.95**



WiNRADiO Excalibur Pro. WR-G33DDC

The WiNRADiO WR-G33DDC 'EXCALIBUR Pro' is a high-performance, low-cost, direct-sampling, software-defined, shortwave receiver with a frequency range from 9 kHz to 49.995 MHz. **£1599.95**

WiNRADiO



WiNRADiO WR-G31DDC EXCALIBUR

£699.95

For full details see web.

Flex 1500

SDR Low cost SDR Transceiver.

£579.95

Flex 3000

With ATU 100 Watt SDR 160-6m with Auto ATU fitted. **£1379.94**

FACTORY APPOINTED DEALER for FLEX

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

MFJ Products

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

Lots more MFJ stocked! See web for details

Flex 5000A

Flagship 100W SDR Base 160-6m

£2495.95

FlexRadio Systems

Flex 5000A-ATU

As 5000A but built-in Auto ATU. **£2745.95**

Flex 5000A-ATU+Twin RX with second receiver. **£3434.95**

The SBS-3 is in stock NOW!

NEW at ML&S

ML&S are proud to introduce the Kinetic SBS-3, a unique and revolutionary product, built on the heritage of their SBS-1 range of receivers. We are an authorised retailer of this unique class-leading product and have sold more SBS-1's than any other retailer in the world.

ADS-B / AIS / Marine band / Air bands (VHF and UHF) Multi-Device - Multi-Band - Multi Channel Software Defined Radio Receiver / Decoder

Introductory price of only £499.95

MyDEL

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

MyDEL MP-8230

13.8V DC, 25A power supply, switch mode.

£69.95

MyDEL MP-925

Linear PSU

£99.95

Ideal for FT-817ND or most handhelds.

MyDEL MP-6A

13.8V DC, 6A power supply. **£29.95**

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

Ideal for TS-480HX or other 200W output radio.

MyDEL MP-9600

60A switch mode power supply.

£199.95

NEW!

MyDEL MP-50SW111

50Amp DC power supply.

£149.94

Probably one of the lightest 50Amp DC power supplies available today, the new MP-50SW111 weighs in at only 2.2Kilos (4.85lbs). Unbelievably compact measuring a mere 940mm wide including chunky rear terminals and front panel knobs and only 90mm high.

MyDEL PS-30SW11

High performance switch mode PSU. 25amp.

£86.75

Very light and compact switch mode fully metered PSU with Noise Off-Set control in case of possible unwanted spuri. Input voltage: 240VAC. Output voltage: 13.8VDC.Adjusts voltage between 9.0 and 15.0 volts. When it is set at the center position it will supply 13.8 volts output Voltage regulation: less than 2% Protection: Short-circuit, Automatic current limiting With in 30A

HF Linear Amplifiers

RF concepts Alpha 8410 1.5kW HF Linear.	£4495.95
RF Concepts Alpha 9500 Auto-tune HF Linear 1.5kW	£5995.95
Yaesu VL-1000 Quadra	£4499.95
Icom IC-PW1Euro	£4699.95
Ameritron ALH-811HXCE	£969.95
Lin-Amp Pioneer 1KW Amp	£1639.95
Lin-Amp Ranger 811	£1415.00
Lin-Amp Ranger 572B	£1525.00
Lin-Amp Challenger Mk1V	£2510.00

ML&S are pleased to announce the famous Idiom Press range of CW Keyers and Digital Voice Keyers.

LogiKey K-5 An excellent fully iambic keyer with six active messages and 12 banked, 1530 characters in total. **£129.95.**

LogiTalker A stand-alone voice keyer with storage from 2 to 266 seconds. Can be configured for any radio. **£129.95.**

Idiom Press

Leads for any rig **£19.95.**

Begali

From £129.95

KENT KEYS

From £53.99

Tigertronics SL-USB

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

From only £99.95

Call to discuss your rig-to-cable requirements.

MiniVNA pro

Pro-Antenna Analyser with Blu-Tooth.£379.95

SPECIAL OFFER

£369.95

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

OPENING HOURS

Monday to Friday: 9.00am to 5.30pm

Saturday: 9.30am to 4.30pm

Tel: 0345 2300 599

SAFE ONLINE SHOPPING

Shopping online with ML&S is safe and secure. E&OE

MiniVNA original still available

(without Bluetooth)

£259.95

Feature

Forget James Bond and the 'Secret Squirrels' – This is the real thing!

Diplomatic Wireless Service

Ross Bradshaw G4DTD shares the experience of working in the Diplomatic Wireless Service from 1979 until 1993.

Editor's introduction: *Ross Bradshaw G4DTD's article is something rather unusual for* PW *and any branch of the 'Secret Squirrels' are always quite sensitive whenever their work is mentioned – even when it's historic. But I'm sure that our readers will be fascinated and if any reader remembers – and responded to – the DWS Recruitment stands at Radio Shows in the 1960s, I would be pleased to hear from you.* ***G3XFD****.*

I served in the Merchant Navy for six years as a Marconi Radio Officer from 1973 until 1979, Figs. 1, 2 and 3. In early 1979 I joined what was at the time, still called the Diplomatic Wireless Service, as a Radio Operator.

On joining the service, I discovered that there had been over 600 applications to join DWS, but the qualifications to join had been set at a PMG1/PMG2 or as in my case, as I held the latest qualification, the Maritime Radiocommunications General Certificate (MRGC). Eventually about 96 persons were selected to attend an interview, myself being one of them.

Of the 96 only about 20 would eventually be chosen to start training. Originally when DWS recruited, staff came usually from the Armed Forces and from conversations with the late **Pete Mooney**, it took about nine months training in radio theory and related subjects before the trainee was suitable for posting overseas.

By taking Merchant Navy Radio Officers with either the PMG or MRGC certificates, training time could be reduced. You would then either serve overseas in an Embassy or a High Commission – but between postings you would serve in the home receiving station at Hanslope Park.

Hanslope Park

Hanslope Park, is just East of the M1 in Buckinghamshire, approximately 11km (7 miles) north of Milton Keynes and close to the Northamptonshire border. With its many receiving antennas, it was enclosed by a long, high fence, some said to keep out unwanted visitors and some said (darkly) to keep us in. It was a forbidding place for the uninitiated!

After my joining briefing in the Administration building, quaintly named *The Big House*, I made my way over to a long, low building standing alone that was some distance from the *Big House*. This was the Central Receiving Station (CRS), a building put up soon after the War as a temporary building and was **still** being used. It would stay in use until the middle of the 1980s before being demolished.

Morse code was more or less out of use due to the high volume of traffic being passed. If a post had a total breakdown of equipment then Morse would be used to alert Hanslope. Telephones would have been used but some of the posts were in countries were the telephone system was problematical at best. Morse code for this reason was still used. The mode of communication between Hanslope Park and the overseas posts was by high frequency (h.f.) radio using 32 tone Mark D Piccolo system.

Note: Piccolo was the original Multiple Frequency Shift Keying (MFSK) mode, developed for British Government communications by **Harold Robins**, **Donald Bailey** and **Denis Ralphs** of the DWS. It was first used in 1962. The current specification "Piccolo Mark IV" is still in limited use by the UK government, mainly for point-to-point military radio communications

As my security clearance had then yet to be approved, like some of the other new boys I was put in the unclassified section to start work. In the unclassified section were a couple of stations that didn't have (or require) on-line cipher equipment. Any classified material for these couple of stations would be sent to London to be 'buttoned up' i.e. enciphered, in machine cipher or in 'book' (book cipher) and then transmitted by us to the station.

Hands On Training!

I would learn more about the radio set up later once my proper training began but for now my 'training' was mainly of the hands-on type. I was given a teach-yourself-to-type book and left to it for half an hour. Then I was called away to work a circuit.

I was then shown how to gently press the letter shift key on the Siemens 75 baud T 100 teleprinter to start it up. Once the teleprinter was running I could either type what was needed or place a length of tape with five-hole Baudot code on it under the tape head and let it run. Such was my training!

I was surprised that I was never given any instructions as to radio procedure – so I made up my own based on Merchant Navy practice. Neither was I ever given any in-depth security training.

The only instruction I **was** given, was never to say too much to the station when you were in plain language – but once in cipher I could say whatever I wanted. My time as a Special Operator serving in the Royal Signals as well as my parents' working for Government Communications Headquarters (GCHQ), had made me aware of how easy it was to monitor radio communications and obtain information. Indeed – the Bletchley Park and the Enigma code-breaking saga shows only too clearly what can happen due to sloppy operating practice!

The Barrier Course

There were eight of us on the Barrier Course. We all had Radio Certificates – so the training would be 11 weeks, there was no need to teach a lot of radio theory, as we had already done so to get our Certificates. Of the eight of us

Fig. 1: Ross Bradshaw G4DTD in his days as a Merchant Navy Radio Officer – casually dressed in the *Al Jabiriah* radio room.

Fig. 2: Ross operating in his usual uniform aboard the *City Of St Albans* while at sea.

I had six years sea time, another had about three months sea time and the rest had come direct from college. I was the oldest at 33 years of age and ready to start training on the Mark D installation.

The Mark D radio installation, as used in overseas posts comprised a high powered transmitter. At one time it had been the Marconi Mark 214, a 500W transmitter that had originally been used in the old Morse days before being converted for Piccolo use.

At the time I joined the stations used the more modern solid state Racal TA 1816 transmitter. This had four 125W modules that could be linked up to either provide a 250W transmitter with the other two modules spare (as back-up), or all four modules could be linked to give a 500W transmitter.

The TA 1816 in the 500W configuration was the normal way to operate. It was however, not a h.f. transmitter in the normal way – but was nothing more than a wideband linear amplifier. Feeding into the Racal TA 1816 was the output from a Sayrosa 607B synthesiser on which you set the frequency you wanted to transmit on. The few watts of output from the synthesier would then be amplified to 500W by the TA 1816. Feeding in turn into the 'synth' were the output tones from the 32-tone Piccolo. The Piccolo unit had a receive section and a transmit section.

Teleprinters & The 911 Box

Messages in the overseas station were typed up on T100 teleprinters in the 911 box. The 911 box, referred to usually as the "Nine-eleven box," was really like a small container, suspended from the floor and fed with mains voltage from a rotary converter.

The rotary converter gave physical and electrical security by isolating the mains supply. This was so a hostile intelligence service could not read the variations in current drawn when keying the teleprinters and working out what was being typed.

If the rotary converter wasn't used (due to a fault) then nothing over the security rating of "Confidential" was permitted to be sent. The container was lined with copper sheeting and its door was always kept shut to provide additionally electrical screening for the contents.

The output from the teleprinter went into the cipher machine, at the time I was in the service the ALVIS/BID 610 and in turn the enciphered output would be taken to the Piccolo machine then in turn to the Sayrosa and then the TA 1816 transmitter.

The connection from the 911 room and the Piccolo machine was via an ITL box. This ensured that there was no direct electrical connection from the inside and outside of the 911 box. The ITL box was a small box that had light emitting diodes (l.e.d.s) and photocells inside to pass the electronic signals.

The l.e.d.s would illuminate when information was passed from the cipher machine and the photocell would receive and pass on the information to the Piccolo machine – and, of course, we know these nowadays as opto-isolators. Thus no direct electrical connection and increased radio security against the outside world.

Monopole Antennas

The Diplomatic 'Post' would have monopoles for antennas on the roof of the building. The monopole was really just a 12m (40ft) long vertical whip antenna that could also be used as a flagpole. Often the Ambassador did not like trailing wire antennas disfiguring his Embassy – so monopoles were used instead. The ground plane for the monopole was supposed to be copper

Fig. 3: Still aboard the *City Of St Albans*, but the ship was then in warmer climes.

wire but the Treasury did not like the cost – so chicken wire was more often used instead!

There were normally four monopole antennas at a 'Post', one spare, one to transmit on and the other two used for diversity reception. Received signals were taken to two Marconi receivers and the output from these would be taken to a Piccolo machine and then via the ITL box into the 911 room and hence the BID 610 machine.

The output of the BID 610 was then fed to the receiving Siemens T100 teleprinter. When a station was updated to the Mark F configuration, we would use Plessey PR2250 receivers instead.

At the CRS we had directional antennas to receive our overseas Posts. These signals would be taken to the receivers and Piccolo equipment in the radio control room, called the "Picc Tune".

The output of enciphered messages would be passed into the Comcen itself. In the Comcen were many bays, each bay having two teleprinters, one for receiving and one for sending as well as cipher equipment. The de-ciphered messages would be passed to other stations if it was for them – or to London on a secure landline which also protected by online cipher such as a BID 610

Messages to the station would be encrypted at the bay with on line cipher and sent in Piccolo tones down the line to Creslow where we had our transmitting station and its own antenna farm.

Operating & Fault Finding

Our training was such that we had to understand the operation and be able to fault find on the transmitter, receivers, synthesiser, Piccolo, and teleprinters. Not just the entire radio station set up, but because there might be a local mains failure (in the Embassy or High Commission).

Down in the depths of the building there would be a stand-by diesel generator to power the radio room. We therefore received instruction on how diesel engines worked, how to maintain them and basic fault-finding on them as well.

We were also instructed on operating the Mark 123 transmitter/receiver. To be blunt this was a 'Spy set' on the lines of the old wartime B2 of SOE fame but brought up-to-date. There was one set in the Embassy and another in the home of a Diplomat, suitably hidden. Should there be a loss of radio and landline contact with Hanslope Park then we would use a Mark 123 to make contact.

The reason one was kept outside the building in the home of a person holding Diplomatic Status was that should the house be raided, the person had the protection of Diplomatic Immunity, whereas anyone else would have been arrested and charged with espionage. To ensure the Mk 123 worked it was tested from the Embassy once a month on prearranged frequencies.

Details of the Mark 123 can be found in Volume Four of the very interesting book, *Wireless for the Warrior*, ISBN 0952063 36 0.

Classified & Published!

During my time at Hanslope Park I also found out a rather interesting fact regarding security classification and 'in the public domain'. It came about because I once asked a question to a a senior grade who tried to palm me off with the excuse that the matter was "classified" and inferred that I was not of a (security) clearance to be told!

I wondered about the 'senior grade's' comments and went to the local library and looked up the information I needed – in the 'public domain'. When I later saw that person and mentioned to him the fact I'd found out what I wanted and it seemed that it was **not** classified. But he, rather than admit that he didn't know, had invoked "security". He then blushed – I was right!

I was to find out more than once that some people – rather than admit that they didn't know, would hide behind the mysterious cloak of 'security' and claim that the matter was "classified". This still happens – and not only in the Foreign & Commonwealth Office!

In Part 2, Ross describes his further adventures with the DWS.

Phil Cadman G4JCP's Valve & Vintage
21 Scotts Green Close, Scotts Green, Dudley, West Midlands DY1 2DX
E-mail: phil@g4jcp.freeserve.co.uk

Spread the Word – to Save that Old Valved Set!

Phil Cadman G4JCP – wearing his traditional brown dust coat – mans the 'shop' this month and discusses vintage audio equipment and topics raised by readers.

Welcome to the *Valve & Vintage* (*V&V*) 'shop'! The Christmas decorations have long been put away ready for next year, and it's now very much down to business. Over the past few months I've received various interesting letters and E-mails, so I thought I'd devote this column to the topics *V&V* readers have raised.

I know from your feed-back that many of you are interested in vintage audio, and **Brook Verrall G0VEB** certainly falls into that category. He says he's recently retired after a lifetime of working on and off with valved equipment. Brook has built a 'Crystal Palace Amplifier', a design by **Morgan Jones**, whose book I mentioned in my October 2011 column. More on audio is requested and I shall be happy to oblige later this year. By the way, I hope you have a long and happy retirement Brook!

Gerry Bubb E-mailed asking for some advice on a Kolster Brandes GR10 five valved superhet, as he was having trouble finding service information. I'm happy to say that after a little detective work, a new 6X4 rectifier valve and a few capacitors, the set is working well. Gerry then rescued a Ferranti U1040 set from being thrown into a skip – and that too is now in good voice. Good to hear of some successes, thank you Gerry!

Spread The Word

I think it's worth repeating the suggestion that all *V&V* readers should 'spread the word' around friends and family, that old radios and other vintage equipment shouldn't just be thrown away. We would like it instead! However, don't leave anybody with the impression that any old junk is worth thousands – simply say that old valved and transistor sets are worth saving, even if only for recoverable spare parts.

While I have always saved items like variable capacitors and transformers, I'm ashamed to say that I've thrown away numerous scrap chassis with their coils and intermediate frequency transformers (i.f.t.s) still attached. These components have not been available new for some time and probably never will be again. It's imperative that any scrap chassis with coils and i.f.t.s still fitted be retained, or the components carefully removed and labelled.

In an E-mail asking about the Marconi Osram ML6 (VT105/CV1105) valve, **Tim Packer** mentioned a rather curious fact. He says: "Did you know that some of the very early cavity magnetrons were produced using the chamber of a Colt revolver as a drilling jig?" Anybody with access to the IEE Journal *Volume 93* part 3A 1946, page 982, can read all about it.

Absolutely fascinating Tim – and the cross section of a magnetron does look just like the chamber of a revolver. How many more bizarre facts like this are known to Valve and Vintage readers? And sadly, how many other stories, facts and anecdotes have been lost forever.

Early transistor radios – both commercial sets and kits – seem to be attracting ever more enthusiasts. **Howard Carter** E-mailed me from his home in France to say that he'd finally decided to build the Micro Midget Pocket Portable radio. He'd been reminded of the design while reading my June 2011 column.

I'm pleased to report Howard's set worked fine, **Fig.s 1** & **2**, although not quite on medium wave; the first station he heard was Radio Romania International! Howard said that he found it difficult to make the small tuning coil have sufficient inductance to cover the whole of the medium wave band. And even with today's miniature components, making the set as tiny as in the original article was no easy task.

Sadly, while we can build, restore and repair these old radios, they can no longer receive programmes of the same quality as those broadcast when they were new. Well, that's my opinion! Readers in the UK will be aware of the classic programmes that are repeated on BBC *Radio 4 Extra*, but that's a digital only station. Radio stations broadcasting music programmes via r.f. from the 1930s, 1940s and 1950s are rare.

However, there are such programmes available on the Internet, and these can be heard either via a computer or by using an 'Internet' radio. Of course, a broadband internet connection is necessary to 'receive' these programmes making them

Fig. 1: Howard Carter, after finally deciding to build the Micro Midget Pocket Portable radio from an older *PW* sent in this photograph.

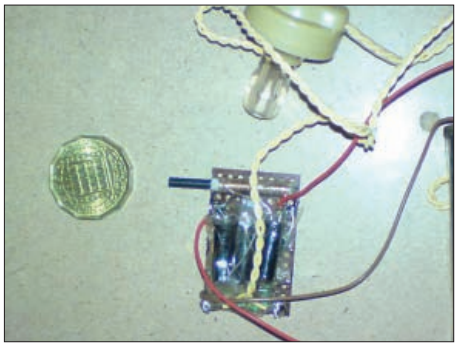


Fig. 2: Howard's radio, alongside an old 'thupenny bit', a twelve-sided coin with a value of three old pre-decimalisation pennies.

inaccessible to many people*.

The other problem is listening to these old programmes on vintage radios, as some form of micropower transmitter is necessary. For a.m. only receivers, a home-brew solution is most cost effective (and the most instructive), but if a set covers the v.h.f. f.m. broadcast band then a cheap commercial f.m. modulator will work fine.

I reviewed an f.m. modulator kit some years ago from the **Kit Radio Company** - who advertise regularly in *PW* – but I don't think it's now available, as it's not listed on their new Web Site: **www.kitradio.co.uk/**

For readers living abroad the BBC* Radio 4 Extra *service – and other radio programmes – are also available on the Freesat service and the subscription only satellite services.* ***Editor**.*

The KT55 Beam Tetrode

Prompted by my remarks in the December 2011 *V&V* column about the introduction of the MOV KT66 in 1937, **Terry Bateman** contacted me about the MOV **KT55** beam tetrode, and did I know anything about it.

While I knew of the valve's existence, I'd never actually come across one, nor had I seen a circuit which used a KT55. Circuit design information and characteristic curves are readily available on the Internet, but there's nothing regarding the valve's history. In addition, its production life must have been short, as the valve is quite rare.

Reading the circuit design notes that were produced by MOV for potential customers does provide a clue as to its short life. It was designed – presumably in the early to mid 1950s – for use in high power audio amplifiers, which had low anode voltage supplies. Specifically, those amplifiers which had no mains transformer and so were capable of running from a.c./d.c. mains supplies. As you might expect, the heater is rated for 300mA series operation, and drops 52V.

The a.c./d.c. type 'live' chassis radio sets are considered to be dangerous enough and they usually only have connections for an external aerial and earth. Such connections are always isolated from the set's power supply by either low value capacitors or by an isolated winding on the aerial coil. Connections for an extension loudspeaker, if present, are isolated by the double wound audio output transformer.

An audio amplifier is somewhat different. It will have connections for loudspeakers, and for various inputs like microphones and record decks. It is possible to isolate these inputs and outputs, but there is always a risk that the isolation will be lost, either through a fault or some incompetent meddling.

Fig. 3: Looking at the electrode tops of a 6CD6G line output valve which has twin cathodes and twin electrode structures and is very similar to a KT55 valve.

The risk of using 'live' chassis equipment and the wide adoption of a.c. mains, probably meant that the KT55 was not widely used. Hence it's logical to assume its production life was short.

However, the valve is suitable for use as a series regulator in stabilised power supplies. The circuit design notes also mention that the valve is suitable for generating a 50Hz 'mains' supply for equipment which has to have an a.c. power source, but where there's only a d.c. mains supply. Equipment which uses small motors, such as record decks, fall into this category.

A pair of KT55s working in push-pull can produce an output of 25W with an anode supply of just 225V. This is most impressive, as such powers are normally achieved with anode supplies of 350V or more. The explanation is in the valve's high mutual conductance (gm) of 19mA/V and large cathode area. This allows the valve to draw a high anode current even at low anode voltages.

Indeed, when triode connected, the mutual conductance increases slightly to 20mA/V, and the anode impedance is a mere 400Ω. That's even lower than a triode connected KT88. Photographs of the KT55 on the Internet reveal how these characteristics are achieved – twin cathodes and twin electrode structures.

Let me explain! To 'pull' large cathode currents at low anode voltages requires a large cathode area. The obvious solution is to make the cathode bigger, but there are practical considerations that limit how far valve designers can go. Fortunately, it's easily possible to double both the gm and cathode current (for any anode supply voltage) by wiring two valves in parallel. And that's what the KT55's designers did. I don't have a KT55 to show you, but I do have a **6CD6G** line output valve which also has twin cathodes and twin electrode structures (see **Fig. 3**).

The twin cathodes and twin control and screen grid supports are clearly visible poking through the mica support just beneath the valve's top cap. What's less clear is the common anode and the fact that the two sets of electrodes are connected in parallel at the base of the valve.

Interestingly, only one set of beam forming plates are used. While the KT55 was always (probably) two valves in parallel, other valves have been produced with both single and double electrode structures. The 6KD6G in Fig. 3. is one such valve.

I also have a 6KD6G which has a straight sided glass envelope and that only has one set of electrodes. Similarly, I have two versions of the

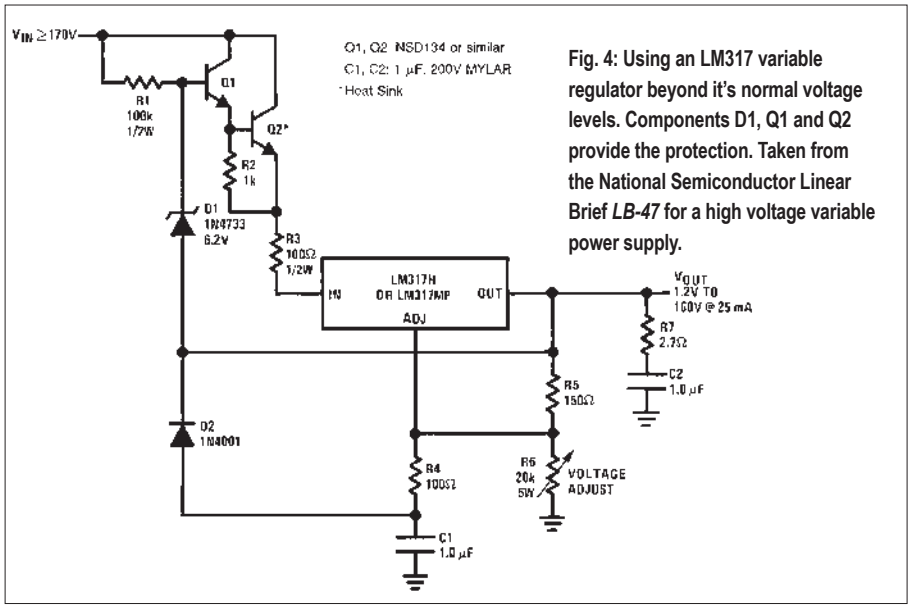


Fig. 4: Using an LM317 variable regulator beyond it's normal voltage levels. Components D1, Q1 and Q2 provide the protection. Taken from the National Semiconductor Linear Brief *LB-47* for a high voltage variable power supply.

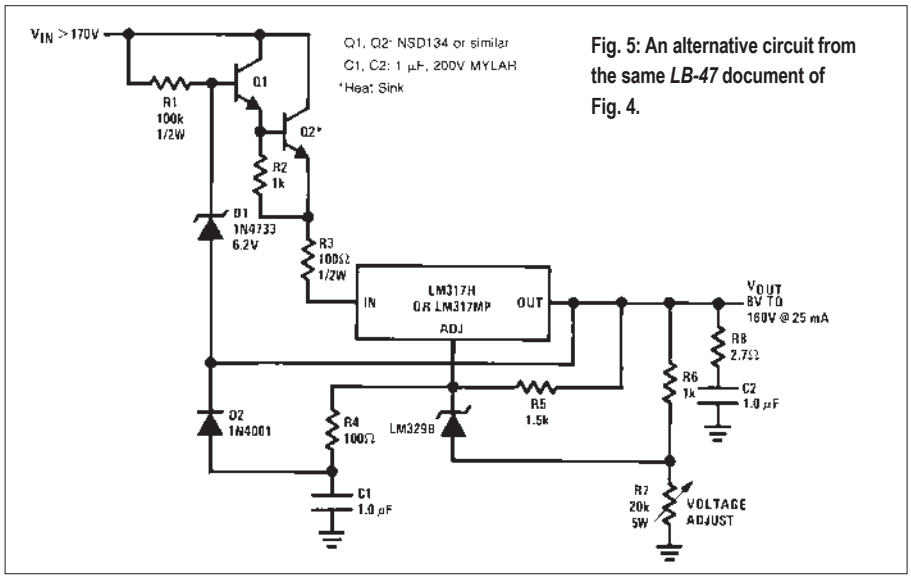


Fig. 5: An alternative circuit from the same *LB-47* document of Fig. 4.

5932, which is a ruggedised 'modern' version of the 6L6. These valves have the same designation and (I hope) the same characteristics. Yet one is a single valve and the other is two valves in parallel, even to the extent of having two separate anodes. The single valve version of the 5932 is shown in Fig. 2. on page 47 of the October 2011 *V&V* column. I'd also be interested to know of any more examples.

The Supertex LR8

Finally, **Steve Seabrook M0ECS** kindly drew my attention to a new adjustable three terminal regulator integrated circuit: the **Supertex LR8**. This device is the same size as a 78L05 (TO92 case) but can handle input voltages up to 450V and can be set for output voltages in the range 1.25V to 440V.

Of course, due to its small package, the regulator can only supply a small current. That's particularly true when the input-output differential voltage is high.

Despite the limited current, such a device would be ideal for producing stable bias supplies and for providing the h.t. supply to a valve oscillator. Unfortunately, the device doesn't seem to be readily available in this country. This lack of availability – and the limited current – reminded me of a National Semiconductor applications note, the LB47. This shows how to greatly increase the output voltage range of the well known LM317 adjustable regulator.

The LM317 is available in several different packages, with the TO220 package being the most common. The regulator can pass up to 1.5A, and can operate with an input-output differential of up to 40V.

The three terminal regulator are more flexible than might be assumed. Their limiting characteristics are their maximum output current, maximum power dissipation and maximum input-output voltage differential. Notice that it's the input-output differential, **not** the absolute value of the input and output voltages that's important. If this differential can be limited in some way, then the regulator can be used to provide much higher voltages than normal.

The circuit suggested by National is shown in **Fig. 4** with an alternative shown in **Fig. 5**. The circuits shown are more complex than usual, and that's because they limits the voltage across the LM317 to about 5V (or less) under all conditions. The components that ensure this are the 6.2V zener diode, and darlington transistor pair, Q1 and Q2. The emitter of Q2 is held, by the zener, to a voltage of 6.2V (less the base emitter voltages of Q1 and Q2) above the LM317's output voltage.

The 1µF between the 'Adj.' pin and the 0V rail helps with high frequency regulation, but necessitates the addition of the 100Ω resistor and 1N4001 diode. These prevent damage to the regulator if the output is shorted. The 2.7Ω /1µF network at the output also helps with the high frequency performance of the circuit.

The LM329B voltage reference diode in Fig. 5, helps the LM317 maintain good regulation, but it's not essential. The LM329B reference can then be safely replaced with just a piece of wire and the 1.5kΩ resistor that's wired between the output and Adj. pins can be removed.

Next, let's look at the purpose of the resistor R3. As the output current of the circuit increases, more voltage will appear across R3. Eventually, there'll be no voltage to spare for the LM317! At this point the circuit will pass no more current thus protecting itself.

In practice, R3 should be calculated to drop about 3V at the maximum required output current by using the formula: R3 = 3/Iout. The short circuit output current will then be limited to about double this value.

The Darlington transistors must be able to pass the short circuit current, while at the same time be capable of withstanding the full input voltage (Vin).

The transistor should remain within its safe working area at all times, and have a large enough heat sink for both normal and overload conditions. For example, with an input voltage of, say, 300V and a short circuit current limit of 100mA, Q1/2 will be called on to dissipate 30W, with Q2 dissipating the majority of the power.

Enough For Now!

Whew! That's enough for now, I think. Please remember to send your comments and letters to me, either via E-mail to: **phil@g4jcp.freeserve.co.uk**, or by mail to: **21, Scott's Green Close, Scott's Green, Dudley, West Midlands DY1 2DX**.

73, de G4JCP ●

nevada® radio warehouse

Ecoflex®

New Ecoflex Low Loss Cables & Connectors at Nevada!

New range of cables & connectors at Nevada! Flexible with PE-LLC dielectric and gas content of over 70% for very low loss and use up to 6 GHz

Ecoflex 15

Specification
- Diameter: 14.6mm
- Loss per 100m: 2.81dB @ 100MHz, 1.96 dB @ 50MHz

Price: £5.99 per metre, **£539** per 100m drum

Ecoflex 15 Connectors
- **PL259** connector (Part: 7350) **£8.95**
- **N type** connector (Part: 7395) **£9.95**

Ecoflex 10

Specification
- Diameter: 10.2mm
- Loss per 100m: 4.0dB @ 100MHz, 2.8 dB @ 50 MHz

Price: £2.89 per mtr, **£260** per 100m drum

Ecoflex 10 Connectors
- **PL259** connector (part: 7378) **£5.95**
- **N type** connector (part: 7367) **£6.50**
- **BNC type** connector (part: 7379) ...**£6.50**

Aircell

Aircell range is a highly flexible coaxial cable for use up to 6 GHz. The low losses in relation to the diameter and the small bend radius of the cable make it perfect for the Radio Amateur.

Aircell 5

Specification
- Diameter: 5.0mm
- Loss per 100m: 9.4dB @ 100MHz, 6.61dB @ 50MHz

Price: £1.39 per mtr, **£125.00** per 100m drum

Aircell 5 Connectors
- **PL259** connector (part: 7760) **£2.25**
- **N type** connector (part: 7700) **£3.95**
- **BNC type** connector (part: 7720) ...**£3.25**

Aircell 7

Specification
- Diameter: 7.3mm
- Loss per 100m: 6.28dB @ 100MHz, 4.52dB @ 50MHz

Price: £1.99 per mtr, **£179** per 100m drum

Aircell 7 Connectors
- **PL259** connector (part: 7390) **£2.65**
- **N type** connector (part: 7392) **£5.25**
- **BNC type** connector (part: 7371) ...**£5.25**

Aircom Plus

Operating up to 10 GHz, this semi Air spaced cable has a massive oxygen free copper inner conductor covered with a thin film of PE to prevent corrosion permanently

Specification
- Diameter: 10.3mm
- Loss per 100m: 3.8dB @ 100MHz, 2.6 dB @ 50MHz

Price: £3.65 per mtr, **£328.00** per 100m drum

Aircom Plus Connectors
- **PL259** connector (part: 7378) **£5.95**
- **N type** connector (part: 7367) **£6.50**
- **BNC type** connector (part: 7379) ...**£6.50**

MFJ Accessories

MFJ 16C06	4 pack Ceramic Insulators	£5.95
MFJ 259B	HF/VHF Analyser	£259.95
MFJ 260C	300W Dummy Load	£45.95
MFJ 269	HF/VHF/UHF Analyser	£369.95
MFJ 260C	300W Dummy Load	£45.95
MFJ 550	Practice Morse Key	£16.95
MFJ 557	Morse Key With Oscillator	£45.95
MFJ 901B	Portable 200 Watts ATU	£109.95
MFJ 912	Remote Balun Box	£79.95
MFJ 931	Artificial Ground	£114.95
MFJ 941E	300W Versa-Tuner II	£139.95
MFJ 949E	300W 1.8-30Mhz Antenna Tuner	£179.95
MFJ 969	300W HF + 6m Antenna Tuner	£219.95
MFJ 971	200W Portable AntennaTuner	£122.95
MFJ 993B	300W Fast Automatic Tuner	£254.95
MFJ 1025	Noise Canceller/Enhancer	£184.95
MFJ 1026	Noise Canceller + Active Antenna	£204.95
MFJ 1701	6 Way Co-Axial Antenna Switch	£52.95

BEST DEALS ON ICOM YAESU KENWOOD

LOWEST PRICES - GUARANTEED!...DAILY WEB SPECIALS!

ICOM

IC-9100	**NEW** HF/VHF/UHF+option DSTAR	£2899
IC-7800	Flagship 200w HF/6m TX	£8895
IC-7700	High End 200w HF/6m TX	£5999
IC-7600	100w HF/6m + DSP/ATU Base	£3279.95
IC-7410	100w HF/6m + ATU/DSP Base	£1549
IC-7000	100w HF/VHF/UHF Mobile/Portable	£1189
IC-E2820	Including UT123 D-STAR Mobile	£699
IC-E880	D-STAR VHF/UHF Twinband Mobile	£439

YAESU

FT-2000	HF/6m 100w +ATU/DSP Base	£2249
FT-950	HF/6m 100w +ATU/DSP Base	£1265
FT-897D	HF/VHF/UHF All Modes Portable	£799
FT-857D	HF/VHF/UHF All Modes Mobile	£699
FT-450D	HF/6m 100w Base/Portable	£849
FT-817ND	Low Power All Mode Portable	£539
FTM-350R	Dualband VHVF/UHF Mobile	£459
FT-8900	Quadband 2m/6m/10m/70Cms	£379
FT-7900E	Twinband VHF/UHF Mobile	£245
VX-3E	Micro Twinbander VHF/UHF	£169
VX-8DE	Twinband Handy APRS etc	£379

KENWOOD

TS-590S	100w HF/6m + ATU/DSP Base	£1269.95
TS-2000E	HF/VHF/UHF + ATU/DSP Base	£1469
TS-480SAT	100w HF/6m + ATU..Mobile	£779
TS-480HX	200w HF/6m + ATU..Mobile	£879
TH-D72E	Twinband Handheld + APRS/GPS	£429

Don't forget!
Call Paul or Tim NOW for a GREAT P/X Deal!

Large selection of quality used equipment always in stock - see website

Weather Stations

save £10

Nevada WH1080PC
Wireless Weather Station with Solar Transmitter

~~£99.95~~ **£89.95**

Simply connect your WS1080PC to your computer via USB port for collecting:
- All Weather Data • Wind Direction
- Thermo-Hydgro Sensor
- Temperature and Humidity
- Radio Controlled Clock/Date Feature
- Indoor Temperature/Outdoor Temp
- Pressure History/Outdoor Humidity
- "EasyWeather" PC Software Included

Davis Vantage VUE
Advanced Wireless weather station for the real weather enthusiast. Monitors Wind speed, Direction, Temperature, Humidity, Rainfall. Highly accurate top of the range unit.

£299.95

AnyTone

AT-5555 *V5
10m (28MHz) All Mode Mobile Transceiver

£149.95

AT-5189D
4m (70MHz) FM Transceiver

£148.95

AT-588
2m (145MHz) FM Mobile Transceiver

£149.95

DAIWA

CN 101L...£99

CN 801HP...£129

CN-103N	140/525MHz 200 Watts	£99
CN-801VN	140/525MHz 200W	£119.95
CS-201A	2 Way Antenna Switch PL	£24.95
CS-201GII	2 Way N type Switch	£29.95

RM HF & VHF Amplifiers – NEW Range !

SAVE £324

BLA-1000
1kW Solid State Amp
- Frequency: 1.5 to 55MHz
- Auto band switching
- No Warm-up, no Tuning
- Over 1kW key down
- 2 Antenna outputs
- Quiet variable speed fan

RRP ~~£2799.95~~ **£2475**

SAVE £30

HLA 300 PLUS
- 1.8-30 MHz 12-14V Solid State 300W
- Input power: 1-15w / 2-20 SSB
- Size: 191 x 450 x 66
- Weight: 3.0 kg

RRP ~~£399.95~~ **£369.95**

BLA-350
300W HF Solid State Amp
- Frequency: 1.5 to 30MHz
- Instant use - no warm up
- No Tuning
- SWR Protected
- Manual or automatic band selection
- Over 300W key down

£649.95

Mobile HF Amplifiers

HLA 150-plus	150w 1.8-30MHz	£299.95
HLA 150-Plus +Fans	150w 1.8-30MHz	£349.95
HLA 300 Plus	300w 1.8-30MHz	£399.95
HLA300V +Fans	300W 1.8-30MHz	£449.95
KL 35	35w 25-30MHz AM/FM	£29.95
KL 60	35w 25-30MHz All Modes	£34.95
KL 203	100w 18-30MHz	£44.95
KL 203P w/Pre-amp.	100w 20-30MHz	£49.95
KL 300P w/Pre-amp.	150w 20-30MHz all modes	£129.95
KL 503	300w 20-30MHz all modes	£179.95

VHF Mobile Amplifiers

KL 144	45w VHF 145MHz	£89.95
KL 145	100w VHF 145MHz	£149.95
VLA 100	100w VHF 145MHz with Fan	£249.00
VLA 200V +Fans	200w VHF 145MHz All Mode	£349.95

50MHz Mobile Amplifier

VLA 150	100w 50MHz (6m) all modes	£199.95

NEVADA – Cable Specialists

Westflex 103	
100 metre drum	£139.95
75 metre length	£112.50
50 metre length	£75.00
Price Per metre	£1.50
RG-213U – Mil Spec	
100 metre drum	£116.00
50m length	£64.50
Price per metre	£1.29
RG-213tm – Economy version	
100 metre drums	£99.00
RG-Mini 8 (Super XX)	
100 metre drum	£59.95
Price per metre	£0.65
RG58/CU – Mil spec	
100 metre drum	£39.95
Price per metre	£0.45
450 Ohm Twin Feeder	
100 metre drum	£89.00
Price per metre	£0.99
300 Ohm Twin feeder	
100 metre drum	£76.50
Price per metre	£0.85
Flexweave Antenna Wire	
100 metre drums	£49.95
Price per metre	£0.55
Coated Flexweave Antenna Wire	
100 metre drums	£59.95
Price per metre	£0.98

Mil Spec Kevlar Antenna Wire

Very strong, ultra light weight, green colour, as used by the military

100m drum	£89.95
Per metre	£0.99

NEVADA Pro-Quality Baluns

BL-6T	6:1 Balun 1kW (Peak)	£59.95
BL-4T	4:1 Balun 1kW (Peak)	£59.95
BL-9T	9:1 UN-UN Balun (for end fed Wire)	£59.95
DPC-01	High Quality Dipole Centre	£14.95

Antenna Collection

Sirio HF Base Antennas

Sirio SY27-3	3 Element 28 MHz Yagi	£84.95
Sirio SY27-4	4 Element 28MHz Yagi	£99.95
SY68-3	3 Element Beam - 70 MHz	£79.95
CX4-68	Vertical- ≤ wave 70MHz 2.9m	£69.95
Gain-master	Vertical (Fibreglass) 28MHz	£129.95
Tornado	Vertical 50MHz - 5/8 wave	£49.95
Vector 4000	Vertical (26-28) MHz- ≤ wave	£89.95
2008	Vertical (26-28) MHz 5/8 wave	£89.95

Sirio VHF Base Antennas

SPO-145-5	144MHz vert 5.15 dBi (3mtrs)	£129.95
SA270LN	144/432 MHz 5.35/7.95 dBi	£109.95
SA270MN	144/432MHz 4.15/6.35dBi	£69.95

Sirio Mobile Antennas – (S0-239)

HP-2070	144/432Mhz–445mm-1/4 & 5/8	£29.95
HP-2070H	144/432MHz- 1080mm 2 x 5/8	£39.95
HP-2070R	144/432MHz - 1000mm 2 x 5/8	£34.95
HP-140-175	144MHz 5/8 wave - 1435mm	£29.95

Nevada HF Wire Antennas

Windom	Pro-Half Size (Kevlar) 40-10m 66ft	£69.95
G5RV	Pro-Full Size (Kevlar) 80-10m 102ft	£69.95
G5RV	Pro-Half Size (Kevlar) 40-10m 51ft	£49.95
G5RV	Standard Full Size 80-10m 102ft	£69.95
G5RV	Standard Half Size 40-10m 51ft	£39.95
G5RV	H/Drawn Copper, Half Size 40–10m	£24.95
WDM-8010	Standard 80/10 Windom	£44.95
WDM-4010	Standard 40/10 Windom	£39.95

Moonraker - Base

Moonraker GP-2500	6-80 mtr Vert	£199.95

TYT-UVF1
Dual Band Transceiver

- 2m/70cms
- 128 Memories
- C/w re-chargeable battery pack, drop in charger, power supply + more!

£99.95

TYT-800
VHF 2 Metre 5W Handheld

- 199 memories
- Steps: 5, 10, 12.5, 20, 25, 30, 50kHz
- 50 CTCSS codes
- VOX time-lapse

£49.95

OPEN: Mon to Fri 9.00am - 5.30pm
Unit 1 Fitzherbert Spur Farlington
Portsmouth Hampshire PO6 1TT

023 9231 3090

ALINCO QUALITY • STYLE • PERFORMANCE

DX-SR8
100 Watts HF Transceiver
- with new 0.1-2W QRP Feature!

A compact HF transceiver with all the facilities an experienced operator would expect as standard, Narrow filters, IF Shift, RF pre-amp, noise blanker and CW keyer with full break in. For the QRP enthusiast a special super low output power setting. With a detachable front panel, front-facing speaker and logically laid out controls, the DX-SR8 is engineered to endure heavy-duty cycles and harsh operating environments.

Included Accessories
- EMS-64 Dynamic microphone
- DC cable • Microphone hanger EBC-7

Optional Accessories
- EDS-17 Front control remote kit (5m cable, front panel bracket, unit cover and hardware)

- Transmit: 1.8 - 30Mhz Amateur Bands (5MHz Band Transmit is optional with modification)
- TX: SSB, CW, AM, FM
- Power: up to 100W SSB/CW/FM - 40W AM
- QRP Mode: (0.1 to 2.0) W extra low power setting
- RX – 150-29.999Mhz (when optional 5MHz mod is enabled, RX extends to approx 35Khz-34.999MHz)
- Detachable front control panel
- Direct frequency entry via key pads
- Fight QRM with STANDARD features - IF shift, Narrow Filter, Noise Blanker
- Emphasis on CW operation - Built in electronic keyer, QSK operation, CW Narrow Filter
- World class transmit audio quality
- Enhanced Scan Modes
- Adjustable switched RF Attenuator
- 4 Stage RF pre-amplifier
- Dual VFO's - Split frequency operation
- 600 channel memories in 3 banks
- Connection for Auto tuner
- ALC for Linear amplifier
- CTCSS enabled for 10 Metre FM repeater access
- Large cooling fan with overheat power limiter
- SWR Protection built in
- Dimensions: 240 (w) x 94 (h) x 255 (d) mm
- Weight: 4.1 kg (approx)

£599.00

DX-R8E
SDR capable Communications Receiver

Tune the world using SDR technology! This full shortwave and LF coverage receiver has an IQ output which allows you to monitor AM/FM/SSB/CW signals either as a superheterodyne desktop radio or using your PC with free software (not supplied) as an SDR radio. Enjoy DRM Hi-fi broadcasts without a converter. PC-decode of HFDL, FAX, NAVTEX, RTTY, PSK and more.

Optional Accessories
12V Power Supply....£14.95

£549.00

DR-635
Advanced Dual Band Mobile Transceiver
Packed with features, Monitor 2 repeaters together in the same or a different band, listen to broadcast FM stations in WFM or Airband Traffic in AM

£299.00

DJ-G7E
Tri-Band Transceiver
Packed with all the features you will ever need!
- Covers 2m, 70cms & 23cms
- Super wide band receive 500Khz to almost 1,300 MHz
- Modes: AM, FM, WFM
- Memories: 1000
- CTCSS/DCS encode/decode
- DTMF Auto-dialer
- Internal Vox control
- Plus lots more !

£349.95

Supplied with **EDC-159E** rapid drop-in charger and **EBP-63** 1,100 mAh Li-ion battery

DJ-V57E
Water Resistant Dual Bander
- Transmit 145/433MHz
- Receive: 136-173.995 MHz
- 200 Memory Channels
- VFO, Memory, Scan modes
- 39 CTCSS tone squelch
- Tone burst function
- Battery-drain function
- Two-touch repeater-setting
- Internal VOX feature
- Wire cloning capability
- SMA antenna port
- DTMF encode & auto-dialer

£159.95

DR-135E MkIII
High Power 50W 145MHz (2m) FM/Data Mobile Transceiver

£189.95

DR-435
35W UHF Mobile Transceiver
GPS input for APRS

£199.95

DM-330MW-UK
30 Amp switching power supply
- Low noise
- Lightweight and portable
- Triple Protection circuit
- Low Ripple

~~£119.95~~ **£99.95**

DJ-175E
Tough, Rugged 145MHz (2m) 5 Watts Handheld

£99.95

DJ-195E
Direct entry Keypad 145MHz (2m) 5 W Handheld

£129.95

DJ-X3ED
700 Channel AM/FM/WFM Wideband Handheld Scanner

£149.00

DJ-XIIE
All Mode AM/FM/SSB Handheld Scanner with IQ Output

£339.00

COMET

H-422 Multi band V Dipole
- Use as rotary or straight dipole - put max lobe where you need it!
- Covers 7,14,21,28 MHz
- Power 1kW max.

£299.95

CHA250BX-II
- Latest Version Wideband Vertical Antenna
- Covers 3.5-57MHz with NO Tuner Needed!
- Maximum length: 7.13m

£349.00

CMX 200
SWR/Power Meter
- Power range: 30/300/3kW
- Frequency: 1.8-200MHz
- Dimensions: 120 x 80 x 105 WHD

£89.95

CAT-300
Quality HF+6m Antenna Tuner
- Frequency: 1.8 - 60 MHz
- Power: 300W (PEP)
- X needle Meter reads: Average/Peak power, SWR

£199.95

Antennas and Accessories

HF Antennas

CHA 250B	Multiband HF Vertical 80-6m	349.00
H-422	4 Band HF V Dipole..10/15/20/40m	299.95
CWA-1000	Quality Multiband 80-10m Dipole	129.95

VHF/UHF/50Mhz Vertical Antennas

GP1	145/433MHz 1.25m	69.95
GP3	145/433MHz 1.78m	74.95
GP6	145/433MHz 3.07m	119.95
GP9	145/433MHz 5.15m	169.95
GP93	145/433/1200MHz 1.78m	119.00
GP95	145/433/1200Mhz...2.42m	159.00
GP15N	50/145/433MHz 2.42m	129.95

50MHz (6m) Beam Antennas

CA-52HB2	2-Ele 6m (50MHz) Yagi	99.95
CA-52HB4	4 Ele High Gain 6m (50MHz)Yagi	139.95

Handheld Antennas

BNCW45	Handy 145/433MHz Double Jointed	32.95
CH32	BNC 144/433/900MHz 45mm	19.95
CH99	BNC Telescopic W/band 195-1135mm L	24.95
RX5	144/430/900MHz 44cm L 8W SMA	34.95
RX7	144/430/900MHz 44cm L 8W BNC	34.95
SH95	144/430/1200MHz 37cm L 10W BNC	29.95
SMA3	144/430/900MHz 25cm L 10W SMA	29.95
SMA99	70-1000MHz 1.1mm max L Tele SMA	22.95
SMA-501	144/430 MHz SMA	22.95
SMA-701	144/430/1200MHz SMA	22.95

SWR/Power Meters

CAT10	Low Power Manual Antenna Tuner	99.00
CAT273	ATU for 144/433MHz 250(PEP)	199.95
CAT300	ATU 1.8-56MHz 300w	199.95
CMX200	Cross needle SWR Meter 1.8-200MHz	99.95
CMX400	Cross needle SWR 140/525MHz	89.95

Duplexers & Triplexers

CF360A	28/50MHz SO239-PL259/PL259	49.95
CF416A	145/433MHz SO239-PL259/PL259	39.95
CF416B	145/433MHz SO239-PL259/N male	39.95
CF416DB	145/433MHz SO239 PL259/PL259	39.95
CF706	Duplexer for Icom IC706	39.95
CF706N	Duplexer for IC706.(N Type)	49.95
CF503C	50/145MHz SO239-PL259/PL259	49.95
CF530C	50/145MHz SO239-PL259/PL259	49.95
CF530A	50/433MHz PL259-SO239/SO239	49.95
CFX431A	145/433/1200MHz N to PL259/N/N	59.95
CFX514N	50/145/433/MHz SO239/PL/PL/N	59.95

Low Pass Filters

CF30MR	Low Pass Filter 32MHz 1kW	59.95
CF30S	Low Pass Filter 32MHz 150W	39.95
CF50MR	Low Pass Filter 57MHz 1kW	59.95
CF50S	Low Pass Filter 57MHz 150W	39.95

Nevada Power Supplies

10% OFF ALL MODELS THIS MONTH

Nevada PSW-50
- 50 Amp Switch Mode Power Supply
- Output voltage: 13.8VDC / 9.0-15.0 V

~~£139.95~~ **THIS MONTH £125.95**

Nevada PS-40M
- 40 Amp Linear 1.5-15 Volt Power Supply
- Over current warning indicator

~~£129.95~~ **THIS MONTH £116.95**

Nevada PS-30M
- 30 Amp Linear 1.5-15 Volt Power Supply
- Current: 25/30A Max

~~£99.95~~ **THIS MONTH £89.95**

Nevada PSW-30
- 25-30A Switch Mode Power Supply
- Output Current: 25A continuous, 30A surge

~~£89.95~~ **THIS MONTH £80.95**

Nevada PSW-30H
- 30 Amp Switch Mode 13.8v Power Supply
- Large Analogue Meter Shows Volts / Amps

~~£79.95~~ **THIS MONTH £71.95**

Nevada PSW-07
- New Switch Mode Power Supply
- 240v input - 13.8v Output / 5-7 Amp

~~£29.95~~ **THIS MONTH £26.95**

Nevada PSW-04
- New Switch Mode Power Supply
- 240v Input - 13.8v Output /3-5amp

~~£24.95~~ **THIS MONTH £22.45**

LDG Tuners
Popular Models
NOW in STOCK!

AT100 Pro II	(160-6m) 125 Watts	£189.95
AT200 Pro	(160 - 6m) 250 Watts	£204.95
AT600 Pro	600W Auto Antenna Tuner	£299.95
AT897 Plus	for Yaesu FT897	£179.95
AT1000 Pro	(160 - 6m) 1kW	£499.95
IT100	for Icom Models 125 Watts	£159.95
YT100	for Yaesu Models 125 W	£179.95
YT450	for Yaesu FT450/950	£224.95
Z11 Pro2	(160 - 6m)125 Watts	£159.95
Z817	QRP for FT817 160 - 6m	£119.95
FTL	Meter for FT857, FT897	£79.95
Balun 1:1	200 Watts	£34.95
Balun 4:1	200 Watts	£34.95

PALSTAR Power Supplies

SPS9600
Heavy duty 60 Amp Switch Mode

£199.95

Other Palstar Power Supplies

SPS9600	Heavy Duty 60 Amp Switch Mode	£199.95
PS30M	30 Amp Variable Linear PSU	£99.95
SPS8250	25 Amp Switch Mode	£79.95
SPA8230	23 Amp Compact, Lightweight	£64.95
PS06	4-6 Amp 13.8V Power Supply	£29.95
PS04	2-4 Amp 13.8V Power Supply	£24.95

- Open air stereo communications headphones
- Included adaptor for 1/4" socket, use these on 3.5mm or 1/4"
- Adjustable headband

Yaesu STA77 Headphones

£59.95

bhi Noise Reduction

DSPKR	DSP Noise Cancelling Speaker	£139.95
DTNA	Stylish DSP Base Station Speaker	£139.95
NEIM1031MkII	Noise Eliminating Module	£129.95
ANEM MkII	'Noise Away' Module	£115.00
NES10-2 Mk3	Noise Eliminating Speaker	£99.95
Radio Mate	Remote Keypad.....now just:	£79.95
CAT-MATE	Electronic Y Splitter for Yaesu	£50.05
BHI 1042	6 Way Audio Switching Box	£29.95
Mini Switch	Small 2-Way Switch Box	£19.95

www.nevadaradio.co.uk

Tim Kirby G4VXE's World of VHF incorporating VHF DXer
Willowside, Bow Bank, Longworth, Oxfordshire OX13 5ER
E-mail: tim@g4vxe.com Twitter: g4vxe

Low Band v.h.f. Transatlantic Reception

Our keen v.h.f. specialist author Tim Kirby G4VXE presents his monthly look at what's going on above 30MHz and takes a look at you reports.

Welcome to the *World of VHF (WoVHF)* – devoted to Amateur Radio activity above 30MHz. And I'm starting off by mentioning it was good to hear from Andy Anderson GM4JR (Dumfries, Scotland). He writes, 'I meant to write last month following the piece about Richard Gosnell G4MUF's reception of "New York Fire Department" on 33MHz. I have no doubt he heard fire service communications on the old 33MHz band – but I very much doubt he heard FDNY as they have been using High Band f.m. (155MHz) for as long as I can remember.

"I think he **may** have been listening to some of the smaller volunteer departments in rural New York **State** (not **City**) or more likely Volunteers in Maine, Rhode Island, Massachusetts, etc. There is a still a great deal of use of this band with Volunteers in Maryland"

Thanks Richard – most interesting! I spoke with Richard G4MUF and he confirmed that it was the more rural departments that he had heard. It was also nice to be able to put Richard and Andy in touch as they have a shared interest in this part of the spectrum.

Alex Allan GM3ZBE

I was saddened to hear of the recent death of **Alex Allan GM3ZBE** after a long illness. Alex was the first GM station that I worked on 50MHz (on tropo) when I lived in Cheltenham in the mid 1980s. He had an excellent 50MHz station near Dundee in Scotland, and we made many QSOs after that. In 1988 he moved to the Midlands and I had the pleasure of meeting him at many rallies and conventions.

In 2005 he retired and moved back to Scotland. A lovely man, he was active across many aspects of Amateur Radio. He had a signature on the bottom of his E-mails 'Remember, it's only a hobby' – a welcome reminder of a sense of perspective in many a forum or reflector! He will be much missed.

Tone Squelch & Activity

David Flaxmere-Barley G6MMC (Croydon) is someone who feels there's a lack of v.h.f. activity. He says that in his area, a few years ago, he could access at least four repeaters, but now not a thing! He puts it down to the 'misuse' of Continuous Tone Coded Squelch Systems (CTCSS). He continues, "In my opinion it is the v.h.f. mega-amp snobs who are holding ordinary operators to ransom. The CTCSS system wasn't designed to keep people out of repeaters but is a system designed to help multiple users, on narrow bands." David says 'Use it or lose it!"

Thanks for E-mailing me David! Happily, I've never encountered people using CTCSS to keep people out of repeaters, although you do occasionally hear people say that particular repeaters are considered as private or closed repeaters.

Sometimes I wonder whether this is in fact down to perception. For example, I speak to a group of regulars on the repeaters in the morning – just because we are all generally there at the same time. I desperately hope that no-one would view it as a clique – anyone is welcome after all!

As for a lack of activity – there's always room for more. However, my view is that there is plenty of activity on v.h.f./u.h.f. but it's split across many different modes and activities. In the old days, v.h.f. activity probably WAS 145MHz f.m. and if you listened on S20, then you heard plenty of activity. Nowadays, activity is split across simplex, repeaters, Echolink, D-STAR, s.s.b./c.w., WSJT, APRS – many of which may not be obvious to the casual listener!

Perhaps I'm a little more sanguine than David, but I would join with him in saying 'Use it or lose it'. The more activity there is – the better for our hobby in a variety of ways.

High Altitude Balloons

Thanks go to to **Jon Joyce GM4JTJ** (Arbroath, Scotland) for a fascinating E-mail. Jon writes, "I thought I would write and let you know about something that I have derived a great deal of fun from over the last year; helping to track balloons launched by engineering students from a variety of university locations in the UK.

"I believe that these projects involve students having to design balloons and payloads that will provide details of their location by transmitting the GPS co-ordinates back to earth via (usually) an RTTY signal on 434.075 or 434.650MHz and other 70cm frequencies. Typically these balloons achieve altitudes of in excess of 30,000m.

"The telemetry decoding is done using a freely available piece of software called 'dl flydigi', which is integrated with the internet and sends any correctly decoded packets back to the mission controllers and an integral part of these projects is to recover the balloon and the payload which makes the contribution of Radio Amateurs vital. They are fitted with mobile phone GPS systems but these don't work at higher altitudes much above a kilometre.

"Sometimes the balloons carry an on-board camera and to receive pictures from space is an added bonus. I'm located on the North East coast of Scotland and last summer was able to receive strong signals from most of the launches. Some of these were above Cambridge, which given the typically 10-20mW transmitters made for a huge amount of fun. I warn you it is highly addictive!!!

"Here are couple of websites which I find useful and I am very surprised that

I have not seen any mention of these activities in the popular Radio press which is why I'm writing.
http://ukhas.org.uk/general:upcoming_launches
http://groups.google.com/group/ukhas
http://webchat.freenode.net/?channels=highaltitude (this is the chatroom during flights)
http://spacenear.us/tracker/ (the online tracker which uses Amateur's decoded packets)

"This doesn't need a lot of sophisticated equipment. I use a home-brewed 70cm station and a 21-element Yagi."

Thanks for your E-mail Jon. This looks really interesting and I'm looking forward to trying it out for myself.

Fig. 1: Tim G4VXE made a handful of QSOs during the RSGB 432MHz Affiliated Societies Contest on February 5th, with the best DX being F8BRK (IN99) at a distance of just under 300km

A New Meteorscatter Mode

From the website of **Erwin Witt DK5EW** I read the following interesting story, "PSK2k is high speed meteor scatter software written by **Klaus Boje von der Heide DJ5HG** (Professor of Computer Science at University Hamburg). It allows two-way meteor scatter QSOs to be conducted with any suitable transceiver/PC/soundcard combination. The PSK2k software is fully error correcting and call specific in operation – so you'll only see the QSO in progress and any non-QSO CQ or QST text. Any other transmissions (other people also in QSO) are discarded. This allows multiple QSOs to take place on a single frequency.

Additionally, PSK2k can be operated in fully automatic mode if required. This enables QSOs to be completed fully automatically without user intervention. Important advantages are that long term testing can be done (on QRP power for example) without having to sit an monitor every period.

When in automatic operation all stations will be answered who call you. Also a special contest mode is there with exchange of serial number, full locator, QTF, transmitted power, antenna gain. You can obtain the PSK2K files from **http://www.dj5hg.de/dj5hg_download.html** The software sounds quite interesting and promising, although I have seen that a number of people have had some teething problems with getting the software running – but I've no doubt that these will be sorted out in due course.

In the PSK2K user guide at **http://www.dj5hg.de/PSK2k_UserGuide.pdf** there are some very interesting discussions of the aims of the mode, a little about how meteor scatter works and the thinking behind the PSK2K protocols and software.

If you try PSK2K please let me know how you get on with it. It will be interesting to see if it can compete with the WSJT modes which have become the defacto standard on v.h.f./u.h.f.

The 50MHz Band

On to the 50MHz band next and although there's a winter peak in Sporadic E propagation in December, January is generally fairly quiet. It was quite a surprise, therefore to have an E-mail from **Ron Pincho ZB2B** with details of an Es opening on January 19th. Ron worked F6GEX) IN97), F4FEY (IN97), G3VYF (JO01), EA1HRR (IN83), G0LFF (IO90) and heard the GB3BAA (IO91) and GB3MCB (IO70).

I was interested in the EA1HRR contact – as that's a very short distance for Es – so I wondered if it was backscatter. Ron was using his Icom IC-7400 and a 4-element Yagi. The beam really must have made a difference in this opening as I also received an E-mail from **Ernie Stagnetto ZB2FK** who said that he was active during the opening but couldn't hear any of the stations on his vertical antenna.

Although I have extolled the virtue of using verticals to get on 50MHz readily – and they work very well indeed in big openings – of course, you'll do much better using a beam when conditions are marginal as they must have been at this time.

Dedicated monitoring of 50MHz pays dividends. I noticed that **Geoff Inns EA5/G3XGS** (IM98) had found openings on January 31st when he heard the 9H1SIX (JM75), GB3MCB (IO70), ON0SIX (JO20) and GB3BAA (IO91) beacons. Next day on February 1st, Geoff logged ON0SIX and GB3MCB once again via Es.

Geoff is also active on 50MHz meteor scatter using the JT6M mode and has made some interesting QSOs. If you have the *WSJT* software, why not set it running with your receiver listening to 50.230MHz and see what you can hear. JT6M QSOs are possible via meteor scatter pretty much all of the time, so it's well worth a go, even if you have a simple station.

Graham Boor G8NWC (Spalding, Lincolnshire) has just built a Moxon antenna from the DK7ZB website (**http://www.qsl.net/dk7zb/start1.htm**) which he is looking forward to using in the Es season. The DK7ZB website is well worth a look and contains a multitude of designs for Yagis and verticals across a variety of v.h.f. and u.h.f. bands.

Paul Bowen M0PNN (Shropshire) found a brief Es opening on January 19th and worked OK2RO (JN99) and in the aurora on January 22nd worked GM4CFS (IO86), MM0AMW (IO75) and GM4ILS (IO87).

The new Region I Band plan for 50MHz has caused some discussion amongst participants in the RSGB's 50MHz Activity Contests. The new band plan suggests that 'domestic' activity i.e. UK-to-UK activity is preferred above 50.200MHz. However, I have seen comments to say that the RSGB's Contest Committee recognise that contacts may be made below 50.200MHz to relieve congestion. Band planning is always a hard task, trying to satisfactorily accommodate everyone's

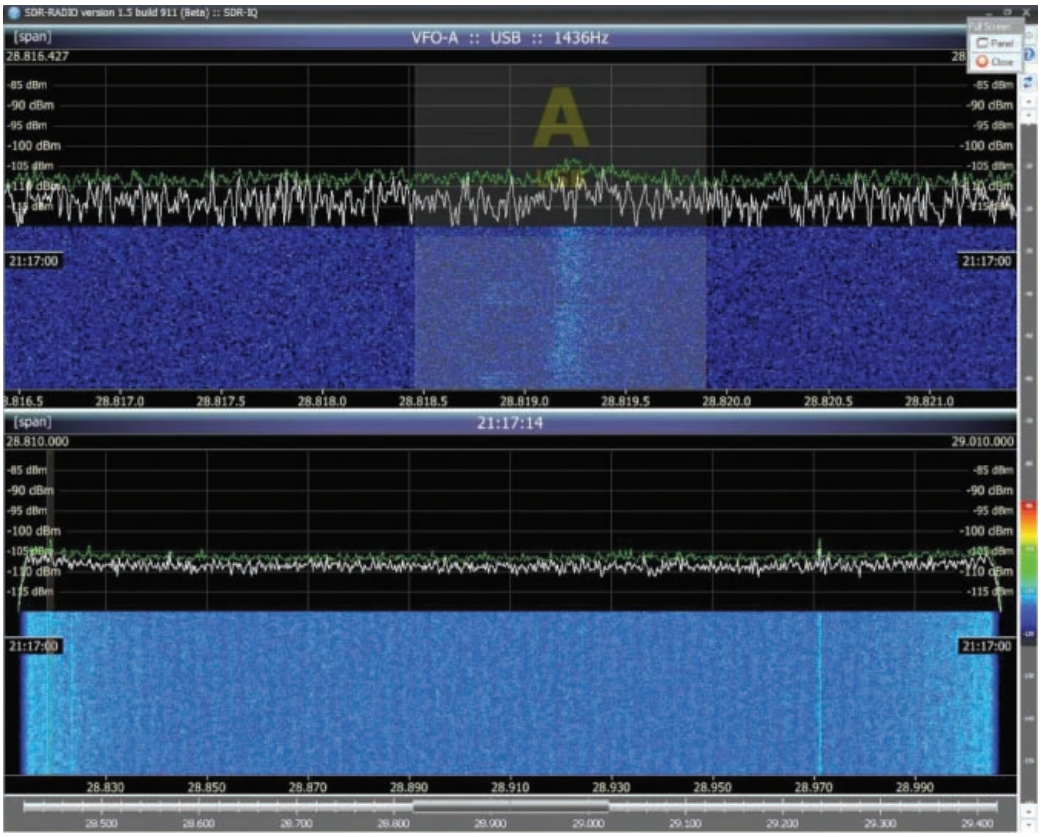


Fig. 2: John Worsnop G4BAO posted an interesting picture on Twitter of a display of the 24GHz band beacon at Martlesham, GB3MHK being received at John's QTH over a distance of 78km by snow scatter.

interests but 50MHz always proves to be particularly challenging.

Looking forward, April often brings the first of the 'summer' Es openings. So, if you haven't been doing so already it will be time to start monitoring 50MHz regularly!

The 70MHz Band

Time for the 70MHz up-dates and **Ken Eastty G3LVP (**Cheltenham, Gloucestershire) drew my attention to a new 'personal' beacon operating on the 70MHz band. Thje beacon – callsign **GM8RBR** – is on 70.100MHz from IO67UF. The beacon was supplied by HG1YA and runs 10W to a 5-element dual band 50/70MHz antenna beaming south. The beacon has been heard in the southern UK by G3LVP (IO81) and G4ZTR (JO01) by meteor reflection and GW8IZR (IO73) has reported hearing it by tropo.

The 144MHz band

It's upwards to the 144MHz band next and Graham Boor G8NWC found good conditions on the evening of January 16th and worked PA3HDG and PI4AMF. During the RSGB's 144MHz Activity Contest, Graham's best DX was GM4AFF (IO86) at a distance of 468km.

There hasn't been much c.w./s.s.b. activity here at **G4VXE** – but I did notice some more distant repeaters audible during the period of January 15th – 17th; GB3BC (South Wales), GB3SH (Southampton), GB3PI (Cambridgeshire). GB3DR (Dorchester), GB3MH (West Sussex), GB3SR (Brighton) and GB3FR (Lincolnshire).

With a period of high pressure and cold weather, I've noticed that there's been a little tropo in the early mornings quite regularly, which fades as things warm up, so there have quite often been hints of more distant stations audible.

I was delighted, however, to have a brief c.w. QSO with **Phil Oakley G0BVD (Great Torrington)** on January 14th. I'd been hearing a few stations from the South West and it seemed worth a try – so we were very pleased to exchange reports.

Phil hadn't got a Morse key attached to the v.h.f. rig, so he ended up using the sidetone from his h.f. rig to generate a.f.s.k! Ingenious and effective. I've resorted to using audio Morse code on a number of occasions when a key was not available – most notably standing on top of a stone wall in Cornwall, whistling Morse code at G0CUZ (IO82). You might laugh, but we completed the contact!

The 432MHz Band

Upwards again next to the 432MHz band where Graham Boor G8NWC reported worked DL6YBF (JO31) on the evening of January 16th using 10W to his 144MHz Yagi. From G4VXE I made a handful of QSOs during the RSGB 432MHz Affiliated Societies Contest on February 5th, while I was supposed to be writing this column! For me there was no real DX, but several stations worked over fair distances; G4ODA (IO92), G4ERO (JO02) and M1MHZ (IO92) with the best DX being F8BRK (IN99) at a distance of just under 300km.

During the tropo event between January 14th and 17th, I logged GB3SD (Weymouth), GB3WI (Wisbech) and GB3PY (Cambridge). **Ann Stevens G8NVI (Didcot)** also worked F8BRK (IN99) and then moved to 1296MHz where Ann reports that signals were stronger than on 432MHz. It's always fun when that happens – sometimes it's to do with conditions – and of course as you go up in frequency, you get more antenna gain for a given boom length.

The 24GHz Band

John Worsnop G4BAO (Cambridgeshire) posted an interesting picture on Twitter of a display of the 24GHz band beacon at Martlesham, GB3MHK being received at John's QTH over a distance of 78km by snow scatter. On the 10 and 24GHz bands, rain and snow scatter are very viable means of making contacts – as rain and snow clouds prove to be good (if not regular) reflectors at microwave frequencies.

If you find this interesting, you might also be interested in the UK Microwave Group (**www.microwavers.org**) – there is some excellent content on the website and membership of the group is a very modest £6 per year.

I'm looking forward to chatting to you again next month. Cheerio until then! ●

Colin Redwood G6MXL's What Next?
PW Publishing Ltd., Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW
E-Mail: what.next@pwpublishing.ltd.uk

From the Foundation Onwards to the Intermediate Licence

In this month's *What Next?* Colin Redwood G6MXL is looking at what is involved in moving from a Foundation Licence to an Intermediate Licence.

Welcome to *What's Next?* (*WN?*) where I'm looking at progressing forwards from the Foundation Licence. Many Foundation Licence holders find that there comes a time when the constraints of their licence conditions, such as the 10W power limit and not having access to certain bands can start to limit their enjoyment of the Amateur Radio hobby.

At this point, some will consider an Intermediate Licence as an attractive way forward. Others may wish to find out more about transmitters, receivers, antennas and propagation or perhaps to have a go at some home construction. Having said this, I should make it absolutely clear that there is no necessity or requirement to move up to the Intermediate Licence (or indeed a Full Licence).

To take the Intermediate Licence examination, you must have passed the Foundation Exam (there's no need to have actually applied for your Foundation Licence). You also must have completed several practical tasks associated with the construction side of the hobby.(I'll look at these later).

Each of the topics covered in the Intermediate syllabus builds on knowledge that was acquired at Foundation level. I would suggest reading through the Foundation Licence book and any notes you may have from your Foundation course to remind yourself of the basics.

The Syllabus

I don't have space to reproduce the entire syllabus (termed specification) for the Intermediate Exam. So, instead I've tried to summarise it, so that readers can see how it builds on the knowledge already picked during the Foundation course and exam.

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 use home-built transmitters on the air) that come with an Intermediate Licence. Candidates are expected to be able to use the Intermediate Licence schedule and be familiar with Intermediate Licence conditions.

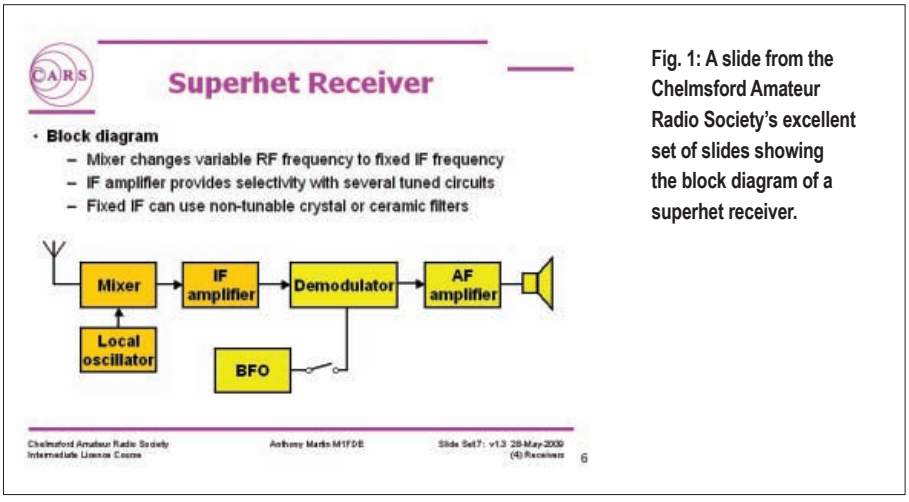


Fig. 1: A slide from the Chelmsford Amateur Radio Society's excellent set of slides showing the block diagram of a superhet receiver.

Candidates & Mathematics

At Intermediate level, candidates will need to be little more fluent in mathematics. The numbers involved can be much smaller and much larger than at Foundation level, and calculations will not necessarily involve whole numbers between 1 and 20. Calculations are required for resistors in series and in parallel. Additional components are introduced including capacitors, inductors, transformers, diodes, transistors. Without going into detail, the basic operation of transistors is covered.

The basic concepts of alternating current (a.c.) theory are also introduced. These include reactance and impedance, and the use of capacitors and inductors in tuned circuits. Some basic measurements of circuits using multimeters are covered.

If what you have just read fills you with dread – please don't worry! When explained in a training course, the basic electronics section of the course really isn't as difficult as the syllabus can make it sound! In most cases it's just basic principles that need to be grasped, which many people find easier with supporting practical work and demonstrations.

Transmitters & Receivers

At Intermediate level the simplified block diagrams that were covered in the Foundation syllabus are explored in a little more depth, with differences between the various modes considered (**Fig. 1**). In addition very basic circuits for some key parts of transmitters such as oscillators are introduced.

As the power permitted by the Intermediate Licence is greater than at Foundation level, transmitter interference is considered together with an introduction to filters that can be used to allow certain frequencies to pass whilst blocking others.

Feeders & Antennas

The concepts of feeder loss and antenna gain are considered along with an introduction to the use of deciBels (dB) for expressing these (see *WN?* September 2010). Antenna polar diagrams are covered (which I touched on briefly in

the August 2008 *WN?* column). Antenna tuning units (a.t.u.s), which are also known as antenna matching units (a.m.u.s.) and standing wave ratios (s.w.r.s) are also introduced. (I think many will find these topics helpful).

Propagation Explored

Propagation is explored in a little more depth at Intermediate level, introducing the D, E and F layers in the ionosphere. As with many aspects of the course, experience of operating on the bands will be helpful to bring these topics to life.

Operating Practices & Procedures

The Operating Practices and Procedures section of the Intermediate syllabus covers the basics of satellites, which I looked at in *WN?* in the July and September 2009 issues of *PW*.

Fast and slow scan television (TV and SSTV) and a few data modes are also introduced. Most candidates will find that operating on both the v.h.f. and h.f. bands will be good preparation for this part of the syllabus.

Learning about readability, strength and tone (RST) signal reports, Q codes, abbreviations like WX (Weather), and some country prefixes from books is not an easy task, whereas hearing and using them on the air makes it so much easier! I covered RST signal reports in the October 2008 *WN?* column.

Electromagnetic Compatibility

At Intermediate level the syllabus for Electromagnetic Compatibility (EMC) covers recognising interference. Also covered are some specific techniques for addressing EMC problems, and how to deal with complaints. This is really useful if you should ever get the dreaded knock on the door! Techniques for avoiding EMC issues are also explored.

Safety Considerations

As ever, safety is an important consideration, with the emphasis this time on safety associated with soldering and drilling. I think it's wise to cover this before undertaking the main construction activities.

Construction & Practical Work

The construction aspects of the Intermediate course, cover safety considerations as well as some practical work, which helps bring to life some of the theory. In addition there are some practical skills to be acquired including fitting connectors to coaxial feeder, recognising some common components including the resistor colour code, and a construction project.

Fig. 5: Successful Intermediate Exam candidates at the Poole Amateur Radio Society in Dorset.

Training Courses

Finding a training course for the Intermediate Exam may be a little harder than at Foundation level. Training at this level cannot take place over a single weekend. Some clubs run Intermediate training over two weekends with a gap between the weekends to give candidates time to complete a construction project. Other clubs run training during weekday evenings, over a period of 8 to 12 weeks.

I would suggest contacting whoever ran your Foundation course. They are most likely to know of local arrangements for the Intermediate course. Another useful source of information about courses is the RSGB website at **www.rsgb.org.uk**

Clubs & Training

Many clubs offer training courses for the Intermediate Licence. Because the Intermediate course is longer than the Foundation course, clubs tend to run intermediate course less frequently than the Foundation Licence.

My own club has found that using a team of tutors works well, with the individual tutors keeping with the same topics from Foundation level at Intermediate level. This has the advantage that the tutors know what material has been covered at Foundation level, and how best to build on this at Intermediate level.

With the exception of the very young candidates some of whom may struggle a little with the maths, my experience is that most people who can pass the Foundation exam can also pass the Intermediate exam.

Self Study

Some candidates may prefer to self-study. This is quite feasible for many aspects of the course, although you will need to find a way of covering the practical parts of the course and have these formally assessed.

I would strongly urge anyone trying soldering for the first time to get someone to supervise them to avoid picking up bad habits. Referring to the *WN?* column in the *PW* for February 2008 issue where I discussed soldering, which may be helpful.

The *Intermediate Licence* Book

Most candidates will find the Intermediate book, published by the RSGB very helpful. It's broken down into small sections termed work-sheets which are designed to take about half-an-hour to study.

The work-sheets present things in bite-size chunks that mix practical and theory. There is a cross-reference section at the back of the book to show where each item of the syllabus is covered.

I would suggest potential candidates make sure they have an up-to-date edition of the book. The latest (sixth edition) was published towards the end of 2011. Over the years there have been a number of changes to the Intermediate syllabus, with the aim of making the move from Intermediate to the Advanced/Full Licence a little easier.

I think that many candidates will find the RSGB's *Amateur Radio Exam Secrets – Revision* book helpful to their preparations, as it focuses on the parts of the syllabus that most candidates find the hardest. There's also a complete mock exam paper for the intermediate course and individual questions on every topic in the syllabus.

The well-illustrated book certainly doesn't replace the *Intermediate Course* book, but it is an excellent revision book. I think it would be particularly helpful to a student that perhaps missed a training session at their local club and wanted to catch up, or for someone wanting to get

Fig. 4: A group of people soldering/constructing a project during a Buildathon organised by Steve Harley G0FUW at the 2011 'QRP In The Country' event held at Tim Walford G3PCJ's farm near Langport in Somerset.

a little more understanding of a particular topic.

The Essex-based **Chelmsford Amateur Radio Society** (CARS) have produced a set of PowerPoint slides and some other material to support training courses (Fig. 1). I find these slides really useful. The slides can be found at **www.g0mwt.org.uk/training/index.htm**

Construction Project

The construction project for the Intermediate assessment can be quite simple. There are few, if any, guidelines on choosing a suitable project. Some clubs will select a specific project for all candidates to build, whilst others will give candidates a choice of several items. Some clubs will even provide support for any project that candidates choose to build.

To my mind, a project that includes at least one active component – e.g. transistor or integrated circuit (i.c.) besides various passive components (e.g. resistors and capacitors) is a good choice. My preference is for projects that will have a use after the course. The PSK31 data interface that I described in the February 2009 *WN?* column ticks the boxes in my opinion, although some might consider it to be more complex than needed to meet the requirements of the Intermediate syllabus.

The Buildathons

I can certainly recommend the Buildathons that take place at various venues over the year. These have really become popular since **Steve Hartley G0FUW** and his team started to promote them in the UK.

Buildathon Constructors attend a 1-day building workshop, with all constructors being provided with everything they need (tools and a kit of parts) to build a project that will meet the requirements of the Intermediate syllabus.

Several helpers are on hand to lend support and advice at every step (**Fig. 4**). The approach adopted is to build a little and test before moving on the next step. Having seen a Buildathon in action – I can really recommend this approach not only to candidates but also to clubs.

Apart from *PW* and The RSGB's monthly society journal *Radio Communications* (*RadCom*), the London-based **Southgate Amateur Radio Club**'s website at **www.southgatearc.org/** is a particularly good place to keep up-to-date with pending Intermediate courses and Buildathons.

The Exam Itself

The exam itself consists of 45 multiple choice questions, in a style similar to the Foundation exam. For the Intermediate exam 75 minutes are permitted. The pass mark is 27.

My impression is that most Foundation Licence holders who are able to do the slightly more advanced mathematics than the Foundation exam, won't find the Intermediate exam too much of a challenge, particularly if they have been active on the air since obtaining their Foundation Licence.

My advice is; read each question carefully and make sure that you understand it before answering it.

Hamtests: Just as with the Foundation exam (and Advanced exam), the *Hamtests* website at **www.hamtests.co.uk/** has a good range of intermediate mock exam questions which potential candidates can use to practice with. This is a good place to get a 'feel' for the level of knowledge needed, and whether you are ready for the exam.

Marked Locally

Intermediate exam papers are marked locally – so you should know whether you have passed within an hour or two of taking the exam (**Fig. 5**). Just as with Foundation exam papers, the Intermediate exam paperwork is then sent to RSGB Headquarters for final vetting before the results being passed to Ofcom.

So, armed with your pass – within a few days you should be able to log on the Ofcom website and obtain your Intermediate Licence!

Practical Wireless On Disk

Throughout this month's *WN?* column I've made reference to the columns over the past four years. However, if you have only recently started reading *PW*, you may not have these issues – but all is not lost! Archived issues of *PW* are now available on disk.

Currently *PW* Archive disks are available for the years 2005 to 2009 and 2010. I can strongly recommend them not only to newcomers but also to long-standing readers. Every page of each issue is included on the disk, together with supplements such as the ever-popular *Datacards* and the *Antennas To Go* supplement from June 2005.

It wasn't until I started to use the disks that I discovered all the benefits. Firstly it's so much easier to find a particular article. Just look in the index and then look in the relevant issue – no need to dig out the paper magazine with the year's index, and then dig out the issue in question. Secondly there is a big saving in shelf space!

The final (and to my mind the most useful and unexpected) benefit is that there's nothing to put back on the shelf when you have finished with an issue, just close the file on your computer. It all makes for a much tidier shack! Hover, I just hope my wife doesn't decide to use the space I've freed up to store her knitting magazines!

Late News – The RSGB QSL Bureau

Some late news next: The RSGB are introducing charges for non-members to receive QSL cards through the RSGB bureau. Non-members wishing to continue to receive cards through the bureau will either need to join the RSGB or pay £11.99 per annum. Reductions are possible for those paying for 2 or 3 years, or paying annually by direct debit.

Both RSGB members and those non-members paying to use the bureau, will receive cards at least once every quarter, provided they lodge envelopes with their QSL sub-manager and there are cards to send. But to send QSL cards through the RSGB bureau you must be a member of RSGB.

See you next time! ●

Tel: 01922 414796

Established 1997

Radioworld communications

34-42 Brook Lane, Great Wyrley,
Walsall, WS6 6BQ
skype: radioworld_uk
E-mail: sales@radioworld.co.uk
Open six days a week - Mon-Fri 9.00am-5.00pm, Sat 9.30am-4.00pm
http://www.radioworld.co.uk

HF/VHF/UHF transceivers

TM-D710E VHF/UHF mobile ... £439.00.
TS-480SAT - HF&6m 100W..... £769.95.
TS-480HX - HF & 6m 200W.... £869.00.
TS-2000 - HF/6/2/70cms ..... £1468.00.
TS-2000X-HF/6/2/70/23cm... £1699.00.
TM-V7E - 2m/70cm's ..... £376.00.
TH-F7E - 2mtrs/70cm's ..... £235.00.
TH-D72E 2/70/GPS ..... £424.95.
TH-K20 2m handheld ..... £119.00.
TH-K40 70cm handheld ..... £119.00.
TM-271E-2m/FM Mobile ..... £165.95.
TM-281E 2m mobile ..... £198.20.
TM-V71E - VHF/UHF ..... £294.00.
IC-7410 HF/6m base ..... £1548.00.
IC-9100 NEW HF/6m base ... £2895.99.
IC-7600 HF 6m transceiver....£3189.00.
IC-7700 HF & 6m Base ..... £5995.00.
IC-7800-2 HF/50MHz 200W.....£8875.00.
IC-7200 HF+6m 100w .....£799.00.
IC-7000 - HF/6m/2m/70cm's.....£1149.00.
IC-718 - HF 100W.....£569.00.
IC-E91 - Top Flight Handheld....£259.95.
ID-31E DStar handheld ..... £349.00.
IC-E2820 Dualband VHF/UHF ....£478.99.
ID-E880 2/70 digital mobile .....£433.00.
IC-E92D D/STAR handy ..... £387.00.
IC-V80E 2M handheld ..... £109.00.
ID-1 mobile TRX 23CM/FM..... £714.00.
IC-T70E 2M/70CM Handy ..... £158.00.
IC-E80D D-Star V/U ..... £320.00.
PW-1 HF Amp 1KW ..... £5055.00.
FT-950 HF Transceiver..... £1264.00.
FTM-10E - VHF/UHF tx/rx ... £319.00.
FT-897D - HF/6m/2m/70cm.. £759.00.
FT-817ND - 1.8-430MHz 5W. £529.95.
FT-857D - HF/6m/2m/70cms £659.95.
FT-7900 mobile VHF/UHF ..... £239.00.
FT-8800E - 2m/70cm mobile. £329.00.
FT-8900 - 10m/6m/2m/70cm. £369.00.
FT-1900 - 2m 55W mobile.. £133.00.
FT-2900M - 2m 75W mobile.. £138.95.
VX-7R - 6m/2m/70cm handy. £299.95.
VX-6E - 2m/70cm handheld.. £249.95.
VX-3E - 2m/70cm handheld.. £169.00.
FT-60E - 2m/70cm FM 5W .. £129.95.
VX-8DE handy with APRS ..... £369.00.
FT-450D transceiver ..... £789.95.
FT-2000 HF/6M Base 100W... £2119.00.
FT-2000D 200W HF/6M Base £2599.00.
FT-DX5000 ..... £4339.95.
FT-DX5000D ..... £4892.00.
FT-DX5000 MP ..... £5400.00.

Transceiver accessories

Yaesu SM-5000 monitor ..... £449.95.
Yaesu SP-2000 speaker ..... £159.95.
Yaesu MD-200 mic ..... £234.95.
Yaesu MD-100 mic ..... £119.00.
Yaesu FC-30 ext. ATU ..... £224.95.
Yaesu FP-30 PSU..... £219.95.
Icom SP-20 speaker ..... £179.95.
Icom SP-21 speaker ..... £98.99.
Icom PS-126 psu ..... £449.95.
Icom RMK-7000 kit ..... £57.50.
Icom OPC-581 ..... £34.49.
Icom OPC-589 ..... £21.50.
Kenwood SP-23 speaker ..... £71.95.
Kenwood HS-5 headphones ..... £55.99.
Kenwood MC-90 mic ..... £191.99.
Kenwood MC-60 mic ..... £120.00.
Kenwood MC-43 mic ..... £20.99.

MFJ Enterprises

MFJ-989D 1500W Auto ATU..£399.95
MFJ-986C 3Kw HF.....£359.95
MFJ-993B dual 300/150 Auto £254.95
MFJ-991B Auto Intellituner....£214.95
MFJ-976 1500w ATU £479.95
MFJ-969 300w Rollercoaster £219.95
MFJ-962D 1.5Kw Inductor.....£299.95
MFJ-949E 300w W/D-Load....£184.95
MFJ-948 300w HF.....£164.95
MFJ-945E Mobile £134.95
MFJ-941E 300w £144.95
MFJ-934 ATU+AG £204.95
MFJ-921 2m ATU.....£98.95
MFJ-924 70cms £98.95
MFJ-914 Extender £90.95
MFJ-901B 200w Versa tuner....£111.95
MFJ-1026 Active Antenna £204.95
MFJ-267 Dummy Load / SWR - £162.95
MFJ-802 Field Strength Mtr..... £55.95
MFJ-249B 1.8-170 Dig.....£264.95
MFJ-259B 1.8-170 .....£269.95
MFJ-269 HF/VHF/UHF £369.95
MFJ-201 grid dip meter.....£154.95
MFJ-269PRO 1.8-170&430-520 £389.95
MFJ-250 1kw Oil filled £78.95
MFJ-250X 1KW without oil £56.95
MFJ-260C 300w PL259 .....£45.95
MFJ-260CN 300w N-Type £54.95
MFJ-264 1.5kw PL259 .....£77.95
MFJ-264N 1.5kw N-Type £84.95
MFJ-267 Load/VSWR £162.95

RigExpert ®

AA-54 HF ANALYZER ..... £269.96.
RigExpert AA-230 ..... £429.95.
AA-230PRO ..... £479.95.
RigExpert AA-30 - HF Analyzer .. £229.95.
RigExpert AA-520 Analyzer .....£479.95.
RigExpert Plus .....£199.95.
RigExpert Standard .....£159.95.

Microphones & Headsets

PR-781-PTT deluxe base mic...£169.96.
Pro-Set-Plus Headset .....£224.95.
Pro-Set-Plus-IC Headset .....£239.95.
Pro-Set-IC Headset .....£159.95.
Goldline GM-4 Stick mic .....£149.95.
Goldline GM-5.1 Stick mic .....£149.95.
HM-4 Handy mic w/HC-4 insert £82.95.
HM-IC Handy mic + Icom insert £99.95.
HM-10-4 Hand mic + HC-4 .....£79.95.
PR-20 hand microphone £129.95
PR-30 hand microphone ..... £229.95.
PR-40 hand microphone ..... £269.95.
Pro-Set-Elite with HC6 ..... £179.95.
Pro-Set-Elite-IC with HC-6 ..... £189.95.
Pro-Set-6 with HC-6 ..... £149.95.
HM-Pro mic ..... £99.95.
Pro-Set Media ..... £129.95.
AD-1 adapters from ..... £22.95.
CC-1XLR leads from ..... £37.96.

COMET

CHA250B broadband vertical, covers 80-6m, no gaps ..... £349.95.
GP-6 High Gain Dualband CoLinear 2/70cm Max 200w ..... £119.95.
GP-15 Tri-Band 2/6/70 Fibreglass Antenna. Max 150w ..... £129.95.
GP-9 highgain dualband co-linear...£169.95.

Tigertronics

SL-USB-13PDI 13pin DIN Icom £94.95
SL-USB-13PDK 13pin Kenwood £94.95
SL-USB-4R 4pin round mic cable £89.95
SL-USB-5PD 5 pin round mic cable £89.95
SL-USB-6PMD 6pin m/DINYaesu £94.95
SL-USB-8PD 8pin m/ DIN £89.95

WATSON

POWER-MITE NF 22A peak £79.95
W-25AM 25A Supply £119.95
W-10AM 10A Supply £64.95
W-5A 5A Supply £33.95
W-10SM 10A Supply £59.95
W-30 2/70 Base £49.95
W-50 2/70 Base £59.95
W-300 2/70 Base £89.95
W-2000 6/2/70 Base £89.95

butternut

Butternut HF-2V 40/80m £299.95
Butternut HF-6V 80-10m £399.95
Butternut HF-9V 80-6m £459.95
Butternut HF-5B 20-10m £469.95
STR-II radial kit £159.95

HUSTLER

Hustler 5-BTV £229.95
Hustler 4-BTV £189.95
Hustler 6-BTV £269.95
Hustler RM-10 10m resonator £21.99
MO-1 mobile mast section £39.95
MO-2 mobile mast section £39.95
MO-3 mobile mast section £29.95
MO-4 mobile mast section £27.95

PALSTAR

AT-1500DT 1500w ATU £534.95
AT-2K 2000W ATU £594.95
AT- Auto 1500 Watt ATU £1129.95
AT5K 3500 Watt ATU £999.95
DL-5K 5kw dummy load £424.95

Miracle Antenna

Miracle Whip QRP allband £129.95
Miracle Ducker IL ATU..... £139.95
Miracle Ducker PL for HF £139.95
Miracle Ducker TL HF/VHF/UHF ... £139.95

AT-1000 Pro

1KW Auto ATU - 1.8-54MHz - 1-8 secs Tune - Approx SWR Rating of 10:1

£499.00

Z-100 Plus

125w Auto ATU - 1.8-54MHz - 0.1 - 6 secs

£134.99

DM-7800

Made exclusively for the IC-7800. This will give you a true analogue meter

£136.00

AT-100 Pro II ..... £184.95.
AT-200Pro ..... £209.95.
AT-897+ ..... £178.00.
KT-100 ..... £173.00.
AT-600Pro ..... £295.00.
YT-450 ..... £224.00.
Z-11ProII ..... £159.00.
YT-100 ..... £177.00.
FT-Meter ..... £44.00.

Z-817 ATU

ATU specific for FT-817 Uses CAT / ACC port Powered by batteries 0.1 - 20w : 1.8 - 54MHz

£119.00

LDG IT-100

Icom ATU 125w Auto ATU - 1.8-54MHz 0.1-6 seconds Tune

£158.95

LDG RBA 1:1&4:1

1:1 or 4:1 Balun - Covers 1.8 - 30Mhz Power rating 200w

£35.00

Radioworld - the longest-running LDG dealer in the UK!!

TONNA

Tonna 220505 6m 5el ..... £118.95.
Tonna 220809 2m 9el ..... £79.95.
Tonna 220811 2m 11el ..... £114.95.
Tonna 220817 2m 17el ..... £148.95.
Tonna 220909 70cm 9el ..... £74.95.
Tonna 220919 70cm 19el ..... £94.95.
Tonna 220921 70cm 21el .....£119.95.
Tonna 220635 23cm 35el ..... £93.95.
Tonna 220655 23cm 55el ..... £119.05.
Tonna 220745 13cm 25el ..... £102.95.

WEST MOUNTAIN RADIO

RIGblaster Pro ..... £299.95.
RIGblaster Plus USB ..... £159.95.
M4-CBL RG45/4Pin lead ..... £18.95.
RIGRunner 10way 12v distribution board £159.95.
CBA-III Computerised Battery Analyser ... £149.95.
CBA/AMP/240 CBA-II Amplifier ..... £719.95.
PG-40S 12V Backup Power System ..... £144.95.

DIAMOND ANTENNA

HF10FX 10m Mobile ..... £49.95.
HF15FX 15m Mobile ..... £49.95.
HF20FX 20m Mobile ..... £49.95.
HF40FX 40m Mobile ..... £49.95.
HF80FX 80m Mobile ..... £52.95.
CR8900 10/6/2/70 ..... £119.95.
CP6 Base 6m-80m ..... £369.00.
X50 Base 2/70 ..... £69.95.
X200N Base 2/70 ..... £99.95.
X300 Base 2/70 ..... £109.95.
X7000 Base 2/70/23 ..... £199.00.

AMERITRON

...The High Power Specialist

AL-811XCE 10-160m 600w £899.95
AL-811HXCE 10-160m 800w £1099.95
ALS600X Solid State 10-160m 600w £1499.95
AL-1500XCE 10-160m 1.5KW £3799.95
AL-1200XCE 10-160m 1.5KW £3499.95
AL-82XCE 10-160m 1.5KW £2749.95

RADIO WORKS

CW-160 160-10m (252ft) £165.95
CWS-160 160-10m (133ft) ... £159.95
CW-80 80-10m (133ft) £134.95
CWS-80 80-10m (66ft) £152.95
CW-40 40-10m (66ft) £121.95
CW-40+ 40-10m (66ft) £142.95
CW-20 20-10m (34ft) £104.95
G5RV+ 80-10m £82.95
G5RV-XF Fullsize £71.95
G5RV-XH Halfsize £56.95

SGC

SGC-230 HF..... £529.95
SGC-500 HF £1399.95
SGC-235 HF-500w £1199.95
SGC-237 HF+6m £309.95
SGC-237 Porta £559.95
SGC-237 PCB £349.95
SGC-239 HF..... £199.95
MAC-200 ..... £279.95

Rotators

G-2800SDX Rotator ..... £897.95.
G-450C Rotator ..... £345.00.
G-550C Rotator ..... £255.00.
G-650C Rotator ..... £395.00.
G-1000DXC Rotator ..... £499.95.
G-5500C Rotator ..... £649.95.
AR-303X Hy-Gain rotator.....£99.95.

Feeders & Wire

RG-213 Military Spec High grade 50 Ohm coaxial Cable

£139.95 per 100m Drum

RG58U ..... £0.70 per Metre
RG8 Super ..... £1.00 per Metre
RG213 ..... £1.36 per Metre
W103 Westflex ..... £2.00 per Metre
RG-8 100 Metre Drum £70.00
Flexweave 50m Flex £30.95
Flexweave-PVC-50 50m £40.95
Enamelled Copper Wire 50m . £17.95
Hard Drawn Copper Wire 50m £24.95

Rotator Cable: - Color coded Cable
3 core ..... £0.80 per Metre
7 core ..... £1.30 per Metre
8 core ..... £2.00 per Metre

DC Connecting Cable
10A DC Cable ..... £0.50 per Metre
15A DC Cable ..... £0.65 per Metre
25A DC Cable ..... £0.90 per Metre
40A DC Cable ..... £1.35 per Metre

FlexRadio Systems

Software Defined Radios

FLEX-1500 SDR Transceiver... £579.95
FLEX-3000 SDR £1299.95
FLEX-5000A Transceiver £2495.95
FLEX-5000A-ATU £2795.95

Telecom linear amplifiers

Self-contained, solid state

23CM150 23cms 150W .....£2099.
2M-HK 2m 500W .....£2099.
64-HK 6m&4m dualband 500W. £2099.
70CM-HK 70cms 500W .....£2099.

Cushcraft

X-7 - 20/15/10 7EL Yagi. .... £899.95.
A3S - 20/15/10 3EL Yagi .....£629.95.
A4S - 20/15/10 Yagi .....£699.95.
A3WS - 12/17 3EL Yagi .....£499.95.
ASL-2010 13-32MHz Log ..£999.95.
MA5B - Mini Beam .....£529.95.
D-3 - 20/15/10 Dipole .....£359.95.
R-6000 - 6Band Vertical ... £449.95.
R-8 - 40-6m Verical .....£559.95.
MA5VA - 10/20m Vertical ....£309.95.

Second Hand List

Quality Used Equipment, 3 Month Warranty. Best prices paid for your used equipment.

Accessories
MFJ-704 Low pass filter £39.95
Yaesu FRV-8800 RX VHF Converter £99.00
Alinco DJ-X3 £89.00
WELZ DL-600 Dummy Load £68.95
50-Watt Dummy Load £56.95
TS-711/811PX Interface £59.95
Kenwood YK-88S SSB Filter £49.00
Snooper S5-R Safety Alert System £119.95
MFJ-461 Pocket Morse Reader £75.00
Yaesu FV-101DM Digital Memory VFO £199.00
ICOM UT-106 DSP Unit £69.00
DRU-2 Digital recording unit. £80.00
MFJ-1817 2m/70cm Telescopic Rubber Duck £22.00
CSC-83 Soft Carry Case for FT-817ND £15.00
Icom PS-85 Icom 20A 13.8V Switch Mode £159.00
YSK-7800 Seperation lead for FT-7800 £30.00
Kenwood YK-455C-1 CW filter for use with TS-140 £49.00
Kenwood FM-430 - fm unit for TS-430 / TS-430S £59.00
Kenwood YK-88CN CW Filter £50.00
SC-45 Soft Case for TH-G71E £10.00
CASE FOR KENWOOD TH-47 £10.00
010-10117-02 Garmin GPSCarry Case £5.00
HS-800/PRO High Sierra Standard Control Box £75.00
MFJ-462B Decoder £139.00
HMC-3 Vox Headset £20.00
Host Master II £20.00
Eton S-350 Field Radio £65.00
Rigblaster Plus £89.00
CSC-88 Soft Case for VX-7R £10.00
Bremi BRL-5 - 3-way switch with 5Watt dummy load £20
JD Model 151 - TVI Low Pass Filter £10.00
Archer Antenna Discharge Unit £15.00
Yaesu SC-1 Station Console £89.00
Dee Comm Dummy Load £69.00
BRV-1 Mirror Mount £10.00
Yaesu CSC-92 soft case with integral belt clip VX-3E £10.00
60W Max Dummy Load £35.00
300W Max Dummy Load £79.00
Drake DL-300 Dummy Load £50.00
MTU-30/20 RF u-tuning Unit C £500.00
MTU-80/40 RF u-tuning Unit B £500.00
KIF700 Keyboard & Interface £69.00
Diamond DL1000 Load £99.00
Philips HC8349 Wireless Rechargeable Headphones £25.00
MAG-BM145PL £14.95
MFJ-332B BNC Magmount £15.95
FM-747 for FT840, FT-747 etc. £69.00
FL-53A 455kHz Filter CW narrow 250Hz £125.00
SU-1 Barometric Pressure Sensor Unit for VX-7R £29.95
Inrad Pre-amp board to fit FT-1000mp £57.50
CSC-71 Soft Case for VX-1R £8.00
Dust Cover £20.00
TI-30D 15-Watt Load £20.00
Hansen DL-20 15-Watt Load £20.00
FM Wide Modification Kit for FRG-8800 £60.00
AirNav RadarBox-Pro 2010 £329.00
Heathkit IM-5217 Meter £30.00
ESC-44 Soft Case for DJ-X30 £10.00
WRP-1300 Pre-Amp £29.95
MMB-M11 Multi-angle mounting bracket £17.00
BC-139 Desktop Fast Charger incl. BC-06 for IC-E90 £50.00
LC-163 Soft Leatherette Carry Case for IC-E91 £12.00
Icom EX-766 interface unit for IC-901 £129.00
ADMS-1G Programming Software for VX-7R £30.00
ADR ARD-2 ACARS/Navtex Decoder £299.00
Yaesu YH-55 Headphones £34.95
CD-15A Desktop Rapid Charger for VX-7R £15.00
Yaesu SP-5 speaker £119.00
WinRadio Trunking option software £49.00
FV-102DM digital Memory VFO £179.00
Roller Coaster Inductor (Surplus) £99.00
Differential Capacitor (Unused) £89.00
520pF Medium Spaced Variable Capacitor £59.00
Large 1-Pole 9-Way Switch £59.00
Large 1-Pole 9-Way Shorting Switch £59.00
18-Pole 2-Way Ceramic Switch £35.00
TEN-TEC 307B external speaker £99.00
Kenwood DM-81 Dip-Meter £89.00
MFJ-264 1.5KW Dry Dummy Load £59.00
MFJ-655B - Deluxe Voice Equaliser & Conditioner £175.00
Remote Keypad for Lowe HF-150 £39.00
VGS-1 Voice Guide & Storage Unit for TS-480 £69.00
DL-150 50/150 Watt Dummy Load £49.00
UT-123 D-star GPS module for IC-E2820 £199.00
Heathkit GD-U1 GDO (without coils) £45.00
Motorola SWLN4183A Dummy Load £49.00
ADMS-1E £20.00
Homemade Dummy Load £5.00
Kenwood VOX-3 (without leads) £20.00
Yaesu VAC-400 Rapid Charger £30.00
AOR ARD9000 Digital Voice Interface £129.00
SEM Marine (156Mhz) Pre-Amp £20.00
Winradio BNC Magmount £12.00

Amplifiers
Kenwood TL-922 HF Linear Amplifier £999.00
Kenwood VB-2200GX 2M Amplifier £79.00
Heatherlite Explorer 1000 1KW HF Amplifier £799.00
Heatherlite Hunter HF Linear Amplifier £599.00
MML 144/30-LS 2m 30W Amplifier £89.00
Microwave Modules MML144/100-S £99.00
Microwave Modules MML144/25 £69.00

Analyzers + SWR meters
Daiwa CN-101 1.8-150MHz SWR Meter 15w-1.5kw £55.00
Harrier SWR-1 SWR & Power Meter £15.00
PALSTAR PM2000AM Mobile Watt Meter £120.00
Daiwa CN-520 1.8~60MHz SWR Meter £45.00
PALSTAR PM2000A Wattmeter £120.00
Welz SP-45M 2m & 70cm SWR/Power Meter £59.00

Antenna
MFJ-914 £65.00
EZ-TUNE-7000IBOX High Sierra Control box for £85.00
Arno 40m EH Antenna £99.95
Telescopic 4m Band Whip £15.00
2m Telescopic Antenna £10.00
CWS-80 Radio Works Caro-lina Windom 80 Special £80.00
A3-WS Cushcraft 3-Element Tribander (WARC) £349.00
MFJ-1798 10-band Vertical all band Antenna £229.00
BWD-90 Barker & Williamson Commercial Antenna £275.00
Coax/Wire to RCA Phono Adaptor £5.00
MFJ-1840T Yaesu FT-817 Telescopic Antenna 40M £22.00
MFJ-1022 0.3 - 200 MHz SWL Active Antenna £50.00

Antenna Tuners
LDG Z-11 QRP ATU £99.00
Kenwood AT-230 ATU £199.00
SGC MAC-200 Antenna Controller Auto-Tuner £219.00
Kenwood AT-200 antenna tuner £139.00
Icom AT-150 Auto antenna tuning unit £169.00
Tokyo Hy Power HC-400L £169.00
LDG Z-817 ATU £99.00
Vectronics VC-3000 Tuner with LED PEP Meter £199.00
MFJ-924 MFJ UHF ATU £85.00
MFJ-994 Automatic ATU 1.8-30MHz 600W SSB £255.00
VC-300M Vectronics 1.8-30MHz Mobile ATU £110.99
Palstar AT1500C ATU £399.00
Nevada TM-1000 ATU £179.00
Howes CTU8 Receive Only ATU £30.00

Books
Air Band Radio Handbook 8th Edition £5.00
Air Band Radio Guide 6th Edition £5.00
Airwaves 2007 £8.00
ARRL Handbook 1985 £10.00
Usborne Audio and Radio Book £5.00
BBC Radio Transmitting Stations 1993-94 £5.00
BBC Radio Transmitting Stations Spring 1990 £5.00
Beginners Guide To Packet Radio £5.00
Flight Routings 2001 £5.00
Flight Routings 1992 £5.00
International FM Guide £2.00
Intermediate Licence Book £4.00
IBA Guide to TV and Radio 1990 £2.00
Microcomputers in Amateur Radio £5.00
PM3055-57 Oscilloscope Manual £5.00
Packet Radio Primer £5.00
Radio Amateur Operator's Handbook £5.00
"Radio" by Tucker & Wilkinson Vol-2 £5.00
"Radio" by Tucker & Wilkinson Vol-3 £5.00
Radio Servicing Vol-4 £5.00
RAE Revision Notes £5.00
R&EW Amateurs Handbook Vol 1, 2 & 3 £4.00
RSGB IOTA Directory 2000 £5.00
UK Scanning Directory 4th Edition £5.00
UK Scanning Directory 2nd Edition £5.00
"Calling Shanwick" £5.00
"49 The Thyristor Book" £5.00
UK Scanning Directory 6th Edition £5.00
USA Radio Amateur Callbook 1986 £5.00
VHF Communications Magazine 1975 £5.00
WRTV Handbook 36th Edition £5.00
WRTV Handbook 1987 Edition £5.00
WRTV Handbook 40th Anniversary Edition £5.00
RSGB Amateur Radio Operating Manual £5.00
Electronic Service Manual £20.00
RSGB 1994 Call Book £10.00
International Listings 1994 Call Book £10.00
International Listings 1991 Call Book £10.00
Guide To Broadcasting Stations 1957-58 £10.00

CB
President Lincoln CB Transceiver £249.00
Lodestar SWR-2T SWR Meter £15.00
Emperor Ninja CB £69.00
Lodestar SWR-2S SWR Meter £15.00
Super Star 3900 £110.00
CB SWR Meter £15.00
DX-5000 K-PO - AM/FM/SSB 10/11 Meter Mobile £170.00
Midland 77-104 FM CB Radio £35.00

DAB Radio
Gemini 46 Digital Radio £39.00
Tevion DAB & FM Radio £30.00

Data Comms
Kamtronics KAM Multimode TNC £129.00
ICS AMT-2 Terminal Unit £49.00
Kantronics KPC-9612 £200.00
USB 56K MODEM £10.00
MFJ-1278b DSP Multimode Data Controller £249.00
DC/Cig adapter/chargers
NC-386 Ni-Cd Battery Charger £20.00

Filters (various)
Bremi BRL-10 - TVI Low Pass filter 27MHz £10.00
AEC LP-30 - Low Pass Filter £15.00
Packer TVI Filter £9.95

Frequency Counter/finder
SCOUT Optoelectronics Frequency Counter/Finder £175.00
Watson FC-128 Frequency Counter £69.00
Maplin MF100 Multifunction Counter £59.00
Marconi Instruments 2431A Counter £79.00
Blackstar Meteor 600 Counter £79.00

Handheld Transceivers
Yaesu VX-7R Silver Tri-band Handy £259.00
Icom IC-T8E £159.00
Icom IC-T7E Dual Band Handy £119.00
Yaesu VX-7R black Tri-Band Handy £259.00
Kenwood TH-F7E Dualband Handheld Transceiver £179.00
Yaesu VX-1R Dual Band Handy £85.00
Alinco DJ-V17E 2m Handheld £104.95
FDC-450A 70cm Handheld £79.00
Quansheng 70cm Handheld £79.00
Quansheng 2m Handheld £69.00
Kenwood TH-G71E Dualband Handheld £149.00
CSC-90 Soft Case for VX-2E £10.00
FNB-82LI (Spare) 1000mA Lithium-ion Battery pack £18.00
Alinco DJ-S41 UHF Handheld £58.75
Jingtong JT-208 2m Handheld £49.00

HF Transceivers
Kenwood TS-570DG/E HF transceiver £599.00
Kenwood TS-850S /AT £699.00
Icom IC-7400 HF, 6m & 2m Transceiver £899.00
Icom IC-718 HF All Band Transceiver £459.00
Yaesu FT-840 HF Transceiver £379.00
Icom IC-751 HF Transceiver £450.00
IC-756PRO-MKIII Icom HF + 6m Trx £1,575.00
Yaesu FT-2000 100W with internal power supp £1,599.00
Alinco DX-77E HF Transceiver £399.00
Icom IC-746 HF/6m Transceiver £675.00
Yaesu FT-690R II £275.00
HX-240 Tokyo Hy-Power HF transverter 2m in HF out. £149.00
Alinco DX-SR8 HF transceiver HF, 100W all mode £529.00
ICOM MB-117 - Carrying Handle for IC-7200 £10.00
MFJ-9410 10 Meter SSB Adventure Radio £220.00
Icom IC-7000 1.8 - 70cms Mobile Transceiver £899.00

Marine transceivers
XM-DSC VHF Marine Radio £79.00

Mics and Speakers
Kenwood SP-23 Base Speaker £50.00
Kenwood MC-50 Base Mic £60.00
Yaesu MW-1 Remote Control Mic £60.00
Adonis AM-708E £129.00
Yaesu CMP460A Submersible Speaker Mic £29.00
Yaesu MD-100 Desktop Microphone £95.00
SM-20 Deluxe Base Station Desk Mic £114.95
NES-10-2MKII bhi DSP Noise eliminating Speaker £79.00
MFJ-382 Deluxe Amplified ClearTone Speaker £30.00
SMC-34 Speaker/Microphone with Volume Control £21.63
HM-133 Remote Control Microphone for IC-E208 £53.00
MC-90 Desk Mic for DSP £149.00
BHI NES10-2 MK3 DSP Speaker £85.00
EMS-47 Remote Control Hand Speaker/mic direct VFO in £15.00
YM-24A Speaker Microphone £25.00
Heatherlite Mobile Microphone - Yaesu 8-Pin £25.00
Heatherlite Mobile Microphone - Yaesu 7-Pin £25.00
EDS-10 Microphone adaptor cable £5.95
QS-112Y4S Watson Handheld Speaker Mic £10.00
Sharman's DM-300 Speaker Mic (Kenwood) £12.00
HM-131L GS Style Speaker/mic for IC-T3H £20.00
Icom HM-70 Speaker Microphone £20.00
SMC-32 Compact Speaker/Microphone £14.00
Sharman's Speaker Mic (Icom Two Pin) £9.00
RS Dynamic Stick Microphone £39.95
Sharman DM-100 Speaker Microphone £10.00
QS-110Y Speaker / Microphone to fit Yaesu £8.00
Vintage Trix Dynamic Stick Microphone £69.00
Vintage Trix Ribbon Microphone £119.00
Audio-Technica AES400 Microphone £120.00
Tentec 705 base microphone (electret) £79.00
HM-118TN DTMF Hand Microphone for IC-706 £45.00

Morse keys / tutors
Kent Straight Key £70.00
MFJ-418 Pocket Morse Tutor £75.00
NATO Morse Key £199.00
Ex-Army Key with Operators Unit £39.00
MFJ-451X Morse Interface (no keyboard) £85.00
MFJ-26B Soft Leather Case for MFJ-418 £7.50
Kent Keyer £79.00
Icom EX-243 Keyer £59.00
Himound HK-702 £89.00
Himound HK-704 £60.00
HK-708 Hi-Mound Standard Key £59.00
German WWII Morse Key £99.00
Hi-Mound HK-804 High Deluxe Morse Key £149.00

Power supplies
Kenwood PS-31 Power Supply £129.00
PT-1012 Microset 12A 13.5 PSU £109.96
Icom PS-125 £270.00
Kenwood PS-20 - Low power PSU £69.00
Daiwa PS-120MII - 10A power supply £39.00
Self PS-134,DC power supply £20.00
Farnell G-12 £59.00
B.N.O.S 12amp power supply £59.00
W-5A Watson 5A 13.8V fixed power supply unit £27.50
Yaesu FP-8 PSU £69.00
Apollo CB-35 PSU £20.00
Altai RPS-1203 £20.00
Mini Power Supply 500mA £14.95
Drae 24 Amp PSU £99.00
GZV-4000 Diamond 40A Switch Mode £165.00
Yaesu FP-80A DC power supply £69.00
Maplin XM-19V 7~10Amp PSU £25.00
Micronta 12-Amp PSU £35.00
Power-Win PSU for FT-817 £30.00

Receivers
AOR AR-7030 HF receiver £499.00
Realistic DX394 HF Receiver £119.00
Icom IC-R8500 Receiver £1,099.00
R-9914 Roberts Multiband Digital Preset World Radio £85.00
ABM-1-KIT Ramsey Passive Airband Monitor Kit £60.00
Alinco DX-R8E Receiver £449.00
Eton G6 Buzz Aldrin FM/AM/Air/SW radio £75.00
Yaesu FRDX-400 HF Receiver + 6m and 2m £329.00

Scanners
Icom IC-R3 Hand held Scanner £250.00
AOR AR-8000 £189.00
Realistic Pro-2006 Scanner £129.00
GRE PSR-214 FM Base Scanner £89.00
AOR AR-8200 Mk II £199.00
Yupiteru VT-125mk 2 Air Band Scanner £129.00
Radioshack Pro-74 Scanner £89.00
AOR 8200 Mk I £175.00
UBC-785XLT Uniden-Bearcat Base Scanner £189.00
UBC-3500XLT Uniden Bearcat Handheld Scanner £169.00
IC-RX7 - Wideband Handheld Receiver £179.00
PSR-255 GRE Handheld Scanner £50.00
Intek AR-109 is an airband, broadcast, marine and VH £69.00
Realistic Pro-9200 Scanner £59.00
MVT-8000 Scanner £139.00

Separation cables
OPC-587 Separation Cable 5m for IC-706 & IC-703 £29.95

VHF/UHF Transceivers
Icom IC-271E 2m multi mode £299.00
Icom IC-490E 70cms Mobile £250.00
Kenwood TM-271E £165.00
Kenwood TS-790E 2/70 Base £699.00
Yaesu FT-847 HF-6-2-70 Base £899.00
Yaesu FT-790 £139.00
Yaesu FT-1500M £129.00
Icom IC-251E £249.00
Yaesu FT-290MkII 2m Multi-mode transceiver £250.00
Yaesu FT-857D Multi-band Mobile £579.00
Yaesu FT-736R 6m, 2m & 70cm Base £799.00
Yaesu FT-736R 2m/70cm Base Multimode £599.00
Yaesu FTV-901R 2m Transverter £220.00
Kenwood TR-9130 2m Multi-Mode Transceiver £249.00
Yaesu FT-897D Multiband Portable Transceiver £629.00
ICOM IC-2200H 144/146 £189.00
Icom IC-7000 1.8 - 70cms Mobile Transceiver £899.00
The TINY-2 MK-II - With Open Squelch Board £109.00
Yaesu FT-726R Base Transceiver 2m £299.00
ICOM IC-E2820 + UT-123 D-star unit - Package deal £525.00
Kenwood/Trio TR-2300 portapack £119.00
FT-90R - Transceiver 2mtr/70cms. £179.00
DR-635E Alinco 2m/70cm FM Dual Band Mobile £239.00
Alinco DR-620 remote cables £12.00
Icom IC-T81E 50-54 / 144-146 / 430-440 / 1240-1300 £240.00
ICOM IC-E2820 dual-band mobile transceiver £389.00
Kenwood TR-851E 430-440 MHz All-mode £299.00
Yaesu FT-726R Base Transceiver 6m/2m/70cm £529.00
TM-241E 2m FM Mobile £99.00
Tait T163FM 4m PMR Converted £40.00
Virtual Radars
AirNav Radarbox 2009 version £269.00

bhi

ANEM amplified module. .....£127.99.
1042 6-way switch box.....£29.99.
NEDSP-1061-KBD DSP module..£101.95.
NEDSP-1062KBD Noise Module.... £106.95.
NEIM1031 Noise Module.....£142.95.
NES10-2 MK III speaker .....£112.95.
1090 Radiomate Keypad.....£89.95.

bhi

PayPal MasterCard VISA VISA Electron SWITCH SOLO

Stock and prices accurate as of 21/02/2012. E&OE.
For accurate, up-to-date prices please check our website before visiting our shop

http://www.radioworld.co.uk

Tel 01922 414796
Fax 01922 417829
skype radioworld_uk

the new Short Wave Magazine

radiouser

incorporating Radio Active

RADIOUSER MARCH

Available from all good newsagents
Price £3.50

radiouser

see www.radiouser.co.uk

RadioUser is published by: PW Publishing Ltd., Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW.
Tel: 0845 803 1979

Harry Leeming G3LLL's In the Shop
The Cedars, 3a Wilson Grove, Heysham, Morecambe LA3 2PQ
Tel: (07901) 932763 E-mail: G3LLL@talktalk.net

Drivers & Power Amplifiers

Harry Leeming G3LLL says "In the last couple of issues I've looked at neutralisation, so this month I'll concentrate more on the power amplifier and driver stages.

Welcome to *In The Shop* (*ITS*) where I look back at my busy days running Holdings – an Amateur Radio and electronics business in the north west of England. Many interesting faults came my way and by sharing their stories I'm sure my experience can help you when you're fault-finding with older valved and hybrid rigs – especially Yaesu equipment.

The diagram, **Fig. 1**, shows the circuit that was used in the Yaesu FT-101Mk2, FT-101B, and FT-101E. It's quite similar to the circuits used in many different rigs by Yaesu and Trio/Kenwood in the 1980s, except that it uses wide range variable inductor tuning (T101A,T102 and T103) in the driver and receiver radio frequency (r.f.) stages, and not separate coils for each band. (T104, T105 and T106 are switched in on 1.8 and 3.5MHz (160 and 80m) to increase the inductance. The inductor L33 comes into circuit on 7MHz (40m) to stop the set radiating its 6MHz intermediate frequency (i.f.) frequency).

The transmit signal – comprising of a few volts – is applied to pin 2 of V1, and appears very much amplified at pin 7 the anode. On the diagram we can see that that C123 feeds from this pin to the bottom end of T106 and is used to neutralise the 12BY7A driver stage. **Note**: On some circuit diagrams this tiny capacitor is not given a value, but is marked * and by using the asterisk Yaesu mean that its value is chosen to match the driver valve that's fitted (more about this later on).

The signal from the anode of the driver valve is applied to the grids of the power amplifier (p.a.) valves via C13, with C131 being switched in parallel with this on 1.8MHz. In the transmit mode the grids of the p.a. valves are biased to about -55V, the exact voltage being set by the user adjustable bias control to ensure that the total p.a. current shown on the front panel meter is about 60mA.

To ensure a clean output signal the positive peaks of the transmit signal applied to the grids of the p.a. valves should not exceed the bias voltage – if they do the valves will pass pulses of grid current through R8. The resultant voltage pulses are rectified and voltage

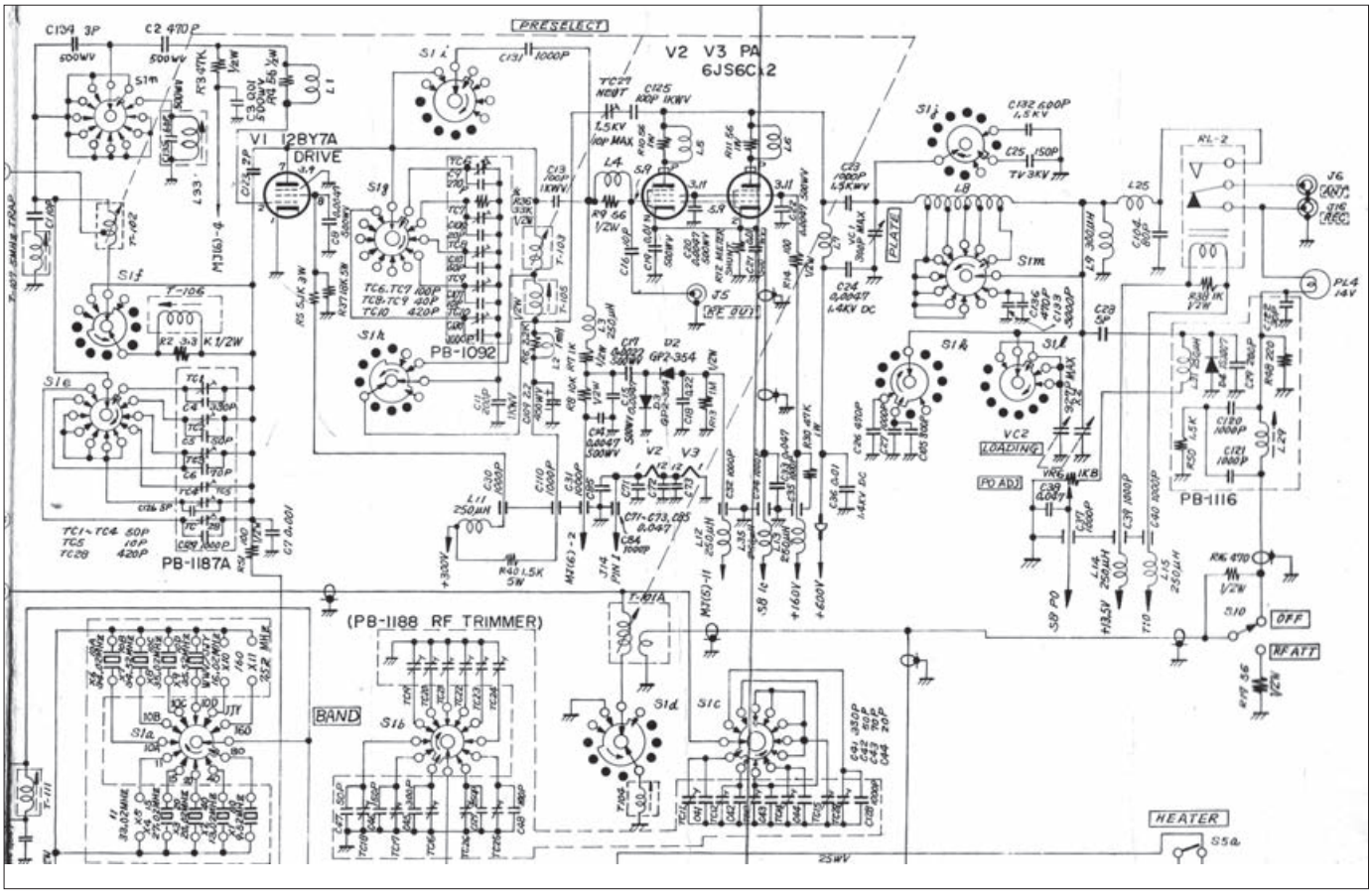


Fig. 1: The p.a. circuit that was used in the Yaesu FT-101Mk2, FT-101B, and FT-101E.

doubled by D2 and D3, and stored in C18. The rectified negative voltage then goes via L12 to the rigs Automatic level control (ALC) system; this turns down the gain of the transmitter to stop the overload, and hopefully reduce the splatter caused by those who will insist on shouting into their microphones.

The output of the p.a. valves is coupled to the p.a. coil L8, which is tuned and matched to 50Ω by VC1 and VC2. Additional fixed capacity and an extra section of VC2 are switched in on the lower frequencies.

Caution – high voltage! The circuit could be dangerous, as the antenna socket is directly connected to the p.a. coil via RL2 the antenna relay. The only item which insulates this from the 600V supply is C23, and if this were to short circuit, 600V would appear on the antenna lead. If the rig was feeding a dipole antenna everything would appear normal, and there would be no indication that the antenna was carrying a potentially fatal voltage.

To protect against the high voltage fault ever occurring, the choke L9 is fitted. This has no effect on the transmitted signal, but should C23 ever fail it should blow a fuse and make the circuit 'fail safe'. The presence of a choke in this position is even more important when a similar circuit is used in a high power linear amplifier, when several thousand volts will be involved.

Note: Never remove this safety component or use the equipment without it being fitted.

New PA Valves?

Many Radio Amateurs – almost instinctively – plug in a pair of new p.a. valves in the case of trouble. My advice is **don't** – you may blow the new valves and are unlikely to solve most problems

If your 100W rig only gives half power on some or all bands, the first thing to check is the amount of drive to the p.a. valves. This is quite simple – switch the panel meter to ALC, speak into the microphone and turn the microphone gain well up. If there is plenty of drive the ALC meter will kick, if it doesn't, then you are short of drive and no amount of messing with the p.a. stage will cure this.

The next move is to check the drive at the grid of the driver valve – pin 2 on a 12BY7A. With the valve removed this should be about 5V maximum on most Yaesu rigs fitted with either a 12BY7A or 6GK6 driver valve. Make this check in the tune mode at maximum drive, or whistle loudly into the microphone, remembering to re-peak the pre-selector to compensate for the lack of

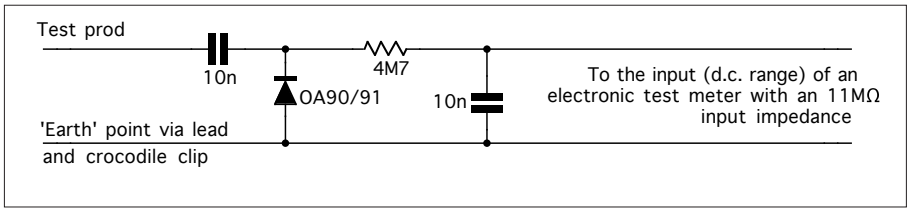


Fig. 2: Circuit of a home-brew diode probe for measuring low to medium r.f. voltages.

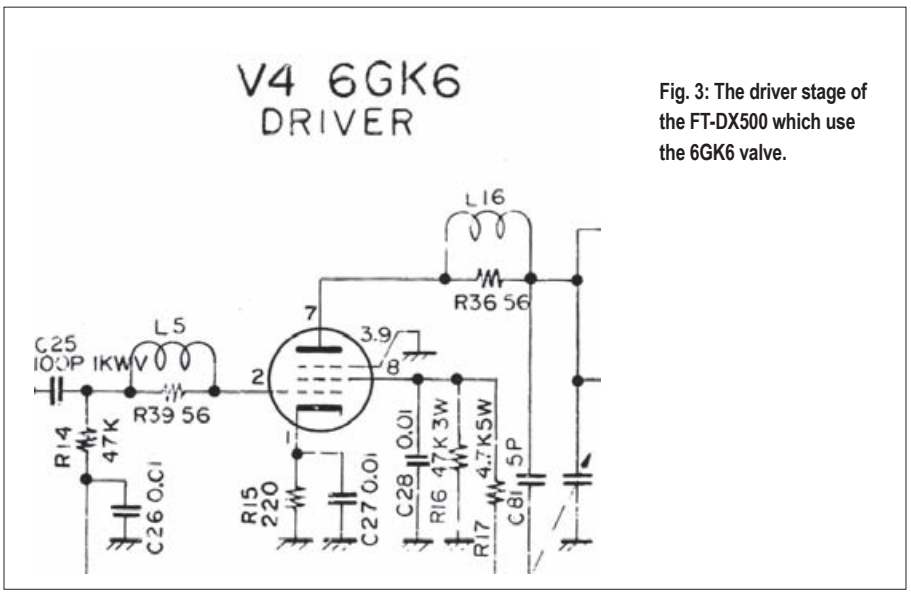


Fig. 3: The driver stage of the FT-DX500 which use the 6GK6 valve.

the valve's input capacity. The drive can be measured with a high impedance wide band oscilloscope, or with a 'home brew' diode probe. See **Fig. 2**.

If you are short of drive here, there's a fault prior to the driver valve, otherwise (if the drive at this point is okay) and yet when you re-fit the valve, you can't get enough drive to activate the ALC, the driver stage is short of gain.

Next, try a new driver valve, but as (once again) Yaesu have used a valve designed for TV use (way outside its intended frequency range) there may be a problem with some makes of valve.

Most 12BY7A valves will work reasonably in the FT-101, but rigs such as the FT-DX401, the FT-DX560 and the FT-DX500 which use the 6GK6, **Fig. 3**, can provide quite 'difficult' operating. The capacitor C81 neutralises the driver valve on the 6GK6, in the same way as C123 does on the FT101. However, 6GK6 valves vary quite considerably between manufacturers and the value of the C81 capacitor has to be altered to suit the make fitted.

Most Yaesu rigs that use the 6GK6 driver were despatched to customers using American General Electric driver valves – but some appear to have left the factory fitted with a Japanese valve. There's no simple way you can glance at one of these rigs to check as to what type of valve should be fitted. And if the 'wrong' one has been fitted by a previous owner, or is substituted, the neutralisation of the driver stage will be incorrect.

The neutralisation of the driver valve doesn't only serve to make the stage stable in the transmit mode, it also effects the valve's loading on the grid input coil, which functions as the r.f. stage tuning coil in the receive mode. If C81 doesn't 'match' the particular valve fitted, either the driver stage will burst into oscillation and send the p.a. current meter to full scale, or the optimum alignment of the driver core setting will be different on transmit to what it is on receive.

The simple answer to aligning Yaesu rigs fitted with the 6GK6, is to replace C81 with a DIY variable capacitor. The way to make this part yourself is as per **Fig. 4**, the capacitor consists of two lengths of stiff insulated wire, each about 1.5in long. These can be twisted and untwisted until a the resulting capacity causes the stage to be stable at the higher frequencies and also for receiver and transmit to peak at the same point on the core of the driver valve grid coil.

The problem is less likely with the FT-101, but can occur occasionally if you happen to have a very 'wrong' 12BY7A, in these cases I have used the same DIY capacitor to replace C123.

If the driver stage is fitted with a known good valve and yet despite an adequate signal to its grid there's still insufficient drive to the p.a. stage you

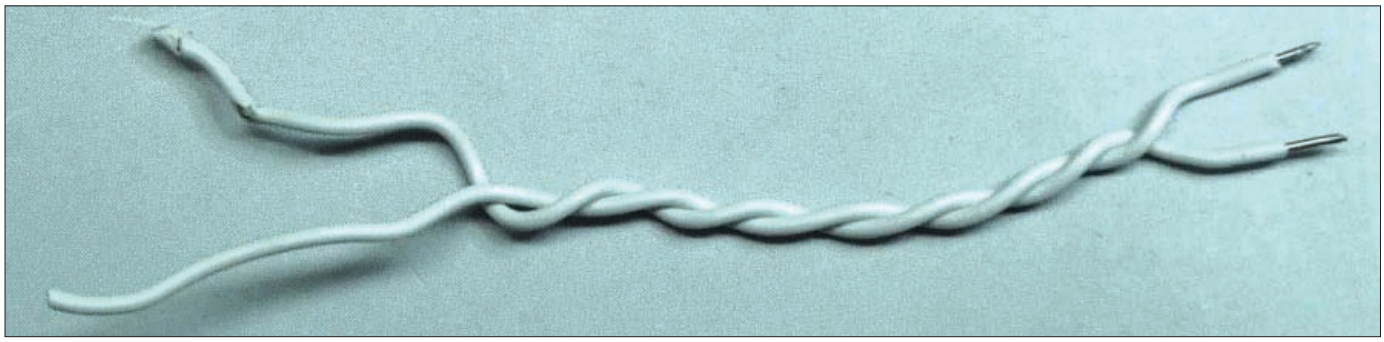


Fig. 4: A simply made low-capacitance 'gimmick' capacitor may be used in place of a fixed low value component.

should (obviously!) check the voltages, as the anode and screen supply resistors do tend to go high in value.

Beyond this it is, of course, possible that the alignment is out. But unless the rig has received the attention of "A little boy with a screwdriver" this will usually not affect all bands.

Two Further Faults

Two further faults in Yaesu driver stages are quite common – but very difficult to trace if you're not aware of them. Low drive on some, or all bands, can be caused by short circuited turns on L2, (or its equivalent L6 in the FT-401 series).

The inductor is often mounted on the 2.2kΩ resistor, or might even be wound on it. The way to test L2 is to temporally replace it with any choke of about the correct value and if this cures the trouble you should then obtain something that looks more like the original.

I've had a few FT-101s brought to me by owners who were suffering from 'interference and spluttering noises' that continued if the antenna was disconnected. The 'interference' was always intermittent and would cease if any attempt was made to trace it. The first time I had this fault it was only after having the rig running in the workshop for a couple of weeks that I eventually traced it to an intermittently leaky C11.

"How much do you charge an hour?" was a question I was often asked. Well in the case of the first time I had tackled the C11 fault – an hourly charge would have cost more than the rig was worth! In cases like this one can only make a reasonable charge for say a couple of hours work and then hope that the fault will occur on someone else's rig. When it does you swap the capacitor, and add a few pounds to the bill for your knowledge (or get *PW* to pay you for writing about it!*). C11 also tends to cause other problems—more about this next month.

There's no problem paying you Harry – but you've just placed another 'Harry's Hint' in the public domain! Editor.

A Little Knowledge?

Here's another story from my 'history' and it involves 'a little knowledge'? I was a 15 year old apprentice and was sent out to help the van driver bring in a console TV. In those days some TVs 'weighed a ton' and so loading them up was definitely not a one-man operation. While we were at the house, we were also asked look at a radio, we tried it and it was absolutely dead – it didn't not even light up.

I was keen to show my technical expertise and so I asked if they were sure that the mains socket was live? There seemed to be some doubt about this and as we had no test equipment, I asked if we could try something else in the socket. Possibly to humour me the lady produced a vacuum cleaner, which I duly plugged in and switched on. There was a slight hum, the room light came on and (open mouthed) we found that the room's light could be switched on and off on using the switch on the handle of the cleaner!

A quick glance at the socket revealed that while it was of the 3-pin variety, it was wired in twin core flex, which seemed to disappear in the direction of a light switch. We were informed that it had been wired by a friend, "Who knew all about electricity" and that the radio had worked perfectly from the socket.

It seemed that the friend had wired the socket in parallel with the contacts on the light switch, and so when the light was off, the radio had been able to draw its 30W consumption through a 150W room lamp without much drop of voltage. However, a vacuum cleaner was another story! Strangely, the customer had never noticed that the radio didn't function when the light was switched on – but apparently they never listened to the radio after dark as then they preferred to watch TV.

Eventually we found a working socket, and as the radio still didn't operate we took it with us when it proved to have a faulty On/Off switch. We also advised the lady that the radio socket was wrongly wired and dangerous and that she should have her electrical wiring checked by a qualified electrician.

Lubricating Small Fans

Finally this month, reader **Matty Cunningham** sent me the following note about lubricating small fans. He wrote, "I've spent many a year employed as a Computer Engineer, and have often had to 're-lubricate' computer fans that had become seized up due to age/lubricant drying up. We used to use a silicon grease that was available in a small plastic tube, with a very thin metal tube – a bit like a syringe – this was very good for lubricating the fan bearings. However I would avoid the use of WD-40 – this may work as a temporary fix, but will evaporate/dry up within a fairly short period of time.

"I would recommend the use of a silicone type grease if available, or something along the lines of the Three-in-One type lubricant as this will stay around the fan and give a much longer service than WD-40.

Another hint for fans (in computers or other enclosures) for getting rid of dust, is to use an air compressor to blow the dust out of the units but disconnect the fan from the board to prevent damage when the fan spins up and acts as a dynamo due to the passing air".

Thanks for the tips Matty! And so that's it for this month – see you next time. ●

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).

Radio Spectrum under threat!

As users of the Spectrum, the issue is simple: PLA devices are causing interference and if we don't do something now we might not have a hobby take part in – it's that serious. We have created a Spectrum Defence Fund – not just to fight the PLT issue but other threats as and when they come up.

The Spectrum Defence fund is made up from donations from individuals and organisations with an interest in protecting the Radio Spectrum from noise, interference, and other issues that may affect licensed Amateur Radio Operation and Short Wave Listening. It is used to cover the cost of challenging the regulators of the spectrum (Ofcom, EU etc) over threats to spectrum noise level.

We are looking to our administration (Ofcom) to protect our interests, which it is their statutory duty. There are other challenges ahead and the fund will be used only to protect the Spectrum when and where we need to do so. This is a long term project and all monies donated will be 'ring fenced' for these actions alone.

If every amateur in the UK pledged £10 to the Spectrum Defence Fund we'd probably have enough to fight the cause and so we need your donations (no matter how small) to help us meet the threat.

Please help amateur radio and the radio spectrum by donating to the fund today!

RSGB

Help us protect the future of Amateur Radio

Please donate online at

www.rsgb.org/defencefund

You can also donate by post by sending a cheque payable to 'The Spectrum Defence Fund' and sending it to; Spectrum Defence, RSGB, 3 Abbey Court, Fraser Road, Priory Business Park, Bedford, MK443WH. The 'Spectrum Defence Fund' is a secure and independently audited fund, the proceeds of which will only be used in defence of the radio spectrum.

Spectrum Defence Fund

Advertising space kindly donated to the Spectrum Defence Fund by PW Publishing

---

NARSA 50th

Don't miss the LARGEST single day show in the U.K.

NORBRECK 50 50

50th NARSA

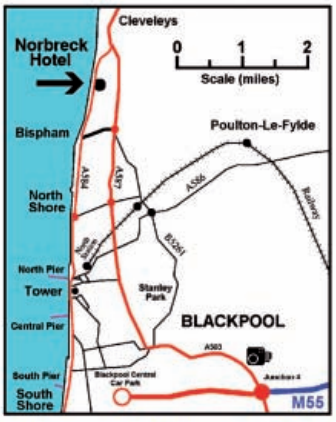
Radio, Electronics and Computing Exhibition

by the Northern Amateur Radio Societies Association at the

NORBRECK CASTLE HOTEL EXHIBITION CENTRE

QUEENS PROMENADE, NORTH SHORE, BLACKPOOL, FY2 9AA

on Sunday, April 15th, 2012 - Doors open at 10:30 a.m.



Why not come to the Norbreck rally in Blackpool! This will be the 50th rally organised by NARSA, an association of over 40 clubs from the North West, and will feature:

- Over 50 traders – radios, aerials, computers and components at bargain prices
- Over 40 club stands – come and find out about YOUR local club
- Bring and Buy stand – organised and run by the East Cheshire Radio Group
- Construction Competition – run by the Warrington ARS (www.warc.org.uk)
- The largest single day rally in the UK – run by NARSA for over 50 years
- RSGB book stand – several local and national officers usually attend the rally
- Radio talk in on S22 – listen in to make sure you get the latest travel information
- Facilities for the disabled – all the stands are on one floor with wheelchair access
- Hot and cold food and drink available in the hotel at reasonable prices
- Morse Tests – more info on the Region 3 Website – www.rsgb-region-3.org.uk
- For the latest information on the rally visit the NARSA website – www.narsa.org.uk

Admission £5 (under 14's free) by exhibition plan - Exhibition Manager: Dave Wilson, M0OBW, 01270 761608

Carl Mason GW0VSW's HF Highlights
2 Golwg-y-Bryn, Woodland Road, Skewen, Neath, Port Talbot SA10 6SP
Tel: (01792) 380822 E-mail: gw0vsw@btinternet.com

Special Diamond Jubilee & Olympic Callsign News!

This time Carl Mason GW0VSW has news of special callsigns available for Her Majesty The Queen's Diamond Jubilee and the Olympics. All information, reports and photos to Carl by the 15th of each month please!

Welcome to *HF Highlights* (*HFH*) and I'm beginning with news of some Special callsigns that we will be able to use shortly. The Radio Society of Great Britain (RSGB) and Ofcom have reached agreement for the 'optional' use of special callsigns for the Queen's Diamond Jubilee and the Olympic Games and Paralympic Games all UK Amateur Radio stations will have the option to apply for a variation to their licence and use a special prefix. The prefix for the Queens Diamond Jubilee will be for a five week period and will add or substitute the letter 'Q' in place of the Regional identifier in your callsign.

A similar option will be available for the Olympic Games and Paralympic Games but this time for a seven week period using the letter 'O'. Both prefix changes will also be available to Amateur Club licences and furthermore, calls in the series GB2012aaa will be available for Special Event Stations that relate to the Olympic Games.

All Notice of Variations will be available to holders of the Amateur Foundation, Intermediate and Full Licences together with holders of a Full Club, Full Reciprocal and Full Temporary Licence.

For the Special prefix to celebrate the Queen's Diamond Jubilee which runs from 0000UTC May 5th to 2359UTC June 10th 2012 and to conform to the requirements of the Wireless Telegraphy Act 2006, each licensee must obtain a NOV which can be done online. The callsign will change with the letter **'Q'** added to the call or replacing the regional identifier e.g. M3aaa becomes MQ3aaa, G3aaa - GQ3aaa, GM3aaa - GQ3aaa, 2E0aaa - 2Q0aaa, 2M0aaa - 2Q0aaa and GX3aaa - GQ3aaa.

With the prefix to celebrate the London 2012 Olympics and Paralympic Games which runs from 0000UTC July 21st to 2359UTC September 9th 2012. Once again a NOV must be obtained but this time the letter **'O'** will be added to the callsign or replace the regional identifier. For example M3aaa becomes MO3aaa, G3aaa - GO3aaa, GM3aaa-GO3aaa, 2E0aaa - 2O0aaa (Two Oscar zero aaa), 2M0aaa - 2O0aaa (Two Oscar zero aaa) and GX3aaa - GO3aaa.

I'm sure there will be a large number of you that will be applying to use the special prefixes and no doubt enjoy the interest from other Radio Amateurs from around the world who wish to work you. Have fun and let us no how you get on!

Fig. 1: A young Ron Hill operating the AR88 during his days in the Pacific ocean islands.

Bob Taylor G1WEX

I had an interesting E-mail from **Bob Taylor G1WEX in** Oldbury, West Midlands which I felt was topical and might generate a few ideas or comments from you. Bob said "I'm a member on a on-line Forum dedicated to radio related matters and also one of its moderators. The group **www.charlietango.co.uk** offers advice and information to **al**l radio users. It has come to our attention a few times now that one of the first 'complaints' M3/M6 callsign holders mention is the poor treatment they get on the h.f. bands by some of the 'older' operators.

"I must say at this point that it is very easy to generalise and that not all M3/M6s complain and that not all older or experienced operators give them a hard time! However, a lot of debate about the current licence system has taken place and it become clear that it is considered a 'two–fold' problem. I believe at Foundation level you get a licence but it teaches you very little about Amateur Radio in the real world. The new licence holder will almost certainly go straight

Fig. 2: Kiritimati, or Christmas Island during the 'Cold-war' period.

Fig. 3: A Johnson Viking Ranger rig.

Fig. 4: Still a good radio, in spite of it's weight – the war-time vintage AR88 receiver.

Fig. 5: Considered top of the range in its day and a joy to use – the Collins 75S1 set.

onto the h.f. bands and not the higher bands as in days past, where any 'mistakes' would only be heard 'locally'.

"Also, their h.f. activity will almost certainly be on the 14MHz 'DX' band where it's fair to say that many operators are very keen DXers which makes the band very competitive and at times almost hostile. This is fine if you know what you are doing but makes you easy prey if you don't! I put forward an idea via the Charlie Tango forum to have a 'safe working environment' which would enable a new licence holder to have their first QSO on the h.f. bands without fear or ridicule during one of the on-air nets our group organises.

"Many of the members have come from a CB radio background so some adjustment in their approach and operating technique is sometimes needed. If we can do this in a constructive way and make the early days of Amateur Radio enjoyable then they might just stick with the hobby and progress to a full licence. The CT nets are normally held on the top end of 7MHz and are well supported.

"Any M3/M6 who wishes to join in can do so knowing that the only advice they will get will be friendly. Of course, anyone is welcome to call in and say hello and we would love them to do so. Full details, time and frequency are announced on the day of the net via the CT site and it is also hoped that a Club Call will be issued shortly to enable finding the net a bit easier".

Thanks for your E-mail Bob! Well I'm certain that many of you will have experienced what Bob describes or have views on the situation. If you have any comments – then please let me know!

Christmas Island

You may remember in the February issue of *PW* I mentioned Kiritimati or Christmas Island OC-024, a raised coral atoll in the Pacific Ocean and that was used during the Cold War when nuclear tests were conducted in the region. Well, **Ron Hill G4DVF** from Ramsgate wrote in to say he was actually stationed on the Island with the RAF in 1962 working in the W/T Signals Office and also operated as **VR3L (Fig. 1)**. Ron said "The club there had a 30ft tower made up of three telegraph poles that were placed in holes drilled out by Engineers on the Island (**Fig. 2**).

"When they had bored a hole deep enough in the coral they went to remove it and the bit got stuck and when it was finally removed the hole quickly filled with sea water. When the pole was finally erected it had on it a TA-33 beam. Unfortunately, the coaxial cable used to feed it didn't last long as it rotted very quickly in the heat and humidity – so dipoles were often used instead though these were constructed and and replaced on a regular basis.

"The club stations equipment included a Johnson Viking Ranger and AR88 receiver using a.m. most of the time. The Americans began operating around the same time running Collins 'S' line transmitters at 1kW which obliterated most transmissions on the island until it was pointed out to them that their licence only allowed for 50W!

"Incidentally, E. F. Johnson Technologies as it was known then was the two-way radio manufacturer founded by its namesake Edgar. F. Johnson, in Waseca, Minnesota, USA in 1923. The company began as a mail order business selling radio transmitting parts to Radio Amateurs and early radio broadcasters. During the Second World War the company devoted 100% of production to defence needs.

"After the war the company introduced its line of Amateur equipment that included the Pacemaker, Ranger, Viking (**Fig. 3**) and Valiant transmitters. The AR-88 (**Fig .4**) was one of RCA's most famous communications receivers. It provided top performance and high reliability in service as a surveillance and intercept receiver during the Second World War and later as a 'workhorse' for the Radiomarine Corporation of America coastal stations.

"Most of the early AR-88 production was sent to Great Britain or Russia during Second World War through Lend-Lease agreements and this accounts for the scarcity of the early versions of the receiver in the USA. The Collins S-Line replaced the A-Line Golddust Twins, the 75A-4 and KWS-1 in 1958 with two new models, the 75S-1 (**Fig. 5**) and 32S-1. Art Collins was inspired by the look of

Fig. 6: A Papua New Guinea QSL, P29FR,who was worked by Peter ZL4TE in Cambridge, New Zealand.

Fig. 7: The JH7VHZ QSL to Dennis Upton VE3UTN, who was busy from his Kitchener, Ontario QTH in Canada.

his Leica camera and wanted the S-Line front panel backgrounds to have a similar leather-like finish.

"The visually pleasing aesthetics were combined with a simplified control layout and a sloping cabinet design that made the S-Line very easy to use and made them an almost instant success".

Ron continued "We often saw the fish you mentioned in the article swimming close to shore and they were often caught by the local fishermen who walked along the shore dragging just a line and hook while their children followed close behind collecting the catch".

Thanks for your fascinating letter Ron! If any of you operated from Christmas Island during this period it would be interesting to hear of your experiences.

Your Reports

There's just enough space for your reports and we begin with 3.5MHz where G**eorge Davis G3ICO** in Yeovil, Somerset listened in around 0900UTC on a noisy band to hear TF3DX/M calling "CQ" and using his Elecraft K2 at 5W to a doublet antenna successfully worked him

.

The 14MHz & 18MHz Bands

Moving to the 14MHz band George managed SC0XMAS (Sweden) at 1131 with a special call for the Christmas period (QSL via SM0OGQ), 9A0QRP (Croatia) – the call of the Croatian QRP Club (CQRPC), which invites all QRP enthusiasts across the world to become members free of charge via E-mail. Membership is offered to all operators whose output power doesn't exceed 5W using c.w., or 10W with s.s.b. To join the CQRPC send an E-mail to **qrp@email.t-com.hr** and include your name, callsign and a declaration that you accept the power limit rule.

The next station worked was EO20HC (Ukraine) QSL via UT2HC, HS0ZEE (Thailand) 1522 and VX3JO (Canada) at 1525UTC. During 2011 George made 1665 QSOs, all c.w., with 144 DX entities!

Also on 14MHz was **Peter Leng ZL4TE** in Cambridge, New Zealand who used his Yaesu FT-1000MP MKV and 10W s.s.b. to a Cushcraft AV-3 vertical antenna. He worked 3D2AG (Fiji) OC-016 at 0552, VP8DNT (Falkland Islands) SA-002 at 0817 (QSL via JH1AJT), J28AA (Djibouti) at 0914 QSL via K2PF or E77E, P29FR (Papua New Guinea) OC-034 (**Fig. 6**) at 0941 (QSL via I2RFJ).

The operator P29R – Renzo Filippini I2KRR – is working on technical support to the Catholic Mission in Vanimo, which is located on the north coast of the main island where he operated before as 9J2FR from 1989-2000. He has an Yaesu FT-857 with him and his antenna is currently a cubical quad built from local materials. He's normally active during the evening (local time) plus Saturday and Sunday afternoons. Peter also made a 10W c.w. contact with CE5HGE (Chile) at 0942UTC.

On the 18MHz band **Dennis Upton VE3UTN** was busy. From his Kitchener, Ontario QTH, Dennis is still pleased with his indoor 'Crown' wire loop. He said "It's still amazing me to this day at 2257UTC. I worked the only PSK signal on my waterfall Hiroyuki Umemura JH7VHZ (Japan) with a very clear and strong signal. I pumped up the FT-857's power a little bit to 35W in case the she didn't copy me – but we made the QSO with no problems at all. In the past few days I have seen calls from Japan in RTTY mode – but with few takers it seems! (**Figs 7** and **8**).

The 21 & 24MHz Bands

In Wantage, Oxfordshire **Terry Martin M0CLH** tried the 21MHz band and, using his new Heil Proset Elite headset, enjoyed working s.s.b. stations V5/DJ2HD (Namibia) 1358, YO8SAI (Romania) 1409, YT2KID (Serbia) 1412, UA1CLR (European Russia) 1413, LZ2II (Bulgaria) 1415, IK7GFS (Italy) 1422. Then came WN4G (USA) 1430 in Lakeland, Florida, TX3XON (Iceland) EU-021 at 1432 and YS1/HB9KNA (El Salvador) 1446UTC using an IC-756 and Cushcraft R8 vertical antenna.

On 24MHz **Eric Masters G0KRT** in Worcester Park, Surry used his Kenwood TS-570 and modified W3EDP antenna tuned with an SG-230 smart tuner to work EM20L (Ukraine) 1057 (QSL via US0LW. Then came RA3AGN (European Russia) at 1127 and ER3ZZ (Moldova) at 1132 using 100W and s.s.b., while later 5W c.w. found K2VV (USA) 1507 in Moscow Mills, Missouri and WB3BEL at 1529 in Springfield, Virginia.

The 28MHz Band

The 28MHz band was in reasonable shape for **David Bambrook 2E0DAB** near Bicester, Oxfordshire who logged UA3AR (European Russia) 1144, US5NMW (Ukraine) 1150, SV2HTI (Greece) 1210, YO3RU (Romania) 1317 and W4SVO (USA) 1330 in Lake Clarke Shores, Florida using a Yaesu FT-747GX at 50W and a dipole antenna mounted along his fence!

Signing Off

Well that is it for this month but before I close I must apologise to the **British Railways ARS** (BRARS) for saying Colin Topping GM6HGW was their Secretary. This job now belongs to **Geoffrey Simms G4GNQ** who is not only the new Secretary but also President of the BRARS. The new website can be accessed through **www.firac.org.uk**

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. 73, Carl GW0VSW

●

Fig. 8: Another QSL, this time ZS6CX to Dennis VE3UTN.

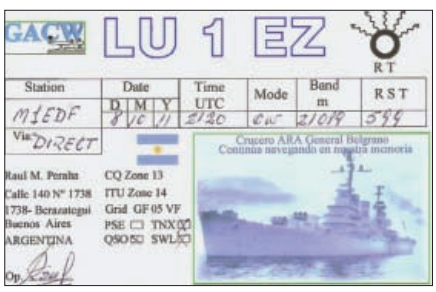


Fig. 9: A QSL card from LU1EZ received by Geoff M3UXB

BOWOOD ELECTRONICS LTD

Suppliers of Electronic Components

Visit our website and order on-line at
www.bowood-electronics.co.uk

or send 60p stamp for catalogue

E-mail: **sales@bowood-electronics.co.uk**

Contact name: Will Outram
Unit 10, Boythorpe Business Park, Dock Walk, Boythorpe, Chesterfield S40 2QR
—— Telephone 01246 200222 ——

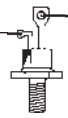
KEEN ON KITS? THEN TRY KRC

KRC-1	4 BAND SUPERHET	£65.99
KRC-2	1-30MHZ REGEN RECEIVER	£54.99
KRC-4	BEGINNERS TRF RECEIVER	£24.99
KRC-5	80METER RECEIVER	£25.99
KRC-A-1	MORSE OSCILLATOR	£16.99
KRC-A-2	90VOLT HT BATTERY	£33.99
KRC-A-8	SPEAKER AMPLIFIER	£24.99
KRC-T-2	5 DIGIT FREQUENCY COUNTER	£65.99
KRC-X-1	7 - 14MHZ CW XMITTER	£69.99
KRC-X-2	80METER CW XMITTER	£33.99

Or send SAE for full details. Mail order direct from:
Kit Radio Company, Unit 11 Marlborough Court, Westerham, Kent. TN16 1EU. Tel no 01959 563023. P&P £4.00

J. BIRKETT

ELECTRONIC COMPONENTS SUPPLIERS



25 The Strait
Lincoln LN2 1JF
Tel: 01522 520767
Partners J.H.Birkett
J.L.Birkett

TRANSISTORS 25AA12 equivalent OC44 @ 75p 4 for £2
MULLARD OC45 TRANSISTORS @ 75p, 4 for £2
THERMISTORS MULLARD VA1015 @ 3 for £1
PISTON TRIMMERS with coil attached 15pf @ 4 for £1
COIL FORMERS 1/4" with core and can @ 25p each
COIL FORMERS 3/16" with core and can @ 20p each
MULLARD FAST RECOVERY DIODES BY2060 12 FOR £1
TRW RF POWER TRANSISTORS TYPE PT46420 @ 5for £10, type PT4577 @ 5 for £10
MULLARD TRANSISTORS AC127 @ 75p, AC176 @ 75p, texas ins. 2G381 @ 75p
CERAMIC B7G VALVE BASE with screen for £1
EX-MOD MORSE KEY with detachable heavy base @ £21
AIR SPACED VARIABLE CAPACITORS 400+400+25+25+25pf @ £4.95

SINGLE 25pf with spindle either end @ £4.50, 150+250pf @ £4.50, 250+250+25+25pf @ £4.50, 350+400+25+25pf @ £4.50, jacksons C804 10pf @ £3.50
BELLING LEE 4mm sockets nut fixing @ 50p, 5 for £2
MULLARD VALVES EZ80 @ £2.50, EZ90 @ £2.50

200 GERMANIUM DIODES CG92 for £4
SOLDER IN FEED THRUS 1000pF @ 8 FOR £1
MCL MODULE SRA-11 @ £4
CL1X WANDER PLUGS red or black @ 30p each, 4 for £1
SILVER PLATED DIFFERANAL 10x10pf air spaced trimmers @ 8 for £1
SMALL RADIAL CAPACITORS 0.15uf 400vw @ 6 for £1
WIRE ENDED ELECTROLITICS 4.7uf 450vw @3 for £1.50, 8uf 300vw @ 3 for £1, 1uf 500vw @ 5 for £1, 33uf 450vw @ 3 for £2, 32uf 350vw 3 for £1.50
EDISWAN VALVES PEN45DD @ £5, PEN45 @ £10
MINIATURE DIL RELAYS 4.5volt DPCO @ 4for £1
ROTARY SWITCHES YAXLEY TYPE 2 pole 5 way 2 bank @ £2, 8 pole 4 way @ £2, 1 pole 8 way 5 bank @ £2
OLD LARGE POTENIOMETERS 500k log with dp switch @ 3 for £2
VALVE HOLDERS B7G @ 50p, B9A @ 75p, B8A @ £1, B9D @ £1, Mazda octal @ £1, CRT base VCR139A @ £1.50

MASTERCARD, ACCESS, SWITCH, BARCLAYCARD accepted.
P&P £2 under £10. Over Free, unless otherwise stated.

www.zyra.org.uk/birkett.htm

WILDHERN RADIO & COMPUTER BOOT SALES 2012

WEBSITE - arac.org.uk
Organised by the **Andover Radio Amateur Club**
For further details contact the Sec. : Dave, G4YVM
on **07749 199453**, e-mail **arac@arac.org.uk**
£6 per Boot & £1.50 Buyers, Tables in the Hall £8
SELLERS 9am - BUYERS 10am
SUNDAY 29th APRIL 2012
and **SUNDAY 2nd SEPTEMBER 2012**

MAHA Professional Range

Advanced Batteries & Chargers
'Approved by the toughest customers'
Military & Defense,
NASA, Kodak, Rockwell - ***and many more***

MH-C9000

The Ultimate Charger Analyser with four independent slots for AA/AAA batteries, it's like having four units in one!

- Match battery capacities, bring life back to old or unused batteries
- Five modes of operation:
  Charge, Refresh & Analyse, Battery forming, Discharge, Cycle
- 29 selectable charging and discharging

£49.95

MH-C808M

- Charge AA/AAA/C/D NiMH batteries
- 8 independent charging circuits
- Ultra fast recharge time
- Built in battery conditioning system
- Worldwide mains adaptor

£79.95

MH-C800S

- Intelligent Precision Charger for AA/AAA batteries
- Charging Slots: 8 Independent slots charge 1 to 8 batteries in any combination
- Large LCD display panel views the progress of all 8 charging slots at once

£49.95

Complete Kit Just £39.95

MH-401FS

- Cool smart charger kit for AA/AAA Batteries includes :-
- 4 x 2700mah Powerex AA Ni-Mh rechargeable batteries
- Car adaptor kit
- Battery carrying case, travel bag
- 240W adaptor, UK 13A plug fitted

£39.95

MH-204W Charger only.....**£24.95**
MH204W+ with four 2,700mAh AA batteries **£34.95**

MH-C490F

- Charge one to four 9V batteries independantly
- 2 hour charge time
- Revive older 9V batteries
- Mains or 12V car operation

£24.95

MH-C1090F

- Ten way version of MH-C490F
- Charge one to ten 9V batteries independantly

£49.95

Rechargeable Batteries

Powerex Batteries
Extra High capacity - recharge up to 1000 times!

MH-2700	AA 2,700 mAh 1.2V (pack 4)	£14.95
MH-D110	D 11,000mAh 1.2V (pack 2)	£22.95
MH-C500	C 5,000 mAh 1.2V (pack 2)	£16.95
MH-84V	PP3 300mAh 8.4V	£9.95

Imedion Batteries
Retains 85% charge for one year!

AAA	800mAh (pack 4)	£11.95
AA	2400mAh (pack 4)	£12.95
MHR-D12	D cell 9,500 mAh (pack of 2)	£39.95
MHR-C12	C cell 5,000 mAh (pack of 2)	£25.95
MHR8.4V	PP3 8.4V 250 mAh	£12.95
MHR-9.6V	PP3 9.6V 230 mAh	£12.95

nevada®
web www.mahaenergy.co.uk
sales 023 9231 3090
Unit 1 Fitzherbert Spur Farlington Hants PO6 1TT
UK Distributors of Imedion, Powerex, Maha Batteries and Chargers

BARGAIN BASEMENT

BARGAIN BASEMENT RULES
Only £5 per advert. Subscribers FREE!
Please write your advert **clearly** in **BLOCK CAPITALS** up to a maximum of **30 words**, plus **12 words** for your contact details on the form provided and send it together with your **payment of £5** (**subscribers** can place their advert **free of charge** as long as they provide their **subs number or mailing label**). Cheques should be made payable to **PW Publishing Ltd.**, credit card payments also accepted.

Send your advert to **Bargain Basement, Practical Wireless, Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW** or E-mail your advert to **peter@pwpublishing.ltd.uk** (If you don't want to include your credit card details on your E-mail, just 'phone us on **0845 803 1979**.

Please help us to help you by preparing your advert carefully. Any advert which contains ?? marks indicates that the advertiseing dept. could not read/interpret the wording.

Please avoid FAXing your advert - it could delay publication.

Advertisements from traders or for equipment that it is illegal to possess, use or which cannot be licensed in the UK, will not be accepted.

No responsibility will be taken for errors and no correspondence will be entered into on any decision taken by the Editor on any of these conditions.

You should state clearly in your advert whether equipment is professionally built, home-brewed or modified.

The Publishers of *Practical Wireless* also wish to point out that it is the responsibility of the buyer to ascertain the suitability of goods offered for purchase.

Bargain Basement adverts will now cost £5 per advert (subscribers still free) and will also be published in *RadioUser*, our sister magazine, unless requested otherwise.

FOR SALE

BHI NOISE ELIMINATING SPEAKER in mint condition with original box, manual, leads and mounting bracket. Very little used, £60 including postage.
Tel: David 0208 397 3614 (Kingston).

CLASSIC RACALS choice of three Racal RA17s - two RA17L and one quite early Mk1 (plain side panels). All in working order and nice condition, £75 each o.n.o.
Tel: Steve 01582 503806 (Luton).

G5RV half size with 300Ω slotted ribbon plus Watson EL-40XC inductor kit to add on 80m. All worth nearly £50 at today's prices. Offered at, £25 plus £4 P&P.
Tel: John G3EGC 01204 301502 (Bolton, Lancashire).

YAESU FRG-7700 £299. Yaesu FRG-7, £145 Both in superb condition. TENTEC RX-10, £130. In good condition. Will ship UK & worldwide.
Tel: 0115 8713562.
E-mail: rxtx5973@gmail.com

WANTED

DOES ANYONE OPERATE A NRD-525 HF/VHF receiver? Can you please help me use mine? I am an OAP /85 with poor eyesight and I have the handbook. All costs will be met for your time, etc. Interests are tracking aircraft on HF frequencies.
Tel: George 01443 437345 (Mid-Glamorgan).

DRAKE MS-4 SPEAKER with or without AC-4 PSU. Also, Trio SP-930 speaker and CW filter for Yaesu FT-901DM.
Tel: Dave G4AFQ 01263 722723 after 19:00hrs (North Norfolk).
E-mail: dave-g4afq@gmail.com

GQRP CIRCUIT BOOK yellow cover. Repanco DR-21, DR-22, DRX-1 coil.
Tel: 01793 762593. 27 Newburgh House, Highworth, Swindon, Wilts SN6 7DW.

HEATHKIT AUDIO GENERATOR model AG-9U. Also, meter for Heathkit V/ voltmeter model V7AU (or complete faulty unit if meter is okay).
Tel: 01591 620747 (Mid Wales).

NOISE REDUCTION UNIT Preferably NEIM 1031.
Tel: David 07751 328188 (Milton Keynes).

OLD HALF INCH FERRITE RODS must be half inch, 12.7mm, in diameter and be six inches long or more. Will pay very good money for the rods.
Tel: Peter Tankard 0114 231 6321 between 9am and 9pm (Sheffield).

RAM CARDS 8MB for old Dell PC, i.e. memory cards.
Tel: 07855 534309 (Shropshire).
E-mail: fcbailey20@btinternet.com

WORKING 100W PA STAGE for Yaesu FT-107M
Tel: 00353 87 2058745 (Shannon, Ireland).
E-mail: tobei5ca@gmail.com

Don't forget to make cheques and postal orders payable to PW Publishing Ltd.

NOW £5

Bargain Basement order form

Please make any cheques or Postal Orders for advertisments payable to PW Publishing Ltd.

Please insert this advertisement in the next available issue of Practical Wireless.

☐ For Sale ☐ Wanted ☐ Exchange

PLEASE NOTE: as a security measure, you must include your house number and postcode.

Name .....

Address .....

.....

..... Post code .....

Telephone Number .....

PW & RU ☐

PW ONLY ☐

CARD NUMBER

VISA SWITCH AMERICAN EXPRESS MasterCard

Signature..... Security number

LAST THREE DIGITS ON THE BACK OF THE CARD

Switch issue number (if on card) .....

Start date of card..... Expiry date of card.....

My Subs Number is.....(or send mailer label)

		(30)	

CONTACT DETAILS FOR ADVERT. Please only write in the contact details you wish to be published with your advert, ie. do you want your name & address, or just your telephone number? Your advert, you decide! **PLEASE - No FAXed Ads!** (12)

Classified Ads

DISCLAIMER Some of the products offered for sale in advertisements in this magazine may have been obtained from abroad or from unauthorised sources. ***Practical Wireless*** advises readers contemplating mail order to enquire whether the products are suitable for use in the UK and have full after-sales back-up available. The publishers of ***Practical Wireless*** wish to point out that it is the responsibility of readers to ascertain the legality or otherwise of items offered for sale by advertisers in this magazine.

Aerials

VORTEX ANTENNA SYSTEMS Delta Loops, Yagis. Monoband and multiband. For the home constuctor – antenna parts including 6082-T6 tubing, stainless U-bolts, saddles, mounting kits and much more. www.vortexantennas.co.uk or 07943 871893.

ROSSCOMM RADIO COMMUNICATIONS Sole UK distributor for the G Whip range of End Fed antennas. Spares for classic Yaesu. Balun UnUn and HF Antennas www.RossComm.co.uk and www.RossCommRadio.co.uk

G4TPH.COM ML-40 HIGH POWER MAGLOOP now available. Tunes 40m –10m, 100 Watts Details and online ordering at www.g4tph.com

Whilst prices of goods shown in advertisements are correct at the time of going to press, readers are advised to check both prices and availability of goods with the advertiser before ordering from non-current issues of the magazine.

Valves

VALVES AND ALLIED COMPONENTS IN STOCK Ring for free list. Valves/ books/magazines wanted. Geoff Davies (Radio). Tel: 01788 574774.

TOP PRICES PAID
for all your valves, tubes, semi-conductors and ICs.
Langrex
Unit 4, Daux Road, Billingshurst, W. Sussex RH14 9SJ
Tel: 01403 785600
Fax: 01403 785656
www.langrex.co.uk

QSL cards

FULL COLOUR QSL CARDS for all your QSL needs. Shirts and caps with callsigns and also ham cartoons by GW3COI. For free samples contact Chris M0DOL. E-mail: qslers@aol.com 24 West Ridge, Kingsthorpe, Northampton NN2 7RA.

Repairs

REPAIRS TO ALL AMATEUR AND VINTAGE Rx/Tx
Cost effective service. Phone or call in for details.
Kent Rigs, 52 Salisbury Road, Chatham, Kent ME4 5NN.
Tel: 07903 023437.

RELIABLE REPAIRS for all amateur and vintage equipment.
Professional service, reasonable rates.
Tel: 01807 580376.
E-mail: radiorepairs@btconnect.com

For sale

X-tals 100kHz-250MHz. Std 10.106, 10.245, 10.7, 11.155MHz @ £1.50. Callg 3.56, 7.030, 14.060, 28.060MHz @ £1.50. 1.7468MHz X-tal Clansman 321 ex-stock p.o.a. 10.7MHz 10kHz filter @ £5.75, 1.4MHz SSB filter p.o.a. P&P £1.50 + VAT.
IQ Electo
Tel: 0208 391 0545.
E-mail: vincentvoy@hotmail.co.uk

Please ensure that cheques or postal orders are made out to PW Publishing Ltd.

ORDER FORM FOR CLASSIFIED ADS

PLEASE WRITE IN BLOCK CAPITALS

The prepaid rate for classified advertisements is 42 pence per word (minimum 12 words), box number 70p extra. Semi-display setting £13.90 per single column centimetre (minimum 3cm). Please add 20% VAT to the total. All cheques, postal orders, etc., to be made payable to PW Publishing Ltd. Advertisements, together with remittance, should be sent to the Classified Advertisement Dept., Practical Wireless, Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW. Tel: 0845 803 1979, Fax: 01202 659950.

Please insert this advertisement in the ..... **issue of** ***Practical Wireless*** (if you do not specify an issue we will insert it in the next available issue of *PW*) for ..... insertion/s. I enclose Cheque/P.O. for £.....(42p per word, 12 minimum, please add 20% VAT to total).

Name: .....

Address:.....

.....

.....

.....

Telephone No.:.....

Box Number @ 70p: Tick if appropriate

Category heading:.....

Please photocopy this form or write on a separate sheet if you prefer

TRADERS TABLE

The equipment for sale on this page is secondhand or ex-demonstration

Disclaimer

Advertisements from traders for equipment that is illegal to possess, use or which cannot be licensed in the U.K, will not be accepted. While the publishers will give whatever assistance they can to readers or buyers having complaints, under no circumstance will the magazine accept liability for non-receipt of goods ordered, late delivery or faults in manufacture.

NEVADA

023-9231 3090

TRANSCEIVERS

ALINCO DJ596 DUALBAND H/HELD £89
ALINCO DJC7 DUALBAND H/HELD £84
ALINCO DX70T MOBILE HF RADIO £349
ICOM 746 TRANSCEIVER £699
YAESU FTC740A 4M TRANSCEIVER £69
YAESU FT817 PORTABLE HF/6/2/70CMS £419
YAESU VX7R TRIBAND HANDIE £209

HANDHELD SCANNERS

ALINCO DJX2000 WIDEBAND SCANNER £159
BEARCAT UBC72XT H/H SCANNER £74
ICOM RX7 SCANNER C/W ACCS £225

RECEIVERS

AIRNAV RADAR BOX £299

CB RADIO

MIDLAND 48 MULTI CB RADIO £79

ACCESSORIES

ALINCO EJ47U DIGITAL BOARD £46
UNIROSS CHARGER & BATTERIES £12
ICOM AT180 AUTO ANTENNA TUNER £399
CLAMP ON DIGITAL MULTIMETER £10
LDG Z817 ATU FOR FT817 ..... £89
MFJ 1278B M/MODE DATA CONTR £199
MFJ 208 VHF SWR ANALYSER £69
MFJ 914 AUTO ATU59
MFJ 948 ATU £109
MIRACLE WHIP £89
BASIC SWR METER £5
£
VECTRONICS VC300DLP ATU £99
YAESU FC30 ATU £179
ZETAGI P27M PREAMPLIFIER £15

B-GRADE ITEMS

ALINCO DJV17 H/HELD TRANSCEIVER £99
ANYTONE AT588 2M MOBILE TX £135
BEARCAT BCT15X SCANNER £229
BEARCAT USC230 SCANNER £99
ETON E100 PORTABLE SHORTWAVE RADIO £35
ETON FR650 PORTABLE RADIO £49
ETON G3 PORTABLE RADIO £69
ETON G8 PORTABLE RADIO £39
GRE PSR200 SCANNING RECEIVER £89
GRE PSR255 HANDHELD SCANNER £64
MAGIC BOX HANDHELD DAB £39
MAGIC BOX KITCHEN DAB RADIO £35
MIDLAND 248 MOBILE CB RADIO £79
MOONRAKER M8 RADIO £20
PALSTAR PS04 POWER SUPPLY £18
TTI TSC3000 SCANNER £99

SHORTWAVE SHOP LTD

01202 490099

TRANSCEIVERS

KENWOOD TR-751E Boxed £195
KENWOOD TS-2000 ..... £775
ICOM IC-706MkII £399
SOMMERKAMP FT-102 ..... £225
YAESU FT-1802M 2M £75
YAESU VX-150 ..... £99
YAESU FT-60 ..... £120
ALINCO DJ-V5 ..... £200
ALINCO DX-70 ..... £245
ALINCO DJ-195 ..... £100
ALINCO DJ-S11 ..... £75
ALINCO DR-430 70cms £85
ICOM PMR 446x2Water Resist/w.charg £200
MIDLAND CB 77-250K £50
MIDLAND CB 77-805UK £55
MAXON ALERT 7E CB £65

RECEIVERS

JRC NRD 535 ..... £795
YUPITERU MVT 7300 ..... £99
UNIDEN UBC-800XLT Ex Demo/software £265
UNIDEN UBC-860XLT Desktop £65
REALISTIC PRO 2042 ..... £95
AMI DIGI SAT RX ASR WS201 ..... £129
ALINCO DJX3 ..... £70
WORLD RECEIVER WR2100 ..... £80
GOODMANS GCD200 DAB ..... Special Price £50
BPL WORLD SPACE £25

ACCESSORIES

AOR SR2000 Freq Monitor - As New £995
ICOM AH7000 DISCONE £85
CREATE CLP 5130 Log Periodic NEW £250
MICROWAVE MODULE 432/100 ..... £165
MFJ 949D Versa Tuner II £85
BNOS LPM 144/25/160 ..... £245
ICOM HS-51 Special Bulk Price £27
HANSEN FS-300H SWR/PWR METER £35
WELZ AC-38M ATU £75
SAMSON ETM-8C MEMORY KEYER £50
YAESU MD1 B8 Desk Mic £50
YAESU SP-767 ..... £75
YAESU XF-110CN Filter £55
YAESU XF-110S Filter £55
AKD WA3 ABS Wave Meter £25
WATSON HUNTER Freq Counter £50
LODESTAR AG-2601A Audio Gen NEW £55
LODESTAR SG-4160B Sig Gen NEW £55
MANSON EP925 25A PSU Demo Model £75
BNOS 12/30E 30A PSU £125
DAIWA PS-120M 10A PSU £49
DAIWA PS-310 30A PSU £75
DAIWA PS-30X M11A 30A PSU £95
DAIWA PS-50XM 5A PSU £25
DAIWA CN620A 1kw POWER/SWR £65
DAIWA CN-410M SWR METER £45
ZETAGI HP1000 SWR METER £65
MFJ 259B Boxed as new £215
WELZ SP-220 SWR/PWR METER £65
PM-2000 2Kw Pwr Meter £70
Various CB PSU's ..... From £10
HEATHKIT GDO Complete with coils £95
LOWE FX-1Complete £75
MORSE KEYS VARIOUS from £35

WATERS & STANTON

01702 206835

Microset	PT-110	12V Stabilized 10A PSU with Over V / A protection	£69
Microset	PR-430A	70cms 100 Watt Version 15db Gain -1.2db NF	£129
Uniden	UBC-60XLT	66-512MHz (with gaps) FM Hand Held Receiver 80Ch. 4 x AA cells	£59
Microset	RU-432-95	70cm 3-25W in,95W out Linear + GaAsFET Preamp	£399
Uniden	UBC-69XLT-2	25-512MHz (with gaps) FM Hand Held Receiver 80Ch. 2 x AA	£55
Icom	IC-F4SR	SRBR Hand Held Transceiver Programmed for PMR-446 24ch	£149
Icom	IC-F4SR	SRBR Hand Held Transceiver Programmed for PMR-446 24ch	£149
Alinco	DJ-191E	2m FM H/Held Transceiver + CTCSS & DTMF keypad	£119
Bencher	ST-1	Bencher Chrome Single Paddle on a Black metal base	£79
Uniden	PMR-845	Pair of PMR-446 up to 6km + VOX Twin-charger & Baby Monitor	£39
Albrecht	AE 6690	80Ch. 4W FM CB Mobile Transceiver + CTCSS	£99
Timewave	PK-12	1200bps V/UHF Packet controller + GPS firmware	£69
Hi-Mound	HK-709	Deluxe Straight Morse Key on Black Base	£55
Icom	IC-A110-EURO	35W Airband Mobile Transceiver + 20ch Multi-Scan & 8.33kHz step	£549
PacComm	Tiny-2	VHF Packet TNC Controller	£79
SGC	SG-500	Power Cube 1.6-30MHz Solid State Linear Amplifier 500W (SSB CW)	£899
Diamond	MX-62M	1.6-56MHz & 76-470MHz Duplexer 600W max	£49
TTI	TSC-100R	66-174MHz AM,FM WFM 200Ch. Mini Hand Held Receiver 4x AAA or 9V DC	£49
Alinco	DJ-X7E	100kHz-1300MHz AM, FM, WFM Hand Held Receiver 1000Ch + 8.33kHz step	£129
SSB	SSB-SP-6	50-52MHz 6m Low Noise Mast Head Preamplifier	£189
Microset	SR-100	2m 4-25W in,100W out all mode + GaAsFET Pre-amp	£179
Diamond	SX-400	140-525MHz 200W SWR,PWR meter	£75
Yaesu	YSK-8900	Remote Mounting Kit for FT-8800 & FT-8900	£25
Microset	PT-105A	12V 5A (max) Protected Stabilized PSU	£35
Yaesu	VC-24	Lightweight VOX Headset + PTT & 3.5mm 4-pole Threaded Connector	£39
AKD	AKD-4001	4m FM Mobile Transceiver Channelised 25W	£99
MFJ	MFJ-906	6m 200W (100W FM) ATU with PWR / SWR meter	£69
Yaesu	DMU-2000	Data Management Unit for FT-2000/D Transceivers will Need Monitor and Keyboard	£829
MFJ	MFJ-762	Step Attenuator up to 81dB + BNC connectors	£69
Uniden	PMR-885-2	Pair of PMR-446 Transceivers up to 6km + VOX Headsets Twin-charger & Baby Monitor	£49
Uniden	PMR-885-2	Pair of PMR-446 Transceivers up to 6km + VOX Headsets Twin-charger & Baby Monitor	£49
Alinco	DX-70TH	HF,6m All Mode Mobile/Base Transceiver with Gen.Cov. & CTCSS 100W (HF & 6m) 12V	£429
Alinco	DJ-S11	2m FM Palm Transceiver with 136-174MHz RX	£59
AOR	AR-3000A	100kHz-2036MHz All Mode Communications Receiver 400Ch. 12V + psu	£299
Yaesu	DMU-2000	Data Management Unit for FT-2000/D Transceivers will Need Monitor and Keyboard	£829
MFJ	MFJ-702B	1.5-30MHz Low Pass Filter 200W max	£35
TS	TSA-6601	140-150,430-450MHz 60W SWR,PWR meter	£29
Yaesu	YM-38	Dual Impedence Desk Mic + PTT-Lock & Up/Down Buttons	£59
Yaesu	FL-2050	2m 50W Linear + 12dB Preamp 10W input 12V 10A	£129
Kenwood	TS-480S AT	HF + 6m All Mode Base/Mobile Transceiver with Gen.Cov. RX, DSP Filter & Auto ATU 100W 12V	£579
Optoelectronics	Model-40	"Scout" 10MHz-1.4GHz Frequency Counter + Reactive Tune & 400ch.	£239
Lilliput	TFT-7000	5.6" Colour LCD Display & TV Tuner + Remote & Video-In 12V	£79
Icom	IC-A22E	Airband Hand Held Transceiver + NAV/COM & headset adapter	£249
Bhi	NES10-2	Noise Eliminating Extension Speaker with Audio Out 12V	£59
microHAM	USB-Interface II	USB Interface for Sound Card Software & Rig Control	£89
Yaesu	DVS-2	Digital Voice Message Recorder fot FT-1000 series	£149
Kenwood	TH-F7E	2m,70cm FM Palm Held Transceiver + 0.1-1300MHz All Mode RX	£169
Kenwood	TS-870S	HF All Mode Base Transceiver with Gen. Cov. + ATU & DSP in the IF, 100W 12V	£799
MFJ	MFJ-969	1.8-54MHz 300W Roller Inductor ATU + Balun, Dummy Load & X-meter	£159
Alinco	DJ-X3	100kHz-1300MHz AM, FM, WFM Hand Held Receiver 700Ch + 8.33kHz step	£99
Yaesu	FT-857	HF,6m,2m,70cm All Mode Transceiver + DSP & Gen.Cov.RX 12V	£499
Kenwood	TH-F7E	2m,70cm FM Palm Held Transceiver + 0.1-1300MHz All Mode RX	£169
Icom	AH-2B	3.5-30MHz Mobile Antenna + Mount for AH-2 or AH-3	£199
Icom	AH-4	3.5-54MHz 120W Auto ATU (Weatherproof)	£229
Yaesu	CT-61	Linear Amplifier Standby Lead for FT-847	£6
Yaesu	ATAS-120A	7-430MHz 120W Auto Tuning Antenna	£219
Microset	PT-120	12V Stabilized 20A PSU with Over V / A protection	£129
Yaesu	VX-5R	6m,2m,70cm FM Micro Hand Held Transceiver 5W + CTCSS with Sp.Mic	£129
Microset	PC-120	13.5A Variable 20A (24A max) Stabilized PSU with meter	£139
Yaesu	VR-5000	100kHz-2600MHz All Mode Receiver + Spectrum Scope 2000Ch. 12V	£319
AOR	AR-7030	0-32MHz All Mode Communications Receiver 12V + PSU	£449
	SEC-1212	13.8V Switch Mode Regulated 12A (max) PSU	£55
Alinco	DJ-V17E	2m FM Palm Transceiver 5W, DTMF keypad & CTCSS	£99
Icom	OPC-598	7m 13pinDIN ACC Lead for IC-706	£19
MFJ	MFJ-912	1.8-30MHz W9INN Remote Toroidal Balun	£49
Icom	SM-20	Deluxe Desk Mic 600ohm + Amplifier	£109
Diamond	MX-62M	1.6-56MHz & 76-470MHz Duplexer 600W max	£49

B-Stock Equipment (includes manufacturers warranty)

Icom	IC-R5	150kHz-1300MHz AM,FM & WFM Hand Held Receiver 1000Ch. + Nicads	£149
Icom	IC-U82	70cm FM H/Held Transceiver with CTCSS, DTMF keypad, Ni-CD & charger	£163
Kenwood	TS-2000E	HF,6m,2m & 70cm All Mode Transceiver + Auto ATU & DSP	£1449
Kenwood	TS-2000X	HF,6m,2m,70cm & 23cm All Mode Transceiver + Auto ATU & DSP	£1699
Icom	IC-E208	2m,70cm FM Mobile Transceiver 50W,35W + CTCSS, DTMF mic (Remote Head)	£219
Icom	IC-E2820	2m,70cm FM Mobile Transceiver 50W, 35W DTMF mic + Remote Head, "D-Star" Ready	£399

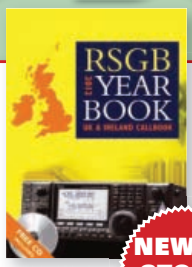
RADIOWORLD

01922 414796

Yaesu FT-2000 100W with internal power supp	£1,599
IC-756PRO-MKIII Icom HF + 6m Trx	£1,575
Icom IC-R8500 Receiver	£1,099
Kenwood TL-922 HF Linear Amplifier	£999
Icom IC-7400 HF, 6m & 2m Transceiver	£899
Icom IC-7000 1.8 - 70cms Mobile Transceiver	£899
Yaesu FT-847 HF-6-2-70 Base	£899
Icom IC-7000 1.8 - 70cms Mobile Transceiver	£899
Heatherlite Explorer 1000 1KW HF Amplifier	£799
Yaesu FT-736R 6m, 2m & 70cm Base	£799
Kenwood TS-850S /AT	£699
Kenwood TS-790E 2/70 Base	£699
Icom IC-746 HF/6m Transceiver	£675
Yaesu FT-897D Multiband Portable Transceiver	£629
Heatherlite Hunter HF Linear Amplifier	£599
Kenwood TS-570DG/E HF transceiver	£599
Yaesu FT-736R 2m/70cm Base Multimode	£599
Yaesu FT-857D Multi-band Mobile	£579
Alinco DX-SR8 HF transceiver HF, 100W all mode	£529
Yaesu FT-726R Base Transceiver 6m/2m/70cm	£529
ICOM IC-E2820 + UT-123 D-star unit - Package deal	£525
MTU-30/20 RF u-tuning Unit C	£500
MTU-80/40 RF u-tuning Unit B	£500
AOR AR-7030 HF receiver	£499
Icom IC-718 HF All Band Transceiver	£459
Icom IC-751 HF Transceiver	£450
Alinco DX-R8E Receiver	£449
Palstar AT1500C ATU	£399
Alinco DX-77E HF Transceiver	£399
ICOM IC-E2820 dual-band mobile transceiver	£389
Yaesu FT-840 HF Transceiver	£379
A3-WS Cushcraft 3-Element Tribander (WARC)	£349
AirNav RadarBox-Pro 2010	£329
Yaesu FRDX-400 HF Receiver + 6m and 2m	£329
AOR ARD-2 ACARS/Navtex Decoder	£299
Icom IC-271E 2m multi mode	£299
Yaesu FT-726R Base Transceiver 2m	£299
Kenwood TR-851E 430-440 MHz All-mode	£299
BWD-90 Barker & Williamson Commercial Antenna 1.8-30	£275
Yaesu FT-690R II	£275
Icom PS-125	£270
AirNav Radarbox 2009 version	£269
Yaesu VX-7R Silver Tri-band Handy	£259
Yaesu VX-7R black Tri-Band Handy	£259
MFJ-994 Automatic ATU 1.8-30MHz 600W SSB 300W CW	£255
Icom IC-R3 Hand held Scanner	£250
Icom IC-490E 70cms Mobile	£250
Yaesu FT-290MkII 2m Multi-mode transceiver	£250
President Lincoln CB Transceiver	£249
MFJ-1278b DSP Multimode Data Controller	£249
Icom IC-251E	£249
Kenwood TR-9130 2m Multi-Mode Transceiver	£249
Icom IC-T81E 50-54 / 144-146 / 430-440 / 1240-1300	£240
DR-635E Alinco 2m/70cm FM Dual Band Mobile Transceiv	£239
MFJ-1798 10-band Vertical all band Antenna	£229
MFJ-9410 10 Meter SSB Adventure Radio	£220
Yaesu FTV-901R 2m Transverter	£220
SGC MAC-200 Antenna Controller Auto-Tuner	£219
Kantronics KPC-9612	£200
Yaesu FV-101DM Digital Memory VFO	£199
UT-123 D-star GPS module for IC-E2820	£199
Kenwood AT-230 ATU	£199
Vectronics VC-300D Tuner with LED PEP Meter	£199
NATO Morse Key	£199
AOR AR-8200 Mk II	£199
AOR AR-8000	£189
UBC-785XLT Uniden-Bearcat Base Scanner 25-1300MHz	£189
ICOM IC-2200H 144?146	£189
FV-102DM digital Memory VFO	£179
Nevada TM-1000 ATU	£179
Kenwood TH-F7E Dualband Handheld Transceiver	£179
IC-RX7 - Wideband Handheld Receiver	£179
FT-90R - Transceiver 2mtr/70cms.	£179
MFJ-655B - Deluxe Voice Equaliser & Conditioner 8-ba	£175
SCOUT Optoelectronics Frequency Counter/Finder	£175

THE PW PUBLISHING
RADIO BOOK STORE

New 2012 Books in stock Now!



NEW IN STOCK NOW

RSGB YEARBOOK 2012

NOW Reformated for easier use!

With around 70,000 amateur radio licences on issue the RSGB Yearbook 2012 is the essential guide to these and matters amateur radio in the UK and worldwide. In a new format for easier use the RSGB Yearbook 2012 provides a comprehensive guide to UK and Irish Callsigns sorted in a wide variety of ways. Nearly 200 additional pages, of the very latest amateur radio information, make this book the indispensable guide for every amateur.

£19.99

Features:
* Around 70,000 UK callsigns
* Irish callsigns
* Callsigns sorted by name and postcode
* Licensing Information UK and International
* A full colour Review of the Year
* National and Featured Club Information
* Exam Licence and Course Information
* Prefix Lists
* Latest Band Plans
* Award and Contest Information
* Technical Help and much more

FREE CD. Some buy this book for the CD alone not only do you get all of the information pages of the yearbook in a fully searchable format you also get, loads of bonus material. This CD contains over 600MB of bonus material. There are samples of RSGB, masses of amateur radio software, extra club information and more, all in an easily accessed format.

CALLSEEKER PLUS 2012 CD

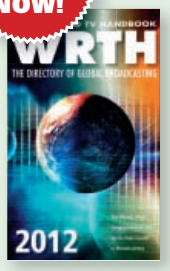
Cheaper than a RSGB Yearbook and with more callsigns.

For those who want the convenience of an instant search call book that not only covers the UK but Europe as well, that is Callseeker Plus! Like the RSGB Yearbook the Callseeker Plus 2012 CD contains the most up-to-date listings of United Kingdom and Republic of Ireland amateurs' callsigns but you will also find comprehensive coverage of callsigns from across Europe. Provided in a user friendly format that takes on no hard disc space this CD is the ideal way to search for European QSLs. The software runs straight from the CD so you can search by callsign, name or location. Navigating through the search results is quick and easy and you can print the results in a variety of formats including straight to an address label. Users will also find callsigns from 9A, DL, EA, ES, F, HA, HB9, I, LX, LY, OE, OH, ON, OZ, SM, SP, SV and Z3.

Callseeker Plus 2012 also provides much more. The nearly 200 pages of the information section from the RSGB Yearbook are included in an easily searchable PDF. Callseeker Plus boasts a host of "extras" from across Europe, including hundreds of Mega Bytes of useful amateur radio software.

£15.99

IN STOCK NOW!



WORLD RADIO TV HANDBOOK 2012

The bestselling directory of global broadcasting on LW, MW, SW & FM

The Features section has a history of radio on Tristan da Cunha, reviews of the latest equipment, an explanation of receiver testing terms and techniques, a visit to Radio Bulgaria, and other articles and items, including our regular Digital Update. The remaining pages are, as usual, full of information on: National and International broadcasts and broadcasters by country with frequencies, powers, languages, contacts, and more, including Clandestine and other target broadcasters.
MW frequency listings by region. International and domestic SW frequency listings, as well as DRM listings International SW broadcasts in English, French, German, Portuguese & Spanish.
Reference section with Transmitter locations, DX clubs, Internet Resources, and much more

IN STOCK NOW!

RADIO LISTENER'S GUIDE 2012 EDITION

Frequencies and transmitter information for all BBC and commercial radio stations, plus DAB digital transmitter details.

Radio Reviews - Independent reviews of analogue and DAB digital radios. News from BBC and commercial radio stations.
Analogue Radio switch-off - The latest information about plans for FM and medium wave switch-off. Digital Radio (DAB) - The latest news and information.Sky, Freeview and Freesat radio information and channel lists. Advice shows you how to get the best from your radio.

ONLY £5.95

RSGB RADIO COMMUNICATION HANDBOOK. 11TH EDITION

Fully updated and revised, the RSGB Radio Communication Handbook is massive 864 pages of the very latest amateur radio technology.

* 864 A4 pages
* 25 chapters and two appendices
* 600,000 words!
* Over 1700 illustrations
* Bonus CD
* Projects for audio to light

If you only ever buy one book on amateur radio, this should be the one!

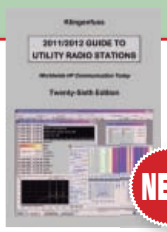
£32.99

	Pages	Price
AIRBAND		
● **CIVIL AIRCRAFT MARKINGS 2011** Alan S Wright. (abc)	448	£11.99
● **MILITARY AIRCRAFT MARKINGS 2011** Howard Curtis. (abc)	224	£11.99
● **AIRWAVES 2011** (Photavia)	144	£11.50
● **CALLSIGN 2011** (Photavia)	111	£11.50
● **THE UK, NORTHERN IRELAND & IRELAND FLIGHT ROUTES 2011** (Seldec)	225	£14.95
● **NEW UK & IRELAND AIRBAND FREQUENCY GUIDE** 16th Edition (Seldec)	146	£10.95
● **NEW POCKET UK & IRELAND AIRBAND FREQUENCY GUIDE** 16th Edition (Seldec)	128	£7.75
● **AIR TRAFFIC CONTROL HANDBOOK David** Smith	208	£16.99
● **VIRTUAL RADAR EXPLAINED** Mike Richards (RSGB)	64	£6.99
● **GUIDE TO THE AIRNAV RADAR BOX** (Seldec)	163	£12.95
● **THE RADARBOX COMPANION** (Seldec)	163	£12.95
● **DIRECTORY OF AIRCRAFT SELCALS** 8th edition. (Seldec)	205 PLUS CD	£15.95
● **HF AIRBAND FREQUENCY GUIDE** (Seldec)	225	£14.75
● **AIR TRAFFIC CONTROL** 10th Edition (abc)	112	£9.99
● **AIRBAND RADIO GUIDE** 7th Edition (abc)	112	£9.99
SCANNING & FREQUENCY GUIDES		
● **NEW WORLD RADIO TV HANDBOOK 2012** (WRTH)	TBA	£24.95
● **NEW RADIO LISTENERS GUIDE 2012**	160	£5.95
● **NEW 2011/2012 KLINGENFUSS GUIDE TO UTILITY STATIONS Inc' Jan 2012 supplement 100s more frequencies**	590	£43.00
● **NEW 2012 KLINGENFUSS SHORTWAVE FREQUENCY GUIDE**	400	£36.00
● **NEW 2012 KLINGENFUSS SUPER FREQUENCY LIST CD**		£26.00
● **KLINGENFUSS RADIO DATA CODE MANUAL** 18th Edition	600	£43.00
● **SCANNERS 6** B. Robertson & P. Rouse	245	£9.95
● **HF MARINE FREQUENCY LIST**. (Seldec)	225	£14.75
● **THE POCKET UK & IRELAND VHF MARINE FREQUENCY GUIDE**. (Seldec)	108	£5.75
● **OUT OF PRINT UK SCANNING DIRECTORY** - 9th edition	544	£19.75
ANTENNAS/TRANSMISSION LINES/PROPAGATION		
● **STEALTH ANTENNAS** (RSGB)	208	£13.99
● **HF ANTENNAS FOR EVERYONE** (RSGB)	336	£14.99
● **BUILDING SUCCESSFUL HF ANTENNAS** (RSGB)	224	£14.99
● **BASIC ANTENNAS** (ARRL)	216	£24.99
● **EVEN MORE OUT OF THIN AIR** (PW Publishing)	80	£6.75
● **25 SIMPLE TROPICAL & MW BAND AERIALS** E.M. Noll (Babani)	54	£1.75
● **AN INTRODUCTION TO RADIO WAVE PROPAGATION** J.G. Lee. (Babani)	116	£3.95
● **ANTENNA FILE** (RSGB)	285	£18.99
● **ANTENNA TOOLKIT 2** Joseph Carr	256	£28.99
● **ANTENNA TOPICS** Pat Hawker G3VA (RSGB)	384	£18.99
● **BACKYARD ANTENNAS** Peter Dodd G3LDO (RSGB)	200	£18.95
● **OUT OF PRINT EXPERIMENTAL ANTENNA TOPICS**	72	£3.50
● **HF ANTENNA COLLECTION** Edited by Erwin David G4LQI. (RSGB)	233	£19.95
● **HF ANTENNAS FOR ALL LOCATIONS** 2nd edition. Les Moxon G6XN. (RSGB)	322	£19.99
● **INTERNATIONAL ANTENNA COLLECTION 2**. G. Brown M5ACN. (RSGB)	200	£12.95

You can see full descriptions of all these books & order securely on-line at www.mysubcare.com see the magazine's related products section. Also, see www.pwpublishing.ltd.uk/bookstore/books.html for full descriptions of all these books.

	Pages	Price
● **PRACTICAL ANTENNAS FOR NOVICES** John Heys	58	£7.99
● **PRACTICAL WIRE ANTENNAS 2** Ian Poole G3YWX	172	£11.99
● **RADIO PROPAGATION PRINCIPLES & PRACTICE** Ian Poole G3YWX	102	£14.95
● **SIMPLE AND FUN ANTENNAS FOR HAMS** (ARRL)	200	£16.99
BEGINNERS/LICENCE/MANUALS		
● **TECHNICAL FOR THE TERRIFIED** (PWP)	124	£12.99
● **ADVANCE! THE FULL LICENCE MANUAL** Alan Betts G0HIQ & Steve Hartley G0FUW. (RSGB)	104	£11.99
● **AMATEUR RADIO EXAM SECRETS** Alan Betts G0HIQ (RSGB)	104	£12.99
● **AMATEUR RADIO EXPLAINED** Ian Poole G3YWX. (RSGB)	80	£5.79
● **DISCOVER DXING**. 3rd edition. J. Zondlo	96	£6.95
● **FOUNDATION LICENCE NOW! 5th Edition** Alan Betts G0HIQ. (RSGB)	32	£4.99
● **HF AMATEUR RADIO 2nd Ed.** Ian Poole G3YWX. (RSGB)	144	£12.99
● **INTERMEDIATE LICENCE – BUILDING ON THE FOUNDATION 4th Edition** Steve Hartley G0FUW. (RSGB)	76	£6.99
● **NOVICE RADIO AMATEURS EXAMINATION HANDBOOK** I.D. Poole. (Babani)	150	£4.95
● **SECRET OF LEARNING MORSE CODE** Mark Francis. (Spa)	84	£6.95
● **MORSE CODE FOR RADIO AMATEURS**. (RSGB)	32 inc. CD	£7.99
DESIGN & CONSTRUCTION		
● **HOMEBREW COOKBOOK** (RSGB)	208	£12.99
● **CIRCUIT OVERLOAD** (RSGB)	504	£18.99
● **THE ART OF SOLDERING** R. Brewster. (Babani)	84	£3.99
● **THE SUPERHET RADIO HANDBOOK** I.D. Poole. (Babani)	104	£4.95
SHACK ESSENTIALS		
● NEW **RSGB RADIO COMMUNICATIONS HANDBOOK + CD** 11th Edition. (RSGB)	864	£32.99
● NEW **RSGB YEARBOOK** 2012 edition. (RSGB)	528	£19.99
● NEW **CALLSEEKER PLUS CD** 2012 edition. (RSGB)		£15.99
● NEW EDITION **AMATEUR RADIO ASTRONOMY 2nd Edition** J. Fielding. (RSGB)	384	£16.99
● **RSGB PREFIX GUIDE**. 9th edition. (RSGB)	34	£8.99
● **RSGB AMATEUR RADIO OPERATING MANUAL** 7th. (RSGB)	224	£16.99
● **ARRL HANDBOOK 2011** inc CD. (ARRL)	1416	£37.99
● **ARRL OPERATING MANUAL** 9th Ed. (ARRL)	420	£19.99
● **DXPEDITIONING - BEHIND THE SCENES FOR RADIO AMATEURS WORLDWIDE** N Cheadle & S Telenius Lowe	180	£6.95
● **THE RIG GUIDE** S W White. (RSGB)	88	£4.99
● **AMATEUR RADIO ESSENTIALS** G. Brown. (RSGB)	288	£25.99
● **AMATEUR RADIO (VALUE) LOGBOOK** (RSGB)	80	£4.95
● **DIGITAL MODES FOR ALL OCCASIONS** M Greenman (RSGB)	208	£16.95
QRP		
● NEW **INTERNATIONAL QRP COLLECTION**. (RSGB)	176	£11.00
● NEW EDITION **LOW POWER COMMUNICATIONS**. 3rd Edition. (ARRL)	240	£14.99
● BACK IN STOCK **MORE QRP POWER**. (ARRL)	176	£16.99
● **QRP BASICS**. George Dobbs G3RJV. (RSGB)	204	£14.99
VHF & HIGHER		
● **MICROWAVE KNOW HOW** Andy Barter G8ATD. (RSGB)	192	£12.99

NEW!



NEW!

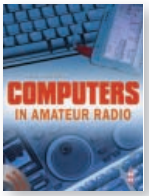
IN STOCK NOW!

2011/2012 KLINGENFUSS GUIDE TO UTILITY STATIONS 26th Edition Inc' a Jan 2012 supplement 100s more frequencies 590 £43.00

2012 KLINGENFUSS SHORTWAVE FREQUENCY GUIDE 400 £36.00

2012 KLINGENFUSS SUPER FREQUENCY LIST CD £26.00

COMPUTERS IN AMATEUR RADIO

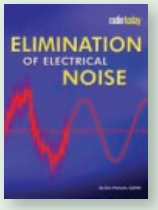


Radio amateurs have always been quick to embrace changes to their hobby to make operating easier or provide something extra. Computers are no exception and they have become essential tools to get the job done quicker and easier than ever before. But there is much that can be done with a computer and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

Free CD

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

£16.99



ELIMINATION OF ELECTRICAL NOISE FROM 30kHz TO 30MHz

Many radio amateurs experience electrical noise problems and feel forced off the amateur radio bands. Don Pinnock, G3HVA is a firm believer that radio amateurs should deal with the problems rather than not be forced off the air. Elimination of Electrical Noise therefore tells of Don's personal experiences and provides solutions to noise problems that will help many.

£6.99

AMATEUR RADIO EXPLAINED

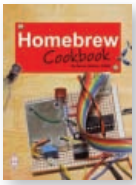
Written by well-known author and radio amateur Ian Poole, G3YWX, this book provides the ideal introduction to the wonderful world of amateur radio. Amateur Radio Explained is for people first taking an interest in amateur radio and those ready to move on from Foundation level. Written in a readable and easy-to-understand fashion, Amateur Radio Explained is the perfect introduction to the exciting world of amateur radio. 80 pages.

£5.79

STEALTH ANTENNAS

Tiny postage stamp-size gardens, intolerant neighbours, planning permission problems, living in apartments: these are some of the challenges facing the modern radio amateur when trying to get on the air. Stealth Antennas offers clear practical advice to those who might have thought they were unable to put up a suitable antenna.

£13.99



HOMEBREW COOKBOOK

If you are interested in home construction, Eamon Skelton, EI9GQ is the acknowledged expert in this field. The RadCom columnist on the subject, Eamon brings his enthusiasm, common sense and easy to understand approach to the Homebrew Cookbook, such that readers will be reaching for their soldering iron with inspiration.

£12.99

AIR TRAFFIC CONTROL HANDBOOK

The complete guide for all aviation and air band enthusiasts. This is a reincarnation of the Air Band Radio Handbook, an essential reference book first published over 20 years ago and a strong seller throughout its eight editions. The new title reflects not just the extent of overhaul and updating that has occurred for this new version, but also the fact that a larger proportion of the audience these days comprises air traffic controllers themselves (both trainees and fully qualified) as well as the traditional air band listening enthusiast. The expert author's accessible and comprehensive text explains the intricacies of air traffic control and its jargon, enabling the reader to locate and interpret what is actually going on in the airways overhead.

£16.99

FOUNDATION LICENCE NOW! £4.99.

INTERMEDIATE LICENCE. BUILDING ON THE FOUNDATION £6.99.

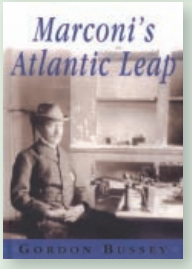
ADVANCE! THE FULL LICENCE MANUAL £11.99.

AMATEUR RADIO EXAM SECRETS £12.99

HITLER'S RADIO WAR

This book tells the story of Nazi international broadcasting during and before the Second World War. At its peak German radio stations broadcast in fifty-four languages to a worldwide audience. For the first time in an international conflict, citizens of the warring nations could hear enemy propaganda in their own living rooms. Many of the voices that they heard belonged to a new type of criminal, the radio traitor. The nickname Lord Haw-Haw is still famous internationally, but there were numerous other radio renegades speaking on behalf of the Nazis. The Nazis' propaganda was sinister enough, but they also ran a series of secret stations that spoke to enemy audiences in the name of 'patriotic' dissidents who claimed to be broadcasting from clandestine transmitters in their own countries. Using archival material, "Hitler's Radio War" dissects the message that Germany's overt and covert propaganda stations broadcast to their audiences, as well as the lives and motivations of the broadcasters.

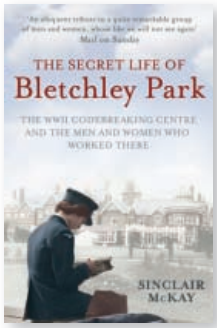
£20.00



MARCONI'S ATLANTIC LEAP

A fascinating fully illustrated and documented description of the bridging of the Atlantic by wireless in 1901 by Marconi, who was only 27 at the time. 96 pages.

£6.99



THE SECRET LIFE OF BLETCHLEY PARK

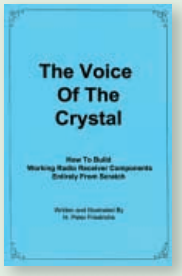
A truly fascinating account of the people who worked at Bletchley Park – their work and recreation. This book is about people working in a very special environment.
Despite the long hours – night shifts were where some of the most amazing breakthroughs were made – there was a social life complete with excellent amateur dramatics and many other activities. Winston Churchill even made sure the staff could have a tennis court! And, despite everything, romance often blossomed between staff!

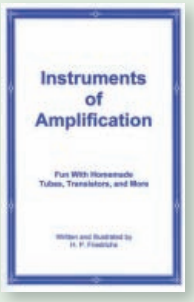
£8.99

VOICE OF THE CRYSTAL

185 pages of practical information on the fabrication of electronic components suitable for use in building crystal radio sets. Basic theory and simple analysis is combined with dozens of examples of historical practice, work by contemporary experimenters, and construction details for many instruments fabricated by the author himself.

£11.95





INSTRUMENTS OF AMPLIFICATION

Rob Mannion G3XFD writes: Peter Friedrichs has written a truly superb book but has chosen a title that really hides its 'light' under the proverbial bushel! Armed with the book an interested constructor can literally build a radio from scratch anywhere! Perhaps a better title could have been Desert Island Radio for the Shipwrecked because everything from simple earphones, detectors and mechanical amplifier to home made valves (tubes) and transistors. If you enjoy Rough Science on BBC2 you'll love this book! **Very highly recommended**.

£14.95

RADIO PIONEERS 1945

Discover the history of the Veteran Wireless Operators Association and the Amateur Radio Relay League. See some of the early wireless catalogues and amateur stations. Get a brief but to-the-point chronology of radio developments to 1925. You get pictures of early tubes, Poulsen in his lab, Marconi parabolic reflectors, a Fessenden alternator and more. The history is brief, fast reading, but informative. You'll read about the personalities and discover what they did.

£7.95

VINTAGE RADIOS

£19.95

This book tells the collector and the armchair wireless enthusiast everything there is to know about classic radios from the 1920s to the end of the 1960s. All the important makes and models are discussed and the author also covers buying and selling, care and restoration and many other topics, including foreign radios and radio-related ephemera. Illustrated with many colour photographs, this is the perfect collector's companion to the fascinating hobby. 208 pages.

THE PW PUBLISHING LTD
RADIO BOOK STORE

mail order...huge range in stock...fast delivery...

	Pages	Price
ALL ABOUT VHF AMATEUR RADIO W. I. Orr W6SAI. (ARRL)	163	£8.95
GUIDE TO VHF/UHF AMATEUR RADIO Ian Poole G3YWX.(RSGB)	180	£9.99
VHF/UHF HANDBOOK Andy Barter G8ATD. (RSGB)	302	£14.99

HISTORICAL

THE SECRET LIFE OF BLETCHLEY PARK Sinclair McKay (Aurum Press)	368	£8.99
HITLER'S RADIO WAR Roger Tidy (Robert Hale)	240	£20.00
WORTHINGTON'S WORLD - THE SHORT WAVE YEARS (PW Publishing)	146	£9.95
INSTRUMENTS OF AMPLIFICATION HP 'Pete' Friedrichs	300	£14.95
RADIO PIONEERS 1945 (Lindsay)	64	£7.95
VINTAGE RADIOS (Crowood)	208	£19.95
MARCONI'S ATLANTIC LEAP (H/B) Gordon Bussey. (Marconi)	96	£6.99
NEW LOW PRICE THE SAGA OF MARCONI OSRAM VALVE B. Vyse & G. Jessop	346	£17.50

CRYSTAL SETS

CRYSTAL RECEIVING SETS & HOW TO MAKE THEM (Lindsay)	124	£8.95
VOICE OF THE CRYSTAL (Pete Friedrichs)	185	£11.95

ELECTRONICS

COMPUTERS IN AMATEAUR RADIO (RSGB)	200	£16.99
ELIMINATION OF ELECTRICAL NOISE (RSGB)	64	£6.99
ELECTRONIC PROJECT BUILDING FOR BEGINNERS (Babani)	110	£4.99
GETTING THE MOST FROM YOUR MULTIMETER (Babani)	102	£4.99
HOW TO USE OSCILLOSCOPES & OTHER TEST EQUIPMENT (Babani)	110	£4.99

BINDERS

- **PRACTICAL WIRELESS OR RADIOUSER** £10.00

Why not tidy your shack with a binder?

Practical Wireless on CDROM

NEW AND AVAILABLE NOW!

PRACTICAL WIRELESS 2010 ARCHIVE £14.99
PRACTICAL WIRELESS 2005-2009 ARCHIVE £24.99

You can order securely on-line at

www.mysubcare.com

see the magazine's related products section.

HOW TO ORDER

Telephone: 0845 803 1979

Call the Bookstore, Monday to Thursday 9am to 4pm (now closed Fridays)

Callers with an appropriate BT inclusive call package can call this number free!
Your order will usually be delivered to you within a week!

Outside these hours your order will be recorded on an answerphone.

Post: Write to the Bookstore, remembering to include your name, address, daytime telephone number and payment details (Sterling please - cash not accepted. **Cheques made payable to PW Publishing Ltd.**), at: **Bookstore, PW Publishing Ltd., Broadstone, Dorset BH18 8PW.**

Fax: If you wish to FAX your order to us please mark it for the attention of the Bookstore and send it to: 01202 659950

E-mail: bookstore@pwpublishing.ltd.uk

Order Securely on-line: www.mysubcare.com or www.pwpublishing.ltd.uk

Photocopies & Back Issues: To order a back Issue, please call the Order Line or E-mail us to check availability. We can photocopy articles from issues that are not available - we have a Review List going back years!

	Current Issue	Back Issues
Practical Wireless	£3.50 (inc UK P&P)	£5.00 (inc UK P&P)
RadioUser	£3.50 (inc UK P&P)	£5.00 (inc UK P&P)

Overseas post: Europe or ROW postal charges to be added to the above.

Photocopies / Reprints (per article): £3.00 (inc P&P).
Overseas: Please add £1.50 to the above prices. E&OE

order form

04/12

Photocopies are acceptable

Please try to order from an up-to-date magazine to ensure correct prices and availability.

.....Price (£).....

.....Price (£).....

.....Price (£).....

.....Price (£).....

.....Price (£).....

.....Price (£).....

.....Price (£).....

.....Price (£).....

Total cost of books ordered:.....Price (£).....

Postage & Packing charges: Please remember to add P&P to your order.

UK: £2.05 P&P for one item, £1.65 per item thereafter

Overseas Europe:
£3.30 P&P for one, £2.50 per item thereafter

Overseas Rest of World:
£5.30 P&P for one, £4.00 per item thereafter (£) .....

Total cost of order including postage **£**
Prices include VAT where applicable

Send this completed form to:

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

Payment Details. Please note: For security purposes, you must include your house number and postcode.

Name .....

Address .....

.....

.....

Postcode.....

Telephone (Daytime) .....

I enclose my Cheque/Postal Order for £.....

Please note: Cheques MUST be made payable to PW Publishing Ltd. and please write your cheque guarantee card number on the reverse.

or please debit my MasterCard/Visa/Amex

Expiry Date ..... Security No.

or please debit my Maestro/Solo

Expiry Date ..... Security No.

Start date ..... Issue No (if on card).....

Signature.....

Orders are normally delivered within a week but please allow 28 days for delivery. Prices correct at the time of going to press. Please note: all payments must be made in Sterling, cash not accepted.

Subscribe to Practical WIRELESS

Britain's Best Selling Amateur Radio Magazine

NEW! No more renewal letters!

3, 6 and 12 Month Subscriptions are Now Available by Direct Debit*

Subscription Rates

Practical Wireless Subscription

	3 Month*	6 Month*	1 Year*	2 Year	3 Year
UK	☐ £10	☐ £20	☐ £38	☐ £73	☐ £104
Europe			☐ £47	☐ £89	☐ £130
ROW			☐ £57	☐ £108	☐ £161

Joint & Practical Wireless & RadioUser Subscription – Save £££s

	3 Month*	6 Month*	1 Year*	2 Year	3 Year
UK	☐ £20	☐ £38	☐ £73	☐ £138	☐ £197
Europe			☐ £79	☐ £170	☐ £246
ROW			☐ £101	☐ £207	☐ £307

* 3 and 6 month subscriptions are only available by Direct Debit. 12 month subscriptions are available to pay by Direct Debit if you wish (no more renewal letters!) Sorry, but due to financial restrictions, this service is not available for 2, 3 year or overseas subscriptions.

Existing subscribers will be offered the option to pay by Direct Debit at the end of their subscription.

- Never miss an issue
- Have it delivered to your door
- Subscribers get their copies before they reach the shops
- Avoid price rises
- Save £££s

To order a subscription please contact our subscription agency:

Practical Wireless Subscriptions
Unit 8 The Old Silk Mill
Brook Street
Tring
Hertfordshire HP23 5EF

NEW Address

Please note: any **cheques should be made payable** to **PW PUBLISHING LTD** and CASH is NOT accepted by ourselves or Webscribe.

Orders taken on:

NEW Numbers

01442 820580

between 9am - 5pm. Outside these hours your order will be recorded on an answering machine.

FAX orders taken on:

01442 827912

Secure Internet orders can be placed at:

www.mysubcare.com

or via e-mail to:

pw@webscribe.co.uk

On-line facilities are available as well as the usual way to pay by cheque, postal order, credit card and now by direct debit too.

Order a new subscription online Simply pay with a credit card or set up your direct debit subscription online using our secure server.

Check the status of a subscription online Existing subscribers can now log in to their own accounts and see how many issues they have left to run.

Update your details online If you move or change your personal details, you can now update them online without having to write in to let us know.

Renew an existing subscription online We've made renewing easier too. Everything you need to renew is now available online as well as by regular mail. (Subscribers still get a reminder in the post when it's time to renew unless it's payable by Direct Debit).

If you wish to pay by direct debit please contact Webscribe, our subs agency, to set it up - it's simple!

☐ *I wish to order a one/two/three* year subscription to* **practical wireless** *starting with the.....issue.*

☐ *I wish to order a joint one/two/three* year subscription to* **practical wireless & radiouser** *and starting with the.....issue.*

Payment Details

I enclose my Cheque/Postal Order* for £.....

*made payable to PW Publishing Ltd.

or please debit my MasterCard/Visa/Amex card No.

☐☐☐☐ ☐☐☐☐ ☐☐☐☐ ☐☐☐☐

Security Number: ☐☐☐

Expiry Date.....

or please debit my Switch card No.

☐☐☐☐ ☐☐☐☐ ☐☐☐☐ ☐☐☐☐ ☐☐☐

Security Number: ☐☐☐

Start Date.....Switch Issue Number (if on card).....

Switch Expiry Date.....

Signature.....

Name.....

Address.....

.....

Please note: For security purposes, you must include your house number and postcode.

.....

.....

Postcode.....

Daytime Telephone Number.....

E-mail.....

Orders are normally despatched by return of post but please allow 28 days for delivery. Prices correct at time of going to press. E&OE.

Please note: All payments must be made in Sterling.
Cash not accepted.
Cheques made payable to PW Publishing Ltd.

*Delete as necessary. Photocopies of this page are acceptable

Rob Mannion G3XFD/EI5IW's

Topical Talk

The Editor discusses comments and feed-back from readers' letters in this issue. And it's no surprise that the GB80PW activity is a main topic!

It was no surprise to me that following the thoroughly enjoyable day operating GB80PW that we had some interesting feed-back from readers. However, I was must admit I was rather taken aback by the number of E-mails received. Thank you everyone! Also, there are many of your envelopes waiting here – and soon as the GB80PW cards are ready I'll be posting them out to you.

In the *Letters* section this month I've tried to publish a 'balanced' selection of the 100 or so E-mails I've received from readers. I was particularly interested to see that quite a number of you have enjoyed using the Dutch-based **www.nachtuilen.net** Web SDR receiver.

As I've already mentioned in this month's *Keylines*, I used the Dutch Internet receiver to listen in to and monitor GB80PW when Phil G3XBZ was operating. Using the facility I was able to confirm how much stronger the transmissions were from my station. It was also gratifying to read how useful **Roy Walker 2E0RAF** and **David Higgins G4NVB** (*Letters* this issue) found the facility to be.

I'm hoping now (as my own E-mails have remained unanswered so far) that any of our Dutch readers will let us know the full story behind the Web SDR facility. I can then fully acknowledge the usefulness to those people involved in running it. Let's face it – it's must take some effort, time and financial effort to keep it running!

Your Favourite Antenna?

It's also gratifying to see that a good number of our readers are responding to my request for details on "Your Favourite Antenna". There has been an unusually good response and I have managed to find space for several examples in the *Letters* section this month.

The idea behind my request is part of the attempt to get help erecting antennas for those who – for one reason or another – can't erect the antennas they need. We'll all need help with choosing and erecting antennas at some time or other – and I'm sure that with that in mind everyone is trying to help by passing on details of their own favourite antennas. Please keep the details coming!

Ian Reichenfeld M0RGI (*Letters* this month) jokingly suggests I've "Opened a can of worms" – because we all know there are some strongly held opinions out there in the world of Amateur Radio. So – please make sure we can read your opinion by sending your own comments in.

Deliberate Interference

Several of my correspondents have commented on the deliberate interference that we sometime get on the Amateur bands – trying to disrupt QSOs. However, we should realise that the occasional Dutch station who popped up on the frequency on Saturday February 11th – probably did so because of propagation changes and I'm afraid that can happen in both directions – so we must be tolerant!

I think it's extremely unlikely that the 'whistlers', 'jammers' and general nuisance types we can attract on the bands will read *PW*. So (and even if they do see the magazine!) I must emphasise that it's essential that nobody comments on hearing the interference they cause. Without a 'signal report' they have no idea if they're being heard!

The nuisance transmitter problem has been raised in *PW* before – it's not new. But to be quite frank the few outbreaks of deliberate nuisance noises only lasted a few moments and didn't cause major difficulties at all to the operators at GB80PW. My advice is – please ignore them – like the peculiar people who spray paint on buildings, walls and on the 'back of the bike shed' – they crave attention. And we should deny that attention!

However, the outbreak of the 'aircraft engine noise' jammer – which fortunately only lasted a short while – does concern me. It popped up on frequency and completely disrupted the channel. This type of jammer was very common in the 'Cold War' and is not available to Radio Amateurs. Bearing in mind the uniformed idiot (it was a bored 'Squaddie') who effectively jammed the 14.1MHz beacon frequency from a military installation in a European Union country in Eastern Europe a few years ago – I hope we're not going to suffer again. Time to get the direction finding antennas ready? I managed to locate the 14.1MHz jammer – and we could locate the nuisance again by working together!

Rob Mannion G3XFD/EI5IW

SPECIALIST DEALERS

DORSET

PW Publishing Ltd
have a wonderful selection of radio based books and magazines.

We can also supply a copy of most individual reviews that you may have read in past editions of *Practical Wireless*, *RadioUser*, *Radio Active* and *Short Wave Magazine* magazines.

Tel: 0845 803 1979

ESSEX

WATERS & STANTON PLC
Spa House, 22 Main Road, Hockley Essex SS5 4QS
Tel: (01702) 206835/204965
Fax: (01702) 205843
Web: http//www.waters-and-stanton.co.uk
E-mail: sales@wsplc.demon.co.uk
Open 9am to 5.30pm Monday to Saturday inclusive.
MAIN AGENTS – ALL BRANDS
PHONE/FAX FOR FREE PRICE LIST

ESSEX

INNOVANTENNAS
THIS AD IS NOT FOR SERIOUS DXERS AND CONTESTERS
(THEY KNOW WHO WE ARE ALREADY)
WWW.INNOVANTENNAS.COM
INFO@INNOVANTENNAS.COM
CALL FREE
0800 0124 205

MID GLAMORGAN

SANDPIPER AERIAL TECHNOLOGY
Unit 5, Enterprise House, Cwmbach Industrial Estate, Aberdare, Mid Glamorgan CF44 0AE
Tel: (01685) 870425 Fax:(01685) 876104
A full range of transmitting & receiving antennas available for the amateur commercial market.
www.sandpiperaerials.co.uk
e-mail: sales@sandpiperaerials.co.uk

NORTHAMPTONSHIRE

TETRA
WWW.TETRA.CO
01604 603 866

SCOTLAND

JAYCEE ELECTRONICS LTD
20 Woodside Way, Glenrothes, Fife KY7 5DF
Tel: (01592) 756962 (Day or Night)
Fax No. (01592) 610451
***New opening hours:** Tuesday-Friday 9am to 5pm. Saturday 9am to 4pm. Closed Sunday & Monday.*
KENWOOD, YAESU & ICOM APPROVED DEALERS
A good stock of new and secondhand equipment always in stock

SCOTLAND

TENNAMAST
General Steel Fabrication
Radio Masts | Masts | Boat Cradles | Trailers
A complete range of Multi purpose Masts
The best of Scottish engineering!
Tel: 01505 503824
www.tennamast.com
sales@tennamast.com

WEST SUSSEX

Adur Communications
PO Box 2047,
Steyning BN44 3XJ.
Tel: (01903) 879526
E-mail: service@adurcomms.com
Repairs and alignment to all amateur and commercial radio equipment.

INDEX TO ADVERTISERS

Telephone 0845 803 1979 to advertise in *Practical Wireless*

HAVING TROUBLE FINDING PW?

The best way to ensure you receive every issue of Practical Wireless and/or RadioUser is to place an order with your local newsagent. Once set up, your copy of Practical Wireless and/or RadioUser will be held for you to collect, saving you the time and the frustration of having to search the newstand. Some newsagents may even offer a home delivery service making it even easier to obtain your copy. So don't miss an issue, simply complete the form opposite and take to your local newsagent today.

KEEP A LOOK OUT FOR THE LOGO AND NEXT TIME YOU VISIT YOUR NEWSAGENT REMEMBER TO JUST ASK! ABOUT OBTAINING COPIES OF YOUR CHOSEN MAGAZINES.

Please reserve/deliver* a copy of ..... on a regular basis,

commencing with the..... issue. *delete as appropriate

Title/Mr/Mrs/Ms.....

First name..... Surname .....

Address.....

.....

..... Postcode.....

Daytime Telephone No: .....

MOONRAKER
SALES LINE 01908 281705
E-mail: sales@moonraker.eu
Web: www.moonraker.eu

If we advertise it – we stock it!

VISA Maestro MasterCard PayPal

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-100 Mil spec, 5mm, 50 ohm, 100m reel **£44.95**
RG58M-DRUM-50 new 50m reel of mil spec RG58 in a great handy size .only **£24.95**
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**
FWPVC-100 Original PVC coated flexweave antenna wire, 4mm, 100m reel **£79.95**

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-P10 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 ½ inch aluminium tube with terminal connections ... **£7.95**
DPC-38 Dipole centre with SO239 socket with two 3/8th 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 **£1.00**
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

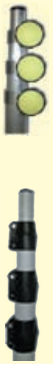
We have all the mounting brackets you could possible want – for all options see our website
TRIPOD-HDA Free standing, heavy duty, fold away tripod, which adjusts from 50-65mm **£149.95**
TRIPOD-25L Free standing heavy duty tripod to suit masts 65mm or less..... **£79.95**
TRIPOD-20L Free standing heavy 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**

bhi

NES10-2 Mk3 noise eliminating speaker .. **£112.95**
The NES10-2MKII Noise Eliminating Speaker removes unwanted background noise, hiss, hash computer hash, plasma TV interference, white noise etc from speech so that you can hear the speech much more clearly.

DESKTOP "noise away" robust base station speaker..... **£154.95**
The Desk Top "Noise Away" is a stylish robust base station speaker for use in radio communications, especially amateur radio

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 Fiberglass 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 33ft 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**

Patch Leads

PL58-0.5 ½m 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 ½m 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**
PL259-103C Compression type for Westflex 103..... **£5.50**
NTYPE-6 Compression type plug for RG58..... **£3.95**
NTYPE-9 Compression type plug for RG213..... **£3.95**
NTYPE-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**
NTYPE-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 38th thread..... **£3.95**

MFJ Antenna Tuners

New lower prices!

See our website for full details.
AUTOMATIC TUNERS
MFJ-925 Super compact 1.8-30MHz 200W **£174.95**
MFJ-926 remote Mobile ATU 1.6-30MHz 200W..... **£429.95**
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**
MANUAL TUNERS
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 3.6-54MHz 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..... **£269.95**
MFJ-259B Digital Analyser 1.8-170MHz..... **£259.95**
MFJ-269 Digital Analyser 1.8-450MHz..... **£369.95**
MFJ-269PRO Digital Analyser 1.8-170/415-450MHz..... **£389.95**
NEW MFJ-966 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 1.8-54MHz continuously **£519.95**
LDG AT-600Pro 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**
RG213 Mil spec **£59.95**
WESTFLEX 103 ..... **£79.95**

ALL PICTURES ARE FOR REFERENCE ONLY

Check on-line for all updates, new products and special offers

Yaesu are proud to be global sponsors of the T32C Christmas Island DXpedition 2011

The Real DX Compact

The FT-450D 100W HF/50MHz Transceiver

The state-of-the-art IF DSP technology in combination with the Roofing Filter and 8 Band Pass Filters combine in the FT-450D to provide a level of transmit and receive performance only previously available in our high-level base transceivers.

The FT-450D offers world class performance in an incredibly compact package that is ideal for base or DX use.

The FT-450D enabled the T32C Christmas Island DXpedition to achieve 10 World Records!

Total QSOs 213,169
Total Uniques 48,914
CW QSOs 102,216
SSB QSOs 88,416
RTTY QSOs 19,225
10.1 MHz QSOs 16,398
21.0 MHz QSOs 35,489
24.9 MHz QSOs 25,265
North America QSOs 109,327
Oceania QSOs 4,214

YAESU
Choice of the World's top DX'ers

Yaesu UK Ltd Unit 12 Sun Valley Business Park Winnall Close Winchester Hampshire SO23 0LB UK