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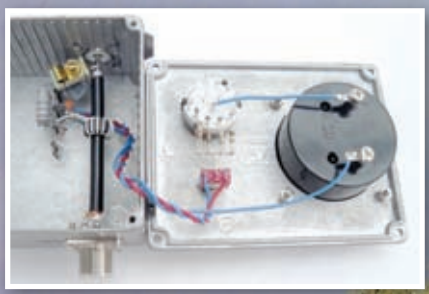

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YouKits HB-1B Now with 4 Bands! NEW

80m, 40m. 30m & 20m

The Tiny QRP CW Radio that fits in your brief case or saddle bag!

This compact transceiver will allow you to go on your own DXpedition. Now with 4 bands, it is even better. Up to 5 Watts out and the ability to run from AA cells or 12v. Offers CW/SSB rx from 3.5 - 16MHz and continuously variable selectivity from 400Hz - 2.2kHz. Full QSK and auto CQ with your own call sign stored. Digital readout and adjustable tuning steps.

£229.95 D

ICOM NEW IC-9100 ALL-ROUNDER

HF to 23cms Base Transceiver

The IC-9100 has received rave reviews and is THE radio for those who want everything in one box! Add the 23cms module & D-Star board to expand your hobby even more. A real gem & comes with 2 year warranty. **UX-9100** 23cms **£599**. **UT-121** D-Star board **£129.95**. **FL-430/1** Roofing filters **£52.95.**

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

Satellite Mode Operation:
Optional D-Star DV Mode.

£2899 D

ICOM IC-7410 HF-6m Transceiver

SAVE £300!

- *100W HF-6m all modes.*
- *Receiver +3-dBm IP3 + 15kHz roofing filter*
- *36kHz DSP IF 32 bit razor sharp filter*
- *Internal auto ATU included.*
- *USB interface for PC control and audio out*
- *Large LCD with comprehensive display*
- *Integrates speech synthesizer*

Another winning design from Icom, the "expensive" features introduced a few years ago are migrating down to some of the more affordable radios. ~~£1999.95~~ **£1695.95 D**

ID-E880

2m/70cm 50W Mobile with D-Star & D-Star Repeat Mode. Features GPS compatability, CTCSS & DTCS, Airband Receive. **£439.95 D**

IC-E80D

- *2m/70cm Handheld*
- *D-Star + Repeat Mode*
- *GPS Compatability*
- *CTCSS & DTCS + Airband Receive*
- *1000+ Memories*

FREE software on Icom site

In Stock Now **£329.95 D**

IC-E92D SPECIAL OFFER!

Buy the IC-E92D 2m/70cm handheld and HM-175GPS speaker mic with GPS receive ***together*** and save over £35!

£489 D

IC-T70E

Dual Band 2m/70cm Handy.

£159.95 D

IC-E90

Triple band 6m, 2m, 70cms.

£244.95 D

IC-E2820

Great dualband mobile.

£499.95 D

Fitted with UT-123 D-Star module. **£699.95 D**

IC-718

Great news. We have purchased a quantity of this radio at a silly price. A full 100 Watts HF transceiver base station that offers typical ICOM quality and all the essentials for HF operation. Don't miss out on this one!

£594.95 D

IC-7800	Deluxe HF / 50MHz All-Mode 200W Transceiver	**£8999 D**
IC-7700	1.8-54MHz 200W with built-in PSK-31 + keyboard	**£6364 D**
IC-7200	HF & 6m DSP 0.005-3335MHz wideband receive with USB port	**£839 D**
IC-7000	160m-70cm 100W (hf) Mobile, portable or base station	**£1189 D**
IC-7600	160m-6m 100W transceiver - building on the old IC-756	**£3299 D**

Other Radios

IC-910H	**£1299.95 D**	**IC-R6**	**£179.95 C**	**IC-R8500**	**£1439.95 D**
IC-2200H	**£229.95 D**	**IC-R20**	**£399.95 C**	**IC-R9500**	**£10999.95 D**
IC-R3	**£399.95 C**	**IC-R2500**	**£649.95 C**	**ID-1** 23cm	**£719.95 D**

YAESU The FT-DX5000 Package!

The radio that will take you to new levels. Built-in AC PSU all in the box. 200 Watts output for 2-element gain on all bands. TWO totally separate receivers. IP3 +40dBm. 2 or 3 roofing filters (model dependent). 9MHz out for SDR use.

FT-DX5000 - ±0.5ppm TXCO - Included. **£4639.95 D**

FT-DX5000D - ±0.5ppm TXCO - Included + SM-5000 Station Monitor **£4939.95 D**

FT-DX5000MP - ±0.05ppm OCXO – Inc. + SM-5000 Station Monitor & 300 Hz Roofing Filter **£5369.95 D**

The FT-5000 series brings perfection even closer. This radio is designed for the serious DXer. Whether it's weak signals on the border of band noise, or high level crowded band conditions, the FT-DX5000 copes with ease. The DSP brings selectivity & QRM reduction to a new level of performance. Short wires, dipoles, big arrays - no matter what you connect, this radio handles them with ease. You can close in on any signal and with dual receivers, DX chasing is even easier. CW/ Data operators can get right down to 50Hz selectivity, and with the built-in ATU, QSYing is easy and quick. It's the radio that gives you what you have always dreamt of - it's Yaesu of course!

Buy any NEW FT-DX5000 Model from us & get the extra package:

- ***Heil HM-12 Mic + Desk Stand & Lead***
- ***Watson HP-200 Headphones***
- ***15% Antenna Discount Voucher.***
- ***15% ATU Discount Voucher***

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.

Back In Stock! £1264.95 D

FT-2000 160 - 6m Transceiver

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

£2259.95 D

FT-2000D 200W 160 - 6m 230v AC PSU transceiver **£2899.95 D**

Two Great Mobiles

FT-2900E

75 Watt 2m mobile with 3W loud audio, CTCSS, DTMF mic and the "WIRES" internet feature.

£142.95 D

FT-7900E

2m/70cms mobile delivers 50/40W with CTCSS, DTMF, "WIRES" internet, 1000 mems and wide rx up to 999MHz.

£239.95 D

FT-450D 3yr Warranty!

NEW

£839.95 D

Now with Auto ATU & Extra filter.

Are you looking for a reliable and feature packed HF transceiver that is affordable, yet can compete with the modern day demands of ham radio and the crowded bands? The take a careful look at what this radio has to offer. And to make it even more attractive, for a limited period we are offering you a 3-Year warranty - **FREE.**

HF Transceivers

FT-DX9000contest	200W HF - 6m "formula one" contest machine	**£4999.95 D**
FT-DX9000D	Deluxe fully loaded base station	**£8229.95 D**
FT- DX9000MP	Amazing 400W "legal limit" radio	**£8999.95 D**
FT-857D	HF to 2m mobile. portable or base - up to 100W	**£714.95 D**
FT-817ND	1.8-440MHz all mode transceiver	**£539.95 D**

VHF Mobiles & Handhelds

FTM-350E	2m/70cm Mobile Bluetooth GPS APRS	**£479.95 D**
FTM-10E	50/40W 2m/70cms stereo FM	**£324.95 D**
FT-8800E	Dualband Mobile 50W / 30W	**£343.95 D**
FT-8900R	10/6/2m & 70cm Mobile	**£389.95 D**
VX-3E	2m / 70cm Handheld Wideband receive	**£169.95 D**
VX-7R	Waterproof dualband handy (silver / black)	**£299.95 C**
VX-6E	2m/70cms handy, 5W Wideband Receive	**£249.95 C**
VX-8DE	Triple Band 6/2m/70cm Upgraded APRS	**£369.95 D**
VX-8GE	Dualband 2m/70cm 5W + GPS Antenna	**£349.95 D**
FT-60E	2m/70cms, 5W handy Wideband Receive	**£129.95 C**

< VX-8DE

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

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Cross Needle Meters

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

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

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

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

NEW BLACK-BOX-MKII

Now with Switchable Audio Filter!

The airband monitor that safe to use in the aircraft cabin & can tune to any unknown frequency is back with a switchable audio filter!
** Non radiating device*
** Antenna built into earpiece (included) * Built-in selectable speaker * Squelch control On/Off light * 12v External power socket * Power: 12v car cigar adaptor (supplied) or PP3 battery (not supplied)*

£79.95 D

YouKits FG-01

Antenna Analyser

Graphic Colour Display!

It is what you have been waiting for. 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 sleep range. Operates from battery and has a COLOUR screen! Available late summer, get your name on the waiting list now as supplies will be limited at first!

£219.95 C

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 www.aorja.com.

£159.95 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!

£469.95 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.

£669.95 D

QUANSHENG

TG-UV2 2m/70cm Dual Bander

** 3 Power Levels: 5W / 2.5W / 1W*
** Steps: 5, 6.25, 10, 12.5, 20, 25, 30, 50 & 100kHz*
** CTCSS, DCS & 1750Hz Tone*
** Dual Watch*
** 200 Memories Alpha Numeric*
** 2 Deviation Levels*
** 2 Bandwidths*
** CTCSS & DCS Scan*
** Built-In LED Torch*
** Backlit Screen*
** PTT or VOX*

£81.95 D

Heil
A Great Sounding Name!

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! We also offer the optional K-901 boom mic assembly that makes a true multi-adjustable, hands free system.

HM-12 Dynamic Mic £69.95 C
K-701 Desk stand (above) £14.95 C

The new **K-901** desk mic stand (appox. 30cm high) with telescopic boom. Takes all mic mounts.

£29.95 C

KENWOOD NEW TH-D72E

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

£426.95 D

HF Transceivers

TS-2000E £1549.95 D

The TS-2000E is the classic all-band, all-mode base station covering HF - 70cms at up to 100W. Includes dual channel receivers & DX-cluster monitor with built-in TNC.

TS-2000X +23cm £1799 D

TS-480HX Ideal for mobile, portable or base station. Gives a massive 200W on HF and 100W on 6m. £879 D

TS-480SAT This model gives 100 Watts on all bands up to 6m, but adds a built-in automatic ATU. £779 D

Handheld

TH-F7E	2m/70cm 5W (2-pin Kenwood) SMA **+FREE Clip Mic**	£236.95 D
TH-K2E	2m 5W 4-Key Keypad (2-pin Ken) SMA **+FREE Headset**	£163.95 D
TH-K2ET	2m 5W 16-Key Keypad (2-pin Ken) SMA **+FREE Headset**	£172.95 D
TH-K4E	70cm 5W (2-pin Kenwood) SMA **+FREE Headset**	£163.95 D

VHF Mobiles TM-V71E £299.95 D

2m/70cm Dualband Mobile Transceiver. Features;- *Wideband Receive, Built-In Echolink, Simultaneous 2 Frequency Receive, Removeable Control Head, CTCSS Encode / Decode, 1000+ Memories, Supplied with DTMF Mic.*

TM-271E	2m FM 60W mobile. CTCSS, 200 Memories, DTMF Mic	£169.95 D
TM-D710E	2m/70cms 50/50W mobile. APRS +EchoLink, DTMF Mic	£445.95 D

KENWOOD *The Amazing TS-590S!*

160m - 6m with superb receiver inc. dual roofing filters, Auto ATU, 32 bit f/p DSP & USB PC connection.
This is not an updated TS-570, but a completely new design embodying the very best engineering crafted by Kenwood to compete with the very best.

£1329.95 D

Watson
Wireless Weather Stations

W-8681-SOLAR

This is weather station requires no connecting cable between the LCD monitor and the remote weather sensors. There is a large LCD control panel, solar transmitter, wind speed & direction sensors, temperature sensor, rain gauge and stub mast. All you need are 3x AA batts for the *new* LCD panel, the outside transmitters are solar powered! There is even a USB lead & software to connect to your PC!

£99.95 C

W-8681-MKII

Wireless weather station with LCD monitor and remote weather sensors. It offers amazing value and comes with everything you need to set it up in the garden. All hardware is included and the only items you need to supply are 3x AA cells for the LCD panel and 2x AA cells for the outside transmitter.

£79.95 C

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 £29.95 C
W-10AM 10A Analogue variable £59.95 D
W-10SM 10A Switched fixed £49.95 D

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

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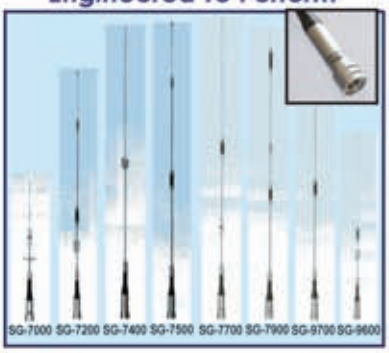


SG-2000 2m/5.2dB 1.59m £92.95
SG-7000 2m/70cm 2.1/3.8dB 0.47m £69.95
SG-7200 2m/70cm 3.2/5.7db 0.96m £94.95
SG-7400 2m/70cm 2/5.5dB 0.99m £84.95
SG-7500 2m/70cm 3.5/6dB 1.06m £69.95
SG-7700 2m/70cm 4.3/6.8dB 1.27m £99.95
SG-7900 2m/70cm 5/7.6dB 1.58m £112.95
SG-9500M 2/70/23cm 3/6/9.7dB 1m £92.95
SG-9600 6/2/70cmdB 0.82m £84.95
SG-9700 6/2/70cm 0/3/5.8dB 1.07m £89.95

Diamond Mounts

K-11 Gutter mount adjustable tilt £39.95 A
K-300 Black gutter mount adjust. tilt £TBA
TRA-II Trunk lip adjust. + 4m cable £TBA
K-600M Trunk lip adjust + cable £76.95 C

K-33 Hatch Mount adjustable £47.95 A
K-400 Heavy Duty Hatch mount £42.95 A
CRM Roof rail / Mirror Mount £15.95 A
K-512 Roof bar mount £49.95 C
ECH 5m cable kit PL-259 £13.95 A

DP-7RH Compact 40/30m Dipole

This is a rigid, telesopic dipole, which has an overall length of approx. 3.5m. It collapses down to pocket size. It can be hung from a tree or clamped to a mast. SO-239 feed.
£129.95 C

HF Verticals

CP-6 80-6m 200W with 1.8m rigid radials. Mast mounted. 4.6m long £349.95 D

CP-8040 80-40m with 1.8m rigid radials. 6.5m long. £389.95 D

KV-5 80-40m ground mounted vertical approx 6.5m long. £349.95 D

SD330
80-6m Remote Tuned Whip

This "screwdriver" design covers all the DX bands (inc WARC0. Continuously tuned with supplied remote control, it will handle 200W and is just 1.85m long. Fitted 3/8" stud mount, it will easily fit onto a 3-way magnetic roof mount. £449.95 D

Diamond VSWR Meters

SX-100 HF 3kW
1.6 - 60MHz 30/300/3kW FSD. 3W sensitivity for FSD. Single sensor 0.1dB insertion loss. PEP/RMS £99.95 C

SX-200 1.8 - 200MHz. 5/20/200W FSD. 1W sensitivity for FSD. Single sensor. 0.15dB insertion loss. PEP/RMS £99.95 C

SX-400 140 - 525MHz. 5/20/200W FSD. 4W sensitivity for FSD. Single sensor. 0.2dB insertion loss. PEP/RMS £95.95 C

SX-600 HF-UHF
1.8- 160MHz / 140-525MHz 5/20/200W FSD. 1W/3W sensitivity for FSD. Dual sensors 0.2dB insertion loss. PEP/RMS. £179.95 C

SX-1100 1.8 - 160MHz. / 430-1300MHz 5/20/200W FSD. 1W/4W sensitivity for FSD. Dual sensors. 0.15dB insertion loss. PEP/RMS £259.95 C

Diamond Power Supplies

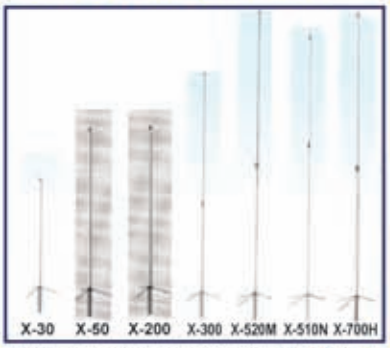
GSV-3000
30 Amps continuous 1 - 15vDC variable 250 x 150 x 2400 mm inc. DC cooling fan, weight 9kg
£199.95 C

GZV-6000 60A **GZV-4000** 40A

GZV-6000 60 Amps continuous 1 - 15vDC variable 210 x 110 x 3300 mm inc. DC cooling fan, weight 5.2kg £389.95 C

GZV-4000 40 Amps continuous 5 - 15vDC variable 210 x 110 x 3300 mm inc. DC cooling fan, weight 3.5kg £229.95 C

Base VHF/UHF Antennas



X-30 2/70cm 3/5.5dB 1.3m 150W £59.95 D
X-50 2/70 4.5/7.2dB 1.7m 200W £69.95 D
X-200N 2/70cm 6/8dB 2.5m 200W £99.95 D
X-300 2/70cm 6.5/9dB 3.1m 200W £109.95 D
X-520M 2/70cm 8.3/11.7dB 2.5m £TBA
X-510N 2/70cm 8.3/11.7dB 5.2m 200W £159.95 D
X-700H 2/70cm 9.3/13dB 7.2m 200W £299.95 D

For More Bargains Visit The W&S eBay Store!
Go to www.wsplc.com then click on the link to our ebay shop.

Watson
Antenna Bargains

Dual Band 2m/70cm

W-300 Base antenna 6.5/9dB 3.1m long £79.95 D
W-50 Base antenna 4/5/7.2dB 1.8m long £54.95 D
W-30 Base antenna 3/6dB 1.15m long £49.95 D

W-627 Triple band 6/2/70cms mobile whip with PL-259 base. 2/4.8/7dB gain. 1.6m long with foldover base. £39.95 C

W-7900 A smart, well constructed 2m/70cms whip with foldover base. 5/7.6dB 1.58m long. £32.95 C

W-3HM Hatch mount for mobile antenna. Fits all car hatch doors and mounts firmly with full angle adjustment. £14.95 A

W-3CK Cable kit 5m long to fit W-3HM. Low loss cable with SO-239 antenna mount & PL-259 to go to radio. £18.95 A

Buddipole
Portable HF Antennas

The most respected portable HF antenna system available. Available as a dipole or vertical system - packs down into a carry pack.

The secret of the system is the hi-q coil assemblies.
www.buddipole.com

W3-BP Dipole 40-2m 250W £219.95 D
W3-BP-DELUXE With mast kit £419.95 D
W3-BS Vertical 40-2m £161.95 D
W3-BS-DELUXE Vertical + clamps £194.95 D
W3-CTA Centre T mast clamp £8.95 A
W3-DKB Buddipole Carry Bag £41.95 C
W3-LBVK Low band vertical kit £199.95 D
W3-MBP Mini Buddipole £239.95 D
W3-MK Mounting Kit £36.95 D
W3-MWA-4 Military whips £102.95 C
W3-RAK Rotate arm kit £39.95 C

Miracle Antennas
Miracle-Whip

A tuneable telescopic whip covering 3.5 to 460MHz. Up to 25 Watts PEP, fiited with PL-259 plug. Great for FT-817 & IC-703 or any other QRP radio.
£129.95 C

2m/70cm/23cm Mobiles

Compact, high quality "N" connector mobile whips with sprung bases.

SGM-803N Triple band 0/2/5.5dB 60W max. 0.37m long £79.95 C

SGM-805N Triple band 0/3.8/7.2dB 60W max 0.57m long £89.95 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

Tonna
VHF/UHF Antennas

220505 6m 5 element 10.1dBi £118.95 D
220809 2m 9 element 13.1dBi £79.95 D
220909 70cm 9 element 13dBi £74.95 D
220919 70cm 19 el. 16.2dBi £94.95 D
220623 23cm 23 el. 17.9dBi £77.95 D
220725 13cm 25 el. 18.3dBi £102.95 D

Create
Rotators

RC5-1 Medium Duty Rotator

**Rotating torque: 6kg/m *Braking torque: 80kg/m *Mast size: 48-63mm *Vertical load 400kg *Horizontal load 800kg *Rotation speed: 60-150sec/50Hz *Power: 230V AC 80VA *Weight: 5kg *Cable: 7-core cable (not supplied) *Requires MC-2 lower mast clamp if mounting on pole*
£569.95 D

RC5-3 £719.95 D
Same as above but with preset control.

bhi
DSP Audio

NEW NES10-2MK3

Speaker & programmable DSP unit. Offers dramatic noise reduction.
£112.95 C

NEIM-1031MKII £142.95 C
Noise Eliminating In-Line Module.
NEDSP-1061-KBD £101.95 C
Noise Eliminating DSP module for FT-817
NEDSP-1062-KBD £106.95 C
Noise Eliminating DSP module for speaker.
ANEM-MKII £127.95 C
In-Line "Noise Away" amplified DSP module.
DSPKR £154.95 C
Noise Eliminating DSP Ext. Speaker 10W.
DTNA - NOISE-AWAY £154.95 C
Amplified DSP Noise Cancelling Desk Speaker.
RADIOMATE £89.95 C
Compact keypad for Yaesu FT-817/857/897.
CAT-MATE £50.95 C
Electronic Y Splitter for Yaesu CAT Interface.

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

Practical Wireless November 2011

contents

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Front cover: Designed by **Steve Hunt** – with thanks to the Cambridge Hams' enthusiastic efforts! (See *The World of VHF* this issue).

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Rob Mannion G3XFD/EI5IW's

Keylines

Rob admires a remarkable Intermediate Examination candidate and discusses wireless Internet router problems.

I have no doubt that many *PW* readers have been following the continuing debate regarding the training of new Radio Amateurs in the Letters pages. I've also found some of the comments – overheard on 3.5 and 7MHz – to be of much interest!

The most often heard comments have involved the supposedly 'easy to get' licence and the 'lack of commitment to the hobby'. However, I know of one supreme example of dogged determination by an Amateur I'm proud to know personally. In fact, although I don't think it's appropriate to name him – he's proved beyond doubt that determination and will power can overcome many obstacles.

My friend left school with few qualifications but now works in an extremely demanding role in catering – looking after the dietary requirements of very elderly housebound people. And – in case anyone has any doubts – catering can be a real 'hot house' in every sense of the term. Indeed, as several so-called 'celebrity chefs' on TV have adequately proved – the profession can provide uncomfortable aural and culinary working conditions!

My friend had no real problem obtaining his Foundation Licence and is a keen member of a local club. He then wanted to progress towards the Intermediate Licence along with the other students as he's well and truly 'hooked' on Amateur Radio.

In recent times many *PW* letter writers – and Amateurs I've heard on the air – have been very concerned at the number of students who have dropped by the wayside after gaining their Foundation Licence. However, I'm pleased to say (and I'm sure he's not alone in this respect) that despite failing the Intermediate Examination on previous occasions – he didn't give up.

My friend's fellow club members had fully supported him with extra tuition and training but – this was entirely his own idea – he then decided to attend evening classes to improve his mathematics and other vital subjects. Bear in mind that this was all in addition to his demanding work commitments – and it's also worth mentioning that he suffers from a debilitating medical condition that has to be carefully managed.

Many months later I was delighted to hear that my friend had passed his Intermediate Examination. He's also pleased with his increased level of knowledge gained after attending the further education courses – expensive perhaps but he feels sure it was money well spent.

I thought it would be very much worthwhile mentioning the efforts of this busy man and his efforts to gain his Intermediate Examination pass. He's now set his sights on the Advanced Examination and I have no doubt he'll succeed – albeit at his own pace and with help from his club friends. I wish him and the many other (out of sight but not out of mind) students trying their utmost to learn as much as possible to gain every benefit from our wonderful technical hobby.

Wireless Routers

On to a different subject now – wireless Internet routers! And although this topic is not strictly Amateur Radio, many of us use wireless technology to access the Internet as part of our hobby. For example, the *FL Digi* software I use so successfully on my Apple Mac laptop for PSK31 operations was downloaded from the Internet.

Unfortunately, for many wireless linked Internet users the 2.4GHz band – with only 14 channels available – is very crowded. Indeed, at my home in Bournemouth there's so much interference – because there are so many routers trying to use the limited number of channels – we often can't use our wireless linking and have to use cable connections. Incidentally, I know of one Radio Amateur who was alleged to be causing interference with a wireless router – but the problem turned out to be from wireless linked equipment within the complainant's own home!

I can identify up to 15 or so different wireless routers in my study at home on my laptop! The private networks are all password protected but the BT Openzone networks (I can receive three) are all touting for business. I wrote to British Telecom to learn more about the r.f. power of the predominant BT Openzone wireless routers and they advise me they are operating within the legal power limits. So, I would be most interested to hear from readers if they're having similar problems.

Rob Mannion G3XFD/EI5IW

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Readers' Letters

Send your letters to:

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

£20 Star Letter

Recycling Compact Fluorescent Lamps

Dear Rob,
I agree with your comments in the *Keylines* Editorial in the October issue – but I also suggest there's a source of some parts that most people will have access to. Compact fluorescent lamps – please see attached photo. They are easy to break into with a junior hacksaw and a small screwdriver – but be careful of the glass!

Usually these lamps fail because the large electrolytic capacitor dries out – particularly in cheaper lamps. However, that still leaves 4 or 5 mylar capacitors, some diodes (typically 1N4007s), a small toroid with a square hysteresis loop – from the Royer oscillator, an 8RB style choke and a small E core inductor of about 3mH. Four resistors and a couple of high voltage transistors (admittedly low gain). Perhaps you could challenge *PW* readers to come up with radio related circuits made from these components?
Best Wishes.
John Dunton G1RXC
Haverhill
Suffolk

Editor's comments: *Thank you for the support John – you certainly seem to have come up with an interesting and regular supply of recyclable components. I suggest 'regular' because from my personal experience these compact fluorescent lamps are very unreliable – no matter where they are made. Please join me on the* Topical Talk *page for further comments.*

Recycling Support From A Fellow Scavenger!

Dear Rob,
I picked the October copy of *PW* from the newsagent and read with interest your piece about recycling. I also remember scavenging old TVs and radios in the 1950s and 1960s. I was in my early teens then and living at home and I sometimes think my parents despaired when yet another old TV appeared on the doorstep!

I'm still doing the same and friends know to ask before throwing away electrical items. This year I managed to get my hands on a defunct music centre which yielded a huge number of components. Last week it was an old toaster with a small circuit board inside.

Rallies and junk sales can also be a useful source of items for stripping, there were some very good r.f. boards around recently for £1 – £2 which have screened coils and other bits.

Do not forget the more modern stuff with surface mount devices. I have recovered many SMDs and use them in projects. Recently I needed some SMD resistors and capacitors to make up a *PIN* diode attenuator; they all came out of the junk box.

Over the last few months many of the salvaged components and boards have gone into my 8-band QRP transceiver. I call it my 'scrap heap challenge' radio because it contains bits and pieces from old projects, salvaged components, a couple of kits and even a newly etched p.c.b. The rig runs 5W and has a superhet receiver. The v.f.o. is a p.p.l. kit using a Si570 so it is both state of the art and salvaged junk! Keep up the good work. Yours sincerely.
Colin Shaw, G8FRA/M5FRA
Hope Valley
Derbyshire

Editor's comment: *You're a man after my own heart Colin! I'm intrigued about the mixed origins of your 5W transceiver – the combination of recycled and new seems very practical – and I would very much like you to send in an article and photographs featuring the project to share with readers. Well done young Sir!*

Jonathan was the only RAE candidate!

Dear Rob
Steve Hartley G0FUW (**Letters** October 2011 *PW*) mentioned that numbers taking the RAE had fallen to such an extent "that for one sitting there were more questions on the paper than there were candidates sitting it". So, I thought you might be amused to know that when I took the C&G RAE back in 1999 at Bedford College I was the **only** candidate! Just me and the invigilator in a huge empty examination hall! 73s
Jonathan Kempster M5AEO
Limehouse
East London

Licence Class War?

Dear Rob,
From reading the letters in *PW* recently I have got the impression that there is a bit of a class war between different Licences and callsigns.

I advanced through the 3-tier system and now I am a M0, which is classed as a Full Licence class A. On the other hand a G8??? is a full licence but was a Class B. Why this distinction exists I do not know. To me the G8??? has almost certainly had many years more radio operating practice.

How far people progress 'up the

ladder', can be limited in many ways. Firstly you can be a home-brewer and not have a Licence for several reasons. Such enthusiasts may be interested in radio but may be too shy to talk over the air.

They may stay as a Foundation Licence holder, because they may live in terraced housing. This can limit the power that can be used without annoying and coming into conflict with neighbours.

I did hear over the repeater when I was a Foundation Licence holder, that one person was describing to another that his friend had given up Amateur Radio because the Morse requirement had been dropped. I thought this was a silly reason to do so, because this so-called 'Man of Morse' has much more bandwidth to use than I. He had the total spectrum to use including the c.w. section. I would feel proud if this was available to me then.

I know G (lower numbers amateurs) who often use QRP. I also know a G8 who spends most of his hobby collecting old radios and making them work again. He has his own museum, and is often taking deliveries from Europe of old Second World War radios, just like your columnist **Ben Nock G4BXD** who runs the 'Kidderminster Kollection'.

Finally, I had a free trial of *Hamsphere* for a month, I didn't use it to its full trial capacity. I know a lot of *PW* readers will say this is not Amateur Radio as it's Internet based. However, for a Canadian I had a QSO with, to him it was a lifeline. He was a fully Licenced Amateur, but unfortunately he lived in a nursing home. I think that for safety reasons he wasn't allowed to operate a transceiver from that QTH.

Fortunately, I have the space and can use the full UK legal power. Unfortunately, I don't have the money to run a 'radio studio' or even a shack. I operate in the corner of a bedroom (away from fiddling fingers) into a simple wire antenna.

What ever your callsign class or limitations, we are very lucky that English is the main language of international Amateur Radio. 73.

Mike Nicholls M0XRZ
Bailey
Newcastleton
Scottish Borders

Editor's comment: *I had some correspondence with Mike (thanks for your interesting letter Mike) and although his full address is Scottish, he really does live in England – despite having a Scottish address and postcode – so the callsign is correct! Mike is also 'up there' with the elite because Highclere Castle in Hampshire (location of the ITV Downton Abbey series) and the largest Manor House in Hampshire, has a postal address gives the impression it's in Berkshire. The media (including ITV and the BBC!) – insist on stating it's in Berkshire rather than its true county because of the Newbury (Berkshire) postcode! Basingstoke in Hampshire also appears to be in Berkshire because of its Reading postcode. I wonder how many other Radio Amateurs are affected by similar problems?*

The Foundation Licence Stigma

Dear Rob,
I just had to write regarding the unfortunate stigma that some Foundation Licence holders have to endure from some of the so-called old brigade. (I emphasise **some**, it doesn't apply to them all thankfully).

I have been active in Amateur Radio since the 1950s, I have built crystal sets, and simple valved receivers over the years. I have also broadcast from around the world from national radio studios.

As an Internationally working photo-journalist I have covered many of the worlds "Hot-Spots" from the Falklands Islands, Beirut, North Africa, Pakistan and Russia! During this period my reports were more often than not radioed from location to an office that would wire my copy to one Editor or another.

Now I'm retired due to a rare medical problem that literally stopped me in my tracks! Now, aged a young 64, and nothing in my career incensed me more than the comments written by GM4SLV.

Due to many of the locations whilst on assignment, it was found far better to have a good hand-held small transceiver. Thus I rapidly got up to speed and passed my foundation in August 2007. I was issued the call sign M3UJZ which I have used when I have operated my hand-held rig. This serves me very well and covers 99% of my needs.

The M3 Foundation Licence is all that I require, but I couldn't be more serious about my hobby. Indeed, I think 57 years in the hobby places me into the possibly dedicated bracket of radio monitors, who unless it's essential that I transmit, I happily get by very well without having to do so!

The type of pseudo snobbery I'm writing about is what makes the average radio fan remain on the outside. Many of us do not want to attend a club bearing a plastic name and rank badge the size of a packet of cigarettes! All we want to do is mix amongst like minded enthusiasts without the club bully ramming down our throats the question – "When are you going to sit your intermediate?"

Richard Cooke M3UJZ
Chidham
Chichester
West Sussex

Editor's comment: *Thanks you for your letter Richard. I invite everyone to join me on the* Topical Talk *pages for further comment.*

Earthing Theory

Dear Rob,
In *Topical Talk*, October you asked can you "...operate safely with an r.f. earth when using (your) fully isolated power supply?" Here's the theory.

The most important of the three mains wires (live, neutral, earth) isn't the live wire. It's actually the earth – although there's no guarantee it's at earth potential at all. So, the correct technical name is protective conductor. However, if you stick a metal rod into a flower-bed the rod will be at true earth potential.

The protective conductor has

Earthing Equipment In The Shack

Dear Rob,
I'm writing regarding the article in *PW* about earthing equipment in the shack. I started life as a radio and TV apprentice and ended up as an electronic Test Engineer in a company, which also had design engineers in low voltage and high voltage fields. Many conversations took place over r.f. earthing problems and the outcomes were as follows.

Example: A transceiver is run off a battery or isolated d.c. p.s.u. and the transceiver/a.t.u. case was earthed by spike in the ground or coaxial cable outer was earthed via static discharge device. It is then possible to have a potential difference between the transceiver r.f. earth and the mains earth. This could lead to a shock if the user got their hands between the r.f. earth and the metal case of mains earthed equipment including bonded central heating pipes, etc. This voltage could be high if internal or external earth faults develop in the house wiring.

The conclusions were: To make the transceiver/a.t.u. earth the same potential as the rest of the house earth by bonding all earths to the same point. To do this take separate short lengths of stout earth wire or thick braid from the transceiver/a.t.u. and bolt to a small length of flattened copper tubing or similar for terminating the wires. Bolt 6mm diameter (or above sizes) earth wire (green/yellow) to the copper tube. Then run this wire to the main consumer box and get a qualified electrician to connect it to the main earth. (This should only take a few minutes)

Problems: If there is an external fault on the mains supply it's possible to end up earthing half the street via r.f. earthing. (However, I'm told this is very unlikely.)

It's important that we do not have r.f. running round the earth wires of the house. To stop this use four or five appropriately sized ferrite rings and wrap as many turns of the 6 mm earth wire through them as you can just after the connection to the flattened copper tube connection. (There are many published articles on winding ferrite rings for r.f. suppression)

All the other shack equipment – 'scopes counters, etc., can be run via a 3-pole mains filter and can be plugged into your mains socket.

And incoming coaxial cables should have their static discharge protection fitted before they enter the house/shack and be earthed with a thick wire and connected to your earth mat spike, etc. I hope this helps with this age old problem! 73.

John Cooper G4RAC
Stretton
Burton on Trent
Staffordshire

only one (vitally essential) purpose: to prevent electrocution. The idea is that everything conductive that can be touched in the premises (**and that includes you**) is at, shall we say, zero volts (0V). This is the potential on the protective conductor. Zero relative to what? It doesn't matter, because if you personally are at that potential and so is every other exposed bit of metalwork. You can touch anything without current flow and you can't be shocked. Just like turning your house into a Faraday cage.

Everything must be bonded together, the pipes, the metal kitchen sink, the central heating, the metal structure of an adjoining conservatory – everything, no exceptions. If water or gas enter through plastic service pipes then the bond must be at the most upstream point of the plastic-to-metal transition using (at least) 10mm squared cross-section cable.

In the London suburbs, our electricity comes in from underground armoured and sheathed cables and 0V is a point where that sheath is exposed at the service inlet (TN-S system).

In rural areas, especially where distribution is by overhead cables, the arrangement is Protective Multiple Earth (PME, the TN-C-S system). This is a dodge to make the supply distribution easier and it brings a new danger. Should the neighbour's neutral fail, your protective conductor wiring becomes their current return. Everything in your Faraday cage rises in potential compared to earth, but as far as the occupant is concerned everything is still at the same potential – feels like 0V – so you can still touch anything without current flow – so there's still no shock. Bring in an earth connection from a radio aerial (perhaps from the earth radial mat) and there's a world of difference.

If you touch the transceiver (connected to the mains protective conductor) and the aerial's earth at the same time – be prepared for a shock! The only way to avoid this is to earth-bond the aerial, just as if its radial mat were an incoming water pipe. This may spoil your nice clean r.f. earth. It also means you'll live a little longer!

You propose to run your rig from an isolated supply and just running a small piece of equipment like this is fine. Once the system gets more extensive, however, isolation becomes degraded and eventually there's enough stray capacitance and even resistive leakage to form an earth connection – defeating the isolation.

If you did isolate, then the mains at the transformer primary must not enter your shack and, indeed, the whole transformer arrangement would have to be insulated beyond reproach. Any chance of touching something on the primary side must be made impossible – or you'll bridge the nominal 0V (or worse) to earth by making yourself the conductor.

Personally, I'd bond everything as required, including any earth spike or radial mat. At the start of each ring circuit, immediately after the fuse, there should be a Residual Current Device (ELCB) rated to trip at not more than 30mA leakage. It won't give you the cleanest most noise-free r.f. earth, but at least it won't introduce an avoidable (and real) danger.

Trying to understand the Wiring Regulations is an ordeal, I recommend one of the commentary/guide books written to provide an explanation of the Regulations' stipulations.73.

Godfrey Manning G4GLM
Edgware
Middlesex

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**

News & Products

Send your info to:

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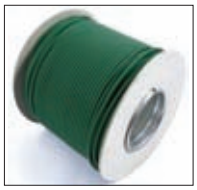
Nevada's Antenna Wire Goes Military Style!



Mike Devereux G3SED, Managing Director of **Nevada** in Portsmouth called *Newsdesk* with some interesting product information; "We are pleased to tell readers of our new Nevada Military style, Green, Kevlar antenna wire. The wire is very light, weighing just 1.8kg per 100 metres length, with an outer diameter of just 2.8mm and yet has a breaking strain of 900kg. The centre is constructed of Aramid (Kevlar) fibres with a conducting outer covering of 16/4/0.1mm braided tinned copper wire. Its light weight, super strength and low visual impact make it idea for all types of Amateur Radio antenna projects. The wire is priced at 99p per metre or £89.95 per 100m drum. Regards.

Mike Devereux G3SED
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Hampshire PO6 1TT
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E-mail: **sales@nevada.co.uk**
Website: **www.nevadaradio.co.uk**

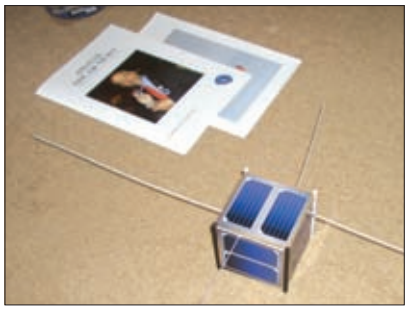
Your Attention Please!

The 2012 *PW* 144MHz QRP Contest Date

Colin Redwood G6MXL – the *PW* Contests Adjudicator writes; "In the results article in the October 2011 issue of *PW*, I stated that the 2012 *PW* 144MHz QRP contest will take place on Sunday June 12th. This should of course have read **Sunday June 10th 2012**. However, please remember that this is a provisional date as the contest will run alongside the RSGB 144MHz contest, the dates for which were still to be confirmed at the time of writing. Many thanks to **Bob Glasgow GM4UYZ**, for spotting my mistake!" **Colin G6MXL**.

2000 Members!

Trevor Hawkins M5AKA of AMSAT-UK reports; "In under a year the AMSAT-UK FUNcube Yahoo Group has achieved over 2000 members. The group was created by **Rob Styles M0TFO** at the end of October 2010 to provide support for the AMSAT-UK FUNcube satellite and the FUNcube Dongle (FCD) Software Defined Radio (SDR).



A FUNcube model.

The FUNcube satellite project is an educational CubeSat project with the goal of enthusing and educating young people about radio, space, physics and electronics. It will support the educational Science, Technology, Engineering and Maths (STEM) initiatives and provide an additional resource for the RSGB GB4FUN Radio Communications Demonstration Module.

The target audience are school pupils in the 8-18 years age range. As well as providing a strong 145MHz telemetry beacon for the pupils to receive FUNcube will also have a 435/145MHz linear transponder for Amateur Radio c.w./s.s.b. use.

Graham Shirville G3VZV with FUNcube

The FCD SDR was originally developed for educational outreach as part of the ground segment for the FUNcube satellite. However, it was realised it can be used for many other applications as well, so AMSAT-UK developed a Pro version which has a frequency range of 64-1700MHz.

Similar to a USB TV Dongle, the FCD simply fits into a computer USB port and can be used with freely available Software Defined Radio software. The FCD is all-mode which this means that as well as data, it will also receive many other signals including a.m., c.w., s.s.b., and f.m. and weather satellite images. 73.

Further information from:
Trevor Hawkins M5AKA
AMSAT-UK
E-mail: **m5aka@yahoo.co.uk**

Join the FUNcube Yahoo Group at **http://groups.yahoo.com/group/FUNcube/**

See SDR-RADIO software at **http://www.sdr-radio.com/**
The AMSAT-UK group publishes a colour A4 newsletter, *OSCAR News*, which is full
of Amateur Satellite information. A sample edition of the newsletter can be seen at **http://www.uk.amsat.org/on_193_final.pdf**

Flex Configured PC System From Martin Lynch

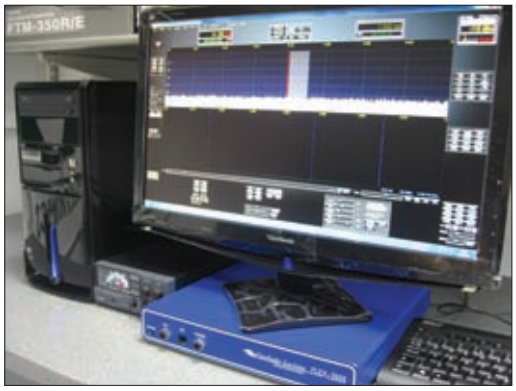


Image shows MyDEL PC together with 22in widescreen HD monitor, MyDEL 30Amp MP-30SW11 PSU and Flex 3000 SDR 100W transceiver.

Martin Lynch G4HKS called *Newsdesk* with some interesting information: "As one of Flex Radio Systems largest distributors, ML&S have today announced a *Windows* PC based system designed and built to work along side the 1500, 3000 or 5000A series of transceivers. **Sanderly Jeronimo**, our team leader at ML&S Customer Support & Engineering, said he was asked by many customers if they could buy a PC "ready to go" out of the box when ordering a Flex SDR radio. After extensive research and test in conjunction with all the Flex family, I discussed with our PC builders to provide a cost effective solution for our customers. Running 64-bit *Windows* and supplied with either a 22in or 24in widescreen HD monitor, pre-configured systems start at only £675 including VAT. **Martin Lynch** ML&S Martin Lynch & Sons Ltd.,
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FAX: (**01932**) **567222**
email: **Martin@MLandS.co.uk**
Website: **www.MLandS.co.uk**

Telford & District Amateur Radio Society

The **Telford & District Amateur Radio Society** (T&DARS) has a busy Autumn and Winter schedule ahead, so reports **Mike Street G3JKX** their Hon Sec. On October 12th there'll be a talk on 'DIY measurements'. On October 19th the club members will be discussing 'Winter projects'. On October 26th – the Highlights of the Year with Curry & Rice! On November 2nd there's a Committee meeting. November 9th there's a talk by **Don Sunderland M0FHM** entitled 'Visiting Eastern Europe'. November 16th brings a 'Quiz night' and on November 23rd there's a 'Surplus Sale' – so bring your pocket money! Further details from **Mike Street G3JKX**
TDARS Secretary/Exams Co-ordinator
Tel: (**01952**) **299677**
E-mail: **mjstreetg3jkx@blueyonder.co.uk**
Websites **www.tdars.org** and **www.telfordhamfest.co.uk**
The T&DARS meets at the **Village Hall**, **Malthouse Bank**, **Little Wenlock**, **Telford**, **Shropshire TF6 5BG between 7 and 10pm.**

New Weather Station From Nevada

Nevada, based in Portsmouth have launched a new weather monitoring product. Their press release states, "We're pleased to advise you of our new Nevada 1080PC weather station which will sell for £99.95. As the Autumn fast approaches Radio Amateurs turn their attention to the weather and especially the winds that could damage their antennas!. The new Nevada 1080PC weather station has a solar powered radio controlled sensor to send all weather data to a central monitor".

"Apart from monitoring all the common weather data the unit also has a Radio controlled clock linked to the MSF time transmissions. A USB output allows all data to be downloaded to a computer where data can be stored and monitored graphically".

Brief Specifications: Connection to computer via USB port for collecting. All weather data, wind direction, displays wind direction (transmitted via 433MHz). Thermo-Hygrometer sensor measures temperature and humidity and transmits data to the monitor via 433MHz. Displays indoor temperature and outdoor temperature. Displays outdoor temperature via 433MHz link. Indoor Humidity . Displays indoor relative humidity as a percentage. Outdoor humidity displays (outdoor humidity transmitted via 433MHz). Pressure history – displays pressure history in the form of a bar graph, rain gauge, and display records rainfall history.

Further information from;
Nevada Radio
Unit 1 Fitzherbert Spur
Farlington
Portsmouth
Hampshire PO6 1TT
Tel: (023) 92 313090
E-mail:
sales@nevada.co.uk
Website:
www.nevadaradio.co.uk

Royal Observer Corps Bunkers Award Launched

Bobby Wadey MI0RYL contacted *Newsdesk to say*, " The award scheme for ROC Bunkers is now up and running in conjunction with the website **www.rocbunkers.co.uk** website. We would like to invite people to put some images on the site of the real life Cold War bunkers, in the days when they were still manned by volunteers during and after the Cold War. Whether images of the here and now or the past, we would love to see them. Any queries you can call me. Many thanks".
Bobby Wadey MI0RYL Tel: **(028) 38852712** E-mail: **lamph121@btinternet.com**

Bargains At The Bangor Junk Sale!

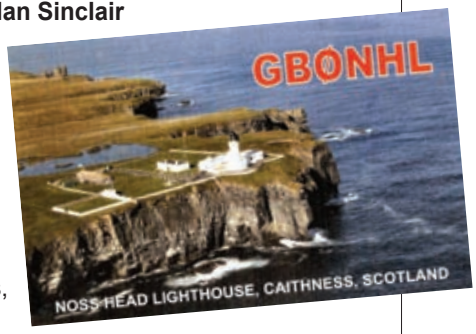
Mike Stevenson GI4XSF, PRO for the **Bangor and District Amateur Radio Society** writes; "We meet on the 1st Thursday of every month in ***The Boathouse***, **19 Harbour Road**, **Groomsport**, **Bangor BT19 6JP** at 8pm. But a real treat is coming up in November! At 8pm on Thursday November 3rd 2011 we are holding our annual surplus sale. (There is a map on our website for anyone who needs help finding the boathouse) and there'll be some great bargains to be had. It's always a great evening – come and sell your junk and take some more home! As always, visitors and new members are most welcome". More information from Mike GI4XSF.

Michael Stevenson GI4XSF (PRO)
Bangor And District ARS
69 Portaferry Road,
Cloughey
Newtownards
County Down BT22 1HP
Tel: (**028 4277**) **2383**
E-mail: **mike@gi4xsf.com**
Website: **http://www.bdars.com/**

Terry Barnes GI3USS – known to everyone as 'Gissus' seems to be raking in the money at a previous Bangor 'Junk Sale' (beg pardon - we meant 'Surplus Sale'!).

Caithness Amateur Radio Society Light Houses on the Air Week End

The Caithness Amateur Radio Society – by Kind Permission of the **Right Hon. Earl of Caithness PC**, **Chief of the Clan Sinclair** and **Mr Ian Sinclair**, were invited to set up a Special Event Station using the Call sign GB0NHL. This Special Event was international involving Special Event Stations situated at Lighthouses all over the UK and around the world.



The Noss Head lighthouse is situated near Wick in Caithness. The name Noss Head comes from the Old Norse word, Snos, a nose, the peak or nose-shaped headland!

The light was established in 1849, and the Engineer was **Alan Stevenson** from the famous lighthouse building family. Robert Arnot of Inverness was the builder. It's position is Latitude 58° 28.8'N Longitude 03° 03.0'W. Character: Flashing white/red every 20 second. Nominal Range:White 25m Red 21 miles. Structure: White stone tower, 18 metres high.

History: The lighthouse was completed in 1849 and the light was switched on Monday 18 June 1849. A new style of lantern with diagonal instead of vertical framing was first used by Stevenson at Noss Head. Stronger and less liable to intercept light in any particular direction, it was adopted as the standard pattern for the service. The lens which is approximately 2m in diameter rotates by clockwork machinery around a mercury vapour lamp. The original lamp from Noss Head is now in the museum at Wick. The Light was automated in 1987 and is now remotely monitored from the Northern Lighthouse Board's headquarters in Edinburgh.

The event was conducted over two days Saturday and Sunday August 21st and 22nd, 2011 with teams of radio Operators and Loggers from Caithness Amateur Radio Society. They managed to contact 340 Lighthouse Special Event Stations and other Radio Amateurs from 27 countries in the UK Europe and around the world. Each Contact is sent a QSL Card which records their contact with GB0NHL .

The event not only drew attention to the lighthouse at Noss Head Wick and the work of the Clan Sinclair Trust in preserving this historic site, it enabled the Caithness Amateur Radio Society to meet with like minded people from around the world on the air.

Bob Renshaw 2M0CEE.
Secretary Caithness Amateur Radio Society.
E-mail: **carssec@halkirk.org.uk.**
Web: **www.radioclubs.net/c.a.r.s./**

The FOC Straight Key **Weekended December 31st 2011 to January 1st 2012**

Colin Turner G3VTT reports; "The First Class Operators Club (FOC) Straight Key Weekend was well supported last year by both club members and non members alike and the FOC Committee has once agreed the weekend can be part of the c.w. calendar. The idea is not to have a contest but to be active using any mechanical keys such as the semi-automatic bug, the side swiper or the pump straight key across all bands 25kHz up from the lower band edge. While many operators use the electronic keyer there are still a sizeable number who are proficient on the older style keys and FOC recognises the value of preserving these old, yet valuable skills.

"The weekend of the December 31st 2011 and January 1st 2012 has been suggested as the first available weekend with many other organisations sharing this slot for straight key activities and c.w. So, operators are invited to join FOC on all bands with their straight key, bug key or any other mechanical keying device, (We'll leave it up to you!).

"The timing will follow the FOC BWQP event timing and start at 0000z and finish at 2359z over the Saturday and Sunday weekend. There are no prescribed operating bands or times – just be active as band conditions permit. It would be helpful if any c.w. club editors could put this information on club reflectors.

"Please send your comments on contacts and perhaps photographs of the keys used to me by E-mail or post to them before the end of January. A log is not needed but comments about the types of keys heard and the best 'fist' would make interesting reading.

"Good luck and I hope to work you over the FOC weekend!"

Colin Turner G3VTT, 30 Marsh Crescent, High Halstow, Rochester, Kent ME3 8TJ
E-mail: **g3vtt@aol.com**
Website: **www.g4foc.org**

Sanzing's Steel Telescopic Masts

Newsdesk received an interesting E-mail from **Simon Worsley G7IVJ**. "I'm writing from our company – Sanzing Ltd – where we make telescopic masts. Let me explain a bit of my background.

"I've been an active Radio Amateur for over 20 years – and have always felt let down by the flimsy nature and the high price of telescopic masts. I couldn't find anything substantial that had a decent diameter top section without spending in the thousands. Although the aluminium telescopic masts have their uses, I couldn't use one for what I wanted. So I made a few calls to locate the materials, put pen to paper and designed steel telescopic push-up masts in four sizes, 20, 30, 40 foot and 50ft and these are in full production now.

"To start with we sourced the materials locally, and used a local metalworkers to assemble. We now have a warehouse in Lingfield in Surrey where we keep stocks of all the four sizes and ship out every day to UK and European customers. We sell these mainly to Radio Amateurs and two-way radio communications providers, but also have a wide range of customers including traffic surveying companies who attach CCTV cameras to the top of our masts.

"Our customers always tell me they cannot believe how substantial our masts are. Exciting times! We are selling the 50ft mast for £199.99 including VAT and next day mainland delivery. Please see our website: **www.radiozing.co.uk** and click on the mast tab. We'll be pleased to answer enquiries from *PW* readers".

Simon Worsley G7IVJ
Sanzing Ltd.
The Granary
Brewer Street
Bletchingley
Surrey RH1 4QP
Tel: (**0207) 1831405** FAX: (**0207**) **1837361**
E-mail: **sales@radiozing.co.uk**
Website: **www.radiozing.co.uk**

All change on 6m!

David Dix G8LZE/G4JZS from the **UK Six Metre Group** Committee contacted *Newsdesk* with the latest 50MHz news; "During the **International Amateur Radio Union** (IARU) conference held in August 2011 in Sun City, South Africa (hosted by the **South African Radio League**), a revised bandplan for the 50MHz, 6-metre band, was agreed.

There had been much discussion regarding how to reorganise the bandplan with many diverse views expressed but eventually, following International consultation with users and special interest groups, a consensus was reached.

The decision was made to modify the bandplan with the aim of spreading activity throughout the full allocation and to try and separate high power modes and those that were not maximum usable frequency (MUF) dependent so did not require space at the low frequency (l.f.) end of the band. Also, due to the nature of 6-metre propagation, it was decided to try and co-ordinate our Region 1 bandplan with those in Regions 2 and 3.

The new bandplan becomes active from January 1st 2012 but some beacons have been given until the end of 2014 to re-locate.

The new bandplan can be viewed and downloaded from **http://www.uksmg.org** and a short video presentation explaining the new layout can be viewed at **www.youtube.com/watch?v=cWPVUWo4g3A** Regards.

David Dix G8LZE/G4JZS
david@minicat.co.uk

Hancock's *The Radio Ham* Celebrates 50 Years

Many *PW* readers will be aware that **Jim Lee G4AEH** is to be heard busy announcing on BBC Radio 4 and Radio 4 Extra (Formerly Radio 7) and despite the *PW* Editor's suggestions he's so far refused to call "CQ" on 1500m (198kHz) when reading the shipping forecast! Recently, Jim contacted *Newsdesk* with the latest information on the Amateur Radio favourite TV and radio programme – **Galton & Simpson's** *The Radio Ham* with the unique comedy of the late **Tony Hancock**.

Jim writes, "I was fortunate to meet and interview **Ray Galton OBE** and **Alan Simpson OBE** to discuss Tony Hancock's *The Radio Ham* and *The Blood Donor* programmes. **Alan Florence G7CDK** was a recording engineer on the session and it had long been my ambition to bring them together to reminisce about that historic recording in 1961.

"I also had a chance to ask the writers how they came up with the idea of making Hancock a Radio Amateur and I hadn't heard the explanation they gave me before, so I think for the first time it can be told!

"Alan and I also pulled their leg about obviously not doing much research, which they admitted to – but then if you think about it, it had to be exaggerated for comic effect. Sitting for hours trying to work through a pile-up wouldn't exactly have people rolling in the aisles!'

He continued; "Radio 4 Extra will broadcast *The Radio Ham* and *The Blood Donor*, back to back between 1400 and 1500 on Saturday October 1st 2011, complete with the interview I did with Alan G7CDK.

"The broadcast will be a few days before *PW* drops through our letter boxes and appearing at the newsagent. But don't worry – the programmes and the short interviews will be available to listen to again via the Radio 4 Extra Website **www.bbc.co.uk/radio4extra/** Enjoy your listening!

Jim Lee G4AEH
Nuneaton
Warwickshire

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Base

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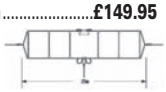
MTD-300 2-30M Broadband wire dipole antenna £149.95



The MTD-300 broadband dipole antenna is designed to provide optimum performance over a wide frequency range and is very easy to assemble and use.

● Frequency 2-30MHz ● Radiator length: 25m (82ft) ● Type: Terminated Folded Dipole ● Radiation: directional ● Feedline: 50 Ohm coax (30m) ● Connector: SO239 ● SWR: <2.0:1 to <3.0:1 depending on factors ● No transmatch required ● Power: 150W (PEP) ● Spreaders: 46cm (18in) ● Weight 3.1kg.

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The AvMap Geosat 6 APRS

The GPS Solution for APRS operations

Tim Kirby G4VXE takes a break from preparing *The World of VHF* to try out some APRS operations using a Kenwood rig. And it seems he's really enjoyed himself!

If you've been reading *The World of VHF* over the last few months, you'll recall that we have mentioned Automatic Packet Reporting System (APRS) on a few occasions.

Wikipedia says of APRS, *Automatic Packet Reporting System (APRS) is an amateur radio-based system for real time tactical digital communications of information of immediate value in the local area. In addition, all such data is ingested into the APRS Internet system (APRS-IS) and distributed globally for ubiquitous and immediate access. Along with messages, alerts, announcements and bulletins, the most visible aspect of APRS is its map display*.

Interesting eh? Anyone may place any object or information on his or her map, and it is distributed to all maps of all users in the local radio frequency (r.f.) network or monitoring the area via the Internet. Any station, radio or object that has an attached GPS is automatically tracked. Other prominent map features are weather stations, alerts and objects and other map-related Amateur Radio volunteer activities including Search and Rescue and signal direction finding.

The Development Of APRS

The APRS in use today has been developed since the late 1980s by **Bob Bruninga WB4APR**, currently a senior research engineer at the United States Naval Academy. He still maintains the main APRS website. The acronym APRS was derived from his callsign!

The Avmap Geosat 6APRS unit looks to all intents and purposes like a 'normal' SatNav unit, but couple it to a Kenwood transceiver and it comes into its own!

If you've not done so before, go to your web browser and go to **http://aprs.fi** and move the map to cover where you live. You can zoom in and out and see many of the APRS stations around you. You'll find some of the icons do different things if you click on them. You'll find weather stations on the map that you can click on, which tell you the state of the weather in a particular location.

How does the information get on the map? Well, some of it comes from the Internet. We'll ignore that for the purposes of this review. Some of it comes from real r.f. operations! In practice APRS on v.h.f. (and there is some h.f. APRS too) is largely centred on 144.800MHz.

Although 144.800MHz is our UK APRS frequency and I believe it's also used in some other countries – but isn't 100% international. So the frequency may not be correct for all our overseas readers. **Note:** 144.800MHz in the UK carries other valid packet signals as well as APRS, so not every data burst heard there will be an APRS beacon. If you tune your receiver to that frequency it's likely you will hear 1200baud AX25 packet bursts and the chances are that these could be APRS activity.

When you've looked at the map of activity you'll have probably noticed that some of the icons were moving, representing a travelling vehicle. There are various parts of such a system; you need a GPS receiver to determine your position, a packet terminal node controller (TNC) to encode the data as AX25 and send it to your 144MHz transmitter.

The equipment described in this review is one way of achieving a very fully featured APRS system. So, what's the AvMap Geosat 6 APRS like in action? Let's take a look at a the list of what it can do.

New High Performance Sofware

The Geosat 6 APRS unit comes with a slim and stylish design, featuring a metal chassis, a 4.8in full colour display in 16:9 widescreen format and a smart magnetic mount that makes it is very easy to place the navigator in the car. It has a re-engineered interface with a 50 channel -160dBm tracking sensitivity u-blox GPS engine for fast and highly accurate fix.

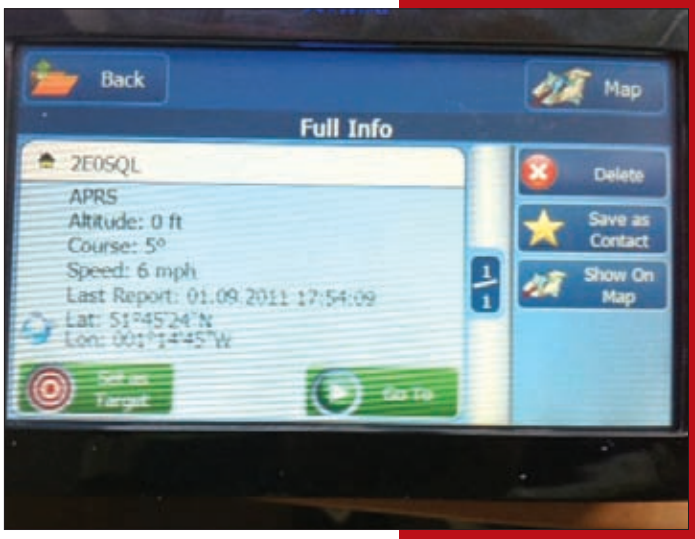
New navigation functions have been added, such as the 'Trip Computer' that shows overview of the journey, with speed graphs, info about average speed, highest speed reached, stop time, etc. Turn-by-turn vocal instructions announce complete street names thanks to the Text-to-Speech technology.

Full Bi-Directional RS-232 APRS Communication

The Geosat 6 APRS comes with a Kenwood-ready cable and exclusive APRS bi-directional RS-232 APRS interface compatible with ALL current APRS ready Kenwood Radios, including the new TH-D72A/E. The system provides GPS location information for your transmitted APRS beacons, and it shows received APRS information on its map display. The unit can store up to 1000 APRS contacts and display them on the map.

Intercept To Target

You can set your Geosat 6 APRS to navigate to your favorite APRS mobile



Two photographs of the Avmap Geosat 6 APRS unit's screen in operation. The banding shown on the screen is a problem of taking a photograph, rather than a problem with the screen itself.

station. You can also get re-routing instructions when the new position is reported!

The APRS Icons

In use you can watch APRS activity right on the screen and you can distinguish between fixed and mobile APRS stations. Static positions are represented by blue 'bulls-eye' icons along with the associated call-sign. If used with a Kenwood TM-D710E rig and if it's set in the KENWOOD format sentence, the Geosat 6 APRS supports standardised APRS icons.

Tactical Mode

The Geosat 6 APRS system takes full advantage of the Kenwood format sentence. The Tactical mode allows you to select an APRS contact to see on the full info page its speed, course and altitude in addition to its callsign and position.

Contacts Management

Thanks to the new APRS contacts smart management, Geosat 6 APRS can auto-delete the received APRS contacts' positions after a set time-out. You can also sort your APRS contacts by alphabetical order or receiving time.

On The Air With APRS

David Wilkins G5HY from Kenwood UK kindly supplied the review model of the Geosat 6 APRS and also a Kenwood TM-D710E 144/432MHz APRS enabled mobile transceiver. My first task was to get the Kenwood TM-D710E set-up and receiving APRS data.

Setting-up the system proved very straightforward although I had never used a TM-D710 previously, it was a simple matter of connecting the rig to 12V, the antenna to my V2000 vertical and tuning one of the variable frequency oscillators (v.f.o.s) to 144.800MHz and enabling the TNC. Within seconds the rig was beeping loudly and frequently as APRS data was received and decoded. To avoid complaints from the rest of the household, the Kenwood TM-D710 Manual was hastily consulted about how to turn the beep off!

What amazed me was just how much data I was receiving! As an APRS data packet is received, the information decoded from the packet is displayed on the front panel of the TM-D710. There's a 'compass rose' to the right of the display that shows a distance and bearing to the station being decoded, assuming that it carries positional information – and of course, that the rig knows its' position. Clearly, because I'd not yet connected up the GPS, it didn't have any idea of its location at that moment!

A SatNav With Extras!

The Geosat 6 APRS is to all intents and purposes a SatNav device with some additional functionality built-in. So getting it going as a SatNav was entirely straightforward. I got it out of the box and even inside (albeit close to a window) it was able to get a 2D and 3D fix. Out in the clear, it obtained a 3D fix in about 75 seconds – which is pretty good.

As the device boots up, you have the choice to start it as a SatNav device or an audio player! For mounting in the car, there's a suction mount with quite a long arm. The suction mount is solid and unlike some GPS mounts I have encountered, not liable to fall of the windscreen. The downside of the long arm was that it made the unit prone to some vibration – at least on some of our more rural Oxfordshire roads anyhow!

The mapping was fair quality – though I noticed a few errors on road

Purchasing AvMap In The UK

Bjorn Nagelhout of AvMap writes: Suggested End User Price in UK is £349 (VAT included). In Europe the End User Price is 399 Euro (Vat included). At the moment in the UK no dealer is selling our Geosat 6 APRS, which can be purchased directly from our shoponline: **http://www.avmap.it/index.php?swt=05**
For Technical Support the user can contact us directly through our website or E-mail address.
Bjorn.
E-mail;
bnagelhout@avmap.it

The Kenwood TM-D710E is a suitable companion to bring out the best APRS expience of the Avmap Geosat 6 APRS unit.

names as I drove around our village and our neighbouring village, Hinton Waldrist (quite a challenge for map makers!).

The map was easy to read, particularly in 3D mode and the unit was fast enough to keep up with the car's motion. The touchscreen interface is fairly intuitive and I didn't have any difficult in making the unit do what I wanted.

The next challenge was to get the GPS talking to the TM-D710E. This was made really simple by virtue of the excellent PDF file provided on the AvMap website which includes details of how to interface the unit to Kenwood APRS enabled rigs, such as the THD-72 hand-held and the TMD-710E. The document tells you which menu options need to be set and what the values should be.

Having set everything up, the connection between the GPS and the TM-D710E is simply a lead with 2.5mm miniature jack plugs at both ends. But make sure you get it the right way round!

The 4 pole connector goes into the GPS' serial port and the 3-pole connector goes into the TM-D710E's GPS port. Make sure that both connectors are firmly pushed into the sockets (it sounds obvious, but I spent a few minutes wondering why I didn't have a connection!). Then switch on!

The GPS indicator on the front of the TM-D710E immediately started flashing, indicating that it was receiving GPS data and I was delighted to see that on the front panel of the TM-D710E I was now starting to see distance and bearing information from me to the various APRS stations that were being received – indicating that the rig was receiving GPS data.

Because in the set-up I had elected to send an APRS beacon, after a while the rig went into transmit sending a short transmission containing my callsign, location and various other bits of information. From the front panel of the TM-D710E, I could see that my beacon had been re-transmitted by several APRS digipeaters.

Even more exciting, by going to **http://aprs.fi** and searching for my callsign, I could see my position on the map as indicated by an icon and my callsign. If you zoom into the map, you'll see just how accurate it is – and if you haven't played with a GPS before – it **will** amaze you!

How About The Other Way?

So, that's the information flowing from the GPS to the rig. How about the other way? I zoomed out the map on the GPS so that it would include an area where I knew there was APRS activity. Sure enough, positional markers with callsigns appeared on the screen! Excellent! I noticed however, that not all of the APRS stations I was decoding via the front panel of the TMD-710 were being displayed on the GPS.

I was puzzled for a little while, wondering if there was something that I had done wrong, or whether there was something about the 'missing' positions/stations that were causing them not to be displayed. Reading through the AvMap website, however, I discovered that this was a 'feature' and that a later release of the software for the Geosat 6 APRS would cure this. (More on this in a moment).

Something else that wasn't quite what I expected – was, that according to the AvMap manuals, the GPS unit should exhibit the ability to send and receive APRS messages when connected to a suitable compatible transceiver. However, after consulting with the manufacturers I understand that this messaging is only available if you connect the Geosat 6 APRS to a Byonics TinyTrack device (which I didn't test).

To try and enable the better display of all APRS stations on the GPS, I needed to upgrade the software on the GPS. To do this, I had to download some software called *GeosatSuite* from the AvMap website and install it onto my PC. This was simple enough to do and appeared to double as a product registration process. Having done that, I connected the GPS, via the USB cable supplied, to my PC. From a menu, I took the option for a 'Software update'.

The software took a couple of minutes to download on a broadband connection. I was then guided through the process of updating the GPS' software with the new version. This is always a nervous moment (particularly when you don't own the device in question!) but the software installed without a glitch and I was then instructed to re-set the device by means of two pinholes on the bottom panel. Having done that, a *Windows CE* boot screen appeared – but quickly vanished to the more friendly AvMap start-up screen.

Eagerly, I connected up the GPS to the TMD-710 and started monitoring APRS traffic on 144.800MHz. To my delight, I could instantly see on the GPS screen that many more stations were now being displayed on the de ice. Navigating through the GPS menus, I was able to see a list of all the APRS 'contacts' (I found that sorting them alphabetically made most sense).

For each of the callsigns shown in the list, you can set them as a 'target' or set the GPS so that it will navigate to them! I thought this was an excellent feature – making it particularly easy to drive to APRS-enabled friends' locations. Or, you can opt to show them on the map – which I found quite interesting.

Thoroughly Enjoyed!

I thoroughly enjoyed my time using both the AvMap Geosat 6 APRS unit and the Kenwood TM-D710E. If you are after a SatNav unit **and** you would like to integrate it into your APRS station, it's a great way of doing so, particularly if you have one of the Kenwood APRS-enabled rigs. The unit is well constructed and straightforward to use.

The mapping wasn't the clearest I've seen, but it's more than adequate. There appeared to be some inaccuracies with street names – at least in our locality. The maps installed on the review device covered Europe and I browsed maps of France and Norway (as examples) and the mapping detail was identical to the UK.

The ability to see APRS enabled stations on the GPS was excellent! Imagine being able to navigate to your friends' house by means of their APRS beacon, or rendezvous with a friend who is out on a bike ride or a walk with an APRS enabled hand-held.

Astonishing APRS Activity!

I was astonished at how much APRS activity there is. From my (admittedly good v.h.f location), I saw around 100 APRS stations recorded by the TM-D710E's APRS list in around 2½ hours. If someone asks you where all the v.h.f. activity is – I think a good amount is on 144.800MHz!

This review has mostly been about the AvMap unit, but I should add that I found the Kenwood TM-D710E very easy to use. The TM-D710E/GeoSAt6 combination replaces the previous TM-D700E/GeoSat5 combination (so both are new models to the market). The TM-D710E 'street price' seems to be about £445 – and I thoroughly enjoyed the APRS functionality built into the rig. Many thanks to David Wilkins G5HY of Kenwood UK for the kind loan of the review equipment and also for his courteous and patient replies to my questions.

Mike Richards G3WNC's Data Modes
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E-Mail: mike@pwpublishing.ltd.uk

Packet and APRS Operating

In his *Data Modes* column, Mike Richards G4WNC looks at Packet Radio operating and introduces the popular APRS mode.

Most of the data modes we've looked at so far have been designed to support simple typed message communications between Amateur Radio stations. Back in the 1970s, when RTTY and AMTOR ruled the roost and home computers were just starting to become feasible, groups of Amateurs began looking at ways to send larger amounts of computer data over radio systems. I remember getting my hands on a pair of 300Baud Post Office modems and running a duplex data link on 144 and 432MHz across town with **Carl Rabe G6NLG**.

As I remember it, Carl had a TRS-80 computer and I had a UK101 Superboard and we used the link to access the input and output streams from each computer. It was great fun but not very reliable and unpopular with local Amateurs who were not amused by the strange noises on the band!

At around the same time, Amateurs in the United States and Canada were working on a more sophisticated data system that made use of the commercial X25 data protocol that was being used for land-line data systems. The X25 system introduced the concept of packet data, a system where data is split up into smaller batches (or packets) prior to sending.

Each packet is then extended with a unique address and checksum so the system knows where to send it and the receiving station can tell whether or not the data has been damaged. Each packet also included information to allow the original data to be reassembled in the correct order. The X25 protocol also uses an acknowledgement system so that the receiving station can send a short signal back to confirm receipt of each packet or ask for a repeat of any damaged packet.

Special Modem

Although the X25 system was certainly very powerful, a special modem was necessary to make the link work. The modem was required to generate the modulation tones, break the data into packets, control the flow of packets of data and manage repeats. The modulation system employed was AFSK (Audio Frequency Shift Keying), i.e. audio tones applied to the 'Mic.' input of the transceiver - see **Fig. 1**.

The AFSK shift was 200Hz and most v.h.f. work was done with the rig set to f.m. whilst h.f. work employed s.s.b. operation. Development of the specialist hardware was pioneered by the **Vancouver Amateur Digital Communications Group** (VADCG) and they produced the first modem or Terminal Node Controller (TNC) as it's called in packet radio. However, the system really took off when the **Tucson Amateur Packet Radio** (TAPR) group introduced the TNC-2 controller in 1984.

The AX-25 Protocol

To produce a working packet radio system suitable for Amateur Radio, a number of changes had to be made to the original X25 protocol. These included making provision for the originating and the target callsigns to be embedded within each data packet. This fully developed protocol was called Amateur X25 or AX-25 as we know it.

All the intelligence for the link was contained within the TNC and so, it was possible to run packet with just a dumb terminal (basic keyboard and display screen) at each end. Let's now take a short overview of the protocol.

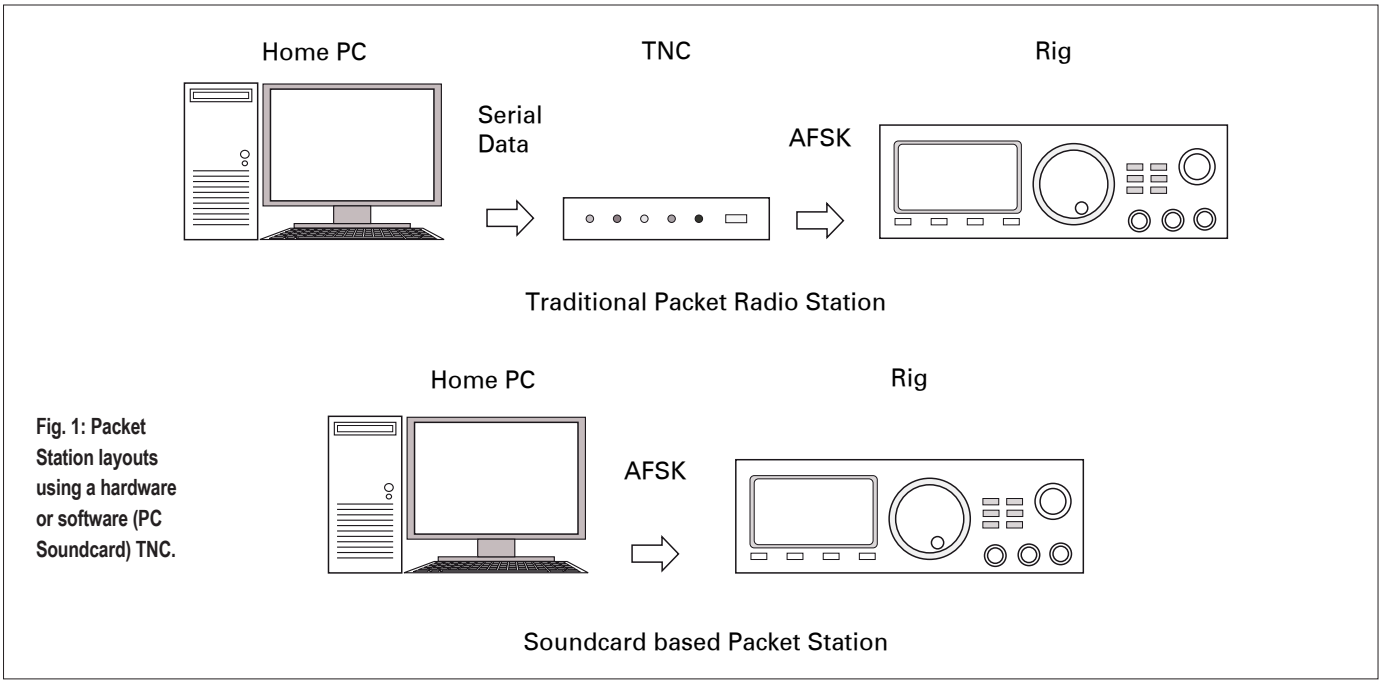


Fig. 1: Packet Station layouts using a hardware or software (PC Soundcard) TNC.

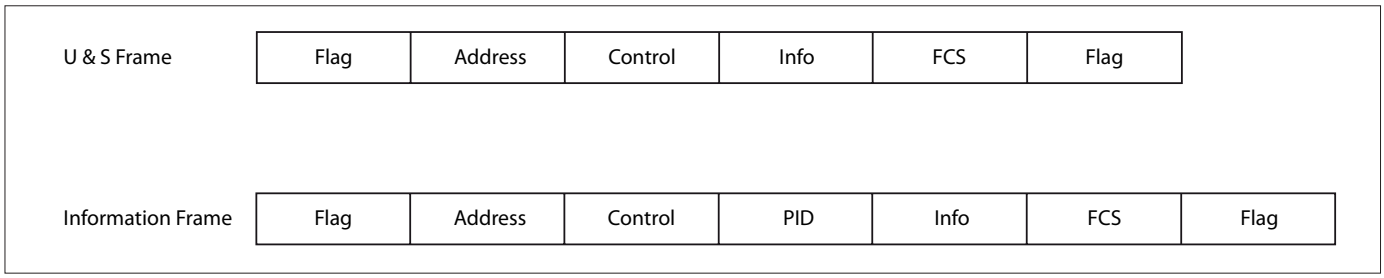


Fig. 2: Packet radio frames.

Packet Frame

Each packet is called a frame within the protocol and there are three basic types of frame in use as shown in **Fig. 2**. The information (I) frame is used to convey the message whilst the Un-numbered (U), and Supervisory (S) frames form part of the control mechanism. You'll see from Fig. 2 that the Flag field appears at the beginning and end of every frame and always has the same value, i.e. 01111110.

The Flag field is used to mark the beginning and end of each frame and so, this particular pattern is not allowed anywhere else in the data. To achieve this, the message data is examined before transmission and bits changed to eliminate false flag patterns – this process is reversed at the receiving TNC so the message data remains intact. The Address field contains both the originating and destination callsigns that are supplemented by a Secondary Station ID (SSID).

The latter SSID extension is necessary as it's not uncommon for Amateurs, using their unique callsign, to run packet on two or more frequencies. So, the SSID provides a way to differentiate between them.

The Control field simply indicates whether the frame is an I, S or U type frame. The Protocol IDentifier (PID) field appears in both U and I frames only, and is used to show whether the frame is part of a higher level protocol, i.e. TCP/IP, etc.

The Info field is where the message data itself is located and the default length is 256 sections of 8-bit (bytes) of information each. This is followed by the Frame Check Sequence (FCS) that's calculated from the data at the transmitting end. The receiving TNC does the same calculation with each received packet and compares the result with the number stored in the FCS field as it comes in. If the two values agree, the data is good.

Each frame is completed with a flag field as at the start. There are three common speeds for packet links with 300Baud on h.f., 1200Baud on v.h.f. and 9600Baud for u.h.f. point-to-point links.

Pros & Cons

In its time, packet radio caused quite a stir as it heralded a new breed of communications that promised reliable data transfer. This spawned a number of applications such as local bulletin boards where Amateurs could exchange messages rather like we do via E-mail now. And there was the opportunity to transfer software using the system too.

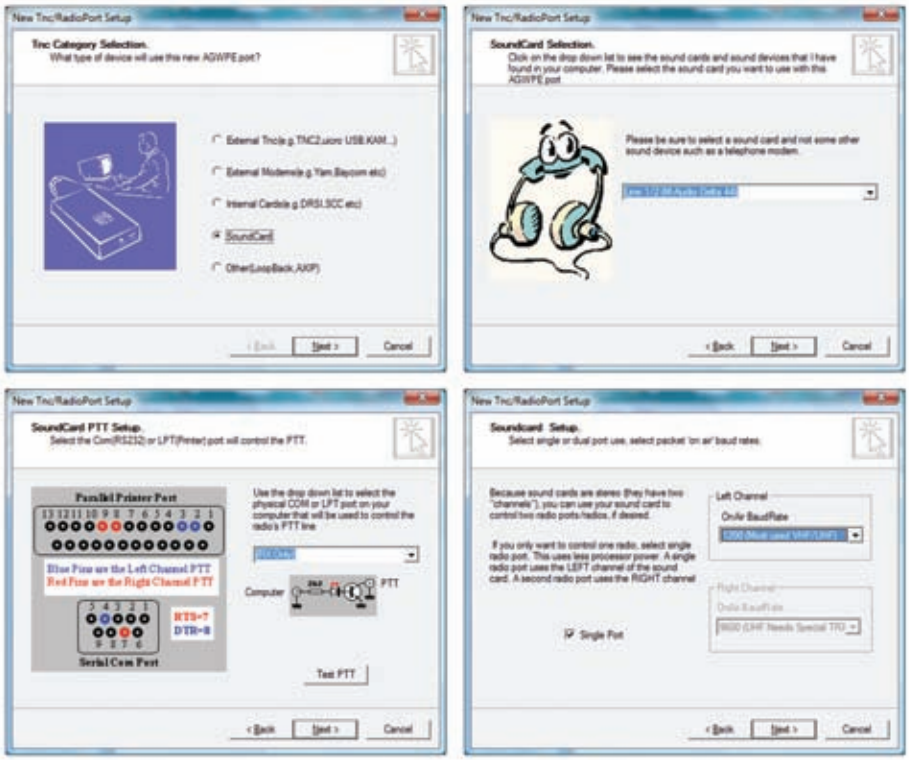
A system called 'Digipeating' was also introduced so, that messages could be relayed through several repeating stations to the intended recipient. For DXers, packet radio was used for the early DX clusters where the status of rare stations could be shared with others (after you've worked them of course!). However, the Internet changed all that and has made high speed reliable data exchange something that everyone expects. Now many Amateurs enjoy 10-20Mb/s globally-connected data links direct into the shack!

As a result of the advent of broadband internet, packet systems operating at 1200Baud look pretty tame. However, the system is still in use and the most common utilisation is through the APRS (Automatic Packet Reporting System) so let's look at that next.

The APRS System

Although APRS employs the same technology as conventional packet radio the way that it's utilised is totally different. Conventional packet radio is intended to create a one-to-one link between two stations with full error control to ensure that data messages make it safely to the far end of the link. APRS, on the other hand, is designed as a broadcast mode where each station broadcasts its message to everyone within range.

It does this by using the Unnumbered Information frames (UI frames). As previously shown, as you can see from Fig. 2, the frame has all the essential elements with a routing field, information field and the all important check sequence at the end. However, UI frames do not solicit an acknowledgement from the distant station so it can be used to support



The *AGW* Packet Engine Pro Setup Guide.

broadcasts. All well and good, but what is there to broadcast?

At the heart of APRS is position reporting – all APRS stations report their current location as a key part of the message field. Whilst fixed stations can send manually entered position reports, mobile stations generally are connected to a GPS unit that provides a regularly updated position report. As you can probably see, APRS would be very useful in any emergency situation, by displaying the locations on a map you know the exact location of all the stations.

In addition to knowing everyone's location, the APRS format allows for other message information to be included in each packet. This can range from local weather reports through to details of competitors passing through a check point.

The *AGWTracker* software showing APRS activity.

Setting-up APRS

If you're lucky and have one of the latest APRS enabled rigs you may already have the ability and perhaps even running it. Some of the newer rigs include a GPS receiver along with an integrated packet TNC that makes APRS reporting about as easy as it can get. But all you really need to get started is a computer (desktop, laptop or netbook) and some freely available software.

Whilst early users of packet had no choice but to use a separate TNC to manage the packet connection, we can use a software TNC that employs your PC and sound card to do all the hard work. For this example I'm going to use the *AGWE Packet Engine* and the *AGWTracke*r both written by **George Rossopoulos SV2AGW**.

There are two versions of the *Packet Engine* and I suggest you start with the *Packet Engine Pro* version, as it includes a useful setup wizard that makes the process so much simpler. You can download both programs from the following location: **www.sv2agw.com/downloads/default.htm**

Following installation, run the *Packet Engine Pro* and choose the Setup menu – New TNC to start the New TNC wizard. Following the introduction screen, select Soundcard as the type of device then choose the appropriate soundcard. If you already use other data modes and you have PC controlled p.t.t. switching setup you can choose the appropriate serial 'Com' port and test it on the next screen.

If you don't have p.t.t. switching leave this on 'RX only' so you can at least check activity and make sure your systems works – you can always add p.t.t. later. On the next screen you can decide whether you want one or two TNCs on your soundcard. *Packet Engine Pro* can create two completely independent TNCs using both the left and right channels of your soundcard respectively.

Single Port

For the time being, select Single Port and set the OnAir rate to 1200Baud for normal v.h.f./u.h.f. operation. If you are primarily interested in h.f. packet you should set this to 300 ('HF Packet KAM') – avoid using the PK232 setting as this puts the packet tones rather too close to the edge of the audio passband for reliable operation.

The next screen is used to set the input level and includes an automated adjustment – just follow the on-screen instructions. Finally, you can name the newly created port and you are done. However you do need to close and restart *Packet Engine Pro* for the changes to take effect. To check out your new TNC, tune to 144.8MHz, f.m. where you should hear regular bursts of packet data.

Main Screen

Now from the *Packet Engine Pro* main screen choose View – Monitor and you should start seeing the received packets. That completes the Packet Engine Pro setup and you now have a working software TNC.

The next step is to geta copy of the *AGW Tracker* software running, so you can make some sense of the received packets. Assuming you've already downloaded *AGW Tracker*, unzip the files to a convenient location and run the *AGWinstall.exe* file. You can then double-click on *AGWTrackere.exe* to run the tracker software.

The first time *Tracker* runs it will automatically take you through the configuration routine where you can set your location, callsign and messages. That completes the setup and if all is well you should see messages appearing on the monitor screen in much the same way as they did in *Packet Engine*.

Plotting Locations

To plot the locations on a map go to the Folder at the very top of the screen and you'll see that you can open a variety of online mapping systems. In the example I've shown a *Google Map* display. These maps are all fully 'zoomable' and you can 'right-click' on any of the station entries to get more information.

For mobile stations you will find details of speed and altitude in addition to the current location. If you want to learn more about APRS I suggest you take a look at some of the following Web resources: **Bob Bruninga WB4APR** is the designer of APRS: **www.aprs.org/**

An excellent resource with setup details for the alternative *UI-View APRS viewe*r can be found at: **www.apritch.myby.co.uk/uiview.htm** The **Tucson Amateur Packet Radio Group** has a good website to be found at: **www.tapr.org/** Cheerio for now. ●

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CW-80	(80-10m) 40m long	£134.99 P&P £10.00
CW-80S	(80-10m) 20m long	£152.99 P&P £10.00
CW-40	(40-10m) 20m long	£121.99 P&P £10.00
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Baluns 1:1 or 4:1 or 6:1 ..... £39.99 each P&P £4

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Maurizio Marti IV3XAZ's Antenna Workshop
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The EasyLoop 14
A Portable Loop antenna for 14MHz

Maurizio Marti IV3XAZ describes a loop without tuning capacitors, that's proved useful over more than just the one band.

In 2008, I built a receiving magnetic loop antenna, starting from suggestions found in the, 21st. edition of the *ARRL Antenna Book*. After many thoughts, I decided to build a portable loop antenna, with a maximum loop diameter of one metre. I did not want to build any loop using a capacitor adjustment to tune over multiple frequencies.

In my cellar I found about three metres of Aircom Plus 50Ω low-loss cable, some RG- 58 cable and some coaxial connectors. As I've just bought an MFJ-207 h.f. s.w.r. analyser, to check out my antennas, I used this as an opportunity to learn and to compare results. The MFJ unit's a very useful tool and very easy to use.

The Aircom cable is quite rigid but, to build a quite perfect circle, needs rather more support. In a plastics store I found a solid, but very flexible 8mm diameter *pvc* rod 3m long and I taped it to the Aircom cable.

Centre Of Loop

Next, in the top, at about the 'centre' of the loop, I cut out a section of braid, some 300-400mm long to divide it in two, almost equal parts. These two sections of shield will add capacitance to the system, to tune the inductance of the loop. See drawing of **Fig. 1**.

Then I fitted the *pvc* rod ends into a short *pvc* pipe with an internal diameter of 10 mm, which forms the rod and cable into a circle. The result was an almost perfectly circular loop. I've taken the two ends of the loop and I connected shield to shield, shield to tip, tip to tip and so on.

Up to this point, everything had gone well, then it started to become a more difficult job... I tried many systems to couple the loop output with the transceiver and to match the impedances. Although deigned for the 14MHz band, I also wanted to use it on other bands.

I then cut some lengths of RG58 cable and I tried to create different stubs at the 'far' end of the loop **Fig. 2**, while the other end was still connected to the radio via 6m of RG58 cable. I tried several different lengths to try and find the best result for both the s.w.r. and the frequencies to use.

In short, I got some interesting results: The 1m. loop can be used on 3,5 to 3.8, 10.100 to 10.150, as well as 14 to 14.350MHz. It could also be used on 18.068 to 18.168 and 21 to 21.450MHz. Of course, when trying out these tests, I used the MFJ-207 first, to view the changes! Then I used my radio (a Kenwood TS-2000) at the 5W level to feed the loop.

Take Care Please!

Please be careful when trying these tests yourself: I found **two systems** to have low s.w.r. and now I'll explain them: Let's call the two loop terminals, **1 and 2** :

Terminal 1 is always connected direct to the radio, using any tuner. The radio should have an output of no more than about 5W. It takes only a few seconds transmission to check the readings.

On 14MHz: I've built a stub/loop as you can see in the heading photograph and I connected it to loop terminal 2. I checked out on transmit at 14MHz and the s.w.r. was about 1.6:1 – quite good. Now to explain how I achieved the other h.f. bands where I've found some interesting results!

I took a piece of 2.5mm^2 insulated wire 10m long with large, strong crocodile clips to both ends, I connected one crocodile at the ground of the PL-259 **Terminal 1** (the one connected to the radio) and I put the remaining wire along the room . I checked very low s.w.r. on 14 and 21MHz (1:1,5), and quite good (1:1,7) on 10MHz.

On 3.5 & 21MHz

In this second step I looked at the setup on both 3.5 and 21MHz. I disconnected the 10m of wire from Terminal 1's ground, and I connected the same length of wire onto Terminal 2's screen. Checking with the radio on 3.5 to 3.8MHz, again with only 5W on the radio, I found an s.w.r. of 1.5:1 It also was very good on 21MHz.

Please keep on mind that, whilst It should be possible to verify or improve these results, they were carried out in my cellar, about three metres under ground. This is a room that's about 7x4m dimensions and has a ceiling height of about 2.50m. The room has three plain walls and the fourth has two small windows near to the ceiling.

For the testing, the loop was laid horizontally on the table, which I think it is the worst way to check an antenna. Next, I set out to test the loop first on the attic and then outside.

The following morning, I checked the Easyloop indoors. I took the antenna up to the attic (about 10m above the ground). There I have a small 6 x 6m room and the ceiling is about 2.5m high. There is also a very small window, so I put the loop close to it.

I checked the antenna and the various results are very similar to the previous day's results. The coaxial feeder cable, was now 20m long and I noticed some variation on the s.w.r. on 14 and 21MHz. On these two bands, I found the s.w.r. lower around the high part of bands (14.3 and 21.35MHz). However, the s.w.r. had risen to around 3:1 s.w.r. in the c.w. segments of both bands.

But because the results on 14MHz are quite good, I decided to 'leave well alone'. It might be possible to improve the matching by shortening the stub to adjust the s.w.r., but I didn't try it out.

After lunch, I took the antenna to my very small backyard (3 x 10m) and put it on the branch of a small tree, about two metres above ground. In this case,

I needed just 13m Westflex 50Ω feeder cable. The results were very similar to those I'd found earlier.

Checking With An ATU

After all these tests, I wanted to check the system with my tuner, which is is an MFJ-994-B Intellituner, with a capability of up to 600W p.e.p. (300W on c.w.) So, with the loop still, outside and fed via the 13m of cable, using around 10-12W, I checked all the bands from 1.8 to 30MHz. Using the MFJ tuner, I was able to match all bands quickly. At 3.5 to 3.8MHz the s.w.r. could be quickly reduced to 1:1.

The only problem I encountered, was at 1.840MHz, where the s.w.r. stubbornly remained at around 3:1. But I think that for this band it's a better option to use a more suitable antenna. If this isn't an option, then consider using QRP power levels.

Trying Some QSOs

Using the MFJ tuner I started trying out some QSOs. First I began with the 7MHz band, where I had two 'local' QSOs here in Italy. The first one was with **Patrizio Principato IZ1NDZ,** (in San Remo, Liguria north west Italy), who was using about 500W to an inverted 'V' dipole 30m high, He sent me a 57/58 RS and I sent him 58/59. My power level was about 70W.

With some fading (QSB) on the path, Patrizio and I checked out two antennas, where I checked the EasyLoop against my Diamond BB-7V wide-band antenna. The comparison was good, because the loop (2m from the ground, remember!) had about one S-point less on the TS-2000's S-meter.

Some ten minutes afterwards, **Maurizio Ciofani IK6RPR**, in L'Aquila - Abruzzo (in the centre part of southern Italy), sent me a 5&5 to 5&9 signal, after asking about his own, which was similar. From my location in Udine (JN66NA – in north east Italy) it's more or less, about 600km to both San Remo or L'aquila. So, I think the small loop is producing good results.

Then I turned to the design band of 14MHz, with a QSO using 50W of PSK31 and using *MixW 2.19***.** I called twice and immediately an RK6 station replied with 599, but, for some reason the radio would not transmit in reply back to him. After the enforced break in the QSO while I tried to find and fix the problem I tried again. But the RK6 station had vanished.

So, after finding and repairing the macro, that had caused the problem, and having been unable to find the RK6 I started with, I called **Viktor Skripnik US5EQ** in Nikopol, in the Ukraine. Viktor came right back to me, sending me RST599 (though I think this may have been 'generous') and I sent him RST579 in reply.

Further Results

Now for some further results. On a day that was cool and sunny, I placed the Loop on the roof, just over the v.h.f./u.h.f./s.h.f. antennas. This time is was on the lightweight rotator, about 12m above ground. I could now compare it with my Diamond BB7-V vertical base antenna.

Incredibly, I found I could hear some signals on the loop that I was unable to hear with the vertical. Perhaps, as it reacts to the magnetic field, more than the E-field, it helps to pick out to these signals from the noise.

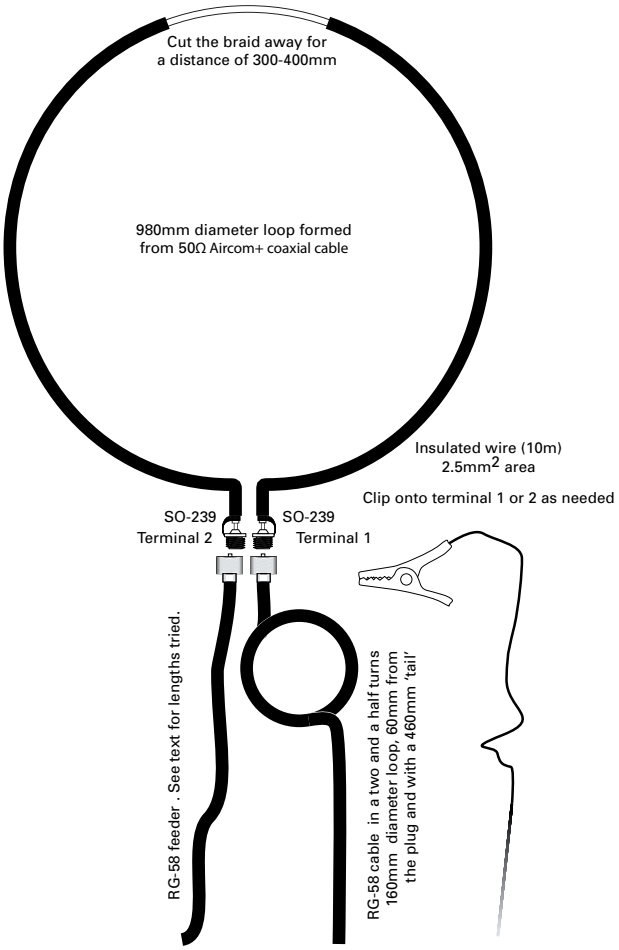


Fig. 1: These two sections of shield will add capacitance to the system, so helping to tune the inductance of the loop.

The s.w.r. readings on 7, 10 and 14MHz were about 3:1, which is not very good. But, using my MFJ -994B Intellituner between the TS-480 and the loop, allowed me to get down to unity s.w.r. The feeder cable this time is about 25m long.

Using power levels from 5-130W and using PSK31 and RTTY, during a recent winter month's activity I had around 25 QSOs of over 1500km. The best ones being with ZS2ND at around 8100km.

All in all, I'm more than happy with the results of the loop antenna. So, why don't you have a go at one? If you'd like to contact me about this design, then I'm on E-mail at: **mmarti@libero.it** or **IV3XAZ@arrl.net**

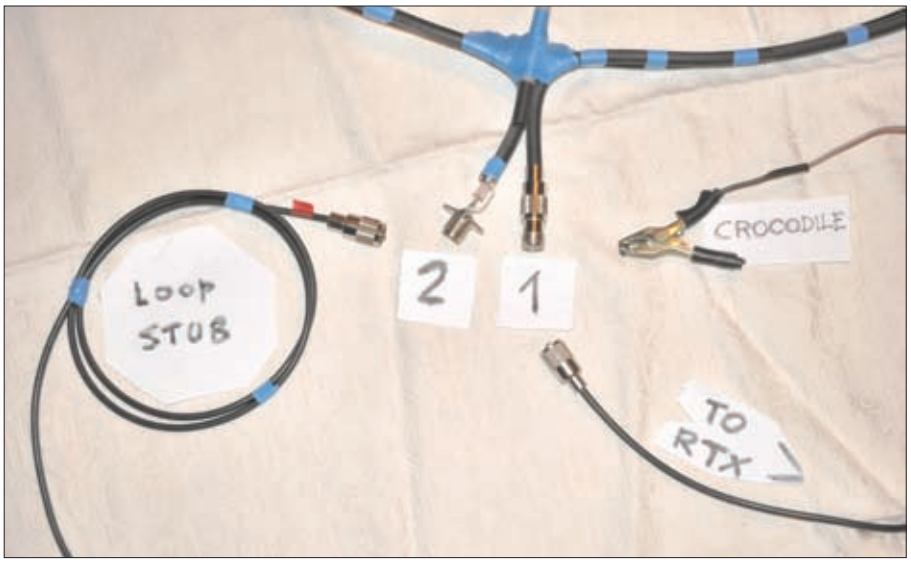


Fig. 2: A little more detail of the parts that may be connect together for operation on different bands.

Transmitter Station Earthing Systems

Dave Porter G4OYX's article replies to the 'station earthing' topic that's proved to be of great interest to *PW* readers recently. Dave runs two stations – one operating on the Amateur bands and the other on the h.f. broadcast bands!

Recently in the pages of *PW*, the subject of 'station earthing' has been aired. In the introduction to an article the late **Frank G Rayer G3OGR** once wrote, "When contemplating a complex project it's often a help to see how it has been done by others". This is pertinent information – so for this exercise I can offer information as to how it is effected at the high power h.f. broadcast station, Woofferton, in Shropshire.

For most of us in Amateur Radio 400W is about the permitted maximum. However, I will give examples on senders* of single 250-300kW units, within a station of ten such h.f. transmitters. The station was built during the Second World War to help expand the BBC external broadcasting during the conflict.

**Senders: This historical term for 'transmitter' was originally adopted by the BBC Engineering Department in the early days of short wave broadcasting and is still used today.*

Woofferton Earthing

The traditional method of station earthing at Woofferton (adjacent to the main A49 approximately half way between Leominster and Ludlow) is by the use of copper tape of typical measurements 50 x 3.2mm for near-floor horizontal runs and 25 x 3.2mm tape for vertical runs to equipment.

'Mouseholes' (**Fig. 1**) of 60mm diameter are formed through walls to allow the tape to pass. Crossovers and joins are made by approved fixings which could typically be four 2BA brass bolts with flat washers, a shake-proof spring washer and nut. More modern installations employ M5 or M6 brass or stainless steel hardware. All joints are usually solder-tinned before being bolted together and then painted over with bitumastic paint.

More modern bonding is again effected by flat tape but during construction the tape can be run either run horizontally or vertically through the brick courses as the building takes place and mouseholes are not employed.

The UK Company Furse™ supply the tape as well as mounting saddles and hardware. Their principal activity is lightning protection earthing systems on churches, other buildings and communication facilities, masts and towers.

A Right Royal job

The primary points of earthing on the Woofferton site are to Earthing Rods (ER) driven into the ground adjacent to the outer wall of the building. The connection points are within a chamber the top of which is covered by a concrete lid with a metal lifting eye.

The lid is marked 'ER' but it's not attributable to Her Majesty! The chambers are then available for inspection of integrity and for loop resistance checks if required. The tape is secured to the rod by approved clamps. At Woofferton each of the ten senders has two outside earthing rod points.

Sender Earthing At HF

The six Marconi senders at Woofferton have earthing connections made by copper tape to the actual cabinets and to the earthy components within. The aluminium chassis comprising the cabinets and transformer laminations are all bonded by earthing tapes.

Earthing straps should be heavyweight to be effective, as shown in this transmitter cabinet at a commercial sender station.

In the modulation enclosures the iron-cored components are bonded by tape to the main tape that goes outside. The protective, shorting switches on the high and low voltage d.c. supplies are similarly bonded.

The 328Ω balanced 'sausage' (their shape earned them the nickname) feeders carrying the modulated radio frequency (r.f.) is within the building and for a portion outside, contained within an aluminium screening box. This box is also bonded to the main sender earth by 50mm tape. It may also be bonded in more than one place!

The later (2006 – 2008) Radio Industry Zagreb (RIZ) senders at Woofferton are earthed in many cases exactly like the Marconi units at the station – but they do differ in the following respect. Prior to the sender cabinets being delivered, the floor area over which they stand was completely lined with sheets of 20s.w.g. copper soldered together.

The sheets were bonded to 50mm tapes to the ER and vertical sections of copper some 200mm wide of 20swg

Fig. 1: A mousehole for the tape entry and exit. (The photos provide a clue to the nickname!).

Fig. 2: A screening grid over the r.f. matrix switch station.

copper foil were connected by soldering at certain points to the sheet. When the units were 'planted' these vertical foils came through rectangular holes cut in the sender cabinets. The copper chassis of the sender cabinets was bolted to these foils – ensuring full earthing underneath the sender.

National Grid Input

Typically, high power sites are fed from the National Grid at 11kV a.c. This three phase supply is fed to switchgear and then mains transformers. It's the secondaries of these transformers that supply the various voltages required. At Woofferton such voltages are 11kV and 415V a.c.

The secondaries of the auxiliary supply transformers are usually in a 'star' configuration on the three phases and a neutral connection is obtained there at the centre of the star. All the a.c. neutrals in the system are referred to that.

Tricky RF Earthing!

The r.f. earthing is probably the trickiest area of all! It's conventional to bond to earth at regular points all overhead screenings on feeders both outside

Fig. 3: When the output r.f. is contained within coaxial cables, provision is made to bond the mast itself to earth, here showing three such bonds.

and more importantly within buildings. Sometimes these 'earths' are effective at say 6MHz but extra ones are needed at 21MHz or vice-versa! It really can be a matter of suck-it-and-see even for professionals!

The photograph **Fig. 2** shows some additional screening that was added to the outside of an antenna selection matrix building at Woofferton. You can see the galvanised steel grill and its many connections to the vertical structure of the switch station; all these verticals are bonded to earth by tape and buried rods.

Regrettably, the most difficult r.f. earthing situation can arise when a first or even second storey room is used to site a transmitter. Here the distance from the transmitting equipment to the ER can be considerable and the length can be significant fractions of a wavelength at the higher wavebands.

The earthing problem came to haunt the BBC at the Rampisham h.f. transmitting station in Dorset, where in 1960 two 100kW Marconi BD253 senders, S35 and S36 were installed on a balcony rather than at ground level. It was a prolonged exercise to successfully bond to earth the r.f. cabinets and associated plant.

For later installations the Rampisham approach was never repeated, for example in 1961 the four BD253 at Daventry, S12, S13, S14 and S16 were at ground level. For Amateur operations then preference should be given to a ground level shack – particularly if h.f. high power (QRO) operation is envisaged.

Earthing VHF & UHF systems

For medium frequency (m.f.) and low frequency (l.f.) the systems employed are very much the same as for h.f. However, for sites with v.h.f. radio and TV then the output r.f. is contained within coaxial cable and provision is made to bond the mast itself to earth, see **Fig. 3** showing three such bonds.

Additionally, where the r.f. feeders approach the base of the mast the outer insulation of the coaxial cable is removed and a connection by a saddle is made to the corrugated copper outer and then by thick stranded wire or copper tape to an earthing point. This saddle is then covered by self amalgamating tape followed by Denso tape to ensure no ingress of moisture can take place.

The Woofferton AC Supplies

Typically high power sites are fed from the National Grid at 11kV a.c. This three phase supply is to switchgear and then mains transformers. As I've already briefly mentioned – it's the secondaries of these transformers that supply the various voltages required.

At Woofferton the supply voltages are 11kV and 415V AC. The secondaries of the auxiliary supply transformers are usually in a star configuration on the three phases and a neutral connection is obtained at the centre of the star. All the a.c. neutrals in the system are referred to that. Within 415V switchgear a monitoring unit* is sometimes provided to check for unbalance on the phases and that looks at the neutral to earth currents.

**This is often referred to as a 'balanced protection system'. It often uses summator transformers on each phase (they are often built in to the input bushing insulators at the transformer end and can be seen as relatively bulky box-like structure between the bushing insulator and the transformer. If a fault occurs on one phase the 'unbalanced' fault generates a control voltage that will then 'trip' the associated circuit breakers.*

Earthing & Safety

I remember as a young Senior Maintenance Engineer (SME) at BBC Brookman's Park in 1978 working with another young engineer on a piece of equipment – with the chance of exposure to 1.25kV d.c. We were then both reminded by **Eric Spicer** (an experienced 'Old Man' in the Amateur Radio sense of the term) SME to **"Get an earth on it"**. Excellent advice indeed!

●

Mini Review

The MFJ-974B
Balanced Antenna Tuner

Rob G3XFD has rediscovered the benefits of balanced feeders. Then he thought an MFJ-974B balanced a.t.u. might further improve the situation!

Several years ago I was discussing antennas with John Heys G3BDQ – seeking advice from my friend and *PW* author. At that time I'd just changed my antenna at home from a trapped dipole into a dipole without traps. I had also re-equipped the mast system with high quality coaxial cable.

Chatting to John G3BDQ led to the advice that I should install a balanced feeder to get a reduction in received noise and better performance. It had been some years since I last used balanced feeder and I only had a short length of the 75Ω balanced twin feeder that was once commonly available in the UK.

I was also considering using my main mast (approximately 12 metres high) to support the dipole as an inverted 'V' with the feed-point directly above my shack. (My mast is situated close to one end of my purpose-built wooden shack).

Ladder Feeder

As I didn't have any ready made balanced feeder I made some myself – in the form of 'ladder' style using short lengths of plastic tubing as spreaders. It was fairly lightweight but rather clumsy and judging by the results it wasn't very effective. One of the biggest problems was that the 'rope ladder' style of feeder seemed to twist very easily in the coastal winds at my home in Bournemouth (approximately 400m from the cliff tops and the English Channel), unbalancing the system. It was also very difficult to tune up.

So, after a few frustrating weeks I abandoned the balanced feeder idea, dropped my mast and re-wired the antenna to the heavy-duty low-loss coaxial cable that I'd left (sealed with self-amalgamating tape) at the top of the pole.

Enter Tony G4CFY & Tex!

The antenna then remained as coaxial cable fed until **Tony Nailer G4CFY** of **Spectrum Communications** introduced his (especially commissioned and made in the UK) balanced 100Ω lightweight twin feeder. Friend and *PW* colleague **Tex Swann G1TEX** purchased a drum of the 100Ω cable and he kindly gave me enough to use for a trial 14MHz dipole.

The temporary dipole fed with the 100Ω balanced feeder was an immediate success. Even though it was only erected at about 5m above ground level the reduction in received noise was dramatic – and I'm not exaggerating here! My existing MFJ-969 (**Fig. 1**) 'roller coaster' type a.t.u. (h.f. and 50MHz 300W p.e.p. rated) proved more than adequate to tune the dipole and I was pleased to hear DX stations much more effectively – and work them too!

Unfortunately, the temporary 14MHz dipole was rather shorter lived than I'd planned and because I'd erected it using a (swaying in the wind) tree at one end, the lightweight stranded wire I'd used soon snapped. However, bouyed up with the success of the simple balanced feeder fed dipole I planned ahead to change over my main antenna.

Nowadays, I have to be prepared to fall over (fortunately mostly on to the soft grass of our lawn!) whenever I'm working on my antennas. I've got two simple choices – concentrate on keeping myself vertical (on my feet) or concentrating on the antenna assembly! However, a simple solution is to use a chair to sit on whenever I'm soldering connections, etc. I'm also fortunate my daughter **Charlotte** and my son-in-law **Brian** live very close by and he can easily drop my mast and re-erect it again in minutes**.**

Despite help being freely available it was some time before I got around to purchasing some tough *pvc* covered wire suitable for the new dipole from **Bowood Electronics** in Chesterfield, Derbyshire. Unfortunately, the first parcel went astray in the post but **Will Outram** of Bowood was kind enough to send another package. What service eh?

Tex had again supplied me with more than enough 100Ω balanced feeder and all I had to do was to get the mast dropped, install the new wire and feed point, seal it up and get the system re-erected. Time simply flew by but eventually I managed to summon up enough energy to finalise the new

Fig. 1: The MFJ-974B in Rob G3XFD's shack (to the right of the Alinco DX-SR8 transceiver) where he found it out-performed his MFJ roller coaster a.t.u. when it was being used with a balanced feeder antenna.

antenna on the August 2011 Bank Holiday Monday.

The overall length of each of the dipole's leg was approximately 16.75m (55ft). The centre feed point is at 12m and dipole leg ended up at approximately 2.7m (9ft) above ground at the house end and (due to my garden rising quite steeply at the far end of the garden plot) the far leg is only about 1.5m (5ft) above ground. The resultant inverted V antenna beams towards the East.

Abridged Manufacturer's Specifications For The MFJ-974B

Band coverage:	3.5 to 54MHz (including 5MHz).
Power handling:	300W p.e.p., 150W continuous.
Matching range:	12 to 2000Ω.
Suitable antennas:	Tunes any balanced lines including 600Ω open wire line, 450/300Ω ladder lines, 300/72Ω twin lead (shielded or unshielded).
Other antennas:	Will tune long wire/unbalanced antennas. Earthing post provided.
See MFJ website	**www.mfjenterprises.com/Product.php?productid=MFJ-974B** for full details

Something Wrong?

Keen to try out the new antenna I connected it up and immediately felt something was wrong because the bands were so quiet! However, a quick tune-up with my MFJ-969 roller coaster a.t.u. soon proved the antenna was okay. I soon tuned the antenna up on 7MHz and had several s.s.b. QSOs that proved it was certainly working well.

The reduction in received noise was so dramatic that this had led me to think there was a problem. I soon proved the balanced feeder was working – conclusively – by shorting out the balanced feeder on the rear of my MFJ-969 a.t.u., and tuning the antenna up as a 'sort of' top-loaded vertical led to the level of noise I would expect from a wire antenna with a significant length of vertical wire.

I then spent several days learning how to tune the antenna on all the Amateur bands from 3.5 to 29.7MHz. I achieved excellent results on all bands except 3.5 and 10MHz. **Note:** I don't like quoting standing wave ratios (s.w.r.) and prefer the broadcast engineering approach – referring to the maximum output level showing on the antenna output side meter and the absolute minimum level on the reflected power side's meter.

On 3.5MHz I found it difficult to get the reflected power down to the lowest figure I'm happy with (I don't like to see the reflected power needle to move at all!) – particularly at the c.w. end and on the frequencies used for PSK31. And although I could have lengthened each leg a little to ease the tuning, this would have meant extending and 'bending' the final metre or so of wire. Instead, I decided to evaluate a dedicated balanced feeder tuner to see if I could achieve even better results.

As I've already briefly mentioned, my MFJ-969 roller coaster a.t.u. has proved itself over the past four years or so and it has proved most useful. However, it's a general purpose unit and I'm also finding winding the roller coaster through its entire length to be quite difficult nowadays due to arthritis in my left arm. So, I had a quick word with **Jeff Stanton G6XYU** from **Waters & Stanton PLC** in Essex and they kindly supplied me with the MFJ-974B dedicated a.t.u. for antennas using a balanced feeder.

Fig. 2: Close up view of the MFJ-974B perched on top of it sibling MFJ Deluxe Versatuner II. Rob found the single large rotary switch of the balanced tuner, that selects the tappings on the inductor – to be more convenient.

Note: The unit can also be used for long wires, etc.

The MFJ-974B Antenna Tuner

The most distinctive physical operating difference on the MFJ-974B roller coaster type a.t.u., **Fig. 2**, and the MFJ-969 balanced antenna tuning unit is that the dedicated balanced feeder a.t.u doesn't have the roller coaster type inductor. Instead, the tuning inductor tappings are selected by a rotary switch and far from being a disadvantage – I found this more convenient than the roller coaster.

The centrally placed rotary switch that selects the tapping on the '974B's inductor proved to be very easy to operate so I could select the tapping to providing the best antenna matching point. In this respect, it was typical of several MFJ tuners I've had. Winding the roller coaster (and hence the continually variable tapping point) can be quite a lengthy process, although in theory the inductor is continuously variable from its minimum to a maximum inductance.

I soon found that the MFJ-974B did have the edge over my roller coaster a.t.u. with my balanced feeder fed antenna. In particular it enabled me to obtain an excellent match on 3.5 and 10MHz. Again, I won't quote the often confusing v.s.w.r. ratios but state that when operating on PSK31 on 80m the forward (Output power) was averaging 25W (my normal operating power on PSK31) while the Reflected power indication could only just be seen to be a little above zero (after I'd tuned up of course).

So, I thought it would be a good idea to share my antenna success with *PW* readers and describe how well the MFJ-974B has proved to work. In fact, I would recommend that anyone contemplating erecting a balanced feeder fed antenna should consider a dedicated a.t.u. for the job. Obviously, the evaluation of my antenna system is on-going but I'm thoroughly enjoying the reduction in the noise level on the bands. My thanks go to Jeff Stanton G6XYU of Waters and Stanton for the loan of the review a.t.u., which costs £194.95p plus £8.50p p&p. ●

KITS & MODULES

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.**

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**.

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**.

5W WIDE-BAND HF AMPLIFIER
A useful push-pull broadband amplifier module giving a nominal 5W output over the range 1.8 to 29.7MHz with drive levels ranging from 37 to 97mW. Harmonics typically are 2nd –42dB, 3rd –18dB, 4th –49dB, and 5th –29dB. Should be used in conjunction with a double Pi type low pass filter, either harmonic halfwave or 5 element Chebychev. Normal supply 13.5V DC with current between 900mA and 1.86A. **Full kit of parts with heatsink but without wound toroids £29. Full kit with wound toroids £39. Ready built £49**. Price includes postage but not low pass filters.

NEW PRODUCT

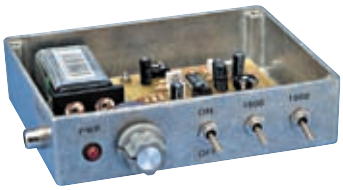
CTCSS TONE ENCODER as described in PW July 2011. All nine tones 67, 71.9, 77, 82.5, 88.5, 94.8, 103.5, 110.9, 118.8Hz link or switch selectable. PC board size 67x55x12mm. PCB kit inc PIC but excluding switch £21.00. Built inc PIC but excluding switch £30. Optional 9-way switch £2.00.

TRANSMIT AMPLIFIERS, for 2 or 4 or 6m, single stage RF switched, class AB linear. 13.5V DC operation. Diecast box with SO239 connectors and heatsink. TA2SA 5W in 25W out, TA4SA 2.5W in 25W out, TA6SA 2W in 25W out, Kit £63.00, Built £82.00. TA4SB 7.5W in 50W out, TA6SB 5W in 50W out, Kit £70.00, Built £89.00. With **RECEIVE PREAMP** 0-20dB adjustable gain, TARP2SA, TARP4SA, TARP6SA, Kit £89.00, Built £123.00. TARP4SB, TARP6SB, Kit £92.00, Built £126.00.

CLASSIC 20/80m SSB RECEIVER

Classic superhet receiver for 20 and 80m using a 9MHz IF and a 5.0-5.5MHz VFO. Uses a 6 crystal ladder filter with near symmetrical passband, 2dB insertion loss, 1.8:1 shape factor, and 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 PCB's and component kits including crystals £92. Complete kit including box and hardware £147.00. Ready built £240.00.**

TWO TONE OSCILLATOR
as featured in *PW* March 2005. A vital piece of test equipment used together with an oscilloscope for setting up AM, DSB, & SSB transmitters. **PCB & hardware kit £28.00. Ready Built £52.50**.



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.**

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.

LCR BRIDGE

With 5 resistance ranges 100, 1K, 10K, 100K & 1M. 3 capacitance ranges, 100pF, 1nF, 10nF and 3 inductance ranges, 1mH, 10mH & 100mH, plus external reference. Scale calibrated 0.01 to 10 times reference value. Optional drilled and labelled plastic or painted diecast box. **PCB & parts with pot and switch £26.00. With plastic box £39.00, with diecast box £44.00.**

SPEECH PROCESSOR

An analogue low noise unit, which includes high pass filtering, clipping, and low pass filtering to enhance the higher voice tones that carry most of the intelligibility. It sounds nice too. Panel controls are included for clip level and output level. Hardware and wiring can be supplied to suit a wide range of circular mic connectors.
SP1000E, Boxed Kit £42.50, Boxed Built £60.00.

DUAL PEAK/NOTCH FILTER & AUDIO AMPLIFIER

It connects directly to the loudspeaker or headphone socket of the receiver and produces up to ½W of audio to a front facing loudspeaker. The unit can be used to notch out two unwanted heterodynes, or just one while enhancing the wanted audio frequency. Similarly it can be used sharpen otherwise dull speech or to dampen shrill audio. **PCB kit and all the potentiometers £35.75. PCB kit and all the hardware with drilled and labelled box £73.00. Ready Built £112.00.**

COMPONENTS

See our web-site or send SAE for list.

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

DUAL GANG BROADCAST VARIABLE CAPACITOR
330+330pF with 3:1 reduction drive. £8.50 each plus £1.50 P&P.

CERAMIC WAFER SWITCH
4 pole 5 way with silver plated contacts. Rated at 2kV and 10A for use in ATU's and Power amplifiers. **£8.50 each plus £1.50 P&P.**

QUARTZ CRYSTALS CUT TO ORDER

HC49U & HC50U Fundamental 5-21MHz, series 3rd Overtone 21-70MHz, 5th or 7th overtone 70-120MHz. One crystal £15, two crystals £13.50 each, three or more crystals £12 each. P&P £1. Also new stock and used HC18U, HC25U, & HC49U see web-site or send SAE for list.

CAPACITORS, ceramic, poly block, electrolytic, mica, trimcaps.
RESISTORS, ¼ W carbon film, 10Ω to 1MΩ, and trimpots.
DIODES, small signal, zener, rectifier, Shottky, & varicap.
INTEGRATED CIRCUITS, linear & logic.
DG MOSFETS BF964S £1.50, 3SK45 £2.00, 3N201 £2.25, 40673 £2.50.
TRANSISTORS, small signal AF and RF bipolar and FET, medium and high power VHF.

SPECTRUM 10mm COILS, pin compatible with TOKO types. Coil values 1.2, 2.6, 5.3, 11, 23, 45, and 90uH. Some types have the primary tapped at ¼ turns and a low impedance secondary winding. Others have centre tapped primary and relatively high impedance secondary winding. Full details of turns ratios, etc. can be found on the website. **1-24 qty 75p each plus £1 P&P. 25-99 qty 55p each plus £2.50 P&P.**

G2DYM / G4CFY 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. 75p/metre plus £3 P&P. 100m drum. £70 inc P&P.

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 £80.00, strong £95.00, inc. carriage.

E-mail: tony@spectrumcomms.co.uk
Prices inclusive of postage unless stated. Payment by Cheque or Postal Order payable to Spectrum Communications, or by Credit/Debit card.

Web site: www.spectrumcomms.co.uk
Web site: http://spectrumcomms.eu5.org

Tony Nailer G4CFY's Doing it by Design
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Forwards And Reverse

In this month's *Doing it By Design* column, Tony Nailer G4CFY develops an h.f. power meter as an alternative to a commercial unit.

Welcome to *Doing it By Design (DiBD)*, where I'll start with some news up-dates. The 50W h.f. power amplifier project has been temporarily shelved due to time constraints. It has been a difficult year with my wife **Jean** suffering a succession of medical problems.

In addition **Robin Sykes G3NFV** of **Sycom** has ceased mail order business, and Spectrum Communications is expanding its component range and web information to fill the void. Also, having established the range of Spectrum 10mm coils there have been supply problems, possibly due to the earthquake and tsunami in Japan. Negotiations with other Far East factories have been long and difficult!

Hopefully my *Technical for the Terrified* (*T4T*) articles have stimulated interest in a variety of pieces of test equipment. As there is much interest in test equipment, such as the Off-air Frequency Standard, LCR Bridge, and Two-Tone Oscillator, I have decided to pursue these projects in the short term as they are relatively quick to develop.

Hopefully, when Jean is back to full health, I will have time again to fully explore the reasons why the 50W amplifier only achieved 30W without significant distortion.

Capacitance Meter

I bread-boarded the direct reading capacitance meter circuit which appeared in *T4T* in the October issue and it worked very well. It's just so easy to use when compared with the LCR bridge, where it's necessary to search for the 'null' position. I calibrated the prototype on its 50p, 100p and 1nF ranges, using 1% micas for both timing and 'unknown'. The 50pF was made using two 100pF capacitors in series.

When testing a wide variety of capacitors to be found in the in 'Spectrum store', I found that most were really close to the marked value. Though one batch of old disc ceramics marked as 470pF were really awful, with many reading as low as 360pF. They went straight in the bin!

As I only have four of the NE566 function generators in stock I searched the Internet for supplies. They are out there, but are now obsolete and many vendors want silly money for them. I am hoping to obtain a quantity at a reasonable price and will then complete the printed circuit boards (p.c.b.s) and mechanical design and make it the subject of a future article.

Noise Bridge

In *T4T* August issue *PW* I discussed the Antenna Noise Bridge and included a circuit from the American *Ham Radio Magazine* of February 1977. The bridge included a capacitor of 180pF in parallel with the unknown port and a 365pF variable in parallel with the variable resistance in the balancing port.

The prototype unit in its smart grey Hammerrite finish die-cast box. The power scale wasn't calibrated at the time this picture was taken.

A kind reader pointed out that reactance in parallel with resistance gives admittance, which is the inverse of impedance. It would be more useful to have the capacitors in series with the unknown port and in series with the variable resistor in the balance port. Values extracted from scale calibration would then be in the form of impedance.

Unfortunately, I can't name the reader as a boot problem with my computer required the operating system to be re-installed. Again unfortunately, Outlook Express is an integral part of *Windows XP* and all my E-mails received and sent were lost during the re-install.

The HF Power Meter

In the same *T4T* I included a reprint of a wide range power meter, which appeared in the RSGB *Radio Communications Handbook* 5th Edition. That design used two meters simultaneously showing both forward and reflected power. The author of the article and design stated that the switches marked S1a and S1b were not to be ganged because the reflected power was likely to be a lot less than the forward power.

I then gave a circuit of a variation of this using a single eight-way rotary switch to select four power ranges each of forward and reflected power. This allowed a single meter to be used and is consequently a more economical design.

I subsequently decided that the constraint of the previous author not to gang the forward and reflected was quite unnecessary. Also that including scale setting resistors in forward and reflected paths could be avoided by the addition

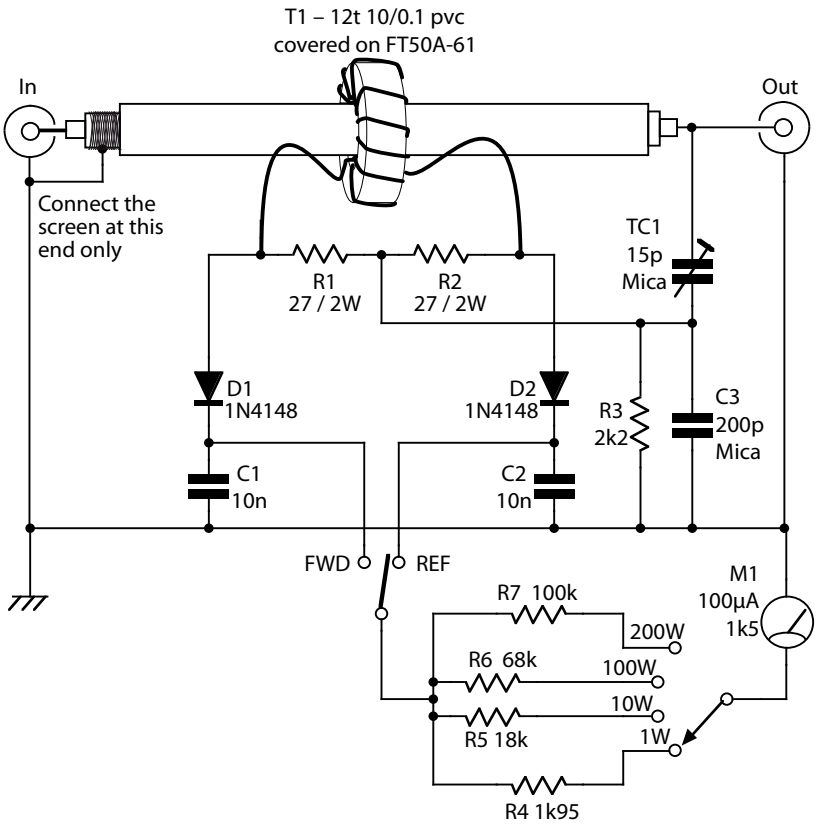


Fig. 1: The circuit diagram of the h.f. power meter features only forward (FWD) and reverse power (REV) readings with a single meter, it doesn't display s.w.r. readings directly.

Kits & Bits

Box drilled and trepanned costs £25. The meter with calibrated scale costs £7.50. Coaxial cable and toroidal transformer assembly costs £5. Other parts, tag strip, connectors, switches and knob £5. The total kit is available for £42.50 plus £4 P&P.

of a single pole double throw switch. The circuit is shown in **Fig. 1**.

The meter is used by selecting the power range and 'FWD' and noting the reading. It's then worth switching to 'REF' to determine if the load is a good match. If the reading is too low then reduce the power range setting until an accurate reading of reflected power can be taken. It's important to realise that if the reflected power is significant then the load is not a good match and the forward reading is likely to be inaccurate.

Current Transformer

The next and most important part of the circuit is the toroidal transformer. The *Radio Communications Handbook* stated 'The ferrite material should maintain a high permeability over the frequency range to be used: a suitable ferrite ring is the Mullard FX1596.

Fortunately, I have a copy of the *Mullard Technical Handbook Number 3*, Components & Materials Part 2. This contains all the Ferroxcube products including the FX1596 toroid, which is nominally 12.7mm outside diameter, 6.3mm inside diameter and about 3.1mm thick.

There it states that "the permeability is greater than 130 at frequencies below 5MHz. The material is type B3 with a recommended range of 500KHz to 2MHz." Not quite in keeping with the statement implying high permeability to maybe 30MHz.

During the design and development of the 5W and 50W h.f. amplifiers I have become quite familiar with the popular dust-iron and ferrite toroids. There is no equivalent to the FX1596 in the Fair-Rite range but the material type 61 has a characteristic µ of 125, is suitable for wide-band transformers to 200MHz, and high *Q* inductors between 200kHz and 15MHz.

A core type FT50A-61 is 12.7mm outside diameter, 7.9mm inside diameter, 6.3mm thick and has a µ of 75. Clearly the toroid has a significantly bigger inside diameter than the FX1596 so I would need to use a different diameter coaxial cable line.

Box & Meter

Before proceeding with the electronic development I searched various suppliers for a nice size box and meter to match. The box should not be too wide as that might cause problems with the internal coaxial sensing line. It should not be too high, like the Bird 43, with a high centre of gravity making it easy to knock over.

I also kept in mind that I'd need a box and meter combination, which might also be used for the direct reading capacitance meter. The box chosen was 120 high by 94 wide by 61mm deep and finished in Hammerite grey. I think you will agree that it does look nice.

The arrangement of input and output sockets at the bottom of each side and close to the back of the box allows room for the switches at the bottom of the front panel. An old style tag strip mounted with one screw and nut to the rear panel gives simple construction.

The Construction

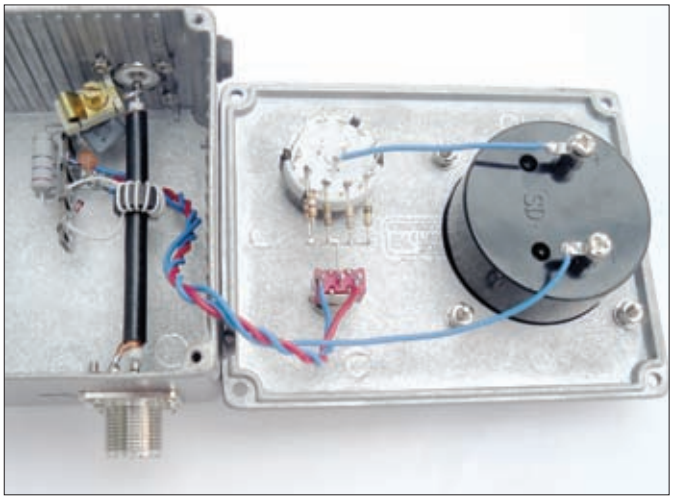
On to the construction side next. The coaxial sockets were fitted 22mm from the back and bottom of each side. A solder tag was included on the bottom screw fitting closest to where the tag strip would be. The four-tag strip was mounted with a single screw to the rear of the box so that its centre line was 20mm from the centre line of the coaxial cable.

I found that Mini 8 coaxial cable was about the right diameter to fit through the toroid when wound with the secondary turns. The coaxial cable was first cut too long and then tried in the box between the connectors, cropping and trying again until it was the correct length. The 'left-hand' end was prepared with the screen as a tail. The 'right-hand' end with the cover and screen cut back 2 or 3mm from the end of the foam dielectric.

Sampling Section

For ease of assembly I used some *pvc* covered equipment wire 10/0.1 with 12 turns tightly wound on the toroid and evenly spaced around it. This proved a nice tight fit with the coax

With the exception of the sensing transformer and trimmer capacitor, the components are all mounted on the 4-way tag-strip.



This view of the inside of the unit, should make it easy to compare with the circuit diagram of Fig. 1.

pushed through it. The toroid was positioned along the coaxial cable so its wires would be equal length to tags three and four.

A 200pF mica capacitor and 2k2 resistor were soldered in parallel between the solder tag on the connector and the first free tag on the strip. The second tag is the earth one with the securing foot. A 27Ω resistor was wired from the first tag to the third tag. Another 27Ω resistor was wired from the first tag to the fourth tag.

The cathode wire of a diode was twisted with a lead of the 10nF ceramic and was fitted onto the tag strip with anode wire to third tag and ceramic to earth. Another diode was twisted and soldered to a ceramic capacitor and fitted with anode to the fourth tag and ceramic to earth tag.

The coaxial cable and transformer was then wired into place and the wires from the toroid were soldered to tags three and four. Now the 15pF compression trimmer was soldered from the right hand coax centre pin to tag one. That completed the sampling section in the box.

Meter Section

One pole of a three pole four way rotary switch was used with its four ways adjacent to the **FWD/REF** switch. Resistors were wired from the tags to a common line close to the FWD/REF switch. The original values chosen were replaced later during calibration.

The resistor, for the 1W range was two 3k9Ω resistors in parallel, the 10W range was 18kΩ, the 100W range was 68kΩ and the 200W range 100kΩ. The common wire was connected to the pole of the little switch with a short link of cropped resistor lead.

The positive connection of the meter was linked to the wiper of the power selector switch using 16/0.2 *pvc* covered wire. Two 150mm lengths of the same type of wire were twisted together and all ends stripped two or three millimetres. One pair of ends were soldered to the diode cathodes in the sampling section and the other ends to the two ways of the FWD/REF switch.

Another length of the same type wire was connected to the earth tag of the tag strip, and terminated on the meter negative terminal after twisting it around the other twisted wires.

The Moment Of Truth!

The moment of truth arrived and the point that I feared the most. Would it work at all and would it be flat across the range 2 to 30MHz. For this I required a rig capable of sustained output at 100W, together with the Bird Thruline and a 2-30MHz 100W element and a 200W dummy load.

The only rig I owned which might do the job was a Yaesu FT-102 purchased maybe 10 years ago and never used. Please believe me when I say I switched it on with some trepidation! Fortunately there was no flash or bang and after a little while I put it into transmit and it worked.

Interestingly, though the FT-102 easily produced 100W output on 24MHz it managed only some 25W on 28MHz. Also at 3.8MHz it easily produced 100W but at 3.5MHz only half of that. I don't think this was anything to do with the sampling element of the Bird meter as I am sure they are rated not at the –3dB points but where they're flat to within ±0.5dB.

Anyway, I retuned the rig to give 100w on 24MHz and substituted the new h.f. meter for the Bird and transmitted again on 24MHz. Virtually nothing showed on **FWD** but the reading was about half scale on **REF**. Obviously, the connection to the FWD/REF switch were reversed. I noted the scale reading precisely and re-connected the Bird and checked it again.

So far so good and I retuned the rig to 3.8MHz again and to 100W. Then re-connected the h.f. meter and the reading came to exactly the same point on the scale. It was proved flat from 3.8 to 24MHz. The reflected reading was small but noticeable so the mica trimcap was adjusted to zero this. This did affect the forward power reading though, so this step must be carried out prior to calibration.

Calibration Game!

What a game calibration turned out to be! I set the rig to 100W on 7MHz using the Bird Thruline. Then substituted the h.f. meter and used a resistor substitution box connected across the scale setting resistor to achieve full-scale deflection. The equivalent parallel value was determined as close to 68kΩ and a new resistor was fitted. Another test proved the reading hadn't changed significantly.

The Bird was re-connected and the rig set at 10W. The h.f. meter was then re-connected and the same procedure repeated to achieve f.s.d and a fixed value of 18kΩ was fitted. Again the Bird was re-connected and the rig now set to just 1W output and this time the resultant value was 1.95kΩ, so two 3.9kΩ resistors were fitted in parallel.

Then I continued the interchange of the two power meters as I came down in 10W steps from 100W to 10W and determined the equivalent linear scale calibration values. Finally I set the rig to 100W again and on the 200W range adjusted the scale setting resistor so the reading gave the same as 50W when on the 100W range.

All that's left to do is to create a posh scale label reading 0 to 100 in 10 steps and test the unit down to 1.8MHz and as high as it will go, maybe even 50 or 70MHz? Cheerio until next time! ●

Rev. George Dobbs G3RJV's Carrying on the Practical Way
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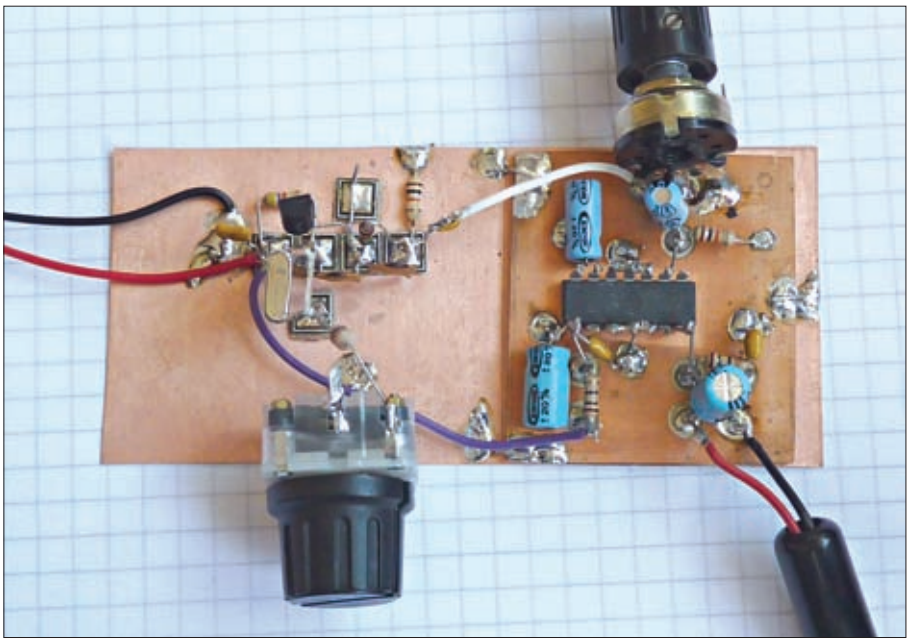
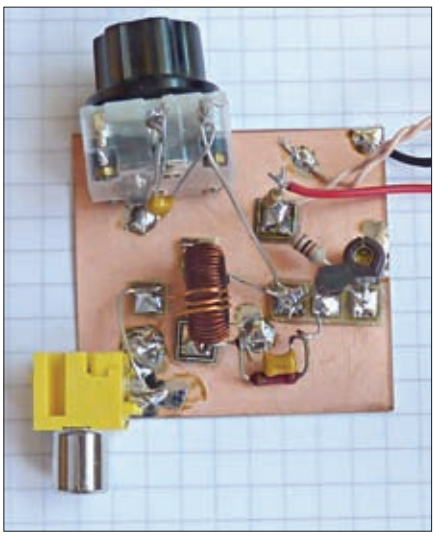
Two Smaller Projects

The Rev. George Dobbs G3RJV presents two very simple receivers and has an ideal and very 'relative' quote from a certain Mr. Einstein!



The simple receiver of Fig. 1, coupled to the audio amplifier of Fig. 3.



The wider coverage receiver of Fig. 4.

"Everything should be made as simple as possible, but not simpler."
Albert Einstein

Welcome to *Carrying on the Practical Way* (*CoTPW*) and it's clearly evident, from the letters I've received over the years, that many readers who have followed this column enjoy the smaller projects I've described. Naturally there are many radio constructors who enjoy building large, comprehensive, projects that take many weeks and considerable spending to complete – but probably there are far more who simply enjoy dabbling with electronics.

The 'dabblers' enjoy circuits that can be built in an evening, or during a weekend. Projects that require little financial lay-out and are easy to build and probably work first time. As one reader once put it to me, "There's great satisfaction in going to bed knowing you've built something – and it worked." Perhaps this is a function of an age in which few jobs see something practical from beginning to completion.

Matthew B. Crawford, writing in an article in *The New Atlantis* for Summer 2006 titled "Shop Class as Soulcraft" wrote: *"The satisfactions of manifesting oneself concretely in the world through manual competence have been known to make a man quiet and easy. They seem to relieve him of the felt need to offer chattering interpretations of himself to vindicate his worth. He can simply point: the building stands, the car now runs, the lights are on."*

Crawford concludes the article by saying, *"So what advice should one give to a young person? By all means, go to college. In fact, approach college in the spirit of craftsmanship, going deep into liberal arts and sciences. But in the summers, learn a manual trade. You're likely to be less damaged, and quite possibly better paid, as an independent tradesman than as a cubicle-dwelling tender of information systems."*

That's why we radio hobbyists can derive great pleasure by building things, however simple, and getting them to work. Such is the draw of any practical hobby. Thousands of people in thousands of sheds, or spare rooms, have come to know such pleasures!

Novel Circuit Ideas

I always enjoy stumbling upon simple or novel circuit ideas in books, magazines or the Internet. Many of them are stored in my box files or computer files ready to try or ponder at a later time. Among them are some notes on simple receiver design by **Miguel Bartié PY2OHH**.

Miguel describes several approaches and circuit building blocks for simpler Amateur band receivers. One of these is perhaps the simplest idea possible for a direct conversion (DC) receiver. It takes its basic idea from a well known simple transceiver usually called the *Pixie*.

The *Pixie* in its many versions and interpretations uses the idea of a single transistor performing two functions. In the *Pixie* a bipolar transistor performs the dual tasks of the power amplifier on transmit and the mixer of a DC receiver. In the PY2OHH receiver, the same bipolar transistor is the local oscillator and the mixer in a DC receiver.

The diagram, **Fig. 1**, shows my version of the circuit. It's somewhat different from the PY2OHH circuit in that Miguel used a ceramic resonator with varactor tuning to determine the receiver frequency. I've used a 7.030MHz crystal (the QRP calling frequency on the 40 metre band) configured as a variable crystal oscillator (VXO) instead,. See this

column for June 2011 for a fuller discussion of the variable crystal oscillator.

To put it simply, the 60pF variable capacitor and the 33µH choke enable the frequency of the crystal to the varied. The capacitor moves the frequency up and the choke moves it down. In practical terms, my prototype of the circuit in Fig. 1 obtained a frequency shift of 7.022 to 7.031MHz. A better shift could probably be achieved by following the advice offered in the June edition of this column.

The circuit of Fig. 1 is a version of the Colpitts oscillator. The two 100pF capacitors form a capacitive divider to enable feedback of signal from the emitter to the base of the transistor. It is this positive feedback that maintains the oscillation of the transistor. I used a 2N3904 transistor but almost any similar device, such as the 2N2222, BC548, BC108, etc., would probably work just as well.

Ideally, the 100pF capacitors ought to have a low temperature coefficient to aid stability. Polystyrene or NPO capacitors are ideal for this purpose and show little change in value with temperature shifts. Although this is much less of a problem when using a v.x.o. rather than a variable frequency oscillator (v.f.o.). The rest of the circuit is rather more curious!

An input from an antenna is applied to the emitter of the transistor. So the oscillating transistor is also receiving radio signals from the outside world. Because a bipolar transistor is really a couple of diodes back to back, this enables the transistor to act as a frequency mixer as well as being the oscillator. It becomes a very basic DC receiver. A DC receiver mixes the input radio signals with a local (internal) oscillator.

A product of the mixing is the audio frequency (a.f.) difference between the input signal and the local oscillator. This enables us to hear the input radio signals. The mixer has directly converted the radio signals into audio signals. In this example, the audio signals are extracted by the capacitor (100nF) at the top of the 10kΩ resistor in the emitter circuit. The audio signals are then fed to an audio amplifier.

The diagram, **Fig. 2**, shows the very basic audio amplifier used by PY2OHH. In practice I found that it didn't work very well with the receiver – but I've included it for interest. It offers a very simple, low component count amplifier that could be used for a variety of Amateur Radio applications. The amplifier is simple to build and the values of the input capacitor and biasing resistor aren't very critical, as my range of values shows.

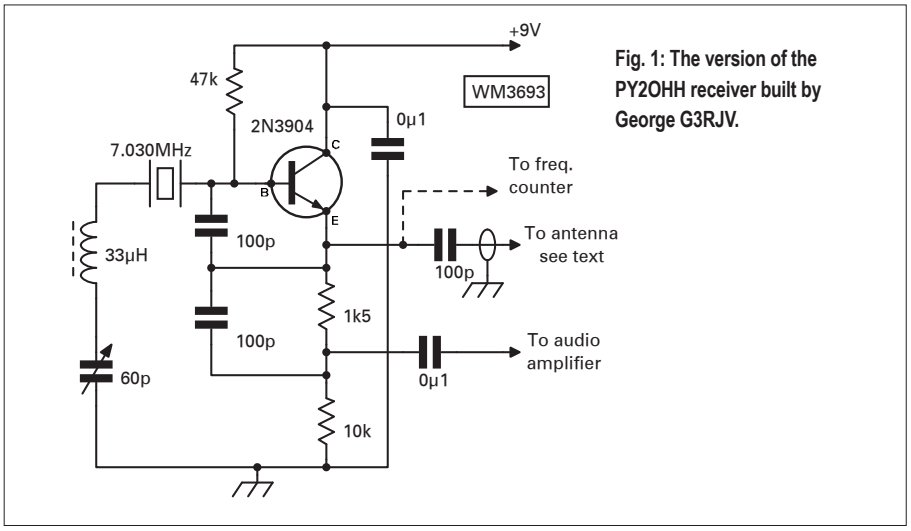


Fig. 1: The version of the PY2OHH receiver built by George G3RJV.

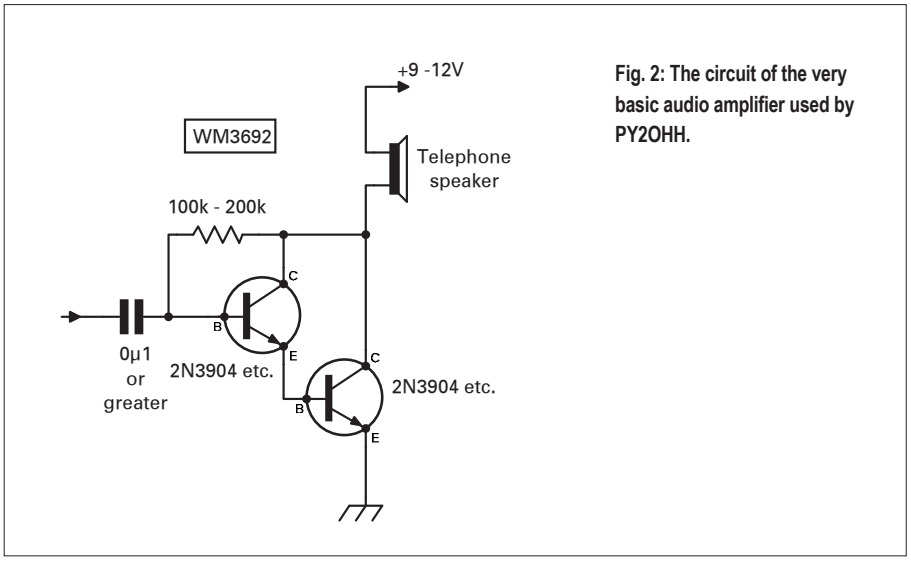


Fig. 2: The circuit of the very basic audio amplifier used by PY2OHH.

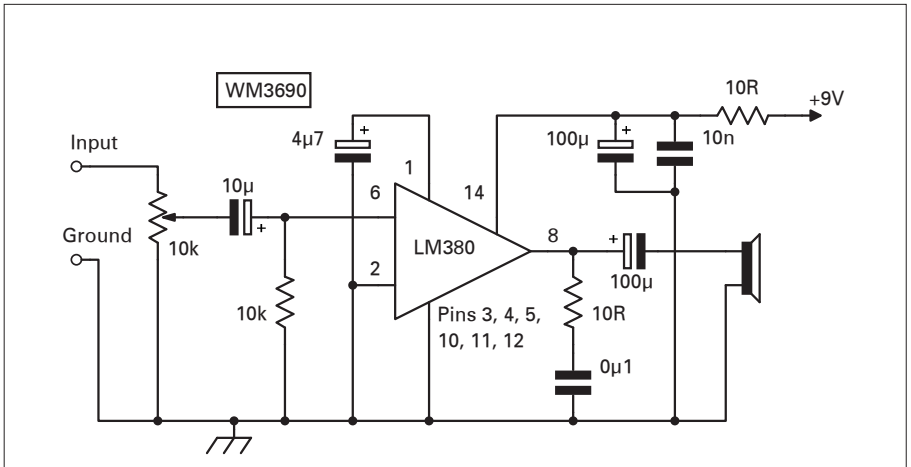


Fig. 3: The 'dead bug' style i.c. based amplifier used by George G3RJV.

The output does require a medium impedance speaker such as may be found in telephone handsets. The circuit in Fig. 2 is the sort of circuit that's worth building to have 'on the shelf' for projects that require a little amplification. Although I didn't use it in the final version of the receiver, I have kept the little board for future usage.

Integrated Circuit Amplifiers

A simple way to get rather more audio amplification is to use one of the range of integrated circuit (i.c.) amplifiers. Regular readers will know that I often use the LM386 amplifier chip but will also know that I prefer the 14-pin version of the LM380 amplifier chip. Those readers may also know that I'm rather frugal in my radio construction. Looking in to my 'odds and ends of circuit board' box I noticed an LM380

amplifier built using the ugly 'dead bug' style.

'Ugly' construction is where the components are mounted over a piece of un-etched printed circuit board (p.c.b.) material, the copper surface acting as a ground-plane. The dead bug version is where an i.c. is mounted with the pins upward for ease of solder connections; it looks like a dead bug. The circuit for the amplifier is shown in **Fig. 3**. This was a satisfactory amplifier for the radio but many other similar circuits could be used.

Harking back to the wise words of Albert Einstein, the design is very simple but getting it to work well was a little more tricky!

In the circuit diagram, of his version, PY2OHH just showed an antenna symbol connected directly to the emitter of the oscillator transistor. I have a 5m (17ft) long counterpoise wire coming to the operating portion of my small work bench as part of a W3EDP antenna. Joining the 5m wire to the emitter yielded nothing so I determined to try a larger antenna tuned for the 7MHz (40m) band.

I use an antenna tuner to match my antenna to the 50Ω input impedance required by modern radio equipment. This adds the advantage of input tuning courtesy of the antenna tuner unit (a.t.u.). I applied the antenna, matched for 7MHz, to the transistor emitter and still no signals were heard!

Checking the circuit revealed that the oscillator had ceased oscillating. The a.t.u. had probably offered too great a load on the transistor. The answer lay in adding a coupling capacitor on the input of the emitter. My tests showed that the value of this capacitor is rather critical so I left the frequency counter connected, as shown in Fig. 1, to the emitter of the transistor and tried a range of values.

The best value seemed to be around 100pF as shown in Fig. 1. Constructors without a frequency counter, could try the same experimentation while listening to the oscillator on an adjacent receiver. This simple receiver did work and I managed to tune c.w. signals on 7MHz – albeit rather muted.

Glen Yingling W2UW's Receiver

Another very simple receiver idea that came to mind was proposed by **Glen Yingling W2UW** in the G QRP Club's magazine *Sprat* number 108 in an article called *An Experimental Transceiver – ET1*. This was later taken up by **Roger Lapthorn G3XBM** in what he called the *FETer Transceiver*. The W2UW transceiver used only one active device; a single MPF102 field effect transistor (f.e.t.).

In fact the MPF102 was directly mounted on a four-pole double-throw switch to switch it between the transmitter and receiver circuits. The transmitter is a keyed Pierce oscillator giving an output power of a mere 20mW and the receiver is a basic regenerative circuit. The whole transceiver used only 15 parts. By the beginning of 2009 (in his 81st year!) W2UW had made over 450 contacts with the *ET1* transceiver!

The diagram, **Fig. 4**, shows the receiver section of the *ET1* and this is perhaps the simplest possible regenerative receiver. With the given values, this version runs on the 3.5 MHz (80m) band. The receiver uses a total of only 10 parts with the most complex part of the construction being the winding of the coil. This has a total of 40 turns of 30s.w.g. wire on a T50-2 core.

The winding is tapped at 6 turns from the grounded (earthed) end. This follows the usual procedure of winding the 6 turns, pulling out the wire to form a short twisted loop, and then adding the further 34 turns. The 2-turn antenna link winding was added over the centre of the main winding. The 6-turn tapping on the main winding provides the feedback path of a Hartley oscillator configuration. The regeneration control is C3; a 50pF trimmer in the drain of the MPF102. I used a 10 – 60pF Murata 5mm ceramic trimmer (coloured brown) for C3.

The tuned circuit controlling the received frequency is the main winding on the coil with C1 and C2. The capacitor C1 is the 60pF section of a polyvaricon variable capacitor and C2 is adjusted to tune the 3.5MHz band in conjunction with C1. The capacitor C2 could be a trimmer capacitor or a fixed value capacitor in parallel with a smaller value trimmer.

In practice I used a 180pF fixed capacitor and this allowed C1 to tune almost all of the 3.5MHz band. As winding homemade coils is not an exact science, some experimentation may be required with C2.

The 100µH coil in the drain of the f.e.t. is a small axial choke. Because the receiver has only one active component (the f.e.t.) the audio output comes from a single crystal earpiece of the sort often used in crystal set radios. The audio output is not great but very usable. Naturally there's no audio gain (volume) control but this is not really a problem with such a simple receiver.

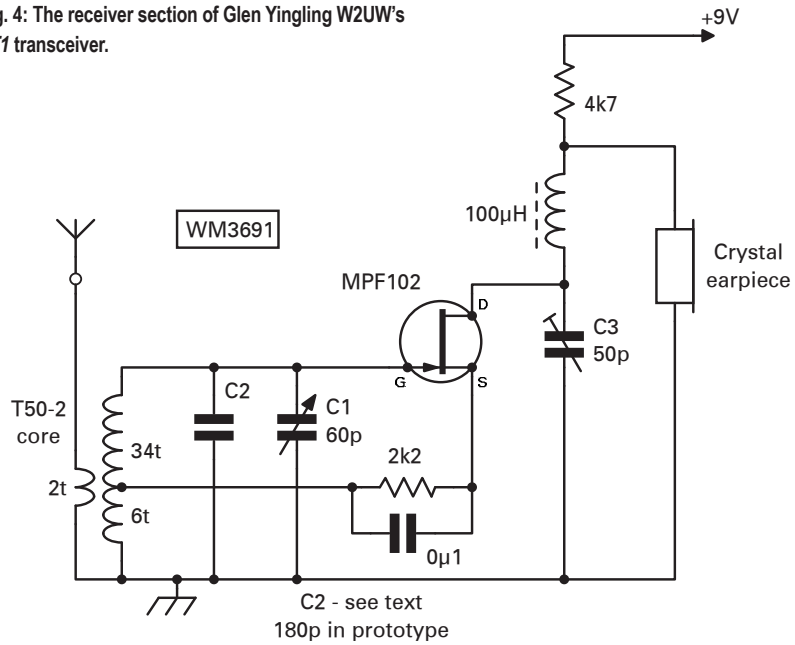


Fig. 4: The receiver section of Glen Yingling W2UW's *ET1* transceiver.

Worked Well!

The receiver worked (oddly perhaps) well using my W3EDP antenna via an antenna tuner, in fact at times there was some signal overloading. The trimmer capacitor C3 is adjusted to just about the point where oscillation occurs. Oscillation of the f.e.t. is indicated by a slight 'rushing' sound in the earpiece.

The tuning was rather sharp using C1 and would have been easier to adjust if C1 had a reduction drive or a small value variable capacitor was added in parallel with C1 as a band-spread control. Nevertheless, I was able to tune plenty of c.w. (Morse) signals and resolve stronger s.s.b. (single sideband) signals. I found it a very satisfactory little receiver considering its simplicity! ●

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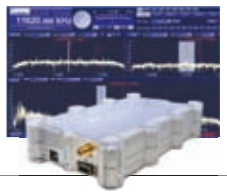

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The World of VHF

Tim Kirby G4VXE provides his usual exciting round-up of Amateur Radio activities above 30MHz. And – like the rest of us – Tim's noticed autumn propagational conditions are already on their way!

Welcome to the *World of VHF* (*WoVHF*)! I'm writing this column at the very beginning of September and it's been noticeable in the last few days how the v.h.f. conditions have been changing. Sporadic-E which has been with us, on the low v.h.f. bands at least, since April is getting much less frequent. On the positive side, though, there's a sense that the autumn tropo is starting to be noticeable.

Twice in the last week as I've been driving around, I've heard 144 or 433MHz repeaters I don't usually hear. Nothing very distant, but it's always interesting to hear the band changing. A little earlier on the morning I wrote the column, I was listening on 144MHz to TM2A, a French contest station operating from an area to the east of Paris. Tropospheric propagation was fair and I was pleased to work him.

However, just before I worked him, he worked an Italian station towards the north-west of the country. What was interesting was that I heard several meteor bursts from the Italian station – just about long enough to get his callsign. This is what fascinates me about v.h.f./u.h.f. – whether you're using f.m. or you have c.w./s.s.b./digital modes available, there's rarely a day that there isn't something of interest!

The ARISSAT-1 Satellite

Last month I reported that the ARISSAT-1 satellite had been deployed by the astronauts from the International Space Station (though not without some drama!). It's good to be able to record that a number of people have reported either hearing or using the new satellite. **Peter Goodhall 2E0SQL** (Oxford) has made a number of contacts through the transponder; August 22nd M1BXF, August 26th DG0ER, August 30th GW1FKY and LA1BNA.

Graham Boor G8NWC (Spalding) wrote, "After seeing a message on Twitter from Peter 2E0SQL regarding his operations on ARISSAT, a satellite deployed by hand from the ISS, and that it carried an SSTV beacon I set about trying to capture some of the images. My initial set-up was using a normal dual band collinear antenna. Although this produced an image it was obvious that the nulls produced a lot of noise bars on the picture, changing over to a hand-held HB9CV antenna and an FT-817 in the garden produced better copy, some almost noise free. An enjoyable week or so in a aspect of the hobby never undertaken before."

Well done Graham and thanks for sending in the images – they're fascinating!

Visual QSOs

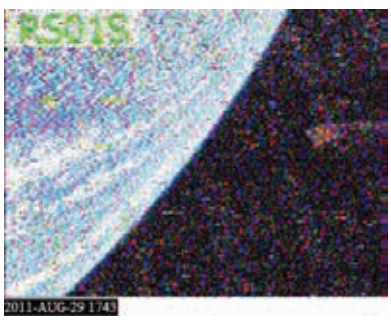
After mentioning **Richard Gosnell G4MUF**'s experiments with heliographs, it was good to hear from **Roy Walker 2E1RAF** on the subject. "I was trained as a telegraphist in the RAF and my first overseas posting was to the Aden Protectorate – now Yemen and the port of Aden. The posting entailed a three week sail from the UK and Aden, and despite feeling a bit 'poorly' in the bay of Biscay I soon found out that I was the only telegraphist among the cargo.

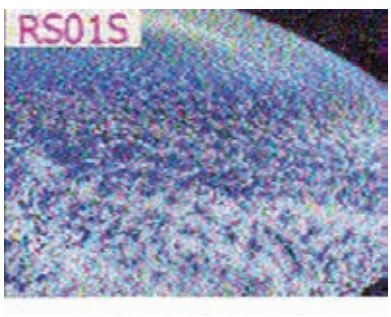
"Every time a ship came over the horizon I was dragged out of my sick bed to read the dots; Invariably it was 'what ship?' 'Where bound'? and 'Bon voyage'. When I got to Aden I was employed in the Wireless Telegraphy cabin high on the hill above the port from where we had an excellent view of the ships making Aldis lamp contacts with the signal station below us.

"This time it was 'AAAAAAAAAAA' as a means of attracting the attention of the shore station, then the callsign of the ship and 'G' (I require a Pilot) or 'H' 'Finished with pilot). Occasionally we got a 'real chat' which made it all worthwhile.

"Your correspondent need have no fears about being able to read the Morse, the speed is, by c.w standards, very low. Just using a hand mirror makes it even slower, it only takes a minute adjustment for the reflected beam to be way off target – so a steady hand will be required more than anything else.

"When I am walking in the hills I carry a compass which has a mirror built into the lid, for taking bearings, that is the thing to take with you, no extra bits of equipment. Use a bit of string about an arm's length long as an aiming device, point the string at the distant 'target' with one hand, with the string taut, peer from behind the mirror and when you can illuminate your





Some images, captured by Graham Boor G8NWC from the SSTV beacon on ARISSAT, a satellite deployed by hand from the ISS.

Pictures of the Camb-Hams, a group formed by the Cambridgeshire Repeater Group (CRG), on location but putting their callsign in lights.

thumb with the reflected beam you are pointing in the right direction.'

Excellent stuff Roy! It would be great to hear from anyone who has managed a visual QSO! Of course, there's also some fascinating work going on with optical and laser QSOs. If anyone would like to share information on these sorts of experiments, we'd love to hear them!

Calling CQ On 2m

Roy G0TAK also wrote direct to me regarding calling "CQ" on 2m, or announce that you are listening?

'I have the pleasure (and occasionally the pain) of being a Civilian Instructor with the Air Training Corps. I teach radio skills, both Military and Amateur. When teaching the military side of things I start out by saying there are two ways of looking at military radio procedures; My way and the wrong way!

When we get to Amateur radio procedures I reverse the instruction by saying "There are no procedures, nothing is wrong – but there are usually adopted procedures of which you should be aware.

The question of initial calls is dealt with clearly by the Foundation Course manual. *"On VHF/UHF bands there is a 'calling channel' set aside for the purpose of making 'CQ Calls"* – (and later) *– "A CQ call might be "CQ CQ CQ this is M3ABC Calling CQ".*

"I don't suppose any harm was done (or meant) by your correspondent but, if that sort of comment was made 'on air' to a newly licensed station, it could result in confusion and disillusion, and taken as a reprimand. Something we should all strive to avoid."

Good points from Roy! However, I need to emphasise that this discussion actually arose out of a light-hearted exchange that I had, so no-one felt rebuked or confused. Nevertheless, I thought it raised some interesting points which were worth sharing more widely.

The 50MHz Band

Mark Marment CT1FJC (Portugal) notes the drop off in Es conditions too, but has used the JT6M mode to make some interesting QSOs throughout the month. On August 6th he worked SV1DH (KM18) at 2786km, on August 16th he worked LZ2NJG (KN23) at 2933km and then a number of QSOs on August 20th around 3000km, OH1MN (KP10), UT5JAJ (KN64), SM3HG (JP81) and SM2CKR (KP03).

Peter Goodhall 2E0SQL also used JT6M during one of the RSGB Activity Contests, working OZ1AXG. Pete used his V2000 vertical and around 30W. The use of JT6M in marginal conditions fascinates me. I need to persuade my rather early model of the Yaesu FT-847 to talk to the computer properly – unfortunately it's rather grumpy about such things!

Mark CT1FJC was also listening every day during Lance Collister W7GJ's 50MHz moon-bounce expedition to Western Samoa, where he operated as 5W0GJ. Mark heard Lance's signals around moonset in Portugal on both August 24th and August 27th. He says that he was very pleased as it was a good test of the complete receiving system; home-brew 5-element Yagi to a DK7ZB design, home-brew pre-amplifier and a TS-590. He also notes that he has some 'ground gain' at his moonset. Mark was also able to hear several well equipped USA stations calling Lance via the moon.

Note: Ground gain occurs when, if you are located on level ground with a horizontally polarised antenna and a flat clear horizon. The effect occurs because of additive reflections when the moon is near the horizon and can amount to as much as an additional 6dB of signal strength. If you have a 'small station' for moon-bounce, this 6dB can be very helpful. If you want to read more – take a look at Lance W7GJ's moon-bounce (e.m.e) tips at **www.bigskyspaces.com/w7gj/emetips.htm**

The Camb-Hams array that points two ways, so reducing the need to rotate 360°.

The 70MHz Band

Jeremy Smith M0XVF (County Durham) found a good Es opening on the evening of August 8th. He worked OH1ND, OH1LEU and OH1XT all with end-stopping signals. Jeremy was also pleased to make his first 70MHz f.m. QSO with a local station, G1DLC. Jeremy is using a *Practical Wireless Meon* transverter with 7W output and an HB9CV antenna in the loft.

Like Jeremy, I was delighted to find the band open to Scandinavia on August 8th and worked OH6PA (KP02), OH1ND (KP00), LA9DFA (JP50), OH1LEU (KP01) and OH1XT (KP01). My equipment produces around 7W output to a vertical antenna.

At the time of writing, the Tring

'parrot' MB7FM (70.4375MHz) is off-air. Hopefully it will return soon as it is a definite aid to f.m. activity in the South and South-East of the country.

The 144MHz band

Jonathan Kempster M5AEO (East London) reported that this year the *Practical Wireless* QRP 144MHz contest was a washout – literally – with heavy rain all day! Owing to the bad weather he didn't put up the mast and horizontal antenna and thus only heard a couple of stations all day. Hopefully things will improve next year.

It was great to hear from **Ceri Jones MW6CLJ** (Denbigh, North Wales). He recently bought a Wouxun dual band (144/432MHz) handheld and has been delighted with the contacts that he's been having, mostly through GB3MP, the Moel-Y-Parc repeater – he says that the group that meets on the repeater have been extremely welcoming. Ceri wonders how he can get a little further on v.h.f. than the local repeater. Hopefully we've been giving some clues in the column about how to do it.

My advice is to get an external antenna up as high as possible, assuming that you're in a reasonable location – and then listen to the bands as much as you can! It does take time and of course, some locations are better than others for v.h.f./u.h.f. Ceri has an iPhone and, like me, finds the *Ham Dashboard* application a very useful one. The application determines from your phone's position which repeaters are close by and gives you all the information you need to set up your rig to use them.

I also find it useful that, if I've heard something on a particular frequency, to be able to punch that into the application. Then I can see what repeaters are on that frequency and try and determine what I've heard. Ceri also mentions that *Ham Dashboard* has the ability to send Automated Position Reporting System (APRS) position reports so that you can be tracked via the APRS servers such as **http://aprs.fi**

Ceri has also tried the *Echolink* and *iAPRS* applications for the phone but plans to spend a bit more time understanding them more fully. He also mentions the *Police Scanner* application. Despite its name, the application allows you to listen to streams of a number of frequencies including some v.h.f./u.h.f. repeaters including GB3OK and GB7OK.

Terry Gabriel M0VRL (Cornwall) reports some exceptional contacts on 144MHz on August 10th when he found some tropospheric propagation to the south west. Terry worked EA8TX (IL18), EA8AVI (IL26), EA8TJ (IL18), EA8CQW (IL18), EA8CSG (IL18), EB8BRZ (IL27), CT1ANO (IN51) and best of all D44TD (Cape Verde Islands, off west Africa HK86). Terry says that he tried for many hours before he was able to work D44TD, but it was well worth it as the distance between them was 4114km.

At the time they made the QSO, D44TD was a '51', but later the signals came up to 57. A really exceptional QSO, Terry – congratulations! Terry's equipment is an IC275H, GS35 triode amplifier and 2 x 17 B2 Yagi antennas.

Here at G4VXE I was also active on August 10th – but being well away from the coast, did not have the sea-path to play with. However, I was still delighted to work EA1FDI in IN53. I heard a number of stations further north calling for EA8s. Not much DX on the band to report otherwise, although I was pleased to make a few continental QSOs during the 144MHz Trophy contest on September 3rd and 4th; F1CXX/P (JO10), PA6NL (JO21), F5KKD/P (JO00), F5KAR/P (JN09), ON4WY (JO11) and TM2A (JN18).

Philip Oakley G0BVD (Great Torrington) said he'd missed a few openings through working outdoors! He was glad to work 2E1KJB from the Isle of Wight through the GB3DN 145MHz repeater – a nice haul from the Isle of Wight to North Devon for 2E1KJB. On September 2nd Phil was on 144MHz s.s.b. and worked 2E1INY (IO83) and G3UDA (IO82) around 0845z – there seemed to be some good tropo to the north.

Phil also reports that the **Appledore Radio Club** (North Devon) has a net every afternoon at 4pm local time on 145.450MHz. However, every Wednesday afternoon they hold the net on the GB3DN repeater to allow people from further afield to join in.

A 10-ele Yagi for 432MHz from DK7ZB's design, that Mark Marment CT1FJC built himself, and that he finds worked 'straight out of the box'.

Gavin Nesbitt M1BXF sent an interesting photo of the antenna system used by the Camb-Hams (The **Camb-Hams** were formed in early 2006 as the social and public-facing side of the Cambridgeshire Repeater Group (CRG). He describes the array, "In theory we only have to move the antenna a maximum of 180° to peak a station, for example the 2 x 17 would point between 090 and 270° (south) and the 9-element would then be 180° off that covering from 270 to 090° (north). Also the beam width of the 9-element is wider for covering more of the UK from a single antenna."

The 432MHz Band

Mark Marment CT1FJC built himself a 10-element Yagi antenna for 432MHz to a DK7ZB design. Mark says that he finds that the DK7ZB designs work 'straight out of the box'. Mark's been using the Yagi to make QSOs through the FO-29 and AO-& satellites. On August 29th Mark worked RW3XL and on August 30th he worked LX2LA, EA3DME and EA1SAL.

Here at G4VXE, my only s.s.b. activity was during the August 432MHz RSGB UK Activity Contest, when conditions didn't seem too great. Nevertheless, it was nice to make a handful of QSOs. It was also good to work M1ELK/M on Goring Hill, Berkshire on 433MHz f.m. simplex. I'd worked Mike on 145MHz simplex and we thought it would be worth trying on the higher band and were pleased to make a contact over the 32km (20 miles approximately).

That's it for this month! Please keep your reports coming – they make fascinating reading! ●

Out of Mothballs!

Reg Irish G4LUF describes how he removed the mothballs (and a few dead spiders) from his beloved Yaesu FT-101 to get it back on the air.

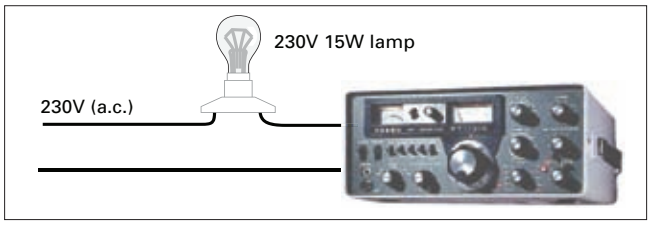


Fig. 1: A single lamp in series, does at least limit the inrush and maximum current taken.

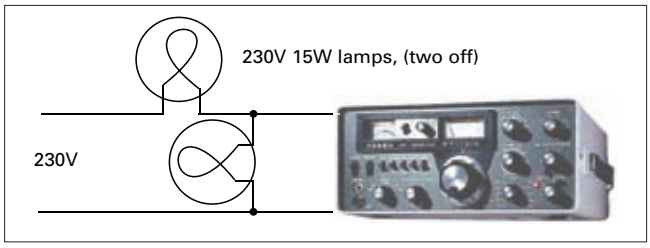


Fig. 2: Adding a second similar lamp in parallel, reduces the input voltage available.

Some five years ago I moved house and at that time put my trusty FT-101 into mothballs, until antennas, etc. could be organised at that new QTH. Inevitably, these things take much more time to arrange than anticipated – and with conflicting family interests – the time has ~~only been~~ found when I could again consider getting the rig out from its box and operational again.

In the meantime, the recent and most relevant articles in *PW* by the FT-101 expert, **Harry Leeming G3LLL**, has drawn my attention to the dangers of connecting a rig such as this directly to the mains supply – in view of the long period of storage. During this time the smoothing capacitors may be expected to depolarise themselves significantly and need to be re-formed.

Reforming of electrolytic capacitors may, most conveniently be achieved using a Variac (variable voltage transformer) to supply an a.c. voltage. This may then be set to a low value (say 50V) and very gradually increased over a long period until the normal mains voltage is achieved and the smoothing capacitors are fully re-formed.

Unfortunately, I didn't have access to a Variac and the cost of purchasing even a modestly-rated one seemed unduly high for just one single use. An alternative solution to the problem was therefore sought which, I hoped, would be significantly cheaper.

Initial Thoughts

The first thoughts on the capacitor re-forming problem suggested that a series resistor, placed in series with the mains supply lead – as indicated in **Fig. 1**, would limit the inrush current to the rig. This would provide a measure of protection should any unforeseen disasters occur.

A few further thoughts then showed me that an incandescent lamp, used as this resistor, would be very ineffective – in view of the very low resistance of low wattage bulbs. I measured a 15W pygmy bulb at room temperature 20°C and found it to have a cold resistance of 391Ω. The calculated resistance when hot is 3.84kΩ!

Yet further thought suggested the use of two such bulbs, connected as in **Fig. 2**. Here, providing the two bulbs are identical, the voltage initially fed to the rig is one half of the supply voltage. It is appreciated that if the rig takes significant current then the voltage applied to it may be somewhat less than half of the mains voltage.

However, if the rig is switched off, except for the power supply section, the current taken will progressively reduce as the smoothing capacitors charge up and polarise. The applied voltage will then become much closer to one half of the mains supply voltage, connected in series with a resistance equal to one half of the resistance of one lamp.

The General Solution

The principle may be extended to reduce the supply voltage to quite a low initial value and to increase it in reasonably small steps – as indicated in the diagram, **Fig. 3**.

Several low wattage lamps, connected as shown in Fig. 3, would enable reasonably small increments of the voltage fed to the rig to be achieved. The larger the number of lamps, the smaller each increment will be. For two lamps the fraction of the mains voltage applied to the rig is obviously one half, for three lamps, each increment is one third of the mains voltage etc.

For four lamps and a supply of 240V, each lamp will have 60V across it and therefore effective supply voltages of 60, 120, 180 and 240V are available. **Note:** by increasing the number of lamps in series and a switch with a greater number of ways, smaller increments of voltage can be created.

Only Disadvantage

The only disadvantage of the arrangement is the significant number of lamps which may be involved (depending on the size of the voltage increments chosen). Great care **must** therefore be taken to avoid the risk of electric shock from any exposed wiring or other metallic parts which may carry all or part of the mains supply.

The principal advantage is that I now have my beloved FT-101 on the air! ●

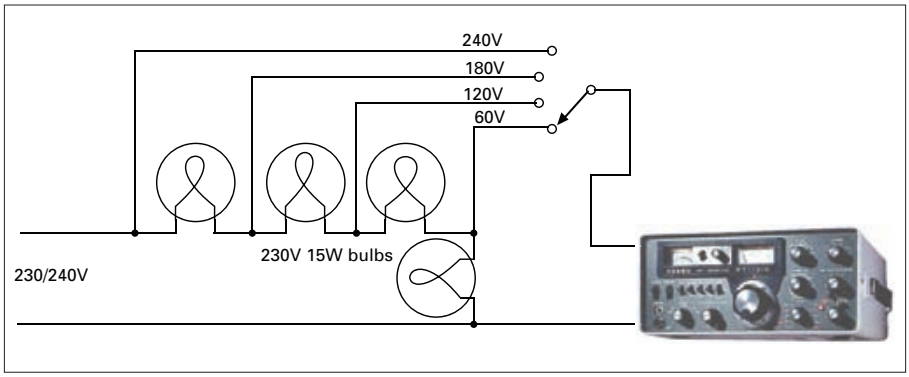


Fig. 3: To control the input voltage, without a variac, you could use a circuit along these lines.

Ben Nock G4BXD's Valve & Vintage
62 Cobden Street Kidderminster Worcestershire DY11 6RP
E-mail: military1944@aol.com

Rising Sun Rig

A very tired Ben Nock G4BXD takes a break from sorting out the 'Kidderminster Kollection' to relax a little to bring his latest news. Perhaps he'll also now advise Radio Amateurs against moving home?

Fig. 2: The 94-3 in its main case.

A very warm welcome once again to the 'Kidderminster Kollection' as its my turn to man the *Valve & Vintage* (*V&V*) shop this month. It's been something of a hectic few months starting earlier in the year. We've moved the collection to a new location and I have been busy erecting shelving and racking, sorting out the good from the bad and the more than expected duplicates. I have found sets which I had packed away years ago and items that have been buried at the bottom of the pile for ages!

One of the main problems has been shelving. Not the lack of it, I had a large quantity of warehouse type racking but this is really too big as the depth of the shelves means items can end up at the back and unseen. The lighter narrower metal shelving seen in the DIY stores also does not fare well when laden with several heavy military sets. So, its been a real headache trying to get suitable display width shelves that will take the strain.

Fig. 1: The UY-510B valve.

Japanese Valve

One of the finds during the move was a box with a very well-padded valve inside. Opening the box I discovered a Japanese valve, a type 510B, **Fig. 1**, a large transmitter type valve similar to an 807 or 1625 type.

I eventually remembered that my good friend **Mr Matsuura** of 'Ham's Office' in Japan had sent it me and which set it was for. So as soon as I could locate the set I thought the best and safest place for the valve would be inside the set.

The (sometimes) mule-carried field set, Model 94 Mk 3, **Fig. 2**, houses a single valved transmitter and a superhet receiver. The batteries for receiver heaters and high tension (h.t.) are carried in the compartment at the base, the transmitter's h.t. supply was provided by a hand-cranked generator.

A comprised translation from Japanese text reads: "94 types 3 wireless radio, upper compartment transmitter, lower compartment main receiver and electric battery box. It is the principal equipment of Army division Communication Station used for short range.

"Communication range: 80km, frequency of transmission 400kHz – 5.7MHz and reception 350kHz – 6MHz. Radio wave type: A1 (telegraphy) transmission output: 10W. Equipment summary: Transmitter: Crystal or self-oscillation 510B tube. Receiver: Superhet system, the high frequency 1 stage and the intermediate frequency 1 stage, audio detection, (UF134-UZ135-UF134-UF109A-UZ133D). Transmission power source: Hand turned generator, reception power source: Dry cell batteries. Antenna: Opposite L type (pillar high 7m and horizontal length 20m), ground wire: 20m".

The type 36D transmitter unit, **Fig. 3**, uses a plug in coil for the output stage, the round black shape in the centre of the set, while the crystal is inserted behind a small door seen above the circular tuning dial on the right of the set. A small Morse key pulls down out of the front panel just to the right of the crystal door but an external key can also be used.

With the crystal removed an internal switch connects the master oscillator circuit for full variable frequency tuning, but I hate to think what the stability is like. Two panel meters monitor p.a. and antenna currents to facilitate tuning of the transmitter into the antenna. The power for the transmitter, 7V and 500V, was derived from the hand-cranked generator.

The receiver unit, **Fig. 4**, also uses a plug-in coil, this time the square unit above the tuning dial. The five-valved receiver has one stage of radio frequency (r.f.) amplification, an oscillator mixer, one stage of intermediate frequency (i.f.) amplification, a detector stage, something called a Rheinartz* type regenerative detector, and the audio output stage.

The compartment below the receiver housed the dry batteries for the receiver's negative bias supply, heater supply and receiver high tension (h.t.) supply, one battery each for bias and heaters and four 22.5V batteries wired in series for the h.t. supply.

Apparently, there are two versions

Fig. 3: The 94-3 transmitter section.

Fig. 4: The 94-3 receiver section.

of the type 36 apparently, the A version is Morse (c.w.) only operation while the 36D is capable of Morse and voice transmission – but I've not been able to confirm that on my example. The whole station would have been packed into three wooden chests, which not only held the set but the extra coil units, spares, tools, technical manuals, spare batteries and even a blow torch to heat the soldering iron for repairs in the field!

Technical Editor **Tex Swann G1TEX writes: The oscillator seems to be a form of Hartley oscillator with a very long time constant in the grid circuit. See* **http://www.vk6fh.com/vk6fh/reinartz.htm**

The Paraset

One of the better known radio sets used by the resistance groups during the Second World War is the British made Paraset. Originally made at Whaddon Hall in Buckinghamshire for SIS and MI6, its designation was the Mk7 or MkVII radio set. Only later, when the Special Operations Executive (SOE) found it ideal as a small transmitter receiver for sending to their agents in occupied countries – did they call it the Paraset, as it often 'parachuted' in with the agents.

Early sets, **Fig. 5**, were housed in a wooden box and carried in a small suitcase along with a 6V vibrator type power unit – remember that most, if not all, cars in those days had 6V accumulators. A mains power supply was also available. Later models were fitted inside a metal tin box made by the Metal Box Company of London.

The receiver is a two-valved set, using the 6SK7 type, with a tuned detector with regeneration and an audio amplifier driving headphones. The tuning range was a single band covering 3 to 7.6MHz.

The single-valved transmitter, using a 6V6, operated as a crystal oscillator and power output stage tuning around 3.3 to 7.6MHz in two ranges. The 'band' switch simply adds extra capacitance across the power amplifier (p.a.) coil on the lower range.

The set was powered by 6.3V for the heaters and around 350V for the h.t., this was dropped internally to a lower value for the receiver valves. The transmitter is Morse code or c.w. only of course, and the set even had its own little Morse key built into the chassis. There are photographs on the Internet though, of operators connecting external Morse keys to the set for ease

Fig. 5: The Second World War Paraset.

of sending as the built-in key can be quite tiring after a period of use.

Depending upon the high tension voltage around 3 to 5W can be delivered into various antenna. We mustn't forget that in its original role the antenna might be a short length of wire across a room or dropped down a drainpipe, or even strung around the attic of the house being used by the agent.

The original users of these sets were never going to have the luxury of a tuned dipole, or 150ft of long wire between two trees 50ft high! They had to make do with some highly inventive antennas but still managed to get their messages back to London as required.

Getting this original Paraset was a great delight. It had apparently been used by a Belgian resistance team with the operator working for the Belgium Railways, an ideal job as information on train timetables and destinations would have been easy to get and pass on.

Although I was keen to see if the set worked after arrival I was careful to apply the h.t. by gradually increasing it while watching the current drawn by the set. It did seem that excessive current was being consumed and after further investigation and measurements I found just one high voltage electrolytic capacitor that was faulty and had a low resistance. With the capacitor replaced the set worked perfectly some 70 years after being made. Not a bad score for British engineering!

The receiver, the two smaller valves to the left of centre has the main tuning control, slow motion friction drive is fitted so tuning rate is very good, and a reaction control only. The reaction control is advanced until the detector does into self-oscillation, at which point c.w. signals and even single sideband (s.s.b.) transmissions can be resolved. Considering the simplicity of the receiver it's also surprisingly sensitive.

The transmitter is crystal controlled, this is inserted in the socket just to the right of the single valve. There are two tuning controls, one for the anode tuned circuit and one for the antenna circuit.

Two small bulbs – which are link coupled to the two tuned circuits – allow for tuning indication. They should have small black sleeving over them to reduce the chances of being seen by the enemy but viewed from above by the operator.

The toggle switch next to the Morse key, lower right, is the band switch for the transmitter, this adds extra capacitance across the tuning capacitor to get to the lower range. The switch in the centre of the set is the receive transmit switch.

The wooden sets had a lead to the power supply, the metal boxed version had a 3-pin Cinch socket fitted with a lead from the power unit connecting it.

Unfortunately, I only purchased the set – there was no power pack or case. However, I found a nice small suitcase to house the receiver transmitter and using a slightly modified Codar AT5 mobile inverter power unit, the Paraset can now be used even in the field. I hope to emulate the operations of those brave agents with some portable operations both from home and abroad in the near future.

That's It For Now!

Well readers, that's about it for my latest stint at the *V&V* shop. I hope you've enjoyed the selection I have bought you and there are more pictures at **www.qsl.net/g4bxd** pictures of the new shack in the 'Recent Pics' page.

As it's my last session before the coming festive season I wish you all the very best and have a cracking New Year. As always I can be contacted, now at my new E-mail address **ben@radiomuseum.plus.com** Cheerio for now. ●

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Optional Accessories

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HF Highlights

Carl Mason GW0VSW provides his monthly reports of your h.f. operations and this time includes feedback generated by the determined activities of 94 year-old Frank Wyer G8RY.

As usual please – all your reports to Carl by the 15th of the month.

Welcome to *HF Highlights* (*HFH*) where I'm pleased to say it's good to see some feedback from readers who read about 94 year-old Frank Wyer G8RY who lives in Suffolk, and his loop antenna operations. **Alan Webb M1ANN** in Redditch, Worcestershire, is a regular reader of *PW* and was interested in the loop antennas mentioned in the September column.

"Alan wrote; "I have recently moved QTH and after a break of five years from Amateur Radio decided I would like to get back on the air. The only problems I had, turned out to be that the garden is not very big – and my XYL!

"The new neighbourhood is not well disposed to antennas of any kind so having thought through the problem, I decided that a stealthy antenna would have to be used with hopefully decent performance and without breaking the bank. I read an article by **Randy Davies K5RCD** about his experiences with loops and so I thought I would give one a go.

"Referring to my trusty *ARRL Handbook 1991*, which has section dealing with loops, and after a tour of the garden with a tape measure, I could just about squeeze a loop cut for 7MHz into the space. This was worked out using the calculation 1005 divided by the frequency. A 100m reel of 2.5mm grey insulated copper cable was purchased from a local electrical wholesaler and cut down to 141.5ft. using the above calculation at a centre frequency of 7.1MHz.

The LZ1670SWS QSL card received by Tom Hutton G0HUT following a 14MHz PSK QSO.

"Getting it into the air took a some planning but after a few hours climbing a birch tree, getting a rash from the Leylandi trees and climbing ladders onto the roof with help from a bemused XYL (who held the ladder) the loop was finally up. The feed point impedance was anywhere between 150 and 300Ω – not very scientific I know and an antenna analyser will be purchased when funds allow.

"A 4:1 balun was used at the two ends of the antenna and fed back into the shack with a short length of RG58 coaxial cable. Using my Kenwood TS-480SAT and without using the built-in tuner I took some s.w.r. readings using 10W with the following results:

7MHz 1.5:1, 14MHz 2:1, 18MHz 1.7:1, 21MHz 1.5:1, 24MHz 1.8:1 and 28MHz 1:1. Amazing, considering how the loop was fitted into the garden through trees and clipped to the outside of the plastic guttering just 6m (20ft) above ground!

"The loop has unequal sides and isn't fed with ladder line so it's not perfect but this will be improved as time and experience allow".

Thanks for that Alan! Incidentally, Alan's best DX to date includes A61AS (United Arab Emirates) but he has also worked ZB2FX (Gibraltar) IZ5MMB (Italy), EA1AZ (Spain), DK0BMW (Germany), RV5YP (European Russia), ON7TQ (Belgium), LAOHK (Norway), SM0OWX (Sweden), F1RCX (France) and HB9ETH/P (Switzerland) to name just a few – all achieved using 100W!

Alan has also told me has copied the USA with good signals and Australia and India on 7, 14 and 18MHz – but has been unable to beat the pile-ups! At a total cost of just £20 to build the loop,

The IR2ITA QSL card received after he was worked by Tom Hutton G0HUT using 14MHz PSK.

The QSL card from SM6CAL sent to Tom Hutton G0HUT following a 14MHz PSK QSO.

Tom Hutton G0HUT's shack

Alan is getting on to the bands again and having a lot of fun along the way which is what the hobby is all about!

If you're encouraged enough – you can read the articles by **Randy Davies K5RCD,** on his webpage at **www.k5rcd.org/** which contains information on loop construction and various other radio links.

I also heard from **Dennis Dumbleton G3HCM** who said, "I have been using a 'magnetic loop' for about 15 years now on the 14, 21 and 28MHz bands from both my original QTH, a bungalow in North Yorkshire and for the past 11 years another bungalow in North Lincolnshire. In each case the antenna was mounted in the loft and suspended with *pvc* twine from the roof rafters.

"The loop was bought from a firm in Wales and if I remember correctly and they used to do various sizes. The one I have is about 2ft 6in diameter with a very large variable capacitor mounted across the element ends. This is driven by a small motor rather like that used on barbeque roasters. Initially the loop is tuned in 'by ear' then I add some carrier and tune for a peak on the s.w.r. bridge (looking for output and **not v.s.w.r.**).

"For years I was able to have a regular sked with **George Beasley 5B4AGC** (formerly **G3LNS**) in Cyprus with excellent reports – although George did have a super location and a very large beam. The loop always did a good job on all three bands and I always wondered why people wrote to *PW* at the time saying that the loops were no good and did not work. Compared with the big antenna you have not got and can't have they work very well indeed!"

Thanks Dennis! I have no doubt we'll be hearing more about loop antennas from our readers!

The DX News

Some DX news for you now and to Club Makokola in Malawi where **Harry Berry 7Q7HB** is back at until November 23rd and will be QRV when possible as there is a poor electricity situation and diesel for generators is scarce. Harry keeps a daily sked with **Allan Hickman G0IAS** (Nottinghamshire) his QSL manager, to pass on his logs as Malawi does not have a bureau. Another Amateur who regularly visits is **Ely Camin 7Q7CE** whose home call is I**N3VZE**.

Harry 7Q7HB usually arrives in September and operates both RTTY and s.s.b. The shack is complete with bathroom facilities and sleeping accommodation for one person and is available to licensed guest operators who are resident at Club Makokola. The station includes an Icom IC-735, Icom IC-736, Clipperton 'L' Amp, Digimodes via SignaLink USB and *MixW* (reg) while the antennas include an A4S tri-band for 14, 21 and 28MHz and a Dipole for 3.5 and 7MHz.

Nearer home, a special callsign **9A20V** will be in use from Vukovar, Croatia until November 21st in remembrance of the tragic events in the town 20 years ago. Activity is expected on all h.f. bands using c.w. and s.s.b. and all QSOs will be confirmed automatically via the bureau with direct requests to 9A6DR.

Your Reports

On to your reports next and the first is from **George Davis G3ICO** in Yeovil, Somerset who used his Elecraft K2 at 5W with a 40m long doublet antenna to work c.w. and log SJ22S (Sweden) 1455 with a special event station marking the 22nd World Scout Jamboree held this summer (have we had a summer?) from July 27th to August 7th just east of the town of Rinkaby. The station was manned 24 hours a day, seven days a week by a select team of 40 Amateur Radio operators from across the globe.

Next into the G3ICO log was TM36ZOO (France) followed at 1629 with a call from the Regional Park of Brenne special call FZOO-011/FFF-031 QSL via F5SSN. Moving up to 10MHz band conditions were slightly better as George worked LX1NO/P (Grand Duch of Luxembourg) at 1407. Then came Mike Gloistein GM0HCQ/MM at 1632 who was operating just North of Scotland.

Then came OL90FOLK (Czech republic) at 1902 with a callsign operated by OK2KYK club members to mark the famous folklore festival Slovacky Rok, which is held every fourth year in town of Kyjov located in south east part of the Moravia region. More details about the festival can be found at **www.slovackyrok.cz** (QSL via OK7MT) and OH0/WS4T (Aaland Islands) EU-002 at 1906 (QSL via ES1WST).

George G3ICO has now worked 979 stations in 123 countries so far this year with 5W or less! (Well done George!).

The 14MHz Band

On to the 14MHz band next where **Tom Hutton G0HUT** in Farnborough, Hampshire used PSK31 to work LZ1670SWS (Poland) 1030 with a special call to honour the Bulgarian Saint Sveshtenomachenik Wisarion Smolianski. By doing so Tom gained 10 points towards the 'St. Teodosii Tyrnovski' award which requires EU stations to work 10 special event calls. Further information can be found at **www.balkanclub.org/awards.htm**

Next into the log was SM6CAL/MM (Sweden) at 1046 with operator Sture Frode making the most of the good sailing weather.

Then came OH1K (Finland) was worked at 1222, IR2ITA (Italy) at 1416, and then MI/EI4GZB (Northern Ireland) 1424, J48NL (Greece) at 1500. Next was TM95SOM (France) at 1523 with a special call operated by the RCA Radio Club marking the 95th anniversary

The QSL card sent by LO2F following a QSO with George Davis G3ICO on 28MHz c.w.

The OL90FOLK QSL sent to George Davis G0ICO following a 10MHz c.w. QSO.

of the Battle of the Somme (QSL via F5KOU) and UQ44Q (Kazakhstan) at 1725. This is the callsign allocated to club station Raimbekskiy Rayon in Kulsai National Park. All QSOs were made using a Yaesu FT-450AT with 30W to a Cobra vertical antenna.

Our next log is from **Eric Masters G0KRT** in Worcester Park, Surrey who was one of several operators at the summer camp of the Wimbledon and District ARS who camped near Reigate in Surry. Power was supplied by a diesel generator and the tent and all equipment including an Icom IC-735, Drake L4B Linear set at 400W and a 3-element Yagi at 13m or so was set up by **John Stockley G8MNY**.

Apart from one evening the bands were in good shape as their s.s.b. were worked using a Kenwood TS-590 running at 100W and a Cushcraft MA5B mini beam antenna.

The 18MHz Band

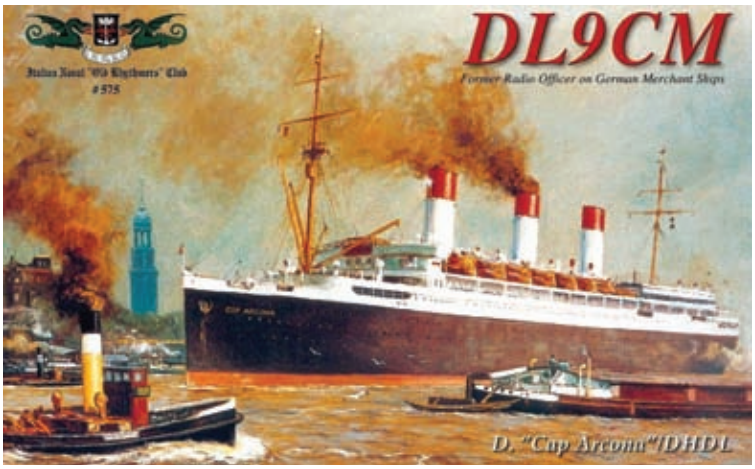
On 18MHz, George G3ICO used 5W c.w. again to work DQ1175E (Germany) at 1050. This was a special call to mark the 1175th Anniversary of the city Erwitte (QSL via DL5DCL). Next came OH0/DL1SVA/P (Aland Islands) 1042, CS2W (Portugal) EU-150 Insua Island at 1345 QSL via HB9CRV, and Z330A (Macedonia) at 1450 celebrating 30 years of Amateur Radio (QSL via Z30A) and LZ1670SWS (Bulgaria) at 1841. Meanwhile Jim GM7TUD used c.w. to work ST0R (Republic of South Sudan) 0706 and s.s.b. for XF3/IZ2LSC (Mexico) NA-045 at 2157UTC.

"very poor" by most of our reporters. Just two managed contacts here. George used his QRP again to work George Burt GM3OXX who was running his usual 1W at 1427, and then LO2F (Argentina) at 1430 (QSL via AC7DX) and PY2MTV (Brazil) at 1948. While Jim managed 4U1ITU (ITU Geneva) at 1311 with c.w. and W2YP (USA) in New Rochelle, New York at 1434 and TY1KS (Benin) again at 1642UTC using s.s.b.

Jim was pleased to receive a call from **Al Wilson ZL1BD** who was on holiday in the region who asked if he could visit and a pleasant day followed with both Al and local amateur **Tom Jardine GM2BMJ** in sharing stories in Jims shack! Incidentally, keep an ear open for Al who can be heard most mornings on 14MHz from his QTH in Ngaruawahia, a small town in the Waikato region of the North Island of New Zealand. He usually has a good signal into the UK.

Fig. 7: The SJ22S QSL card sent to George Davis G3ICO for a 7MHz c.w. contact.

The 9A20V QSL card.



The DL9CM QSL sent after he was worked by Geoffrey Powell M1EDF using 7MHz c.w.

logbook shows W2OSR (USA) 2150 in Glen Cove, New York, W3GN (Canada) at 0020. Then came LU3MCJ (Argentina) 0036, CN2YAN (Morocco) 0041, ZL4CFT (New Zealand) OC-134 South Island at 0047, V21RW (Antigua & Barbuda) NA-100 at 0118. They were pleased to work VK7ZE (Australia) OC-001 in Ulverstone, Tasmania at 0151, HS0ZIN (Thailand) 1804 and TF3EE/QRP (Iceland) EU-021 at 2309UTC.

Also on the band was **Jim Pedley GM7TUD** In Locharbriggs, Dumfries who reports that the long path in the mornings continues to improve though the higher bands remain poor. His 14MHz log included KE7HOP/KL7 (Alaska) 0721, NX7DX (USA) in Bonney Lake, Washington at 0729, ST0R (Republic of South Sudan) at 0749 (QSL via EA5RM). Next came 8P6GU (Barbados) NA-021 at 0828, TY1KS (Benin) 0857 (QSL via IZ7KHR), C21YY (Nauru) OC-031 at 0924 QSL via OH2YY, A35CT (Tonga) OC-039 at 0935, and JX5O (Jan Mayen) EU-022 at 1458. Logged next were 5Z5/IZ7ATN (Kenya) AF-067 at 1714 and YW5LR (Venezuela) SA-035 Los Roques Islands at 2020UTC QSL via DM4TI. All

The 21 & 24MHz Bands

Moving to the 21MHz band Jim Pedley found ET3AA (Ethiopia) 0728, Z21BB (Zimbabwe) 0912 QSL via W3HNK, V84SHM (Brunei Darussalam) OC-088 Borneo Island at 0925. This was a special call celebrating the 65th Birthday of His Majesty the Sultan of Brunei (QSL via V89FD). Then came TY1KS (Benin) 1524, ZD8D (Ascension Island) AF-003 at 1541 (QSL via DL9HO). Next came YI1RZ (Iraq) 1844 QSL via IK2DUW, YW5LR (Venezuela) SA-035 at 2016. On 24MHz Jim worked SV9GPV/5 (Dodecanese) EU-001 on Rhodes Island at 0803UTC.

The 28MHz Band

The 28MHz band was open at times though conditions were described as

Signing Off

Well that's it for another month. 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. Until next time I wish you all good DX. 73, Carl GW0VSW ●

It's Competition Time!

You Could Win The Anytone AT-5555 Multimode 28MHz Transceiver – reviewed in the September 2011 Issue of *PW* – kindly donated by Mike Devereux G3SED of Nevada.

WORTH £149.95

Join In With The Fun On 28MHz!

Have you experienced the remarkable DX conditions that can appear on the 28MHz band? Rob G3XFD remembers his first encounter with 10m DX; *"My antenna was very simple in those days – just a short wire antenna but I 'worked the world' with ease. To be quite frank, the DX I worked during the wonderfully persistent conditions on 28MHz in the latter half of 1968, has never re-appeared for me! In one afternoon I worked all continents using a.m. and my (probable) 35W – and everyone else was doing the same. It was a truly thrilling experience to work Hawaii – and get "5&9" – and then be called by VK (Australia) and ZL (New Zealand) stations!"*

Be ready to enter our special – very simple – competition. There are four things you need to do to enter the competition:

1: Firstly you need to have read **Rob Mannion G3XFD**'s review of the Anytone AT-5555 that's in the September 2011 issue of *PW*.

2: Save the corner flash coupon from this page.

3: Then complete with your answers to the three questions, that will be published in the December 2011 issue of the magazine. Questions that will be based on the text of Rob's review.

4: Then send your completed form (photocopies of the form are acceptable but the corner coupons must be detached and sent with the entry form).

Rules: Only one entry per household. Multiple entries will be disallowed. Each entry must be accompanied by the corner flash coupons from the November and December 2011 issues of *PW* along with the completed competition entry page from the December issue of the magazine (photocopies of the entry form are acceptable but you must attach the corner flash coupon from the page and send it with the photcopied form).

The entry must reach the *PW* offices by the closing date, which will be provided on the competition entry form to be published in the December issue of *PW*. Late entries will not be accepted. The Editor's decision will be final and no correspondence will be entered into. The winner will be notified by the Editor and the competition result published in the *Newsdesk* section of the magazine.

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FT-60E - 2m/70cm FM 5W .. £129.95.
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FT-450D transceiver ..... £799.00.
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-58DM mic ..... £56.95.
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-500 analyser 5 to 500 MHz .. £574.00.
AA-54 HF ANALYZER ..... £322.96.
RigExpert AA-230 ..... £514.95.
AA-230PRO ..... £574.95.
RigExpert AA-30 - HF Analyzer .. £274.95.
RigExpert AA-520 Analyzer .....£574.95.
RigExpert Plus .....£262.95.
RigExpert Standard .....£190.95.

HEIL SOUND 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 ..... £299.95.
Comet V-250 3.5-54MHz Max 200w. Ideal for limited space ..... £299.95.
GP-6 High Gain Dualband CoLinear 2/70cm Max 200w ..... £99.95.
GP-15 Tri-Band 2/6/70 Fibreglass Antenna. Max 150w ..... £99.95.
GP-9 highgain dualband co-linear...£139.95.

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 £92.95
W-10AM 10A Supply £59.95
W-5A 5A Supply £29.95
W-10SM 10A Supply £49.95
W-30 2/70 Base £49.95
W-50 2/70 Base £54.95
W-300 2/70 Base £74.95
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 £449.95
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 ..... £189.95.
AT-200Pro ..... £209.99.
AT-897+ ..... £178.00.
KT-100 ..... £173.00.
AT-600Pro ..... £299.95.
YT-450 ..... £224.00.
Z-11ProII ..... £159.95.
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

LDG ELECTRONICS

Radioworld - the longest-running LDG dealer in the UK!!

LDG ELECTRONICS

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 ..... £112.95.
CP6 Base 6m-80m ..... £389.95.
X50 Base 2/70 ..... £82.95.
X200N Base 2/70 ..... £129.95.
X300 Base 2/70 ..... £149.95.
X7000 Base 2/70/23 ..... £255.95.

AMERITRON

The High Power Specialist

AL-811XCE 10-160m 600w £899.95
AL-811HXCE 10-160m 800w £999.95
ALS600X Solid State 10-160m 600w £1499.95
AL-1500XCE 10-160m 1.5KW £3769.95
AL-1200XCE 10-160m 1.5KW £3499.95
AL-82XCE 10-160m 1.5KW £2749.95

RADIO BOOKS

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 ..... £850.00.
G-450C Rotator ..... £314.95.
G-550C Rotator ..... £295.00.
G-650C Rotator ..... £355.00.
G-1000DXC Rotator ..... £459.95.
G-5500C Rotator ..... £584.95.
AR-35X 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 ..... £1.20 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 .....£1999.
2M-HK 2m 500W .....£1999.
64-HK 6m&4m dualband 500W. £1999.
70CM-HK 70cms 500W .....£1999.

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-722 CW / SSB Filter £59.00
Yaesu FRV-8800 RX VHF Converter £99.00
Alinco DJ-X3 £89.00
Comet CF-BPF 6 band pass filter £30.00
EDC-16B adapter £9.99
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 SS-R Safety Alert System £119.95
Icom CT-17 Computer Interface £59.00
SGC MAC-200 Antenna Controller Auto-Tuner £220.00
MFJ-784B DSP Filter £219.00
Microset SR-200 2m 200w £319.00
AOR ARD9000 Digital Voice Interface. £126.31
Midland 48 Plus Multi £69.00
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
MFJ-901B £65.00
Kenwood DFC-230 external digital frequency £89.00
YF-114SN 2nd IF Filter 8.2/2.0KHz £49.00
SC-8200 Soft Case for AR-8200-8200-S2 £10.00
Kenwood YG-455C-1 - CW Crystal Filter £89.00
Kenwood YG-455CN-1 - CW Crystal filter £100.00
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
HMC-3 Vox Headset £20.00
Host Master II £20.00
Eton S-350 Field Radio £65.00
Rigblaster Plus £89.00
Icom LC-158 Carrying Case for IC-R20 £12.00
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
60W Max Dummy Load £35.00
300W Max Dummy Load £79.00
Drake DL-300 Dummy Load £50.00
Revex L20 50 Ohm Dummy Load £25.00
MMB-80 Mobile Mounting Bracket for FT897 £14.00
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
SC-37 Soft Case £6.00
SC-41 Soft Case £6.00
Diamond DL1000 Load £99.00
Philips HC8349 Wireless Rechargeable Headphones £25.00
Toyo T-100 Dummy Load £59.95
MAG-BM145PL £14.95
MFJ-332B BNC Magmount £15.95
FMU-747 for FT840, FT-747 etc. £69.00
FL-53A 455kHz Filter CW narrow 250Hz £125.00
SU-1 Barometric Pressure Sensor Unit £29.95
Yaesu XF-8.9KCN CW filter £40.00
Inrad Pre-amp board to fit FT-1000mp £57.50
T1-30D 15-Watt Load £20.00
Hansen DL-20 15-Watt Load £20.00
Icom UI-8 PM Demodulator Board £60.00
Garmin GPS-38 Personal Navigator £49.00
FM Wide Modification Kit for FRG-8800 £60.00
AirNav RadarBox-Pro 2010 £299.00
AN-3 Three Way Antenna Switch £15.00
Heathkit IM-5217 Meter £30.00
SSB-SP-2000 SSB ELECTRONICS 2m Pre-amp £159.00
SSB-SP-7000 SSB ELECTRONICS 70cm Pre-amp £189.00
FT-290 MK1 Charger £12.00
ESC-44 Soft Case for DJ-X30 £10.00
CSC-73 Soft Case for VX-5R £7.00
LC-152A Leatherette Carry Case for IC-E90 £10.00
WRP-1300 Pre-Amp £29.95
Icom BP-197 Battery Case (3 x AA) £20.00
MMB-M11 Multi-angle mounting bracket £17.00
Yaesu FAS-1-4R - Remote Antenna Selector £119.00
BC-139 Desktop Fast Charger incl. BC-06 for IC-E90 £50.00
CP-19 Cigarette Lighter Cable £22.00
LC-163 Soft Leatherette Carry Case for IC-E91 £12.00

Amplifiers
Kenwood VB-2200GX 2M Amplifier £79.00
Explorer 1000 1KW HF Amplifier £799.00
Ampere AP8-57A UHF Amplifier £129.00
MML 144/30-LS 2m 30W Amplifier £89.00
R-25 Microset 30W 2m Linear Amplifier £89.00
Microwave Modules MML 50/100w £99.00

Analyzers + SWR meters
Daiwa CN-103L Meter £70.00
AV-20 AVAIR VSWR POWER Meter £25.00
YW-3 SWR meter £30.00
Harrier SWR-1 SWR & Power Meter £15.00
PALSTAR PM2000AM Mobile Watt Meter £120.00
KENWOOD SW-100 PWR/SWR METER 140-450MHZ £35.00
Tech TE-15 Dip Oscillator £88.95
Kenwood SW-2100 SWR Power Meter £99.00
Daiwa CN-520 1.8~60MHz SWR Meter £45.00

Antenna
EZ-TUNE-7000IBOX High Sierra Control box for £85.00
MC-4MT Mobile Cable £13.00
Heathkit HD-1424 Active Preselector £59.00
Arno 40m EH Antenna £99.95
Telescopic 4m Band Whip £15.00
2m Telescopic Antenna £10.00
Wideband Scanner Antenna £15.00
Wideband Base Scanner Antenna £15.00
Palstar AA-30 Active Antenna £79.00
C-POSE Wander-Wand Tunable £35.00

Antenna Rotators
KR-600RC Rotator £220.00

Antenna Tuners
LDG Z-11 QRP ATU £99.00
MFJ-948 Antenna Tuner £125.00
Kenwood AT-230 ATU £199.00
Yaesu FRT7700 Antenna Tuner £69.00
MFJ-906 6m ATU £49.00
Vectronics VC-300D Tuner with LED PEP Meter £199.00
MFJ-971 MFJ QRP Portable ATU, ANTENNA TUNER. £99.00
SG-231 SGC Smartuner £275.00
MFJ-924 MFJ UHF ATU £85.00
MFJ-994 Automatic ATU 1.8-30MHz £255.00
Capco SPC-100 300W ATU £95.00
LINEAR AMP SPC Supertuner £399.95

Books
Icom IC-R20 manual in Italian £5.00
AERAD Chart 1994 £2.00
Air Band Radio Handbook 8th Edition £5.00
Air Band Radio Guide 6th Edition £5.00
Airwaves 2007 £8.00
ARRL Handbook 1983 £10.00
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 Airband Radio Handbook £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 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
Scanners 2 International £5.00
UK Scanning Directory 4th Edition £5.00
UK Scanning Directory 2nd Edition £5.00
"Calling Shenwick" £5.00
Shortwave Voices of the World £5.00
"49 The Thyristor Book" £5.00
Transistor Equivalents and Substitutes £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
WRTV Handbook 27th Edition £5.00
RSGB Amateur Radio Operating Manual £5.00
Electronic Service Manual £20.00
Scanners 4 Book £5.00
"The Antenna Experimenter's Guide" by Peter Dodd £10.00
Shortwave DX Handbook by DL2VFR £10.00
G-QRP Club Antenna Handbook £10.00
"HF Antennas for all Locations" by Les Moxon £8.00
RSGB 1994 Call Book £10.00
International Listings 1994 Call Book £10.00
International Listings 1991 Call Book £10.00

CB
Lodestar SWR-2T SWR Meter £15.00
Emperor Ninja CB £69.00
Lodestar SWR-2S SWR Meter £15.00
CB SWR Meter £15.00
Ranger RCI 2970DX 10 - 12m " 150w" Transceiver £249.95
Magnum S-9 Multi Mode mobile Transceiver £240.00
Maycom EM-27 CB Transceiver £55.00
DX-5000 K-PO - AM/FM/SSB 10/11 Meter £189.00
CB Magmount Antenna £10.00
Harrier-CBX CB Radio £69.00
Midland Port-A-Pak 27MHz FM CB £78.95
RANGER VOYAGE VR-9000 - 10/11 meter all mode £145.00

DAB Radio
Gemini 46 Digital Radio £39.00
Sony XDR-S55DAB £30.00
Tevion DAB & FM Radio £30.00

Data Comms
Kamtronics KAM Multimode TNC £129.00
ERA Microreader CW Decoder £79.00
ICS AMT-2 Terminal Unit £49.00
USB 56K MODEM £10.00
MFJ-1278b DSP Multimode Data Controller £249.00

DC/Cig adapter/chargers
NC-38G Ni-Cd Battery Charger £20.00
Duplexer / Triplexer
Revex D24 duplexer 1.6-150 MHz £22.00

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
Vanco HF Low Pass Filter £14.95
YK-88C-1 CW 500Hz Filter £59.00
2m Helical Band Pass Filter £60.00
Frequency Counter/finder
Watson FC-128 Frequency Counter £69.00
Maplin MF100 Multifunction Counter £59.00

Handheld Transceivers
Icom IC-T8E £159.00
Yaesu VX-1R Dual Band Handy £85.00
IC-E91 Icom 2m/70cm Handheld Transceiver £209.00
Alinco DJ-V17E 2m Handheld £104.95
FDC-450A 70cm Handheld £79.00
FDC-150A 2m Handheld £79.00
Quansheng 70cm Handheld £79.00
Quansheng 2m Handheld £69.00
Kenwood TH-G71E Dualband Handheld £149.00
Wouxun KT-689 2m Transceiver £59.00
FNB-82LI (Spare) 1000mA Lithium-ion Battery pack for £18.00
CSC-72 Leatherette Case for VR-500 / VT-120 £10.00
Jingtong JT-208 2m Handheld £49.00
Jingtong JT-308 70cm Handheld £49.00
EDC-144 Rapid Charge Cradle £29.00
Yaesu FNB-102LI 7.4V 1800mAh battery £40.00
Yaesu CD-41 - Rapid Charger Requires NC-86U £10.00
ADMS-VX8 Programming software and lead for VX-8 £45.00
Yaesu CSC-93 soft case £9.00
Puxing PX-777 UHF Handheld £49.00

HF Transceivers
Kenwood TS-950SD HF150W DSP Base £950.00
TS-480HX £669.00
Yaesu FT-1000MK V 200w £1,499.00
Kenwood TS-950SD HF Transceiver £1,099.00
Kenwood TS-570DG/E HF transceiver £599.00
Yaesu FT-990 /AC £799.00
Yaesu FT-101ZDmk3 HF Transceiver £325.00
Icom IC-706 MkIIG with DSP £599.00
Trio-Kenwood-TS-830S £349.00
Alinco DX-70TH HF & 6m transceiver £399.00
IC-756PRO-MKIII Icom HF + 6m Trx £1,575.00
Yaesu FT-2000 100W with internal power supp £1,599.00
Yaesu FT-2000D 200watts £1,950.00
IC-7400 HF, 6m & 2m transceiver £849.00
Icom IC-718 HF Transceiver £399.00
Yaesu FT-950 £989.00
Midland Alan 98 Plus CB Tranceiver £49.00
Yaesu FT-690R II £275.00
IC-706 MK2 £499.00
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

Mics and Speakers
Kenwood SP-430 Speaker £59.00
Yaesu MD-1 Desktop Microphone £75.00
SMC-34 Speaker/Microphone with Volume Control £21.63
HM-133 Remote Control Microphone for IC-E208 £52.46
MC-90 Desk Mic for DSP £149.00
Alinco EMS-8 - Speaker Microphone £10.00
EMS-47 Remote Control Hand Speaker/mic direct VFO in £15
YM-24A Speaker Microphone £25.00
Yaesu MH-12A2B speaker-microphone £15.00
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
HM-75A Spkr/Mic with Up/Dwn for IC-M3EURO £30.00
Speaker Mic for Kenwood £10.00
Speaker Mic (Yaesu VX-1 etc.) £9.00
Speaker Mic (Icom Two Pin) £9.00
Sharman's Speaker Mic (Icom Two Pin) £9.00
RS Dynamic Stick Microphone £39.95
PRO-SET-ELITE-6 Headset using Heil HC-6 element £139.00

Morse keys / tutors
MFJ-418 Pocket Morse Tutor £75.00
NATO Morse Key £199.00
Ex-Army Key with Operators Unit £39.00
Star-Masterkey CW Keyer £49.95
MFJ-451X Morse Interface (no keyboard) £85.00
MFJ-26B Soft Leather Case for MFJ-418 £9.96
Kent Keyer £79.00

Power supplies
Bnos 20AMP PSU £99.00
Kenwood PS-430 Power Supply £119.00
PT-1012 Microset 12A 13.5 PSU £109.96
Icom PS-125 £270.00
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 SA 13.8V fixed power supply unit £24.00
Drae 6-Amp PSU £49.00
Yaesu FP-8 PSU £69.00
Apollo CB-35 PSU £20.00
Alba RPS-1203 £20.00
Mini Power Supply £14.95
Drae 24 Amp PSU £99.00
GZV-4000 Diamond 40A Switch Mode £165.00
Mercury 20 Amp Output, 13.8 Volts PSU £50.00
Nissei PS-1225 25-Amp PSU £50.00
Eurosonic 5~7Amp PSU £15.00
Nissei PS305W-II - Power Supply Unit £70.00
Yaesu FP-80A DC power supply £69.00

Receivers
Icom IC-R72 Receiver £399.00
AOR AR-7030 £550.00
Realistic DX-394 HF Receiver £129.00
Yaesu FRG-100 HF Receiver £299.00
Icom IC-R5 Receiver £129.00
AOR AR-3000A Wideband Receiver £450.00
Yaesu FRG-7700 HF Receiver £249.00
AOR AR-8600 Mk2 530kHz-3.000GHz Wide-band £499.00
AOR AR-3000 Wide Band Receiver £350.00
R-9914 Roberts Multiband Digital Preset World Radio £85.00
R-30CC HF PALSTAR HF Rx £499.00
Alinco DJ-X30 Scanning Receiver 100KHz - 1.3GHz £125.00
AR-108 Airband Scanner £35.00
ABM-1-KIT Ramsey Passive Airband Monitor Kit £60.00
IC-EX257 FM Board for IC-R71 £69.00
Palstar R-30A Short Wave Receiver £499.00

Scanners
AR-8200-MkIII AOR Scanner 530 kHz-3 GHz £359.00
Icom IC-R3 Hand held Scanner £250.00
GRE PSR-214 FM Base Scanner £89.00
MVT-7100 Scanner £179.00
UBC-92 XLT Uniden-Bearcat Handheld Scanner £85.00
UBC-72XLT Scanner with 'Close Call' £74.95
AOR 8200 Mk I £220.00
UBC-78SXLT Uniden-Bearcat Base Scanner £209.00
UBC-3500XLT Uniden Bearcat Handheld Scanner £159.00
IC-RX7 - Wideband Handheld Receiver £179.00
Realistic Pro-2045 Base Scanner £49.00
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
UBC-278CLT Uniden-Bearcat Base Scanner £60.00
Realistic Pro-2021 Base or Mobile Scanner £59.00

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Icom IC-490E 70cms Mobile £250.00
Kenwood TS-2000 All Band Base £949.00
Kenwood TH-271E £165.00
Kenwood TS-790E 2/70 Base £750.00
FT-290RMKI 2m Multi mode £150.00
Yaesu FT-790 £159.00
Yaesu FT-1500M £129.00
Trio (Kenwood) TS-711E 2m Multi-mode £375.00
Yaesu FT-817 Portable Transceiver £379.00
IC-7400 HF, 6m & 2m transceiver £849.00
Icom IC-821H Dual Band transceiver £599.00
Yaesu FT-290MkII 2m Multi-mode transceiver £250.00
Kenwood TS-2000 HF, 6m , 2m & 70cm Transceiver £1,199.00
Yaesu FT-736R 6m, 2m & 70cm Base £799.00
Yaesu FT-480R 2m SSB, CW & FM Transceiver £220.00
Yaesu FTV-901R 2m / 70cm Transverter £275.00
ICOM IC-207H Dual Band Mobile £179.00
Kenwood TS-2000 All Mode Multibander Transceiver £999.00
Icom IC-7000 1.8 - 70cms Mobile Transceiver - IC7000 £899
FT-817bhiDSP Yaesu Transceiver with bhi dsp£529.00
Yaesu FT-1802E FM 2m Band Transceiver £98.00
The TINY-2 MK-II - With Open Squelch Board £109.00
Kenwood TM-741E - VHF/UHF transceiver £229.00
DR-635E Alinco 2m/70cm FM Dual Band Mobile £239.00
Icom IC-T81E 50-54 / 144-146 / 430-440 / 1240-1300 £240.00
FT-7900 2 Meter / 70 cm Dual Band FM Transceiver £195.00
Kenwood TR-851E 430-440 MHz All-mode £299.00
Virtual Radars
AirNav Radarbox 2009 version £299.00

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

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Colin Redwood G6MXL's What Next?
PW Publishing Ltd., Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW
E-Mail: what.next@pwpublishing.ltd.uk

Which Way?

In this month's What Next? Colin Redwood G6MXL looks at the techniques used for switching radio frequency signal pathways.

This month I'm looking at the various techniques that are commonly used for switching radio frequency (r.f.) signal paths. The reason for doing this is that over the next few months I'll be looking at situations where switching cannot be taken for granted!

Why Do We Need RF Switching?

You may ask – why do we need r.f. switching? In answering, the main reason is so that a receiver and transmitter can share a common antenna (**Fig. 1**). In most situations it's best **not** to switch r.f. signals from a transmitter while you're transmitting.

This is because during switching the voltage standing wave ratio (v.s.w.r.) and impedance presented to the transmitter can vary enormously for a brief period. This may be sufficient to case damage to semiconductors in power amplifier stages and also cause high-level transmitter power to be presented to the receiver input.

Other situations when r.f. may need to be switched include pre-amplifiers, power amplifiers and transverters.

Pre-Amplifiers

A pre-amplifier is an amplifier that increases the level of received signals. As the pre-amplifier contains sensitive devices they can be easily destroyed by the power of a transmitter, switching is needed to by-pass the pre-amplifier when transmitting. **(Fig. 2**).

Power Amplifiers

A power amplifier (p.a.) is an amplifier that increases the level of transmitted signals. Switching is needed to enable received signals from the antenna to be heard. If the antenna is still connected to the power amplifier output they won't be heard. So the power amplifier must be by-passed when receiving (**Fig. 3).**

Combined Pre & Power Amplifiers

In most combined pre-amplifiers and power amplifiers, it's possible to by-pass the pre-amplifier and/or power amplifier when not needed. This situation means that additional switching is required.

Transverters

A transverter allows a transceiver, designed to operate on one band, to transmit and receive on another band. On transmit, the transverter takes a low-level output from the transmitter (usually in either the 28MHz or 144MHz bands) and mixes it with a local oscillator signal to arrive at the band you require. On receive, the transverter converts the v.h.f./u.h.f. signal down to 28MHz or 144MHz (**Fig. 4**). So, switching is again required to change between the receive path and the transmit path and back again.

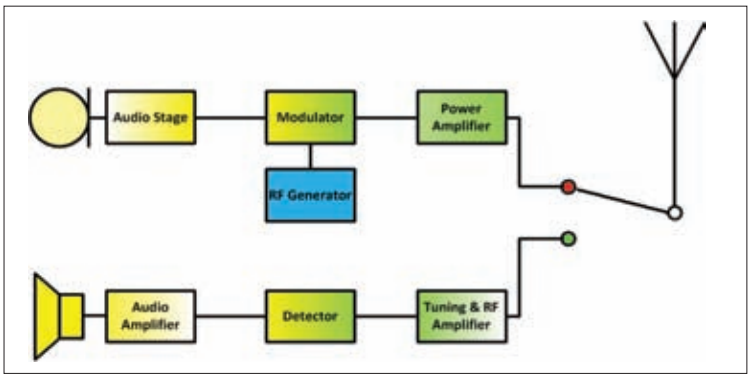

Fig. 1: A simple transceiver block diagram showing the switching needed to share a common antenna. The switch is shown in the transmit position.

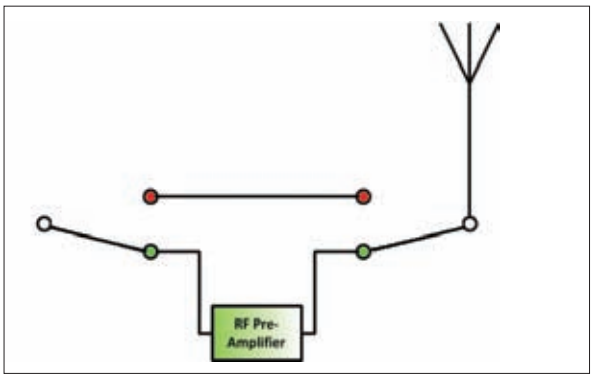

Fig. 2: A receive pre-amplifier, showing the switching needed to by-pass it on transmit. The switches is shown in the receive position.

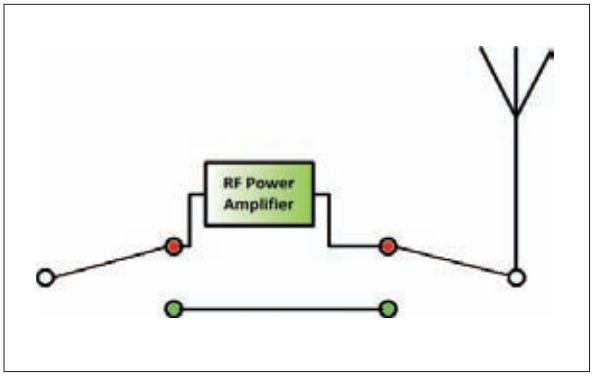

Fig. 3: A power amplifier, showing the switching needed to by-pass it on receive. The switches are shown in the transmit positions.

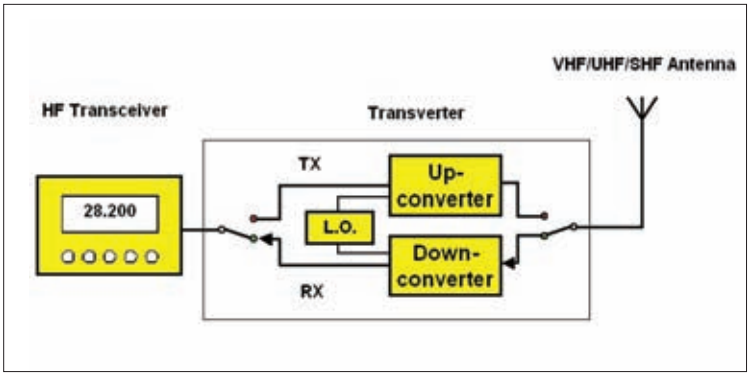

Fig. 4: A transverter, showing the switching needed between transmit and receive.

Available Methods?

So, having discussed the need to be able to switch r.f. signal paths, what are the methods available? Well, there are three ways that can be used: relays, manual switching and *pin*-diodes.

The arrangements needed depend a lot on the frequency of the r.f. signal and the power levels. A low power (QRP) 1.8MHz (Top Band) transceiver's switching arrangements are not as critical, as those of a high power v.h.f., u.h.f. or s.h.f. transceiver.

As a general principle, switching should not occur when significant power is present – i.e. not changing over when transmitting. Otherwise it risks damaging relay or switch contacts, and presenting a high v.s.w.r. to the transmitter's output stages, albeit for a fraction of a second.

Using Relays

Relay are electromechanical switching devices. In a normal arrangement current is applied to a coil which creates a magnetic field, which then attracts some iron towards it – operating a switch at the same time. There are many types of relays around, and they have coils rated at various voltages which for amateur purposes normally require a switched direct current voltage to operate.

Most relays encountered are not intended to switch radio frequency (r.f.) signals. Many are employed switching direct current (d.c.) or low frequency alternating current (a.c.) signals such as from the mains.

Relay Specifications

It's important to understand relay specifications so that you know whether a relay will suit the purpose you intend to use it for.

Coil Voltage

The coil voltage is the voltage that must be applied to the coil of the relay for it to operate. Generally speaking, applying a voltage 25% less should still enable the relay to function properly and most relays will tolerate a voltage a bit over the quoted voltage.

Applying a voltage substantially less than the design voltage may cause the relay to take longer than intended to switch. Also, it may not pull the contacts fully into contact with each other, thereby affecting the relay contacts current handling. Some relay suppliers quote a range of coil voltages over which the relay will operate.

Actuator Current

The actuator current is the amount of current that flows through the coil in order to reliably pull over the contact. The power supply to the coil must be able to supply at least this amount of current if the relay is to function properly.

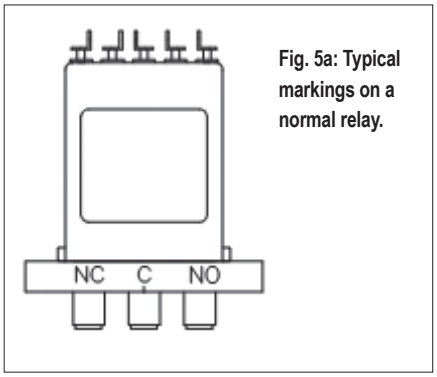

Fig. 5a: Typical markings on a normal relay.

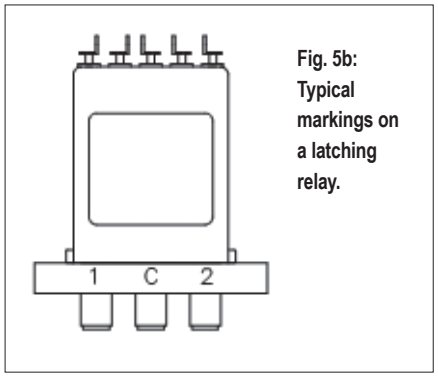

Fig. 5b: Typical markings on a latching relay.

Coil Resistance

Next comes the coil resistance. This is exactly what you guessed it means! It also enables us to calculate the amount of current the relay will draw in operation, which may be less than the actuator current.

From Ohm's law, we know that a low coil resistance means that the relay will draw more current than one with a higher resistance coil. This might be a consideration in a portable set-up where the coil is to be powered by a battery.

Contact Details

Contact details are important. In non-r.f. applications, relay manufacturers will usually quote maximum a.c. and d.c. voltages and maximum currents that the relays will switch. Exceeding these may cause the contacts to arc over and become damaged and a circuit not to be properly isolated.

Note: Some relays may have lower limits when switching inductive loads.

Normal Or Latching Type?

With a normal relay the contacts change from 'normally open' (when unactivated) to closed (when active) only as long as there's sufficient voltage applied to the coil. When the voltage is not present on the coil, the relay reverts back to the normally open position. This type is the one most commonly encountered, particularly for non-r.f. switching. In a latching relay, every time it detects a pulse of voltage, it will switch from whatever the current state is to the alternative state.

I have one tip for visually distinguishing normal, non-latching relays from the latching variety. On non-latching relays the contacts or r.f. sockets are often labelled 'NC', 'C' and 'NO' (**Fig. 5a**). 'NC' means normally closed, so that with no power connected to the coil, the 'NC' socket will be connected to the 'C' (common) socket. 'NO' means normally open so that with no power connected to the coil, the 'NO' socket will not be connected to the 'C' (common) socket. Latching relays tend to label the common 'C', but the other two sockets are often labelled 1 and 2 (**Fig. 5b**).

Relay manufacturers have been taken over by other companies multiple times. This means that it's very difficult indeed to establish the specification for anything other than current model numbers. I have also failed to find a really comprehensive web site to convert older model numbers to current equivalents. If *What Next?* readers know of one, please let me know so that I can share it with other readers.

Switching Sequence

Like switches, relay contacts can either be 'break-before-make' or 'make-before-break'. In the case of break-before-make, the normally closed contacts are separated (opened) for a fraction of a second, before the normally open contacts are closed. In other words, for a fraction of a second the common is not connected to either the normally closed or the normally open terminal.

In the case of a make-before-break, the normally closed contacts stay connected to the common until after the normally open contacts are joined, and then the movement causes the normally closed contacts to open. In other words, for a fraction of a second the common is connected to both the normally closed and the normally open terminal simultaneously. In most Amateur Radio situations, we need a break before make switching sequence.

Switching Time

Switching time is the time for the relay to fully switch over, usually expressed in milliseconds. For Amateur Radio purposes, it's worth remembering that whilst the relay is switching, any radio signals on the contacts will be seeing a high v.s.w.r.

Additionally, if you are transmitting

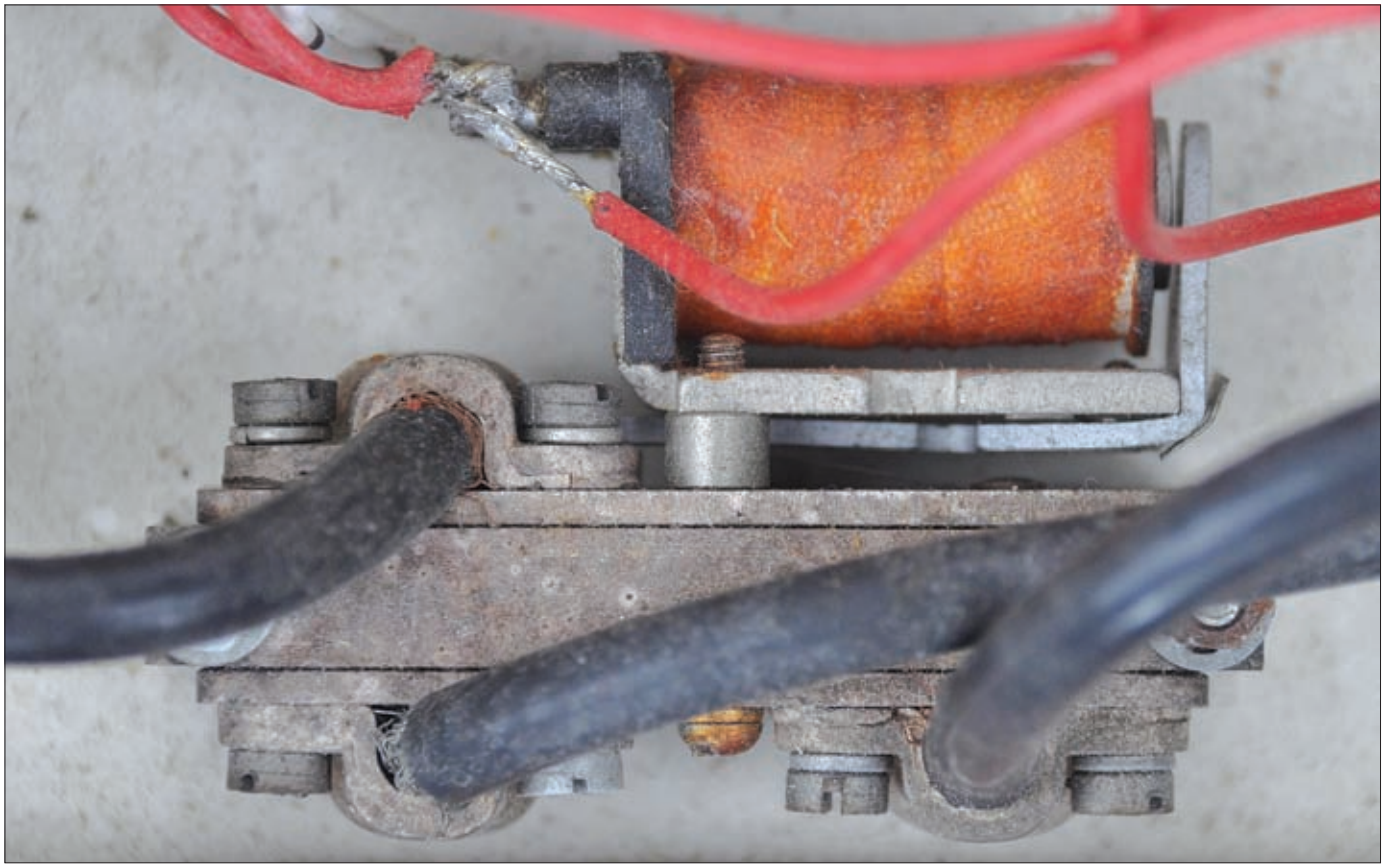

Fig. 6: A relay suitable for low power v.h.f. use with connections made directly to the coaxial feeder.

data while switching is taking place, r.f. is not getting to the antenna – and hence some key bits of data may not be transmitted. Packet radio terminal node controllers (TNCs) used to be configured to delay transmitting their data for a fraction of a second to allow switching to complete.

Frequency Range

The actual arrangements of the contacts may limit the frequency over which a relay can operate without presenting an unacceptably high v.s.w.r. or effecting the r.f. isolation between the contacts. Relay specifications often quote the v.s.w.r. at one or more frequencies.

Insertion Loss

Insertion loss can be considered a bit like feeder loss. However, the losses are likely to be fractions of a dB (0.2 to 0.5dB) in most cases, so not a major problem unless you are using several relays. The lower the insertion loss, the better.

Isolation

The term Isolation refers to the extent that r.f. on the closed contact can be 'heard' on the open contact. Typically this will be 50 to 80dB for a good r.f. relay. The higher the isolation, the better.

Relay Connectors

Just like transceivers, r.f. relays can be found with a variety of connectors. Most commonly they have BNC, N-type or SMA sockets, with BNC used mainly at v.h.f., N-type at u.h.f. and SMA at s.h.f. Some relays allow coaxial feeder to be connected directly to the relay (**Fig. 6**). Others are designed for printed circuit board (p.c.b.) mounting.

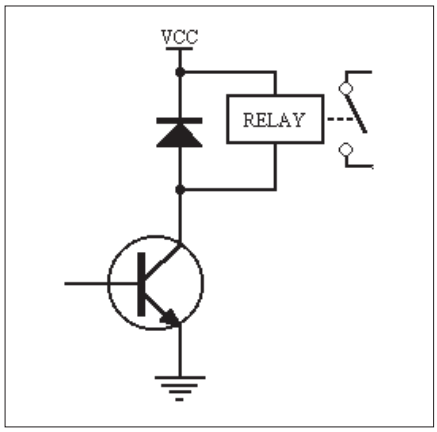

Fig. 7: The use of the diode to protect the transistor from back e.m.f.

Driving The Relay Coil

It's common to use a simple transistor circuit to drive the relay coil. As the coil on the relay is an inductor, it's important to protect the transistor from the 'back e.m.f.' from the coil when the current is switched off. The easiest way to do this is to use a diode across the coil of the relay (**Fig. 7**). A diode in the 1N4001 to 1N4007 range is ideal for most applications.

Coaxial Switches

It's possible to purchase coaxial switches. In essence these can be thought of as relays with the coil replaced by a purely manually operated switching arrangement. These are ideal for switching the output of a multi-band transceiver between antennas designed for different bands.

Pin Diodes

In practice *pin*-diodes can be used as an alternative to switches at low power r.f. They have two big advantages over relays: size, and switching time. They have disadvantage of being only able to switch low power r.f. and relatively low attenuation (typically about 20dB) (the *pin*-diode's equivalent of a relays isolation) in their off state. It is possible to put several together to the increase attenuation.

The *pin*-diode also introduce some loss into the path. Nevertheless, they are commonly deployed in low power hand-held transceivers to switch the antenna between receive and transmit paths. However, some Amateurs have concerns about their use with external antenna systems in areas affected by lightning.

That's it for this month. If you have any queries – please don't hesitate to contact me. My details, as always, are published at the head of this column and I always welcome comments from readers. Colin G6MXL. ●

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

OCTOBER

October 16th
The Blackwood Rally
The Blackwood and District Amateur Radio Society Rally will be held at Coleg Gwent, Crosskeys Campus, Risca Road, Crosskeys NP11 7ZA. The doors will open at 10.30am (10.00am for the disabled) and admission will cost £2.00. There will be talk-in on S22 (V44) and free car parking will be available. There will be trade stands, a Bring & Buy, special interest groups, a prize draw and catering. In addition, there will be a car boot sale held in the rear car park.
Dave GW4HBK
Tel: 01495 228516
E-mail: gw4hbk@talktalk.net
www.gw6gw.co.uk

October 16th
The Hornsea Rally
The Hornsea Amateur Radio Club Rally will be held in the Floral Hall, 7 The Esplanade, Hornsea, East Yorkshire HU18 1NQ. The doors will open at 10.30am and there will be car parking, trade stands, a Bring & Buy, special interest groups including the Royal Air Force Amateur Radio Society, a raffle, catering with a licensed bar and facilities for the disabled.
Rick M0CZR
E-mail: R106221@aol.com
www.hornseaarc.co.uk

October 23rd
The Callington Rally
The Callington Amateur Radio Society Rally will be held at the Callington Community College, Launceston Road, Callington, Cornwall PL17 7DR. The doors open at 10.00am and admission will cost £2.00. There will be talk-in, car parking, trade stands, a Bring & Buy, a prize draw, catering and facilities for the disabled.
John G4PBN
Tel: 01822 835834
E-mail: lumley85-cars@yahoo.co.uk

October 23rd
The Galashiels Rally
The Galashiels and District Amateur Radio Society Rally will be held in the Volunteer Hall, St Johns Street, Galashiels, Scottish Borders TD1 3JX. The doors will open at 11.30am (11.15am for the disabled), admission will be £2.50 and there will be trade stands, a Bring & Buy, catering and a prize draw.
Jim GM7LUN
Tel: 01896 850245
E-mail: mail@gm7lun.co.uk

October 29th/30th
The North Wales Rally
The North Wales Rally will be held at the John Bright School, Llandudno LL30 1LF. The rally will be open from 10.00am to 5.00pm each day. Tickets will cost £4.00 each (children free) and there will be talk-in on S22, car parking, trade stands, a Bring & Buy, catering and facilities for the disabled.
Liz Cabban GW0ETU
Tel: 01690 710257
E-mail: lizcabban@yahoo.co.uk
www.nwrs.org.uk

October 30th
The Holsworthy Rally
The Holsworthy Amateur Radio Rally will be held at the Holsworthy Community College, Victoria Hill, Holsworthy, Devon EX22 6JD.
Roger Williams
Tel: 07773 983691
E-mail: gsowter@talktalk.net

NOVEMBER

November 6th
The Kempton Rally*
The West London Radio and Electronics Show will be held in the Kempton Park Racecourse, Staines Road East, Sunbury-on-Thames, Middlesex TW16 5AQ. The doors will open at 10.00am (9.50am for the disabled) and there will be talk-in on S22 (V44), free parking, trade stands, a Bring & Buy, flea market, special interest groups, lectures, catering and facilities for the disabled.
Paul M0CJX
Tel: 0845 1650351
E-mail: info@radiofairs.co.uk
www.radiofairs.co.uk

November 12th
The Rochdale Rally
The Rochdale & District Radio Society Traditional Radio Rally will be held at St Vincent's Church Hall, Caldershaw Road, Rochdale OL12 7QL. The doors will open at 10.30am (10.15am for the disabled) and admission cost £2.50 with concessions for those under 12 and senior citizens. There will be a Bring & Buy and catering.
Dave G0PUD
Tel: 07710 243107
E-mail: dave.shaw1@sky.com
www.radars.me.uk

November 20th
The Plymouth Rally
The Plymouth Radio Club Rally will be held in the Elm Community Centre, Leypark Walk, Estover, Plymouth PL6 8UE. The doors will open at 10.00am, admission will be £2.00 and there will be talk-in, car parking, trade stands, a Bring & Buy, a prize draw and catering.
Bob Griffiths G7HNB
Tel: 01752 3431277
E-mail: freebobx@yahoo.com

November 20th
The CATS Radio & Electronics Bazaar
The 34th Coulsdon Amateur Transmitting Society (CATS) Radio & Electronics Bazaar will be held at the headquarters of the 1st Coulsdon Scout, Richmond Hall, Lion Green Road Car Park, Coulsdon CR5 3BP. The event will run from 10.00am to 1.00pm and admission, which includes a cup of tea, will be £1.00. There will be free car parking, a Bring and Buy, displays, catering and facilities for the disabled.
Glen G4FVL
E-mail: chariman@catsradio.org

November 20th
The Mayo Rally
The May Radio Experimenters Network Club Radio Rally will be held at the Welcome Inn Hotel, Castlebar, Republic of Ireland and the doors open at 11.00am.
Padraic Baynes EI9JA
00 353 (0) 876 957154
E-mail: pbaynes1@eircom.net
http://ei7mre.org

DECEMBER

December 4th
The Bishop Auckland Rally
The Bishop Auckland Radio Amateurs Club Rally will be held at Spennymoor Leisure Centre, County Durham DL16 6DB. The doors will open at 10.30am (10.15am for the disabled) and admission will cost £1.50 (under 14s free). There will be talk-in on S22 (V44), car parking, trade stands, a Bring & Buy, catering, licenced bar, family attractions and facilities for the disabled.
Mark G0GFG
Tel: 01388 747497

JANUARY 2012

January 15th
The Red Rose Radio Rally
The Red Rose Winter Radio Rally will be held at the George H Carnall Leisure Centre, Kingsway Park M41 7FJ (M60 junction 9, opposite the Trafford Centre). The doors will be open from 11.00am to 3.00pm. There will be free car parking, trade stands, a Bring & Buy, special interest groups, an RSGB bookstall, catering, licensed bar and facilities for the disabled.
Steve
Tel: 07502 295141
www.wmrc.org.uk/carnall.htm

FEBRUARY 2012

February 5th
The Canvey Rally
The 27th Canvey Radio & Electronics Rally will be held at the Paddocks Community Centre, Long Road, Canvey Island, Essex SS8 0JA (the southern end of A130). The doors will open at 10.30am and there will be free parking, trade stands, catering and facilities for the disabled.
Dave Speechley
Tel: 01268 697978 (evenings)
E-mail: rally@southessex-ars.co.uk
www.southessex-ars.co.uk

February 26th
The Rainham Radio Rally
The Rainham Radio Rally will be held at Rainham School for Girls, Derwent Way, Rainham, Kent ME8 0BX. The doors will open at 10.00. There will be talk-in and catering will be available.
Trevor G6YLW
Tel: 07717 678795
E-mail:
trevwig1.co.uk

MARCH 2012

March 4th
The Cambridge Radio Rally
The Cambridge & District Amateur Radio Club Rally will be held at the Wood Green, King's Bush Farm, London Road, Godmanchester, Cambridgeshire PE29 2NH. The doors will open at 10.00am and admission will cost £3.00. There will be talk-in on S22, trade stands, a Bring & Buy, special interest groups, family attractions, catering, licensed bar and facilities for the disabled.
John G0GKP
Tel: 01954 200072
E-mail: j.bonner@ntlworld.com
www.cdarc.co.uk

APRIL 2012

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: SouthGlosRadioRally Coordinator@gmail.com
www.southglosradiorally.org.uk

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

JUNE 2012

June 24th
The West of England Radio Rally*
The West of England Radio Rally will be held at the Cheese & Grain, Bridge Street, Frome, Somerset BA11 1BE. There will be car parking, trade stands, catering and facilities for the disabled.
Shaun G8VPG
Tel: 01225 873098
E-mail: rallymanager@westrally.org.uk
www.westrally.org.uk

NOVEMBER 2012

NOVEMBER 4th
The Holsworthy Rally
The Holsworthy Amateur Radio Rally will be held at Holsworthy Community College, Victoria Hill, Holsworthy, Devon EX22 6JD.
Roger Williams
Tel: 07773 983691
E-mail: gsowter@talktalk.net

The *Practical Wireless* Archive 2010 on CDROM

You've been asking for them and you've been waiting for them! At last they're here!

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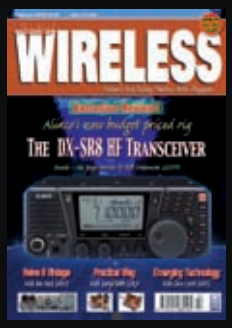

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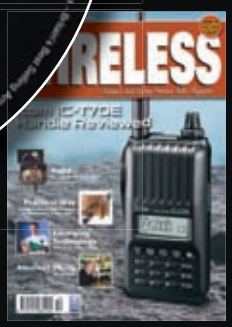

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The Editor Rob Mannion G3XFD has already tried out the CDROM archive – and here's what he thinks: "What a wonderful idea! Readers have been asking for archived issues for a long time – and I can tell you that wait will have been worth it! Every day I work on *PW* I need to research previous issues so the *PW* 2010 Archive on a CDROM is perfect and I thank my colleagues for their hard work in preparing it. So, don't delay – order yours now and you'll always be 'looking back' in a much more convenient style!"

The *PW* 2010 Archive CDROM costs £14.99 plus p&p. Please see page 76 for ordering details.

Harry Leeming G3LLL's In the Shop
The Cedars, 3a Wilson Grove, Heysham, Morecambe LA3 2PQ
Tel: (07901) 932763 E-mail: G3LLL@talktalk.net

In The Shop

Harry Leeming G3LLL looks back to the days when he ran a very busy Amateur Radio and electronics business. This month he discusses thermal runaway, valve biasing techniques, servicing problems and the Internet.

Welcome to *In The Shop* (*ITS*) where I look back at the time I operated Holding's – a busy Amateur Radio dealership, which led me to facing every type of radio and electronics fault! I'm starting off this time discussing thermal runaway and valve biasing – both of which can be 'hot topics'!

To ensure that a valve doesn't pass too much current, and that it operates on the correct part of its characteristic, it's necessary that the control grid is biased negative relative to the cathode. This is normally achieved by fitting a cathode bias resistor, as per R2 in **Fig. 1**. In this case as the current through the resistor makes the cathode positive, with respect to 0V, the control grid, being tied to 0V becomes negative in relation to the cathode.

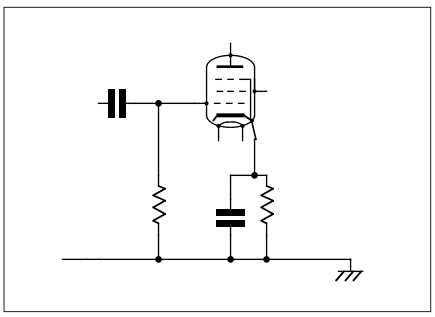

Fig. 1: Fitting a cathode bias resistor, R2, is the most usual method of achieving negative grid bias.

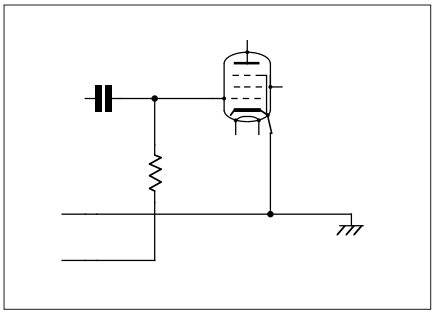

Fig. 2: A fixed bias supply can allow more power to be developed in higher power amplifiers, than when using a cathode bias resistor.

The advantage of the Fig. 1 arrangement is that no separate negative bias supply is needed and that the valve stage is self regulating. If the valve gets rather hot and starts to pass more current the voltage across R2 increases; this increases the negative bias and so tends to cancel out the increase of current.

The Fig. 1 arrangement is almost universally used in the low power stages of receivers and transmitters and works well. However, it limits the achievable power in the output stages of high power radio frequency (r.f.) or audio amplifiers. So, to achieve maximum output these stages can be run with a fixed bias supply as per **Fig. 2**. In the case of r.f. power amplifiers, this is set so that with no signal input very little anode current flows (Class B operation).

If however, the cooling is inadequate, or if overdriven, the valves may get too hot and positive control grid current starts to flow. This cancels out some of the negative bias, valve current becomes greater, and the valve gets hotter still. And so a 'snowball' effect starts, resulting eventually in a blown fuse, or melted valves and a burnt-out power supply.

Good ventilation is the best way of preventing thermal run away and it is as well to check that the fan is properly lubricated and that the blades spin freely. A technically efficient improvement would be to substitute the original fan for something more powerful but this is often unacceptable on the grounds of noise.

The Yaesu FT-102, which uses three 6146B valves very close together, seems very susceptible to the thermal run away problem and I have had quite a few brought in to me with valves that have actually melted with the heat, **Fig. 3**. Possibly this rig was developed using the original S2001, which was the rugged Japanese version of the 6146B – Japanese valves were of extremely good quality, but are no longer made.

As stated last month it is essential to keep a careful eye on the power ampiflier current by leaving the meter in the **I/C** position when using normal 6146Bs in the FT-102. If after improving the ventilation you find that the cathode current still tends to creep dangerously upwards, you can spend around £100 on a new set of valves, and hope they will be better – or modify the bias.

An FT-102 in good order will give about 160W r.f. output. However, if you are willing to drop this to around 100W, the bias can be altered to give a good degree of protection against the p.a. stage overheating and running excessive current. This can be achieved by adding a little cathode bias in addition to the fixed bias as per **Fig. 4**.

After carrying out the little modification, if the cathode current

Fig. 3: In spite of their thermal robustness, valves can actually melt with the heat generated.

tends to increase, so will the voltage across the 5 or 10W 68Ω resistor. This will increase the bias voltage and limits the rise of current. **Note:** Make certain that you wire the original shunt resistor R08 between chassis and the end of the new resistor and that the meter feed runs from this point.

The Basic FT-225RD

The basic Yaesu FT-225 144MHz transceiver was purely analogue although the 'RD' version as sold in the UK had the addition of a digital frequency display. These rigs had quite a good receiver and they became popular in the early 1980s with 144MHz DX chasers. Indeed, they were so popular that the UK company Mutek, decided that the FT-225 series could be further improved.

Mutek produced a replacement plug-in r.f. and first mixer board and several modifications – these resulted in a very sensitive receiver that was pretty immune from overload. In fact, the add- on was a real success and it sold worldwide and there must still be thousands of these upgraded FT-225s in use.

My customer '**Terry**' owned an FT-225RD, which was his pride and joy and when the power output suddenly dropped to under 1W, he was sure that the p.a. transistor had at long last given up the ghost. So, as the FT-225 is reasonably accessible for servicing, he managed to obtain and fit a replacement. But it was 'no go', he still couldn't get any more output and he asked me if had I any suggestions. So, I set about trying to help Terry.

The FT-225 was basically an upgraded version of the earlier FT-221, and one of the main improvements was that the output power was doubled to 25W. As so often happens when extra power is squeezed out of equipment, something eventually proves to be a weak link and in the case of the FT225 it's the low-pass filter.

The low pass filter inductors – L09 and L10 (see **Fig. 5**) are wound on ferrite cores, and so I told Terry to have a look at them. And sure enough – one had cracked and the other was little more than dust.

Unfortunately – even Yaesu are unlikely to have spares for a 30 year old rig! But I passed on to Terry a tip that I had been given by the importer many years ago – make your own! To do this wind 5 turns of 20s.w.g. wire onto a small electrician's screwdriver with a 1/8th inch blade, to produce two coils as per **Fig. 6**. Use these to replace L09 and L10, peak TC03 and TC04 for maximum output and – as Terry found – the rig will then again produce around 25W.

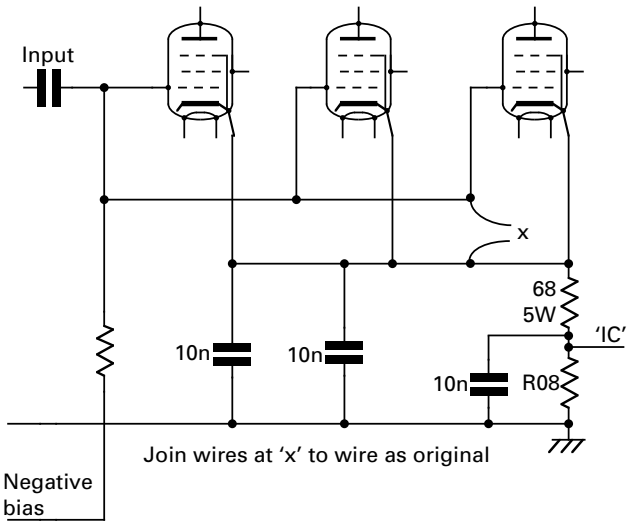

Fig. 4: Using a combination of a little cathode bias to the fixed bias.

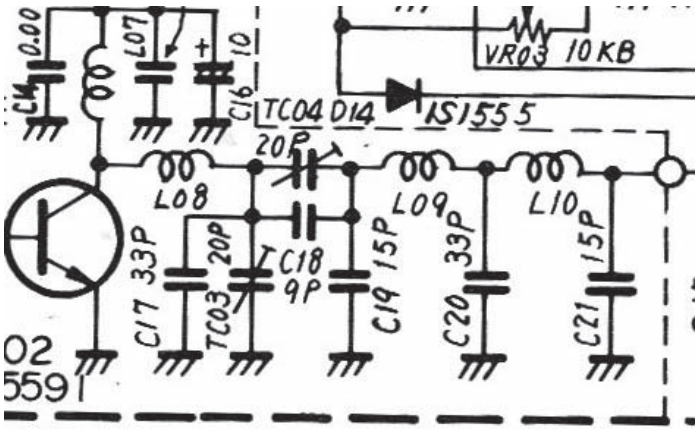

Fig. 5: The low-pass filter in the FT225 – inductors L09 and L10, can fracture if too much power is drawn through them.

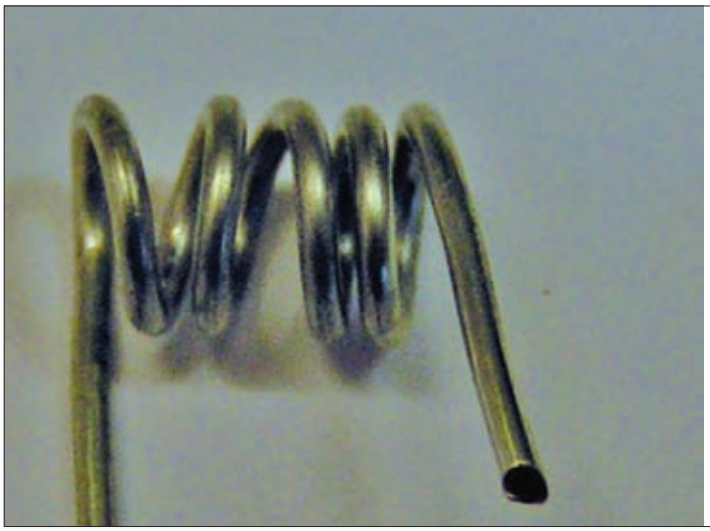

Fig. 6: A replacement for L9 and 10 may be created by winding five turns of 20s.w.g. wire onto a small electrician's screwdriver with a 3.5mm blade.

Troubles With The FT-290

Pierce Dunphy EI7KA from the attractive town of Enniscorthy in County Wexford, Ireland**,** E-mailed me to tell me of problems with his FT-290. He'd left his '290 running on scan and that when he came back to it the display had disappeared – all he could get out of the rig was a hiss on receive. I gave him the usual advice, "Switch off the back-up battery and operate the on/off switch a few times with no power connected".

My usual advice is guaranteed to cure most odd faults on the FT-290, but in this case it didn't! So, Pierce was on his own and all I could suggest was

that he tried the various voltage lines. He E-mailed me again to say that he'd checked the voltages on the regulator board, found that the 5.6V line was dead, had cured this by swapping Q4 the regulator transistor and that "now all was now well".

I'm pleased that Pierce sorted his problems out. As with the older valve equipment voltage checking was a standard part of fault finding – perhaps it's as well to remind ourselves that it still produces results with more modern solid state items.

Computer Fans

Recently a friend brought to me the control box from his security system which was overheating. Removing the cover revealed a 50mm (2in) computer type fan that was not rotating. The fan blades did not move freely, and so I peeled back the label as per **Fig. 7**.

A small shot of WD40 was applied by G3LLL, the blades given a push start, and within seconds the motor was as good as new. So – keep an eye on any fans in your own electronics equipment – a bit of TLC can often help!

Boot Up Time For Harry!

Now that I'm getting older, my brain doesn't 'boot up' as quickly as it used to. A few weeks ago a reader phoned to ask if I had a spare antenna change-over relay for the FT-101ZD. The contacts on his were pitted he explained, and even when cleaned were unreliable. I was busy at the time, had something else on my mind and so I just advised him that I was sorry but that I couldn't help.

Sometime later my brain 'clicked into gear', and I remembered that in most cases, where it's just a matter of a worn contact, you don't need a new antenna relay. The antenna change-over relay on the FT-101ZD has two sets of contacts – one of which isn't used.

So, if the relay starts giving trouble it's only necessary to swap the wires over to the 'spare' contacts and these will then be good for another 20 years or so. What a pity I didn't have my enquirer's 'phone number, or an E-mail address! I just hope he reads this column.

Bill Problems

My comments about repair cost complaints, resulted in the following E-mail from **Bert Hemmens GW4KUS** in Swansea with a story from his TV servicing days. "I was called to attend to a faulty TV receiver and on arrival no fault tracing was needed as the fault was immediately obvious – turn

Harry found that peeling back the label on a fan motor and squirting some lubricant into the bearings, helped the fan to run freely.

the brightness up, picture expands and disappears – the diagnosis was that there was a faulty e.h.t. rectifier valve.

"On this particular TV access to the rectifier was easily accessible by just removing the back cover. Three dabs with the soldering iron removed the faulty valve, another three fitted the new one, a dab of silicon grease on the connections, replace back, job done. When presented with the bill, the lady of the house moaned – "But it took you only 15 minutes'! My reply came from the heart – "No it didn't, it took me three years of study in Swansea Technical College to know where to look"!

Antenna Tuning Unit Problems

I hadn't had any contact with '**Sam'** since I closed down the shop 12 years ago. So, I was pleased to get an E-mail from him and even more so, to be able to help. He explained that he'd recently purchased a Yaesu FT-2000, but was unable to get its internal antenna tuning unit (a.t.u.) to tune on parts of some bands. He said that had the chance of acquiring an FC-757 a.t.u., and asked if I had a lead to make it function with the FT-2000. Alternatively, he asked if I could recommend a good external automatic a.t.u. (a.a.t.u.).

The FC-757 auto tuner was Yaesu's first a.a.t.u., and was somewhat limited in its matching ability. Indeed, it has been derogatorily referred to as an 'Ought To Tuner', and so I advised him to leave it alone! Later Yaesu a.a.t.u.s (from the FT-1000 onwards) have in my experience been pretty good – but like most a.t.u.s they sometimes need a little help.

When a length of feeder is connected to an antenna that doesn't exactly match it, the impedance and reactance it presents to the a.t.u. depends very much on the feeder length. So, I advised Sam to stick with the FT-2000's internal a.t.u., and to experimentally try adding 10, 15 or 20 feet to his coaxial feeder, to see if he could find a length that would enable the tuner to obtain a match over the full frequency range.

He then E-mailed me back to say that he had done as I suggested and that the internal tuner now worked perfectly on all Amateur bands from 1.8 to 28MHz. He also said that, as I had saved him the cost of a new a.t.u., he was making a donation to the hospice. Now that is the kind of result that has made writing this column worthwhile! After all at 74 – who knows as to when I might need the hospice's help!

Try Google!

I've got quite used to Amateurs turning up with a faulty rig, and a sheaf of technical information downloaded from the Internet. Sometimes this was quite useful, and when recently I had a strange intermittent fault on my Citroën C3 car, I decided to do the same.

My problem was that occasionally, just after I started the engine, I got a very loud 'machine gun' type rattle from behind the dash board for about ten seconds. On odd occasions it would also suddenly do this as I negotiated traffic, which was very disconcerting!

As with the 'best' intermittent faults, it would not make the noise to order, and so as they could not hear it the local garage had no idea as to what the trouble was. Eventually I fed the symptoms 'into Google', and found several other people who had the same intermittent problem, and one who had found a cure. I took a print-out to the garage, they replaced the stepping motor that controls the flaps on the air conditioning – and all is now well.

Now I must get some treatment for my aches and pains, and so I'll close with some words of wisdom from **Mike Webb GD6ICR**; "Time flies like an Arrow, Fruit Flies like a Banana". And then I'll take a printout from the internet round to my Doctor. ●

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).

RADIOUSER OCTOBER

Reviewed – The Sangean ATS-909X *Mike Richards takes a look at the ATS-909X, the latest version of this well respected multiband travel receiver from Sangean*

Scanning Scene *Bill Robertson offers timely advice about improving home antenna systems and reminds us that despite the end of Shuttle missions, there are plenty of other spacecraft to monitor*

Decode *NAVTEX Reception and DXing with Mike Richards*

Military Matters *Kevin Paterson gives a close up view of a training exercise for service personnel about to deploy to Afghanistan*

Maritime Matters *Robert Connolly looks at the Global Maritime Distress and Safety System*

Airband News *Tweaking the ATC System with David Smith and news of proposed airspace changes over the Irish Sea*

News & Products

NDB DXing *NDB DXing can be good for you. Robert Connolly looks at aeronautical NDBs, VOR reception via Sporadic-E and tells us of enthusiasts who see beacons rather than listen to them*

Sky High *Godfrey Manning with an update on VHF airband channel spacing and he experiments with an Amazon Kindle*

Off the Record *Oscar looks at proposals to create offshore structures for free thinking people to live on and wonders if this could herald a return of big league offshore radio*

Broadcast Matters *Chrissy Brand brings you her comprehensive roundup of readers' reports and logs*

Special Offer – Save over £30! *The KAL-NLA high performance, lightweight and easy to install Mode-S/ADS-B antenna kit from Kinetic Avionic Products Limited*

SBS Files *Kevin Paterson brings us up to date regarding new releases of BaseStation, PlanePlotter and software for the Aurora SSRx*

DXTV & Satellite News *Keith Hamer and Garry Smith bring you their roundup of Band I and Band II reception reports and details of long haul DX. They also report on fires at two Dutch transmitter sites*

Radio Websites *Chrissy Brand explores the gamut of websites with a radio connection for you. There's no shortage of new, old, interesting and useful information out there to aid the radio enthusiast*

Comms from Europe *Simon Parker considers the health of CB in the UK and he looks at changes afoot that will further harmonise CB in the EU*

Software Spot *This month's software collection includes programs for satellite tracking and slow scan television. In addition, there is software that will assist with designing and testing antennas*

Radio Events *Radio rally roundup*

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023-9231 3090

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ALINCO DJC7 DUALBAND H/HELD £84
ICOM 7800 HF & 6M FLAGSHIP TX £5495
KENWOOD TS570DG TRANSCEIVER £599
YAESU FTC740A 4M TRANSCEIVER £69
YAESU FT450 TX £549
YAESU FT450AT TX WITH ATU £599

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ALINCO DJX2 AM/FM/WFM RADIO £79
BEARCAT UBC800XLT H/H RADIO £225
BEARCAT C USC230XLT H/HELD £225
GRE PSR 295 SCANNER £89
ICOM R5 HANDHELD SCANNER £145
RADIOSHACK PRO28 SCANNER £59

RECEIVERS

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ETON MINI 300 PORTABLE £13
ICOM R75 RECEIVER WITH UT106 ..... £499
KINETIC SBS1 ..... £299
MIDLAND BASECAMP £79
YAESU FRG100 ..... £329

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CLAMP ON DIGITAL MULTIMETER £10
MFJ 1278B M/MODE DATA CONTR £199
MFJ 208 VHF SWR ANALYSER £69
MFJ 784 DSP FILTER £229
WATSON W25AM PSU £40
ZETAGI P27M PREAMPLIFIER £15

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BEARCAT UBC92XLT H/HELD SCANNER £99
BEARCAT 785XLT BASE SCANNER £199
ETON E100 PORTABLE SHORTWAVE RADIO £35
ETON G3 PORTABLE SHORTWAVE RADIO £69
ETON G6 PORTABLE SHORTWAVE RADIO £69
ETON SAT750 RECEIVER £269
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YAESU VX-150 ..... £99
YAESU FT-60 ..... £120
ALINCO DJ-V5 ..... £200
ALINCO DJ-195 ..... £100
ALINCO DJ-S11 ..... £75
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MIDLAND CB 77-805UK £55
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STANDARD HX260E Marine H/H New £99

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LOWE HF-225 with Keypad £325
YAESU FRG-9600 ..... £225
YUPITERU MVT 7300 ..... £99
UNIDEN UBC-800XLT Ex Demo/software £265
UNIDEN UBC-860XLT Desktop £65
REALISTIC PRO 2005 ..... £65
AMI DIGI SAT RX ASR WS201 ..... £129
ALINCO DJX3 ..... £70
WORLD RECEIVER WR2100 ..... £ 80
GOODMANS GCD200 DAB Special Price £50
BPL WORLD SPACE £25

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CREATE CLP 5130 Log Periodic NEW £250
MICROWAVE MODULE 432/100 ..... £165
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Trailer mounted SCAM 40 Pump Up Mast £650

WATERS & STANTON

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Make	Model	Description	Price
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Microset	PT-110	12V Stabilized 10A PSU with Over V / A protection	£69
Optoelectronics	Model-2810	10Hz-3GHz Frequency Counter	£145
Microset	PR-430A	70cms 100 Watt Version 15db Gain -1.2db NF	£130
MFJ	MFJ-940A	28-30MHz 10m Mobile ATU + meter 150W	£39
Win-Radio	WR-G305i	9kHz-1800MHz All Mode PCI Internal Computer Controlled Communications Receiver	£399
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
AOR	AR-3000A	100kHz-2036MHz All Mode Communications Receiver 400Ch. 12V + psu	£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
Alinco	DJ-V17E	2m FM Palm Transceiver 5W, DTMF keypad & CTCSS	£99
Roberts	R-9921	Portable FM MW + 7 Band SW Digital Radio 4x AA cells or 6V DC	£45
Albrecht	AE 6690	80Ch. 4W FM CB Mobile Transceiver + CTCSS	£99
Timewave	PK-12	1200bps V/UHF Packet controller + GPS firmware	£69
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WinRadio	WR-ADS-Full	Advanced Digital Suite Option for G3 series receivers	£119
WinRadio	WR-G303e/PD	9kHz-30MHz All Mode PC Controlled Communications Receiver + Pro-Demodulator 12V	£499
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Diamond	MX-72	1.6-150MHz & 400-460MHz Duplexer 1kW max	£29
Diamond	MX-2000	1.6-60MHz (PL-259), 110-170MHz (PL-259) & 300-950MHz (PL-259) Triplexer 800W max	£65
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Icom	IC-737A	HF All Mode Base Transceiver with Gen.Cov.Rx, Auto ATU 100W 12V	£599
Daiwa	PS-140 II	13.8V 12A PSU + Cigar Socket	£59
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Yaesu	FP-700	13.5V Matching PSU with Extension Speaker	£79
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Icom	IC-2200H+UT-118	2m FM Mobile Transceiver 55W 113ch. + CTCSS & Optional UT-118 D STAR Unit	£279
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Yaesu	FRT-7700	150kHz-30MHz Receive ATU for FRG-7700/8800	£69
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MFJ	MFJ-948	1.8-30MHz 300W ATU + Balun & X-meter	£109
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Yaesu	VX-120E	2m FM Mil. Spec. Hand Held Transceiver 5W + Full CTCSS & DTMF memories	£69
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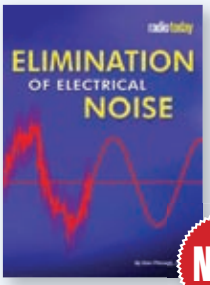

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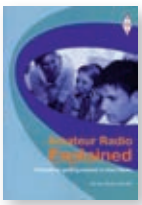

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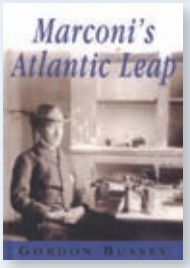

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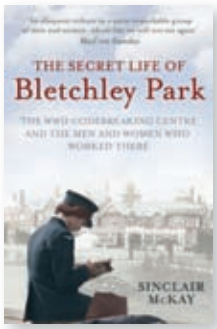

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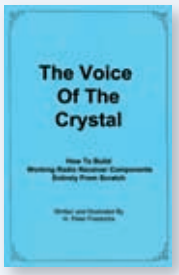

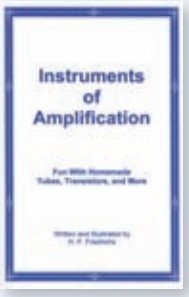

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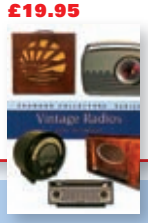

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Topical Talk

Suitable items for recycling components, the attitudes demonstrated against Foundation Licence holders and the misconceptions by those involved in the debate.

My thanks go to everyone who has written to *PW* the recycling and Foundation Licence topics. I feel very strongly about recycling traditional radio/TV and Hi Fi units. And to support my argument – I've discovered that the older type analogue equipment has very little of value to the professional scrap merchants in the UK and abroad.

I was particularly encouraged by the letters from **John Dunton G1RXC** (Star Letter) and **Colin Shaw G8FRA/M5FRA**. I'm hoping that Colin G8FRA will rise to the challenge I've offered him and that we'll soon have an article that will encourage other constructors

Of course, I asked John G1RXC about possible risks in recycling the compact fluorescent type bulbs – and he confirmed there were no real problems. However, after recycling one myself I advise that the glass sections should be wrapped in a strong transparent plastic bag. If the glass does fracture it won't slice into fingers or contaminate the workbench.

Incidentally, while discussing the very unreliable compact fluorescent lamps that are being forced on us – I'm left wondering how those radio enthusiasts who prefer incandescent lighting are going to generally illuminate their workshops in future.

After discussions with my friend and colleague the *PW* Technical Editor **Tex Swann G1TEX**, he suggested that I try some of the halogen bulbs that are available. Or perhaps, the new powerful, white light emitting diode lamps might 'save the day'!

I've only got a few 60W incandescent bulbs left and I'm loathe to have the compact fluorescent type lamp generated interference in my shack! However, I must admit the interference levels do vary – better quality types sometimes produce less interference than cheaper models – although both types can be equally unreliable.

As my eyesight begins to reflect my age (forgive the pun!) I'm finding that I require much brighter illumination when I'm working at the bench. Bench lamps using halogen bulbs – as suggested by Tex G1TEX would be ideal here – but I would prefer the softer, more economical incandescent lighting provided by the traditional bulb. However, with the enforced changes the preferred option won't remain for long – even if some people have stockpiled 100 and 150W type bulbs!

Hopefully, readers will pass on their own tips regarding workshop lighting. In the meantime I can confirm that I'll be avoiding fluorescent lighting in my shack!

Opinions & Perceived Prejudice

The debate regarding the opinions and perceived prejudice involving the Amateur Radio Foundation Licence continues. The latest – strongly worded – opinion to be published comes from **Richard Cooke M3UJZ** who lives in Chichester, West Sussex. Richard, as his photograph surely indicates, is a keen radio enthusiast.

On occasions, I have to remind myself (some of the letters and E-mails arriving at my end are quite vitriolic!) of the saying that *"I have my opinions and the other person has their prejudices"*. Normally, whenever I present this statement during a lively argument it brings smiles and helps diffuse anger. However, sometimes it's obvious that there's a lack of understanding on both sides of an argument and I think Richard M3UJZ really has also misread the situation in some respects.

Unfortunately, **there's certainly** some 'class distinction' being shown towards Foundation Licence holders and I don't support any form of prejudice in our wonderful hobby. Amateur Radio is diverse enough to have room enough for us all.

However, unusual opinions can exist either side of any argument! I say this because over the two decades and more of *PW* Editorial visits (well over 250 of them) to radio clubs, the only time I have seen badges – apart from the occasional RSGB and/or club membership emblems – have usually been those worn by the Club Secretary, Chairman, etc., to reflect their particular office.

The situation at rallies and Amateur Radio shows is different – and this is where I often wear my own callsign/ name badge. I often meet and make new friends this way and there are many badges on show. But I don't think wearing a callsign badge can be misconstrued as showing prejudice – instead we're just identifying ourselves to friends.

I'll try my best to encourage Richard M3UJZ to join another club (I think he must have had a bad experience previously). I'm sure he'll be made welcome and he'll not need a badge!

Rob Mannion G3XFD/EI5IW

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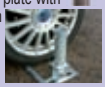

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