December 2011 £3.50 ISSN 0141-0857

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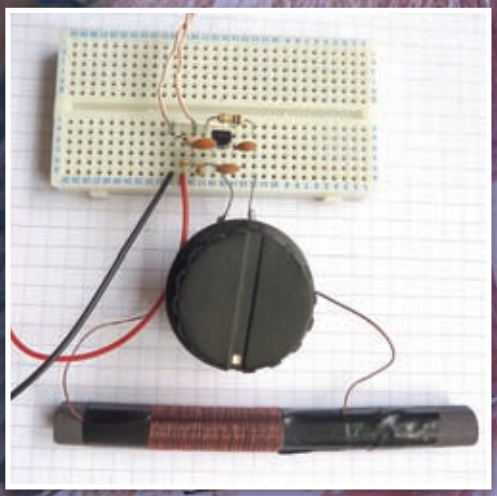
Practical WIRELESS

Britain's Best Selling Amateur Radio Magazine

Reviewed
Wouxun KG-UVD1PL
70/144MHz Dual-band hand-held transceiver

YouKits FG-01
SWR analyser



Practical Way
Radios for children

Antennas
Whispering antenna performance

Technical for the Terrified
What's an equivalent circuit?

In the Shop
To shift – or not to shift?

The World of VHF
Amateur Radio above 30MHz

Competition
Win an Anytone AT-5555 worth £149.95!

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WATERS & STANTON

Happy Christmas To All Our Customers!

Orderline
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www.wsplc.com

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

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***

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**

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**

ID-E880

2m/70cm 50W Mobile with D-Star & D-Star Repeat Mode. Features GPS compatability, CTCSS & DTCS, Airband Receive. **£439.95 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-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-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-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**
IC-R6	**£179.95 C**	**IC-R8500**	**£1439.95 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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Spa House, 22 Main Road,
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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

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

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**

Handhelds

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

Yaesu Christmas Sale Day!

Saturday 17th of December

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

Bill, Betty & Scott welcome you to our Scottish Store in Glenrothes.

InnovAntennas NEW From EME Arrays To HF Yagi Beams

Performance through Innovation

We are pleased to announce that Waters & Stanton have been appointed exclusive UK resellers for this fine range of antennas engineered by Justin Johnson, G0KSC. They are hand built to exacting standards, featuring low noise design for ultimate weak signal work. They are now being used world-wide by top VHF/UHF operators - check *www.innovantennas.com*

This 5 element LFA-HG array has a gain of 10.69dBi, FB ratio of 28.3dBi and can handle 5kW. Boom length 3.9m. **£189.95**

We will shortly be offering complete eme systems that enable anybody to enjoy eme contacts. The illustrated 2m system occupies little space and comes with rotator! Check *www.wsplc.com*

We offer several options for HF bands from 10MHz - 28MHz. The unique matching is achieved with the element design and NOT with conventional transformers. This reduces loss and increase bandwidth.
Typical 3 Element 20m Beam: Gain 7.52dBi, 5kW power handling and boom just 4.2m. **£429.95**

Order Your Bespoke Antenna.
The antennas shown here are just examples of what we can provide from this exciting new range. Customers all over the world are enjoying the satisfaction of top performance and predictable results.
This is just a small selection of models. We can also supply matching power splitters for any antenna in either 2-way or 4-way format. Call or e-mail us for quotes. Check: www.innovantennas.com for full technical details.

Model	Price	Carr.
3 el. **14MHz** OP-DES Yagi (4.2m)	£429.95	£10.00
4 el. **14MHz** OWA-HD Yagi (9.8m)	£699.95	£10.00
3 el. **21MHz** OP-DES Yagi (2.7m)	£349.95	£10.00
3 el. **28MHz** OP-DES Yagi (2.1m)	£199.95	£10.00
5 el. **50MHz** LFA-HG Yagi (3.9m)	£189.95	£10.00
5 el. **70MHz** LFA Yagi (3.1m)	£149.95	£10.00
5 el. **144MHz** LFA Yagi (1.8m)	£89.95	£10.00
9 el. **144MHz** LFA PBP Yagi (4.4m)	£194.95	£10.00
14 el. **144MHz** LFA Yagi (8.9m)	£325.95	£10.00
10 el. **432MHz** LFA-SQ Yagi (2.0m)	£92.95	£10.00
15 el. **432MHz** LFA-SQ Yagi (3.17m)	£129.95	£10.00

All antennas can handle USA max. power levels. **Carriage Charges** to Scottish Highlands and Ireland are extra. European shipping £20.00 per antenna.

WATSON Made for Watson by m0cvo antennas NEW

1:1-BALUN-1.5 **1.5kW 1.8-30MHz** A 1:1 balun able to handle up to 1.5KW RF power. Used to feed a balanced antenna, or doublet with unbalanced feeder, reduces static on feedline. **£49.95 C**

4:1-BALUN-1.5 **1.5kW 1.8-30MHz** A 4:1 4:1 Extra High Power 1.5KW current balun for Windom, off centre fed or folded dipoles. Reduces 200 - 300 Ohms at feed point of antenna to 50 Ohms enabling the antenna to be fed with 50 Ohm coaxial cable. **£49.95 C**

W-LINE
1:1 Line Isolator
400W 1.8-30MHz
Removes RF from Coax. **£29.95 C**

1:1/4:1-BALUN
400W 1.8-30MHz
Can be used as centre feed point.
Each model **£29.95 C**

MONO BAND HF DIPOLES

MD-12HP 12m for portable fixed station use 400W CW 1:1 Balun 5.77m **£39.95 C**
MD-17HP 17m for portable fixed station use 400W CW 1:1 Balun 7.95m **£39.95 C**

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

WATERS & STANTON

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www.wsplc.com

YouKits FG-01
Antenna Analyser

Graphic Colour Display!

It's 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 scan range. Operates from battery or external 12V. Provides dual VSWR and Impedance traces. Includes Lithium cells and AC charger.

£229.95 C

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!

£69.95 C

NEW Microphone Desk Stands

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

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**

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, fitted with PL-259 plug. Great for FT-817 & IC-703 or any other QRP radio.

£129.95 C

For More Bargains
- CLICK IT!

eBay

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

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 December 2011

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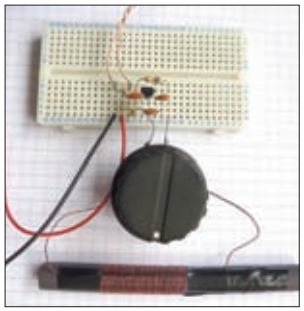
Front cover. Tim Kirby G4VXE shows off the Wouxon KG-UVD1PL 70/144MHz dual-band v.h.f. transceiver.



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Rob Mannion G3XFD/EI5IW's

Keylines

Rob enjoyed the Newark Amateur Radio show – meeting friends old and new – but hasn't enjoyed listening to the free-for-all behaviour that was spoiling DXpedition efforts.

I throughly enjoyed meeting old friends and making new ones at the Newark Amateur Radio Show's pleasant venue. Some of the new friends I've made have been the willing team from the **Lincoln Short Wave Club** – and the other clubs that have provided volunteers – who made sure there was space to park my especially adapted Peugeot estate car.

My good friend and *PW* colleague **Tex Swann G1TEX** helped unload my battery buggy on the Thursday and friends from the team of organisers helped me load it on Saturday on the way home. Thanks for all your help folks!

Although the Newark Show – which is really a convention – is quickly establishing itself on the UK's Amateur Radio calendar, from my point of view I'm not yet as busy as I sometimes was at the old Leicester Show. There (by the end of the Friday) I would have been losing my voice from talking to so many readers. Despite this, the *PW* Team were kept busy and (on the Friday in particular) I met quite a number of new faces.

It's great to meet *PW* readers – especially those who have just returned to the hobby and I'm already really looking forward to the 2012 event. Unfortunately, I didn't get a chance to attend any of the lectures. From what I've heard I missed some excellent speakers and I hope that next time I'll be able to attend at least one lecture. But I must never forget I'm there to meet our readers – and you are my priority.

The New G3XFD Antenna

The new antenna system at G3XFD is proving a great success! I wish that I had erected the balanced feeder fed inverted 'V' dipole last summer – if I had, I'm sure I would have worked more DX stations. The reduction in noise (see my my 'mini review' of the MFJ-974B balanced feeder antenna tuning unit in the November issue) now means that I can hear the DX more effectively.

Although I'm finding c.w. (Morse) operating difficult nowadays, due to my arthritis, hearing South American stations and other DX has been too tempting. I've found that the DX stations are there if you're **prepared to listen** – and even as late at 2230 hours local time on 14MHz I've heard stations from South America coming through on c.w. So, despite my poor 'fist' I plonk away with my electronic paddle key using either my Alinco DX-70TH or the SR8 – taking advantage of its built-in keyer. However, most of my DX has been achieved using PSK31 although I have ventured on to RTTY again (thanks to the excellent free *FLDigi* software for the Macintosh computer).

Appalling Operating Behaviour

I was keen to try and hear the Christmas Island DXpedition (callsign **T32C**) – still on the air as I write *Keylines* – and I was delighted to receive their transmissions on several of the upper h.f. bands. However, the operating standards on s.s.b. of some European Amateurs was absolutely appalling. Despite their impeccable manners and patience the Christmas Island operators weren't having an easy time.

Mind you, the c.w. operating was quite interesting to hear – I've never heard so many c.w. stations calling on one frequency at the same time. Indeed, When I heard the – many hundreds I would think – c.w. stations calling on 18 and 21MHz it was like a strange form of music. There would be a slight pause and the 'music' would start again. How anyone could decipher the strange 'tune' I don't know – but I ended up really admiring the dedicated team at the receiving end of the 'music'.

However, although the c.w. traffic was intense on all the bands I could hear – there didn't seem to be much bad practice – although I should imagine there were some very frustrated hopefuls calling Christmas Island. But the problems, bad language and appalling operating behaviour on s.s.b. was 'something else'.

The keen and determined Amateurs who go to tremendous lengths to set up and run DXpeditions deserve better. So, what can we do to assist? 'Blacklisting' persistent offenders has been suggested – but would that work? What do you think readers? Over to you!

Rob Mannion G3XFD/EI5IW

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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

Another Use For Incandescent Bulbs

Dear Rob
There have been so many topics raised over recent editions that I could comment on.
I too remember as a pre-teen sitting on rubbish dumps with a pair of my father's shoes making 'pinchers' as they were known, clipping out useful components from discarded television sets but that is not why I write.

The subject regarding the debate about incandescent bulbs and compact fluorescent bulbs is what has motivated me to contact you.

I have changed most of the old incandescent bulbs at home for modern energy saving fluorescent bulbs but for a slightly different reason.

Incandescent bulbs are extremely useful for limiting the current inrush on high voltage power supplies. A couple of bulbs in series with the mains input to a p.s.u. with shorting switches across them can make a big difference to the safe operating and longevity of any high voltage p.s.u. and it is for this reason that I have hoarded all the old house incandescent bulbs.

They prevent that 'bang' that sometimes accompanies switch on and after a few seconds the shorting switches can be closed ensuring a smooth and safe power up. I incorporate this feature in most power supplies that I build and don't forget they make extremely useful dummy loads for h.f. frequencies!

In your request for comments regarding lighting for the shack, or should I say 'shed', I like to 'kill two birds with one stone' and I use a halogen security lamp which not only gives me superb lighting for this particular 'bespectacled home brewer', but it also provides a fair degree of radiated warmth in the shack during the colder months.

Finally, thank you for a great read every month and keep up the good work. Best regards
Jon Joyce GM4JTJ
Inverkeilor
Arbroath
Scotland

Editor's comments: *Some good ideas there Jon! The once common-place incandescent bulb has many uses and I think most of us must have used them for dummy loads in the past. As mentioned by you, and demonstrated by* ***Reg Irish G4LUF*** *in his* Out of mothballs – Revitalising a Old Friend! *in the November issue, they are helpful as current limiters when reforming electrolytic capacitors. Incidentally, I wonder how many readers have been thankful – like myself – that they wear spectacles when electrolytic capacitors have exploded?*

The G QRP Club's *Das DereLicht* Article

Dear Rob
I was interested to read the Star Letter in the November *PW* from **John Dunton G1RXC** and his challenge to *PW* readers to develop radio related circuits using the components recovered from defunct compact fluorescent lamps (CFLs).

As I am sure the **Rev. George Dobbs G3RJV** will already have mentioned to you, such a circuit appeared in the Spring 2009 edition (Issue N. 138) of ***Sprat*** – the journal of the **G-QRP Club**.

The article entitled *Das DereLicht* – was by the well known experimenter **Michael Rainey AA1TJ** and described the construction of a 1.5W c.w. transmitter for the 3.5MHz band using components recovered from a defunct CFL. Michael also quoted a useful web page **http://www.pavouk.org/hw/lamp/en_index.html** which gives details of some typical CFL schematics and parts values.

Michel AA1TJ was most recently in the Amateur Radio news this month (October) as the instigator of the project to commemorate the 54th anniversary of the launch of Sputnik. The project is using replica transmitters based on the original valve transmitter used in Sputnik and using the same type of Russian miniature valves.

I hope John G1RXC and your readers find this information useful – perhaps someone will come up with a receiver to partner AA1TJ's transmitter?
With best wishes.
Richard Sayer F5VJD
Vignouse
Paimpont
France

Editor's comment: *Thanks for your very interesting letter Richard and it's good to hear from you again. I'll be listening out for you on 7MHz s.s.b. and look forward to working you again soon.*

Possible Source Of Incandescent Bulbs

Dear Rob,
I hope you're well? It's quite a while since we last chatted but I'm writing regarding your comments shack lighting, in Topical Talk in November. I'm writing because you are probably not aware that a light bulb company has appeared in 'Tesco Town' (otherwise known as Bicester). Details are:
The LightBulb company (UK) Ltd., ***Thomas Edison House***, **41 Murdoch Road, Bicester, Oxfordshire OX26 4PP**. Tel: (**01689**) **362224**.

E-mail: **sales@thelightbulb.co.uk**
Website: **www.thelightbulb.co.uk**
I don't know whether or not they do mail order. Failing that, the Kempton rally in November is on my itinerary. I'm sure you will get a supply from somewhere, they surely can't be the only company specialising in this field. Best Regards to Tex G1TEX and yourself.
Dave Williams G4BII
Poundon
Buckinghamshire

Editor's comments: *Thank you Dave. I think this source of incandescent bulbs will be useful to many of our readers, so I'm pleased to publish the information. I also think there's bound to be other sources. I'm also looking forward to seeing you at the Kempton Park rally on November 6th.*

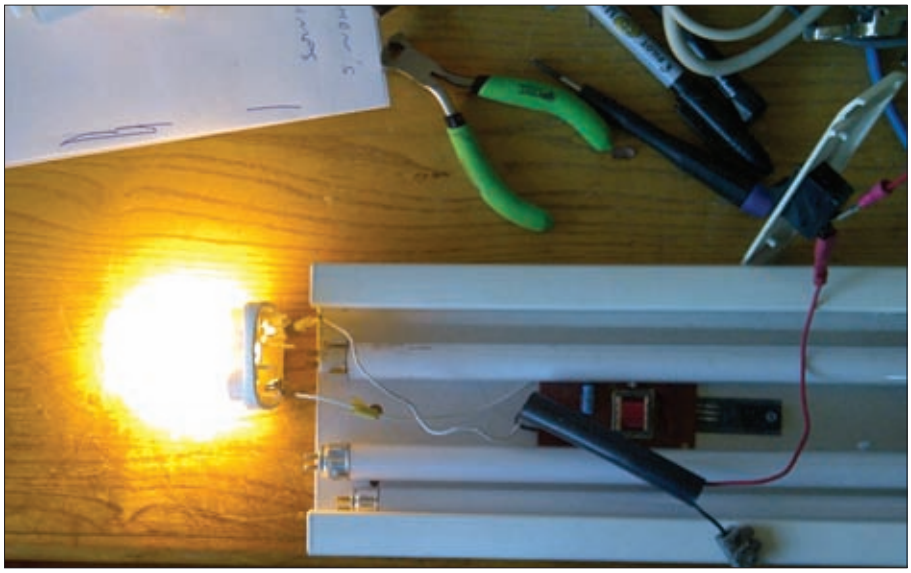
Another Viewpoint On CFL lighting

Dear Rob,
I'm writing with regard to the recent thread about Compact Fluorescent Lamps and their short lifespan. I have to agree with you on that, certainly in applications where they get turned on/off frequently, they often 'die' early.

In other sites (outside dusk/dawn lamps) where they get turned on, and left for long periods, they last an amazingly long time and do save a lot of energy costs, while (in my experience anyway) don't cause any more than the odd birdy on low band h.f. Even then, not objectionable, compared to some man-made QRM. (PLT & Plasma TVs, etc.).

Salvaging parts from dead CFLs can be worthwhile as already mentioned, but don't discount the lamp itself! See the attached – rather doubtful quality – photo. I've been playing with combining an ex-CFL tube, and an old caravan 12V fluorescent lamp driver that has troubles working reliably with two 8W tubes (even new ones) but runs on a well-used 17W CFL tube just fine. It even draws less current, and makes more light than the two 8W tubes ever did.

Interestingly, the smaller lower wattage CFL tubes, are more difficult to start, than these physically larger types. Or, maybe it is the tube that dies in those cases? This is not a new idea, as I also have a commercial portable work light, that is a CFL lamp, but with a 12V 'ballast' and battery. Lasts for ages, and more than enough light. Best Regards to you and the *PW* team.
Dave Baxter G0WBX
Maids Moreton
Buckingham
Buckinghamshire



Dave G0WBX suggests we could find the ex-CFL tubes to be useful.

The QRP In The Country Event & G3PCJ's Projects

Dear Rob,
Before I go any further it was nice meeting you again after quite a few years down at the QRP rally at **Tim Walford G3PCJ**'s farm I thought it was quite a good show perhaps not as many there as I would have expected but it was well organised. I also looked at all the videos on Youtube that you made whilst there, it was nice also meeting the **Rev. George Dobbs G3RJV** after reading his articles over many years.

Whilst I was there I bought some kits from Tim to make up, mainly to give me something to do now that I am not as mobile as I used to be. I bought the Midney/Kingston and The Counter unit. I made them up without to much trouble and when I did have problems Tim was at the end of the 'phone. Since making them up into a transceiver for 7MHz I have worked all over Europe, from Russia to Spain and had great reports both on the quality of audio and signal strength bearing in mind it is QRP 5W output, I use a G5RV at 35ft. I find they are as stable as a rock – no drift that I can find even leaving it on overnight it is still on the same frequency. I am pleased as punch with it, so pleased I have ordered another three kits to make up for 3.5MHz.

Anyway Rob like I said it was nice meeting you again look forward to next time, keep up the good work. Best Regards.
Dave Seabrook G4LJG
Rushden
Northamptonshire

Editor's comment: *It was great to meet you again Dave and I hope your health continues to improve.* ***Tex Swann G1TEX*** *and I thoroughly enjoyed the QRP in the Country event and we will publish the date for the 2012 event when it has been finalised. Please join me on the* Topical Talk *page for further comments on low power operations.*

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**

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Rishworth QRP Convention Success For 2E0BSI & 2E0LUL!

Nigel Ferguson G0BPK, the Committee Member in charge of Special Event Stations for the **Pontefract** and **District Radio Society** (RSGB Club of the Year Region 4) reports: "On Saturday October 22nd I drove to the Rishworth G QRP Club's 2011 Convention at **Rishworth School**, Rishworth in West Yorkshire near with my 14 year-old daughter **Catreena 2E0BSI**, to meet fellow PDARS member **Chris Pearson G5VZ** and his 13 year-old daughter **Laura 2E0LUL**.

The two young ladies ran the Convention raffle (again), raising £166 for the G-QRP club. Not only did they go round all the trade stalls asking for (and receiving) many donations of prizes, they separated many Radio Amateurs from their money! The accompanying photo is of the two girls extracting money from one such innocent – the **Rev. George Dobbs G3RJV**. He stood no chance! They've had years of practice extracting money from their parents!

Chris G5VZ, was involved with the "Bring a Book, Buy a Book" stand. My job was to keep the pie & peas, apple pies & cream coming – and the tea, coffee and soft drinks flowing!

Many thanks to all the traders and groups who donated prizes, too many to mention individually and it would be unfair to single out one or two. All the donations were much appreciated.
Nigel G0BPK
E-mail: **g0bpk@roydmoor.com**

Spectrum Communications To Take Over Garex Electronics

Peter Longhurst G3ZVI (left) shakes hands with Tony Nailer G4CFY while Jean Nailer looks on.

On Friday October 14th, **Peter Longhurst G3ZVI** the owner of **Garex Electronics** together with his wife **Mary** visited **Tony Nailer G4CFY** his wife **Jean** at **Spectrum Communications** in Dorchester. Also present – by request of both parties – were *Practical Wireless* Editor **Rob Mannion G3XFD**, *PW* Technical Editor **Tex Swann G3TEX**, and **Phil Ciotti G3XBZ**, Chairman of the **Poole Radio Society**.

At the meeting agreements were signed and exchanged for Tony and Jean to take over Garex Electronics and the rights to all its proprietary products with effect from November 30th 2011.

After the signing and general chat, plus the official tour of the Spectrum laboratory, the party retired to a local hostelry to celebrate the occasion. Phil Ciotti G3XBZ then sprang a surprise on Tony G4CFY – and invited him to give a talk to the Poole Club in 2012. Tony agreed!

The new owners will continue the Garex name and separate web address for the foreseeable future. The electronic products and antennas will compliment nicely with the existing range of Spectrum products.

Production of the Garex 4001 and 6001 f.m. transceivers in their present form will continue until existing stocks are exhausted. Post-design work will then be undertaken to up-date the designs and maybe to make a new case in keeping with existing Spectrum products.

Production will also continue of the popular range of Blackline TV and broadcast interference filters, and of the Garex receive pre-amplifiers, portable passive and active wire aerials, flexi-whips and rigid mono-band and dual-band whips, and a high quality magmount.

Tony G4CFY finished the day off by announcing: "Look out for new advertising of the Garex range of products coupled to the Spectrum Communications name at **www.garex.co.uk** and **www.spectrumcomms.co.uk** and in the January issue of *PW*, due for publication on Thursday December 8th."

Further details from Spectrum Communications, **12 Weatherbury Way**, **Dorchester**, **Dorset DT1 2EF**. Tel. and FAX: (**01305**) **262250**.

The Editor writes: *The Editorial team, along with our publishers PW Publishing Ltd. wish the new venture well and we offer our congratulations.* ***G3XFD****.*

Triple Triumph for Borders Radio Society

The **Borders Amateur Radio Society** (BARS) which is based in Berwick upon Tweed, is celebrating the successful completion of the first training course it has ever run – the Foundation Amateur Radio Licence Course.

All three students passed with flying colours and are now allowed to transmit on the h.f., v.h.f and u.h.f. Amateur bands. The new licence holders will be able to actively take part in the Club's Amateur Radio activities such as competitions and special events. However, for one of them, holding his Amateur Radio also has a practical use as he's a member of a Four Wheel Drive motoring club, which provides support to the local emergency services in extreme weather conditions. Clearly, being able to communicate over the air waves will be of tremendous use to him, the emergency services and the local community – in fact it could potentially be a life saver!

Chairman of BARS, **Graham Tinn MM0XXL** commented "I'm delighted to welcome three new recruits to the exciting world of Amateur Radio. I'm also sure they will find this a useful, absorbing and interesting hobby. Our club arranges radio related events and activities throughout the year, so if anyone wants to find out more then please do come along to the BARS meetings. We meet at the **St. Johns Ambulance Hall** in **Tweed Street**, **Berwick on Tweed TD15 1NG** on the second Friday of the month. Alternatively you can call me on **07740 743854** or email me at **mm0xxl@yahoo.co.uk**

The new recruits proudly show off their certificates. (Left to right) Jim Edgar G4FVM, Douglas Steadman, Keith Farnington, Stephen Hanson, Glenys Roddis 2M0YLG.

Keen Sea Scout Operates GB2CIS

The **South Essex Amateur Radio Society** operate the **Jambouree On The Air** (JOTA) station **GB2CIS** every year at the 2010 event. **Dave Speechley G4UVJ** reports, "We had one young Sea Scout during the day that was very keen to take up the hobby. His parents were duly contacted with a view to involving their youngster in Amateur Radio and, as we do not have the facilities for formal training, referring him to the local Foundation Course. The Club then sponsored **Luke Halsey M6LNT** through the Foundation Course with proceeds from the Canvey Rally. We now have a very enthusiastic young operator who turns out for all of our field events and Club meetings and is always keen to get involved. So, at the 2011 JOTA with the 1st Canvey Sea Scouts, Luke was one of our main operators making contacts all over Europe and some skeds on SSTV. Indeed, itwas a very busy day for us all."

Luke M6LNT operating the GB2CIS JOTA Station with members of the 1st Canvey Sea Scouts.

Dave G4UVJ Secretary SEARS
g4uvj@btinternet.com

You Can Catch The Bath Buildathon Number 5!

Newsdesk received a press release from **Steve Hartley G0FUW** promoting the next Bath Buildathon event. "Those guys is Bath are at it again! The 5th Bath Buildathon will take place on Saturday, January 7th 2012. Regular *PW* readers (and watchers of **Rob G3XFD**'s YouTube videos) will have seen reports of the previous events. However, for those that aren't familiar with the concept, a Buildathon is where a group of radio enthusiasts gather together and build a radio project with under the supervision of some helpful mentors. Buildathons are ideal for Intermediate student projects and for licensed Radio Amateurs who would like to try their hand at 'practical wireless' construction".

The Bath event in January will cost £60 which will include a 14MHz (20m) single sideband (s.s.b.) superhet receiver kit, room hire, tea, coffee, etc. All tools, test equipment and supervision will be provided by the Bath Buildathon Crew, Steve G0FUW, **Lewis Thomas G4YTN** and **Mike Coombs G3VTO**.

Buidathon students don't require any previous experience – although it does help if you know which is the hot end of the soldering iron! Booking forms for the 5th Bath Buildathon are available on request by E-mail or by post. 73.

Steve Hartley, G0FUW
73, Steve Hartley
5 Sydenham Buildings
Bath BA2 3BS
E-mail: **g0fuw@tiscali.co.uk**

‘Dickie’ Bird G4ZU’s Grand-daughter Becomes A Radio Amateur!

A young lady from Essex – **Sarah Sipple** – is set to carry on the family tradition of Amateur Radio operating. She obtained her Foundation licence in October 2011 and now operates under the callsign **M6PSK**. She’s carrying on the family tradition of Amateur Radio operating as she’s the grand-daughter of well known Silent Key Gordon (‘Dick’) Bird G4ZU. Dick, who sadly passed away in 2005, is best known in the Amateur Radio community for his innovative h.f. antenna designs, and is credited for the design of the Bow-and-Arrow Yagi, the Birdcage and the Minibeam. The popular multi-band ‘Spider beam’ Yagi (sometimes referred to as the ‘Skypper’), is also based on a design by Dick G4ZU.

Asked if she has any plans to create her own innovative antennas Sarah said: “Don’t expect to see any novel antenna designs from me just yet. I’m very pleased to be able to carry on the family tradition, and I still have a lot to discover about the world of Amateur Radio”.

Sarah obtained her Foundation Licence with the **Chelmsford Amateur Radio Society**, in Danbury, and hopes to be an active member of the club. And, as well as being the grand-daughter of an Amateur, she’s also married to one – **Pete Sipple 2E0PSL**! Sarah and will be helping out with the Essex Amateur Radio website (**www.essexham.co.uk**), which is designed to encourage others in the Essex area to take part in the hobby.

Chelmsford Amateur Radio Society website: **www.g0mwt.org.uk/**

The RSGB 2011 Convention 2011

Once again keen h.f. DXer and author Roger Cooke G3LDI was acting as the *PW* Convention Correspondent at the annual RSGB Convention – and it seems he had a busy time indeed!

The RSGB’s annual Convention was again at The Horwood House Hotel, located in the heart of Buckinghamshire on 38 acres of landscaped gardens – the sort of place the average Radio Amateur dreams about! This year I booked in for all three days, travelling up on the Friday with **Chris Danby G0DWV**. On the way we had to collect the trailer tower from Bletchley Park and take it to use with **GB2IW**, the Convention’s Special Event station.

We had to modify the trailer hitch but luckily we managed to get it there safely. We then had to erect the tower and install the beam for h.f. and a folded dipole for the low frequency (l.f.) bands. This went reasonably well and the station was finally active. **Pic. 1.** shows the Wimo mini-beam that was used with the shack situated in one of the rooms in the thatched building. **Pic. 2** shows one of the members of the Russian Robinson Club talking to his father back home.

Pic 1.

Pic 2.

Booking In Stand

The RSGB had the usual booking-in stand and it was nearly always busy, Navigation within the Hotel lay-out hadn’t got any easier – but having been once, vague memories came back as we all tried to look for various rooms. In my case, it was looking for my room that proved difficult and I found at least three different routes to it!

Each room had a Convention mug and calculator on the desk as a gift – a nice touch! One thing I forgot to take

Pic 3.

Pic 4.

with me was my watch, and I couldn't see any clocks anywhere within the Hotel, so I must remember that next year! One added item for this year was for the ladies. On the Saturday, a visit to the National Trust Stowe Landscape Gardens was arranged, concluding with some retail therapy (shopping!) in Milton Keynes.

The first evening meal was sponsored by **Martin Lynch & Sons Ltd.** and **Pic. 3** shows (Left to right) **Chris Danby G0DWV**, yours truly, **Roger Greengrass G4NRG**, **Ian Bassett M5AXA** and finally **Steve Nichols G0KYA**. Another view in **Pic. 4** shows **Roger Balister G3KMA** and other guests. A relaxed evening prepared us for a hectic weekend of talks and lectures. It was difficult to choose the ones to see and those to miss, because there were several on at any one time, although a few were repeated on the Sunday.

The Convention Saturday

On the Saturday I plumped for the *Timor-Leste DXpedition* talk by **Tim Beaumont M0URX**. Listening in the Columbus room, to some of the squalor that exists in this third world country makes our small problems seem tiny in comparison. I came out half-way to try and catch the *Tour of the ARRL*, by **Bob Inderbitzen NQ1R** in room Cook 2.

After that it was back to Columbus for the IOTA talk with Roger Balister G3KMA. Again, half-way through, it was back to Cook 2 for *Africa with two suitcases* by **Nick Henwood G3RWF**. Then back again to Columbus for The Isles of the 'Five-Pointed Sun', an illustrated talk on the XV7RRC/XV3RRC operation by **Yuri Zaruba UA9OBA** and **Sergey Morozov RA3NAN**, members of the **Russian Robinson Club**. The Russian guys are certainly an extrovert and entertaining group and I found this talk also quite amusing!

I failed to book lunch so managed with just more coffee and then back to Columbus for *Success at the Second Attempt*, the V73RRC DXpedition to Ujelang Atoll OC-278, a presentation by **Yuri Sushkin N3QQ**. I then attended Cook2 for *A Theoretical Look at Greyline Propagation* by **Carl Leutzelschwab K9LA** at which Steve Nichols G0KYA assisted with a few points.

Pic 5.

I stayed here for it's full of plasma – why space weather and radio signals are linked by **Dr Colin Forsyth** from SSL. Colin is not a licensed Radio Amateur, but the talk followed on from last year and the talk that **Dr. Lucy Green** gave. Solar phenomena is all related to h.f. propagation and I found this one very interesting indeed.

I finished off the Saturday session with a talk on the extremely successful FUNcube dongle, designed by **Howard Long G6LVB**. The fantastic success of this project speaks for itself and has surpassed all Howard's expectations.

Rushing around like I did over the weekend, makes it impossible to take in all of the offerings. Some of those I missed I would have liked to have seen, but this is impossible in such a short time. A few pictures of the events are shown in **Pic. 5** through **8.**

Gala Dinner

Saturday evening of the Convention Weekend is the time for the Gala Dinner, a prestigious event preceded by a speech from the President of the RGSB, **Dave Wilson M0OBW**. Dave is shown in **Pic. 9** welcoming guests as they arrive for dinner. In this case the guest is **John Gould G3WKL**. We then had a competition to complete!

Everybody had a question paper which consisted of identifying some really old radio equipment, answering some questions verbally put to us and then identifying some very famous voices. By some strange quirk, I won a prize for this, a very nice box of chocolates. I think my age possibly was on my side for this event!

The meal was accompanied by the usual chit-chat and quite a lot of laughs. **Pic. 10** shows Chris Danby G0DWV, Steve Nichols G0KYA, Bob Inderbitzen, NQ1R from the ARRL, and **Andre Ravary M0RAV** from Yaesu UK taking pre-dinner drinks.

Pic 6.

Pic 9.

Pic 10.

The Convention Sunday

As I'd had my normal light breakfast on Saturday, on Sunday I decided to have the traditional 'unhealthy' breakfast of bacon, eggs and beans, etc. Again, it was decisions, decisions. However, I was not too stressed about the day, but picked what I wanted to see in order to allow me to take part in the FOC club's pile-up challenge.

Pic. 11 shows **Ray Goff G4FON** adjudicating. This year I made 36, slightly better than 2010, but more practice is needed! I was impressed with the *Learn Morse* talk in picture format. **Steve White G3ZVW** managed to get three people who knew no Morse at all to remember the alphabet in the 'di-dah' fashion by the end of his talk.

I missed the 80m propagation talk and kicked myself over that as I really wanted to see it. But next year perhaps? I also missed the *Contest Log Adjudication* talk, another I wanted to see. However, as there are several talks on at any one time it really is difficult to get it right all the time. I even managed to miss booking for lunch, so had to opt for a packed lunch and was rather disappointed with that choice.

Pic 11.

Displays & Stands

Obviously, as a principal sponsor Martin Lynch & Sons Ltd. was there in force, as were **Icom UK** and **Kenwood UK**. The room with the trade stands was quite popular with people wandering in and out all the time. The RSGB had their usual book stand and **Amsat UK** were in attendance, lots of interest being generated by Howard Long's Funcube Dongle.

The **UK Microwave Group**, **ARDF Committee** and **CDXC** were also there, as was the ARRL. **Carl Leutzelschwab K9LA**, who together with **Fred Handscombe G4BWP/A65BD** were checking QSL cards for DXCC applications. It was also possible to take both UK and the USA Amateur exams during the weekend.

Icom UK sponsored the *Contest University* and again this year **Mark Haines M0DXR** was the course director. I did manage one lecture from this stream, but again, lectures clashed and mixing in v.h.f. as well, now makes it difficult to accommodate every lecture you might wish to attend.

Pic 12.

Sunday was rounded off nicely with the usual cups and trophies presentation and of course the raffle. The star prize this year, an Icom IC-7410, was won by **Nigel Cawthorne G3TXF, Pic 12,** to a huge groan from the assembled crowd! It was a tiring weekend – noticeable by Sunday lunchtime with some heavy eyelids (including my own!). However, it was a very enjoyable time and I am very much looking forward to 2012. Indeed, I hope to see you there! ●

Pic 7.

Pic 8.

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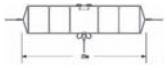
MTD-300 2-30M Broadband wire dipole antenna **£149.95**



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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Review

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The Wouxun KG-UVD1PL

70/144MHz dual-band hand-held transceiver

Our keen v.h.f. specialist columnist – Tim Kirby G4VXE – has very much enjoyed the latest offering from Wouxon – a 70/144MHz dual-band v.h.f. transceiver. "A real breath of fresh air" he says!

Tim Kirby G4VXE says that the Wouxon transceiver is "A real breath of fresh air".

It's fair to say that the arrival of Wouxun, and the other Chinese manufacturers, onto the Amateur Radio scene has been a real breath of fresh air. Particularly in the hand-held transceiver market, they have challenged the pricing structure of the established manufacturers and come up with some good quality products at very reasonable prices.

Wouxun have offered a single-band 70MHz handheld for a while, but I was very interested to have the opportunity to review one of the new models, which offers both 70 and 144MHz. I felt that the benefits of this over the previous single-band 70MHz model was that when 70MHz is quiet, you at least have the rather more active 144MHz band to fall back on – but yet have the capability to use 70MHz.

About The Rig

So, what do Wouxun say about the KG-UVD1P in their promotional information? The feature list says:

- Frequency Range: 4m (66-88MHz) and 2m (130-174MHz)
- Modes:U-V/U-V/V-V/U-U can be set freely
- 1750Hz tone
- DTMF encoding function
- CTCSS/DCS Scan (Digital/Analog)
- Bright flashlight illumination
- Output power 5W/1W
- English voice guide
- Digital f.m. radio
- Wide/Narrow bandwidth selection(25kHz/12.5kHz)
- Priority scan, add scanning channel
- High/Low power selection
- Channel name edit and display
- 50 Groups CTSS/105Groups DCS
- Multi-frequency steps: (5k/6.25k/10k/25k/50k/100k)
- Multi-scan
- VOX transmission control
- Transmit overtime voice prompt
- Begin/End transmitting beep prompt
- Auto/Manual keypad lock
- Wire clone (can clone other rigs), programmable by computer
- Stopwatch function
- Low voltage voice prompt
- Busy channel lockout

You may think that some of the information provided by Wouxon is a little cryptic and I confess I did too. I've reproduced this directly (not to make fun of it), as actually, it's fairly clear what the meaning is. I'm providing it to give you an indication of what the user manual is like.

As with other Wouxun hand-helds I've seen, the manual is actually quite comprehensive. However, sometimes the way that things are described can be a little confusing and may take a few moments of reading and trying the function to establish exactly how it works.

First impressions

The rig comes neatly packed and is easily put together. The battery needs to be attached to the radio and the flexible dual band 70/144MHz antenna connected using the Wouxun 'standard' reverse-SMA connector. This is all the

The dual band 70 and 144MHz fits nicely into Tim's hand.

Technical specification (as supplied)

Frequency range:	The 70 and 144MHz Amateur Bands
Memory channels	128 channels
Operating voltage	7.4V
Operating temperature	30° to 60°C
Working mode	'Co-channel or Di-channel simplex'
Output power	5W/1W
Modulation	F3E (FM)
Max Frequency Deviation	Less than 5KHz
Spurious radiation	Less than -60dB
Frequency stability	Plus or minus 2.5ppm
Receive sensitivity	Less than 0.2 microvolt
Audio output power	> 500mW
Waterproof	IP55
Dimensions	61 x 119 x 37.5mm
Weight	248g

work of seconds and will not provide you any challenges.

Also included with the rig is a desktop drop-in charger which worked well. Battery life for the rig seemed good. It wasn't quite the sort of battery that you could charge and then almost forget about it – but certainly the battery lasts over several reasonable operating sessions. Unlike some earlier versions of the Wouxun chargers, this one came with a proper UK mains lead/plug.

The rig is well built and attractive. It appears of quite robust construction – perhaps slightly less so than the more expensive handhelds from 'mainstream' manufactures, but the rig feels good in the hand, not too heavy or light and the controls are positive and pleasant to use.

As default, the 'voice guide' is activated which talks you through the different menu options. I found this quite annoying and turned it off! However, if you're visually impaired or even just operating in the dark, this might be a useful facility to you. Likewise, I disabled the keypad beep as I didn't find useful.

I always like to see how much I can do on a new rig without recourse to the User Manual. This rig fared quite well, although I have used Wouxun hand-helds before so I'm familiar with the basic principles of their user interface.

The transceiver I was sent for review was 'unlocked' and could have been used off the Amateur Bands. However, on checking this with Martin Lynch I found that those being sent to to customers would be sent 'locked' to cover the Amateur Bands only. Mine had been sent to me quickly for the review and had bypassed the normal procedures before going on sale.

Actually, during the review process I found it easy to set frequencies either by using the keypad, or by using the 'channel selector' knob on top of the rig. The **A/B** button on the front panel allows you to switch between the two variable frequency oscillators (v.f.o.s). I placed one v.f.o. on 70MHz and the second on 145MHz. However, there's nothing to stop you having both v.f.o.s on 70, or 145MHz. The **TDR** button allows you to switch between single and dual-band receive modes.

Note: Dual-band receive is not quite full dual-band receive. I placed one v.f.o. on 70MHz to receive a signal there, flicked the TDR button to switch to 145MHz and brought up GB3WH, the local 144MHz repeater. I continued to hear the 70MHz signal, rather than the output of GB3WH. But, the function works really well as a **Dual Watch**, so that you can have one v.f.o., let's say, on 70.450MHz and one on 145.500MHz and the moment that one of the frequencies springs into life, then you will hear the activity.

Setting Up The CTCSS

Setting up the continuous tone coded squelch system (CTCSS) did require recourse to the manual to do it through the keypad (we'll discuss programming software a little later) but the process wasn't complicated and worked fine. Repeater shift was already programmed for 144MHz as +600kHz so didn't require adjustment and of course there are no duplex repeaters on 70MHz.

Incidentally, new owners should take the opportunity to set the narrow deviation on each of the bands, but particularly so on 144MHz. All these adjustments were made quickly and after all this, it was soon time to try the rig on air.

On The Air

Tuning around both 70 and 144MHz showed that the receiver was quite sensitive. On 144MHz I was able to hear all the repeaters that I expected to hear from my location over a distance of 40 to 48km (25 to 30 miles). On 70MHz, it's harder to evaluate the sensitivity, but I found that the GB3RAL beacon from Harwell in Oxfordshire was a very solid signal on 70.050MHz.

I did find that the S-meter, a bar graph on the display was quite optimistic and had a tendency to read quite high, even for relatively weak signals. However, this is not a serious concern.

Having checked my repeater shift and CTCSS tone, I put a call through the GB3WH (Swindon 145MHz repeater) and was very pleased to be answered by **Adrian Heath G4GDR**. Adrian

knows my voice and confirmed that the signal sounded like me and was of a good quality and an adequate level. High power on both bands, by the way, is 5W and low power is 1W. These seem sensible and useful power levels depending on where you are; 1W will be adequate for local QSOs and 5W for more distant ones.

On 70MHz, I checked that the signal sounded okay across the shack, using my converted Ascom SE-550 PMR rig as a monitor receiver. The levels sounded good and of course the signal strength was very strong. Despite a number of "CQs" on 70.450MHz from reasonable locations around the village, I was still without a demonstration QSO!

Fortunately, I was able to do some 70MHz tests with two stations, having contacted them using my base station – 25W to a vertical at around 10m (30+ feet). **Matthew James 2E0RNM** (Oxford) is about 19km (12 miles) from me and was a solid signal on the base station. I tried a contact with Matthew using the hand-held from a location in the village which has a good take off in his direction, but he wasn't able to hear me.

Similarly I was pleased to try with **Mark Palmer G0OIW** who was operating portable from Stokenchurch on the Chilterns, an elevated location about 40km (25 miles) from my home. Mark was just able to hear me using the hand-held and the supplied antenna – and I was able to receive him clearly.

I think the message here is that the supplied antenna is very inefficient on 70MHz. It will work very well for QSOs over a few miles – but if you are expecting to work tens of miles or more on the band, even if you are well located, you'll probably be disappointed. Clearly, this isn't the fault of the transceiver, but is just a function of the efficiency of the short antenna on the longer wavelength. If you connect the transceiver to a mobile antenna, on your car, perhaps, using a reverse SMA adapter, you should find that your results are vastly improved by use of the more efficient antenna.

Other features

The rig has a voice operated transmit-receive switching (VOX) feature which could be quite useful. It was easy to configure it to trigger at different levels of voice. The rig also has a Band II broadcast radio built-in and I found this was quite sensitive and was able to receive a variety of local and national stations. This could be a nice feature. The rig would also be a useful scanner on the marine band around 156MHz, although once again, beware of transmitting as there is nothing to prevent the set from doing so.

The transceiver on charge in its special cradle.

Although I wouldn't (of course) recommend a hand-held to use when driving a car, sometimes you may want to be able to take a handheld along to listen to. Bearing this in mind I found the volume of the audio from the rig was loud enough – and clear enough – to use in the mobile environment.

Programming Software

Martin Lynch & Sons Ltd. kindly supplied the rig with the programming lead (from the rig to a USB port) and a miniature CDROM. However, there's no information on the CDROM or included with the programming lead about how to program the radio. The manual doesn't offer much assistance either as although it mentions the USB driver software and the programming software, it doesn't actually tell you where you can obtain them from.

Fortunately, I quickly discovered that the USB driver software was provided on the CDROM included with the Programming Lead. I chose the version of the driver for my operating system, installed that and then re-booted the computer before attaching the programming lead. As soon as I did this, the computer detected a new serial (COM) port and I noted the setting to be used later, COM6.

Where was the programming software? No documentation with either the rig or the programming lead gave this information, which I felt might be off-putting to someone who wasn't so used to hunting things down on the Internet. Fortunately, a quick Google for 'Wouxun kg-uvd1p programming software' resulted in the URL **www.wouxun.com/down_01.asp** where all the Wouxun software can be downloaded. **Note:** Make sure that you choose the right model/software.

I downloaded the software and installed it and found that I was able to use it to program the rig with different frequencies into memory locations including repeater shifts, CTCSS tones etc. Although the software was functional, it was not entirely intuitive.

However, I found that there is an alternative program that can be used for programming Wouxun hand-helds. It's called **KG-UV Commander** and has been written by **Jim Mitchell KC8UNJ**. It can be downloaded from **www.kc8unj.com/kguv.html**

I found the software from KC8UNJ was slightly more straightforward than the Wouxun software. If you have other Wouxun hand-helds and already own a programming cable, then this program may be useful to you. It worked well and as you can see I was able to set up various memories in the rig, upload and then use them.

Hard To Resist!

If you're a 70MHz fan and enjoy portable operation, you'll find this rig hard to resist at the price. But do expect to have to use an external antenna, otherwise your results on 70MHz will probably be disappointing. However, if you're anticipating using 70MHz for local QSOs then the chances are that you will be just fine. On 144MHz performance was good and entirely what I would expect from a good quality hand-held transceiver.

It was disappointing that the instructions with the programming software were virtually non-existent! Nevertheless, it wasn't difficult to work out what to do and how to do it, but a little Internet based research was required. When discussing the programming software with other Wouxun users – several said that they had programmed the set by hand initially with all the memories they needed and didn't anticipate requiring the cable and software.

If you enjoy computers and interfacing with radios, the software path is probably a more flexible way of setting up the rig just as you want. Do bear in mind that the 'replacement' software KG-UV Commander seemed much easier to use than the Wouxun software.

In summing up, I think the Wouxon 70/144MHz transceiver is an exciting rig that represents good value at **£99.99 plus £8.51** courier delivery – and would be fun to put in your pocket as you go out for a walk. Many thanks to **Martin Lynch and Sons Ltd**. for their kind loan of the equipment for review and for their willingness to answer questions. ●

Peter Dodd G3LDO's Antenna Workshop
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Whispering Antenna Performance

Peter Dodd G3LDO, looks into measuring mobile antenna performance using *WSPR* software.

Welcome to my turn as guest author of *Antenna Workshop* (*AW*).The most common question one might ask after constructing a new antenna is 'how well does it perform?" The most useful item that you might have is an existing antenna that has been in use for some time, whose characteristics are well known to you.

Assuming that you have done all the matching and tuning of your new antenna, initial tests can be done checking on the relative signal strengths of received signals before testing it on transmit.

A coaxial switch is beneficial in this situation, allowing you to switch quickly between antennas and be ahead of propagation fading. You'll need to keep these results of these antenna comparisons in a notebook and it's likely to take some time before a picture of the characteristics of your new antenna become apparent.

In January of this year **David Dix G8LZE**, introduced us to the *WSPR* (Weak Signal Propagation Reporter) [‡1] otherwise known as Whisper. This is a computer-controlled method of sending and receiving low-power transmissions to test propagation paths.

Antenna Tests Using *WSPR*

When *WSPR* checks a particular propagation path for efficiency, along with the effectiveness of the antenna, which must also feature in the measurement. It follows that the system can be used for checking the comparative performance of antennas.

Initially, I used *WSPR* to check two antennas whose performances I was already familiar with; my multi-band dipole and a multi-band quad loop antenna, described in [‡2]. In just one and a half hours *WSPR* generated 60 signal reports, 33 for the dipole and 27 for the quad loop antenna.

Fig. 1: The Texas Bugcatcher antenna mounted on the rear of an estate car.

Fig. 2: The Outbacker Outreach antenna

The average signal reports for the dipole were –22.33 dB while the reports for the quad gave –15.38 dB. This gave the quad loop antenna a gain of just under 7dBd (referenced to a dipole), which was about what I was expecting showing that the method of testing is feasible.

Tale of Two Mobile Antennas

When operating /mobile I often park up and use a large antenna, one that's larger than is sensible to use when driving. One of these antennas is the venerable Texas Bugcatcher mounted on the roof of the vehicle as shown in **Fig. 1**.

The Bugcatcher has a large low-loss coil and has a total length 2.05m. It has a good reputation for performance but can be fiddly to set up the coil tapping points for each band. This antenna is also rather heavy, weighing in at around 1.8kg.

I recently acquired an Outbacker Outreach antenna. This antenna uses pre-set tapping points for each band and is fine tuned by altering the length of the 'stinger', or whip. This antenna, see Fig. **2**, is 2.74m long, so is even longer than the Bugcatcher. But it only weighs 900grams, it's easier to adjust and more convenient to install. On 14MHz (20m), It also has a wide 2:1 s.w.r. bandwidth of 13.91MHz to 14.39MHz.

The Bugcatcher's 2:1 s.w.r. bandwidth on the same 20m band, is only 14.016MHz to 14.140MHz, which implies that it has a much higher *Q* and should therefore be more efficient in spite of being shorter. Normal operating didn't give either antenna a noticeable edge. Would *WSPR* provide the answer?

Setting Up *WSPR*

Before to use using *WSPR* I recommend that you read the article by David G8LZE and the operating instructions that come with the free

software. The mode requires only very low power, 2W is ample. So, my FT-817 works quite well in this application. The FT-817 also has a data connection that works very well with my SignaLink USB interface. If you don't have an interface for your radio then again I recommend you read David's article for more information.

The technique for checking the performance of each antenna is to transmit for periods of 15 or 20 minutes first using one antenna and then the other, keeping a strict record of the periods in which each antenna is connected. Arrange the antenna change-over so that it occurs during a receive period. It's important that the antenna matching and power level to each antenna is equal and is the best that can be achieved.

Finally, a computer is required. I use one of these diminutive notebook computers that can be propped up on a cushion for the most convenient operating position. The equipment set-up for testing mobile antennas is shown in **Fig. 3**.

I had to use sheets of green plastic held over the windscreen by parked windscreen wipers and over the drivers side window to reduce the light level so that the computer screen could be read in comfort.

Monitoring The Power

It's very important that power to the antenna is monitored and that this power is the same for both antennas. I use Diawa s.w.r. and power meter because it has a large scale. The photo shown in Fig. 3 was taken during a transmit sequence and shows a forward power of 2.3W.

With *WSPR* running, each antenna in turn is connected to the radio for a period of 15 minutes over a total period of, let's say, one and a half hours. A record of which antenna is used and the periods under test must be recorded in a notebook or your results will be meaningless.

The computer display during the test period is shown in **Fig. 4** with some signals received from other *WSPR* stations. Most of these are short skip but one is a DX station DU1/DL3KGB. This station is over 10,000km distance and running a power of 40dBm (10W), which is quite a lot of power for a *WSPR* station.

Clearly, these received signals are not suitable for the antenna tests because there are not enough of them for any sort of statistical analysis. The transmit period fraction bar, see Fig. 4, should be set to at least 40.

Fig. 3: The WSPR test setup using the FT-817 with SignaLink USB interface perched on top of the normal mobile remote box (not used in this test).

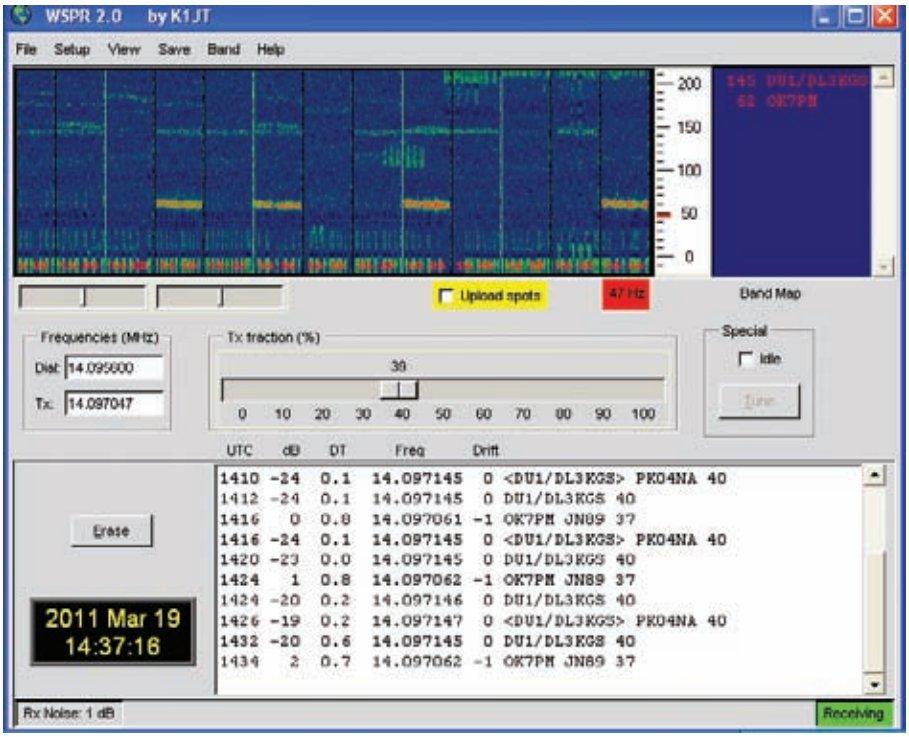

Fig. 4: Received signals from other WSPR users seen during the tests.

After your transmitting session from the mobile location you need to find out who has received you. Participating stations usually upload signals that they receive on to a real time data base so you will probably have to go to your home computer and check in [‡3].

An example of the data base is shown in **Fig. 5**. When using *WSPR*, you can collect a considerable amount of data in a short space of time so, some method of selecting and processing the data will be necessary.

Analysing The Data

The data collected, first has to be re-organised, using the the database filters to select your station callsign and the band used for the test, as shown in Fig. 5. The file can then be saved as a text

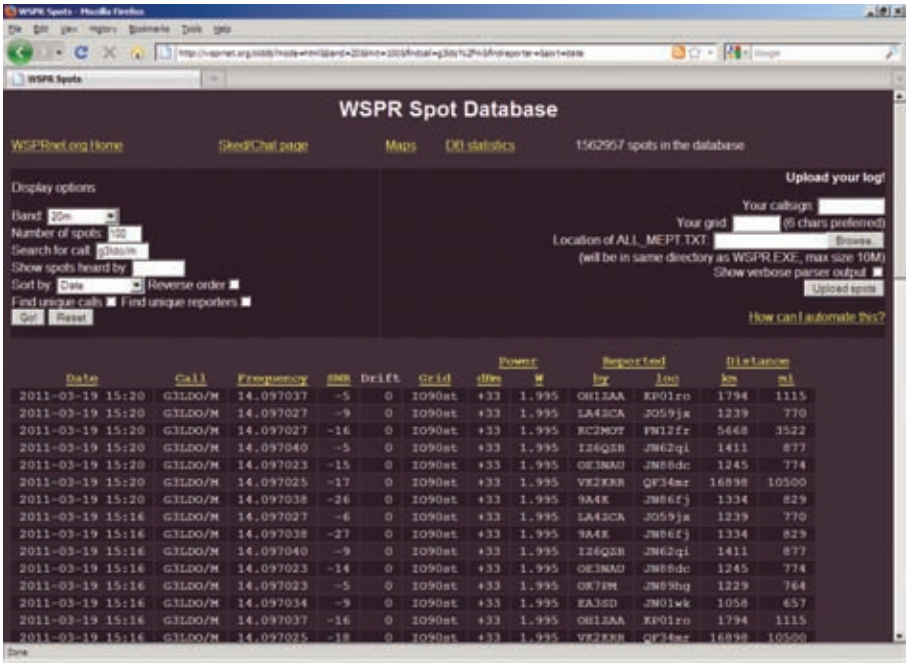

Fig. 5: The WSPR Spot Database reports of my signals during the test after filtering.

file, which can then be imported into a word processor to be sorted into some sort of order for making comparisons. I've created a small table of this data as shown in **Table 1**.

Normally you would first selected stations whose signal reports you were going to use, but for the purpose of this exercise I have selected just one DX station. All the column information shown in Fig. 5, that's not useful for these measurements, such as my call sign, frequency, drift, and my transmit power may be deleted.

The reported *WSPR* signal strength is measured as a signal-to-noise ratio SNR in dB so the greater the SNR number the stronger the signal. However most of the SNR reports are likely to be negative, so the greater the negative number the weaker the signal.

From Table 1 it can be seen that signal reports from VK2KRR (distance 16898km) average out at -14.57 dB when using the Bugcatcher and –17.71 dB on the Outbacker. However, one of the items in the Outbacker data is –26 dB, indicating a propagation dip. If this item is ignored then the average changes to –16.33 dB.

Using the original data this gives the Bugcatcher just over 3dB improvement over the Outbacker but using the modified data reduces the Bugcatcher's superiority to just 1.76dB.

For antenna measurements to be of any use, it's important that the propagation path is fairly stable. By this I mean that the variation in signal levels over the test period should not vary dramatically.

Not The First

I'm not the first to use *WSPR* as a method of comparing antennas by any means, but I think that this is the first time *WSPR* has been used to compare mobile antennas. Some time ago, **Martin Ehrenfried G8JNJ** mentioned his method of using *WSPR* to measure antenna performance.

Martin has automated the data collection and sorting process. A brief description of comparison tests with a loop and a dipole antenna can be seen at [‡4].

More measurements are planned firstly ensuring that ground (earth) losses are minimised and the matching optimised. A further interesting characteristics of antennas could be examined using the WSPR method is to study the propagation characteristics of comparative antennas. I hope you find the WSPR technique as interesting as I did! ●

REFERENCES

[‡1] *The Whisper Mode*, David Dix G8LZE, *Practical Wireless* January 2011.

[‡2] Antennas, *RadCom* November 2010.

[‡3] *WSPR*, written by Joe Taylor K1JT. Obtainable at **www.physics.princeton.edu/pulsar/K1JT**

[‡4] **http://g8jnj.webs.com** See '1m HF loop antenna.

Table 1. Part of the edited G3LDO/M transmission data from the WSPR spot database

Date/Time,	SNR,	Call,	locator ,	km,	miles
Bugcatcher antenna					
2011-03-19 15:36	-15	VK2KRR	QF34mr	16898	10500
2011-03-19 15:32	-18	VK2KRR	QF34mr	16898	10500
2011-03-19 15:08	-12	VK2KRR	QF34mr	16898	10500
2011-03-19 14:42	-18	VK2KRR	QF34mr	16898	10500
2011-03-19 14:40	-12	VK2KRR	QF34mr	16898	10500
2011-03-19 14:14	-13	VK2KRR	QF34mr	16898	10500
2011-03-19 14:06	-14	VK2KRR	QF34mr	16898	10500
Average =-14.57					
Outbacker antenna					
2011-03-19 15:20	-17	VK2KRR	QF34mr	16898	10500
2011-03-19 15:16	-18	VK2KRR	QF34mr	16898	10500
2011-03-19 15:02	-14	VK2KRR	QF34mr	16898	10500
2011-03-19 14:58	-15	VK2KRR	QF34mr	16898	10500
2011-03-19 14:50	-15	VK2KRR	QF34mr	16898	10500
2011-03-19 14:28	-19	VK2KRR	QF34mr	16898	10500
2011-03-19 14:22	-26	VK2KRR	QF34mr	16898	10500
Average -17.71 (-16.33)					

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Silver
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INCLUDES WIDEBAND RECEIVE AS STANDARD (PLUS DUAL RECEIVE)
INCLUDES REMOTE DTMF MIC WITH REMOTE FREQ/FUNCTION CONTROL.
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Easy to use ATU.
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NISSEI HAVE BECOME RENOWNED FOR PUTTING QUALITY FIRST, YET MAINTAINING A GOOD PRICING STRUCTURE. A TRULY SUPERB POWER SUPPLY UNIT
'Smallest version to date' now with cigar socket.
QUALITY MADE PRODUCT
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Features: ★ Over voltage protection ★ Short circuit current limited ★ Twin illuminated meters ★ Variable voltage (3-15V) latches 13.8V ★ Additional "push clip" DC power sockets at rear. Dim's: 256(W) x 135(H) x 280(D)mm.
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0.1-30MHz SSB/AM 88-108MHz (FM stereo) 118-137MHz airband/rotary antenna. 1000 mems/ rotary tuning/wide-narrow filters & more. + FREE HD-1010 headphones
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FREE MIC
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Includes free speaker mic
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IN CAR CHARGER	£24.99
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2 x TG-UV2 for £150.00
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all include battery, charger and antenna

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

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Quality rotator for VHF/UHF. Superb for most VHF-UHF Yagis, 3-core cable required. 3-core cable £1 per mtr.
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No tuning required

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6m + 2m + 70cm. 2 section (2.5m long) PL-259 fitting.
Superb quality. **£134.99**

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Analyser 1.8-60MHz
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80-40, 30-20m 4-band QRP rig.
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New: 50m roll, stranded antenna wire ..... £16.99 P&P £7.50
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Set of 3 heavy duty fixing spikes (~0.7m long) £29.99
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All our brackets are of high quality, British made and galvanised.

LIMITED STOCK

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(Can be hand operated or by compressor/foot pump)

Del £40 10m MAST, ONLY **£1199.99**

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TWO SETS FOR £140.00 THREE SETS FOR £179.99

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24 foot mast. 1½" – 4 sections (6ft long).
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XMAS SPECIAL:- 3 SETS £109.99

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18 foot – 6 x 3 foot (1½") slot together ally sections.
£49.99 per set.
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Dia: 1¼" ideal to take anywhere. **£39.99**
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Simply close shut over cables and notice the difference! Will fit cables up to 13mm diameter. Ideal on power supply leads/mic leads/audio leads/phone leads.
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(Fits up to 2" mast) **£13.99** + P&P £4.50
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Pulley will hang freely and take most rope up to 6mm. (Wall bracket not supplied).
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Wall bracket, screws not supplied. Simply screw to outside wall and hang pulley on WALL BRACKET £2.99 P&P £1.00
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132m (4.4mm) nylon guy (480Kg) £45.00

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500kg brake winch. BARGAIN PRICE
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(Now includes cable grip)
Winch wall bracket £22.99

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PL-259 - PL-259	0.6m	£11.99
PL-259 - PL-259	1m	£14.99
PL-259 - PL-259	4m	£19.99
PL-259 - PL-259	20m	£49.99
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Heavy duty universal mount.
Includes 5m cable **£34.99**

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Adjustable roof rack/window bar mount
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True military spec real UK coax

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★ 1.8 - 60MHz HF vertical ★ 15 foot high ★ No ATU or ground radials required ★ (200W PEP).
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CW-80S	(80-10m) 20m long	£152.99 P&P £10.00
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2 way CX-201 (0-1GHz) SO239 ..... £24.99
2 way CX-201 'N' (0-1GHz) 'N' £29.99
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(POST £4.00)

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Very heavy duty. Available:- SO-259 or 3/8 – specify.
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Rev. George Dobbs G3RJV's Carrying on the Practical Way

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E-Mail: pracway@pwpublishing.ltd.uk

This month the Rev. George Dobbs G3RJV says he's presenting "Radios for children or a Christmas group project" – and the appropriate quote – Enjoy!

A teacher's job is to take a bunch of live wires and see that they are well-grounded. (Author Unknown)

For a number of years, I devoted the December edition of this column to simple projects that could be used with children, though not recently. The idea being that when the excitement of Christmas was wearing thin, why not go into the workshop and build something with a child or grandchild? (there are times when I'd love to have done so – but social services would have probably intervened!!). Those articles were mainly devoted to variants of the crystal set radio and I've not presented these for several years – simply because I ran out of new ideas.

Then, just before I was preparing this column, I was approached by **Esde Tyler G0AEC**, about a simple radio to build with children. Esde is well-known through her work in the early days of the Novice Licence and as the former columnist of *Novice News* in the **Radio Society of Great Britain** (RSGB) monthly society journal *Radio Communications*. Esde was looking for suitable projects to use with children of primary school age. Her requirement was a radio that could be built by young children, in a sort period of time, without the use of soldering.

Esde had already built crystal sets using the excellent "Green Radio" kits from the **Halifax Amateur Radio Society**. These are built using 'chocolate block' type connectors for joining the parts to make a crystal radio.

My approach to building crystal set radios without soldering had been the 'Four Screw Radio'. This followed the format of my Ladybird book, *Making a Transistor Radio* – published in the early 1970s in which I used brass screws and screw cups to interconnect the components.

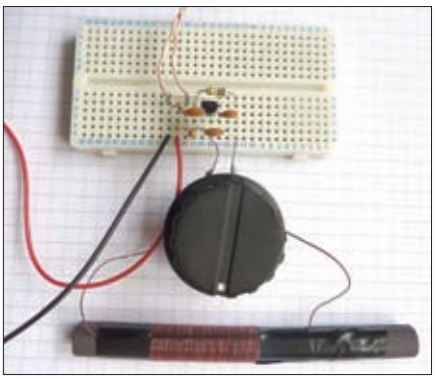
In fact, although the book was published in 1972, I still receive a few letters and E-mails about it. In amongst the corespondents there have been several people, now in important positions in electronics and technology who began that interest by building the radio described in the book.

A scan of the whole book is available on-line at **www.mds975.co.uk/Content/george_dobbs_trf_radio.html** Number 6 brass screw cups held down by ½ inch brass screws were used to trap and interconnect the parts leads for the radio.

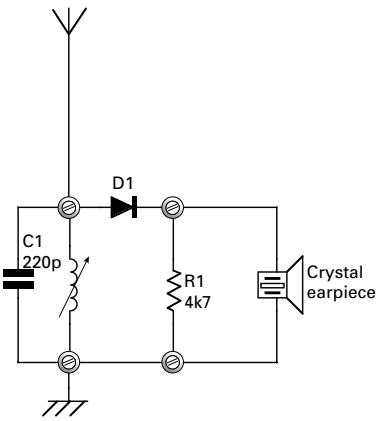
The circuit for the Four Screw Radio is shown in **Fig. 1** and the practical implementation is shown in the photograph. As variable capacitors can be expensive, a fixed capacitor (C1) is used with a ferrite rod or slab antenna to form the tuned circuit. Tuning of the stations is achieved by sliding the ferrite in or out of the coil.

Varying the value of C1 will achieve different tuning ranges on the medium wave (a.m.) band. The Four-Screw Radio works as well as any basic crystal set but it does require a good aerial (antenna) and, if possible, an earth connection.

What was really required was a simple radio that does not need an external aerial or the use of soldering. My column this month is somewhat unusual in that it is about methodology rather that circuit ideas.



The plug board version



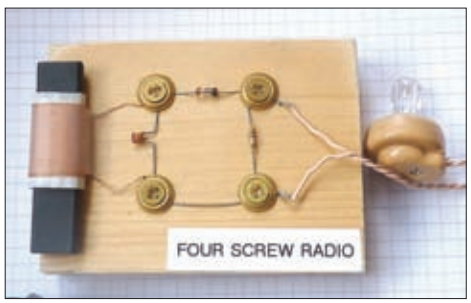


Fig. 1: The circuit for the Four Screw Radio is shown here and the practical implementation is shown in the photograph.

Simple Radio For Children

I offer a blow by blow account of a simple radio for children to build. In details that follow, it should be possible for a teacher, children's leader, parent or grandparent to build the radio with a young person or group.

The circuit is simple and ventures where most people would go after building the basic crystal set. As **Fig. 2** shows, it's based upon the popular MK484 integrated circuit (i.c.), a complete radio in one 3-pin TO-92 case that looks like a single transistor. In the 1970s Ferranti produced the first single chip a.m. tuner; the ZN414. This was replaced by the MK484, which is interchangeable with the TA7642.

The frequency range of the chip is roughly 200kHz to 3MHz, although I have used them on the 3.5MHz Amateur band. The MK484 requires a 1.5V supply (a single AA cell works well) and draws under one milliampere (mA) of current, so battery life is no problem. The chip also includes automatic gain control (a.g.c.) which helps in tuning weaker stations.

In short, the i.c. is an ideal component for building a simple radio for beginners. One slight downside is that it has a high impedance output making it unsuitable for driving the common portable cassette player style headphones. High impedance headphones are quite a rarity these days, and expensive, but a cheap crystal earpiece in conjunction with a loading resistor provides adequate audio output.

In Fig. 2, the required radio signals are tuned using L1 and C1. L1 is wound on a

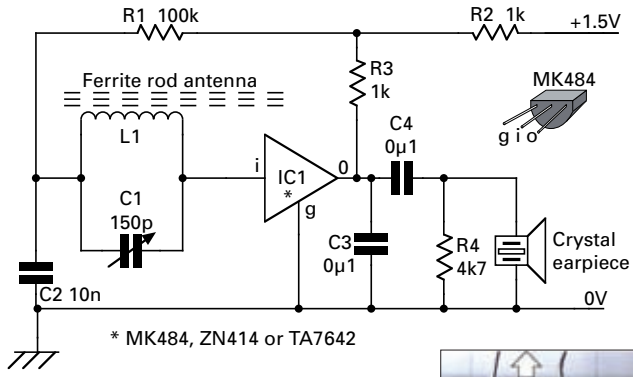


Fig. 2: This circuit, based upon the popular MK484 integrated circuit (i.c.), is a complete radio in one 3-pin TO-92 case that looks like a single transistor.

ferrite rod forming a ferrite rod antenna, doing away with the need for an external antenna. The MK484 has a very high impedance amplifier as a first stage, thus there is very little damping of the L1/C1 tuned circuit. This is followed by three stages of amplification and an active detector giving about 70dB (decibels) of gain; about the same as a domestic superhet radio.

Thus the radio will receive lots of stations without the need of an additional antenna. The d.c. voltage at the output pin varies with the signal strength of individual stations, providing automatic gain control. This enables the radio to give satisfactory results without a manual volume control.

Residual radio frequency signals present at the output are bypassed to ground by C3. Capacitor C2 bypasses the end of the tuned circuit to ground at radio frequencies. Capacitor C4 couples the required audio signals to R4 where they appear as a fluctuating voltage. A high impedance crystal earpiece is connected across R4 converting the audio voltage signal into sound.

Editor's tip: *Readers who built the MK484 receivers featured in the* Radio Basics *series will remember that the balanced armature headphone inserts (or telephone receiver inserts) worked extremely well when connected in series in the audio output circuit (They are usually around 30 to 50Ω impedance). On strong signals they can even act as small loudspeakers and they are extremely robust.*

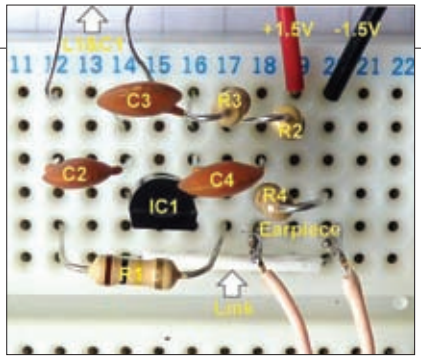


Fig. 3: Less solid wires can be soldering in parallel with stiff solid wire to plug into the board, as can be seen coming in from the top of this picture.

Risky Soldering?

The real question is – how to build the radio in Fig. 2 without resorting to soldering which could be risky for children. Many years ago, in the early days of i.c.s I used solder-less prototyping boards for my early attempts at i.c. projects. These are plastic boards with a 0.1 inch matrix of holes into which component leads or i.c. pins can be plugged.

The vertical lines of holes are electrically connected and it is possible to build quite complex circuits using the combination of joined and non-joined holes. The nature of the boards may be seen from the photographs. They are usually called proto-boards or 'Plugboards'. Veroboard is a similar system that requires soldering to hold the leads and pins in place.

Such boards are usually far too large for such a simple circuit as Fig. 2. The smallest board I could find was the Maplin AD100 Plugboard. It has two sections each containing 30 blocks of six rows. More than we require but better than most similar boards.

The AD100 board also has the advantage of horizontal numbering and vertical alphabet lettering to identify each hole. This is ideal for locating the required holes when plugging in the components. When I worked out the parts placements, I found that I needed all of the six rows of holes – although many blocks were unused.

Some of the parts don't lend themselves well to being plugged into the board and require some preparation before the young constructors begin work on their radios. L1 and C1 are best connected as shown in **Fig. 3** by soldering them in parallel with stiff solid wire to plug into the board.

The crystal earpiece came with a small jack plug on the end of the leads. I cut the plug off and soldered small lengths (about 10mm) of stiff wire on the end of each lead to enable plugging into the board. A 15mm link wire is also required and can be made up in advance and added to the supplied parts.

The diagram, Fig. 3, also shows the layout of the parts to build the radio. Table 1 is a complete parts list and Table 2 lists the placements of the parts in the AD100 Plugboard.

Using Figs. 2 and 4 with Tables 1 and 2, there should be enough information for young people to build the radio under guidance.

For those who wish to take the simple radio a little further, **Fig. 4** shows a version with an added audio amplifier. With this addition the radio will drive a loudspeaker at enough volume for a small room. For simplicity I have used the well known LM386 in a stripped down circuit. The LM386 is used in its basic configuration that gives a gain of 20, so there is no extra capacitor

Table 1. Simple radio components

Maplin AD100 Plugblock (Code AG08J).
R1 100kΩ
R2 1kΩ
R3 1kΩ
R4 4.7kΩ (¼ watt to match prototype photo).
C2 10nF
C3 100nF
C4 100nF
IC1 MK484 or TA7642 (Rapid Electronics or Maplin).
Crystal Earpiece
L1 Ferrite Rod with coil (Maplin)
C1 150pF Polyvaricon variable capacitor
1.5V Battery Holder (AA- single cell)
1.5V Battery (AA)
15mm Link Wire

Notes on parts:
L1 can be home-made by close winding 60 turns of 28s.w.g. enamelled copper wire on a 10mm ferrite rod. Secure the ends with tape.
C1 is a polyvaricon type two gang variable capacitor (150pF and 60pF). The 150pF section is used this is designated G (for ground) and A (for antenna) as shown the photograph.
C1 – use connections Marked 'G' and 'A'

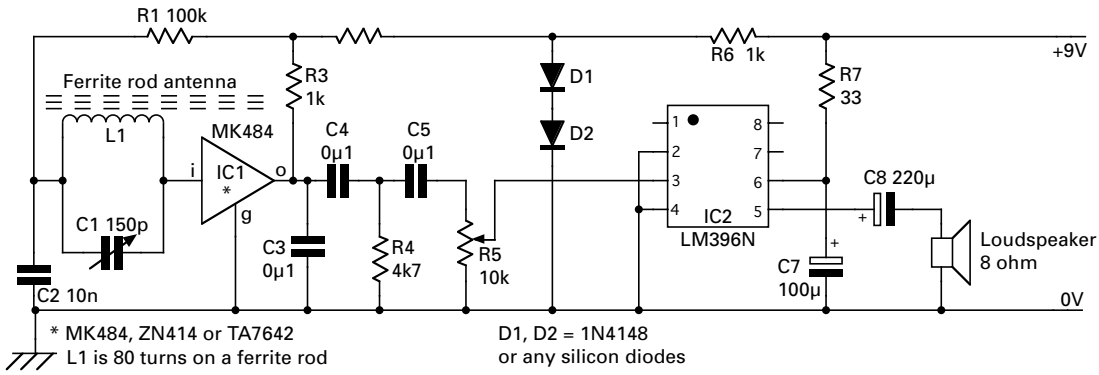


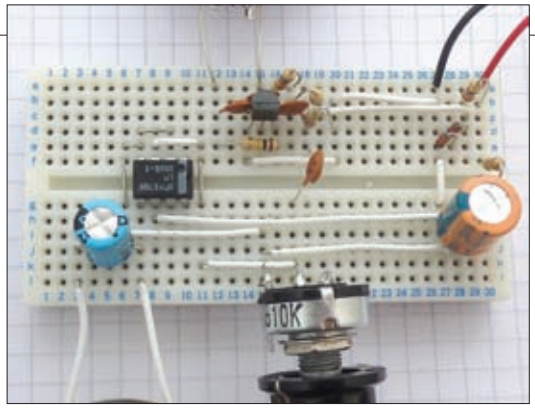
Fig. 4: Adding the ubiquitous LM386 audio amplifier chip gives more than adequate audio volume.

Table 3 – Connections for adding an LM386 audio amplifier

Link	20mm	**b20 to b27**
Link	25mm	**c19 to c29**
Link	6mm	**d7 to d9**
Link	3mm	**e6 to e7**
Link	10mm	**e8 to e11**
Link	10mm	**f6 to g6**
Link	10mm	**f11 to g11**
Link	10mm	**f27 to g27**
Link	50mm	**h8 to h28**
Link	22mm	**i6 to i15**
Link	32mm	**j15 to j27**
Link	15mm	**k11 to k17**
R5	10kΩ Log potentiometer	**l16, l17, l19**
R6	2.2kΩ (red-red-red)	**b29 to b30**
R7	33Ω (orange-orange-black)	**f30 to g30**
C5	100nF (marked '104')	**e18 to g17**
C6	220µF electrolytic (negative to j3)	**j3 to j7**
C7	100µF electrolytic (negative to i27)	**i27 to i30**
D1	Diode 1N4148 or similar	**d28 to d29**
D2	Diode 1N4148 or similar	**e27 to e28**
Speaker	8Ω loudspeaker	**l3 to l6**
LM386	Audio amplifier	
	Connect as shown	**f7, 8, 9, 10**
		g7, 8, 9, 10
PP3	9V battery + red	**a30**
PP3	9V battery - black	**a27**

Table 2 – PLACEMENT OF PARTS

Connections on Maplin AD100 Plugblock		
R1	100kΩ (brown-black-yellow	**e12 to e17**
R2	1kΩ (brown-black-red)	**b17 to b19**
R3	1kΩ (brown-black-red)	**a16 to a17**
R4	4.7kΩ (yellow-purple-red)	**d18 to d20**
Note: R2, R3 and R4 are mounted vertically		
C1	C1 is supplied joined to L1 as shown the diagram connected **- a12 to a15**	
C2	10nF (marked "103")	**c12 to c14**
C3	100nF (marked "104")	**b14 to b16**
C4	100nF (marked "104")	**c16 to c18**
L1	Ferrite rod antenna – medium wave coil.	**Joined to C1 as shown**
IC1	Connection correct way round – see layout	**d14 – d15 – d16**
EP1	Crystal Earpiece	**e18 to e20**
Battery	AA Battery (positive + red lead)	**a19**
Battery	AA Battery (negative + black lead)	**a20**
Link	15mm link wire *pvc* covered solid wire	**f14 to f20**



between pins 1 and 8.

I have also omitted the Zobel filter on the output without apparent detriment to the amplifier stability. So the resultant circuit adds only a few extra parts to the basic radio circuit of Fig. 2. The LM386 requires a 9V supply but the MK484 requires only 1.5V. I have achieved this by using a couple of common silicon diodes as stabiliser diodes to extract 1.5V from the 9V (PP3) supply. Diodes D1 and D2 could be 1N914 or similar common diodes.

The extra circuitry can be added to the same AD100 Plugboard but its placement must be clear of the joined rows of holes used for the basic radio. I opted to place the amplifier to the left of the basic radio placement as this seemed the more viable option. The result is shown the photograph, which also shows a problem.

Although the construction is not complex and the resultant radio works well, there are more link wires than parts on the board. It may look a little clumsy but it does produce the required results. For those who want to add the amplifier, the connections are given in Table 3. This layout does require arranging the LM386 chip and the electrolytic capacitors the correct way round but this is clearly shown in the photographs.

Hopefully some readers will be able to use this month's offering to introduce young people to the joys of radio construction.

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YouKits FG-01 SWR Analyser

Our Technical Editor, 'Tex' Swann G1TEX gets to grips with a new, small s.w.r. analyser from the YouKits stable.

I'm always fascinated by the various devices that are around to show the matched state of antenna systems. Like many other Radio Amateurs, I started out with a dip meter that showed the frequency that the system was resonant at, but not how good the matching was. I then progressed on to a unit that just indicated the standing wave ratio (s.w.r.), which was followed by a hand-held unit with two meters – one for s.w.r., the other for an approximation of impedance.

These later units were followed by smaller models that needed a computer to show the system variations with frequency. Their 'tethered' state was offset by the amount of information that could be gathered from the displayed data.

The subject of this review is a hand-held unit, that although displaying less information than the computer-based type, has reverted to being a stand-alone unit with a built-in colour display. The type that I'm looking it is an early production model, and will change slightly when the full production one become available. And although its operation is effectively complete – it doesn't have the rechargeable battery fitted. So, I was provided with a small external power supply to undertake the review.

The Analyser

So, what does the YouKits FG-01 Antenna Analyser consist of? The first impression is that when it's compared to previous units – it's tiny! It's a mere 35mm deep box measuring just 55mm wide and around 97mm high, excluding knobs and projecting sockets. The display is some 30mm square, just above the one control knob, which due to the small size of the unit, gives the impression of being rather larger than it really is.

The unit's one control is a rotary encoder with a push-to-switch action and all functions are controlled either by rotation of pressing this control. The only other item on the front panel is the **On**/**Off** switch.

When I first switched it on the multi-colour display came on within a couple of seconds. It displayed a clear s.w.r. plot with a coloured legend for numerical values of s.w.r., green for values up to and including 2.0:1 and red for values above this point. There's only a central vertical line to indicate the centre frequency ('CF:') of the sweep.

Centre Frequency

The centre frequency may be set to between one and 60MHz and is displayed – to a resolution of 1kHz – as yellow text directly under the centre line. The maximum frequency of the oscillator is 60MHz and the frequency will not go beyond that value. Neither will it go below 1MHz.

Under the centre frequency and displayed in white text, is the 'edge to edge' sweep (SW:) of the plot. This can have values of 50, 20, 10, 5, 2 or 1MHz, or smaller sweeps of 500, 200, 100, 50, 20 or 10kHz. There's one more setting, that shows 0kHz, allowing the output to be set for use as a signal generator or s.w.r. display at just one frequency.

The third line of text, shown under the two frequency lines, is of the s.w.r. at the centre frequency. The text in this instance changes with the s.w.r., green for less than 2:1, red for values above this level, so, mirroring the s.w.r. display. And finally in the low right hand side of the display, is the supply voltage, so allowing you to monitor the battery voltage.

The YouKits FG-01 SWR analyser showing the variation of s.w.r. to be found in a typical multi-band antenna.

A momentary click of the switch function of the control toggles a small green triangle between the CF: and SW: lines of text, showing where changes will take place, when the control is rotated. When the CF: line is active a longer press of the control, will cause, one of the characters of the frequency setting to change to a red colour.

Then, rotating the control will cause the red coloured character to move left or right, indicating that steps will be in 1, 10, 100 or 1000kHz (1MHz) steps. A momentary click returns the control to its frequency setting mode, with the step rate controlled by the last setting.

When the SW: line has the green active triangle against it, a longer press of the control saves the centre frequency, step and sweep settings to memory for the next time you switch on. Set up your favourite band and sweep width for instant use on switch-on!

In use, I found that the display, though small was very clear, and gave a bright, clean indication of the s.w.r. over the swept range. Bear in mind though, that there can be some small 'wobbles' on the otherwise smooth curves of the plot. I suspect that these

Fig. 1: Inside the YouKits FG-01 SWR Analyser, as you'd expect with such a small unit, it's mainly surface mount components.

are to do with the stepping of the direct digital synthesiser (d.d.s.) oscillator.

Inside The FG-01

I suggest that you now take a look at the picture of the insides of the FG-01, as shown in **Fig. 1**. As you'd probably expect, with such a small unit, it's almost constructed from all surface -mount components. The direct digital synthesiser (d.d.s.), and its crystal oscillator are centrally mounted low down on the main board. The output feeding a low-pass filter.

After the low-pass filter, there's a small 'chip' amplifier, followed by what appears to be a larger dual amplifier feeding the sensing transformer – the largest component on the board. The signals are thus fed out via a 50Ω BNC socket to the antenna system under test. This would probably mean that most users would need to source a BNC to SO-239 adapter or patch lead.

The unit has a 'healthy' output of between 4mW at 1MHz, falling to a little over 2mW at 60MHz into a 50Ω matched load. So, it's perhaps, wise to minimise the time that readings are taken on your antennas as even a few milliwatts can travel a long way to cause interference.

Just below the sensing transformer is the associated measurement chip (AD8302). This feeds all the levels back to the main controller to carry out the calculations and display the results.

The final components on the board would appear to be the microprocessor and it's associated 'clock' crystal that controls the whole game. The socket for the battery is visible on top-right on the board shown in Fig. 1.

How Did It Perform

So how did the FG-01 perform? To answer that I have to say without hesitation – "Very well indeed!" The heading shot shows my antenna system over a sweep width of 20MHz, centred on 21MHz. As you can see the antenna system shows commendably low s.w.r. readings on both 14 and 21MHz, though faring rather less well on the 28MHz band.

By reducing the sweep width and changing the centre frequency settings, I could take better and more detailed readings of these or other bands. Incidentally, all of these were almost instantly displayed on the front of the hand-held unit.

I'm unable to comment on battery life as the unit I was playing with was so new, it didn't have one fitted. But when running it on the power supply, it became pleasantly warm to the touch after an hour or so. This fact alone would lead me to guess that battery life would probably be in the area of a couple of hours continuous use. However, this would be very dependent on the actual capacity of the battery pack fitted.

Finally, I can say that I'd be more than happy to add this unit to my armoury of antenna test equipment available to use when I have a go at h.f. antenna building and adapting! My thanks go to **Jeff Stanton G6XYU** of **Waters & Stanton PLC** for the loan of the review unit. ●

Supplier
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Hockley,
Essex SS54QS
Tel: 01702 204965
E-mail sales@wsplc.com

Pros
Small and very handy
easy to use after a few minutes with reference to an instruction book.

Cons
Display, though clear is quite small
Need to source a BNC to other socket adapter

My thanks go to Waters & Stanton for the loan of the YouKits FG-01 SWR Analyser for review. It costs £219.95 + £5 p&p.

Provisional Specifications

Overall Size	55 x 97 x 35mm (excluding knobs and sockets)
Controls	On/Off switch Rotary controller with push-to-make switch
Display	30 x 30mm multi-colour l.c.d. Shows s.w.r. graphically over the sweep range against a numerical scale, and numerically at the centre frequency separately
Frequency range	1 - 60MHz centre frequency
Frequency control	1, 10, 100,1000kHz steps
Frequency sweep	50, 20, 10, 5, 2 or 1MHz, or 500, 200, 100, 50, 20, 10, 0kHz
Frequency accuracy	Not stated

KITS & MODULES

TRANSVERTERS for 2 or 4 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.**

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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**.

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NEW PRODUCT

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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.

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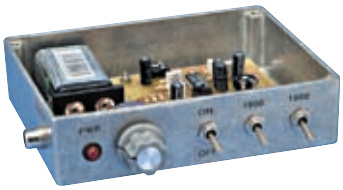
TWO TONE OSCILLATOR
as featured in *PW* March 2005. A vital piece of test equipment used together with an oscilloscope for setting up AM, DSB, & SSB transmitters. **PCB & hardware kit £28.00. Ready Built £52.50**.



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.**

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What's an Equivalent Circuit?

In his *Technical for the Terrified* column, this month Tony Nailer G4CFY looks again at equivalent circuits to see how they help to work things out!

This month I hope to again address the issue of equivalent circuits. This is the way that we split circuitry into parts that affect the signal and parts that provide the necessary supply voltages.

Normal Circuit

The normal circuit of a typical radio frequency amplifier is shown in **Fig. 1** and is configured for low impedance input and high impedance output. The low impedance input is achieved using a capacitive divider comprising C1 and C2. Together C1 and C2 in series have an equivalent value CT , where CT=(C1*C2)/(C1+C2). This equivalent value resonates with L1 to select the required frequency.

Provided that the capacitors and inductance are low loss components, then the dynamic resistance measured across the coil at resonance will be the product of the coil reactance and the *Q*. In the case of an antenna input stage, often the impedance of the antenna and its feeder provide a loading on the tuned circuit to achieve the required *Q*.

The required *Q* is simply the centre frequency of operation divided by the bandwidth of the circuit. At 14MHz for example the band is 350kHz wide, so the required *Q* will be 14/0.35 = 40.

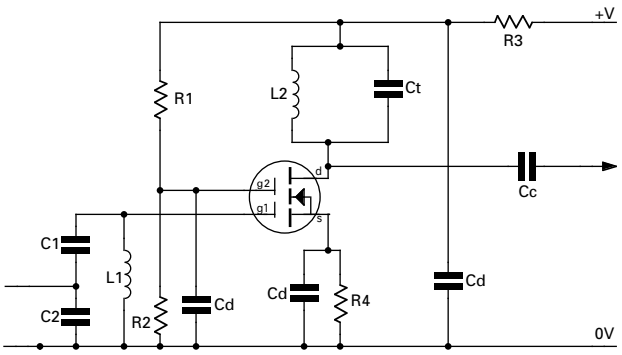

Fig. 1: The full circuit of a typical radio frequency (r.f.) amplifier.

If the antenna is resonant at 14MHz with a radiation resistance Ra of 50Ω, with a *Q* of 40 the dynamic resistance Rd will be 50*40 = 2000Ω.

Determination of C1 and C2

Now √(Rd/Ra) = (C1/C2)+1.

So √(2000/50) = (C1/C2)+1.

Then 6.32 = (C1/C2)+1.

C1/C2 = (6.32-1).

Finally C1 = 5.32*C2.

At 14MHz, good value for the inductance of L1 and L2 will be 2.6pH. The value of capacitance to resonate with this will be CT = 1/(39.5*f*f*L).

CT = $1/(39.5*14*14*10^{12}*2.6*10^{-6})$.

CT = $1/(39.5*14*14*2.6*10^{6})$. CT = $1*10^{-6}/(20129)$ = $0.0000496*10^{-6}$ = 49.6ρF.

The formula for determining the value of two capacitors in series is CT = (C1*C2)/(C1+C2).

But we've shown that C1 = 5.32*C2,

then CT = (5.32*C2*C2)/((5.32*C2)+C2)).

So CT = (5.32*C2*C2)/(6.32*C2)

CT = (5.32*C2)/6.32 = 0.84*C2.

In practice the dual gate m.o.s.f.e.t. device will have an input capacitance of about 4pF, then the series arrangement of C1 and C2 has to make up the difference between 4 and 49.6pF, or 45.6pF.

If CT = 45.6pF then C2 = (45.6/0.84) = 54pF. Use 56pF for C2.

As C1 = 5.32*C2, then C1 = 5.32*56 = 298pF.

In practice to slightly reduce the total because C2 was slightly high, then make C1 = 270pF.

The output coil L2 will be tuned with CT, the nearest value of which is 47pF.

De-Coupling Capacitors

The de-coupling capacitors Cd, exist in three places in the circuit of Fig. 1. In each case they should provide such a low reactance at the operating frequency to be considered effectively as a short circuit. For ease of calculation I usually choose that value to be 1Ω.

Then Xc = 1/(2*π*f*C).

By transposition of formula,

C = 1/(2*π*F*Xc).

Now with Xc = 1, C = 1/(2*π*f).

C = $1/(2*\pi*14*10^{6})$ Farads.

C = $(1*10^{-6})/88 = 0.011*10^{-6}$ Farads = 11nF. Use 10nF.

Equivalent AC Circuit

By now, assuming that the de-coupling capacitors are essentially a short circuit to a.c., the equivalent circuit becomes as shown in **Fig. 2**. The output coupling capacitor Cc together with whatever capacitance exists at the input of the following stage will add to the capacitance across L2.

It's usual practice to make the reactance of the coupling capacitor a tenth of the input resistance of the following stage

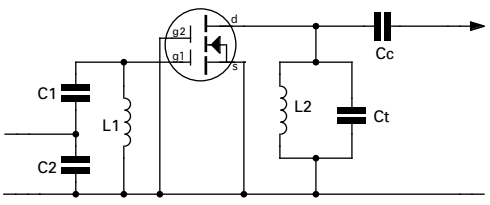

Fig. 2: Assuming that the de-coupling capacitors are essentially a short circuit to a.c. – the equivalent circuit of Fig. 1 becomes as shown in this diagram.

(or less). Also to make its value ten times or more than the input capacitance of the following stage.

If for example the input resistance of the following stage is say 10kΩ then the reactance of the coupling capacitor, should be 1kΩ or less. If the input capacitance is say 4pF then Cc needs to be 40pF or more.

Cc = 1/(2*π*F*Xc). Where Xc =1kΩ, then Cc = 1/ (2*π*14*10^6*10^3),

Cc = (1*10^{-9})/88 = 0.011*10^{-9} = 11pF. The limiting factor here then is not the input resistance but the input capacitance, as Cc needs to be 40pF or more.

Anything above this value is alright to use and could be the same as Ct for convenience.

If it's required for the amplifier to have low output impedance, then a circuit arrangement the same as the input can be used. Alternatively, if the coil can be obtained with a suitable low impedance winding this would work both at input and output.

Equivalent DC Circuit

When considering direct current (d.c), after an initial change of voltage at switch-on, no current flows through capacitors, so they become invisible. Similarly with inductors that after a momentary change of current flow at switch-on, they can be considered a short circuit. Then the circuit of Fig. 1 is reduced to that of **Fig. 3**.

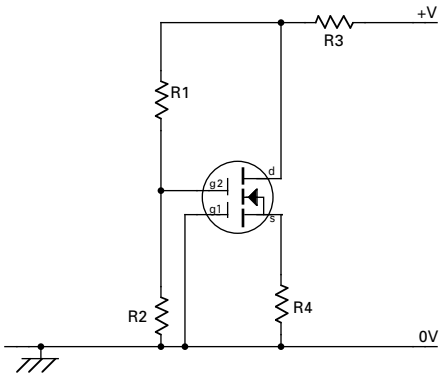

Fig. 3: Considering the circuit of Fig. 1 at d.c., the equivalent circuit may be considered as shown in this diagram.

Traditional dual gate m.o.s.f.e.t.s are have drain currents between 5 –15mA when the gate 1 is grounded. The source is normally set to about 1V above 0V due the resistor R4. If it is assumed that the source – drain current is 10mA then R4 = V/I = 1/0.01 = 100Ω.

To make the a.c. decoupling of the positive rail more efficient it is usual to make the voltage drop across R4 also 1V. This means that R4 will also be 100Ω.

The gate 2 is normally biased to around 4V positive with respect to the source, that makes it 5V above ground. If the supply +V is 13.5V then the drain will be 12.5V. R1 and R2 can be high values as the current flowing in gate 2 is miniscule. It has been determined that the voltage across R2 is 5V, so the voltage across R1 will be 12.5-5 = 7.5V. This reveals that R1 is 1.5 times R2. Good values would be 15kΩ for R1 and 10kΩ for R2.

Typical Colpitts Oscillator

A circuit of a typical Colpitts oscillator is shown in **Fig. 4**. Moving straight on to the a.c. equivalent circuits by ignoring all the resistors gives **Fig. 5**. By switching the crystal X and C1 positions as shown in **Fig. 6** reveals that there are three capacitors in series.

The particular re-arrangement in Fig. 6, shows why this

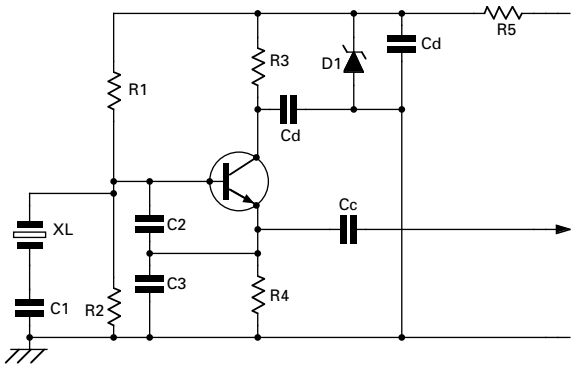

Fig. 4: The circuit of a typical Colpitts oscillator.

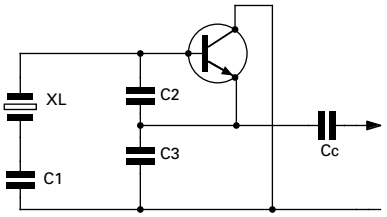

Fig. 5: The a.c. equivalent circuits of Fig. 4, ignoring all the resistors.

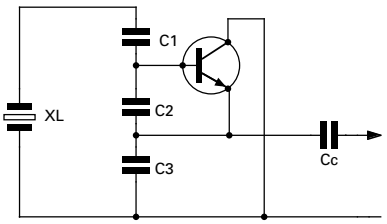

Fig. 6: By switching the crystal X and C1 positions as shown, reveals that there are three capacitors in series.

circuit works well with bipolar transistors, which are relatively low impedance devices. The series arrangement of the three capacitors provides two capacitive tap impedance transformations, one to the base and a lower one to the emitter. The value of the three capacitors in series provides the necessary capacitive loading for the crystal.

Many crystals work with a nominal load capacitance of 30pF. A good rule of thumb is to make the series value of C2 and C3 equal to the value of C1. So if C2 & C3 are 120pF each they will be 60pF together. If now C1 is also 60pF, in series with the other 60pF gives 30pF total. Now isn't that clever. In practice C1 is usually made up from a 39pF fixed capacitor in parallel with a 30pF trimmer capacitor.

Invisible Capacitors!

At d.c. the capacitors are considered 'invisible', which leaves the circuit of **Fig. 7**. The stabiliser diode D1 is normally chosen to be 6V8, or 8V2 the choice of which is dependent upon the starting supply voltage. In this example I choose D1 to be 8V2. I will also assume the operational current of the circuit is 5mA and that a further 5mA will flow in the diode.

If the supply rail is 13.5V then there will be 13.5-8.2 = 5.3V across R5 and 10mA flowing through it. Using Ohms law gives 530Ω for R5. Choose either 470 or 560Ω initially.

The oscillatory circuit is between base and emitter so, it would be usual to set the emitter at about two thirds of the collector voltage. Also the collector voltage is about 1V below the zener voltage, with the difference across R3.

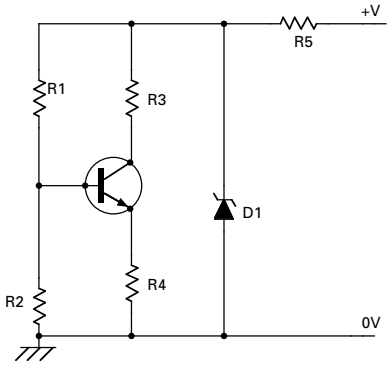

Fig. 7: At d.c. the capacitors are considered invisible which leaves the equivalent circuit of Fig. 4, as shown here.

Now, if the collector current is 5mA then R3 = V/I = 1/0.005 = 200Ω. Use 180 or 220Ω.

The collector will then be 7.2V and the emitter will be 0.66*7.2 = 4.75V with an emitter current also of 5mA R4 will be 4.75/0.005 = 950Ω. Use 1kΩ.

With the emitter at 4.75V and a base emitter junction drop of 0.7V gives the base bias at 5.45V above 0V. This means that R1 has (8.2-5.45)V = 2.75V across it. Note that R1 is close to half R2. A good choice would be 4.7kΩ for R1 and 10kΩ for R2.

Proof Of Correct Bias

To establish the proof of the correct bias, the voltage across R2, V_{R2} = (R2*V_{D1})/(R1+R2) = 10*8.2/(4.7+10) = 5.57V. The base current will also flow in R1 and if that is 1/200 of the collector current it will be 25pA. This will drop an additional $4.7*10^{3}*25*10^{-6}$ = 0.118V leaving 5.45V at the base.

In practice, it's necessary to check the voltage across D1, and if the oscillator is drawing higher current, then the measured voltage will be lower than expected. We should then reduce the value of R5 until a level close to the zener voltage is achieved. A recommended way to do this is using a trimpot in series with a 100Ω resistor to feed the zener from the full supply. Then substitute a fixed value equal to trimpot plus 100Ω.

Understanding Improved?

I hope this exercise has been of assistance and that the understanding of circuits according to their d.c. and a.c. conditions has been improved! If you have any questions – I may be contacted in relation to this article or others in the series via **tony@pwpublishing.ltd.uk** Cheerio until next time.

Mike Richards G4WNC's Data Modes
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Now it's time to Round-Up

This month, in his *Data Modes* column, Mike Richards G4WNC recaps the modes that he's covered so far.

What started as a short series of articles on data modes has turned into a much larger project and there's still so much more to cover! Having discussed this with **Rob G3XFD** the Editor, I'm afraid you'll have to put up with my ramblings for a while longer!

This month, rather than ploughing into yet another digital mode, I think it's time to take stock and summarise the ground we've covered and start getting a bit more practical. If you've been following this series, you'll no doubt have noticed a few common themes as I've described the various modes.

So, let's start by simplifying the main processes in the encoding and decoding of data signals. I've shown a generic block diagram in **Fig. 1**. Here you can see that there are three key stages in the generation of many data signals.

The First Stage

The first stage for many, but not all systems, is to convert the code generated by the computer keyboard into a different form. You may ask why do we need this stage? Well, there are many reasons, but the 8 or 16-bit code generated by the computer for each key press is not necessary the most efficient way to communicate that character.

For good old RTTY we have to make a conversion because RTTY only has 5 data bits available for each character – that's just 32 combinations. As a result, for RTTY, our keyboard output has to be translated into the RTTY 5-unit code.

In PSK31, **Peter Martinez G3PLX**, put considerable effort into developing an alphabet that would make typical Amateur QSOs as efficient as possible. The result was the PSK31 Varicode that uses a variable length code to represent the characters in the message. Much like Morse code, the common letters are allocated much shorter codes that the less common letters and punctuation.

By way of example, in varicode, the lower case 'e' uses just two data bits whilst the '?' character uses 10-bits. It's also worth noting that upper case letters all have longer codes than their lower case counterparts; if you need speed, stick to lower case characters.

For the AMTOR modes A and B, they also use a special alphabet, but in this case the alphabet comprises 7-bits but each character comprises a pattern of four 1s and three 0s. This unique pattern is used by the decoder to check for errors. If the received character matches the pattern it's accepted, if not it is discarded.

Dealing With Errors

With the vagaries of the h.f. bands, it's inevitable that all data modes will encounter errors. These could be due to all manner of problems, i.e. local noise, adjacent signals, weak signals, propagation effects, etc. The strategy for dealing with these errors is the prime reason for the development of many of the newer data modes.

When it comes to coping with errors, the basic choices, or options for data modes are much the same as we would employ for 'phone QSOs i.e.

1: Ignore errors and leave the distant operator to 'guess.'
2: Make frequent checks that the message is getting through.
3: Repeat everything you say.
4: Use phonetics which means that you send patterns of information (words) that can be used to establish the starting letter even if the word itself is partially corrupted.

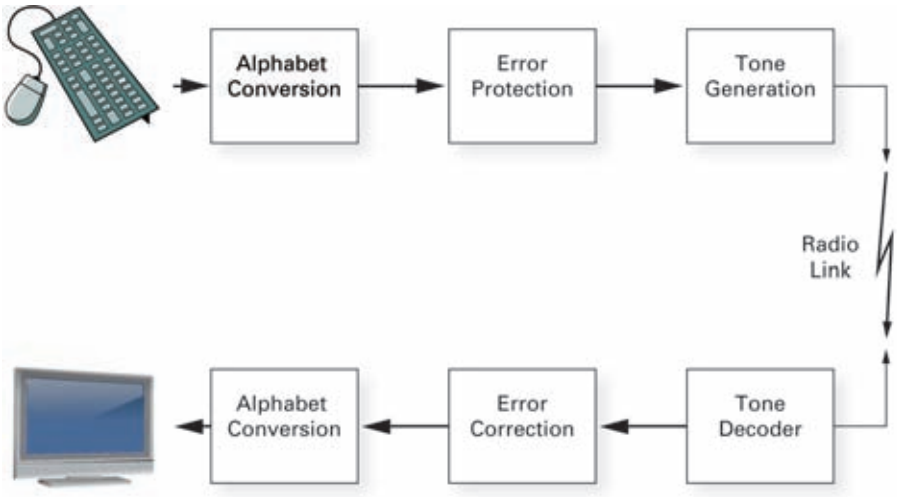
Option 1

Option 1 is to ignore errors and this is fine when you have a good link and errors are few and far between. This is the system used for RTTY and PSK31 signals. When there are just occasional errors, it's relatively easy for the distant operator to spot and correct occasional character errors.

Option 2

Option 2, is that frequent checks can be used under more difficult conditions, where you know there is a problem and so you might just check reception after each part of the message. If there's a problem the distant operator can ask you to repeat. In the digital world this technique is known as Automatic Repeat reQuest or ARQ.

The ARQ technique is extremely effective and is particularly good at getting the message through when there is heavy fading (QSB) as it just keeps trying until the message



Key stages in the encoding and decoding of digitals signals.

succeeds. The downside is that the technique only works between two interlocked stations. This technique is used in AMTOR, PACTOR and the latest V4Chat modes.

Options 3 and 4

Options three and four can be dealt with together, as these are the most sophisticated error protection systems. The basic principles are very straight forward as they invariably supplement and extend the message to create patterns of information that allow the original message to be recovered even when vital parts are missing.

The error protection process is known as Forward Error Correction (FEC). The simplest system is that used for the AMTOR FEC broadcast mode as this just sends the entire message twice but with the second copy delayed by three characters. If the decoder detects an character error it simply waits three characters for the repeat and uses that.

However, there are many more sophisticated systems that can provide excellent error protection under adverse conditions. A useful analogy for this type of error protection can be seen in the way the phonetic alphabet works. Each word in the phonetic alphabet has been carefully selected to be very different to all the other words in the alphabet. As a result, you can take out the starting letter of the words and the message will still get through. Here's an example: ?hiskey, ?ovember, ?harlie which is really 'WNC'.

The concept of using a pattern of information to protect against errors is particularly powerful when implemented with digital technology. The most common system in use is known as convolutional coding, which is where

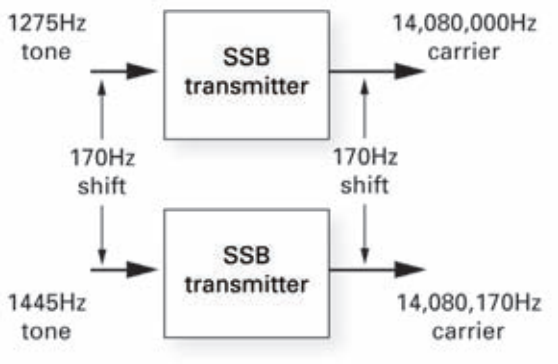


Illustration of Audio Frequency Shift Keying (AFSK).

Table 1 – PSK-31 Varicode Alphabet Sample

Character	Varicode
c	101111
d	101101
e	11
f	111101
g	1011011
h	101011
i	1101
j	111101011
k	10111111
l	11011
m	111011

the data signal is passed through a series of interconnected shift registers. The outputs of these shift registers are combined using special adders and the result is an output pattern that is determined by the data in all the registers.

In one of the more common systems, the output comprises two bits for each one entering. And the pattern of bits is determined by the seven bits currently passing through the encoder. This particular variant was developed for the NASA Voyager deep space missions and was used to recover data from vehicles whilst deep in space. Having spent millions of dollars building and launching the spacecraft, they needed to be absolutely sure they could recover the data from the very weak and wobbly signal they would receive back on Earth.

The convolutional coding theories were developed back in the first half of the 20th Century but it's only through the development of today's powerful computer processors, that many of the systems have become practical for everyday use. All mobile phones use convolutional coding as do all digital TV signals. In fact, the decoding algorithm developed by **Andy Viterbi** is thought to be the most used mathematical algorithm in the World!

Although convolutional coding is the most popular systems for data mode error protection, two of the newer and very powerful systems, MT63 and Olivia employ Walsh Transforms to create the FEC data pattern – take a look at my previous Data Modes columns to see how this is done.

Modulation Systems

Let's just finish-off this month's round-

Table 2 – Summary of Data Modes covered so far

Mode	Bandwidth	Keying	Error Correction Mode ARQ/FEC	FEC Encoder	Purpose
RTTY	170	FSK	n	n	QSO
AMTOR	170	FSK	both	ARQ	QSO
PACTOR	200Hz	FSK	both	ARQ	email
PSK31	31Hz	PSK	n	n	QSO
QPSK31	31Hz	QPSK	FEC	Reed-Solomon	QSO
MFSK16	360Hz	MFSK	FEC	NASA	QSO
JT65A	200Hz	MFSK	FEC	Reed-Solomon	specialist weak signal
ALE	1750Hz	MFSK	FEC	GOLAY	Link control
ROS	500 or 2000Hz	MFSK	FEC	NASA	QSO/ weak signal
Hellschreiber			n	n	QSO
WINMOR	500 or 1600Hz	MFSK	both	NASA	email
V4Chat	200Hz	MFSK	both	NASA	QSO
Olivia	125 to 2000Hz	MFSK	FEC	Walsh	QSO/weak signal
MT63	500 to 2000Hz	MFSK	FEC	Walsh	QSO/weak signal
Packet APRS	200Hz	FSK	ARQ	n	data

up with a quick review of modulation systems employed for data modes. The simplest of all is Frequency Shift Keying (FSK) and we see that used in RTTY. In the FSK method, the carrier frequency itself is shifted to represent the bits within the data stream, and typically would shift high (in frequency) for a logic 1.

Although the original systems employed genuine frequency shift keying, all modern Amateur systems use Audio Frequency Shift Keying (AFSK). Let me quickly explain that. If you inject a single tone into the microphone socket of an s.s.b. transmitter the output should be a single carrier. And it would be offset from the 'notional' carrier frequency by the audio tone.

So, if we were to shift the input audio tone up by 170Hz the carrier would also shift by 170Hz. It's this characteristic that we use to create FSK by injecting tones into the microphone input of your transceiver. For all the data modes that I've dealt with, the audio tones that we need, are generated in software and are available from the 'Line-out' on your computer's soundcard.

So, what about Phase Shift Keying (PSK), can that also be generated at audio? The answer is yes, if we change the phase of the audio tone, the change is also reflected in the transmitted output. However, there's more to data mode modulation than simple frequency shifting or phase swapping. If you've listened around on the data section of the bands you will no doubt have heard all manner of multi-tone systems burbling away.

Multi-tone Systems

The use of multi-tone systems has extended the basic FSK of RTTY and may use up to 64 separate tones to carry the data. By employing more tones the encoder is able to spread the message over a range of frequencies thus making it less vulnerable to single-tone interference. This technique is usually combined with spreading each character in time, which makes the systems very robust and able to work under extremely poor conditions.

Probably one of the best examples of this technique is to be found in Olivia which was developed by **Pawel Jalocha**. Olivia employs 32 tones for its modulation, each spaced 31.25Hz apart. The tones are combined with a sophisticated Walsh function encoding technique, where each 7-bit character in the message is expanded to 64-bits prior to transmission. The result is a data mode that can operate reliably with signals below the noise floor!

Let's Get Together!

One of the main problems for data modes enthusiasts is finding someone to work. There isn't a problem if you want to use PSK-31 or even RTTY as there is always activity on the popular bands. The problem starts when you want to try one of the less used modes.

To help with this, I have just created a new Yahoo Group called Datamodes that I want to use to help people get started but you use it to contact me or to arrange skeds with other Amateurs. I am very happy to join in the fun on just about any mode. If you want to give it a go, sign-in to Yahoo and follow the link below to join the group:

http://tech.groups.yahoo.com/group/datamodes/

In addition to the message forum, I have posted a copy of the slides I used at this year's RSGB Convention plus a large number of audio samples that you can use to test your system. I look forward to seeing you on the air!

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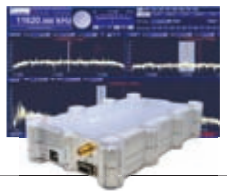

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Pre-Amplifiers & Power Amplifiers

This month, in his *What Next?* column, Colin Redwood G6MXL takes a look at pre-amplifiers and power amplifiers.

Welcome to *What Next?* (*WN?*). Last month I looked at techniques for switching radio frequencies (r.f.) paths. This month I'm discussing pre-amplifiers and power amplifiers that make use of some of the techniques mentioned last month

Firstly, I'm going to look at pre-amplifiers, often abbreviated as pre-amps, and then I'll go on to examine power amplifiers.

Pre-Amplifiers

A pre-amplifier can be used as part of a receiving station to boost (amplify) the signal from the antenna. There are a couple of parameters that are particularly important when considering pre-amplifiers. The first is gain and the second is the noise figure.

Gain is a measure of the extent to which the pre-amplifier increases the signal and it is measured in deciBels (dB). A typical pre-amplifier having a gain of 10dB will increase the signal power 10 times (voltage level by a little over three times). So, from a gain point of view, installing a 10dB gain pre-amplifier will have the same effect as installing an antenna with a 10dBd gain instead of a dipole. However, this is not the whole story.

All electronic equipment generates noise within itself. It is therefore, a good idea to choose a pre-amp with a low noise figure (also measured in dB). A good low-noise pre-amplifier will have a noise figure of well under 1dB.

Best Results

To get the best results from any pre-amplifier, it should be located close to the antenna, rather than close to the receiver or transceiver. You may ask, "Why is this?" Well, in answering, it all comes down to the signal-to-noise ratio. The signal-to-noise ratio is the amount of wanted signal related to the unwanted hiss and static signals.

By putting the pre-amplifier near the antenna (**Fig. 1**), there's more wanted signal to boost, with no change in the background noise level (unlike placing the pre-amplifier at the rig end of the feeder, where the signal may have been reduced by around half due to feeder losses).

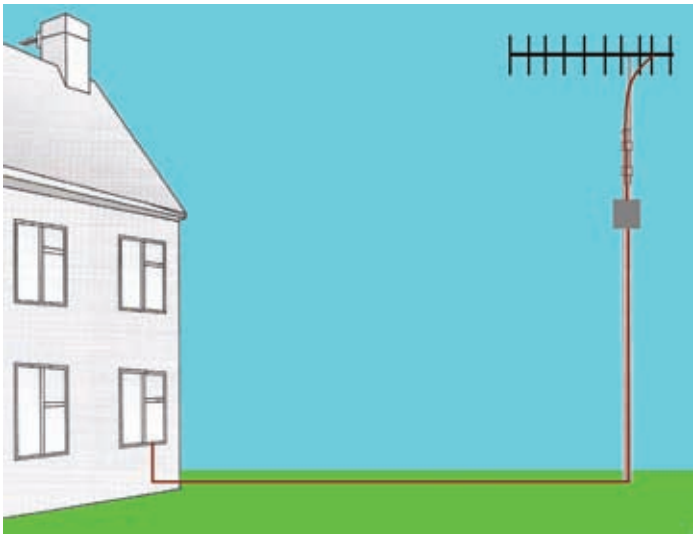

Fig. 1 : The best signal-to-noise ratio can be obtained by mounting the pre-amplifier near to the antenna.

The pre-amplifier will contribute its own noise no matter whether it is mounted at the mast-head or in the shack. When mounted at the antenna, the cable looses some of this 'extra' noise as well as the amplified signal too.

If the pre-amp is installed at the receiver or transceiver, the signal from the antenna is already weaker than at the mast-head due to feeder loss. The pre-amplifier will increase the strength of the weaker signal and add its own noise. Overall this will give a poorer signal to noise ratio than mounting the same pre-amp at the mast-head. Nevertheless you may still notice some improvement with a pre-amplifier next to a somewhat 'deaf' receiver or transceiver rather than without a pre-amp at all.

As feeder loss is mainly an issue at very high frequencies (v.h.f.) and even higher frequencies, it's on these bands where pre-amps are mainly used and can be more effective.

Strong Signals

The presence of strong signals, even from outside the Amateur band, may cause an overload in the pre-amplifier or the amplified signal may overload the receiver or transceiver. Because of this, I always prefer to be able to switch a pre-amplifier off under these conditions.

So, if you think another station is splattering or has a wide signal, it's always a good idea to first check what happens if you switch off the pre-amp. More often than not, this will make a big improvement – in which case it is likely to be a problem with your receiver's ability to handle strong signals and not the other station's transmissions.

It is also important to remember that pre-amps are sensitive devices. They must not be exposed to high levels of r.f. such as those found on the output of transmitters or transmit power amplifiers.

There are a number of categories of pre-amplifiers. So, let's take a look at these.

Receive Only

Receive only pre-amplifiers don't incorporate any capability for being

by-passed or handling the output of a transmitter. They're are fine for listening, perhaps using with a scanner, for example. If you're looking for such a pre-amp, it's worth checking whether it's designed for a particular band of frequencies (perhaps the amateur 144 -145MHz band) or a more wide range of frequencies.

Note: Receive-only pre-amplifiers designed for a specific amateur band, generally include some filtering to limit strong out-of-band signals – which is also usually a feature of the other types shown below.

Transmitting Stations

The second type of pre-amplifier is designed for use with a specific Amateur band, for transmitting and receiving and are intended for use in the shack. These usually incorporate switching (usually r.f. relays) to by-pass the pre-amp when transmitting. The switching arrangements should specify the maximum transmit power that can be used.

Mast-Head Pre-Amplifiers

Next come the pre-amplifiers intended to be mounted at mast-head near the antenna. These are usually in waterproof enclosures (**Fig. 2**). They usually incorporate switching (using r.f. relays) to by-pass the pre-amp when transmitting.

For a pre-amp mounted at the top of the mast, I suggest that you should not rely on feeder loss in assessing the maximum transmit power that can be used. In my experience it's a good idea to be cautious in these things.

Note: The direct current (d.c.) power for mast-head pre-amps is often fed up the coaxial feeder, using either a bias-T* unit or from an optional d.c. supply from the transceiver.

**This technique allows the d.c. power supply to be fed up the coaxial cable feed. The d.c. is 'blocked' by a capacitor, which allows the r.f. signal from the pre-amplifier to flow down the coaxial cable to the receiver end, where it's passed to the receiver via another coupling capacitor.*

Combined Pre & Power Amplifiers

The final type of pre-amplifier is intended for use in the shack as part of a combined pre-amplifier/power-amplifier. These are usually designed for a single Amateur band, and to be located close to the transceiver in the shack.

Power amplifiers, sometimes called 'linears', are designed to increase the power output from a transmitter. Here

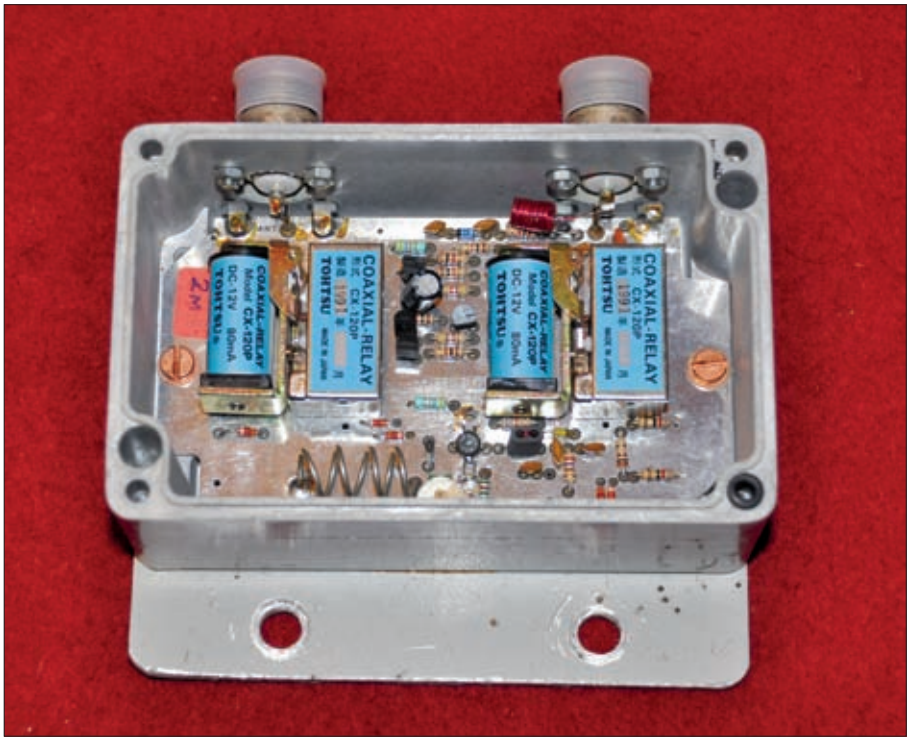

Fig. 2: A waterproof pre-amp designed for mounting at the masthead. The p.c.b. mounted input and output relays are clearly visible.

I'm not referring to one of the last stages of a transmitter – but to separate external units connected between the output of the transmitter and the feeder to the antenna.

Imagine that you have a low-power transmitter and want to increase the r.f. power output. One option is to sell your low-power transmitter and buy a higher power transmitter. The other option is to install an external power amplifier.

Power amplifiers are available for the h.f. to s.h.f. bands. At h.f., power outputs quoted often exceed the maximum permitted by UK Licence schedules. Why are they sold? Quite simply – by under-driving the power-amplifier they produce their most linear output with the least production of spurious signals.

Input & Output

Basically speaking, r.f. power amplifiers take relatively small signal and make them bigger. They can only do this over certain range of output powers. As the input power is increased, the output power should go up in proportion to the increase in input power. This is known as linear gain. So for example if a 1W transmitter is connected to a 10dB gain (x10) power amplifier, the output from the power amplifier will be 10W.

If the input power is then turned up to 5W, we can expect a 10dB gain (x10) gain giving an output of 50W. If the input power is then turned up to 8W, we might again expect 80W output.

However, if we turn the input power up to 9W, while we would expect to

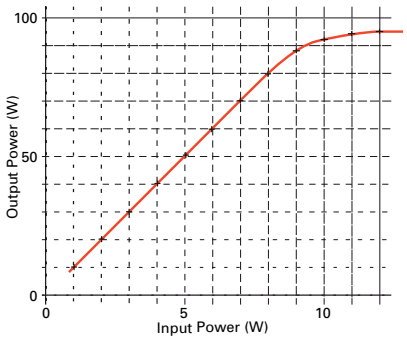

Fig. 3: A graph of input power versus output power of a hypothetical power amplifier. Note how the power output stops increasing the output level as it becomes 'saturated'.

get 90W output, we might find that the output is a little less (let's say 87W). If we turn the input power up to 10W, we may only get 92W output. Turning the input power up to 20W may only result in an output power of 100W – and no matter how much more power is applied no additional power will be produced.

If we were to draw of graph of input power against output power, it will look something like **Fig. 3**. The part of the graph that is a straight line is the range of input power over which the power amplifier is said to be linear. Using a power amplifier outside its linear region can cause server distortion to signals where the amplitude of the signal is important – e.g. amplitude modulation (a.m.) and single sideband (s.s.b.).

Power amplifiers were more common some years ago, when v.h.f. and u.h.f. transceivers generally had lower power outputs than modern equipment. Nevertheless, a power-amplifier for a favourite band could be a useful add-

on for a low-power transceiver such as Yaesu's FT-817.

These days power amplifiers with outputs up to around 100W or so are usually based on semi-conductor (transistor) technology. At higher power outputs, valves are still frequently to be found. If you are thinking of going for a valve amplifier, please remember that they have very high voltages present – that can kill – especially if not handled correctly.

Power Supply

It's important that the power supply used with a power amplifier, is able to supply the necessary current. If it can't do so, then the linear part of the graph will be reduced. As general guidance, a good transistor power amplifier delivering 100W of r.f. power will need in the order of 20+ Amps from a 13.8V power supply.

Receive To Transmit

To switch from receive to transmit, some pre-amps and power amplifiers can detect that there is r.f. present on the socket connected to the transceiver and will automatically switch to transmit. This is known as r.f. sensing. Those that employ r.f. sensing often have two settings (**Fig. 4**).

The first setting is intended for frequency modulation (f.m.) signals and switches back to receive as soon as the signal is no longer present. The second setting is intended for s.s.b. use, whereby switching back to receive is delayed to allow for a short pause in signal (due to a pause in between words).

Some amplifier require the grounding of a spare pin on a connector (**Fig. 5**), and others rely on some d.c. being present on the coaxial socket connected to the transceiver. Some pre-amps and power amplifiers offer a selection of switching techniques.

Having used all three techniques, I know that, when implemented correctly they all work. In general I prefer either the explicit d.c. presence or grounding of a pin technique with r.f. sensing as a fall-back in the event of some un-planned failure.

Electromagnetic Compatibility

Before considering running higher power, readers should consider the Electro-Magnetic Compatibility (EMC) implications of doing so. Increasing power can cause neighbour's TV and radio equipment to overload, leading to complaints of TV interference (TVI), etc. Perhaps this is good point to remind readers of the fun that can be had running QRP. So please don't feel that high power is essential to enjoying the hobby – it certainly isn't!

Fig. 4: A combined pre-amp and power amplifier designed for 1W input power on 432MHz. Note the f.m./s.s.b. switch on the bottom right. This control determines whether there is a delay in switching back from transmit to receive when r.f. sensed switching is employed with s.s.b. signals.

Fig. 5: The rear panel of the combined pre-amp and power amplifier. Note the 3.5mm jack socket on the bottom right. Grounding the centre pin will cause the unit to switch to transmit.

Fig. 6: A valve linear from the Linear Amp UK range. This one is their '2m Discovery' model. With permission of Linear Amp UK.

Many manufacturers of pre-amps and power amplifiers that were once so common, are no longer in the market place, although you may see units from firms such as Microwave Modules, BNOS and RN Electronics on the second-hand market. And to help one Amateur – **Dave Robinson G4FRE** – has a page on his web site containing circuit diagrams of some discontinued pre-amplifiers and power amplifiers at **http://www.g4fre.com/circuits.htm** which readers may find helpful.

Current manufacturers include *PW* advertiser, **Spectrum Communications**, who supply a range of pre-amplifiers and power amplifiers both in kit and ready-made forms for the 50, 70 and 144MHz bands. I**com UK** have a couple of mast-head pre-amps for the 144MHz and 432MHz bands. **Kuhne Electronic GmbH** in Germany have a wide range of pre-amps and power amplifiers for the v.h.f., u.h.f and many microwave bands.

For the h.f. bands, Icom's IC-PW1 Euro and **Yaesu's** VL/VP-1000 and a number of **Ameritron** and **Linear Amp UK** high-power valved linears for the h.f. and 50MHz bands are all capable of producing full UK power.

Linear Amp UK Amplifiers also have a range of a high-power valve linears for a range of v.h.f. and u.h.f. bands (**Fig. 6**). Additionally, **RM Amplifiers** produce a range of semi-conductor power amplifiers, for the h.f. and v.h.f. and u.h.f. bands.

Colin Offers Encouragement!

Finally, I would encourage readers to explore improvements to their antennas and to try to reduce feeder loss before considering pre-amplifiers and power amplifiers. These are often a cheaper way of getting a better receive signal and a stronger transmitted signal than using pre- and power-amplifiers.

However, if you've done everything you can to improve the antenna and reduce feeder loss, then pre-amplifiers and power amplifiers can certainly be helpful. ●

It's Competition Time!

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By answering three simple questions – based on the review of the Anytone AT-5555 28MHz multi-mode transceiver by **Rob Mannion G3XFD** in the September 2011 issue of *PW* – you could win the actual transceiver (kindly donated by **Mike Devereux G3SED** of **Nevada**) used by the Editor!

Questions: All the answers can be found in the Anytone AT-5555 review in the September issue of *Practical Wireless* (pages 22, 23 and 24).

To enter: All you require to enter our free competition is the corner flash from the November issue of *PW* and the completed entry form (or corner flash from this issue (December). You may photocopy the competition entry page but you must detach the corner flash and send it in with your entry. Only one entry per household. Multiple entries will be disqualified. Entries must arrive at the PW Publishing Ltd. Offices in Broadstone on or before the closing date of 8th December 2011. The winning entry will be drawn from the Editor's (outsize!) hat after the closing date and the winner will be notified by the Editor. (Please ensure you provide your full postal address, telephone number and E-mail address on the entry form) and you pay the correct postal charge (wrongly, or un-stamped entries will not be delivered to the *PW* offices by the Royal Mail). The Editor's decision on the prize winner will be final and correspondence will not be entered into.
Good luck with your entry!

Send To:
***Practical Wireless* Anytone Competition**
PW Publishing Ltd.
Arrowsmith Court
Station Approach
Broadstone
Dorset BH18 8PW

Question 1:
Which British Radio Amateur friend did Rob G3XFD work via the Swiss based 28MHz repeater?

Question 2:
Who programmed the 28MHz f.m. repeater frequencies into the Anytone AT-5555 for Rob?

Question 3:
Which UK Island did Rob G3XFD manage to work during his on-air evaluation of the AT-5555?

Name and callsign:
.....

Your full address and post code:
.....
.....
.....

Telephone:
.....

E-mail address:
.....

Please write your details in carefully. Don't forget your telephone number and E-mail addresses. As the prize is a transceiver that requires a valid transmitting licence to use – to win, you must hold an Amateur Licence too.

Don't forget to attach **both corner flashes** – from this issue and the one from the November issue – to your entry. If you photocopy the competition page please don't forget to attach both corner flashes! Entries received without both corner flashes will be disqualified.

PW Competition Dec 2011 Coupon 2

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

NOVEMBER

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 and admission will cost £2.00. 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 & Buy, displays, catering and facilities for the disabled.
Glen G4FVL
E-mail: chariman@catsradio.org

November 20th
The Mayo Rally
The Mayo Radio Experimenters Network Club Radio Rally will be held at the Welcome Inn Hotel, Castlebar, County Mayo, Ireland and the doors will 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 3rd
The Friskney Winter Sale
The Friskney & East Lincolnshire Communications Club Mid-Winter Table Top Sale and Auction will be held at the Friskney Village Hall, Church Road, Friskney, Lincolnshire PE22 8RR. The doors will open at 7.30pm and admission will cost £1.50. Tables (two for the price of one) will cost £4.00. There will be free parking, free identity badge printing, one free entry to the raffle and free tea and coffee.
Tel: 07554 362020
E-mail: felcc@btinternet.com
www.felcc.com

January 15th
The Dover Rally
The Dover Amateur radio Club Rally will be held at the Whitfield Village Hall, Dover CT16 3LY. There will be talk-in via GB3KS, trade stands and a Bring & Buy.
www.doverradiorally.com

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 5th
The Radio-Active Rally
The Radio-Active Rally will be held at the Civic Hall, Nantwich, Cheshire CW5 5DG. The doors will open at 10.30am and there will be car parking, trade stands, a Bring & Buy and catering.
Simon Chettle G8ATB
Tel: 01270 841 506
www.midcars.org

February 12th
The Northern Cross Rally
The Northern Cross Rally, organised in association with the Wakefield & District Radio Society, will be held at the Thornes Park Athletic Stadium, Horbury Road, Wakefield, WF2 8TY. The doors will open at 10.30am (10.15am for the disabled) and admission will cost £3.00. There will be free car parking, trade stands, a Bring & Buy (booking-in from 10.15am), catering and facilities for the disabled. In addition, there will be a miniature steam railway in the afternoon (weather permitting).
Ken Quinn 2E0SSQ
Tel: 07900 563117
E-mail: 2e0ssq@wdrs.org.uk
www.northerncrossrally.com

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

February 26th
The Swansea Rally
The Swansea Amateur Radio Society Rally will be held at the Court Herbert Sports Centre, Neath Abbey, Neath, SA10 7BE. The doors will open at 10.30am and admission will cost £2.50. There will be free car parking, trade stands, a Bring & Buy, special interest groups and catering.
Roger GW4HSH
Tel: 01792 404422
www.radioclubs.net/swanseaars

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

March 11th
The Wythall Rally
The Wythall Radio Club Radio and Computer Rally will be held at Woodrush Sports Centre, Shawhurst Lane, Hollywood, nr Birmingham B47 5JW (on the A435, 2 miles from Junction 3 of the M42). Admission will be £2.00 and there will be talk-in on S22 (V44), car parking, trade stands, catering and a Bring & Buy.
Chris, G0EYO
Tel: 07710 412 819
E-mail: g0eyo@blueyonder.co.uk
www.wrcrally.co.uk

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

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

April 15th
The Blackpool Rally*
The 50th Northern Amateur Radio Societies Association Exhibition (Blackpool) Rally will be held at the Norbreck Castle Exhibition Centre, Blackpool FY2 9AA. The doors will open at 11.00am (10.45am for the disabled) and there will be talk-in, car parking, trade stands, a Bring & Buy, special interest groups, Morse tests, catering with a licensed bar and facilities for the disabled.
Dave M0OBW
Tel: 01270 761 608
E-mail: dwilson@btinternet.com
www.narsa.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 17th
The Newbury Rally
The 25th Newbury Radio Rally and Boot Sale will be held at the Newbury Showground, Priors Court, Hermitage, Thatcham, Berkshire RG18 9QZ (next to M4 J13). The gates will open at 9.00am and admission will cost £2.00. There will be talk-in on S22 (V44), free car parking, trade stands, a big display area with amateur radio stations, exhibitions and special interest groups, a flea market, catering and facilities for the disabled. Sellers will have access to the site from 8.00am and pitches will cost £10.
E-mail: rally@nadars.org.uk
www.nadars.org.uk

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- **N type** connector (part: 7367) £6.50
- **BNC type** connector (part: 7379) £6.50

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- **BNC type** connector (part: 7720) £3.25

Aircell 7

Specification
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Aircell 7 Connectors
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- **BNC type** connector (part: 7371) £5.25

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MFJ 557	Morse Key With Oscillator £45.95
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Icom IC-208	Twinband VHF/UHF Mobile £189
Icom IC-706MkIIG	All Mode HF/VHF/UHF £699
Icom SM20	Base Microphone £99
Kenwood SP430	Extension Loudspeaker £49
Kenwood TS-570DG	5-100w Base/Mobile HF TX £589
Kinetics SBS-1	Real-Time Virtual Aircraft Radar RX £299
MFJ 784	DSP Filter Unit £229
MFJ 12788	Multimode Data Controller unit £199
MFJ 1702	6 Way Antenna Switch £39
MFJ 208	Portable Antenna Analyser £69
Yaesu FC700	Manual 100watts Antenna Tuner £149
Yaesu FT450AT	HF/6m Portable/Base Transceiver £599
Yaesu FRG100	HF Desktop Receiver £329
Yaesu FT7800	Twinband 145/433Mhz FM Mobile TX £179
Yaesu VR-5000	Wideband RX Fitted DSP Board £429

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Yaesu FT817ND
Portable All Band, All Mode TX.....£549.00

Yaesu FT7900E - B2
Twinband 145/433MHz Mobile FM TX ..£249.95

Kenwood TS590S
New HF + 6m Transceiver
£1339.95

Kenwood TS-480SAT
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Lack of v.h.f. Activity?

This month our keen v.h.f. author Tim Kirby G4VXE takes his regular look at the world of Amateur Radio above 30MHz and discusses some perceptions about v.h.f. activity (or the lack of activity!).

Welcome to the *World of VHF* (*WoVHF*). I've recently had the chance to do some club talks on a theme loosely connected with this column; v.h.f./u.h.f. and how you can try to get more out of it – often very simply! Particularly when you speak to a very h.f. orientated group it can be quite interesting to talk about the perceptions of v.h.f./u.h.f. – so I thought *WoVHF* readers might be interested in some of the questions that I've been asked.

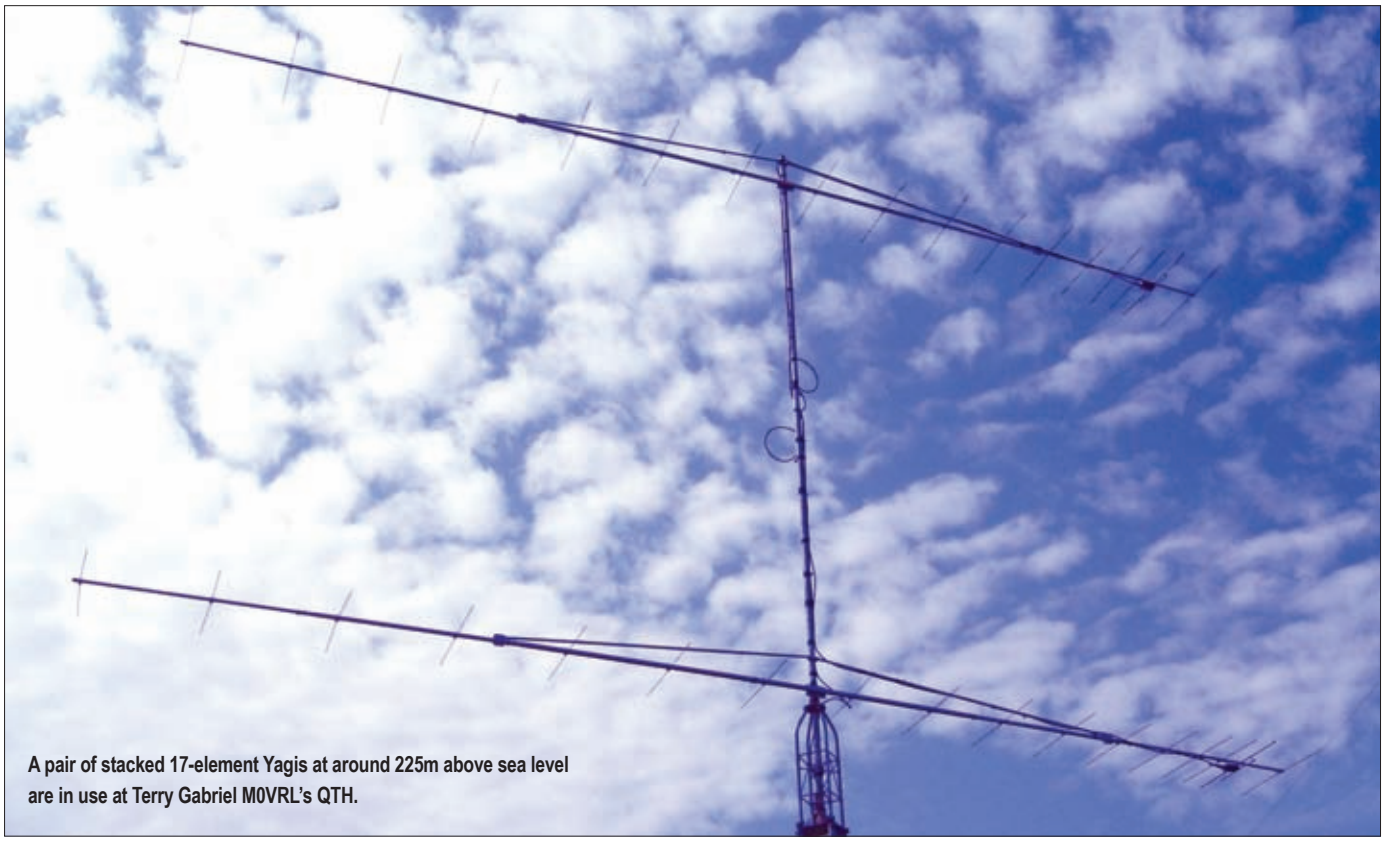
One question was *"Does anyone use v.h.f./u.h.f. these days"*. The answer is "Yes, they do!" There's a lot of activity across a very wide variety of modes on v.h.f. – some of which may not be obvious to the casual listener. Take for example APRS. I recently logged over 90 different callsigns on the mode on 144.800MHz during a couple of hours. Yet, that level of activity, which would be quite welcome to a v.h.f. contester, is not obvious to the casual listener.

Then there's the weak signal work taking place at the bottom of the band, Satellites, D-STAR, Repeaters, f.m. simplex, the list goes on. But it's easy to see how only a couple of those activities might be obvious to a casual listener. It's probably fair to say that this is symptomatic of the hobby in general – people talk about declining activity. There's probably as much activity as there's always been – it's just fragmented across more modes and bands.

As well as being active, I think it's important for us to be positive about what we work and enjoy. If a new or returning Radio Amateur hears a QSO taking place where people are moaning about a lack of activity – they're probably not going to be tempted to join in! Be positive about the activity that you do find and think about encouraging people to get on the air and have fun.

I was posed another question. "Do you think the introduction of Continuous Tone Coded Tone Squelch System (CTCSS) on f.m. led to a decline in activity". And I admit that this question hadn't even occurred to me! But certainly there was a perception that particularly with older equipment it was more difficult to use repeaters than when the only requirement was a toneburst (or perhaps a glissando whistle).

Also, some operators complained



A pair of stacked 17-element Yagis at around 225m above sea level are in use at Terry Gabriel M0VRL's QTH.

that since the introduction of CTCSS they couldn't hear other repeaters on the same frequency which might previously have been: a) interesting and b) alerted them to improved propagation.

Talking this through during the club talk, we recognised that many repeaters will open with a toneburst and not necessarily require a CTCSS. tone, although this is not universal. Additionally, most transceivers allow you to transmit a CTCSS tone to gain access to a repeater, but you do not necessarily have to receive a tone to decode.

Therefore, as I'm interested to hear anything that is going on – I set the memories on my transceiver to send the tone that the repeater requires, but don't require a 'decode' tone, so the receiver will open at any signal that's heard. Hopefully this went some way to addressing the perception that CTCSS has perhaps made things more complicated.

During the club talk a keen and experienced v.h.f./u.h.f. operator highlighted the difficulty that he faced trying to get QSL cards for awards. Many people – and I have to include myself in this – aren't interested in exchanging QSL cards, although most (again myself included) will do so if someone specifically needs a confirmation.

It was also discouraging to find that web information on some of the RSGB v.h.f./u.h.f. awards had not been updated since 2007! Of course, most of us realise that volunteers, whose time may be short, are behind these awards programmes, so I hesitate to be overly critical, but nevertheless, there was a sense that the 'domestic' RSGB v.h.f./u.h.f. awards programme could benefit from an overhaul.

Some Amateurs were excited to find that their 'white stick' v.h.f. antenna could receive signals from space or at least, rather further afield than the next town or hilltop! All interesting discussions to have and I look forward to having more of them over the coming months as I visit other groups

Propagation Changes Mark The Seasons

I'm writing *WoVHF* at the start of October, and by now, the summer Es on the lower v.h.f. bands is just a memory, with a few brief openings popping up from time to time. However, after some the cooler nights, a misty morning as the temperature comes up, is much more common and it is surprising how much of a difference this can make to 'local' v.h.f./u.h.f. signals over a distance of perhaps 75 to 250 km. If you wake up and see a band of mist around, it's very often well worth a tune around the bands.

If you enjoy long distance tropospheric propagation on 144MHz and can operate a little c.w. then look out for the Marconi Memorial CW contest on the first weekend of November – there should be plenty of activity from all over Europe so there's a good chance of making some good contacts even if you are not interested in taking part in the contest.

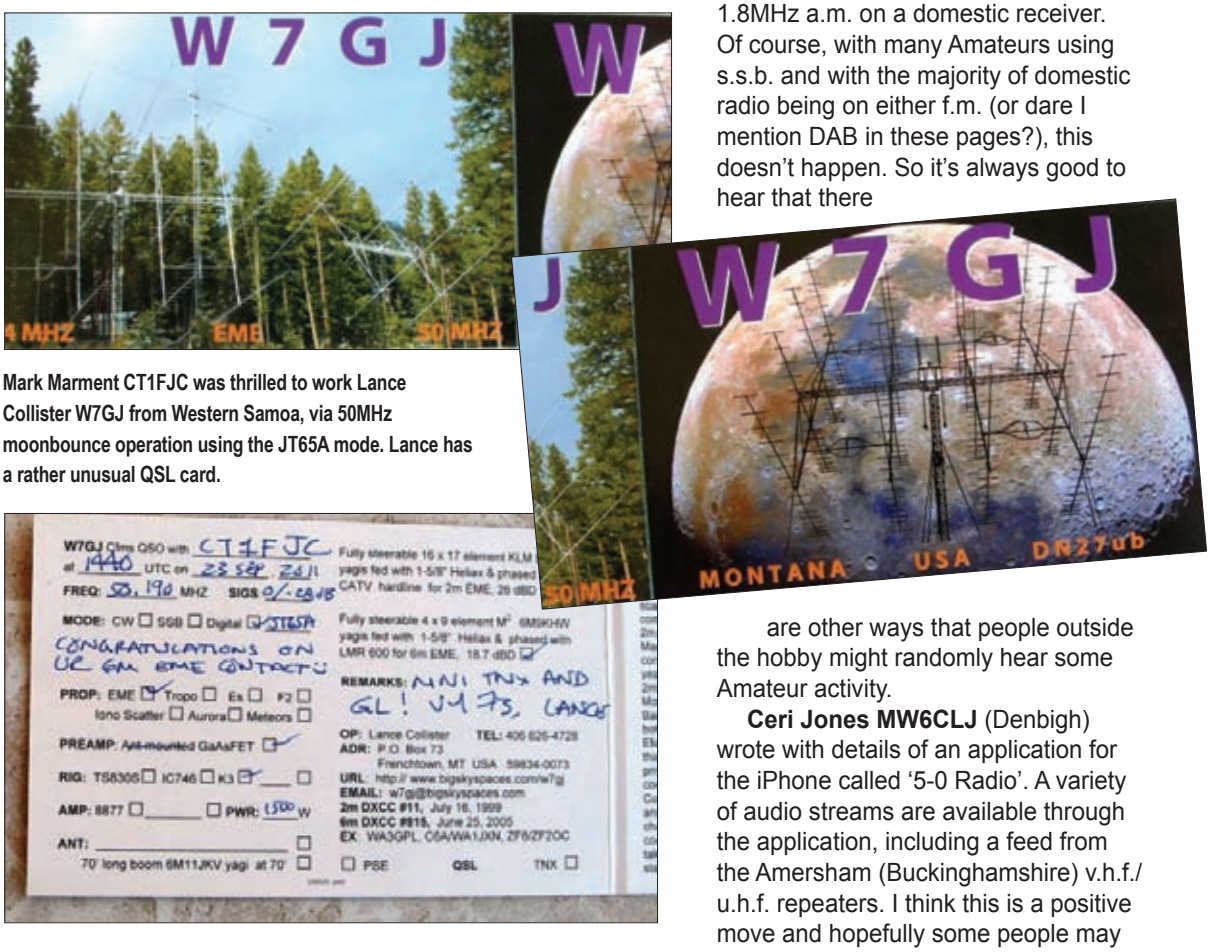
Draconids Meteor Shower

The Draconids meteor shower was predicted to be particularly intense this year, peaklng on the evening of October 8th. For visual observers, there was disappointment as much of the UK at least was under cloud.

However, it was interesting to monitor the GRAVES radar from France on 143.049MHz and see a very considerable increase in reflection rates. At the time of writing I'm not aware of any QSOs made using the shower, but if you have any information please send it in!

Listening To VHF On The iPhone

Many Amateurs of a 'certain age' were introduced to the hobby by listening to 1.8MHz a.m. on a domestic receiver. Of course, with many Amateurs using s.s.b. and with the majority of domestic radio being on either f.m. (or dare I mention DAB in these pages?), this doesn't happen. So it's always good to hear that there are other ways that people outside the hobby might randomly hear some Amateur activity.



Mark Marment CT1FJC was thrilled to work Lance Collister W7GJ from Western Samoa, via 50MHz moonbounce operation using the JT65A mode. Lance has a rather unusual QSL card.

Ceri Jones MW6CLJ (Denbigh) wrote with details of an application for the iPhone called '5-0 Radio'. A variety of audio streams are available through the application, including a feed from the Amersham (Buckinghamshire) v.h.f./u.h.f. repeaters. I think this is a positive move and hopefully some people may be curious enough to listen – perhaps their first step on the road to obtaining an Amateur Radio licence.

The 50MHz Band

At the **International Amateur Radio Union** (IARU) Region 1 conference held in August, 2011 in Sun City, South Africa, a new bandplan was agreed for the 50MHz band. The main change is that the majority of beacons will move from the lower portion of the band where they are currently, to the segment between 50.400 and 50.500MHz, although synchronised beacons will share a segment between 50.000 and 50.030MHz.

The c.w. segment shows a 'Future International Calling' frequency at 50.050MHz and an Intercontinental Calling frequency at 50.090MHz.

Moonbounce (e.m.e) has a segment from 50.310 to 50.320MHz and Meteor Scatter between 50.320 and 50.380MHz.

A WSPR frequency is established at 50.401MHz (±500Hz) with a beacon exclusive band from there to 50.500MHz. The new bandplan is set to take effect from January 2012, although beacons have until the end of 2014 to move to their new frequencies.

Although the band has been largely quiet from the UK, our friends further south having been making some interesting contacts. **Ronald Pincho ZB2B (Gibraltar)** was very excited to make some great QSOs on October 2nd. He worked 5N7M (JJ39) and then called "CQ" to be called by a number of European stations on backscatter including EA6DX, CT1DMK, IS0GQX, EA6VQ, CT1FJO, CT1FFU and EA5GPJ.

Suddenly, the propagation changed towards the Carribean and Ronald worked a weak FM8DY (FK94) but then 9Y4D (FK90) called with a huge signal, followed by 9Y4VU (FK99) and 9Z4BM (FK99). Ronald says that the opening was incredibly strong and unusual particularly at this time of year when Es has all but ended.

Mark Marment CT1FJC (Portugal) has also been enjoying some F2 and TEP propagation into Africa and South America; September 20th PY1RO (GG87); September 21st 5N7M (JJ39), CE4WJK (FF45), CE3SX (FF46); September 23rd 5N7M; September 24th PY2WBC (GG67); September 25th PY4AQA (GG88), PY7XAF (HI22). On September 30th he worked PY2ESG (GG66), ZP5SNA (GG14), PY4OG (GG78); October 1st C5YK (IK13); October 2nd brought CX2CC (GF15), CX9AU (GG53) and PY2EX (GG66). Mark says that the signals have been quite good strength although there has been very deep fluttery fading on the paths.

Mark had another exciting QSO to report. As I reported last month, he had E-mailed an s.w.l. report to **Lance W7GJ** for Lance's 50MHz moonbounce operation from Western Samoa. Lance quickly E-mailed back, confirming the report and also offering a sked with Mark from Lance's home station on Mark's moonset. Mark was thrilled to make his first 50MHz EME QSO using the JT65A mode. Lance's best signal was -18dB, but in the past Mark has heard him with a stronger signal. Mark says that after the QSO was over, Lance continued to call "CQ" so that Mark could check the lobes on his antenna. Lance W7GJ runs an excellent system with large antennas and 1.5kW output. Mark was using his legal limit to a 5-element DK7ZB design Yagi. Mark reflects that what **really** made the QSO was the fantastic *WSJT9* software by K1JT. Congratulations to Mark and Lance for a fascinating QSO and experiment.

Don't forget as we move towards the end of the year, there's sometimes a secondary peak in 50MHz Es. And with the rising solar activity it will certainly be well worth pointing your beams towards South American or Africa in the evenings and keeping an ear out for some DX.

The 70MHz Band

The 70MHz band plan was also discussed at the IARU Region 1 conference in August. No major changes to this band plan, although a new WSPR frequency is established at 70.091MHz (±500Hz). The c.w./s.s.b. calling frequency will remain on 70.200MHz and a Meteor Scatter calling frequency is on 70.250MHz. Co-ordinated beacons have a segment between 70.000 and 70.090MHz with Personal beacons between 70.090 and 70.100MHz.

Jeremy Smith M0XVF (County Durham) reports that owing to an impending house move most of his station has been packed away, apart from his MX294 for 70MHz f.m. which has been used to give away points in contests and local QSOs. He says he is always keen and available for skeds at any time on 70MHz on any of the modes. Jeremy says that he was active during the *Practical Wireless* 70MHz Contest and there were plenty of locals on, but not so many contesters.

Jeremy comments that most of the contesters use horizontal beams, so only relatively short contacts are made with stations using verticals, owing to the crossed polarisation losses. He wonders if contesters might gain a few more points by putting up a simple vertical antenna as well as their beams.

Here at **G4VXE** I made a few QSOs during the RSGB contest on September 11th, the most distant being G4RFR (IO90). During the *PW* contest on September 25th I was pleased to make a few contacts, the most distant of which was **G5RS/P** (JO00) on s.s.b. but it was good to work a few stations on f.m. as well. The most distant station worked on f.m. was **Walt Davidson G3NYY** who was operating portable from Broadway Hill in Worcestershire.

It was interesting listening to Walt as he worked 2E0UAC in Coventry, who I could hear easily and other stations as distant as Nuneaton in Warwickshire and the Brecon Beacons who I could just detect. Quite good distances for 70MHz f.m.

The 144MHz Band

Not too much to report on s.s.b. from myself **G4VXE**, although I was very pleased to work HB10K (JN37) on September 23rd during some nice tropo. The Swiss beacon HB9HB was easily audible a couple of times in the evening of the 23rd and the morning of September 24th.

On f.m. my monitoring for distant repeaters has showed up a number of localised tropospheric openings September 8th; GB3KD (Kidderminster), GB3FR (Lincolnshire) and GB3VT (Stoke on Trent); September 28th GB3FR again and GB3HH (Buxton); September 30th GB3PO (Ipswich) and GB3BC (South Wales); October 1st GB3CO (Colchester) and GB3NF (Nottingham) and October 2nd GB3FR (again!), GB3BC, GB3CG (Gloucester), GB3KD and GB3MH (West Sussex).

There were also some nice f.m. simplex QSOs to be had; September 30th M0WYB (Bath) and G4LOE (Solihull); October 1st G0DUQ (Hednesford), G1KDU (Nuneaton). Although these are not very long distance QSOs they do show what can be done with **very** simple equipment when conditions improve just a little bit.

It was interesting speaking with **Rob Wilkes G0DUQ** (Hednesford, Staffordshire). Rob was using a simple collinear antenna for 144/432 and 1296MHz, albeit at about 260m a.s.l. on Cannock Chase. Rob said that over the years he had worked stations from Norway all the way around to Portugal using the simple antenna. And of course, with v.h.f./u.h.f. Yagi antennas from the same location he had done even better!

The 432MHz Band

There's not very much to report from me at **G4VXE** on the 432MHz band. I was disappointed to miss the RSGB UHF and up contest at the start of October. However, the repeater monitoring has turned up few unusual stations over the period; September 30th GB3HW (Romford) and GB3BZ (Braintree); October 1st GB3ME (Rugby), GB3LE (Leicester) and GB3TF (Telford).

That's it for this month! Thanks for all your reports and feedback – **it really is** appreciated! There's always room for more though, so if you have a piece of v.h.f./u.h.f. news then please do get in touch. See you next month!

Carl Mason GW0VSW's HF Highlights
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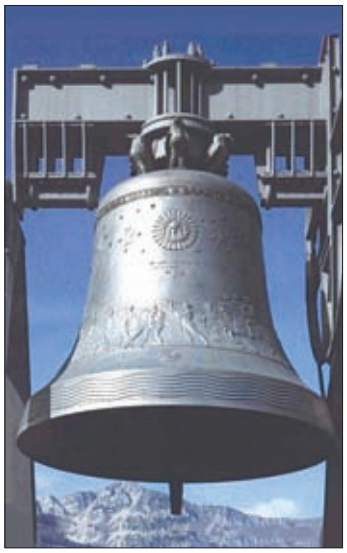
Tel: (01792) 380822 E-mail: gw0vsw@btinternet.com

Please send your reports to Carl by the 15th of each month.

Watch out for IR3MD!

Carl Mason GW0VSW has a jam-packed h.f. column this month including news of IR3MD. Everyone has been busy chasing the DX it seems!

Welcome to this month's *HF Highlights* (*HFH*) and, as I have received a large number of logbooks this month, there's only room for news of one very special event from Italy. The Campana dei Caduti or Bell for the Fallen is the largest moving bell in the world weighing 22.5 tonnes and was made to commemorate those who fell in the First World War 1914-1918. Every evening it sounds with 100 tolls in the hope that 'man may find the path that leads to Peace'.



The Maria Dolens Bell

The bell was cast in Trento in 1924 and made with the bronze from the cannons of the countries that took part of the First World War. Baptised with the name Maria Dolens, it was placed on the Bastione Malipiero of the Castello di Rovereto an ancient fortress town standing at the frontier between the bishopric of Trento (which was an independent state until 1797) and the republic of Venice. It is from here that the special callsign **IR3MD** will be in use by ARI Rovereto and operate until November 30th on all the h.f. bands. An award is available and details can be found on *QRZ.com* with the QSLs going via IZ2GOT.

The OM55TV QSL card sent to George G3ICO followingh an 18MHz c.w. QSO.

The QSL card from WQ3W after he was worked by Paul G0VHT.

The QSL card from Dennis VE3UTN.

Your HF Reports

On to your h.f. reports now and the first is from **Eric Masters G0KRT** in Worcester Park, Surrey who tried 'Top Band' (1.8MHz) for a change and managed an 30W amplitude modulated (a.m.) A3E contact with G8BPY in New Malden who was using a 1940s crystal controlled 'Trawler Transmitter' and the first time it had had a QSO for a good number of years.

The 7MHz band provided Eric with TM11CAN (France) 1527 and a station run by the Association des radioamateurs de Loire Atlantique marking an international rowing competition in Nantes (QSL via F5KEQ). Next came ON3PBH (Belgium) at 1535 and PD0MNF (Netherlands) at 1540UTC using a Kenwood TS-570 and modified W3EDP antenna tuned with an SG-230 smart tuner.

The 7MHz band had some interesting results for **Michael Hall M0MGH** in Worksop (Nottinghamshire) who's been using his Kenwood TS-2000X at 5W to an indoor trapped dipole. He sent in some *WSPR* reports and was amazed that his signal was being copied as far away as the West Coast of America between 1412 and 1454UTC by N6RY in Carlsbad in California, AK4DW in Knoxville Tennessee, KB9AMG in Waukesha, Wisconsin, AE2EA in Springwater, New York and K1JT in Princeton, New Jersey.

Geoffrey Powell M1EDF in Seckington, Tamworth had a c.w. QSO on 10MHz with DF9US/MM at 0810 who was operating in the North Sea again. He had been calling "CQ" for a time with no takers so Geoff gave him a call and enjoyed a brief rag chew with Herman before he broke off for a well earned 'cuppa'.

The 14MHz Band

On to the 14MHz band and there was another unusual station to make Geoff's log – Jan Steskal OK1AVG (Czech Republic) at 1015UTC who was operating /P and collecting USA States from his boat on a river using a Icom IC-706, MFJ-971 tuner and solar power. Geoff used his Icom IC-718 with 60W to a doublet antenna.

A variety of modes for **Bill Ward 2E0BWX** in Edwinstowe,

Nottinghamshire who used ssb to work 9A3WL (Croatia) 0930, HB9IRC (Switzerland) at 1415, IZ6BZV (Italy) 1805 and EA5HRB (Spain) at 1825 with 50 watts while 25 watts PSK31 found YU7MK (Romania) 0940 and EU8CV/P (Belarus) 1321 and RU4PF (European Russia) at 1815UTC with JT65HF using a Icom IC-7400 and Pro whip antenna.

The log from **Peter Leng ZL4TE** in Cambridge, New Zealand shows PSK31 contacts with TX8BG (France) 0320, RW3QM (European Russia) 0329, WB7BBQ (USA) in Bremerton, Washington at 0411. Then came YO7CFD (Romania) 0445, OM7OM (Slovakia) 0450, SP8EEX (Poland) 0456, RV6ALI (European Russia) 0513, DL3KOG (Germany) 0521, I3QDK (Italy) 0532. Next came a s.s.b. QRP QSO with 9A/IZ4UEZ (Croatia) 0526 running 10W and then QRO contacts with JE1SDO (Japan) AS-007 at 0856. Next logged was 4W6A (Timor-Leste) OC-148 at 0936UTC using A Yaesu FT-1000MP MKV and either a Cushcraft AV3 or newly installed loop antenna using 150ft of wire fed with ladderline to a a 4-1 balun.

Paul Morrison G0VHT in Milton Keynes has found a little more leisure time and his recent return to mobile h.f. operating is proving to be incredibly good fun! A good example of this took place in September when Paul was driving home from work near Oxford. Using his old Icom IC-706 and 100W to a monoband whip for 14MHz he heard a large pile-up with numerous stations trying to contact an American station WQ3W.

Paul was fortunate and his call was picked out from the masses at the first attempt but it was not until the end of the QSO that Paul realised WQ3W was operating /AM over the North Atlantic. Ronal was the captain of a Boeing 757 and using the aircraft's commercial h.f. transceiver for Amateur Radio contacts. Ronal said "The radio isn't much but the antenna is between 30 and 43000 feet up" and gave Paul a solid 5/9 report and his first ever mobile to aeronautical mobile contact at 1645. Others that made VHT's mobile log included 9K2HN (Kuwait)1810 and V85SS (Brunei Darussalam) at 1810UTC.

Also on 14MHz was **Colin Evans M0CGH** in Keighley, West Yorkshire who was a guest operator at **GB6VMR** – a call for the North Yorkshire Vintage Machinery Society's Annual Working Weekend and Rally at Ellerton Park, Scorton and organised by the **Riggwelter Special Events Group** (inter-club group). Colin said "After the propagation blackouts on h.f. during the daytime the bands suddenly came back to life with a bang.

"From late afternoon on the saturday until around 2000 we got lots of QSOs into the special event station's log. The generator we were using was then shut down to give some peace to our fellow campers and I then decided to miss the beer tent and hook up my little RockMite 20 c.w. transceiver to the special event station's 4-band vertical antenna which was mounted on a pole at the front of the caravan to try and work some DX and try to work across the Atlantic.

"I set the RockMite 20 and using battery power began calling "CQ" using the rig's memory keyer on 14.058MHz. After just a few calls Ted N1WPU came back to my call at 2105UTC giving me a 539 report! Ted was in Stockton Springs, Maine and my power was just 264mW which makes the contact in the order of 11,000 Miles Per Watt! I couldn't believe my ears"! It doesn't get much better than that!

The loop antenna used by **Frank Wyer G8RY** enabled VK3ZPF (Australia) in Melbourne to enter his log at 0640UTC using his Ten-Tec Omni V transceiver.

In Worcester **Steve Wellon M0SAS** enjoyed a few PSK31 QSOs mostly with Europe. But he was pleased to log JH9FNB (Japan) at 1957UTC using a Yaesu FT-857D with 20W to a Cushcraft MA5B.

The 18MHz Band

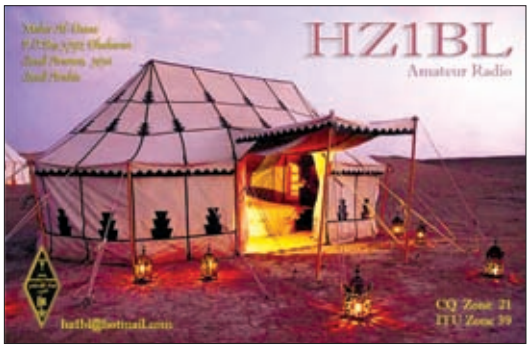
On 18MHz Steve managed another Japanese station JR2DUM at 1612UTC. Meanwhile **Dennis Upton VE3UTN** in Kichener, Ontario, Canada wrote in to say he had tried my 'Crown' wire loop design in his attic. His version is slightly larger and has been very pleased with the results from it so far on the 14, 18, 21 and 50MHz bands.

Dennis has worked into Brazil, Venezuela, Algeria, Mexico and of course the UK running PSK31 at 20W or less from his Yaesu FT-857D. This month, to his surprise he made VR2XLN (Hong Kong)!

In Yeovil **George Davis G3ICO** used his Elecraft K1 at 5W to a dipole antenna to work c.w. stations OM55TV (Slovakia) 1018. This was a special call to mark the 55th anniversary of

The Floating Amateur Radio 'shack' of OK1AVG, who was operating on 14MHz.

The GB5SCT Special Event QSL card.



The HZ1BL1 QSL card sent to Maynard M1EGX after a 21MHz s.s.b. QSO.

The JH9FNB QSL card sent to Steve M0SAS for a 14MHz PSK31 QSO.

The JR2DUM QSL card sent to M0SAS following an 18MHz PSK31 QSO.

The QSL card from XX9LT to Jim GM7TUD for the QSO on 21MHz s.s.b.

The QSL card from PD5MNF confirming Eric's 7MHz s.s.b. QSO.

The FG5GP QSL card sent to Maynard M1EGX for a 21MHz s.s.b. QSO.

television broadcasting in the republic (QSL via OM3MB). Next came EN20EU (Ukraine) 1516, 9M2TO (Malaysia) AS-015 at 1549 and ZA/OK1MBZ/P (Albania) at 1755UTC.

The 21 & 24MHz Bands

The 21MHz band is a favourite with **Maynard Beddard M1EGX** in Sutton Coldfield, West Midlands who found the band in great shape for a change. Voice contacts were made with JY4CI (Jordan) 1010, RV6ALI (European Russia) 1025, P49T (Aruba) SA-036 QSL via W3BTX at 1440, and VK4MSA (Australia) Queensland at 1452. Then came OD5NH (Lebanon) 1500, HZ1BL (Saudi Arabia) 1530, YB0OBZ/1 (Indonesia) 1531, 9K2HN (Kuwait) 1540, 5B4AIF (Cyprus) AS-002 at 1550 (QSL via EB7DX). Next into the log came 9H4JX (Malta) EU-023 at 1645, CN8QN (Morocco) 1655 QSL via EA7FTR, 5N6SYL/25V (Nigeria) 1715, CT9/RW9JW (Madeira Islands) AF-014 at 2250, 5Q1A/P (Denmark) 2301 (QSL via OZ5ESB). The he worked LU9ESD (Argentina) 2305, CO6LC (Cuba) NA-015 at 2310 and FG5GP (Guadeloupe) NA-102 at 2317UTC. All were achieved using a Yaesu FT-920 and Heil headset, and 100W into a dipole at 25 feet above ground. a.g.l.

Also on the band was **Jim Pedley GM7TUD** in Locharbriggs, Dumfries in Scotland who logged XX9LT (Macau) 1124, R3BY/0 (Asiatic Russia) AS-066 1141 with c.w. While s.s.b. found S79DO (Seychelles) AF-024 at 1206 (QSL via DL5RDO). Next came SU3MB (Egypt) 1216, P29FR (Papua New Guinea) OC-034 at 1235 (QSL via I2RFJ). Next came OE6MBG/KH6 (an Austrian Amateur operating from Hawaii) OC-019 at 1733 and YN2N (Nicaragua). All were achieved using a Kenwood TS-590 at 100W to a Cushcraft MA5B antenna.

On the 24MHz band **Nicholas Phillips 2E0BPU** in Croydon used an Icom IC-703 and 5W QRP to a 100ft doublet antenna to work (on s.s.b.) stations R8MC (Asiatic Russia) 0904, EA8BPX (Canary Islands) on Tenerife AF-004 at 0908, and EW6DX (Belarus) 0915. Then came UR5XFQ (Ukraine) 0925, YO4WO (Romania) 0930, PT7CB (Brazil) 1453, VE3AW (Canada) 1459, LZ2KV (Bulgaria).

Frank G8RY managed to work JM1VWR (Japan) in Tokyo at 0648. He says "I should get up early more often as conditions seem to be more far better recently" so hopefully Frank's logbook will be filling up with DX over the coming months.

On another special event was **John Wakefield M0XIG** who operated **GB5SCT** for St. Cyres Telegraph near Honiton, Devon. This event commemorates over 200 years since the shutter telegraph first operated at this site**.** During the Napoleonic wars the St. Cyres Shutter Telegraph was one of a number that operated as a communication link for the Admiralty between London and Plymouth.

John's station was his Yaesu FT-1000 MKV and Acom amplifier running around 300W to a Butternut HF6V vertical with 100 separate 10m long radials. His operation was cut short, due to the severe weather we experienced over the weekend, but he still managed to work a huge amount of stations on 14MHz before trying 21MHz. He logged JA7CSL (Japan) 1055, W4FHC (USA) 1116 in North Carolina, PY1FC (Brazil) 1139, 7Z1TT (Saudi Arabia) 1204, TA4A (Turkey) 1302, VK4ACE (Australia) in Queensland at 1335. Then came YB4GU (Indonesia) 1336, A61NN (United Arab Emirates) 1548, and VE1ZA/M (Canada) 2029UTC. John mentioned the 4W6A DXpedition which "took him out" while he was operating on 21.310MHz. the 4W team began operating on 21.295MHz but were calling 'split' 5-15 up so John decided to call it a day and watch the torrential rain as it began to fall!

The 28MHz Band

Several of you reported that 28MHz had been open at various times during the day with good DX to be heard or worked if you could break the EU pile-ups. George G3ICO used QRP again and logged PY4HO at 1847 on the key using his doublet antenna.

I also managed a short spell here working ST2AR (Sudan) 1407 QSL via S53AR with 50W and QRP QSO's with A45XR (Oman) 1438 and EA8IN (Canary Islands) at 1625UTC. I used a Yaesu FT-867D, with 5W to a modified SRC X-80 vertical antenna.

Signing Off

Well that's it for another month. It's great to see the h.f. bands improving once again and as I write this in early October the bands are buzzing with DX with openings that are becoming longer although the propagation and the bands do close rather quickly at times! 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. I'm pleased to say that there was a good deal to work through this time and I hope I have managed to fit you all in. Until next month I wish you all good DX. 73, Carl GW0VSW.

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AOR AR-7030 £550.00
AOR AR-8200Mk3 £349.00
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The KT66 – a Great Valve!

The brown dustcoat worn by our 'shop manager' announces it's Phil Cadman G4JCP in charge this month. But why is he wearing the sprig of holly behind his left ear?

Welcome to the festive *Valve & Vintage* (*V&V*) 'shop', suitably bedecked with fairy lights and tinsel. And lots of nice warm valves, of course. As promised last time, I'll begin with a brief mention of the British cousin to the American 6L6, the MarconiOsram Valve (MOV) **KT66**.

As I've already mentioned to *V&V* readers, in an attempt to get around the Philips pentode patent, engineers at MOV's parent company EMI had come up with the beam tetrode. Because of initial manufacturing problems, the design was shown to RCA, whose engineers – in 1936 – produced the world's first commercial beam tetrode, the 6L6. Good as the 6L6 was, the engineers at MOV improved on the design and just one year later, MOV began selling the legendary KT66.

Up to this time, directly heated power triodes such as the PX4 and PX25 had been highly regarded as audio output valves (they still are). However, the improved efficiency of pentodes and beam tetrodes over triodes, was very attractive to manufacturers.

Fortunately, the KT66 proved to be a superb audio output valve, particularly so when connected in pairs in the ultra-linear configuration. That's where the screen grids are connected to taps on the primary of the output transformer.

I would imagine that even the triode enthusiasts weren't too upset, as when triode-connected, the characteristics of the KT66 closely resemble those of the PX4. And being indirectly heated, the KT66 is much easier to bias than the PX4.

A Pair Of KT66s

A pair of KT66s - in ultra-linear - can produce around 30W with cathode bias and 50W with fixed bias. That's plenty for home and modest public address use, but by the 1950s there was a demand for higher power.

So, in 1956, MOV introduced the **KT88**, ostensibly a higher power version of the KT66. Indeed, a pair of KT88s in ultra-linear can produce 50W with cathode bias and a whopping 100W with fixed bias. Even when triode connected a pair can still manage around 27W.

A few years later, in 1960, and in direct competition to the Mullard EL34 pentode, MOV introduced the **KT77**. It was physically identical to the EL34 and had similar characteristics. In fact, they are just about interchangeable.

The KT77 is far less well known than its two siblings, yet it is a fine valve, and equally as good as the EL34. Also in 1960, MOV introduced the **TT21** and **TT22**.

With A Top Cap

The TT21 is, more or less, a KT88 but with a top cap. (The TT22 is the same as a TT21 but has a 12.6V heater.) Low distortion audio valves can make good radio frequency (r.f.) amplifiers too, as long as their physical construction is suitable.

The TT21 has the same base connections as the KT88 except the anode is taken to a top cap. This keeps the anode-grid capacitance to a minimum, and allows a higher working anode voltage. Physical differences aside, the TT21 can be used in place of a KT88 with no circuit modifications.

When used as a linear amplifier for single sideband (s.s.b.), the TT21 is considerably better than the 'sweep tubes' (TV 'time base' valves) that were used in early Amateur Radio s.s.b. transmitters. It's even better than the ubiquitous 6146B, with third order intermodulation products some 10dB less than the 6146B when operated at the power levels found in most Amateur Radio transceivers.

At maximum ratings, a single TT21 can produce 110W p.e.p., nearly as

The military version of the KT66 with its shrouded glass envelope, made it difficult to see what configuration the valve had. Contrast this with the 'civilian' version in the other photograph!

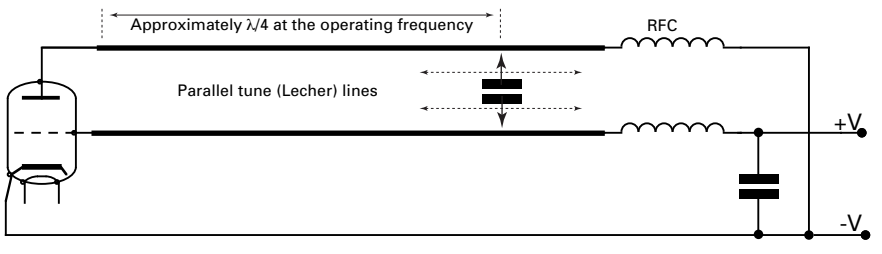


Fig. 1: Able to generate some useful output power at v.h.f./u.h.f., the grid and anode of the valve are connected to a parallel line resonant system (such as Lecher wires) as shown here to help define the frequency.

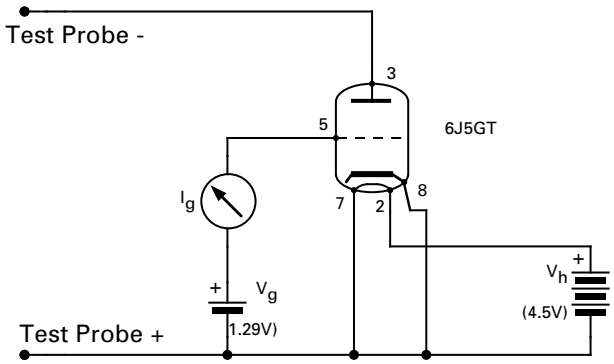
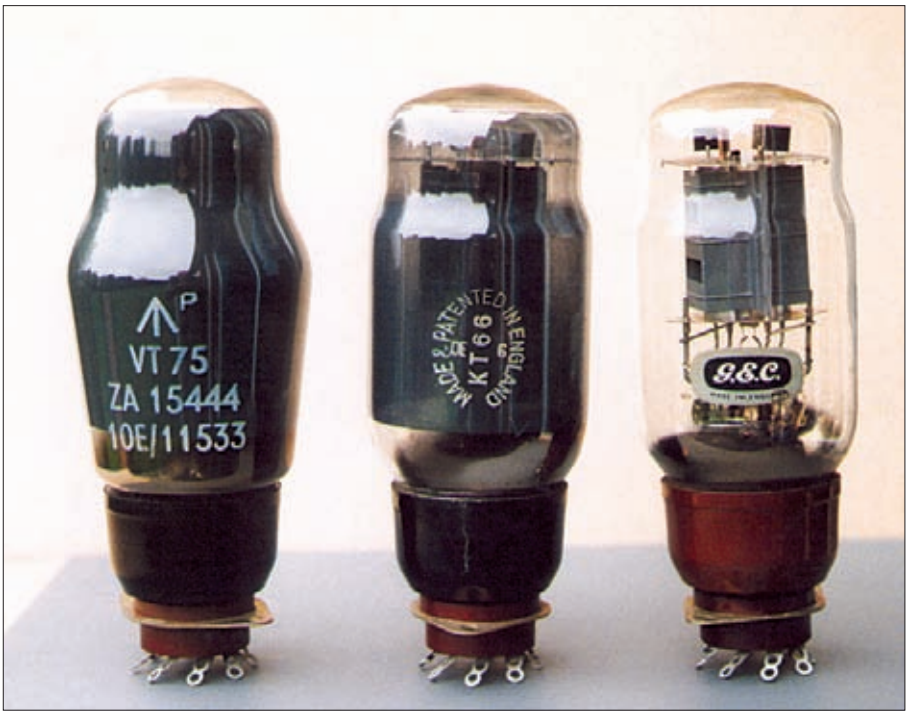


Fig. 2: The inverted triode voltmeter and in its simplest form has the the outstanding property of an extremely high input resistance.



The KT66 in three disguises, on the left as the Miilitary 'bottle' and two 'civilian' variants to the right.

much as two 6146Bs. Shortly after its introduction, **George Jessop G6JP** (of MOV fame) designed a c.w. and a.m. transmitter which used a TT21 in the p.a. The design was published in the July 1961 issue of the RSGB *Bulletin*.

In 1964, George designed a linear amplifier for s.s.b., which can also be found in the *Bulletin* (I don't know the issue). This amplifier also appeared in the fourth edition of the RSGB's *Radio Communication Handbook*. Despite its excellent performance, the TT21 was never – as far as I know – used in any commercial Amateur s.s.b. gear.

I suppose its size was a determining factor; the TT21 is 116mm tall when seated, whereas the 6146B is only 80mm tall. You couldn't really make a compact transceiver with a pair of TT21s inside.

The Green Drive

Because of the unceasing drive to 'go green', most domestic filament lamps are no longer being manufactured. Instead we are being forced to use either halogen (but for how long?) or high efficiency lamps. The fluorescent and l.e.d. lamps now available can cause radio frequency interference, and this fact reminded me that filament lamps can also cause r.f. interference.

Most filament lamps have a gas inside but hard vacuum types do exist and it's this type of lamp that can produce oscillations in the lower v.h.f. spectrum. The term **Barkhausen Oscillation** sprung to mind and after a little searching I found some information.

There's currently an interesting article about some experiments carried out on such lamps at:

www.radiomuseum.org/forum/rustika_lightbulb_fm_measurements.html

Early light bulbs were hard vacuum types and ran from d.c. mains supplies and it's under these conditions that some lamps will produce continuous r.f. oscillations. The accepted explanation is that electrons are emitted from the negative end of the filament and are attracted to the positive end.

Most electrons miss the filament and swing around it in both clockwise and anticlockwise directions. These two clouds of electrons interact with each other and can oscillate back and forth, resulting in the generation of r.f. energy. It's quite complicated so I won't go into any more detail here.

Any search for Barkhausen oscillations will produce lots of references to the **BarkhausenKurz** tube. This device is also known as the BarkhausenKurz (BK) Oscillator, retarded field oscillator or positive grid oscillator. Although severely limited in output power, the BK tube was for a time the only practical way of producing r.f. energy in the u.h.f. spectrum. It's essentially a triode valve, but the grid is held at a significant positive potential with respect to the cathode while the anode is held at, or slightly below, cathode potential.

Electrons emitted from the cathode are accelerated towards the positive grid. However, most miss the widely spaced grid and continue on until slowed to a stop by the slightly negative anode. They are then accelerated back to the grid where, once again, most of the electrons fly through the grid wires and head towards the cathode.

Here they are again slowed to a standstill before heading back to the grid. Bunching occurs when their velocity becomes zero at the cathode and anode, and this results in moving clouds of electrons oscillating backwards and forwards across the grid. Electrons captured by the grid are replaced by new electrons emitted from the cathode.

The frequency of oscillation is primarily dependant on the tube's electrode structure and the grid voltage, there being no resonant circuit or cavity as there would be in a normal oscillatory circuit. With cylindrical electrodes and grid–cathode spacing the same as the grid/anode spacing, the approximate wavelength – in centimetres (c.m) is given by:

$\lambda = 670D/\sqrt{(Eg)}$ [1]

Where D is the diameter of the anode in centimetres and Eg is the grid voltage.

In practice, and in order to generate some useful output power, the grid and anode of the tube are connected to a parallel line resonant system (such as Lecher wires) as shown in **Fig. 1**. When the capacitor is close to the tube, the frequency generated is independent of the external circuit.

However, as the capacitor is moved away from the tube, at some point the frequency will increase and become considerably more intense. In this condition, the frequency can be influenced by the external circuit. Invented in 1920, the BK oscillator was superseded in the early 1940s by the reflex klystron, a valve which also works on a similar principle, but is far more efficient.

My search for information on the BK tube reminded me of another application where the anode of a triode is deliberately made negative with respect to the cathode. This time, however, the purpose is to measure voltage and the technique is still valid today.

It's called the inverted triode voltmeter and in its (very) simplest form is shown in **Fig. 2**. The outstanding property of this voltmeter is its extremely high input resistance.

As you can see from Fig. 2, the grid of the triode is made slightly positive, while the voltage to be measured is applied between the cathode and the anode. But note the polarity: the anode is the negative terminal. With no potential applied to the anode, it's clear that there will be some grid current, and all the electrons leaving the cathode will (eventually) be collected by the grid. This current depends almost entirely on the electrostatic field in the vicinity of the cathode, and it's substantially independent of how this field is produced.

Since both grid and anode potentials affect the intensity of this field, it's possible to apply a negative potential to the anode in order to control (reduce) the current leaving the cathode. As I've already mentioned, all the electrons leaving the cathode are collected by the positive grid, so there's no current flow in the anode circuit. Hence the input resistance is solely determined by the leakage resistance between the anode and the cathode.

To find out how the grid current varies with anode potential, I lashed up the circuit shown in Fig. 2. As I covered the 6J5 triode last time, I thought it appropriate to use an old Sylvania 6J5GT for the test. A rather tired AA cell provided the positive grid potential, hence the rather unusual voltage of 1.29V. Running the 6J5's heater at 6.3V produced significant grid current, even in the absence of any positive potential on the grid. This is an undesirable (if unavoidable) effect, which can be alleviated by reducing the heater voltage.

I used 4.5V for the tests, although in retrospect, 3V would have been even better. Cathode temperature greatly influences the grid current at Va=0V, and so the heater supply must be well regulated.

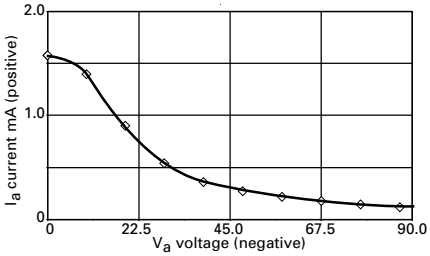


Fig. 3: How the grid current varies with anode potential, using a positive grid potential of 1.29V from a rather 'tired' AA cell.

A digital multimeter set to the 2mA range measured the grid current, while a variable negative anode voltage was provided by a stack of PP3 batteries. The results were most interesting and are shown graphically in **Fig. 3**. The graph is anything but linear, but it does show that the voltmeter is sensitive enough to measure even a few volts.

Beyond about 50V, the graph does begin to straighten out and approximates to a sensitivity of 3uA per volt. Because the grid current is dependant on both the grid voltage and cathode temperature, as well as the voltage applied to the anode, any voltmeter based on this circuit would need calibrating before use. Fortunately, practical voltmeters don't use this simple circuit.

If the grid voltage is held constant, then the variation in grid current with anode voltage is grossly non-linear, as demonstrated in Fig. 3. However, if the grid **current** is held constant, then the variation in grid voltage with anode voltage ***is*** linear. In fact, it's equal to 1/mu, where mu is the amplification factor of the valve. This makes sense when you consider that the usual functions of the anode and grid have been interchanged.

By feeding the grid from a constant current source the magnitude of the change in grid voltage will be directly proportional to the applied anode voltage. But remember, there is a considerable zero offset.

Just to demonstrate the main advantage of this voltmeter, even my lash-up had a very high input resistance. I'd used a short piece of wire to connect the anode of the 6J5 to the stack of PP3 batteries. Removing this wire from the negative end of the stack caused the grid current to increase from 120µA to 1500µA in about three seconds.

If I left this wire attached to the batteries and removed the wire from the positive end of the stack instead, the same increase in grid current took over 27 seconds! Roughly estimating the time constant and guessing the capacitance of the stack of batteries, I came up with a figure of around 10,000MΩ for the input resistance.

Difficult To Make Meter

I've already mentioned that it's the mu of the valve which largely determines the sensitivity, so it's difficult to make a multi-range meter with a triode. The usual trick of adding a potential divider to increase the range is wholly inappropriate here. A design for a practical inverted triode voltmeter was published in *Wireless World* [2].

The article's authors used a pentode valve and connected the control, screen and suppressor grids in various combinations. This created a multi-range meter which retained its very high input resistance on all ranges. The sensitivities they achieved are given in **Fig. 4**.

With modern semiconductors - and a microcontroller to take care of the scaling and zero offset – it should be possible to make an accurate inverted triode voltmeter with a digital readout. Any takers? Oh, and for measuring voltages in the kV range, there's always the PD500, which has mu of around 1,200!

And with that, I hope you all have a good Christmas and New Year. Please do send your comments and letters to me, either via E-mail to: **phil@g4jcp.freeserve.co.uk**, or by mail to: **21, Scott's Green Close, Scott's Green, Dudley, West Midlands 2DX**. Merry Christmas to you all! Phil G4JCP ●

Fig. 4

"Anode"	"Grid"	Earthed Screen	DC Range
a+g3+g2	g1	--	0--0.3V
a+g3	g1+g2	--	0--50V
a+g3	g1	g2	0--75V
a	g1+g2	g3	0--600V

References

[1] *Radio Engineering, 2nd edition*, F.E. Terman. Page 388.

[2] *Inverted Triode Voltmeter*. R.B. Rowson and A.P. Williams. *Wireless World*, August 1960, Page 403.

Radio Spectrum under threat!

As users of the Spectrum, the issue is simple: PLA devices are causing interference and if we don't do something now we might not have a hobby take part in – it's that serious. We have created a Spectrum Defence Fund – not just to fight the PLT issue but other threats as and when they come up.

The Spectrum Defence fund is made up from donations from individuals and organisations with an interest in protecting the Radio Spectrum from noise, interference, and other issues that may affect licensed Amateur Radio Operation and Short Wave Listening. It is used to cover the cost of challenging the regulators of the spectrum (Ofcom, EU etc) over threats to spectrum noise level.

We are looking to our administration (Ofcom) to protect our interests, which it is their statutory duty. There are other challenges ahead and the fund will be used only to protect the Spectrum when and where we need to do so. This is a long term project and all monies donated will be 'ring fenced' for these actions alone.

If every amateur in the UK pledged £10 to the Spectrum Defence Fund we'd probably have enough to fight the cause and so we need your donations (no matter how small) to help us meet the threat.

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Spectrum Defence Fund

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Harry Leeming G3LLL's In the Shop
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Tel: (07901) 932763 E-mail: G3LLL@talktalk.net

To Shift – or Not to Shift

This month Harry Leeming G3LLL discusses special controls on Amateur Radio equipment, remembers the days when he ran a busy radio business in the north west of England and acknowledges the help from Brenda.

Welcome to *In The Shop* (*ITS*) – the column where I remember my days in the Amateur Radio trade – and pass on some of my experiences. This time I'm starting off by looking at a special control often found on modern equipment. Whilst many high frequency (h.f.) rigs are fitted with **IF Shift** controls, this doesn't actually alter the receiver's bandwidth.

Instead the IF Shift just alters the intermediate frequency (i.f.) frequency slightly, to attenuate any interference on one side of the pass-band. Using this control may for instance reduce some interference on the h.f. side of a station, only to move you into more QRM on the low frequency (l.f.) side of the signal – so it has its limitations.

Several Yaesu rigs, including the FT-101ZD, FT-902, FT-707 and FT-107, don't include the IF Shift system, but instead have a genuine variable bandwidth control. Adjusting this increases selectivity by chopping off either the h.f. or l.f. side of the response, depending on which way the knob is turned.

When receiving a single sideband station (s.s.b.) station adjusting the variable bandwidth control may result some loss of speech quality. However, as careful adjustment often improves readability this is acceptable. So, how do the i.f. stages of these popular rigs function?

Block Diagram

The illustration, **Fig. 1**, shows a simplified block diagram of the receiver i.f. stages of the Yaesu rigs already mentioned – with the amplitude modulation (a.m.), c.w. (Morse) and frequency modulation (f.m.) filter switching omitted. First the signal goes through the 20kHz wide 'roofing filter', which limits the bandwidth to prevent signals that are way off frequency overloading subsequent stages.

The next stage – the noise blanker (NB) – is designed to stop the receiver working for a tiny fraction of a second, during sharp, fast noise pulses. As these pulses have first to pass through the 20kHz filter, this must be carefully chosen. If the filter were to ring it would lengthen the pulses, and make them too long for the blanker to function.

The 8.9875MHz first i.f. frequency signal next goes on to the 2.4kHz wide s.s.b. filter, and then on to the 2nd mixer, where it is mixed with the output of the voltage controlled crystal oscillator (v.c.o.). The second i.f. frequency signal (19.7475-8.9875 =10.76MHz) is applied to the 2.8kHz wide filter.

If the v.c.o. is altered in frequency slightly by using the front panel 'Width' control, the effect is to move the second i.f. frequency slightly either side of 10.76MHz. This results in part of the signal being outside the pass-band of the second i.f. filter, so reducing the bandwidth, on either the high or the low side of the response.

The signal could then be passed on to the detector, but the rig would be very difficult to use. This is because every time the width control was moved, the variable frequency oscillator (v.f.o.) knob would have to be re-tuned to compensate for the slight change in i.f. frequency. Doing this would then cause the transmit and receive frequencies to be different.

To get over the difficulties a 3rd mixer is used, and this is also fed with the 19.7475MHz v.c.o. signal. As the difference between 19.7475MHz and 10.76MHz is 8.9875MHz,this becomes the third i.rf., and is at the original first i.f. frequency.

Note: The frequency shift in the 2nd and 3rd mixers exactly cancel each other out, and so the output at the third i.f. frequency remains at exactly 8.9875MHz – whatever the setting of the width control. So there's no need to re-tune.

However, the technique has its problems and everything is fine until the frequency of the v.c.o. shifts more than 2.8kHz. Many rigs have been taken in for repair with the complaint that, "the receiver has gone dead", only for it to be discovered that the width control has been accidentally turned to its extreme. In this case the two i.f. frequencies would have been moved so far apart so that no signals can pass through. This problem is most likely to occur after some junior operator has been fiddling with the controls, but as G3MWO reminded me in the following E-mail, it can happen under fault conditions.

"Remember I contacted you about an FT-101ZD which had 'died' when a v.c.o. had gone way off frequency? I cured this by adding capacitance to the varicap diode circuit. Another friend recently had a very similar experience with an IC-490 where a 63MHz v.c.o. in the p.l.l. had gone high in frequency. After a lot

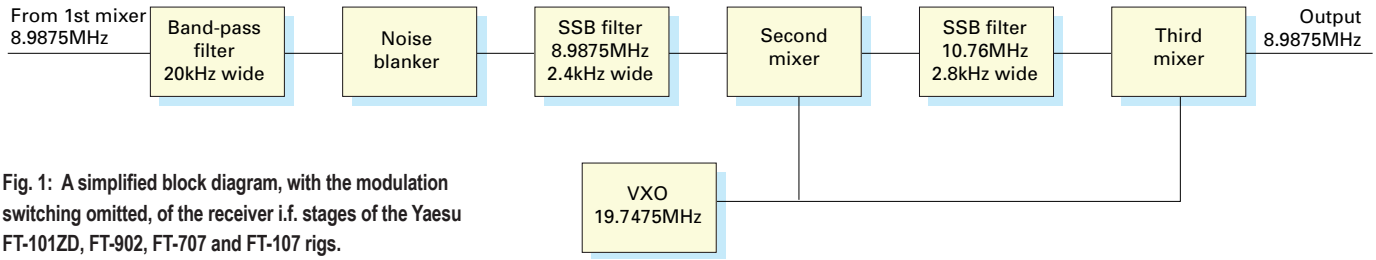

Fig. 1: A simplified block diagram, with the modulation switching omitted, of the receiver i.f. stages of the Yaesu FT-101ZD, FT-902, FT-707 and FT-107 rigs.

Fig. 2: Many Yaesu rigs made in the early 1980s, like this FT-107, had an i.f. Shift (or width) circuit.

of prompting from me, he also 'cured' it by adding a small capacitor across the Varicap diode."

Thanks for the E-mail Derek!

Flash & Bang?

On to plugs wiring and the possibilities of an unexpected 'flash and bang' next! Fortunately, if you want to wire a 13A plug there is a standard way of doing it – but there's no such standard on the power connectors of Amateur Radio equipment.

Indeed, there are multitudes of ways you can wreck your equipment, but because of the lack of standardisation, using the wrong power cable or one that is incorrectly wired, is one of the very easiest.

When confronted with a mains lead, which doesn't have a 13A plug on the end, it's tempting to attach it to a 'Safe Block' (work bench connector), or even worse to poke the ends into a mains socket. Do not get into the habit of doing this, it can lead to disaster. '**Ted**' was in a rush, had his mind elsewhere, and wanted to quickly test a rig. 'Ted' poked the lead into a mains socket, there was a flash, the bench lights went out, and as far as that **12V rig** was concerned it was the end of the story.

I can be absent minded myself, and so, I have made it a rule that **I never** make temporary connections to a.c. power leads, but always fit a 13A plug. This may cause a slight delay, but at least it gives my brain time to click into place before I try and do it with a 12V lead.

Both the KDK and Yaesu's early 144MHz rigs used the same type of two-pin 12V connectors, and the leads looked the same. To help keep the repair trade in business, they wired 'plus' and 'minus' leads the opposite way round, with obvious results. Of course, if you have two pieces of equipment made by the same manufacturer you should be quite safe, as no one would produce two items of equipment using the same d.c. plug, but wired in reverse; **would they?**

Yaesu used a small coaxial plug for the FT-290 12V connector, with the outside terminal being positive. They also use the same connector to deliver 12V to the FC-102, and 8V to the FC-707 antenna tuning units (a.t.u.s), but wired the leads the opposite way round – so don't get the leads crossed.

In recent years things do **seem *to*** have got better, as most d.c. leads for h.f. rigs now use the same 6-pin plug, wired the same way – but be careful. If you really want to do some damage try connecting an Icom 13.8V d.c. power supply unit (p.s.u.) to a Yaesu rig with the standard six way connector.

The d.c. connections are exactly the same, but there's one subtle difference. The pins that are **not** used to feed the 13.8V supply on the d.c. lead, are used by Icom on some p.s.u.s to connect the mains supply to the rig's on/off switch, so that the power supply can be switched off from this.

Inside some Yaesu rigs, these spare pins on the power connector are used as convenient anchor points for components in the power amplifier (p.a.). If you do try and use an Icom p.s.u., and connect it to the Yaesu rig using the 6 pin plug on the end of the interconnecting lead, you'll connect the mains to all the wrong places, and be in big and expensive trouble.

Wiring Up Power Connectors

I received an E-mailed question , "How do I wire up the power connector for an FT-101E, or will the lead from a TS-520 do?" Well I'm pleased that Christopher sent me the E-mail and asked, because while the mains leads use the same connector and look the same, they are wired differently.

So, if you buy an FT-101, or a TS-520 at a rally do be certain that you are supplied with the correct lead. And – just to be sure – trace the connections through to the primary of the mains transformer with a meter, before plugging it in.

The 12-way connector that's used on the end of the d.c. or a.c. power lead on the FT-101 serves a dual purpose. It connects the power, and is also used to strap across various pins to differentiate between a.c. and d.c. operation. The pins are all numbered on the circuit in the manual and so with a little care there should be no problem – **but there is**!

Incredibly, there are some connecters around that are physically the same, but have the pins numbered differently to the connector used by Yaesu. I could hardly believe it when I saw one – and so to be doubly sure I have always copied the connections from a known good sample, when making a lead up. If you want to wire up a mains lead for an FT-101Mk1 B, or E, have a look at **Fig 3**, for the FT-101ZD **Fig. 4**, and for the FT-902 **Fig. 5**, and copy this just to be certain.

Fig. 3: The mains connector for the B and E versions of the FT-101MK1.

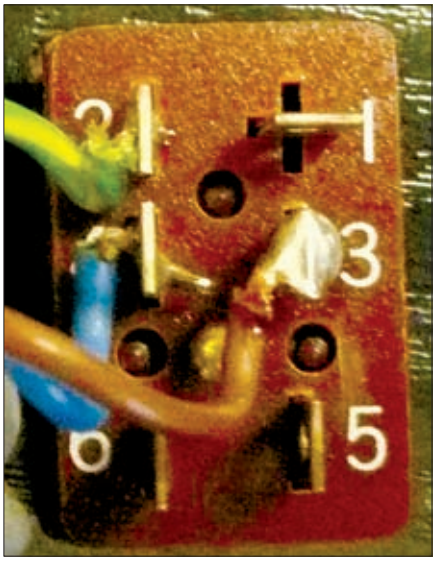

Fig. 4: The mains connector for the later FT-101ZD model.

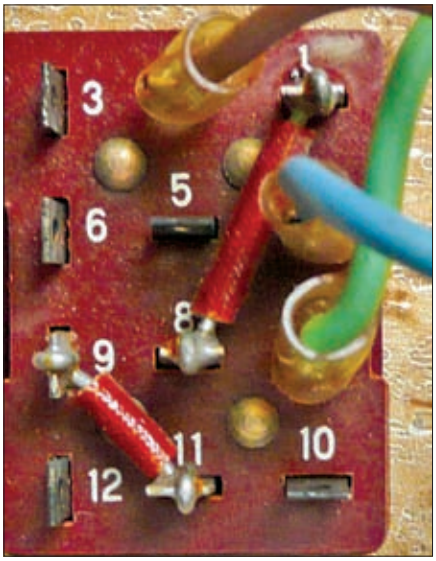

Fig. 5: The mains connector for the slightly later FT-902 model.

Clearing Out PCB Holes

A few months ago I mentioned the problem of clearing out the holes printed circuit boards (p.c.b.s), when removing components, and this prompted **Jack Hardcastle G3JIR** to E-mail me

"I have used several methods for cleaning holes through p.c.b.s, several of which you mentioned. One method I find is sometimes successful is simply to melt the solder in the hole and blow it hard from close range. One major hazard of this ploy is the tendency to get too close to the board and burning your lips!

If this method fails I melt the solder and poke a fine probe into the hole. Initially I used a sharpened matchstick for the purpose, but I found it had a very short life before the end broke off, or even worse, became stuck in the hole. Looking around for substitutes I found a pack of garden canes; the short split canes used for staking carnations, etc. From this I made my own matchstick-sized probe. The straight grain of the bamboo material is much easier to sharpen into a long, fine probe with sides which are essentially parallel.

These latest probes have a very long life and leave a nice clean hole. With moderate care you can clean plated-through holes with confidence".

Well thanks for that Jack*. One of the beauties of *PW* is that it provides a useful forum for the exchange of ideas and information, and here's another for which we thank **Dave Williams**.

"Regarding your observations on removing components from p.c.b.s, (*In the Shop*, July 2011), I wonder if you are aware that Maplin sell an electrically heated De-Solder Pump, (Mains Voltage), for around £15? Order Code N37CH.

"And, regarding Yaesu Batteries, I've just replaced the two batteries in a FT-208 and a FT-708.

"They are still available from stock at Alexander Batteries as type BP4W-P and in April the price was £15.40+VAT+carriage.The E-mail link: **sales@combatalexander.co.uk** will take you there".

Thank you Dave!

Technical Editor's tip: *I often use a modern propelling pencil with the 'lead' sticking out slightly, as many of them are 0.7mm. It's possible to get 1.0mm versions for somewhat larger holes. Pencil lead repels the molten solder away.* ***Tex Swann G1TEX****.*

Harry's History

I'm sometimes asked about my background and how I became a 'professional Radio Amateur'. In fact, I became interested in Amateur Radio in the old amplitude modulation days, when I was about 12. I found the 7MHz (40 metre) band on our domestic radio, built a crystal set and then decided that I wanted a career in electronics.

I left school in 1952, and started work on my 15th birthday as an apprentice radio and TV engineer. After I had qualified the owner of **Holdings of Blackburn Ltd.** who I knew through a Mission Hall which we both attended, offered me the job of developing the Hi Fi side his tape recorder and photographic business, but this had to wait as I was then dragged away to do my National Service.

Army tests rated me as not intelligent enough to train in telecommunications. I kicked up a bit of a fuss about the training camp's verdict, and to shut me up was sent to base workshops to be assessed. There they must have seen something in me, because within a week I was allowed to take the test that 'had I been more intelligent' I would have taken after a 9-month training course.

I passed, and was sent to Pembrokeshire South Wales as a Telecommunications Mechanic 3rd class to repair radio-controlled target aircraft. I got a higher rate of pay than I would have had as a trainee, and went on to pass both the 2nd and 1st class examinations.

Feeling lonely, I started writing to **Brenda** who I knew through the church youth group, and despite my atrocious spelling, a romance developed. Two years later when I was released from REME, I started the Hi Fi department in her father's business and in 1962 Brenda and I married.

I soon realised that I had not only acquired a wonderful wife, but also a typist and spelling-checker. I had previously had many ideas for articles, but my spelling and writing had made this a non-starter. With Brenda's help I started writing for various Hi Fi magazines.

Writing letters or articles for publication is a wonderful way of promoting a business, in the latter case I effectively got paid for advertising and I continued writing when we moved into Amateur Radio. But more about this next month, see you then! ●

Problems

I like to hear about problems with older equipment, particularly pre-1990 Yaesu rigs. Please E-mail me, (add some radio related term in the subject heading, to differentiate against spam), or write and enclose a stamped addressed envelope. Remember that electricity is dangerous, if you are not familiar with safety precautions you must never work on your equipment whilst it is plugged into the mains. (Switching off at the wall socket does not necessarily make equipment safe).

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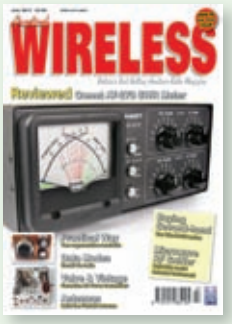

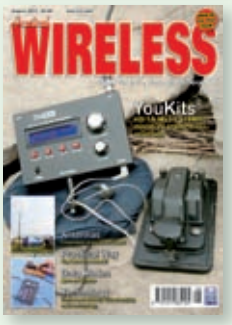

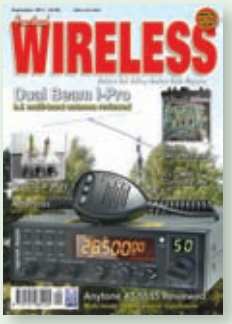

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Tel: 01903 859712 anytime (Rustington, W. Sussex).

MARCONI MARINE LODESTAR IIID radio. 250-550kHz, 19" rack mount. AM, SSB, £50. Buyer collects. Tel: 07831 209242 daytime (Notts).

MOSLEY TW-33 12/17/30 three element beam, never used and in box. Offers over £299. It is worth at least twice this amount. Collect only and cash payment required.
Tel: Alan G1VAG 01937 844755 (Wetherby, W Yorks).

REALISTIC DX-394 communications receiver, £90. Also, Eton YB-550PE portable short wave radio, boxed as new, £45. linco DJ-X10E hand-held scanning receiver, £100.
Tel: Phil 01604 516598 (Northampton).

UNIDEN 780XLT in good working order. Missing one button, £60. Uniden 396T scanner in excellent condition, £75. Posted at cost or buyer collects.
Tel: 01330 823879 (Aberdeenshire).
E-mail: scottishscanner@googlemail.com

YUPITERU MVT-7100 hand-held receiver scanner. PSU, leather case and handbook. Looks like new and works well, £125. Includes whip antenna and postage and packing.
Tel: George 01443 437345 (Tonypandy).

WANTED

AOR AR3030 RECEIVER Must be in very good condition and complete with AOR PSU and handbook.
Tel: A Bradley 01724 763404 (North Lincs).

DATONG D-70 morse tutor. Essential, good working order. Tel: Mike 01604 760798 (Northants).

HELP WANTED G1IMQ Swindon wants help tuning in Tx/Rx. Fee payable. Is there anyone out there? Also, Denco Repanco coil, Practical Wireless.
Tel: 017937 62593. 27 Newburgh House, Highworth, Swindon, Wiltshire SN6 7DW.

OLD HALF INCH FERRITE RODS must be half inch, 12.7mm, in diameter and be six inches long or more. Will pay very good money for the rods.
Tel: Peter Tankard 0114 2316321 between 9am and 9pm (Sheffield).

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Bargain Basement order form

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Aerials

GAREX ELECTRONICS VHF/UHF accessories and aerials, TVI Filters, 4m & 6m Transceivers.
Tel: 07714 198374
www.garex.co.uk
PO Box 52, Exeter EX4 8WX

VORTEX ANTENNA SYSTEMS Delta Loops, Yagis. Monoband and multiband. For the home constuctor – antenna parts including 6082-T6 tubing, stainless U-bolts, saddles, mounting kits and much more.
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07943 871893.

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www.langrex.co.uk

Valves

VALVES AND ALLIED COMPONENTS IN STOCK Ring for free list. Valves/ books/magazines wanted. Geoff Davies (Radio).
Tel: 01788 574774.

For sale

X-tals 100kHz-250MHz. Std 10.106, 10.245, 10.7, 11.155MHz @ £1.50. Callg 3.56, 7.030, 14.060, 28.060MHz @ £1.50. 1.7468MHz X-tal Clansman 321 ex-stock p.o.a. 10.7MHz 10kHz filter @ £5.75, 1.4MHz SSB filter p.o.a. P&P £1.50 + VAT. IQ Electo
Tel: 0208 391 0545.
E-mail: vincentvoy@hotmail.co.uk

Repairs

REPAIRS TO ALL AMATEUR AND VINTAGE Rx/Tx Cost effective service. Phone or call in for details. Kent Rigs, 52 Salisbury Road, Chatham, Kent ME4 5NN. Tel: 07903 023437.

RELIABLE REPAIRS for all amateur and vintage equipment. Professional service, reasonable rates.
Tel: 01807 580376.
E-mail: radiorepairs@btconnect.com

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The prepaid rate for classified advertisements is 42 pence per word (minimum 12 words), box number 70p extra. Semi-display setting £13.90 per single column centimetre (minimum 3cm). Please add 20% VAT to the total. All cheques, postal orders, etc., to be made payable to PW Publishing Ltd. Advertisements, together with remittance, should be sent to the Classified Advertisement Dept., Practical Wireless, Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW. Tel: 0845 803 1979, Fax: 01202 659950.

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TRADERS TABLE

The equipment for sale on this page is secondhand or ex-demonstration

Disclaimer

Advertisements from traders for equipment that is illegal to possess, use or which cannot be licensed in the U.K, will not be accepted. While the publishers will give whatever assistance they can to readers or buyers having complaints, under no circumstance will the magazine accept liability for non-receipt of goods ordered, late delivery or faults in manufacture.

NEVADA

023-9231 3090

TRANSCEIVERS

ALINCO DJ596 DUALBAND H/HELD £89
ALINCO DJC7 DUALBAND H/HELD £84
ICOM IC706MK II G TRANSCEIVER £599
ICOM IC706MK II G TRANSCEIVER £699
ICOM 7800 HF & 6M FLAGSHIP TX £5495
ICOM E208 FM TRANSCEIVER £189
KENWOOD TS570DG TRANSCEIVER £599
TYT 800 2 METER HANDHELD £39
YAESU FTC740A 4M TRANSCEIVER £69
YAESU FT450AT TX WITH ATU £599

HANDHELD SCANNERS

AOR AR8200MK II H/H SCANNER £299
ALINCO DJX11 ALL MODE SCANNER £275
ALINCO DJX2 AM/FM/WFM RADIO £79
BEARCAT UBC800XLT H/H RADIO £225
ICOM R5 HANDHELD SCANNER £145
RADIOSHACK PRO28 SCANNER £59

RECEIVERS

AIRNAV RADAR BOX £299
ETON MINI 300 PORTABLE £13
KINETIC SBS1 ..... £299

ACCESSORIES

ALINCO EJ47U DIGITAL BOARD £46
BHI NOISE ELIMINATING SPKR £49
UNIROSS CHARGER & BATTERIES £12
ICOM SM20 BASE MICROPHONE £99
INTELLIGENT DIGITAL MULTIMETER £25
CLAMP ON DIGITAL MULTIMETER £10
KENWOOD SP430 SPEAKER £49
LDG AT100 PRO AUTO ATU £149
MFJ 1701 COAX SWITCHER £39
MFJ 1278B M/MODE DATA CONTR £199
MFJ 208 VHF SWR ANALYSER £69
MFJ 784 DSP FILTER £229
MFJ 901B MANUAL ATU £75
MFJ 914 AUTO ATU £49
MFJ 934 ATU/ARTIFICAL EARTH £169
NISSEI SWR/PWR METER £49
PALSTAR PS30M POWER SUPPLY £79
WATSON W25AM PSU £40
YAESU FC100 ATU £149
ZETAGI P27M PREAMPLIFIER £15

B-GRADE ITEMS

ALINCO DJV17 H/HELD TRANSCEIVER £99
ALINCO DXR8E RECEIVER £499
BEARCAT BCT15X SCANNER £229
BEARCAT USC230XLT SCANNER £99
ETON E100 PORTABLE SHORTWAVE RADIO £35
ETON G3 PORTABLE SHORTWAVE RADIO £69
ETON G6 PORTABLE SHORTWAVE RADIO £69
ETON SAT750 RECEIVER £269
GRE PSR200 SCANNING RECEIVER £89
GRE PSR255 HANDHELD SCANNER £64
MOONRAKER M8 RADIO £20
TYT UVFI HANDHELD £74
ZETAGI HP500 METER £39

SHORTWAVE SHOP LTD

01202 490099

TRANCEIVERS

KENWOOD TS-450S £455
KENWOOD TR-751E £175
KENWOOD TR-751E Boxed £195
KENWOOD TS-140 ..... £225
ICOM IC-706MkII £399
YAESU FT-1802M 2M £85
YAESU VX-150 ..... £99
YAESU FT-60 ..... £120
ALINCO DJ-V5 ..... £200
ALINCO DX-70 ..... £245
ALINCO DJ-195 ..... £100
ALINCO DJ-S11 ..... £75
ALINCO DR-430 70cms £85
UNIDEN 2830 10M Mobile Boxed £135
ICOM PMR 446x2Water Resist/w.charg £200
MIDLAND CB 77-250K £50
MIDLAND CB 77-805UK £55
MAXON ALERT 7E CB £65
STANDARD HX260E Marine H/H New £99

RECEIVERS

JRC NRD 535 ..... £795
LOWE HF-225 with Keypad £325
YUPITERU MVT 7300 ..... £99
UNIDEN UBC-800XLT Ex Demo/software £265
UNIDEN UBC-860XLT Desktop £65
REALISTIC PRO 2042 ..... £ 95
AMI DIGI SAT RX ASR WS201 ..... £129
ALINCO DJX3 ..... £70
WORLD RECEIVER WR2100 ..... £80
GOODMANS GCD200 DAB Special Price £50
BPL WORLD SPACE £25

ACCESSORIES

ICOM AH7000 DISCONE £85
CREATE CLP 5130 Log Periodic NEW £250
MICROWAVE MODULE 432/100 ..... £165
MFJ 949D Versa Tuner II £85
BNOS LPM 144/25/160 ..... £245
ICOM HS-51 Special Bulk Price £27
YAESU MD1 B8 Desk Mic £50
YAESU XF-110CN Filter £55
YAESU XF-110S Filter £55
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WATSON HUNTER Freq Counter £50
LODESTAR AG-2601A Audio Gen NEW £55
LODESTAR SG-4160B Sig Gen NEW £55
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DAIWA PS-120M 10A PSU £49
DAIWA PS-310 30A PSU £75
DAIWA PS-30X M11A 30A PSU £95
DAIWA PS-50XM 5A PSU £25
DAIWA CN620A 1kw POWER/SWR £65
DAIWA CN-410M SWR METER £45
ZETAGI HP1000 SWR METER £65
MFJ 1278B DATA CONTROLLER £65
MFJ 259B Boxed as new £215
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LOWE FX-1Complete £75
Trailer mounted SCAM 40 Pump Up Mast £650
MORSE KEYS VARIOUS from £45

WATERS & STANTON

01702 206835

Icom	IC-A3E	Airband H/Held + NAV/COM 50ch Alphanumeric	£160
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
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
WinRadio	WR-UNIFSK	Universal FSK Decoder Software Option for G3 series receivers + Audio Lead	£199
WinRadio	WR-ADS-Full	Advanced Digital Suite Option for G3 series receivers	£119
Radio Shack	Pro-60	30-512,760-999MHz AM,FM,WFM Hand Held Receiver 200Ch.	£79
Diamond	MX-72	1.6-150MHz & 400-460MHz Duplexer 1kW max	£29
Heil	GM-4	Deluxe "Goldline" Hand Mic with Studio & HC-4 inserts	£99
Icom	IC-PS15	13.8v 20A Power Supply.	£150
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
Hi-Mound	HK-709	Deluxe Straight Morse Key on Black Base	£55
GRE	PSR-200E	26-512MHz (with gaps) AM, FM, WFM Desk Scanner 200Ch & 8.33step 9V + psu	£69
Icom	IC-A110-EURO	35W Airband Mobile Transceiver + 20ch Multi-Scan & 8.33kHz step	£549
Icom	IC-2200H+UT-118	2m FM Mobile Transceiver 55W 113ch. + CTCSS & Optional UT-118 D STAR Unit	£279
PacComm	Tiny-2	VHF Packet TNC Controller	£79
Alinco	DJ-X3E	100kHz-1300MHz AM, FM, WFM Hand Held Receiver 700Ch + 8.33kHz step	£70
Watson	Power-Max-45	12V Variable 40A (45A max) Switch Mode PSU with Noise Offset Feature	£89
Watson	Power-Mite-NF	12V Variable 20A (22A max) Switch Mode PSU with Noise Offset Feature	£49
Alinco	DJ-596E	2m/70cm FM Transceiver + DTMF keypad & CTCSS	£99
Yaesu	VX-120E	2m FM Mil. Spec. Hand Held Transceiver 5W + Full CTCSS & DTMF memories	£69
Yaesu	FTM-10E	2m,70cm FM Mobile Transceiver + Remote Waterproof Head & BlueTooth Ready 50W,35W	£229
Diamond	X-50	2m 70cm Base Colinear Antenna 1.7m 4.5 & 7.2dB Gain + SO-239	£45
SGC	SG-500	Power Cube 1.6-30MHz Solid State Linear Amplifier 500W (SSB CW)	£899
Yaesu	FT-290R	2m All Mode Portable Transceiver 2.5W 12V or 9 x C cells	£149
BNOS	LP144-3-50	2m Linear Amp 3W in , 50W out + Preamp	£89
Yaesu	VX-150	2m FM Mil. Spec. 5W Hand Held Transceiver + LCD Display, Full CTCSS & DTMF keypad	£65
Albrecht	AE-550	2m FM Mobile Transceiver 25W 10Ch.	£79
Yaesu	YSK-857	Remote Mounting Kit for FT-857	£25
Diamond	MX-62M	1.6-56MHz & 76-470MHz Duplexer 600W max	£49
GRE	PSR-255	26-512MHz (with gaps) FM only Hand Held Receiver 50Ch. 6 x AA cells	£39
Yaesu	VX-246	PMR-446 8-Ch Hand Held Transceiver + DTMF keypad	£79
TTI	TSC-100R	66-174MHz AM,FM WFM 200Ch. Mini Hand Held Receiver 4x AAA or 9V DC	£49
Alinco	DJ-X7E	100kHz-1300MHz AM, FM, WFM Hand Held Receiver 1000Ch + 8.33kHz step	£129
SSB	SSB-SP-6	50-52MHz 6m Low Noise Mast Head Preamplifier	£189
Yaesu	FT-5100	2m,70cm FM Mobile Transceiver 50W,35W Full Duplex	£59
Realistic	PRO-2006	25-520,760-1300MHz AM, FM, WFM Base Scanner 400Ch. Mains or 12V DC	£99
Icom	IC-E92	2m/70cm FM "D-Star" Hand Held Transceiver, Full Duplex + Wide RX, DTMF keypad	£259
Kenwood	TS-711E	2m All Mode Base Transceiver 25W mains	£249
AOR	AR-8200 III	530kHz-3GHz All Mode Hand Held Receiver 1000Ch. Alphanumeric	£349
DCI	DCI-145-2H	2m 200W Band Pass Filter with SO-239	£149
MFJ	MFJ-704	0-30MHz Low Pass Filter 1.5kW max	£49
AirNav Systems	RadarBox-3D	3D Real-time Aircraft Virtual Radar using ADS-B + Internet Networking & Google Map	£339
Kenwood	TM-251E	2m FM Mobile Transceiver 50, 10, 5W 41ch 12V	£69
AOR	SR-2200	25MHz-3GHz AM, FM, WFM PC-controlled Communications Receiver via USB 1000Ch. 12V	£849
Uniden	UBC-9000XLT	25-550,760-1300MHz AM, FM, WFM Desk Receiver 500Ch. 12V + psu	£189
Microset	SR-100	2m 4-25W in,100W out all mode + GaAsFET Pre-amp	£179
Heil	HTSS	Traveller Single Sided Headset + Boom Microphone & PTT control	£49
Kenwood	TH-48E	70cm FM H/Held Transceiver + DTMF keypad 40ch supplied with BT-8 Battery Box	£59
Kenwood	MC-85	Electret Desk Mic + Preamp,Compressor, Tone Control,Up/Down, Meter & 3x Outputs	£99
Diamond	SX-400	140-525MHz 200W SWR,PWR meter	£75
MFJ	MFJ-921	144-220MHz 300W ATU + meter	£59
Uniden	UBC-92XLT	25-960MHz (with gaps) AM,FM Hand Held Receiver + "CloseCall" 200Ch.	£79
Yaesu	FT-8800E	2m,70cm FM Mobile Transceiver 50W,35W Full Duplex + DTMF mic, Remote Head	£239
Yaesu	YSK-8900	Remote Mounting Kit for FT-8800 & FT-8900	£25

B-Stock Equipment (includes manufacturers warranty)

Icom	IC-E2820	2m,70cm FM Mobile Transceiver 50W, 35W DTMF mic + Remote Head, "D-Star" Ready	£399
Icom	IC-R5	150kHz-1300MHz AM,FM & WFM Hand Held Receiver 1000Ch. + Nicads	£149
Icom	IC-U82	70cm FM H/Held Transceiver with CTCSS, DTMF keypad, Ni-CD & charger	£163
FlexRadio	FLEX-3000	PC Controlled 160-6m All Mode Transceiver + Auto ATU Gen Cov RX DSP filtering 100W	£1,149
Kenwood	TS-2000E	HF,6m,2m,70cm All Mode Transceiver + Gen.Cov., Auto ATU & DSP	£1,449
Kenwood	TS-2000X	HF,6m,2m,70cm & 23cm All Mode Transceiver + Auto ATU & DSP	£1,699

RADIOWORLD

01922 414796

Yaesu FT-2000D 200watts	£1,950.
Yaesu FT-2000 100W with internal power supp	£1,599.
Kenwood TS-950SD HF Transceiver	£1,099.
Icom IC-R8500 Receiver	£1,099.
Kenwood TS-950SD HF150W DSP Base	£950.
Kenwood TS-2000 All Band Base	£949.
Icom IC-7000 1.8 - 70cms Mobile Transceiver - IC7000	£899.
Explorer 1000 1KW HF Amplifier	£799.
Yaesu FT-990 /AC	£799.
Yaesu FT-736R 6m, 2m & 70cm Base	£799.
Kenwood TS-790E 2/70 Base	£750.
Yaesu FT-847 Multi-Band Transceiver	£699.
IC-7200 HF Transceiver	£649.
Kenwood TS-570DG/E HF transceiver	£599.
AOR AR-7030	£550.
Alinco DX-SR8 HF transceiver HF, 100W all mode	£529.
FT-817bhiDSP Yaesu HF/6m/VHF/UHF 5W Transceiver	£529.
MTU-30/20 RF u-tuning Unit C	£500.
MTU-80/40 RF u-tuning Unit B	£500.
AOR AR-8600 Mk2 530kHz-3.000GHz Wide-band Receiver	£499.
R-30CC HF PALSTAR HF Rx	£499.
Palstar R-30A Short Wave Receiver	£499.
WR-G305e/WFM WiNRADiO USB	£475.
Alinco DX-R8E Receiver	£449.
Yaesu FT-817ND HF 6m VHF UHF 5W Transceiver	£439.
Icom IC-R72 Receiver	£399.
AOR AR-3000 Wide Band Receiver	£350.
AOR AR-8200Mk3	£349.
NRD-515 Receiver	£349.
FRG-8800 With FRV-8800 VHF Converter	£349.
Microset SR-200 2m 200w	£319.
AOR ARD-2 ACARS/Navtex Decoder	£299.
Kenwood TR-851E 430-440 MHz All-mode	£299.
Yaesu VX-8 full 5 watts FM on 50/144/430 MHz	£279.
Yaesu FT-690R II	£275.
Yaesu FRG-8800	£275.
Icom PS-125	£270.
AirNav RadarBox-Pro 2010	£269.
CP-6 Diamond Vertical HF Antenna	£269.
AirNav Radarbox 2009 version	£269.
MFJ-994 Automatic ATU 1.8-30MHz 600W SSB 300W CW	£255.
Icom IC-R3 Hand held Scanner	£250.
Icom IC-490E 70cms Mobile	£250.
Yaesu FT-290MkII 2m Multi-mode transceiver	£250.
MFJ-1278b DSP Multimode Data Controller	£249.
Yaesu FRG-7700 HF Receiver	£249.
Magnum S-9 Multi Mode mobile Transceiver	£240.
Icom IC-T81E 50-54 / 144-146 / 430-440 / 1240-1300	£240.
DR-635E Alinco 2m/70cm FM Dual Band Mobile Transceive	£239.
Yaesu VX-7R black Tri-Band Handy	£229.
UBC-800XLT mobile scanner	£229.
Kenwood TM-741E - VHF/UHF transceiver 144-146 / 430-	£229.
MFJ-9410 10 Meter SSB Adventure Radio	£220.
AOR 8200 Mk I	£220.
Yaesu FT-480R 2m SSB, CW & FM Transceiver	£220.
Yaesu FTV-901R 2m Transverter	£220.
MFJ-784B DSP Filter	£219.
UBC-785XLT Uniden-Bearcat Base Scanner 25-1300MHz	£209.
Vectronics VC-300D Tuner with LED PEP Meter	£199.
NATO Morse Key	£199.
FT-7900 2 Meter / 70 cm Dual Band FM Transceiver	£195.
DX-5000 K-PO - AM/FM/SSB 10/11 Meter Mobile Amateur	£189.
ICOM IC-2200H 144?146	£189.
Yaesu FC-902 - HF Antenna Tuner (Modified)	£179.
IC-RX7 - Wideband Handheld Receiver	£179.
ICOM IC-207H Dual Band Mobile	£179.
SCOUT Optoelectronics Frequency Counter/Finder	£175.
GZV-4000 Diamond 40A Switch Mode	£165.
Kenwood TM-271E	£165.
Icom PS-85 Icom 20A 13.8V Switch Mode	£159.
Icom IC-T8E	£159.
UBC-3500XLT Uniden Bearcat Handheld Scanner	£159.
FT-290RMKI 2m Multi mode	£150.
NCM-515 Controller	£149.00

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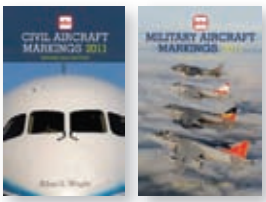

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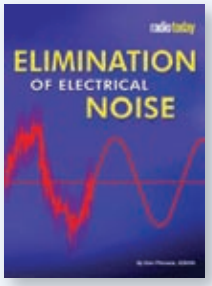

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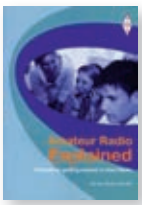

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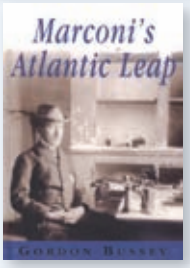

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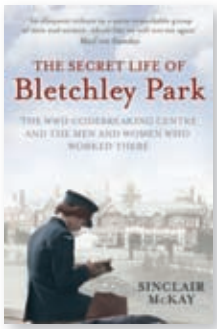

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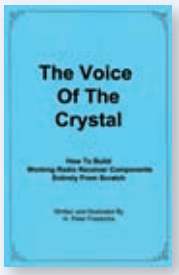

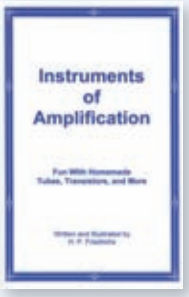

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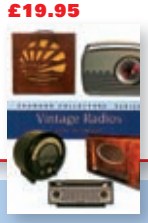

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Rob Mannion G3XFD/EI5IW's

Topical Talk

The Editor reflects on readers' comments and discusses the pleasures of low power operating – particularly using keyboard modes.

I found it very interesting to hear more on the uses of incandescent bulbs from this month's *Star Letter* writer John Joyce GM4JTJ. It's also interesting to read that John is finding a use for the compact fluorescent lamps (CFLs).

By coincidence – as I mentioned in my footnote – **Reg Irish G4LUF** mentioned the technique in his article on renovating the Yaesu FT-101 in the November issue. John also mentions the use of the traditional incandescent bulb as transmitter loads – something that I enjoyed demonstrating to the young students at the Clayesmore School Radio Club (Iwerne Minster, Dorset) in the mid 1990s.

The students were fascinated when I was able to demonstrate the r.f. output from the club's KW2000B transceiver using a 100W bulb load. In this way I demonstrated the output of the single sideband (s.s.b.) transceiver and the drop in output when there was no speech present – was clearly seen as the 100W bulb dimmed dramatically when only the residual carrier was present.

I had already shown the club member what an amplitude modulated (a.m.) transmitter's output looked like when the 100W bulb was used as a load. The students were able to see the bulb stay fairly bright with minimum modulation applied and glow much brighter with speech peaks. This technique allowed me to show the main differences between the modulation systems.

Several of the club members went on to achieve careers in radio and electrical engineering professions – and I feel that my practical demonstrations gave them some encouragement. And I feel – very strongly – that anyone who gives up time to help youngsters and newcomers into our fascinating science must be encouraged themselves. By doing so they play an important part in promoting the electrical sciences and ultimately our wonderful hobby – and from my own experiences I know it's very enjoyable from the instructor's point of view too.

Another Viewpoint On CFLs

Dave Baxter G0WBX from Maids Moreton in Buckinghamshire, wrote to me and offered another viewpoint on CFLs. He's also had some success in recycling the small tubes themselves. However, I found his comments on the QRM and QRN from CFLs to be interesting, as he considered them reasonable – compared to other sources.

I would be most interested – as we are being forced to use CFLs – to hear from readers which type/or manufacturers produce the least problems in QRM terms.

The AA1TJ Article In *Sprat*

In his letter this month, my friend **Richard Sayer F5VJD** (we've often worked on 40m) mentioned the article by **Michael Rainey AA1TJ** published in ***Sprat***, the **G QRP Club**'s journal. I wasn't aware of that challenge and the resultant project from Michael AA1TJ seems fascinating.

Although I've no doubt that many of our readers are members of the G QRP Club – perhaps we should have our own 'official *PW* Scrap Recycling' challenge? I would be interested to hear from readers who would like to join in. And I'm sure that the forthcoming article on building a project using scrap materials (see *Topical Talk* in the November issue) that **Colin Shaw G8FRA/M5FRA** has agreed to write – will encourage many of you to join in.

Low Power Operating – A Pleasure & Challenge

The letter from **Dave Seabrook G4LJG** reminded me of the wonderful day out at the QRP in the Country event in July and that Dave himself had still been recovering from an extremely serious illness at the time. I was so pleased that he's well enough to enjoy home construction and low power operating again. And it really seems he's been busy building.

I can understand how much Dave has been enjoying his building and operating because it really is so enjoyable – and therapeutic. Even though my c.w. operating is severely hampered by the arthritis in my left arm – I've found that PSK31 can offer me a wonderful form of operating using low power communications using my computer keyboard at a comfortable typing speed.

Just before I starting preparing this *Topical Talk* I enjoyed several enjoyable PSK31 QSOs with Argentina and Brazil on 28MHz – using less than 30W and my new antenna. I then fully appreciated just how much we have to thank **Peter Martinez G3PLX** for inventing this fascinating mode. Thanks Peter!

Rob Mannion G3XFD/EI5IW

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Reviewed

The Ten-Tec Eagle Transceiver
Our keen and very busy h.f. author **Roger Cooke G3LDI** has been trying out the Ten-Tec Eagle compact h.f. and 50MHz 100W transceiver at his well-equipped Norfolk station.

Buying Second-hand

Join Chris Lorek G4HCL as he uses his many years experience to guide you through the second-hand equipment maze. There's much useful equipment waiting to be snapped up and Chris tells what to look out for.

Let The Gin Pole Take The Strain!

Ian Dilworth G3WRT is our *Antenna Workshop* guest author this month and he's demonstrating how a simple gin pole can really take the strain out of 'getting that antenna up there' safely. It's a traditional method that's often overlooked nowadays – but Ian say it 'does the job'.

Plus all your favourites *Doing it by Design*, *The World of VHF*, *Morse Mode*, *Carrying on the Practical Way* and much, much more!

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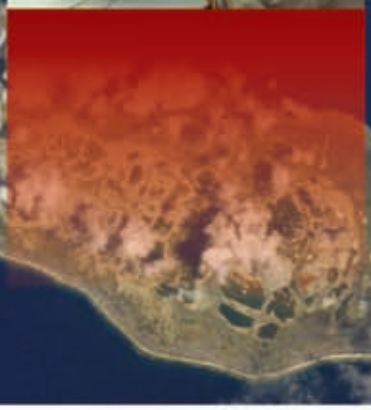

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