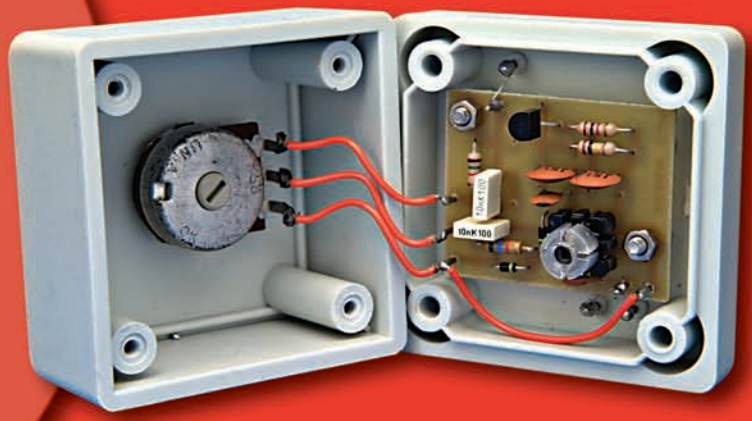
practical wireless - britain's best selling amateur radio magazine

pw

www.pwpublishing.ltd.uk



Build
The PW Portland VFO

Antenna Workshop
Experimenting with G3LDI

on test

MFJ Auto IntelliTuner™

Plus - Doing It By Design
Audio Amp & Loudspeaker Filter

9 770141 085082 03 >
March 2006
£3.00

WATERS & STANTON

UK'S L

HEAD OFFICE & SOUTHERN STORE • SPA HOUSE, 22 MAIN RD, HOCKLEY, ESSEX, SS5 4QS ENQUIRIES: 01702 206835/204965 FAX: 01702 205843
MIDLANDS STORE • W&S @ LOWE, BENTLEY BRIDGE, CHESTERFIELD RD, MATLOCK, DERBYSHIRE, DE4 5LE ENQUIRIES: 01629 832375 FAX: 01629 580020
SCOTTISH STORE • W&S @ JAYCEE, 20 WOODSIDE WAY, GLENROTHES, FIFE KY7 5DF ENQUIRIES: 01592 756962 FAX: 01592 610451-CLOSED MONDAYS

Visit our eBay shop for more bargains!

eBay

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

NEW UK Radio Communications Equipment Guide 2006

£3.95 + £1.75P&P

• Free Carriage Vouchers • 400 Pages • Full Colour • Articles & Reviews • Detailed Spec on every piece of Ham Gear • Over 4000 Products

The Ultimate QRP Radio

We are now stocking the 1 Watt QRP version of the SDR-1000. This software defined radio covers 160m to 10m plus general coverage and offers the best receiver and transmit performance you will have ever experienced. Match it up to a home-built amplifier and you have a really amazing station. (Requires PC running Windows XP.) For further information check out www.wsplc.com.

£649 B

PRICEMATCH!

We will match or beat any UK advertised price on UK sourced and UK guaranteed stock. Items must be in stock with the competitor and brand new - not B-Stock or old stock clearance.

CALL FREEPHONE SALES 08000 73 73 88

PAY NOTHING 'TIL 2006!

BUY NOW PAY LATER AT ALL 3 STORES

AVAILABLE ON ALL SALES OVER £200

You won't find a better deal!

Proof that at W&S you get the best possible deal. On selected items it is now possible to pay nothing for a whole year without incurring any interest charge. Amazing but true. And what's more, you get probably the best prices in the business. Give us a call today or visit one of our branches.

0% APR Typical example of buy now pay later. Cash price £600. Pay no deposit and pay the full amount by the due date. Pay no interest.

OR

29.8% APR Repay £31.53 per month for 36 months, after the 12 month period. Total amount due £1135.08. Interest is calculated from the date of the agreement.

All finance subject to status written quotation on request.

FAST SAME-DAY DESPATCH

www.wsplc.com

FREEPHONE ORDER LINE 08000 73 73 88

NEW SOFTWARE DEFINED TRANSCEIVER

Performs like a £5,000 transceiver but costs 80% less!

SDR-1000 1W - 100W, 160M - 10M. Nothing else comes close to its performance. Spectrum display, superb receiver front end and filter shape factors that are unobtainable with normal rigs. Welcome to the new era in ham radio. It has received rave reviews in the USA. Delivery soon. Check details on www.flex-radio.com

WIN AN FT-1000MK-V

FREE FT-1000MKV!

This radio could be yours FREE!

Purchase **any** Yaesu transceiver or receiver from any Waters & Stanton shop, or mail order or at an outside event, and you will automatically be entered into our competition for this beautiful radio.

You have a 500:1 chance of winning!
Winner will be decided after 500 cards have been issued

NEW ICOM IC-7000

The IC-7000 uses new IF-DSP technology as used in the IC-750PROIII and IC-7800. Slightly smaller than the IC-706MkIIG, it packs even more features. It covers all the amateur bands all modes from 160m to 70cm. Variable power low to high is available on all bands. The general coverage receiver tunes from 30kHz to 200MHz and 400 to 450MHz. It uses Digital IF filters with a choice of 41 different filter widths.

+FREE NC-4 Noise Cancelling Headphones

£999 C

Icom HF Transceivers

ICOM IC-756 PRO III

Top of its range of HF transceivers. HF & 50MHz, features large colour LCD with spectrum scope, auto ATU and 32-bit floating point DSP unit. £2099 C

IC-7800 £6400 C
Icom' Flagship HF 200W transceiver. 200W max. The ultimate receiver - the ultimate design! AC psu built in.

IC-7800-PACK £6995 C
The superb transceiver as above plus 17" flat screen, keyboard and SM-20 base microphone.

IC-7400 *Lower Price* £1279 C
HF/VHF 160m - 2m transceiver 5 - 100W. SSB CW FM AM. 12V DC. Nice big display. Lovely price.

IC-706 MkIIGDSP £769 C
It's unbeatable. 160m - 70cm (up to 100W HF) yet so small with detachable head. The ultimate mobile..

IC-718 £449 C
This is a budget class radio HF 160 - 10m at a price that belies its performance. Beautiful display.

IC-703 *FREE IC-703 Logbook* £539 C
Take an IC-706, reduce power to 10W max and get rid of VHF/UHF. 160 - 6m of pure QRP joy!!

Going HF Mobile?

Then check out the great 80m - 6m SIDEKICK magnetic mount whip from USA. No hassel and great performance. £249.95 C

Kenwood HF Transceivers

KENWOOD TS-2000

Top-of-the-range Kenwood transceiver. The Station in a box. 160m-70cm with every feature imaginable inc. DX Cluster. Kenwood fans dream rig. HF/VHF/UHF or up to 23cm with the optional module. Built-in auto ATU, DSP and its unique TNC. *New Lower Price* £1295 C

TS-2000X *Lower Price* £1789 C
Take the TS-2000 and add a superb 23cm module. The best 23cm we know of plus all other bands!

TS-B2000 *Lower Price* £995 C
Designed for the 21st century. You get HF - 70cm with PC software for direct PC control. It works great.

TS-570DG *Lower Price* £799 E
The best budget radio at the price. Superb 100W from 160m to 10m. As used by Peter Waters, G3OJV

TS-480HX *Lower Price* £799 C
Take the TS-480SAT, remove the auto ATU and offer a beefy 200W output. That's a really potent package!

TS-480SAT *Lower Price* £699 C
HF 160m - 6m with remote front panel. Large enough for base use, small enough for mobile. Big display

Yaesu HF Transceivers

YAESU FT-1000 MKV

200W HF transceiver, EDSP, Collins filter, auto ATU, 220V AC PSU. Acknowledged as one of the finest DX rigs on the market. Superb tailored audio and the ability to select Class A bias for dramatic signal purity. £2099 E

FT-1000 FIELD £1499 E
The HF choice for DXers. With this rigs reputation on DXpeditions what more persuasion do you need?

FTV-1000 *Lower Price* £599 B
6m 200W module for the FT-1000 range. Probably the ultimate for 6m DXing.

FT-897D £649 C
160m - 70cm self-contained portable. 100W and up to 20W from optional internal batts.

FT-857D *Limited Offer* £579 C
160m - 70cm mobile with up to 100W output. Lovely tuning control from remote head unit - and great price!

FT-847 £999 C
Complete station in a box! 160m - 70cm - up to 100W (50W 2m/70cm). Great for satellite work.

FT-840 £399 C
Is there any other radio that comes close to this price? One of our all-time best sellers. 100W 160m - 10m

FT-817ND £419 C
The ultimate QRP self-contained radio. Up to 5W output 160m - 70cm. New low price. UK warranty.

FT-817bhiDSP £529 C
FT-817ND with fitted bhi DSP module.

Warning - as a regular advertiser you can be sure all our stock is genuine UK warranted. Check serial numbers!!

New Carriage Charges: A=£3, B=£4, C=£6.95, D=£10, E=£12

LOWEST PRICES

ZERO DEPOSIT ZERO INTEREST

Enquiries 01702 206835

Freephone Orderline 0800 073 73 88

Icom
VHF/UHF Mobile/Base

ICOM IC-E208 *LIMITED OFFER*

VHF/UHF FM Dual Band Mobile Transceiver
*Freq range 144-146MHz, 430-440MHz Tx
*55/50W (3 pwr steps each band)
*Wideband Rx 118-173, 230-549 & 810-999MHz
£215 C

IC-910H *Lower Price* **£1087 C**
2m / 70cm 100W Base station all - modes with option for 23cm module (**UX-910 £359**)

IC-910HX *Lower Price* **£1235 C**
As above but with 23cm module ready fitted and a big saving as well.

IC-2725E **£269 B**
Icom's new dual band 2m / 70cm radio. Very easy to operate and install and a lovely detachable head.

Kenwood
VHF/UHF Mobile/Base

KENWOOD TMD-700E

2m/70cm dual band mobile transceiver with APRS. Doesn't need extra high cost boards to function. Only extra if required is a compatible GPS receiver.
Lower Price **£418 C**

TM-G707E **£265 C**
Dual Band 2m & 70cm with detachable front

TM-V7E **£359 C**
Dual Band 2m & 70cm with 50/35W output

TM-271E **£187 C**
Single Band 2m FM 60W mobile transceiver

Yaesu
VHF/UHF Mobile/Base

YAESU FT-7800E *SPECIAL OFFER*

*2m/70cms Dual Band Mobile *High power 50W 2m /40W 70cms *Wide receive inc. civil & military airband *CTCSS & DCS with direct keypad mic. *Detachable front panel *1000 memories plus five one-touch
FREE YSK-7800 SEPERATION KIT
£229 B

FT-2800M **£149 B**
*2m FM Mobile transceiver * High power 65W * Capable of VHF wideband receiver

FT-8800E *LOW PRICE* **£267 C**
*2m/70cmDualband FM Mobile transceiver * 50W 2m, 35W 70cm * Wideband receiver

FT-8900R **£339 C**
*2m, 70cm, 6m & 10m Quadband FM Mobile transceiver * Independent dial for each band

Watson
On-Glass Antenna

WGM-270

Dual Band 2m/70cm mobile whip. 2.5dB gain and 1.5:1 VSWR. 0.8m long. Complete system including 3.5m cable. No drilling involved. Antenna sticks on glass and interface assembly sticks on inside. Simple and very effective.
£29.95 B

Icom
VHF/UHF Handhelds

IC-V82 *NEW* **£159 B**
2m FM Digital Handheld 7W

IC-U82 *NEW* **£159 B**
70cm FM Digital Handheld 5W

IC-E90 *Limited Offer* **£199 B**
6m / 2m / 70cm handheld transceiver

IC-T3H **£129 B**
2m FM handheld 5.5W c/w BC-01 & BC-146

IC-E7 *DUE IN 2006*
New 2m / 70cm handy wide RX

Kenwood
VHF/UHF Handhelds

KENWOOD TH-F7E

• 144-146MHz Tx/Rx: FM
• 430-440MHz Tx/Rx: FM
Up to 6W out with Li-ion battery and **"scanner" style coverage from 100kHz to 1300MHz** including SSB on receive! This is a great radio to have at all times when you are on your travels.
£237 B

TH-D7E **£299 B**
2m/70cm dualband FM handheld transceiver with data communications

TH-G71E **£179 B**
2m/70cm dualband FM handheld transceiver

TH-K2E **£139 B**
2m FM 5W portable transceiver c/w Ni-MH battery/charger

TH-K2ET **£145 B**
2m FM 5W portable transceiver c/w Ni-MH battery/charger

TH-K4E **£139 B**
70cm FM 5W portable transceiver c/w Ni-MH battery/charger

Yaesu
VHF/UHF Handhelds

YAESU VX-7R
LIMITED SPECIAL OFFER

Totally waterproof, wide frequency coverage 500kHz-900MHz AM/FM. 132x64 dot matrix display providing easy-to-read frequencies and information plus pictorial graphics.
£209 B

***NEW* VX-6E *Offer* £189 B**
2m /70cm Submersible 5W

FT-60E 2m/70cm 5W **£169 B**
VX-2E 2m/70cms min **£119 B**
VX-110 2mhandheld **£94 B**

Alinco
VHF/UHF Handhelds

DJ-C6E *NEW* **£119 B**
2m/70cm FM 300mW handheld transceiver

DJ-V5E **£169 B**
2m/70cm FM 5W dualband handheld transceiver

DJ-193E **£99 B**
2m FM transceiver no keypad, Ni-Cds & charger

DJ-195E **£109 B**
2m FM transceiver with keypad Ni-Cds & charger

DJ-C7E **£129 B**
2m/70cm credit size FM handheld

Linear Amp UK
HF Linear Amplifiers

RANGER 811H

*1.8 - 29.7MHz
*800W CW or SSB, 400W RTTY
*Uses 4 x811A vertically mounted
*Drive 10 - 100W
*Toroidial AC Power Transformer
*6:1 Reduction Drive on Tuning Controls *"Near Silent" Papst Cooling fan *Front-panel ALC Adjust Control *Built-in AC 230V @ 8A Supply
£945 D

CHALLENGER III **£1795 D**
HF linear amplifier 10-160m WARC 100W in 1.5kW out

W3FF
NEW Mini Buddipole

Portable 40 - 2m Ant
Just 14" long packed!

£189 C
Order as W3-MBP

Comes in a case **just 14" long** yet extends to a **highly efficient 4.6m long rigid rotatable dipole.** Great for camping and back-packing. Handles 200W and band changing is just a coil tap away. Supplied with 25' of coax and balun. Centre has standard 1/2" plumbers pipe thread. Optional telescopic mast and tripod available.

SGC
HF Linear Amplifiers

SG-500 **£1399.95 C**
"Power Cube" 1.6-30MHz 500W solid state

Yaesu
HF Linear Amplifiers

VL-1000 QUADRA **£3795 D**
HF + 6m linear amp. 1kW comes with PSU

Watson
Mobile Antennas

ANTENNAS

W-2LE	1/4 wave 2m 0.48m 200W	£9.95 B
W-285	5/8th 2m 1.33m long 200W	£14.95 A
W-77LS	2m/70cm 0.42m 50W	£14.95 B
W-770HB	2m/70cm 1.1m 200W	£24.95 B
W-7900	2m/70cm 2m/70cm 1.58m	£32.95 B
WSM-270	Dual band mini magnetic	£19.95 A

BASES

WM-08	8cm diam magnetic	£9.95 A
WM-14B	14cm diam magnetic	£12.95 A
W-3HM	Hatch mount	£14.95 A
W-ECH	Cable kit	£12.95 A

NOTE: All antennas have PL-259 ends. Mag mounts have cable attached. Hatch mount needs ECH cable.

WATSON
Low Noise PSUs

WATSON W-25SM

Competitors models get bad press (see Radcom Dec. P66) But "Watson W-25SM stood out from the others."

£79.95 B

NEW STOCK & OFFERS

YAESU VX-120 & VX-170 *NEW*

< VX-120
A 2m 5W handheld with an 8-key pad, Ni-MH batt & charger
VX-170 >
A 2m 5W handheld with a 16-key pad, Ni-MH batt & charger

£99.95 B **£109.95 B**

YAESU FT-DX9000D *NEW*

Top-of-the-range 200W HF + 6m Deluxe Base Station. Auto ATU, 220V AC PSU, Class 'A' operation for AM & SSB, large TFT data management unit and dual analogue meters, Main/Sub receivers, 32-bit IF DSP. Return of the FT-DX series represents the very best in high power DX-ready base stations.
£7299 D

bhi
DSP Equipment

bhi NES10-2 MkII

NES10-2 Combined speaker and programmable DSP unit. Offers dramatic noise reduction and reduces annoying hetrodynes. 8 filter settings, 12V DC.
£99.95 B

NES-5 **£79.95 B**
DSP Speaker Basic Plug & Go model

NEIM-1031 **£129.95 B**
Noise Eliminating In-Line Module with DSP

ANEM *NEW* **£119.95 B**
"NOISE AWAY" Amplified LS DSP module

NEHM *NEW* **£99.95 B**
"NOISE AWAY" Headphone DSP module

1042 **£19.95 A**
Switch box allowing up to 6 items to connect to one bhi speaker/module.

NEDSP-1061 **£89.95 B**
Small DSP PCB module for retrofitting into rigs

NEDSP-1062-PCB **£89.95 B**
Amplified DSP module to insert in speaker path

NEDSP-1062-KBD **£99.95 B**
As NEDSP-1062 but with small keyboard

NCH **£34.95 B**
ANR Noise Cancelling headphones

WATSON
WM-S Hands Free

WATSON WM-S

Stay legal. Flexible boom microphone mounts under sun visor. PTT box mounts on gear changer. All powered from rig mic socket! **Includes detachable lead to match you radio.**
£39.95 B
To check compatibility, download PDF "WM-S Compatibility" in leaflets section of www.wsplc.com

New Carriage Charges: A=£3, B=£4, C=£6.95, D=£10, E=£12

WATERS & STANTON

Freephone Orderline 08000 73 73 88

Enquiries 01702 206835

www.wsplc.com

UK'S LOWEST PRICES!

NEW STOCK & OFFERS

FUJIKON NOISE CANCELLING HEADPHONES

NEW

These Active Noise Cancelling Headphones, from Fujikon, blockout annoying ambient background noise. Powered by an AAA battery noise cancelling is controlled by an on/off switch. NC-4 has a folding design for easy storage.

FUJIKON NC-2 £18.95 A

FUJIKON NC-4 £19.95 A

POCKET MORSE READER

MFJ-461

Reads CW

Just hold near receiver speaker

£69.95 B

That's right - just hold this self-contained decoder near your speaker and see the text scroll across the screen. Absolutely amazing

MFJ-936B Loop Tuner

The most amazing antenna we have seen in years. For optimum results take a wire around 1/5th wave long, bend into square loop (14ft on 20m = 3.5ft square) and attach to MFJ-936B. Result: Ultra low indoor noise and VK, ZL & W all on SSB! That's what we achieved in one day's operation! 20m loop works on 15m as well. Now In Stock. Great for QRP and portable as well.

£219.95 B

Antenna Accessories

Dipole Bits			
Kevlar	Strong 400lb strain line 200ft	£22.95	A
FW-PVC-50	50m clear PVC 2mm wire	£39.95	A
Flexweave	50m multi-strand 2mm wire	£29.95	A
HDCW	50m hard drawn 16g copper	£14.95	A
Insul-8	Black ribbed insulator	£0.99	A
WDC-50	SO-239 dipole centre insulator	£6.49	A
Egg-m	Medium ceramic egg insulator	£2.15	A
Egg-s	Small ceramic egg insulator	£1.75	A
WS-2580	25pcs 3" ladder line spacers	£9.95	A
Diamond 50 Ohm Baluns			
BU-50	1:1 1.7MHz 40MHz 1.2kW	£26.95	A
BU-55	1:1 3.5MHz - 75MHz 500W	£34.95	A
Antenna Traps (pairs)			
TR-200-14	200W bands 10m - 20m	£44.95	B
TR-200-10	200W 10MHz	£47.95	B
TR-200-7	200W 7MHz	£49.95	B
TR-200-3.6	200W 3.6MHz	£53.95	B
TR-1000-14	1kW bands 10m - 20m	£59.95	B
TR-1000-10	1kW 30m	£61.95	B
TR-1000-7	1kW 40m	£64.95	B
TR-1000-3.6	1kW 80m	£73.95	B
German Made High Quality Baluns			
HB-1-200	1:1 3.5 - 30MHz 200W	£25.95	B
HB-4-200	4:1 3.5 - 30MHz 200W	£25.95	B
HB-6-200	6:1 3.5 - 30MHz 200W	£25.95	B
HB-1-1	1:1 3.5 - 30MHz 1kW	£34.95	B
HB-4-1	4:1 3.5 - 30MHz 1kW	£41.95	B
HB-6-1	6:1 3.5 - 30MHz 1kW	£41.95	B
Remote 4:11.5kW Balun			
REM-BAL	For coax to ladder line match	£46.95	B
Patch Leads			
WPL-70	V low loss 75cm PL-259	£6.95	A
WPL-50	Standard 50cm PL-259	£2.99	A
WPL-50BNC	BNC version of above	£2.99	A
HQ-66	66cm RG-213 PL-259	£4.99	A
HQ-10m	10m long PL-259	£14.99	A

SGC External Auto ATU's

SGC SG-231

1 - 60MHz. 3 - 100W pep (50W CW). Min wire length, 7m. 50 Ohm feed. Needs 12V at approx 900mA.

£349.95 C

SG-239 £189.95 C
Mini auto ATU 1.8 - 30MHz 1.5 - 200W PEP primarily for long wires - non waterproof. 12V DC

SG-231 £349.95 C
1.8 - 60MHz 100W PEP. A great random wire tuner that you can use outdoors. 12V DC

SG-237 £299.95 C
1.8 - 60MHz 100W PEP. Great for mounting outdoors and feeding long wire. Waterproof. 12V DC

SG-230 £339.95 C
1.8 - 30MHz 200W PEP. The original design that handles end fed or coax unbalanced. Waterproof. 12V

SG-235 £749.95 C
3.5 - 54MHz. A hunky 500W PEP tuner that handles long wires. Great outdoor design. Waterproof.

Icom External Auto ATU's

AH-3 £379.99 C
1.8 - 28MHz. A hunky 120W PEP tuner that handles whips or wire longer than 2.5m. Waterproof.

Alinco External Auto ATU's

EDX-2 £299.95 B
1.8 - 30MHz 150W long wire tuner designed for use with DX-70 transceiver. Waterproof.

MFJ External Auto ATU's

MFJ-993B

*Auto ATU with digital data display *1.8-30MHz *Long wire, coax & balanced line *300W SSB, 150W CW *Cross needle metering

£219.95 C

MFJ-991B £189.95 C
1.8 - 30MHz auto ATU. Similar to MFJ-993 but no digital display. Works with any HF transceiver. 150W PEP

MFJ-994B £299.95 C
1.8 - 30MHz high power auto ATU. 600W PEP / 300W CW. Tunes wire, coax and balanced feed.

SGC External Auto ATU's

MAC-200 £259.95 C
1.8 - 60MHz 200W PEP. Wire, coax and balanced feeder. Features auto antenna switching.

SG-237PCB £279.95 C
1.8 - 60MHz 100W PEP. Same as SG-237 but without housing for building into your own housing.

SG-211 £189.95 C
1.8 - 60MHz works off internal dry cells. Zero drain wait state. 60W PEP. Ideal for portable (Min 1W).

Yaesu External Auto ATU's

FC-20 £249.95 C
1.8 - 60MHz 100W matched for FT-100/Ft-847. Desk top unit to match transceivers. Coax systems only.

FC-30 £249.95 C
1.8 - 60MHz 100W. Designed for use with FT-857/FT897. Coaxial input / output.

FC-40 £239.00 C
1.8 - 60MHz 100W. New waterproof ATU designed for use with FT-897 / FT-857 and mobile operation.

Icom External Auto ATU's

AT-180 £349.95 C
1.8 - 54 MHZ ATU designed for IC-706. Plugs directly into transceiver for seamless operation. Coax only.

Kenwood External Auto ATU's

AT-50 £319.95 C
1.8 - 30 MHZ 100W ATU specifically designed for use with TS-50 transceiver. Coaxial only.

Cushcraft HF Antennas

MA5V £239.95 C
Vertical 5-band 20m - 10m. No separate radials needed. 250W. Self-supporting. 4.48m tall.

A3-S £469.95 D
The classic 20, 15, 10m 3-el beam. 2kW 8dB gain. 8.45 el. Turn radius 4.72m. F/B ratio 25dB.

A3-WS £379.95 D
Dual Band 3 el. beam for 17m & 12m. 2kW. El length 7.66m. Turn radius 4.4m. Gain 8dB. F/B ratio 25dB.

A4-S £569.95 D
Tri-band 4 element Yagi. for 20m - 10m. DXers delight. 2kW , 8.9dB gain F/B 25dB. Turn radius 5.49m

R-8 £469.95 C
8-band vertical 40m - 6m. No separate radials needed. 1.5kW. Height 8.7m

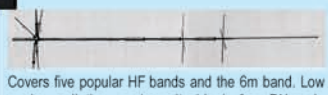
R-6000 £329.95 C
6-band vertical 20m - 6m. No separate radials needed. 1.5kW. Height 5.8m. Great small garden ant.

MA5B £369.95 C

5-band 2 El mini beam. 20m - 10m 2kW. Elements 5.2m Turn radius 2.7m. (Dipole on 17/12m) 5dB gain

Diamond HF Antennas

DIAMOND CP6



Covers five popular HF bands and the 6m band. Low angle radiation makes it ideal for DX work. Outperforms dipoles for long distance contacts and compares favourably with beams located 10m+ above ground.

*Bands: 3.5 -50MHz *Power: 200W *VSWR: Better than 1.5:1 *Socket: SO-239 *Height: 4.6m *Radials: 1.8m rigid adjustable £239.95 C

Radio Works HF Antennas

CW-160 £129.95 C
8-band 160m - 10m dipole with 22ft vertical radiating feeder. 1.5kW. Balun fed. 265ft long.

CWS-160 £119.95 C
Compact 8-band 160m - 10m dipole with 22ft vertical radiating feeder. 1.5kW. Balun fed. 133ft long.

CW-80 £99.95 C
7-band 80m - 10m dipole with 22ft vertical radiating feeder. 1.5kW. Balun fed. 133ft long.

CWS-80 £109.95 C

Compact 7-band 80m - 10m dipole with 22ft vertical radiating feeder. 1.5kW. Balun fed. 133ft long.

G5RV Plus £59.95 B

Rugged 2kW balun matched G5RV with 102ft element and 31ft ladder line. Requires ATU. Made in USA

Hustler Base Antennas

6-BTV £229.95 C
80 - 6m 6-band vertical. 7.3m tall 1kW. Can be used at ground level with earth stake. Ideal small gardens

5-BTV £199.95 C
80 - 10m 5-band vert. 7.64m tall 1kW. Can be used at ground level with earth stake. Ideal small gardens

4-BTV £169.95 C
40 - 10m 4-band vert. 6.52m tall 1kW. Can be used at ground level with earth stake. Ideal small gardens

Butternut Antennas

HF-2V £229.95 C
80 / 40m high performance vertical. 1kW PEP 9.75m tall. Self supporting for ground mount use.

HF-6V £299.95 C
6 band vertical 80-40-30-20-15-10m. 2kW. 7.9m tall. Use own radials or ground mount.

HF-9V £349.95 C
9-band 80 40 30 20 17 15 12 10 6m vertical 1kW 7.9m tall. Use radials or ground mount

Buddipole Products

LOWER PRICES!

HF Portable at its Best

W3-BP £179.95 C
40m - 2m adjustable dipole. 250W and max length of 4.65m. Packs down to 65cm approx.

W3-MBP £189.95 C
Sames as W3-BP but packs even smaller.

W3-BS £119.95 C
40m - 2m vertical is half a Buddipole. Ideal for QRP and rucksack - as used by Peter Waters G3OJV.

Peter Waters says: *I think these products are great. Superbly engineered and very efficient.* Options include adaptor for dipole to decorators pole £6.95, Field tripod £89.95, 2.45m telescopic mast £49.95, mini tripod for Buddistick.

Super Antennas

MP1-SA Low Price £99.95 B
Screwdriver style adjustable HF QRP whip 40m - 70cm. 150W PEP. Max extended 185cm approx

MP2-SA £199.95 A
Electrically tuned version of the above. Requires around 9V - switch control box not included.

MP-80M £29.95 A
Add on 80m coil to extend the LF coverage of the MP1 and MP2.

High Sierra Mobile Whips

HS-1800/PRO
£379.95 C
The ultimate mobile whip. Electrically tuneable 80m - 6m 1kW PEP Includes switch box and 12V cable. Massive 2" coil. Made in USA. Superb!! Available in Black or Grey.

SIDEKICK As used by Peter Waters G3OJV/M
£249.95 C
Get mobile on all bands from 80m to 6m in minutes. This compact screwdriver antenna comes with cables and control box. Designed to go on our 3-way magnetic mount (£39.95 extra) it is an amazing performer and only 1.37m maximum! Available in Black Only.

New Carriage Charges: A=£3, B=£4, C=£6.95, D=£10, E=£12

March 2006
On Sale 9 February
Vol. 82 No. 3 Issue 1187
(April Issue on sale 9 March)

Published by
PW Publishing Limited
Ar owsmith Court
Station App oach
BROADSTONE
Dorset BH18 8PW
Directors: Stephen Hunt & Roger Hall

Editorial Department
☎ 0870 224 7810
Fax: 0870 224 7850

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

Production Editor
Donna Vincent G7TZB/M3TZB
donna@pwpublishing.ltd.uk

Technical Editor
NG (Tex) Swann G1TEX/M3NGS
tex@pwpublishing.ltd.uk

Art Department
☎ 0870 224 7820
Fax: 0870 224 7850

Art Editor
Stephen Hunt
steve@pwpublishing.ltd.uk

Typesetting
Peter Eldrett
peter@pwpublishing.ltd.uk

Sales Department
Fax: 0870 224 7850

Advertisements
Roger Hall G4TNT
roger@pwpublishing.ltd.uk
☎ 0207 731 6222

Advertisement Administration
Joan Adams
joan@pwpublishing.ltd.uk
☎ 0870 224 7820

Book Orders
bookstore@pwpublishing.ltd.uk
☎ 0870 224 7830

Subscription Administration
Webscribe
Practical Wireless Subscriptions
PO Box 464
Berkhamsted
Hertfordshire HP4 2UR, UK
pw@webscribe.co.uk
www.webscribe.co.uk
☎ 01442 879097
Fax: 01442 872279

Finance Department
☎ 0870 224 7840
Fax: 0870 224 7850

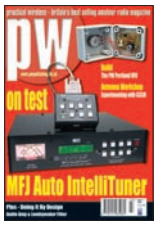
Finance Manager
Alan Burgess
alan@pwpublishing.ltd.uk

Finance Assistant
Margaret Hasted

PW Publishing Website
www.pwpublishing.ltd.uk

All our 0870 numbers are charged at the BT Standard National Rate

Cover subject



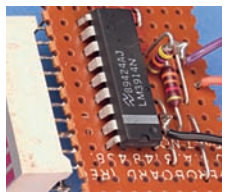
We've lots on offer this month to helo enhance your radio hobby. The review of the MFJ Auto IntelliTuner gives an insight into how useful auto tuners can be, if home construction is your favourite, why not have a go at building your very own Portland Oscillator from **Tony G4CFY**'s design? There's also all your regular favourites too, enjoy!

Design: Steve Hunt
Photographs: Tex Swann G1TEX

march 2006 contents

features

Page 18



regulars

Published on the second Thursday of each month by PW Publ shing Ltd., Arrowsm th Court, Station App oach, B oadstone, Dorset BH18 8PW. Tel: 0870 224 7810 Printed in England by Holb ooks P inte s Ltd., Portsmouth P03 5HX Distributed by Seymour, 86 Newman St eet, London , W1P 3 D, Tel: 0207-396 8000, Fax: 0207-306 8002, Web http://www.seymour co uk. Sole Agents for Aust alia and New Zealand - Go don and Gotch (Asia) Ltd.; South Africa - Cent a News Agency. Subscriptions INLAND £32, EUROPE £40, REST OF WOR D £49, payable to PRACTICAL WIRELESS, Subscription Department PW Pub ishing Ltd., Arrowsm th Court, Station App oach, Broadstone, Dorset BH18 8PW. Tel: 0870 224 7830 PRACTICAL WIRELESS is sold subject to the following conditions, namely that it shall not, w thout written consent of the publishers fi s having been given, be lent, re-sold, hi ed out or otherwise disposed of by way of t ade at mo e than the ecommended selling price shown on the cover, and that it shall not be lent, re-sold, hi ed out or othe wise disposed of in a mutilated condition or in any unauthorised cover by way of T ade, or affixed to or as part of any publication or advertising, lite ary or pictorial matter whatsoever. *Practical Wireless* is Publ shed monthly for $50 per year by PW Publishing Ltd., Ar owsm th Court, Station App oach, B oadstone, Dorset BH18 8PW, Royal Mail International, c/o Yellowstone International, 87 Burlews Court, Hackensack, NJ 07601. UK Second Class Postage paid at South Hackensack. Send USA add ess changes to Royal Ma l Inte national, c/oYellowstone Inte national, 2375 Pratt Bouleva d, Elk G ove Village, IL 60007-5937. The USPS (United States Postal Se vice) number for Practical Wi eless is: 007075.

rob mannion's keylines

This month Rob G3XFD pays tribute to a remarkable Irish Radio Amateur, discovers his Grand-daughter's opinion of Madonna's singing and discusses the requirements of front cover photographs for PW.

It's a fact of life that we have to say 'Goodbye' to old friends - and here at *PW* I often hear from other friends who have news of the passing of yet another Amateur. In the news pages this month we have an obituary marking the death of **Jim Gaffney EI8W**. However, even though Jim's friends have clearly expressed admiration and their sorrow at losing Jim, I realise that it's not possible to fully credit the life of such a person as EI8W in a few brief words.

Jim - as he was known to everybody - was a stalwart of the **Tipperary Amateur Radio Group (**TARG**)**, a very keen bunch of Radio Amateurs! Indeed, it was TARG who were among the first Irish clubs to extend a welcome, making the *PW* Editor feel at home whenever he ventured over the Irish sea to provide club visits.

Jim Gaffney EI8W made me particularly welcome in his own home, and as I have had a lifelong interest in flying, he told me many stories of what it was like flying the big commercial jets. And although I've not seen it mentioned elsewhere - I recall Jim describing his first flights for British Airways flying the then new, giants of those days - Trident jets!

My own hobbies were of interest to Jim and on one occasion he was very keen to see how I went about making home-baked bread. However, because he was becoming somewhat forgetful at that time, when I arrived with the bread-making equipment during a visit to Clonmel, Tipperary where he lived - Jim seemed very puzzled!

Despite the little set set-back, Jim enjoyed watching me make the dough, prove it, and then bake the loaves while he waited. During the process I was able to get a very brief insight into this exceptionally modest man's life and work. Fortunately the bread turned out well, and we all enjoyed it!

However, as I mentioned in my letter of sympathy to **Pauline**, Jim's widow - it's likely I shall always be remembered as the somewhat eccentric Englishman who turned up un-announced to bake bread!

I'm proud to have known Jim EI8W, and like many other people quietly getting on with their lives - he was a hero in his own way. Tipperary and its Amateur Radio group are justly proud of Jim and his achievements.

Young & Enthusiastic

My 9-year old grand-daughter Georgia finally got her chance to build radio receiver with me in the shack over the Christmas period. This young, enthusiastic constructor was keen to do the same as her younger brother Freddy.

The building process was just as enjoyable for me! To help a child build a radio and discover a little about science, physics and radio is a wondrous thing. The look on her face under the headphones (1922 made!) was a delight to see.

As she tuned the crystal set over the medium wave band I saw her hesitate at one spot on the band. Holding the headphones close to her ears she had a broad grin on her face, and started swaying form side-to-side and was obviously enjoying some music being broadcast.

I asked her: "What have you found Georgia - you seem to be enjoying it"? Her reply was both memorable and amusing: "Oh, it's Madonna Grand-dad, I love her music and even though she so old - she can still sing so well"?

I roared with laughter at her comments and Georgia wondered why I thought it was so funny. I explained that if she considered Madonna was old - Grand-dad was positively ancient! Yet again I'd been left with another classic story to share with readers - and the satisfaction of sharing the joy of making something.

February Front Cover

Front covers for *PW* can pose a problem sometimes - we're always working hard to get what we use on the cover to reflect what's inside. It can be difficult and the Art Dept. can often come up with miracles. Anyone wishing to make a silk purse from a porcine auditory appendage need only ask for our Art Editor!

February's main picture showed **Brendan Minish EI6IZ**, operating a special demonstration station, promoting Amateur Radio to the general public. The photograph was kindly provided by **John Corless EI7IQ** (thanks again John!) and you could also perhaps help PW in the same way!

We always ask budding *PW* authors to provide as any good quality photographs as possible to accompany articles and - with some care and thought - you may end up providing us with a front cover shot. It's rare (fortunately) that we get articles in nowadays without some form of photograph, drawing or illustration, but we need more keen photographers to co-operate with us to help produce the best pictures possible, whether it be for the front cover or inside the magazine.

If you've got any ideas for an article and want some advice on photography - don't hesitate to speak to *PW* photographer/illustrator **Tex Swann G1TEX** or myself. We'll be pleased to hear from you.

Rob G3XFD

practical wireless services

Just some of the services *Practical Wireless* offers to readers...

Subscriptions

Subscriptions are available at £33 per annum to UK addresses, £41 Europe Airmail and £50 RoW Airmail.

Components For *PW* Projects

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

Photocopies & Back Issues

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

Placing An Order

Orders for back numbers, binders and items from our Book Store should be sent to: **PW Publishing Ltd., Post Sales Department, Arrowsmith Court, Station Approach, Broadstone Dorset BH18 8PW**, with details of your credit card or a cheque or postal order payable to PW Publishing Ltd. Cheques with overseas orders must be drawn on a London Clearing Bank and in Sterling. Credit card orders (Access, Mastercard, Eurocard, AMEX or Visa) are also welcome by telephone to Broadstone **0870 224 7830**. An answering machine will accept your order out of office hours and during busy periods in the office. You can also FAX an order, giving full details to Broadstone **0870 224 7850**.
The E-mail address is **bookstore@pwpublishing.ltd.uk**

Technical Help

We regret that due to Editorial time scales, replies to technical queries cannot be given over the telephone. Any technical queries by E-mail are very unlikely to receive immediate attention either. So, if you require help with problems relating to topics covered by *PW*, then please write to the Editorial Offices, we will do our best to help and reply by mail.

amateur radio waves

Promoting Packet Radio

● **Dear Editor**

I am writing in response to **Andy Foad G0FTD's** 'Star Letter' in February 2006 *PW*. I do so because, personally, I think that there must be quite a number of Amateurs, still using or at least still interested in Packet that feel the same as Andy. For a number of reasons they do not express their opinion publicly. It could be a lack of time, lack of articulation, don't wish to get involved, or just plain old apathy, a traditional British complaint!

Whilst I do agree that the last few years has seen a decline in activity from the user base, essentially the Network is still there, the BBSs are still there, the Nodes are still there!

It's just that most users have felt it more convenient to use BT and pay £14 per month for the pleasure of the internet. If only they had donated £14 per annum to the Packet Network it would be in much better health than it is. Even so, there is still a nucleus of Radio Amateurs who will remain dedicated to the Network, despite the desertions.

The use of Amateur Radio to communicate in non-real time is obviously going to be slower than the commercial World Wide Web E-mail, but most Amateur traffic is not so urgent that an immediate reply is needed. Not only that, but there is infinitely more satisfaction from the radio method in the knowledge that it is based on a world-wide ad-hoc system, with individuals donating their time, money and equipment free of charge. To throw all this away would be absolute sacrilege.

Having said all that, I do see a glimmer of light on the horizon. I have seen an increase - yes an increase - in my user-base, plus an increase in possible interest in some newer licensees. I have given a few talks at my club and perhaps this has helped, plus a few local friends and myself are offering a few 486 PCs, set up with operating system and Packet software ready for use, free to newer licensees, who will promise to use the network. However, thus far we have only had one person taking up that offer.

Packet radio has some very talented software writers and hardware designers within its midst, and to waste this talent by not using the Network is causing more BBSs to close. This reduces the use of the v.h.f./u.h.f. bands, making a very good case for the commercial organisations to lay claim to under-used frequencies. In effect we are signing the death warrant to some of our bands, and to a great part of our hobby too!

Finally, my dear Editor (good friend of mine!) I must take exception to your comment, however, when you said it was an "author's" decision to cut the Packet column, when it was not! I would agree about the feedback though, but this is the same whatever the column - I don't get any feedback from the antenna column either! This has always been thus, just goes to show that nobody knows whether the content is the **correct content**, if we're relying on feedback. I guess the sales figures of the magazine, or circulation figure, would be a more reliable statistic.

73 to all. Live long and Prosper!

Roger Cooke G3LDI
Swardeston
Norfolk

Editor's comments: Don't worry readers - Roger and I won't fall out over his last comments! In fact, we'll be meeting after I have attended the King Lynn Club on July 6. The decision on the Packet column was taken due to reader feedback via one of our occasional surveys. However, things can change and surveys can be either inaccurate or outdated. As usual, we welcome your comments on this topic.

Problems For QSL Manager

● **Dear Rob**

I would be grateful if you could publish in your magazines, a plea on my behalf. As the G8+3 QSL sub manager I am now holding a lot of cards for people. I have 817 of the G8+3 calls who have envelopes or cards in my system. Out of that I have 2494 cards for 551 of the G8s where I have no envelopes to send the cards out. While storage is not an issue for me I would like my fellow Radio Amateurs to actually receive the cards that have been sent to them. People can check the following web page **www.g6fsp.com/qsl** for further details of what cards that and envelopes that I am holding for them. My E-mail address is **dave@g6fsp.com** and my address is; **1 Beechfield Avenue, Barton, Torquay, Devon TQ2 8HU**.

I appreciate that not all Amateurs are members of the RSGB but there is a likelihood those non-members will read your magazines. Thanking you in advance for your assistance in this matter.

Dave Helliwell G6FSP
Torquay

Editor's support: Pleasure to help Dave! I hope readers can pass on Dave's plea - his work (and that of all the QSL Sub Managers) deserves much praise. Thanks to you all for what's done on our behalf.

Strange Ofcom Logic?

● **Dear Editor**

I'm writing about the Ofcom decision on 'specialised Licensing Facilities' and your Editor's Keylines Editorial, (February *PW*). Yes, just what is the strange logic behind the decision to hand over the 'specialised licensing facilities, etc., of Amateur Radio in the UK to the British bureacracy beast? Or in G3XFD's words , a "Quango"? Surely it cannot be the cash they will recoup from the RSGB who administered it via a 'subsidy'?

To think, as Rob suggests, that "someone in power will; release this and adopt the sensible (and more economical) attitude" - that isn't ever going to happen! With all due respect Rob, to believe otherwise is folly. Besides, when did any Government or Government Department ever do anything remotely sensibly? I can't think of any scenario where it has actually occurred.

In fact, I think Rob G3XFD is correct in so far as paying out more cash is concerned. At the end of the day it will cost far more money! But, what is more puzzling, is just why the RSGB welcomes these changes (statement in *RadCom)*. Being an old cynic I'll believe what the RSGB promises in the statement, and believe things when I seem them!

Ray Howes G4OWY
Weymouth
Dorset

Editor's comments: Several letters - from readers criticising my comments - were received but the authors specifically requested 'not for publication', regarding the letters as personal, for my attention only. (I always try to present a balance of opinions on topics within these pages).

Topping's Tips

● **Dear Editor**

Ben Nock's Fishing for DX article and his experiences at boot sales was most interesting, as well as humorous. My answer is to have a wife **Gail**, who although no longer active as a Radio Amateur, picks up all my radio bargains at boot sale. Over the years Gail has found many radio bits 'n' pieces at boot sales including a hefty commercial a.t.u. (£5), several ex-p.m.r. radios for conversion and a vintage Second World War engine, now coupled to an alternator for use during the winter months when we can experience prolonged power cuts. Additionally, Gail has also

secured a number of items at boot sales for our yacht.

My advice to all males, leave the shopping to the experts, after all, Sunday should be devoted to one's interests, radio during the winter and sailing in the summer, not traipsing around a car boot sale in a muddy field!

Regards,

Colin Topping GM6HGW
Newport on Tay, Scotland

Frustrated Author!

● **Dear Rob**

Knowing that *PW* is always seeking articles from readers and possible authors and your request for us to contact you, I sent you a feature article and photos via E-mail, only to be asked to send the work in by post. You also said to me that you didn't have time to look on website to check on articles suitable for *PW*. I was very surprised - as it only takes a few moments of your time to look on a website to see a possible author's work - I ended up being discouraged.

Although I got the *Author's Guide* you sent me - literally the next day- I feel that I've perhaps wasted my time. Surely it's quicker for everyone if you check on a website for an article idea rather than rely on snail mail? As you seem to do an enormous amount of work on E-mail, and save me postal costs, why can't I submit my articles and ideas via E-mail?

I have many ideas, and you answer my questions promptly via E-mail and I can understand your quaint typos! But surely, you must be able to bypass the post?

Best wishes to you, I'm trying to understand your situatuation and of course I fully support *PW*.

John Williamson
Hungerford
Berkshire

Editor's reply: I asked John if I could publish his letter because we've received a number on this topic, expressing similar comments, and unfortunately the necessary reply cannot be brief! John's letter represents a number of others sent to me on the same subject. Firstly, there's no problem in E-mailing me with an idea, and discussing it. I will then send out an *Author's Guide* - an essential item as it contains important information on copyright, the way we work with authors, essential instructions, requirements on article acceptance, advice, style and our general editorial approach. All potential authors will be sent, and really should have - a copy of our guide. During the working day our computers are fully occupied with *PW* work and we literally don't have time to go trolling through Websites for information. Additionally, I can also confirm that we're very unlikely to re-publish an article that's been on a website or has appeared elsewhere - unless it's very special indeed. Why you may ask? The answer is simple - it's unfair on our readers because that material can be read for free on the Web. We also need to know we're dealing with the author for legal and copyright reasons (we've even been asked - quite often - if we would publish an article under a pseudonym, or credit it to another person. For very obvious reasons, we cannot do this because of HM Inland Revenue Laws!)

Articles published on the web have often re-appeared in various magazines at the same time. This can cause real problems with copyright. All articles sent in to us by post are read in paper form, in turn by **Tex**, **Donna** and myself (sometimes at home). If necessary drafting/checking and proof copies can be sent and received by E-mail once an article has been accepted, and we do our very best to work and co-operate with our authors. Finally, if I were submitting an article to a newspaper or magazine - I just would not dare (or stand a chance of publication) by asking the Editor to "Take a look at my website for examples of my work"!

Having discussed this on the telephone with you John - I know you now understand our problems, and I hope other authors also appreciate the situation. By working and co-operating together we can produce the *PW* you want!

Letters Recieved by e-mail. 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

amateur radio rallies

Radio rallies are held throughout the UK. They're hard work to organise so visit one soon and support your clubs and organisations.

2006

February 12
Northern Cross Rally
Contact: John G7JTH
Tel: (01924) 251822
Website: www.wdrs.org.uk
The Wakefield & District Radio Society will be holding its 15th Annual Northern Cross Rally at the Thornes Park Atletics Stadium, Horbury Road, Wakefield, West Yorks. Doors open at 1030 (1015 for disabled visitors), ample parking, Bring & Buy. Admission £1.50.

February 26
Swansea ARS Amateur & Radio Computer Show
Contact: Roger GW4HSH
Tel: (01792) 404422
The Swansea ARS rally is being held at Afan Lido, Aberavon Seafront, Port Talbot, one mile from J41 off the M4. Opening at 1030 the rally will offer plenty for visitors including trade stands, Bring & Buy, Special Interest Groups, Repeater Groups, Catering and Talk-in on 145.550MHz.

March 5
Cambridge & District ARC Rally
Contact: John G0GKP
Tel: (01954) 200072
The Cambridge & District ARC Rally takes place Britten Arena, Wood Green Animal Shelter, A1198 Godmanchester off A14. Doors open at 1000, admission is £2, free parking, boot pitches and tables.

March 11
Junction 28 QRP Rally
Contact: Russell Bradley G0OKD
Tel: (01773) 783394
E-mail: russel.bradley@ntlworld.com
The 6th Junction 28 QRP Rally hosted by the The South Normanton Alfreton And District Amateur Radio Club (SNADARC) in Association with the G-QRP Club takes place at the Village Hall Community Centre, Market Street, South Normanton, Nr Alfreton, Derbyshire.The event will be fully signposted, just five minutes from the M1 Junction 28 and the A38. Open to the public from 1000. There will be Amateur Radio, electronics and related items, Bring & Buy and special interest group stalls, outdoor flea market (weather permitting), refreshments.

March 12
Aberystwyth Rally
Contact Ray GW7AGG
Tel: (01970) 611432
E-mail: ray@clocktower.go-plus.net
The Aberystwyth Rally Hobbies Fair with Amateur Radio, computers, model railways, model aircraft and doll's houses takes place at Penweddig School, Aberystwyth from 1000 until 1630. There will be h.f. and v.h.f. on the air, hobbies demonstrations, trade stands and special interest groups, refreshments and Talk-in on S22.

March 12
Wythall Radio Club 21st Annual Radio & Computer Rally
Contact: Chris G0EYO
Tel: (07710) 412819
E-mail: g0eyo@blueyonder.co.uk
Website: www.wrcrally.co.uk
The Wythall Radio Club 21st Annual Radio & Computer Rally takes place at the Woodrush Sports Centre, Shawhurst Lane, Hollywood, Near Wythall, Birmingham B47. There will be plenty of radio and computer traders, massive Bring & Buy, refreshments, good on-site, parking. Only two miles from J3 M42. The rally will be open from 1000-1500 and will be under cover in the sports halls. Admission: £1.50. Talk-in on S22 and the location will be well sign posted. Bookings are now being taken and traders are advised to book early.

March 19
Exeter Rally
Contact: Vic G4KEE
Write to: c/o PO Box 52, Exeter EX4 8WX
Tel: (07811) 920840
The Exeter rally takes place from 1030 - 1530 at the America Hall, De La Rue Way, Pinhoe, Exeter EX4 8PW. Please note this rally is taking place instead of the Tiverton Rally which was originally scheduled for March 19 but has had to be cancelled due to the unavailability of the venue.

Note to Rally Organisers: Please include the postcode of your rally venue (see Keylines).

If you're travelling a long distance to a rally, it could be worth 'phoning the contact number to check all is well, before setting off.

amateur radio news & products

A comprehensive look at what's new in our hobby this month

Fixed Penalty Fines

The Department of Trade and Industry (DTI) has launched a consultation on proposals to introduce fixed penalty fines for certain offences committed under the Wireless Telegraphy Act 1949. The 1949 Act (WT Act 1949) regulates the use of radio equipment.

The WT Act 1949 provides for a number of criminal offences to enforce the regime. In order to lighten the touch of the regulatory regime, the Communications Act 2003 (CA 2003) enables the less serious offences under the WT Act 1949 to be dealt with by fixed penalty notice rather than prosecution. This consultation proposes that in relation to certain minor offences under the WT Act 1949 a system of fixed penalty notices should be introduced as a possible alternative to prosecution. A fixed penalty of £100 is proposed.

The proposals do not cover more serious offences in connection with both licensed and illegal (i.e. unlicensed) broadcasting. It is also proposed not to bring into the regime offences involving receive-only apparatus. For more information take a look at **www.dti.gov.uk/consultations/**

New Catalogue

The latest catalogue from Hamshire based WCN Supplies has recently landed on the *PW* newsdesk. It's packed full with useful items from components to tools and power supplies to l.c.d. screens. There are rechargeable 1200mA nickel metal hydride AA batteries at just 75p each. Post and packing is £2.25 per order.

WCN Supplies, who also attend some rallies during the year, is open from Monday to Friday 0900 to 1700 and Saturday 0900 to 1300 can be found at:

WCN Supplies
The Old Grain Store
Rear of 62 Rumbridge Street
Totton, Southampton
Hampshire SO40 9DS
Tel: 023 8066 0700,
Website: www.wcnsupplies.net

Summits Remain Active

The Short Wave Listening section of the Summits On The Air (SOTA) programme remains active and one s.w.l., **Roger Leighton** from Rawdon, Leeds, has become the first to hear 100 Unique summits. The SOTA Uniques is a relatively new set of awards in the SOTA programme, based on the number of distinct summits heard on an all-time basis. Roger (pictured here) became the first to reach the 100 landmark when he listened in to the GW3TJE/P 5MHz activation of Sugar Loaf GW/SW-011 on 10 December 2005.

For more information about swling SOTA and the Summits On The Air awards programme in general please visit the official website at **http://www.sota.org.uk**

Intermediate Course

The 5th Intermediate course to be run by the **Chelmsford Amateur Radio Society** (CARS) starts in March. The course will be held at the Danbury Village Hall near Chelmsford on Thusday evenings between 1900 and 2100 hours from 2 March until 4 May with the exam will be held on the 11 May.

Anyone interested in attending the course should contact the CARS Training Manager **Clive Ward G1EUC, Tel: (01245) 224577/Mobile: (07860) 418835, E -mail: training2006@g0mwt.org.uk** or take a look at the Training Web page at **http://www.g0mwt.org.uk/training/**

RadioUser

Don't forget that PW Publishing Ltd., has recently merged *Short Wave Magazine* and *Radio Active* to form the new *RadioUser*. This 84-page magazine, incorporating the very best of *SWM* and *RA* is jam packed with more columns, more features, more pages, more reviews - everything for the radio listener and enthusiast all in one place.

The February issue is on sale now and is available from all good newsagents priced £3.25. Look out for *RU* now. If you're interested in subscribing check out **www.radiouser.co.uk** for a very special deal.

For the latest news and chat with fellow readers why not join the *RU* readers list by sending an E-mail to: **radiouser-on@pwpublishing.ltd.uk**

Record Breaker!

The attendance for the talk by **Carl Thomson G3PEM** at the **Chelmsford Amateur Radio Society** (CARS) broke all previous records. A total of 98 people turned up to see Carl deliver a superb talk on his time as Chief Radio Engineer onboard Radio Caroline in the 1960s.

Carl, who served on both Radio Caroline North and South, captivated his audience with his tales of life onboard Caroline. While the pay may have been good, three times what could be earned in the UK, the living accommodation was cramped and there were certainly plenty of hazards. Carl vividly described the time that Radio Caroline ran aground on the Essex coast during a heavy storm.

The 90 minute talk was illustrated by dozens of previously unpublished pictures. Much technical detail was revealed about the various transmitters and antenna systems and there was a marvellous story of the night the antenna system 'caught fire' as a result of arcing. Until the Offshore Radio Stations like Caroline started up, people in the UK had been restricted to listening to just a single state controlled radio station. The offshore stations rapidly gained many millions of eager listeners.

Send all your news and club info to
Donna Vincent G7TZB
at the PW editorial offices
or e-mail donna@pwpublishing.ltd.uk

Stop Press!

Leicester Show 2006 dates announced

As we went to press the LARS organisers announced that the show will take place on Friday 8, and Saturday 9 September.

See you there!

website:
www.lars.org.uk

Get safety conscious with Braintree

The first meeting of 2006 for the **Braintree Radio Society** was an evening dedicated to safety and checking both the clubs and members' equipment for electrical safety. Two members who are qualified to undertake the task spent the evening checking PSUs, mains leads and the like, to ensure that they conform to current safety requirements.

It is now a club policy for Braintree that no mains powered equipment, either members' or the club's, can be used at a public event without it being tested prior to the occasion and a record being made in the club book.

The event was the first time that many members had seen PAT testers at work and the first casualty of the evening was, much to their despair, the club kettle! However, a standby was found and they managed to make the tea and coffee, so the evening was not the disaster it could have been!

It was an interesting start to the year and what with up and coming meetings including a rig clinic, v.h.f./u.h.f. (magnetic) loop antenna construction evening and by various guest speakers, 2006 promises to be another busy year for the club. For more information visit **www.badars.org.uk**

International Marconi Day

The 19th International Marconi Day takes place on the 22 April and although not a contest, awards can be obtained. Full details can be found at **www.gb4imd.org.uk**. For a station to be counted towards an award by applicants, that station must be registered by contacting the webmaster via E-mail at **webmaster@gb4imd.org.uk** prior to the event with full details of the station.

In order to qualify as an 'Award Station' operations should take place from a site that either used Marconi equipment prior to his death in 1937 or from which Gugliemo Marconi carried out experiments during his lifetime. Why not join in?

SBS-1 Improvements

The SBS-1 allows users to track aircraft at ranges of up to 402km (250 miles). The manufacturers, Kinetic Avionic Products Ltd, have added a new interface mechanism for connectivity to a range of popular radio scanners. This will allow users to 'watch' aircraft and listen to air traffic in a single consolidated action. The attached radio scanner will be automatically tuned to the frequencies selected. Frequencies can either be entered freehand or associated with waypoints.

The first updated SBS-1 units will have interface libraries for the Icom IC-PCR1000, the AOR8200 and the AOR8600. The modular plug-in nature of the interface means that support for other scanners can be easily added and many more interface modules are under development.

The SBS-1 retails for £499.95 including VAT with shipping costing £10 and is available from: **Martin Lynch & Sons, Outline House, 73 Guildford Street, Chertsey, Surrey KT16 9AS**
Tel: 0845 2300 599 Website: www.hamradio.co.uk

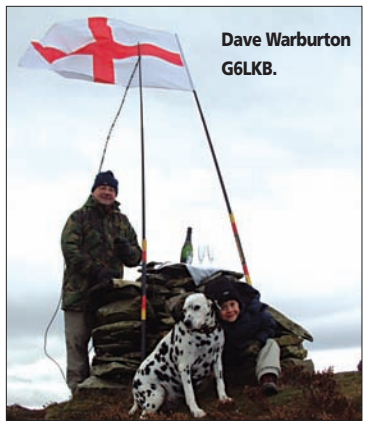
Remembering a Maltese Amateur

Felix Scotto 9H5EA passed away peacefully in his sleep at his home in Malta on Saturday 10 December 2005, aged 65. Felix was a keen Radio Amateur and *PW* supporter and he was particularly proud of the fact that his was one of the very few families, if not the only family, in Malta GC to all be Radio Amateurs.

The other licenced Amateurs in Felix's family are: his wife, **Sheila Scotto 955ST**, his two sons, **Marco 9H5SA** and **Stefan 9H5SS,** as well as his daughter, **Valerie Scotto 9H1VS**. He is sorely missed by his family and friends. May he rest in peace.

Felix and his wife regularly visited the UK.

100 Times Over!


Dave Warburton G6LKB.


Jimmy Read M3EYP.

Two summits in Summits On The Air (SOTA) programme have now been activated over 100 times. The first to reach this landmark was Kirkby Moor G/LD-049, a 333m high summit in the Southern Lake District, known better locally as Lowick High Common. The 100th activation took place on 26 November 2005 by **Dave Warburton G6LKB**, for whom this is his local summit. In fact he has now activated it no less than 69 times, mainly without scoring, since SOTA activator points may only be claimed once in each calendar year!

The second summit to reach the 100 activation landmark was Shining Tor G/SP-004, which stands at 559m, above the Cat & Fiddle road between Macclesfield and Buxton. This took place on 18 December 2005 and was activated by **Jimmy Read M3EYP/G-20848**, making his second activation of this hill.

In Memory of James Gaffney EI8W

It was with deep sadness that we learned of the passing of **James Gaffney EI8W**. James 'Jim', from Clonmel County Tipperary died on Christmas night 2005.

Jim was born in Dublin on 14 January 1924 and in his teens, joined the Irish army in the Curragh in Kildare for about six years, followed by seven years in Shannon as a Radio officer. In his late 20s he moved to Rhodesia (now Zambia) and worked as a radio officer with BKS, which later amalgamated with British Airways. He then returned to England and took private flying lessons to become a pilot with British Airlines.

In 1989 Jim retired and returned to Ireland and got his old callsign restored, he was involved in setting up the **Tipperary Amateur Radio Group** and later held the post of Chairman. He was very active in all aspects of radio communications and was an extremely respected Amateur held in the highest esteem judging by the amount of national and international messages of sympathy received.

Married for 44 years he was a devoted husband to his wife **Pauline** and father to son **Alan**, daughter **Linda** and it is to his family and friends we extend our sincerest sympathy. May he rest in peace. (*See Keylines for further comment*, Editor).

Space Station Contact

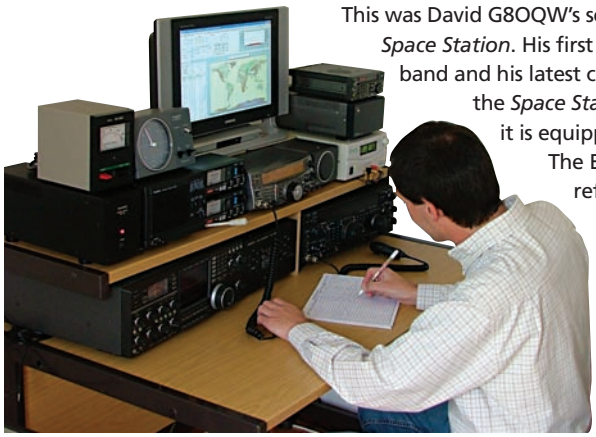
***ISS* Commander Bill McArthur KC5ACR**

David Barber G8OQW made a 430MHz QSO with the *International Space Station* Commander **Bill McArthur KC5ACR** on Sunday 15 January thanks to the help of **Chelmsford Amateur Radio Society** (CARS) member **David Worboys M0ZLB/KG4ZLB**, who is currently in Florida. David M0ZLB/KG4ZLB heard Bill calling CQ from the *International Space Station* using the callsign **NA1SS** on 437.550MHz as it flew past Florida. He immediately sent an E-mail out on the Essex Amateur Radio Yahoo Reflector to alert people that the *Space Station* was active.

David G8OQW saw the E-mail and started calling NA1SS from the outset of visibility (prior to hearing it). The fact that all previous *ISS* passes that day were packet on 145.800MHz meant that no one else knew he would be on 437.550MHz so for a few vital seconds nobody else was calling the *Space Station* and David's call had a chance of being heard. When NA1SS replied to David G8OQW's call Bill said that he had heard his first call in the clear it was then swamped by all the other stations.

This was David G8OQW's second QSO with the *International Space Station*. His first was last November on the 144MHz band and his latest contact means he has now worked the *Space Station* on all the Amateur Bands that it is equipped for.

The Essex Amateur Radio E-mail reflector is open to all not just Essex Amateurs. To join just send a blank E-mail to: **EssexAmateurRadio-subscribe@yahoogroups.co.uk**



David G8OQW talking with Bill KC5ACR aboard the International Space Station.

amateur radio clubs

Keep up-to-date with your local club's activities and meet new friends by joining in!

COUNTY DURHAM
Great Lumley AR & ES
Contact: Nancy Bone G7UUR
Tel: 0191-477 0036 (Home)/(07990) 760920 (Mobile)
E-mail: nancybone2001@yahoo.co.uk
Website: www.glares.org.uk
The Great Lumley Amateur Radio And Electronics Society meet at the Community Centre, Front Street, Great Lumley, Chester-le-Street, County Durham every Wednesday from 1930 to 2130hours. There is a speaker on the second Wednesday and a Committee meeting on the fourth Wednesday. Meetings you may like to attend include: **February 15**: On the Air Tonight - go along and take to the air and **22nd**: Committee meeting And On The Air Tonight. Go along, you'll be very welcome.

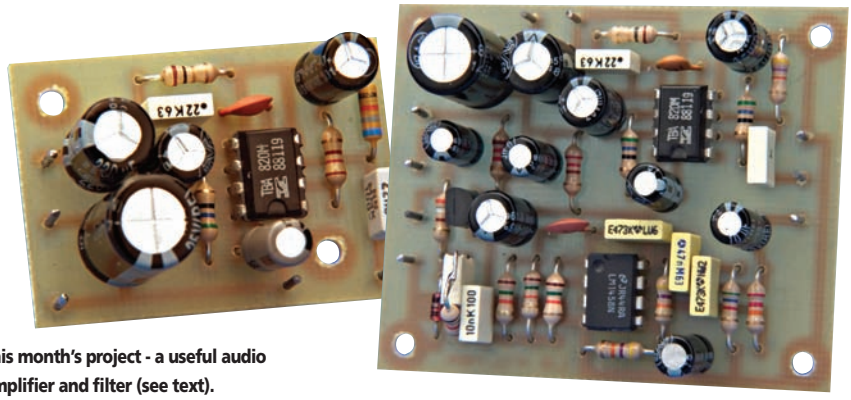
HAMPSHIRE
Andover RAC
Contact: Terry Cull
Tel: (01980) 629346
website: www.arac.co.uk
Meetings of the Andover Radio Amateur Club take place at the Village Hall Wildhern, just North of Andover, on the 1st & 3rd Tuesday of each month at 1930 hours. For more details check out the website.

MACCLESFIELD
Macclesfield Wireless Society
Contact: Ron G0WUZ
Tel: (01625) 430433
Email gx4mws@gx4mws.com
Website: www.gx4mws.com
The Macclesfield Wireless Society meets every Monday at 2000hours at the Pack Horse Sports & Social Club, Abbey Road, Macclesfield. The weekly club net operates each Wednesday from 2000hours on 145.550MHz +/- QRM. Forthcoming meetings and events include: **February 13:** Club evening; **20:** On-air activity evening; **27th**: Club evening; **March 6:** On-air activity evening and **27th**: Talk on Aerial Measurement by **Ron G0WUZ.**

WILTSHIRE
Trowbridge & District ARC
Amateur Radio Club – G2BQY
Contact: Ian Carter G0GRI
Tel: (01225) 864698
Website: http://uk.geocities.com/tdarc@btinternet.com
The Trowbridge and District Amateur Radio Club meet at Southwick Village Hall, unless noted otherwise on the 1st and 3rd Wednesday of every month. Forthcoming meetings include: **March 1**: "Amateur Radio in the Classroom" by **Adrian Dening G4JBH** and **Tone Townsend M3VBH** and **April 5:** "Radio & Electronics in the Entertainment Industry' by **Bob Collins G0VTA.**

doing it by design

This month Tony Nailer G4CFY describes the design process of an audio amplifier and loudspeaker filter. And even though the feedback on Tony's column from readers is excellent - you can be sure it's under control in the March project!



This month's project - a useful audio amplifier and filter (see text).

During the time I've been writing the DiBD series, it has become something of a cult, with a following of readers who are making the various circuit blocks with a view to incorporating them into more complex equipment. Many are hoping that eventually enough jigsaw puzzle pieces will be available to create a variety of receivers and transmitters and other add-ons!

However, the last DiBD in January was very heavy with formula and with no circuit module available at the end of it. The subject I covered was one I had been asked to cover by readers and I hope it was of use. The subject of matching is complex and needs a lot more work to do it justice, so I might return to it at a later date.

In this month's article I will consider a couple of spin-offs from previous articles which result in a couple of useful modules and which are 'light' on the theory. And those who have read the articles on the Mellstock transmitter and receiver in September to November 2005 *PW*, will have noticed the use of a TBA820M audio amplifier.

The little TBA820M integrated circuit (i.c.) came to my attention in the early 1980s when I purchased a production run of cheap CBs manufactured under the name Halcyon. There were about 150 units of which only a handful had been completed. In fact, the design had been rushed into production and was poor in many respects. My interest was in the recovery value of parts in the boards including MC145106, MC3357, LM324, TBA820M and a number of f.e.t.s and m.o.s.f.e.t.s.

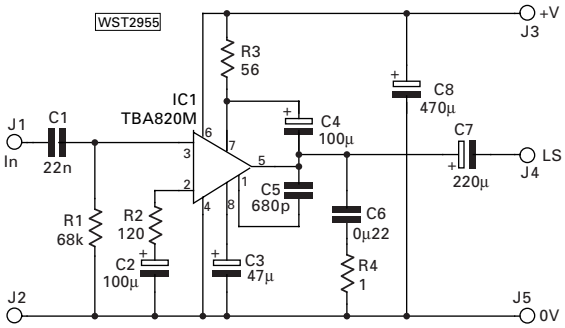


Fig. 1: The audio amplifier, using the TBA820M. The choice of input components is very wide (see text).

The TBA820M i.c. is particularly useful as it is a dual-in-line 8-pin (DIL8) package with up to 1W audio output to an 8Ω load on 12V d.c. supply. The quiescent current is typically only 5mA when run on a 13.5V supply. Finally, the external component count is just 12.

What I particularly like about the device is that it is very low noise and it doesn't require a heat sink. For many years I preferred the LM380 and LM386 due to their low component count but found there was always a noticeable background hiss.

Audio Amplifier Project

A suitable circuit for a receiver audio amplifier, using the TBA820M is shown in **Fig. 1**. The choice of input components is very wide as the input arrangement of the i.c. is a Darlington pair of *pnp* transistors requiring only 0.1 to 0.7µA of bias current. This equates to an input resistance of between 1.4 and 10MΩ.

A few years ago I used the i.c. with the input pin-3 connected directly to the wiper of the volume control and it seemed to work quite well. Unfortunately, I eventually found that when the wiper was close to 'ground 'the quiescent current of the i.c. had gone up enormously. So now I always d.c. isolate the input. Values of R1 can be anything in the range 10 to 150kΩ.

The input capacitor C1 in conjunction with R1 forms a single pole high pass filter where;

$F = 1 / (2*\pi*R1*C1)$. If R1 is 68kΩ and F = 100Hz then $C1 = 1/(2*\pi*R1*F)$.

$C1 = 1 / (2*\pi*68*10^3*100) = 1 / (136*\pi*10^5)$

$C1 = 0.00234*10^{-5} = 23.4nF$.

Use 22nF.

Although it's not common practice to use such a low value of input capacitor - it does attenuate low frequency signals before entering the amplifier. This is not vitally important and in many

applications I use 100nF, which with 68kΩ will have a corner frequency of 23.4Hz. To interface this amplifier to earlier stages I suggest using a 10kΩ logarithmic law volume control.

Pin 2 of the amplifier is a gain adjustment point and is principally set by R2. The capacitor C2 has to be relatively low reactance in comparison with R2 and 100µF is about 16Ω at 100Hz.

Values of R2 of 22Ω give a gain of 48dB. Values of 39Ω for 43dB, 56Ω for 40dB, and 120Ω for 36dB.

Capacitor C5 works in conjunction with R2 to set the low-pass characteristic of the amplifier. And the circuit, with 680pF for C5 and 120Ω for R2 will have -3dB frequency of 7kHz.

The graphs in **Fig. 2**, are copied from the SGS/ATES *June 1978 Data Book* and show the relationship between C5 (CB) and R2 (Rf).

The graph in Fig. 2 allows you to find the appropriate value of C5 for a required cut-off frequency when you have already chosen R2 for the gain required. For example if R2 is 100Ω and the cut-off frequency is 10kHz then C5 looks to be about 370pF. You should use 390pF. For a 5kHz cut-off with 100Ω for R2, C5 needs to be about 1200pF.

Capacitor C3 - on pin 8 - is for ripple rejection and is generally deemed unnecessary. It's one component that could be left out if space and price was that important. The resistors R4 and C6 are now commonly used with i.c. amplifiers to prevent instability.

The capacitor C4, in conjunction with R3, is a 'Bootstrap' circuit. This assists the output circuit achieve the necessary 'swing' while maintaining good linearity.

The output capacitor C7 works in conjunction with the impedance of the loudspeaker to form another high pass characteristic. It's responsible for the roll-off at low frequency shown on the graph of Fig. 3. The roll-off here should be equal or lower in frequency than that set by the input high pass filter.

Using an 8Ω loudspeaker and having the same high pass characteristic as the input, with a corner frequency of 100Hz gives C7 = 1 / (2*π*8*100) = 199µF. Use 220µF.

The data sheets and literature for audio amplifiers often show the supply decoupler equal or lower in value than the capacitor driving the speaker. This I would not recommend as it's possible that input line filters, cabling and connectors might have relatively high reactance and even several ohms of resistance. For this reason I always use a supply decoupler at least twice the value of the loudspeaker coupling capacitor. In this case use 470µF.

A printed circuit board layout and component overlay is supplied this month, to provide a very versatile amplifier module and are shown in **Fig. 3**. (See separate panel for Kits & Bits. **Editor**).

Active Filter

In November issue *PW* DiBD I dealt with active filters and included a bandpass design suitable for use as a microphone filter for a transmitter or as a post detector filter for a receiver. It comprised an input buffer amplifier, a low pass section and a high pass section.

Readers have asked me if it's suitable to plug into the extension speaker socket of a receiver to act as an analogue loudspeaker filter. The answer is no. This is because the output of the unit would need to have speaker drive capability, which it does not. Nevertheless the idea is good, and I will proceed to show how to redesign the unit for that purpose.

The original filter was designed to be fed with signals in the region 50 to 200mV and to provide the same level out. Experiments showed me that the overlap of the high and low pass sections caused a mid range loss of 14dB.

Taking into account the output trimpot being set mid way, contributing to a further reduction of 6dB, the input buffer has to have a gain around 20dB. The input stage was designed using a non-inverting amplifier which is much lower noise than the inverting configuration. That really completed the design to my satisfaction.

In this requirement the drive source is very low impedance already and likely to be several volts peak-to-peak. We don't want to try to pass signals much over 1.5V p-p through the filter and need to ensure the filter is protected.

To achieve this I have taken the clipper-indicator used in the Mellstock transmitter and used it in front of the bandpass filter sections. Following this is the TBA820M audio amplifier already described. The whole circuit is shown in **Fig. 4**.

The unit is designed for receivers which have one side of the speaker connected to the negative rail. In the case of positive rail speakers an electrolytic of 10µF can be fitted at the input to the unit.

Use of the clipper-indicator means that the volume control of the receiver can be adjusted until the peaks of audio cause the light emitting diode (l.e.d.) to glow intermittently. **Note:** this is the ideal setting.

Upper Cut Off Frequency

The low pass filter section in the *PW* November 2005 had an upper cut-off frequency of about 3kHz, which I found to be a bit high. I re-ran the equations for the low pass section and achieved an upper cut-off frequency of 2.3kHz using 18kΩ resistors in place of the 15kΩ used previously. The theoretical -3dB passband points should now be 330Hz to 2.3kHz.

An audio signal causing clipping at the input will have an amplitude of about 1.5V p-p. Output from the filter sections to the volume control VR1 will be 14dB down from this, which is divide by 5 and hence about 300mV p-p. (The potentiometer is, as previously, a 10kΩ log law type.

Input to the audio IC via C11 and R12 together have a high pass -3dB point of

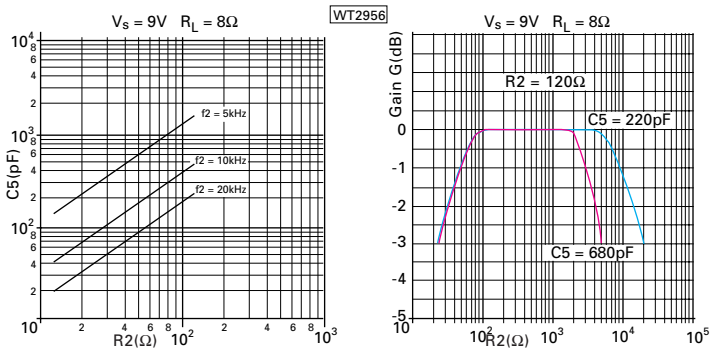


Fig. 2: Data book graph (see text).

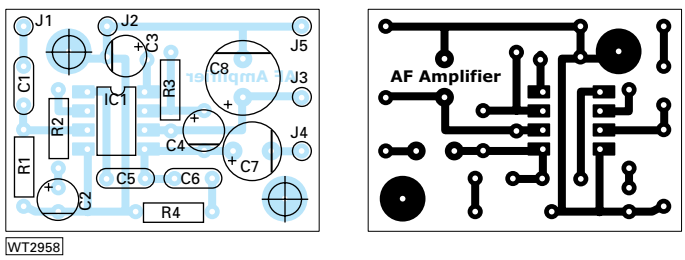


Fig. 3: Printed circuit board lay-out and overlay design for the amplifier project (see text).

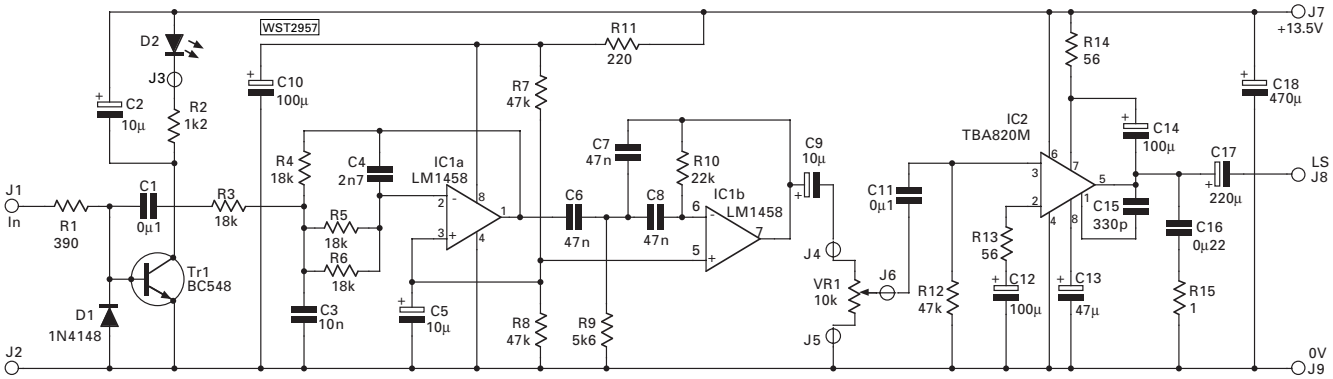


Fig. 4: This circuit clipper-indicator is based on that used in the Mellstock transmitter, and used it in front of the bandpass filter sections. Following this is the TBA820M audio amplifier already described (see text)

34Hz. It is not necessary to be this low and C1 could be reduced to 22nF which would bring this up to 155Hz.

The gain setting resistor R13 has been chosen as 56Ω for a gain of 40dB though in practice this might be too much. Anyway for a low pass -3dB point of 7kHz C15 is chosen to be 330pF. For the same roll-off and a gain of 34dB use 120Ω for R13 and 680pF for C15.

The unit can be manufactured as an interface with a speaker jack on a flying lead for its input and a matching chassis mounted socket for its output. It will also need a socket for d.c. input or a length of twin lead for DC 13.5V input from a bench supply. The alternative approach is to find a suitably sized loudspeaker in its own case and fit the board and volume control inside it.

Development tests

During the development tests, the first lay-out of this project included an additional input with an electrolytic for alternative referenced speakers. (It also was with an upper limit of 3kHz).

The l.e.d. was fully 'on' even without an input signal which I quickly traced to having not included a d.c. blocking capacitor between R3 and the base of Tr1. I lifted the input end of R3 and fitted a 100nF poly-block capacitor in the vacant hole and soldered R3 to its free end. This cured the problem.

I tested the unit by connecting it to the extension speaker socket of a CB rig. Everything then functioned as it should with the l.e.d. setting indicator working very well as a useful guide for correct level with and without clipping.

The circuit was then modified by leaving out the original input electrolytic and designating the 100nF poly-block as C1. The p.c.b. lay-out was modified and is shown with its component overlay in **Fig. 5**.

Connection & Use

Connect the filter unit to a bench 13.5V supply and turn its volume control to minimum. Switch on your receiver and tune to a suitable signal and plug the unit into the extension loudspeaker socket of the receiver.

If the l.e.d. comes on - and stays on - you'll need to fit the 10µF electrolytic at the input. Alternatively you could arrange a toggle switch to be able to choose between negative referenced and positive referenced speakers.

Then, you should adjust the volume control on the receiver until the l.e.d. glows intermittently and turn up the volume of the filter to a suitable level. Excessive clipping indicated by a continuous glow of the l.e.d. may be an advantage in some cases. Otherwise it might sound softer to use the unit below input clipping level and take full advantage of the available gain of the TBA820M.

If you wish to correspond regarding this article or previous ones subscribe to the list

pw-g4cfy-on@pwpublishing.ltd.uk

by sending a blank E-mail with the word subscribe in the subject box. When you receive confirmation from the server you can send an E-mail to

pw-g4cfy@pwpublishing.ltd.uk and your comments will be answered by myself or the *PW* team

Enjoy the project - and cheerio until next time. **PW**

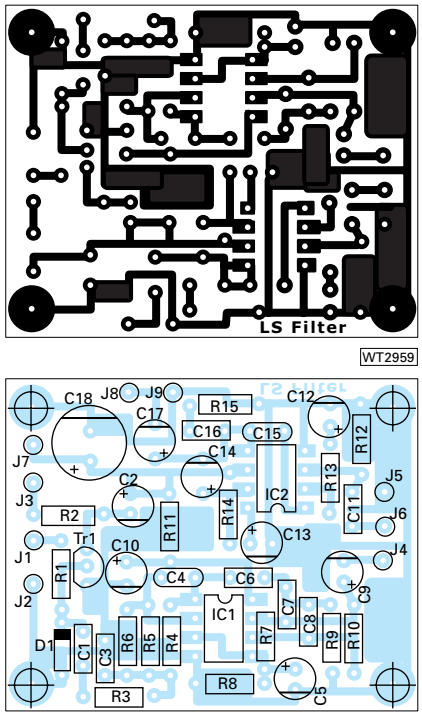


Fig. 5: The circuit was then modified by leaving out the original input electrolytic and designating the 100nF poly-block as C1. The p.c.b. lay-out was modified and is shown with its component overlay (see text).

Kits & Bits

Kits & Bits are available: The 1W Audio Amplifier p.c.b. cots £3, Components parts £4.15.

The LS Audio Filter p.c.b. costs £5. Component parts including l.e.d. and volume control cost £8.25. P&P 75p. Please make cheques payable to **A.J. & J.R. Nailer**, and address to; **Spectrum Communications, 12 Weatherbury Way, Dorchester, Dorset DT1 2EF**.

The MFJ Intellituner - Automatic Ant

Rob Mannion G3XFD - despite not being able to achieve all he intended to do over the Christmas holidays - managed to find time to enjoy working on the air with a new automatic antenna tuner from MFJ. After the experience, Rob thinks it's an innovative unit that could prove useful for many Amateurs.

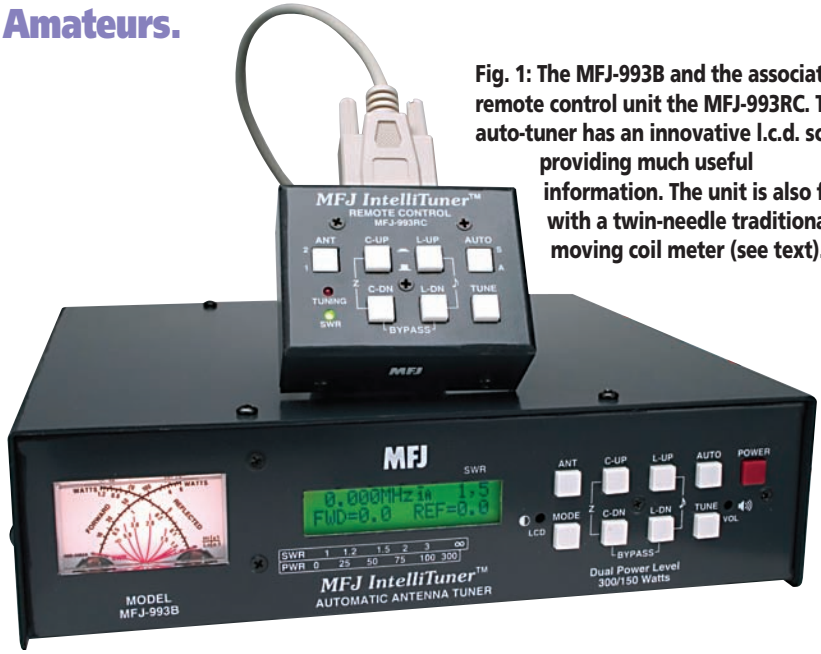


Fig. 1: The MFJ-993B and the associated remote control unit the MFJ-993RC. The auto-tuner has an innovative l.c.d. screen providing much useful information. The unit is also fitted with a twin-needle traditional moving coil meter (see text).

Over the last few years I've had much experience using automatic antenna tuners (a.a.t.u.s) and I actually own an SGC unit. With modern microprocessors and built-in memories - they can be remarkably effective. The MFJ-993B Intellituner proved to be just as effective - with some remarkably innovative features.

Intended for indoor use (whereas my SGC unit is weather-proofed for outdoor use) the MFJ unit is relatively small, as can be seen from the heading photograph **Fig. 1**. Simply stated it's a microprocessor-controlled antenna tuner, with an illuminated indicator meter with a cross needle meter movements indicating voltage standing wave ratio (v.s.w.r.). The a.a.t.u. also has some very helpful, innovative facilities - and these are displayed on the green background black numeral l.c.d. unit on the front panel.

The actual antenna tuning is carried out by the use of electronically controlled relays (more of this later). These literally try out thousands of combinations of L and C to find a suitable match into the antenna in use. The microprocessor comes into play by 'remembering' any particularl combination for a given antenna on a specific frequency.

On previous occasions when I've provided my opinions on a.a.t.u.s in *PW* - readers have written to me to express their surprise at the noise that comes from this type of unit when they're first switched on. So, this time I'm making a point of mentioning that (when first used with a particular antenna) the a.a.t.u. will sound like a miniature machine gun for a few moments - until it's satisfied there's a match. This noise, depending on the size of a relay-controlled tuner, can be quite surprising at first!

The MFJ-999B is no exception to the noise, and MFJ mention it in the accompanying manual! My grandson Freddy was in the shack when I first set it up - he literally jumped and came up with the miniature machine gun comparison! However, once the unit has been used - particularly with one antenna, which doesn't have its parameters changed between use - the tuner reacts extremely quickly.

A good example of how quickly the MFJ-993B 'remembered' a frequency I'd used before - is 18.108MHz (just below the 18.110MHz International Beacon Frequency). Keying the transmitter briefly (away from the IBP frequency) I heard a single faint 'click' from the tuner. The display on the meter told me there was also a good match.

However, to be fair to equipment of this type - you must be prepared for a period when there's some rapid clicking. One Amateur I worked - he had an a.a.t.u. of the same basic design using relays - said it sounded like a "Frenetic woodpecker in a tin box" at times, but he'd never part with the unit as it enabled him to use a variety of simple antennas!

Features & Specifications

Let's now take a brief look at the features and specifications as presented by MFJ, and quoted from their manual. Incidentally, as I expected, the MFJ manual is in the form of a slim paper booklet. It's clear, concise and doesn't waste time with too much waffle. It's straight to the point and explains that the a.a.t.u. matches antennas with impedances of six to 1600Ω, or six to 3200Ω. The unit can handle 300W (matching six to 1600Ω) or 150W (matching six to 3200Ω).

The a.a.t.u. will tune and match in less than 15 seconds, (usually less than five seconds). There are over 20,000 (non volatile) memories, and this means it doesn't 'forget' when the unit is switched off, or disconnected from the power supply.

Importantly, there are four memory banks per antenna, with over 2500 memories per bank. The manufacturers also inform us that the L-network employed is a highly efficient matching circuit. The unit can be operated between 1.8 and 30MHz, and has an adjustable 'target' v.s.w.r. and threshold of 'acceptability'.

Numeric readings for s.w.r./Watts with high/low and auto range options are provided on the l.c.d. display (this has adjustable contrast levels). Bargraph type indicators are provided for s.w.r., forward and reflected power, and there are selectable range options.

enna Tuner

Thanks

My thanks go to **Waters & Stanton PLC** for the loan of the MFJ-993 and MFJ-993-RC. The a.a.t.u. recommended price is £219.95, and the remote control £39.95.
Contact Waters & Stanton at **Spa House, 22 Main Road, Hockley, Essex SS5 4QS, Tel: (01702) 206835,** for further details. Website **www.wsplc.com**

Note: An important feature included on the MFJ-993B is an audible s.w.r. meter, with volume control. This makes the unit suitable for an operator with impaired vision.

There's also a built in frequency meter, two SO-239 sockets for coaxial fed antennas. Separate connectors are provided for random length wire antennas, and a built-in 4:1 current balun for use with balanced wire antennas.

There's also an optional remote control unit, the MFJ-993RC (supplied for the review) and an optional interface for compatible radios.

Minimum input power for tuning is 2W, maximum power while tuning is 100W. Power requirements 12-15V d.c. 1A or less. Unit dimensions 257 x 71 x 234mm w/h/d). Weight 1.77kg.

On The Air

For my on-the-air evaluation I decided to test the MFJ-944B out on antennas I use myself. This is because I consider that this form of a.a.t.u. will prove particularly attractive to those operators who have to use compromise antennas.

Although my garden is much larger than many suburban homes - it's an odd shape, surround by large trees, and it's difficult to erect h.f. antennas, Bournemouth Borough Council (the BBC!) have also made it a 'conservation area'. For preference, mainly because it's physically easy to handle, I use a lightweight 7MHz dipole, another for 14MHz and my trusted 10m (extremely lightweight) fibreglass fishing pole antenna, in conjunction with an extensive radial system.

Undoubtedly, my favourite system is the fishing pole antenna. I've shared the description the pleasure of this antenna with readers via the pages of *PW* on many occasions. It's a very reliable performer and can be used with a manual a.t.u. and, in conjunction with a 'roller coaster' add-on unit, can operate effectively on 3.5MHz.

The DX conditions weren't particular good over Christmas, but I operated a great deal on 7MHz, and also on 18MHz. Interestingly, I also had a short foray onto 3.5MHz in the 'wee small hours' and worked several East Coast Americans on c.w. and got a "QRZ" from a west coast station when using only 10W, but here I got lost under a host of other Europeans calling him! Amazing how many people are up and about at 0300 hours.

On 7MHz the MFJ-993B soon stored all my favourite operating frequencies in its memories when using the vertical. I used the remote control on several occasions, with the a.a.t.u. placed at the end of my shack.

With the unit on my operating desk it was fascinating to see the frequency displayed, along with the s.w.r. reading. It was remarkably quick 'tuning up' on new frequencies on the higher bands, and although I didn't have any QSOs on 21, 24 or 28MHz, it tuned up remarkably quickly.

Using the vertical (in effect it's a vertical 30ft (10m) long wire plus 3 metres (about 9ft) lead in, the system worked perfectly and I didn't find any band (other than 3.5MHz) where it seemed to take longer than five to eight seconds. On 7MHz I worked all over Europe, on both s.s.b. and c.w., but the majority of QSOs were on c.w.

My best DX on 18MHz was Canada, followed by several c.w. QSOs to the mid-West USA, I was pleased to get a "QRZ" was a West coast station - but again several Italians beat me to it! (I was only running 10W).

Incidentally, tuning up to 18MHz from a quick IBP beacon check on 14.1MHz, the tuner surprised me by tuning up within three seconds (timed on my IBP system calibration stopwatch). Unfortunately, 14MHz was mostly unusable for much of Christmas at my location due to a nearby switch-mode power supply.

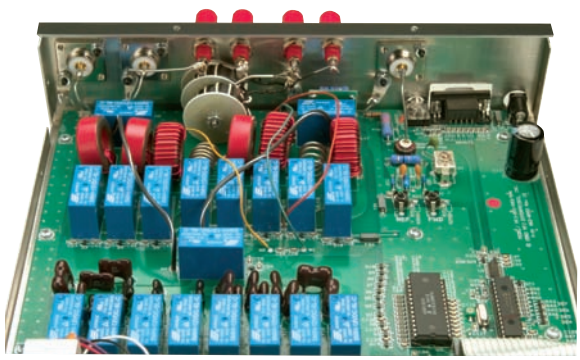


Fig. 3: Inside view of the MFJ a.a.t.u., with the tuner's control electronics on the right, with the switching hardware (blue cased relay units) and tuning inductors (red toroids) on the left. (See text).

Fig. 2: The MFJ-993B has rear panel connections provided for most forms of antennas in Amateur Radio use. (Note the socket for the remote control unit).

Most of my daytime QSOs on 7MHz were inter-G and EI. (The vertical isn't really good for close-in QSOs) and during one contact I was delighted to work two old friends **John EI7BA/M** and **Brian EI5HV** - both in County Cork, with Brian in Midleton (it is spelt with one D!) under rapidly changing, poor conditions.

Very rarely did the unit show anything other than an s.w.r. of 1.2:1, and I was only running around 50W, during the changing band conditions.

The real test for the MFJ-993B was tuning the vertical up on 3.5MHz - because of its short length it's quite difficult for me with my manual tuner, and I usually have to insert the extra inductance provided by a small roller coaster tuner I've got ready for use with this antenna. However, I needn't have worried - the a.a.t.u. achieved a reasonable match within 15 second with my roller coaster in the antenna circuit. Quite a test for an auto-tuner I think.

Using the MFJ-993B with the 7MHz dipole was very straightforward, although it doesn't really need much of an adjustment with any a.t.u. However, my 14MHz dipole is a compromise (overshadowed by a 30m/100ft high tree that's still in leaf!) but - the MFJ-993B handled the varying effects of the tree very well.

I think the MFJ-993 would be ideal for someone having to operate with limited wire antennas. It's a versatile tuner and the many features (too many to detail here) including the frequency display, bargraph style indicators, and the audio s.w.r. facility make it a real bargain.

The only criticism I have is the lack of average power display on the mechanical meters - although it's provided on the bargraph display. Perhaps I'm just old fashioned! Excellent product MFJ - the '993B was great fun to use! **PW**

The PW Portland A Rock steady VFO

You lucky readers! We've got a double helping of Tony Nailer G4CFY's designs this month! In this article Tony describes the Portland v.f.o. - for use with h.f. and v.h.f. designs, it will feature in forthcoming projects - including a 70MHz s.s.b. transceiver.

Deceptively simple looking - the Portland v.f.o. is designed to be extremely stable for use in h.f. and v.h.f. projects (see text).

The local oscillator is a vital part of any receiver or transceiver. If it's a crystal controlled stage it's easy to make, has very low noise but only provides one frequency. The variable crystal oscillator (VXO) trades some of its stability and noise performance for a limited frequency swing.

The digital synthesiser it is complex and moves across the band in a series of small jumps, it is also very noisy. Finally the variable frequency oscillator v.f.o. is wide range and low noise but is prone to drift.

In a future issue of *PW* it is my intention to publish a complete 70MHz s.s.b. transceiver, and several parts of this are already in existence. My choice of local oscillator is to mix a low frequency v.f.o. with a crystal oscillator, thereby gaining good frequency stability at 70MHz.

To this end I have determined that a v.f.o. with a range of 7.1 - 7.6MHz would tune the required 500kHz without a harmonic passing through the band. This, together with a 52.2MHz crystal oscillator, will produce a signal 59.3 - 59.8MHz for use with a 10.7MHz intermediate frequency (i.f.). Otherwise, the same v.f.o. mixed with 53.9MHz crystal oscillator will give 60 - 61.5MHz for a 9MHz i.f.

Recently the 40 metre band has been extended to cover 7-7.2MHz, so a v.f.o. operating directly over this range could also be useful for direct conversion receivers and transmitters. The v.f.o. described here includes component values for both these frequencies.

Design Considerations

Let's now look at the design considerations. Varicap tuning was chosen to keep down size and cost. Use of a good buffer amplifier to enable a signal level of 2V p-p to be delivered into a 50Ω load.

Also important is isolation of the resonant components from sources of heat to minimise drift. Rigid construction has to be adopted so that the board and resonant components would not be mechanically stressed when the tuning control was adjusted. There also has to be a 'clean' and stable supply rail to minimise amplitude and phase modulation and drift.

The requirement for the v.f.o. is that it be as 'pure' as possible and the target will be for all harmonics to be 40dB below the fundamental. This necessitates the use of a pair of Varicap diodes connected in anti-phase across the tuning coil. The reason for this is that a single diode would be forward biased by the oscillator voltage, and this would clip the wave and cause large amounts of second harmonic.

Circuit Design

An experimental Colpitts v.f.o. circuit is shown in **Fig. 1**. The frequency control components are R1 and VR1 where the value of R1 determines the voltage range over which the control voltage swings. Initially, I chose to use a 6V2 Zener diode stabilised supply together with a log law 10kΩ potentiometer in series with 10kΩ for R1. This would give a 3V swing for the Varicaps.

The capacitor C1 and resistor R2 allow the d.c. voltage to be applied to the Varicaps but filter the radio frequency (r.f.) signal from passing back to the potentiometer. The Varicaps being reverse biased diodes have leakage currents of around 10 nanoamps (nA). This means that if R2 was 1MΩ the voltage drop across it would be just 10mV.

Being wary of using very high value resistors because of p.c.b. losses and humidity effects, I chose R2 to be 100kΩ. The value of C1 was selected to be a 10nF

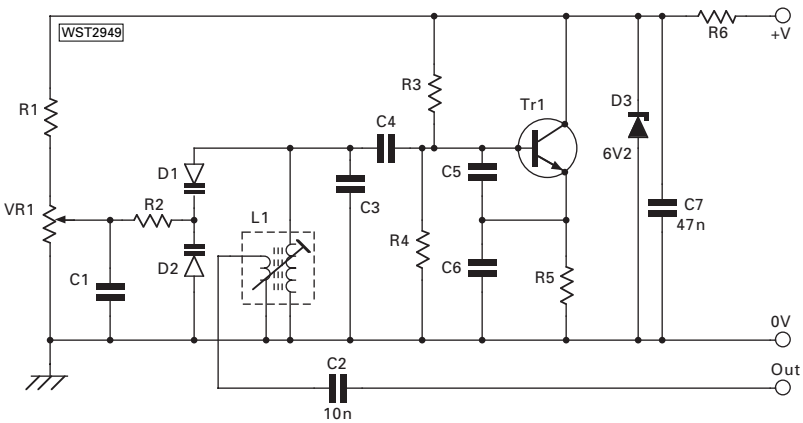


Fig. 1: An experimental Colpitts v.f.o. circuit. The frequency control components are R1 and VR1 (see text).

poly block which has a reactance of 2Ω at 7MHz and has low noise.

A sinewave signal on the junction of the Varicaps - which is probably in excess of 1V p-p - will see a resistance of 100kΩ then followed by 2Ω to ground. The amount of signal escaping to the wiper of the potentiometer will be 1V/50000 = 20µV. (This will not radiate far, especially if connections to the potentiometer are short and if the 6.2V supply is also decoupled).

The frequency determining components are D1, D2, L1, C3, C4, C5, and C6. The design procedure follows that of the Colpitts Crystal oscillators explained in Doing It By Design in *PW* September 2004.

The capacitors C5 and 6 are chosen to be fairly high values, from experience 120pF is a good starting value. These two in series total 60pF. Then C4 is chosen to be close to this, and I chose 56pF. The total value of C4 in series with C5 in series with C6 is close to 29pF.

Inductor L1 is chosen initially as the 5.5µH TOKO coil 3334R. At 7.1MHz this resonates with 91.3pF and at 7.6MHz with 79.6pF. There is about 12pF change in capacitance between these frequencies.

The BB809 or BB109G Varicaps, with 0V bias are about 50pF and at 3V they're at about 26-32pF. Two diodes back-to-back will give a range of around 13 - 25pF (just right!). At 7.6MHz the total of 79.6pF will be made up from 13pF of the feedback capacitors plus 25pF of the Varicaps and 37.6pF in C3.

The d.c. bias components are R3, 4, and R5. Resistors R3 and 4 are equal value - and fairly high resistance - so their parallel equivalent value will not damp the resonant circuit. Values of 15kΩ were chosen. With a 6V2 supply the base of the transistor will be close to 3V, and the emitter will then be 2.3V. I also chose the starting value of emitter current to be 4mA. So 2.3V/4mA = 575Ω, (standard value 560Ω was used).

The d.c. input was chosen to be a standard 13.5V. If the Zener D1 current is set at 10mA and the transistor 4mA, the bias and tuning components draw 0.5mA then R6 will drop 7.3V for 14.5mA. R6 = V/I = 7.3/14.5mA = 503Ω. (standard value 560Ω was used). Supply decoupler C7 was chosen as 47nF.

Dead Bug Breadboard

A breadboard of the circuit was built 'dead bug' style on blank p.c.b. material. The frequency could be tuned into the range using the coil core but the frequency swing was not wide enough and I reduced the value of R1 from 10kΩ to 4.7kΩ.

The next test achieved the required signal swing. The 3334R coil fortunately had a low impedance secondary winding. Taking the signal from this winding was considerably cleaner than that at the emitter when observed on the oscilloscope.

It soon became clear that the frequency swing was cramped at one end of the scale, so I tried a linear potentiometer. The swing was then fairly even with rotation of the control knob, although the amplitude of the signal fell slightly across the band. Signal purity as observed on an oscilloscope was quite good and its amplitude was around 1.5V p-p unloaded.

Buffer Amplifier

Let's now take a look at the buffer amplifier. The purpose of this is to prevent loading from later stages from pulling the oscillator off frequency. It's also used to provide amplification and an output impedance of 50Ω or lower would be ideal.

I tried several buffer circuits, including a single stage common emitter amplifier, a Darlington configuration, and finally, a two stage amplifier with feedback - as used back in the 1970s. Next, I designed a common emitter amplifier was then developed as Buffer 1 as shown in **Fig. 2**, and was added to the original breadboarded circuit.

Buffer 1 includes an isolating resistor at the input to avoid loading of the v.f.o. The amplification then just about makes up for the step down at the input. Output was 1.5V p-p into a 50Ω load. The second harmonic distortion observed on my Spectrum Analyser was -35dB.

I made d.c. voltage measurements on the v.f.o. and Buffer 1 and dissipation of resistors and transistors were calculated. The v.f.o. transistor and bias components dissipated 28.6mW, R6 dissipated 95mW and the Zener D3 52mW. Buffer 1 dissipated 208mW of which 87mW was in R10 and 84mW in Tr2.

To reduce dissipation in the v.f.o., I increased the value of the emitter resistor R5, until the signal started to distort. A good compromise between efficiency and distortion was with a value of 1.5kΩ. The dissipation of the v.f.o. transistor and emitter resistor then dropped from 28.6mW to 9mW.

The value of R6 was then recalculated for a v.f.o. current of 2mA and Zener current of 4mA which gave 1.2kΩ. The dissipation in the Zener was then 25mW, and in R6 44mW. (This 69mW of heat should be kept away from the resonant components).

Stability From Switch-On

Stability of the breadboard from switch on was quite good with it settling within five minutes. The stability was improved by moving warm components well away from the resonant components. It was even susceptible to heat from my table lamp, from my body heat and from my breathing! Variations of 250Hz occurred due to these sources of heat.

Next, a two stage amplifier with feedback was designed with a low power stage one giving voltage amplification and the second one as an emitter follower. The circuit is shown in **Fig. 3**, and is designated Buffer 2. Using this buffer the second harmonic distortion was -40dB.

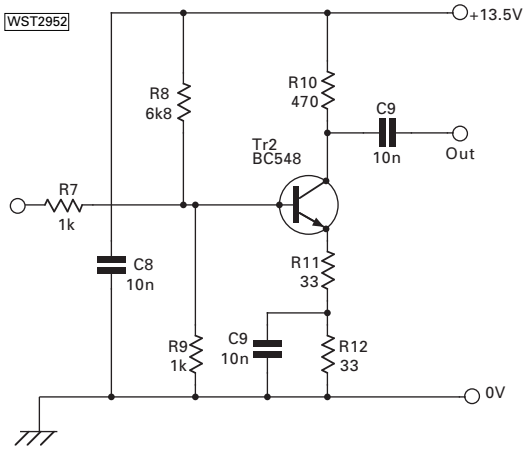


Fig. 2: Continuing the development process, G4CFY designed a common emitter amplifier, Buffer 1 as shown here and was added to the original breadboarded circuit (see text).

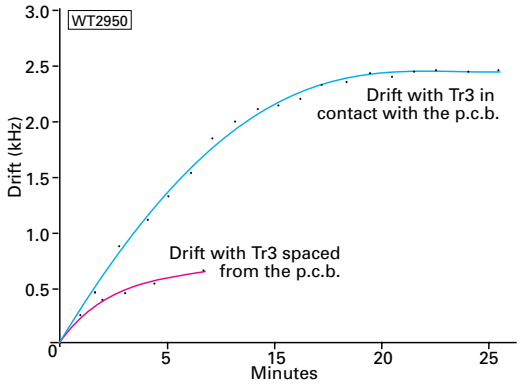


Fig. 3: Initially, from cold drift reached 2.5kHz, but a dramatic improvement in drift and time was achieved. The lower curve shown shows a total drift from switch on of only 500Hz with stability being reached within five minutes (see text).

The dissipation of components in Buffer 2 were 34.5mW in Tr2, 1.7mW in R8, 28mW R9, 8mW R10, 3.8mW R11, 204mW in Tr3 and 256mW in R12. This totals 535mW and together with R6 and D3 gives 604mW.

Measurements of output resistance revealed the v.f.o. section was 220Ω, Buffer 1 was 36Ω and Buffer 2 was 15Ω.

Prototype VFO

I decided that it would be best to incorporate the v.f.o. board within a box and have the buffer outside. (Use of a plastic box would reduce conduction of heat between buffer board and v.f.o.) board. The box also had to include the tuning potentiometer to keep lead lengths down and to reduce mechanical stress between the potentiometer and the v.f.o. board.

A suitable plastic box was obtained from RS Components and I laid the p.c.b. boards out to fit in and on the box. The diodes D3 and R6 were fitted on the buffer board to keep the heat away from the v.f.o. components. Dissipation of the v.f.o. section within the box was then only 11mW.

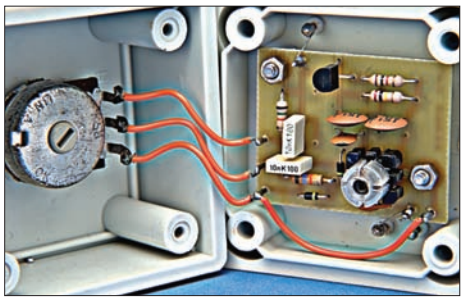
Making a p.c.b. for the v.f.o. was the next job, and populated and fitted to the box. The unit worked first time - without any problems - and was easily tuned to the operating frequency range with a 15kHz overlap at each band edge. Output level was 1.5V p-p.

Next, a p.c.b. for Buffer 2 was laid out and produced and populated and fitted to the outside of the v.f.o. box.

Stability Tests

At switch-on the frequency drifted upwards. This continued on for a long time and didn't reach a stable state as quickly as the prototype - "most strange" I though to myself!

A proper test from cold was then undertaken and the results plotted as in Fig. 3. The stability was not reached until around 18 minutes from switch on - with the total drift reaching 2.5kHz.



It took me some thought to determine the cause of the problem - and I perhaps it was due to the Zener being heated by Tr3 nearby. Removing D3 from the top of the board and fitting it to the track side greatly reduced the drift. In the end I concluded that Tr3 (being in close contact with the p.c.b.) was also conducting heat to the Zener, so a new Tr3 was fitted on a plastic spacer.

Another thermal test was undertaken with a dramatic improvement in amount of drift and time to reach stability. The lower curve (**Fig. 4**) then showed a total drift from switch on of only 500Hz with stability being reached in five minutes.

Variety Of Changes

A variety of changes were made in bias components and Zener current, with the box open and with the box closed. Sometimes the result was better and sometimes worse!

A change from 6V2 to 5V1 zener was one positive move. Trying a 1N4148 in series with the Zener was not good. Eventually Tr1 was replaced with an f.e.t., R3 removed and R4 changed to 100kΩ.

During the design work over 30 stability test runs lasting from three minutes to 15 minutes were undertaken. Many of which gave suspiciously good results.

Starting tests in the morning always gave relatively high values of drift. Tests after component changes often gave falsely good results. The problem here is that soldering applies 240°C to a localised part of the board. This permeates across the board material and along the tracks, and unless given sufficient time to dissipate masks the drift caused by d.c. and a.c. power dissipation.

Using an f.e.t. resulted in the drift going negative whereas before it had been positive (It's unlikely the base bias resistors were producing measurable heat). In fact it's more likely that the source-drain current reduces gradually as the device warms up, whereas it probably increased with the bipolar device.

With the transistor the frequency determining capacitors needed to be more 'positive' with temperature to negate the rising frequency they now need to be 'negative' going with temperature to negate the falling frequency.

The f.e.t. version of the v.f.o. used 150pF N150 capacitors for C5 and C6. Capacitor C4 was unfortunately a 68pF NPO type,

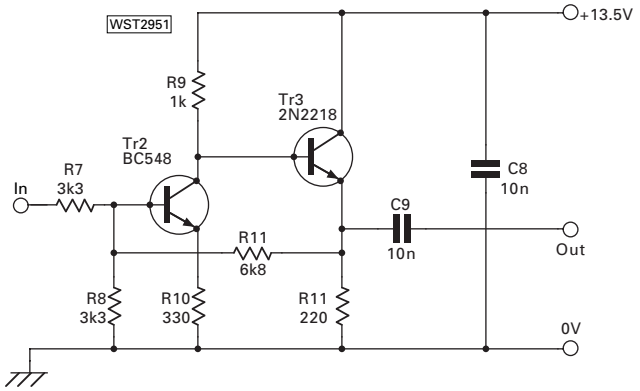


Fig. 4: A final circuit for the buffer stage (see text).

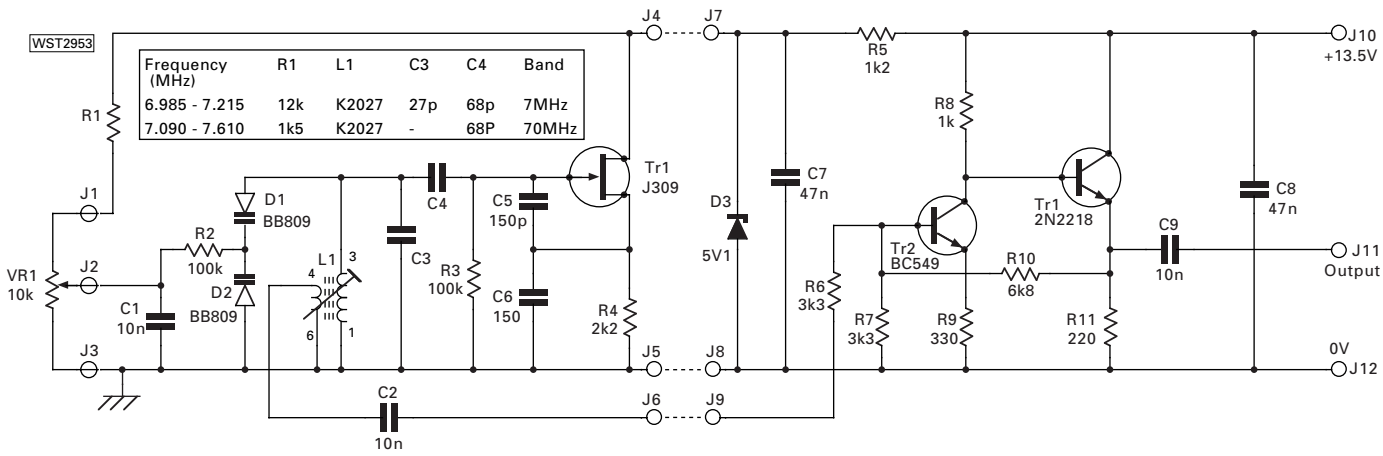


Fig. 5: The final circuit for the full oscillator project.

with zero temperature coefficient. At the time of going to press I had not changed this to an N150 type but had ordered some from RS. Hopefully, a negative coefficient component here might reduce the drift to a negligible level.

A final circuit is shown in **Fig. 5** and new p.c.b. layouts and overlays are provided in **Fig. 6**.

Recommended Box

The recommended box is RS type 381 5120. You may purchase it from me ready drilled, or purchase it from RS Components and drill it yourself.

To start, I suggest you lay the v.f.o. p.c.b., copper side up, on the top of the lid, and adjust it to be equi-spaced from each edge. Next, mark the two fixing hole positions and lay the Buffer p.c.b., copper side down, on top of the lid and do the same.

Whilst the board is still in place mark a drill hole adjacent to J7 exactly mid way between the pin and the edge of the box. Do the same adjacent to J8 and J9. Mark the bottom of the box for a hole exactly in the centre.

Drill all holes using a 2.8mm (7/64th inch) drill bit. Drill out the holes adjacent to the pins with a 3.2mm (1/8th in) or 3.6 mm (9/64th in) drill to suit Oxley p.t.f.e. feed-through capacitors. Drill the hole in the bottom of the box to 9mm (3/8th in) or drill it to 6.3mm (0.25in) and ream it out to size.

Assembling PCBs

Fit the pins to both boards from the copper side, ensure the heads are flush with the copper either by tapping them home with a small hammer or by using pliers. Fit the rest of the v.f.o. components as **close to the board** as possible.

The Buffer board will benefit from R5, 9, and 12 being slightly away from the board to aid heat dissipation. The diode D3 is intended to be fitted to the underside of the board to shield it from radiated heat from Tr3.

When the v.f.o. board is completed and has been thoroughly examined, connect it (using 7/0.2mm) wire to the potentiometer. Also, loosely wire the control to the buffer board.

Next, connect a 13.5V bench supply to the +13.5V and 0V of the buffer board and undertake measurements of the v.f.o. performance using an oscilloscope and frequency counter. Adjust the core of L1 to bring the operation into the correct frequency range. Check the swing of the v.f.o. is adequate. (If the range is too great or too small correct it by changing the value of R1 up or down to suit).

When you are satisfied the two boards are working much as they should - it will be time to secure them onto the lid of the box. Fit two 12.5mm (1/2in) screws for the v.f.o., secure with double nuts, likewise for the Buffer. Then you can finally secure the boards in place with a further nut in each position. Push three Oxley feedthroughs into the holes provided and wire to the adjacent pins inside and out using fine tinned copped wire 26 - 30s.w.g.

Kits & Bits

As usual, kits and bits are available. Please specify which version is required, 6.99 - 7.21MHz or 7.09 - 7.61MHz.

The VFO & Buffer 2 p.c.b. £5.00.
PCB components & potentiometer £9.00.
Suitable box RS 381 5120 undrilled £4.50, drilled £8.00.
Ready built VFO and Buffer unit on chosen frequency £46.50.
Postage on PCB & components 50p. Postage on box kit or box built £1.50. Please make cheques payable to: **A.J. & J.R. Nailer**, and address to; **Spectrum Communications, 12 Weatherbury Way, Dorchester, Dorset DT1 2EF**.

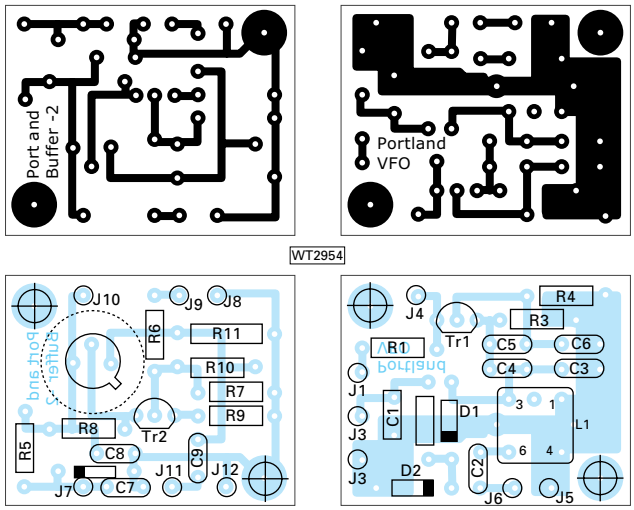


Fig. 6: The p.c.b. layout and overlay diagrams for both boards.

Room Temperature

I suggest you leave the unit open for 10 minutes or so to assume room temperature. Then switch on and do final setting of L1 to put the frequency in the correct range with an even overlap at the band edges.

Try closing the lid and noting the frequency change then compensate by adjusting L1. Next, you secure the lid to the box and leave it for a few minutes more before undertaking a stability test.

Connect a frequency counter to the buffer output terminals. Write on a piece of paper a vertical column 0, 1, 2, 3, 4, and 5, representing minutes. When your watch is 5 to 10 seconds from the minute or half minute mark connect the bench supply and note the start frequency as the watch reaches the minute or half minute mark. Typical results are 120, 180, 100, 70, and 30Hz. Settling normally takes five minutes and the total drift is about 500Hz.

Performance Summary

Performance summary: The v.f.o. with Buffer 2 will deliver 1.6V p-p into a 50Ω load with distortion products better than -40dB. This will suit f.e.t., m.o.s.f.e.t., and diode ring mixers in receivers and transmitters with negligible loading effects.

Knocking the side of the box also caused wild fluctuations in output frequency - presumably due to ceramic capacitors waving about. Additionally, when the p.c.b. prototype had its lid open, the pulling effect of the wires to the potentiometer caused significant changes in frequency. To obviate these effects requires embedding the frequency determining capacitors in bee's wax to hold them still. Making the connections from the p.c.b. to the potentiometer using extra-flex wire or fine enamelled copper wire - possibly adding vent holes to give limited air venting.

Another useful technique, which I haven't yet undertaken with this unit, is to heat cycle it. The process starts: First put it on a really hot central heating radiator for an hour. Then allow 30 minutes to cool to room temperature followed by 60 minutes in the freezer. Repeating this sequence twice should relieve all the stresses created by soldering and in the mechanical assembly.

Well, that's it! I hope you enjoy building the project - it's designed to be the foundation of a number of interesting larger projects. Watch this space!

PW

Radio Basics

This month Rob Mannion discusses some of the techniques he uses to enjoy the Amateur Radio hobby, particularly the tools and ideas necessary because of the effects of 'Anno Domini' aggravated by wear and tear! Rob is well aware that many disabled people enjoy the hobby - and he's determined to keep his soldering iron busy - despite creaks and groans!

There's no doubt about it - most Radio Amateurs are a determined bunch - despite age related problems or physical difficulties. Recently, I read a report of an American Amateur - aged well into his 80s - having to be rescued from his antenna tower, which seemed to be well over 15m (approximately 50ft) high. He had to be rescued as he'd been hanging upside down for a while.

Watching the TV report (it appeared as a brief news item in parts of the UK) he seemed quite unperturbed. That age group is certainly tough - and judging by some of the letters received at the *PW* offices - the rugged octogenarian mast climber is not the only elderly type who would try to climb a mast!

However, there are many of us - who although really keen on the hobby - enjoy it with some difficulty. Many of our readers are 'senior', and I often meet keen types who make me (60 years young this year) feel very, very young compared to them!

Nowadays - because of spinal arthritis, and joint problems affecting my left arm and my 'modified' arm - I'm gradually beginning to have to adapt my approach to the hobby. Obviously, climbing trees went years ago, and climbing ladders is no longer safe. In fact, I followed my wife, Carol's advice and sold my two long ladders several years ago. Trying to be wise, I follow her advice and use my friendly local TV antenna contractor. It costs extra of course - but at least I can relax while a professional gets to work.

Another bit of very sensible advice from Carol is that: "If you can't lift it Rob - get rid of it"! Of course, she was right and so, apart from one elderly signal generator - all my heavy equipment has gone. In fact, the only heavy receiver I own now - is my original Eddystone 750. I remember struggling with that - and my old KW Vanguard on several occasions during our house moves.

I donated my Vanguard to the Winchester Club before moving to Scotland to live. I need not have worried about its future - because a number of years later I heard from a newly licensed Amateur telling me he'd bought it at his local club 'Junk' sale for a £1. As far as I know he's still using it, so it did at least go to a good home. I really dislike throwing good - but elderly - equipment away! Many people tell me I'm a 'Hoarder' (Including **Elaine Richards G4LFM**, Editor of *RadioUser*), and my wife supports her!

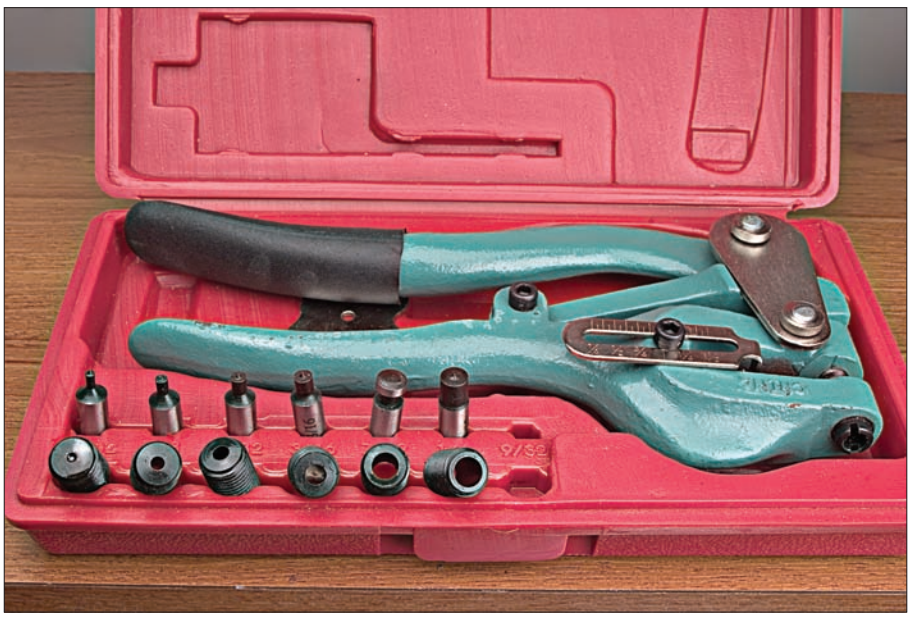


Fig. 1: The hand-punch obtained by Rob G3XFD - with the help of George G3RJV. It enables the operator to punch small discs of p.c.b. material to make 'copper islands'. These are then fixed to the p.c.b. using Cyanocrylate adhesive (see text).

Modifying Workshop Methods

Along with having to swallow the uncomfortable new regime 'medicine' by losing heavy ready-made equipment, I also have to modify the way I work in the shack. Gone are the days when I could 'chassis bash', bend or saw metal to make the traditional chassis. Instead, I've had to use different techniques - and these will help me enjoy the hobby for many years to come. Power drills have been very useful for me during the last 20 years, but nowadays I even use an electric drill unit to drive screws in, and remove them. The large - extremely heavy - speed control hand drill I bought recently is only used for the biggest job. I can still just about hold it - and a professional style drill stand will be obtained as soon as possible.

Other, lightweight drills are also use. Battery powered, these come with many different bits, ranging from crosshead screws to routers and rasps. Last year, I bought a particularly lightweight battery powered drill (the battery is permanently mounted in the handle) from Woolworth's. This unit is so small it's proved to be ideal for working on smaller equipment.

The action required for sawing - even with a junior type hacksaw - can be extremely difficult for anyone with upper - limb problems. I'm in this class nowadays, and after I'd made things extremely uncomfortable after sawing several layers of printed circuit board (p.c.b.) material) I decided to look for another method of

cutting the copper - clad material.

The resin - based (fibreglass) and synthetic resin paper board (s.r.p.b.) boards can be cut by scoring them with a file, while they are clamped to the bench, with a protective guide mounted underneath. I've used this technique for many years - using a pair of 'Mole Grips wrenches to hold the material down. However, even this method can be very tiring, so Always keen to avoid physical work wherever possible - I looked around for another way of cutting the material, small sections of aluminium, and wood used when helping my grandchildren to build radios.

Power Saws

Small, mains or battery powered saws are just becoming available in DIY stores such as B&Q. Unfortunately for me, they are far too heavy to use effectively. Only by using the industrial technique of supporting the saw from the ceiling by a special cord would work. But, I could see me slipping and causing a great deal of damage as the reciprocating blade swung about! So, until lightweight power saws become available - I'll stick to the useful little Dremel high - speed rotary tool.

The 'Dremel' and other types of multi tools - can be used with a great variety of tool attachments. The available tools range from mini - grinding stones to sanders and even a miniature disk saw. I use one of these to cut or grind slots in the p.c.b. Material - cutting it very effectively, so I can break the sections off with very clean edges. Unfortunately though, it's not suitable for cutting aluminium.

Using PCB Material

As from 2005, I stopped using chassis-style construction altogether, except for very specialised jobs - including power supplies. Most of these projects (still heavy, unfortunately!) require good, sturdy box, or enclosure. When I need the units, they're available from *PW* advertisers, the larger rallies and also Maplin's. (We've now got two Maplin shops in the Bournemouth area - including one very close to the *PW* offices).

Instead, I'm now using p.c.b. material for all my weekend and other projects. I can fabricate small boxes and front panels. My efforts are nothing like the excellent 'open style' p.c.b. projects produced by **Tim Walford G3PCJ**, but they work! And they work very well and this means I can enjoy home brewing to my heart's contents.

Although I have no problems with making small p.c.b.s using the effective (but admittedly crude) method of using an etc - resist pen, and then using ferric chloride to etch away the un-used copper, Radio Basics (RB) readers often tell me they just do not like the process themselves. Try as I might - there's always someone who comes up to chat to me at shows, club visits, etc., so I must accept the fact that etching p.c.b.s isn't to everyone's taste.

However, there's no need to give up on the p.c.b. open style board approach, with the components mounted on the same side as the copper. It's been my favourite method for many years, and is the chosen technique for RB projects.

Instead of using etched tracks, you can use the 'copper island' technique. Kits for this purposes were available for a number of years, produced by keen constructor **Duncan Walters G4DFV**. Unfortunately Duncan no longer provides the useful little kits - as he's gone on to do others things. But there's no need to despair because, as **Fig. 1**, shows, there's an extremely useful (but heavy!) hand punch available so that you can produce the 'copper islands' yourself.

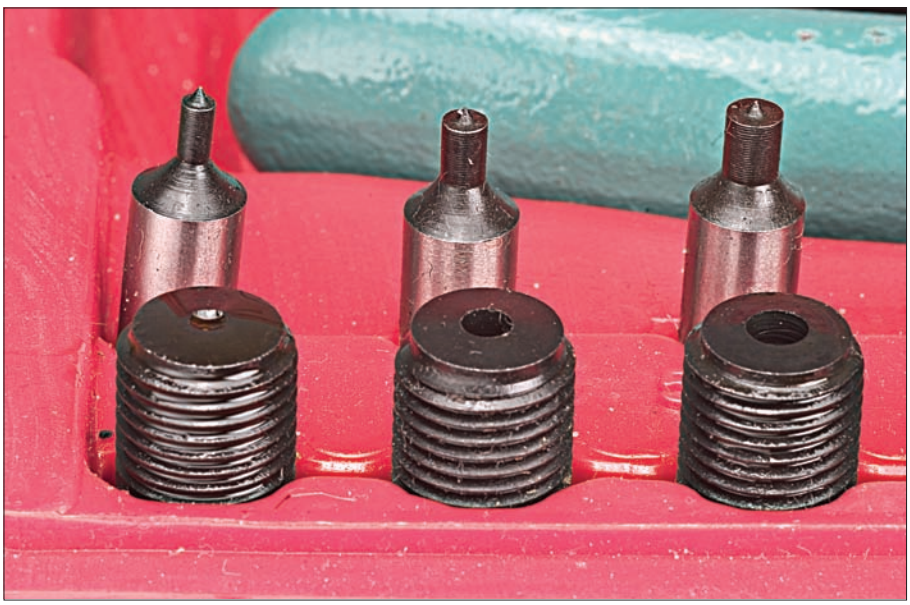


Fig. 2: The hand - punch is provided with a good selection of punches and associated dies. The latter screw into position on the underside of the tool, with the punch itself mounted in the upper jaw on the tool (see text).

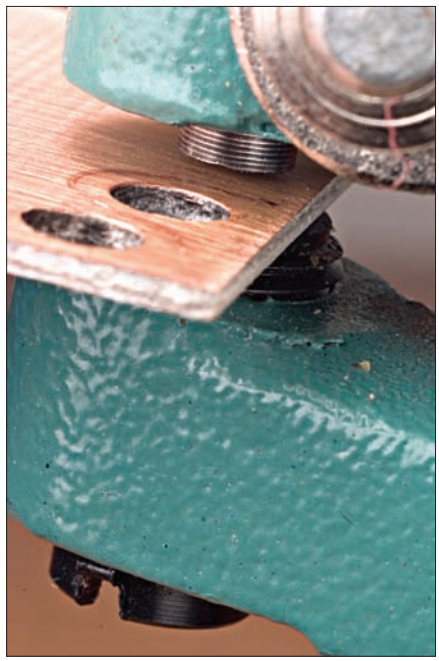


Fig. 3: Close - up view of the hand punch in use making one island. Two previous holes may be seen. Note the end of the die visible under the punch lower jaw.

Made in the 'People's Republic' (Communist) China, the hand punch is available in America from **Harborfreight Tool Shops** (website **http://www.harborfreight.com)** and believe it or not - even with carriage costs included, this item costing around $US15, can still only cost the purchaser £40 or so by the time it arrives in the UK. **Note:** As it's well below the newly increased Import Duty rates the package will not attract Import Duty, but unfortunately it is likely to be opened - ended by the seemingly greedy British Post office who will then charge £3 or so (plus of course VAT) to open it before sending it on to you!

To be honest, my hand-punch was brought back for me by a good friend on his way back from the Dayton HamVention. - and when I found out how heavy it was - I felt embarrassed! (Thanks **George G3RJV** - I owe you one for that kind favour).

Incidentally, I did make enquiries to several UK based companies and to my dismay found that each punch would cost well over £100! This price, so I was told,

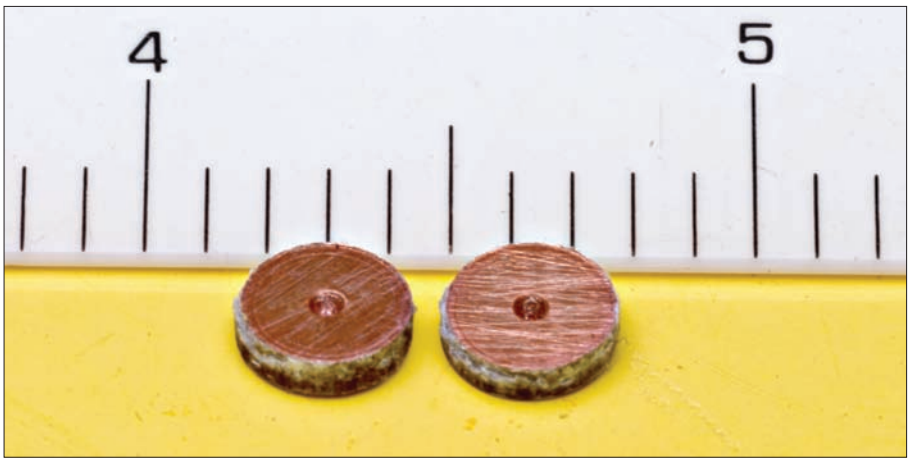


Fig. 4: Examples of the resultant discs. In practice the can be either mounted on the copper side of p.c.b. material, or on the blank side (see text).

cost that much because of minimum order costs, handling charges, plus the inevitable VAT. However, again, all is not lost - hopefully one of our advertisers will take note, see a business opportunity and import (or order them) in bulk. Here's hoping!

As you can see from the photographs in Figs. 1 and **2**, the punch comes with a selection of punches and the associated dies. It's possible to make a good selection of sizes, as can be seen in **Figs. 3** and **4** and the resulting discs (**Fig. 4** shows typical examples) can be then stuck on to the copper side of p.c.b. material, to be used as soldering and component mounting points.

As the punch is so heavy, it's extremely difficult for me to hold and use it. Fortunately, this most useful tool can be mounted in a bench vice and secured firmly enough to create as many discs of p.c.b. material as you need.

Freddy my eldest grandson loves the job - and he'll quite happily produce a hundred or so discs. He then keeps the matrix left over ready for little projects of his own. Using a few sheets of the holed material I made a sunflower seed feeder for birds, Freddy helped and it took around 15 minutes. With the copper side outwards, even the grey squirrels that infest Bournemouth will avoid chewing the assembly; even 'Super Squirrel' doesn't like the taste of copper! Waste not - want not eh?

Significant Challenge

Home brewing equipment nowadays faces a significant challenge in that usually it's far cheaper to buy equipment than make it yourself! However, most thoroughly enjoy the thrill of making something for ourselves. I shall always remember the faces on my two eldest grandchildren when they heard music and voices through the headphones of a simple receiver they made with my help.

There's no doubt about it - building a radio is great fun. However. in a local 'Pound Shop' recently Carol my wife purchased a little radio for £1. It covers Band II v.h.f., medium wave and short wave too! A nice little thing to take on your travels - but other than marvelling at the hard work put in by some Third World factory worker - surely making your own can't be beaten?

We may not be able to make a smart looking little projects, but we can tailor them to our own requirements. For example, even though I have several - extremely good quality - Eddystone 898 type dials - I'm actually building a small portable receiver which actually uses a disk cut from s.r.p.b. material as the tuning dial. It's fitted with a rim - drive type of reduction control. Maybe not so attractive as the truly beautifully made Eddystone dial - but the advantage is that I can fabricate everything on my work bench, and don't have to do any serious metal work. I get great satisfaction from my home construction attempts.

In fact, I can compare my approach to that of the die-hard Railway enthusiasts who show little interest in modern railway technology. Although I love steam engines myself, when criticised for my all-consuming interest in railways - including electrified services - I reply "I'd rather see a railway working using 100% modern trains than seeing it closed". It's the same with our radio hobby in an odd parallel. Here I would rather see the clumsiest attempt to build something, see the constructor enjoy themselves (especially when they're disadvantaged in any way) rather than see home construction, the foundation of our hobby, become a thing of the past. Enjoy the hobby - in whatever way pleases you the most! **PW**

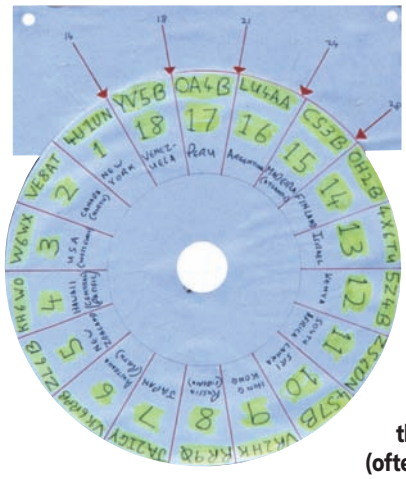


Fig. 5: Rob G3XFD uses the synthetic resin paper board (s.r.p.b.) a great deal in his shack. The material is very easy to work and shape (see text). In addition for standard p.c.b. work it can be used to fabricate virtually anything needed including tuning dials, front panels, drive discs and many other applications. An example of the versatility of the material (often available surplus at very reasonable prices) is the original prototype (mechanically driven, rim motor type) Intentional Beacon Project system presented in Radio Basics in 2001. In this prototype, virtually the entire project was fabricated from the s.r.p.b. material - even the stiffening panels on the rear! Rob says that "The object of the RB series is to encourage home construction and innovative ideas - not to win radio beauty contests".

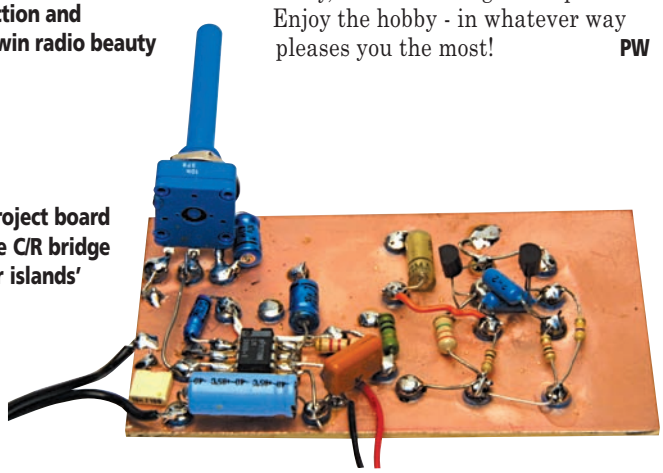


Fig: 6: An example of a project board - built for RB and used the C/R bridge project- using the 'Copper islands' technique (see text).

RADIOWORLD

www.radioworld.co.uk
42, Brook Lane,
Great Wyrley,
Walsall, WS6 6BQ.
Tel. 01922 414796.
Fax. 01922 417829.

ALINCO - AOR - BHI - CUSHCRAFT - DIAMOND - HEIL - ICOM - KENT - KENWOOD - MFJ - RADIOWORKS - WATSON - WEST MOUNTAIN - YAESU - YUPITERU

KENWOOD TS-2000

HF 6m 2m 70cm 23cms Option. DSP

UT-20 23cms Unit . £369.95
DRU-3A Rec Unit £99.95
VS-3 Voice Synth £45.95
SP-23 Ext Speaker . £68.95
MC-60 Desk Mic £117.95
MC-90 DSP Mic £187.95

1 YEAR WARRANTY **£1,295.00**

KENWOOD TS-480SAT

WITH FREE HEIL MH5 + Cable

New HF+6m. HX-200W - £1099.00

VGS-1 Voice Unit ... £64.95
SP-23 Ext Speaker . £68.95
MC-60 Desk Mic £117.95
PG-4Z Ext Cable £44.95
PS-53T 23A PSU .. £229.95
SO-3 TCXO £109.95

1 YEAR WARRANTY **£699.00**

KENWOOD TM-271E

2m 60W FM Tansceiver

PG-5A Data Cable .. £11.95
MJ-88 Mic adapter... £22.95
MC-60A Desk Mic . £117.95
PG-2N DC Lead £9.95
PS-52T 23A PSU .. £229.95
SP-50 Speaker £27.95

1 YEAR WARRANTY **£187.00**

KENWOOD TS-570DGE

100W Base HF. 1.8-30MHz. DSP ATU.

VS-3 Voice Unit £45.95
SP-50 Ext Speaker . £27.95
MC-60 Desk Mic £117.95
MB-430 Bracket £44.95
PS-53T 23A PSU .. £229.95
SO-2 TCXO £122.95

1 YEAR WARRANTY **£789.00**

KENWOOD TS-50S

100W Moble HF. 1.8-30MHz.

AT-50 TS-50 ATU . £319.95
SP-23 Ext Speaker . £68.95
MC-60 Desk Mic £117.95
MB-13 Bracket £39.95
HS-5 Del Phones £52.95
SO-2 TCXO £122.95

1 YEAR WARRANTY **£594.00**

KENWOOD TMD700E

2m & 70cms. Dual Band. APRS. TNC

SP-50B Speaker £27.95
PS-33T DC PSU £199.95
MC-58DM DTMF £44.95
PG-4X Ext Cable £61.95
PS-53T 23A PSU .. £229.95
VS-3 Voice Unit £45.95

1 YEAR WARRANTY **£424.00**

KENWOOD TMG707E

2m & 70cms. Dual Band. Det Front

SP-50B Speaker £27.95
DFK-3C Panel kit £34.95
MC-58DM DTMF £44.95
PG-4X Ext Cable £61.95
MB-12 Mount £14.95
MB-201 Mount £14.95

£265.00

KENWOOD Handhelds

TH-F7E 2&70 .... £237.00
TH-D7E 2&70 .... £289.00
TH-22E 2m £135.00
THG-71 2&70 .... £219.00
TH/K2E 2m £139.00
TH/K4E 70cms .. £139.00
Plus much more phone...

www.radioworld.co.uk

YAESU FT-1000MP

HF Base DSP. MkV 200w £2099.00

SP-8 Ext Speaker . £136.95
MD-100 Base Mic .. £116.95
TXCO-6 TXCO £124.95
DVS-2 Voice Unit .. £199.95
FH-1 Keypad £33.95
E-DC-20 DC Cable . £11.95

FT1000MP FIELD **£1,699.00**

YAESU FT-847

HF 6m 2m 70cm. DSP. ATU Option

ATAS-120 Act ant . £259.95
ATAS-25 Man ant . £189.00
FC-20 ATU £249.95
FVS-1A Voice Unit £199.95
MH-36D8 DTMF £54.95
MMB-66 Bracket £32.95

2 YEAR WARRANTY **£989.00**

YAESU FT-897D

HF 6m 2m 70cm.100W Transportable

FP-30U AC supply £199.95
FNB-78 Batt pack ... £99.95
FC-30 Ext ATU £249.95
MMB-80 Bracket £15.95

2 YEAR WARRANTY **£649.00**

YAESU FT-857D

HF 6m 2m 70cm.100W. Mobile

ATAS-120 Act ant . £259.95
FC-30 Ext ATU £249.95
MH-36E8J DTMF £57.95
CT-39 Packet cab ... £14.95
TCXO-9 TXCO £69.95
YSK-857 Sep kit £45.95

FREE DSP **£579.00**

YAESU FT-817ND

HF 6m 2m 70cm. Portable / Mobile

FP-30U AC supply £199.95
FNB-78 Batt pack ... £99.95
FC-30 Ext ATU £249.95
TCXO-9 TXCO £69.95
MMB-80 Bracket £15.95

FREE BATTERY & CHARGER **£449.00**

YAESU FT-840

100w Mobile / Base 1.8-30MHz.

FIF-232C CAT cab . £99.95
FM-747 FM unit £49.95
MD-100 Desk Mic .. £110.00
SP-6 Ext Speaker . £146.95
TCXO-4 Temp Osc . £41.95
YH-77STA Hdphs ... £49.95

2 YEAR WARRANTY **£389.00**

YAESU FT-8800/8900

FT-8800 Dual Band Mobile. 2/70
£269.00

Quad Band Mobile. 10/6/2/70 **FT-8900**
£329.00

2 YR WARRANTY

YAESU FT-2800M

2m Mobile. 137-174 MHz RX. 65W.
VHF Rugged Mobile TX.

MH-48A6J DTMF ... £39.95
SP-7 Speaker £34.95
MLS-100 Ext spkr ... £29.95
FP-1030A PSU £199.95
DC Power cord £17.95

2 YEAR WARRANTY **£159.00**

www.radioworld.co.uk

ICOM IC-7800 FLAGSHIP

HF+6m Flagship 200W. 32Bit DSP. ATU. LCD Scope.

Keboard&Monitor . £469.95
SM-20 Base Mic ... £144.99
SP-20 Ext Spkr £164.99
CT-17 CI-V Conv £99.95

2 YEAR WARRANTY **£6,400.00**

ICOM IC-756 PROIII NEW

HF+6m 100w ATU. 32 Bit DSP.

AH-4 100W ATU ... £359.95
SM-20 Base Mic ... £144.99
SP-20 Ext Spkr £164.99
PS-125 25A PSU .. £295.95
CT-17 CI-V Conv £99.95
UT-102 Voice unit ... £32.99

2 YEAR WARRANTY ~~£2099.00~~
call for the latest price

ICOM IC-7400

HF 6m 2m 100W ATU. 32 Bit DSP.

AH-4 100W ATU ... £359.95
SM-20 Base Mic ... £144.99
SP-20 Ext Spkr £164.99
PS-125 25A PSU .. £295.95
CT-17 CI-V Conv £99.95
CR-338 TXCO £43.48

2 YEAR WARRANTY **£1,279.00**
Inc. SP-21 & SM20

ICOM IC-706 MkII G

Last Few Remaining

HF 6m 2m 70cm 100W DSP Mobile.

AT-180 ATU £329.95
MB-62 Bracket M £17.99
MB-63 Bracket F £9.99
MB-72 Handle £9.95
OPC-581 Sep Cab . £32.99
UT-86 Voice unit £41.13

2 YEAR WARRANTY **£749.00**

ICOM IC-7000 (NEW)

HF, VHF & UHF Mobile Transceiver

AT-180 ATU £329.95
CT-17 Level Conv..... £99.95
HM-151 Rem Con Mic..... EPOA
MB-105 Controller bracket EPOA
MB-106 Carrying Handle... EPOA
OPC-589 Mic Adapter..... £16.95
SM-20 Desktop Mic £144.99

2 YEAR WARRANTY **£999.95**

ICOM IC-718

HF 100W TX. Dual VFO. Auto Notch.

AH-4 100W ATU ... £359.95
MB-5 Bracket £35.25
MB-23 Carry strap £9.99
UT-102 Voice unit ... £32.99
OPC-599 ACC Cab £32.99
UT-106 AF DSP £84.99

2 YEAR WARRANTY **£439.00**

ICOM IC-910H / X

All mode 2 & 70. 100W. 9600bps op.

AG-25 Preamp £159.95
MB5 Bracket £35.25
CR-293 TXCO £89.99
UT-102 Voice unit ... £32.99
UX-910 23cms unit £349.99
UT-106 AF DSP £84.99

2 YEAR WARRANTY **£1087.00**

ICOM & YEASU Handhelds

IC-T3H 2m FM .. £129.00
IC-E90 6/2/70 .... £199.00

FT-60E 2&70 ..... £169.00
VX-2E 2&70 ..... £119.00
VX-6R 2&70 ..... £189.95
VX-7R 6/2/70 .... £199.00
VX-110 2m FM £99.95

www.radioworld.co.uk

01922 414796

ORDER HOTLINE

Email: sales@radioworld.co.uk

Mon - Fri - 09:00 - 17:30,
Sat - 09:30 - 1600.

Most Goods are shipped for 24Hr delivery. [UK Mainland] is £10 P&P unless otherwise stated.

Credit Cards Accepted

MasterCard VISA VISA Electron SWITCH SOLO

Order Hotline - 01922 414796
Order Online - www.radioworld.co.uk

ALINCO · AOR · BHI · CUSHCRAFT · DIAMOND · HEIL · ICOM · KENT · KENWOOD · MFJ · RADIOWORKS · WATSON · WEST MOUNTAIN · YAESU · YUPITERU

MFJ. Tuners

Tuners, Meters, Analysers.

MFJ-989C 3Kw	£319.95
MFJ-986C 3Kw	£299.95
MFJ-993 Intelliturner	£209.95
MFJ-971 QRP	£89.95
MFJ-969 300w	£169.95
MFJ-962D 1.5Kw	£249.95
MFJ-949E 300w	£135.95
MFJ-948 300w	£119.95
MFJ-945E Mobile	£99.95
MFJ-941E 300w	£109.95
MFJ-934 ATU+AG	£159.95
MFJ-921 2m	£59.95
MFJ-924 70cms	£59.95
MFJ-914 Extender	£56.95
MFJ-901 200w	£72.95

Reads SWR + Resistance(R) & Reactance(X) or Magnitude(Z) & Phase(degrees). Coax cable loss(dB) Coax cable length and Distance to fault... plus more.

Analysers

MFJ-249 1.8-170 Dig	£219.95
MFJ-259B 1.8-170 Rm&Dig	£199.95
MFJ-269 HF/VHF/UHF	£269.95

Dummy Loads

MFJ-250 1kw Oil filled	£69.95
MFJ-250X 1kw without oil	£44.95
MFJ-260C 300w PL259	£33.95
MFJ-260CN 300w N-Type	£39.95
MFJ-264 1.5kw PL259	£59.95
MFJ-264N 1.5kw N-Type	£69.95

MFJ-418
Morse Decoder / Tutor
£69.95

Learn Morse code anywhere, anytime with this MFJ Pocket Morse Code / CW Tutor! Take it everywhere! enjoy code at home, going to work, on vacation, on a plane or in a hotel. A large LCD display reads out letters, numbers and punctuation in plain English.

Heil Audio

Microphones, Headsets, Accessories.

Pro-Set-Plus Headset	£155.95
Pro-Set-Plus-IC Headset	£169.95
Pro-Set-HC-4/5 Headset	£109.95
Pro-Set-HC-IC Headset	£119.95
Goldline GM-4 Stick mic	£109.95
Goldline GM-5 Stick mic	£109.95
Goldline Vintage Stick mic	£129.95
HM-10-4 HC4 Reg stick mic	£69.95
HM-10-5 HC5 Reg stick mic	£69.95
HM-Dual HC4+5 Stick mic	£119.95
HM-10-I Icom Stick mic	£89.95
HMM-1C Icom Hand Mic	£59.95
HMM-K HC4/5 Ken hand mic	£74.95
HMM-Y HC4/5 Yae hand mic	£74.95
Traveller-817 Yaesu headset	£79.95
Traveller-706 Icom headset	£79.95

Call for Leads and Accessories

Adonis Microphones

AM-708E
Variable Compression
2 Microphone Outputs
£129.95

Adonis AM-7500E	£Phone
Adonis AM-708E	£129.95
Adonis AM-508E	£79.95
Adonis AM-308E	£69.95
Adonis FX-10	£59.95

bhi DSP

Noise Cancelling Solutions for Amateur Radio & SWL

NES10-2 Speaker with dsp	£99.95
NES1031 Inline dsp module	£129.95
NES1061 817 dsp module	£89.95
NES1061 817 brd inc fitting	£115.95
NES1062 dsp module	£89.95
NES1042 Switch Box	£19.95

Watson Supplies

W30-AM
0-15VDC
30/35A Peak
£119.95

W25-XM
NEW
13.8VDC
25A Switchmode
£99.95

W-25AM 25A Supply	£89.95
W-10AM 10A Supply	£59.95
W-5A 5A Supply	£29.95
W-3A 3A Supply	£22.95
W-25SM 25A Supply	£79.95
W-10SM 10A Supply	£49.95

Diamond Supplies

GZV4000
5-15 VDC
40A Peak
£154.95

GZV-6000 60A Supply *NEW*	£299.95
GZV-4000 40A Supply	£154.95
GSV-3000 30A Supply	£144.95
GZV-2500 25A Supply	£114.95

Frequency Counters

Will tune AR-8200, AR8000 & IC-R10
Super Searcher
£99.95

FC130	£79.95
Hunter	£59.95

Call for further details

* 10Hz-3GHz
* Imp - 50 Ohms
* LCD readout
* 10-Digit display

Super Hunter
£149.95

Daiwa Accessories

Cross-needle meters

CN101L HF/VHF	£59.95
CN103N VHF/UHF	£65.95
CN801H HF/VHF	£109.95
CN801V VHF/UHF	£119.95

Coax Switches 2/4 Way.

CS-201 2-Way	£24.95
CX401 4-Way	£49.95
CS401N 4-Way NType	£Call

Avair Meters

AV-200
HF / VHF PWR SWR meter

AV-201 HF/VHF	£49.95
AV-401 VHF/UHF	£49.95
AV-601 HF/VHF/UHF	£69.95
AV-1000 HF/VHF/UHF	£89.95
AV-20 HF/VHF	£29.95
AV-40 VHF/UHF	£29.95

Palstar Tuners

TThe AT1500CV is an antenna tuner that can handle up to 1500 watts (1500 watt PEP) with low profile construction and bullet proof operation

AT-1500CV £389.00

AT-1KD Digital Display	£299.95
AT-1KM Regular Display	£289.95
AT-1500BAL 1500w Bal	£599.95
AT-1500CV 1500w ATU	£389.95
BT-1500BAL Dual Bal	£569.95

Palstar ZM30 - Antenna Analyser
Micro-controlled SWR antenna analyzer
£289.00

Watson Antennas

Watson W2000
Bands 6m/2m/70cm
Gain 2.15/6.2/8.4dB
Power 200W (50W 6m)
Type 1/2, 2x5/8, 4x5/8
Length 2.5m
£69.95

W-30 2/70 Base	£39.95
W-50 2/70 Base	£49.95
W-300 2/70 Base	£64.95
W-2000 6/2/70 Base	£69.95
WBV-70 4m 1/2 Wave Base	£39.95

Bencher Antennas

Butternut HF-6V
Bands: 80/40/30/20/15/10
Height (Adj): 26 ft (7.9 m)
Weight: 12 lbs (5.4 kg)
Impedance: Nom 50 ohms
VSWR: 1.5:1 or less
£299.95

Butternut HF-2V 40/80m	£229.95
Butternut HF-6V 80-10m	£299.95
Butternut HF-9V 80-6m	£349.95
Butternut HF-5B 20-10m	£319.95
30-MRK 30m ad for HF2V	£89.95
A-17-12 17&12 ad for HF6V	£49.95
A-6 6m ad for HF6V-X	£14.95
TBR-160S 160m HF2/6/9V	£114.95

Hustler Antennas

Hustler 5-BTV
5 Bands - 80-10m
Height 7.64m - Weight 7.7kg
SWR 1.15:1 - Power 1kW
£195.00

Hustler 4-BTV 4 Band Vert	£169.00
Hustler 6-BTV 6 Band Vert	£225.00

West Mountain Radio

RIGblaster Pro	£209.95
RIGblaster Plus	£119.95
RIGblaster M8	£89.95
RIGblaster M4	£89.95
RIGblaster RJ	£89.95
Nomic 8P	£59.95
Nomic 4P	£59.95
Nomic RJ	£59.95

Tonna Antennas

Tonna - 20655
23cms (1296 Mhz) 55 element 21.5 dbi gain "N" 4.64m long.

Tonna 20505 6m 5el	£89.95
Tonna 20809 2m 9el	£54.95
Tonna 20811 2m 11el	£79.95
Tonna 20817 2m 17el	£99.95
Tonna 20909 70cm 9el	£45.95
Tonna 20919 70cm 19el	£59.95
Tonna 20921 70cm 21el	£74.95
Tonna 20635 23cm 35el	£64.95
Tonna 20655 23cm 55el	£89.95
Tonna 20745 13cm 25el	£69.95

Diamond Antennas

HF10FX 10m Mobile	£39.95
HF15FX 15m Mobile	£39.95
HF20FX 20m Mobile	£39.95
HF40FX 40m Mobile	£39.95
HF80FX 80m Mobile	£42.95
CR8900 10/6/2/70	£72.95
CP6 Base 6m-80m	£239.95
X50 Base 2/70	£54.95
X200 Base 2/70	£84.95
X300 Base 2/70	£99.95
X510 Base 2/70	£124.95
X700 Base 2/70	£249.95

Cushcraft Antennas

X-7 - 20/15/10 7el Yagi	£669.95
A3S - 20/15/10 3el Yagi	£499.95
A4S - 20/15/10 Yagi	£569.95
A3WS - 12/17 3el Yagi	£379.95
ASL-2010 13-32MHz Log	£749.95
MA5B - Mini Beam	£369.95
D3 - 20/15/10 Dipole	£249.95
D3W - 30/17/12 Dipole	£249.95
D4 - 40m Rotary Dipole	£349.95

TGM Antennas *Mini Beams*

** Call for prices on TGM upgrade kits.*

MQ-24SR 6-20m 2el	£329.95
MQ-34SR 6-20m 3el	£449.95
MQ-3 6-20m 3el	£379.95
MQ-26 6-20m 2el	£389.95
MQ-26SR 6-20m 2el + EH	£419.95
MQ-36SR 6-20m + Dir	£559.95

Radioworks Wire Ants

CW-160 160-10m (252ft)	£129.95
CWS-160 160-10m (133ft)	£114.95
CW-80 80-10m (133ft)	£89.95
CWS-80 80-10m (66ft)	£109.95
CW-40 40-10m (66ft)	£84.95
CW-20 20-10m (34ft)	£89.95
G5RV+ 80-10m	£59.95
Radioworld G5RV Fullsize	£29.95
Radioworld G5RV Halfsize	£27.95

RADIOWORLD
If You Don't need it, we won't sell it to you.

price match
Find a lower price? We'll try to match it!*

www.radioworld.co.uk

RADIOWORLD

42, Brook Lane,
Great Wyrley,
Walsall, WS6 6BQ.
Tel. 01922 414796.
Fax. 01922 417829.

ALINCO - AOR - BHI - CUSHCRAFT - DIAMOND - HEIL - ICOM - KENT - KENWOOD - MFJ - RADIOWORKS - WATSON - WEST MOUNTAIN - YAESU - YUPITERU

LDG Electronics

AT-1000

1KW Auto ATU - 1.8-54MHz - 1-8 secs Tune - Approx SWR Rating of 10:1

£449.95

LDG Z-100

100w Auto ATU - 1.8-54MHz - 0.5 - 6 secs

£115.00 ***BEST SELLER****

LDG TW-1 TALKING WATTMETER *New*

Speaks Fwd - Rev power in Watts & SWR
Continuous tone for amplifier adjustments
Power range: 0 – 2000 watts PEP

£109.00

LDG AT-100Pro *New*

100w Auto ATU - 1.8-54MHz
1-5 seconds Tune - 2 Pos Ant switch

£169.95 ***New***

LDG RBA 1:1 & 4:1

1:1 or 4:1 Balun - Covers 1.8 - 30Mhz
Power rating 200w

£29.95

LDG AT-897

100w Auto ATU for FT-897 - 1.8-54MHz

£199.95

Accessories:

K-OTT Kenwood Interface	£49.95
Y-OTT Yaesu Interface	£54.95
Icom-IC1 Icom Interface	£29.95
Alinco-IC1 Alinco Interface	£29.95
AC-1 Cable	£19.95

W4RT Electronics

One-Plug-Power

One-Plug Power is the internal FT-817 battery solution you have been waiting for until now.

OPP-817 £54.95

NEW! 2300 mAh Large Capacity FT-817 Internal Battery Soluion Still use Internal 817 Charger

OPP-897 £89.95

One Plug Power for the FT-897 4500 mAh; Fully Compatible with the FT-897 and Yaesu Charger.

NEW!

One-Plug Power is the internal FT-817 battery solution you have been waiting for until now. One-Plug Power comprises a 1800 mAh NiMH battery pack, both over-termperature and over-current protection, connection to the FT-817 Molex connector, and a modified Yaesu battery cover door featuring a power jack that allows connection of a battery charger such as the Maha MH-C777 or MH-C888.

One-Big Punch

One BIG Punch (OBP) is a custom add-on accessory for the Yaesu MH-31 microphone commonly used with many Yaesu amateur radios

OBP £49.95

Speech Compressor for the Yaesu MH-31 mic and FT817 FT857, FT897. Improve the TALK POWER.

MAX PUNCH £165.95

You can also enjoy the "MAX PUNCH" option that features the HC-4 with the OBP and the HC-5 (w/o OBP). The TONE switch is used to select which element is operational.

HAND MIKE £57.95

W4RT Electronics Microphone with One BIG Punch Speech Compressor included.

The One BIG Punch is an AF-based speech compressor specifically configured to provide remarkable increase in talk power while maintaining good audio quality. The OBP is NOT a clipper, but a compressor providing great voice compression, high-level limiting, and noise gating. The unit can be mounted inside the MH-31, requires no additional electrical power, and can be turned on or off by using the MH-31's TONE switch.

One-Board-Filter

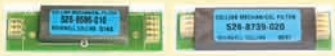
The One-Board Filter (OBF) affords you the opportunity to have both the Collins CW and SSB mechanical filters available in your FT-817 together!

OBF £229.95

Replace two filters in the space of one. OBF includes the two optional filters and fitting.

Collins Mechanical Filters
for the Yaesu FT-817, 857 & 897.

500 Hz CW - £94.95 ***2.3kHz SSB - £94.95***



This is the option that many, many FT-817 owners have requested. The OBF utilizes Collins Mechanical Filters that are the same as used in the optional Yaesu filters for the FT-817. The bandwidth of the 7-pole CW filter is 500 Hz and the 10-pole SSB filter is 2.3 kHz. The One-Board Filter is NOT available for installation by FT-817 owners. This is not a "do-it-yourself" option. The One-Board Filter must be installed by RADIOWORLD, or a competent engineer . If in doubt please call for details.

One-Touch-Tune

At the touch of a button, you have the carrier needed for tuning. One-Touch Tune (OTT) is totally transparent to the FT-817 and to any external equipment that you have attached to the rig.

OTT-817 £54.95

It requires no external power and works with both manual and automatic tuners.

W4RT OTT-FT817	£54.95
W4RT OTT-FT100/857/897	£54.95
W4RT OTT-FT847	£54.95
W4RT FT817 One Fast Charger	£Call
W4RT Antenna Boss	£139.95

***NEW* FT-817 Stand £19.95**

Simply snaps into position. Adjust for desired height. Complete with non slip feet and allen wrench.

Professional-Grade FT-817 Stand

W2IHY Technologies

*Available and IN STOCK now**

Finally, professional audio processing technology is applied to the unique requirements of amateur radio operators! The W2IHY 8 Band Audio Equalizer and Noise Gate is an easy-to-use, sophisticated unit loaded with high-performance features.

W2IHY 8 Band Audio EQ Noisegate

£229.95

If You Are Ready for New Adventures in High-End Transmit Audio Then You're Ready for -- *EQplus by W2IHY*

£299.95

W2IHY 2 Band Processor

2 Band Audio Processor, You can adjust Bass and Treble of your transmit audio for rag chew, dx and contest style audio

£119.95

Adapter cables to fit Icom - Kenwood - Yaesu £22.95

ATX Walkabout

ATX Walk--about PL-259

£47.95

The ATX Walkabout covers all bands (including WARC bands) from 80-6m, 5W guaranteed, 25W max. When fully telescoped it is about 65 inches long. This makes it ideal for the FT-817 or any other portable HF radio.

ATX Walkabout BNC	£47.95
ATX Walkabout PL259	£47.95
ATX Walkabout Universal	£54.95

The Miracle Whip

RX - 0.6 to 460 Mhz
TX - 40,30,20,17,15,12, 10, 6, 2m & 70cm

Power Limits 25W PEP 10W Cont.

£127.95

In Stock*

* The Miracle Whip will transmit on almost any frequency you are licensed to use including WARC, MARS/CAP, Alaska Emergency, Citizens Band, Marine, and most commercial HF SSB and VHF/UHF channels

** The Miracle Whip is optimized for for best receive rather than lowest swr on 80 and 160, as no short antenna will present good transmitting opportunities at these frequencies

Portable Masts

Telescopic Masts Inc Guy Rings

Small 17' 6"	£55.95
Medium 26' 0"	£65.95
Large 33' 0"	£75.95
Tripods to fit masts	£25.95

Mobile Mounts

Solarcon MAGZ-17 TRI-MAG

£39.95

An extremely strong magnet base which actually consists of 3 x 5" chrome magnets that are interconnected with metal strips to form one very large mount. Suitable for very large mobile antennae such as ¼ wave tank whips.

Siro MAG125 3/8	£17.95
Siro MAG125 PL	£17.95
Siro MAG 145 3/8	£22.95
Siro MAG 145 PL	£22.95
Solarcon Magz-17	£39.95

RM Amplifiers

RM HLA-150
HF - 1.5-30MHz
Power Amplifier
150 WATTS

£249.95

RM HLA-300
HF - 1.5-30MHz
Power Amplifier
300 WATTS

£329.95

01922 414796

ORDER HOTLINE

Email: sales@radioworld.co.uk

Mon - Fri - 09:00 - 17:30,
Sat - 09:30 - 1600.

Most Goods are shipped for 24Hr delivery. [UK Mainland] is £10 P&P unless otherwise stated.

Credit Cards Accepted

MasterCard VISA VISA Electron SWITCH SOLO

Do a great deal better @ RADIOWORLD

01922 414796 - www.radioworld.co.uk

price match — Find a lower price? We'll try to match it!*

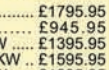
Linear Amp U.K.

Challenger Mk3 **£1795.95**

Challenger MK3 HF	£1795.95
Ranger811H HF	£945.95
Discovery 2-31 2m 1KW	£1395.95
Discovery 2-35 2m 1.5KW	£1595.95
Discovery 6-31 2m 1KW	£1395.95
Discovery 6-35 2m 1.5KW	£1595.95
Discovery70 70cms 700w	£1495.95
LA-STNM Bal Super Tuner	£345.00
LA-STWM Bal Super Tuner	£395.00

SGC. Smartuners

SGC-230 200Watts **£339.95**



SGC-230 HF	£339.95
SGC-231 HF+6m	£349.95
SGC-235 HF-500w	£749.95
SGC-237 HF+6m	£299.95
SGC-237 Porta	£529.95
SGC-237 PCB	£279.95
SGC-239 HF	£185.95
MAC-200	£339.95
SGC-211,1.8-60MHz 60W	£189.95

Rotators YAESU

G-2800SDX Rotator	£999.95
G-450C Rotator	£299.00
G-550C Rotator	£309.00
G-650C Rotator	£379.00
G-1000DXC Rotator	£429.00
G-5500C Rotator	£569.00

Feeders & Wire

RG-213 Military Spec High grade 50 Ohm coaxial Cable **£84.95** A 100m Drum

RG58U	£0.50 per Metre
RG8 Super	£0.70 per Metre
RG213	£1.00 per Metre
W103 Westflex	£1.30 per Metre
RG-8 75 Metre Drum Special .	£39.95
Flexweave 50m Flex	£29.95
Flexweave-PVC-50 50m	£39.95
Enamelled Copper Wire 50m .	£12.95
Hard Drawn Copper Wire 50m	£14.95

Rotator Cable: - Color coded Cable

3 core	£0.45 per Metre
7 core	£0.79 per Metre
8 core	£1.09 per Metre

DC Connecting Cable

5A DC Cable	£0.50 per Metre
10A DC Cable	£0.75 per Metre
20A DC Cable	£1.00 per Metre
25A DC Cable	£1.10 per Metre

Wonder Wand *New

Wonder Wand MonoBand Antenna. Mono Band QRP antenna High Quality Mono Band antenna. Available for 3 x Bands.

MB-160 Mono 160m	£49.95
MB-80 Mono 80m	£49.95
MB-60 Mono 60m	£49.95
Wonder Wand 40m-70cm	£89.95

C-POISE Wander-Wand Tunable Counterpoise System £59.95

The UK's No.1 Used Equipment Trader

Second Hand List.

Quality Used Equipment. 3 Month Warranty.
Best prices paid on your used equipment.

BHI NEIM-1031 Noise Eliminating Module £89.00
432-50 70cms Amp 50w £99.00
AEA PK-12 Packet Terminal £69.00
AKD 6001 6m FM Trx £135.00
Alan HQ-2000 SWR / Watt Meter £25.00
Albrecht AE 485S 10m Mobile Transceiver £125.00
Alinco DJ-G5 Dual Band Handy £159.00
Alinco DJ-G5 Dual Band Handy £159.00
Alinco DJ-V5 Handheld £99.00
Alinco DJ-X10 Wide Band Rx £200.00
Alinco DJ-X2000 Intelligent Receiver £275.00
Alinco DR-112 2m Mobile Transceiver £99.00
Alinco DR-150 2m Trx £120.00
Alinco DR-430 70cm FM Mobile Transceiver £99.00
Alinco DX-70TH HF & 6m transceiver £375.00
Alinco DX-77E HF Transceiver £389.00
Alinco EDX-2 Auto ATU £219.00
Ameritron AL-811 £499.00
AOR 350L Bar Element £30.00
AOR 350M Bar Element £30.00
AOR 8200-PC Computer lead £45.00
AOR AR-1500 Wideband Receiver £89.00
AOR AR-3000 £349.00
AOR AR-3000 Wide Band Receiver £350.00
AOR AR-7030 £550.00
AOR AR-7030 HF Receiver £550.00
AOR AR-8200 2 £199.00
AOR AR-8200 Mk II £199.00
AOR AR-8200Mk3 Scanner £275.00
AOR AR8000 £189.00
AOR LA-350 Loop Antenna £129.00
AOR SDU-5000 Spectrum Display Unit £299.00
Avair AV-200 VSWR/POWER Meter £30.00
Bearcat UBC-120XLT Scanner £69.00
Bearcat UBC-278 XLT Scanner £99.00
Bearcat UBC-780XLT Scanner £199.00
Bnos 20AMP PSU £89.00
BNOS LP50-3-50 6m linear amplifier £99.00
Codan 9360 SSB transceiver £399.00
Comet CD-270D Meter £49.00
CX-201 Diecast Coax Switch £10.00
Daiwa CNA-1001 £149.00
Datong FL-2 Multimode Filter £69.00
Dewsbury Electronics Supa-Tuta £35.00
Diamond SX-100 Meter £65.00
Diamond SX-200 Meter £69.00
Drake R8E HF Receiver £425.00
EDC-16B adapter £9.99
FRT-7700 £69.00
FT-290R 2m Multi mode £150.00
FT-817 £375.00
Fujion F-2000A Finder £99.00
FV-101DM Digital Memory VFO £199.00
Global AT2000 SWL ATU £59.00
GRE PSR-214 FM Base Scanner £89.00
Heil BM-10-5 Headset £50.00
Hora C-150 2m FM Handheld Transceiver £79.00
HS-5 Deluxe Headphones £30.00
IC-275H - 2m Base Transceiver 100W £399.00
IC-7400 HF, 6m & 2m transceiver £899.00
ICE 413 2m Band Pass Filter £30.00
Icom AT-180 AUTO ATU £225.00
Icom Ic at-500 automatic ATU £250.00
ICOM IC-207H Dual Band Mobile £149.00
Icom IC-2340H Dual Band Mobile Transceiver £169.00
Icom IC-24ET Dual Band Handy £139.00
Icom IC-703 HF, 6m Portable £399.00
Icom IC-706MKIIG £649.00
Icom IC-706MkIIG DSP £649.00
Icom IC-718 HF All Band Transceiver £389.00
Icom IC-718 HF Transceiver £379.00
Icom IC-735 £299.00
Icom IC-7400 HF, 6m & 2m Transceiver £899.00
Icom IC-746 HF/6m Transceiver £799.00
Icom IC-751 HF Transceiver £400.00
Icom IC-756Pro £995.00
Icom IC-756Pro III HF / 6m Transceiver £1795.00
Icom IC-910H 2m/70cms base 100w £899.00
Icom IC-R2 Wideband Receiver(Scanner) £89.00
Icom IC-R2 Wideband Receiver(Scanner) £8900
Icom IC-R3 Hand held Scanner £250.00
Icom IC-R70 HF Rx £299.00
Icom IC-R72 Receiver £350.00
Icom IC-R75 £449.00
Icom IC-R8500 Receiver £899.00
Icom IC-R8500 RX £999.00
Icom IC-T7E Dual Band Handy £139.00
Icom IC-W31E Dual Bander £160.00
Icom ut-102 Voice Synthesizer Unit £25.00
ICS AMT-2 Terminal Unit £49.00
Jil SWR Meter £15.00
JPS NIR-10 Noise Unit £99.00
JRC NRD-525 HF Receiver £399.00
Junker Pump Key £75.00
Kamtronics KAM Multimode TNC £140.00
Kantronics KPC-3+ TNC £129.00
Kent Straight Key £45.00
Kenwood AT-250 Auto ATU £199.00
Kenwood AT-50 ATU £175.00
Kenwood BO-9 Base Unit £39.00
Kenwood IF232 £50.00
Kenwood MB-201 £20.00
Kenwood MC-60A Microphone £80.00
Kenwood PS-31 Power Supply £129.00
Kenwood SM-230 Station Monitor £499.00
Kenwood SO-2 Hi-Stab Oscillator £69.00
Kenwood SP-31 Loudspeaker £59.00
Kenwood SP-950 Loudspeaker £90.00
Kenwood TH-79E Dual Band Handy £149.00
Kenwood TH-D7E Dual band Handy £199.00
Kenwood TH-F7E Dual Band Handheld £189.00
Kenwood TH-G71E Dualband Handie £129.00
Kenwood TH-K2E 2m Handie £99.00
Kenwood TL-922 HF Linear Amplifier £849.00
Kenwood TM-G707E Dual Band Mobile £189.00
Kenwood TR-751E 2m Multi-mode transceiver £325.00
Kenwood TR-9130 2m Multi-Mode Transceiver £249.00
Kenwood TR-9500 70cms Multi-Mode Transceiver £220.00
Kenwood TS-140S HF Transceiver £299.00
Kenwood TS-2000 All Mode Transceiver £1099.00
Kenwood TS-2000X HF/6m/2m/70cm & 23cm £1499.00
Kenwood TS-440S HF Transceiver £399.00
Kenwood TS-570DG/E £675.00
Kenwood TS-570S HF / 6m Transceiver £649.00
Kenwood TS-690SAT HF -6m Transceiver £599.00
Kenwood TS-790E Dual Band Base Transceiver £799.00
Kenwood TS-850S /AT £699.00
Kenwood TS-870S HF Transceiver £949.00
Kenwood TS-950SD HF Transceiver £1099.00
Kenwood TS-950SDX HF Transceiver £1499.00
Kenwood TSU-8 CTCSS encoder £30.00
Kenwood VS-1 Voice Synthesiser £39.00
Kenwood VS-2 Voice Synthesizer £30.00
Kenwood YG-455C IF Filter £65.00
Kenwood YK-88C-1 500Hz CW Filter £40.00
Kenwood YK-88CN-1 CW 270Hz Filter £40.00
Linear Amp Challenger II amplifier £1199.00
M/Mods 144/100 £119.00
M/Mods 432/50 £99.00
Magellan GPS 315 Receiver £129.00
Manson EP-850 50A Power Supply Unit £120.00
Maplin YN48C Dip Meter £49.00
MCL1100 EasyReader £59.00
MFJ-1272B TNC / Mic Switch £20.00
MFJ-1701 6 Way Antenna Switch £40.00
MFJ-442 Elec + Memory keyer £89.00
MFJ-722 CW / SSB Filter £59.00
MFJ-784 DSP Filter £149.00
MFJ-9015 15m cw Trx £84.26
MFJ-906 6m ATU £49.00
MFJ-914 £39.95
MFJ-921 VHF 200 Watt ATU £50.00
MFJ-941E Versa Tuner £79.99
MFJ-949E Manual ATU £109.00
MFJ-962D Versa Tuner £220.00
MFJ-969 ATU £130.00
Microset PC2S 30 Power Supply £99.00
Microset PT 135 PSU £120.00
Microset R50 2m Amp £79.00
Mirage B-108 2m Linear Amplifier £129.00
Mizuho ATU £40.00
MML432-30L £89.00
MML432-50 70cm's Linear Amplifier £79.00
MVT-7100 Scanner £139.00
NES-10-2MKII bhi DSP Noise eliminating Speaker £69.00
NEUMANN U 87 Ai condenser microphone £1100.00
OptoElectronics X Sweeper £1199.00
Palstar PS-30N PSU £79.00
Pro.Sis.Tel Rotator and Head Unit £289.00
Proset-Plus £109.00
Realistic DX394 HF Receiver £119.00
Realistic Pro-2006 Scanner £129.00
Realistic Pro-2012 £79.00
Realistic Pro-26 Scanner £89.00
Realistic Pro-28 Scanner £35.00
Realistic Pro-43 Scanner £89.00
Rexon RL-501 Dual Band Handy £89.00
Rode Classic 1 studio condenser microphone £550.00
SEM TranZmatch £89.00
SGC SG-230 Auto ATU £259.00
SM-20 Deluxe Base Station Desk Mic £89.00
SMC 150PL Dummy Load £29.00
Snooper S5-R Safety Alert System £119.95
Standard C-156E 2m Handheld £125.00
Standard C468 70cm Handy £59.00
Target HF3 HF3 RX £99.00
Tentec Paragon HF Base Inc. Speaker £700.00
TenTec RX-350 HF Receiver £799.00
Timewave DSP-59+ Filter £129.00
Timewave PK-12 Packet £99.00
Tokyo Hy-Power HT-106 6m Transceiver £199.00
Tono Theta 777 TNC £49.00
Trio (Kenwood) AT-230 Antenna Tuner £149.00
Trio (Kenwood) YK-88C IF Filter £40.00
VECTRONICS DL-2500 High Power Dummy Load £119.00
Vibroplex Vibro Keyer Deluxe £119.00
Watson W-25AM Power Supply £75.00
WELZ DL-600 Dummy Load £49.00
Wimo R-150 HF Linear Amplifier £89.00
Yaesu FC-20 Auto ATU £175.00
Yaesu FC-30 Antenna Tuner Unit £149.00
Yaesu FC-757AT Auto ATU £169.00
Yaesu FL-2025 25W Linear Amplifier £99.00
Yaesu FP-707 PSU £110.00
Yaesu FR-101 HF RX £399.00
Yaesu FRG-100 HF Receiver £299.00
Yaesu FRG-100 HF Receiver £299.00
Yaesu FRG-7700 HF Receiver £199.00
Yaesu FRG-9600 VHF-UHF Receiver £199.00
Yaesu FRT-7700 £70.00
Yaesu FRT7700 Antenna Tuner £69.00
Yaesu FRV-7700 Converter for FRG-7700 £60.00
Yaesu FRV7700 Converter £60.00
Yaesu FT-1000 "CLASSIC" HF Transceiver £1399.00
Yaesu FT-1000MK V 200w £1499.00
Yaesu FT-1000MP / AC HF Transceiver £999.00
Yaesu FT-1000MP Mark -V Field £1299.00
Yaesu FT-101Z, With Digital Display Fitted £299.00
Yaesu FT-101ZDmk3 HF Transceiver £325.00
Yaesu FT-101ZDmkIII HF Transceiver with FM fitted £325.00
Yaesu FT-290MkII 2m Multi-mode transceiver £250.00
Yaesu FT-416 2m Handy £79.00
Yaesu FT-41R Handheld Transceiver £120.00
Yaesu FT-470R Dual Band Handheld £129.00
Yaesu FT-5100 VHF/UHF transceiver £175.00
Yaesu FT-51R Dual Band Handy £149.00
Yaesu FT-690Rmk2 6m Multi mode £275.00
Yaesu FT-707 HF Transceiver £220.00
Yaesu FT-726R VHF/UHF Base Transceiver £399.00
Yaesu FT-736R 2m/70cm Base Multimode £499.00
Yaesu FT-736R 6m, 2m & 70cm Base £699.00
Yaesu FT-736R Multi- Band Transceiver+6m+23cms £899.00
Yaesu FT-736R"MUTEK" 2m / 70cm 6m/ Base £749.00
Yaesu FT-747 HF TRANSCEIVER £250.00
Yaesu FT-767GX HF, 6m & 2m transceiver £599.00
Yaesu FT-76R 70 cms Handheld Transceiver £99.00
Yaesu FT-7800 2/70 mobile £199.00
Yaesu FT-817 Portable Transceiver £375.00
Yaesu FT-817ND HF 6m VHF UHF 5W Transceiver £379.00
Yaesu FT-840 HF Transceiver £299.00
Yaesu FT-847 Multi-Band Transceiver £849.00
Yaesu FT-8900 Quad Band Mobile Transceiver £279.00
Yaesu FT-890AT HF Transceiver £425.00
Yaesu FT-897D Multiband Portable Transceiver £569.00
Yaesu FT-902DM HF transceiver £325.00
Yaesu FT-920AF HF / 6M Base £749.00
Yaesu FT-990 /AC £899.00
Yaesu FT857 Multiband Mobile £425.00
Yaesu FTV-1000 200 W Transverter £475.00
Yaesu FTV-901R 2m / 6m Transvertor £275.00
Yaesu FV-901DM VFO £175.00
Yaesu MD-1 Desktop Microphone £75.00
Yaesu MD-100 Desktop Microphone £79.00
Yaesu MH-29 Speaker Microphone £49.00
Yaesu MMB-31 Mobile Mounting Bracket £15.00
Yaesu MW-1 Remote Control Mic £60.00
Yaesu NC70 Battery Charger £60.00
Yaesu PA-11C £20.00
Yaesu SP-8 Loudspeaker £89.00
Yaesu SP-901 Loudspeaker £0.00
Yaesu SP-980 Speaker £80.00
Yaesu VR-500 100kHz-1300MHz Scanner £149.00
Yaesu VX-110 2m Handy £79.00
Yaesu VX-1R Dual Band Handy £89.00
Yaesu VX-2E Dual Band Handy £99.00
Yaesu VX-5R Tri-Band Handy £149.00
Yaesu VX-5R Yaesu 6m / 2m / 70cm £149.00
Yaesu VX-7R (Silver) Tri-Band Handy £169.00
Yaesu YH-77STA Lightweight Stereo Headphones £30.00
Yupiteru MVT-225 £149.00
Yupiteru MVT-3300EU Scanner £99.00
Yupiteru MVT-7100 £140.00
Yupiteru MVT-7100 Scanner £149.00
Yupiteru MVT-7300 Scanner £179.00
Yupiteru MVT-9000 MK2 Scanner £249.00
Yupiteru MVT-9000 Scanner £199.00

OR VISIT OUR WEBSITE

www.radioworld.co.uk

The UK's No.1 Used Equipment Trader - Call 01922 414796

42 Brook Lane
Great Wyrley
Walsall WS6 6BQ

We are Premier UK Dealers for ICOM, Kenwood, Yaesu.
Full UK Warranty with full peace of mind. RADIOWORLD

Antenna Workshop

Antennas & Propagation

Roger Cooke G3LDI looks at propagation in relationship to the antenna system - and suggests some courses of action to consider.

The winter of 2006 is now being looked upon as the bottom of the present sunspot cycle. Propagation will favour the l.f. bands, as indeed it does most winters, but 2006 should theoretically be exceptional. I say theoretically because propagation can be very fickle and it could still prove us wrong. However, it's a good idea to make good use of 7, 3.5 and even 1.8MHz for DX working.

This winter has shown DX on all three lower bands with 7MHz being superb on occasions, with some JAs being worked with outstanding signals during late mornings. However, though this sort of operation is possible using the correct antenna for the job plays its part in working that DX.

Low angle of radiation is important with directivity, and gain if possible being desirable too. These are difficult to achieve on the l.f. bands for somebody with a small garden. A support structure of around 18-20m high is really needed in order to achieve any success with wire antennas. Also, a good system of ground radials is necessary, although certain antennas do use a raised system of radials about 3m (10 feet) off the ground and often only four are needed.

As you have probably gathered, l.f. band working predicates a large garden, in order to erect any serious form of DX antenna. However, it's possible to manage with less, though more patience is required.

From experience, I can tell you that DX working on the l.f. bands isn't easy! I had a delta loop up at about 30m on 3.5MHz in the 1980s and it worked like thunder. However, since then, four squares have become more popular and in California, two W6 stations, both with three element beams now put a tremendous signal into Europe.

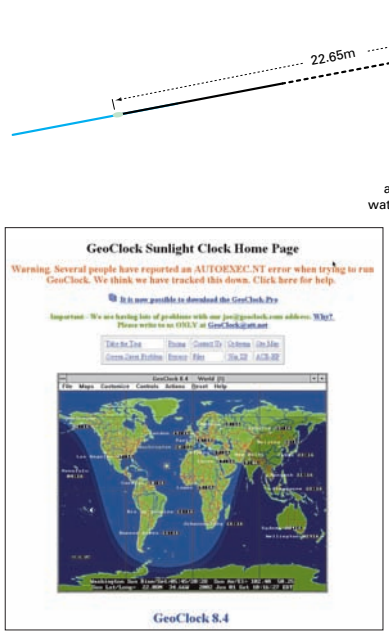


Fig. 1: Geoclock showing the grey-line terminator that has enhanced propagation.

Fig. 2: Smaller antennas for 1.8MHz as used by Frank G3YCC.

Depends On Propagation

All working on the h.f. bands depends heavily on the propagation conditions however. And in order to understand what is to be expected, some understanding of the mechanism is required, and that entails a fair amount of reading!

The most valuable tool to predict when the band may be open is a computer program such as *DX Edge* or *Geoclock*, etc. These programs show the 'grey line'. The grey line is the period of semi-darkness (dusk or dawn) that is created as a position on the Earth rotates from night to day and day to night. *Geoclock* may be found at: **http://home.att.net/~geoclock**

The time of occurence, and even the location of the grey line or 'Terminator' changes with the seasons as the Earth, with its tilted axis, rotates around the Sun. The variation in grey line patterns with the seasons has a major effect on what DX can be worked and when. I use *Geoclock* and I also have a very useful aid that I've had since I was first licenced in 1956. I don't think they are available now, but the predictor, that I used all those years ago, was called the Fisk Solarscope, it's a cylinder approximately 80mm tall and has the map of the world on the surface. Inside the cylinder are transparent plastic overlay charts showing the grey line at any time of the year. *Geoclock* is the modern computer equivalent and has a lot more besides!

Optimum Time

The optimum time to work East/West (including N/E, S/E, N/W and S/W) DX is when both ends of the path are in near darkness which is when they are both in their respective grey lines. This is due to a refraction effect in the Ionosphere that 'ducts' the signals between the coincident grey lines. This includes the long path when, as an example, Autumn and early Winter offers some great long path openings to the West Coast of the USA around our sunset (their sunrise). I have worked Long Path W6 and W7 calls on 7MHz at that time, mostly c.w.

I have also worked the W6 call area on 3.5MHz on Morse and voice. When propagation on that path is good, it's possible to use average wire antennas, but bear in mind that there are

others with arrays with gain and directivity. For example there are several G stations on 7MHz now running beams, so working from this end can be very competitive!

For those of you with Internet access, there are some really good sites to be found with propagation forecasts, tutorials and so on. One such is:

www.ae4rv.com/tn/propflash.htm

On this page, the tutorial takes the form of a flash video by AE4RV and is quite informative. The daily forecast of SFI, A index and K index can be found at:

www.sec.noaa.gov/ftpdir/latest/wwv.txt

Solar information and other propagation information can be seen at this superb site:

http://spaceweather.com/

A Google search will produce other sites too. So, it's worth spend some time looking around and reading before you begin working the bands.

Suitable Antennas

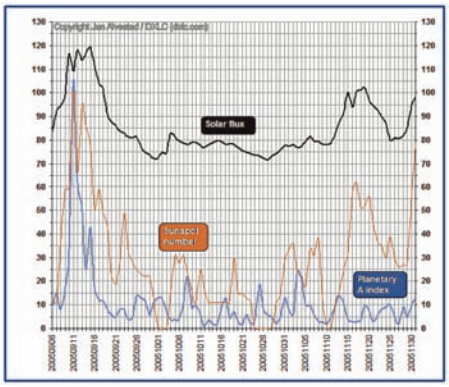
I've worked USA stations on 3.5MHz using a 20m end fed Zepp antenna so don't be afraid to experiment with whatever you can get in the air. Hunting around, I found a design, suitable for some of the smaller gardens. In **Fig. 2**, you'll see the design of antenna, that was used by the late **Frank Lee G3YCC** for 'Top Band' (1.8MHz) working, details of which can be found on his web site, now hosted by **Graham G4MFJ** at **www.g3ycc.karoo.net/** It consists of 45.5m of insulated wire, the first half of which (22.75m) is space wound on an insulated tube.

In Frank's design, he used g.r.p. tubing, but *pvc* plumbers tubing may be used instead. The tube is 32mm in diameter and about 1m long. The turns are about 10-15mm apart. The other half (22.75m) of wire acts as a loading wire and slope down from the top of the coil to near ground level.

The system is fed with coaxial cable to the base of the coil, with the shield or braiding going to earth at the base of the tower or mast. The antenna works very well, apparently giving some horizontal and vertical polarisation.

One great advantage of G3YCC's system can be tuned without having to lower the mast, by pruning the loading wire to resonate on the required part of the band. Bandwidth is also good - about 30kHz either side of resonance. This is where the MFJ Antenna Analyzer MFJ-259 becomes invaluable for this project, as well as many other experimental systems.

Ensuring that your earth is actually an efficient earth system will add to the effectiveness of the antenna. The more radials you can lay down the better, but after about 50, you will have to lay another 50 to notice any difference! It really is a time consuming business. I feel sure that Frank's many friends will not mind me mentioning his antenna here!



Solar data may be used to correlate propogation effects and the Sun's condition over time.

The Spaceweather website is a useful place to find out about solar effects that will change propagation.

Sloping & Bending

The more usual problem for home installation is less than great vertical or horizontal space. How much changes will affect performance will have to be found by experiment or by modelling the antenna with ELNEC or similar computer software. However, if all you have is a small garden, the only other alternative may be to move! If you're sticking with your smaller garden, then you'll still need a fairly high support to accommodate antennas for the lower bands.

Bending the vertical at the bottom

The first way to save vertical space is to bend the lower end of the vertical to the side. The upper horizontal arm remains 21.2m long. The overall length of the vertical is also 21.2m, but part is now vertical and part horizontal. The chief effect of the bend is to raise the high angle radiation a little and to raise the elevation angle of maximum radiation.

The latter figure indicates a slight loss in the lowest angle radiation, which would be expected from shortening the vertical length. None of these small changes in dimension affect the usefulness of the antenna.

Tall Support?

You may wish to use the antenna where there is only one truly tall support and the support for the far end of the horizontal arm is lower. The result is a sloping horizontal arm. Using a peak height of 22.65m and keeping the dimensions of each wire at 21.2m. Gain increases are at high angles of radiation, with some loss of low angle radiation.

Although a true horizontal is perhaps the best compromise for maximum low and high angle performance, the patterns with a modest slope to the horizontal arm do not make the antenna unusable by any means.

Drooping Ends

If horizontal space is limited, a common practice is to bend the outer ends of a dipole (or allow to droop) downward. Since this region is the high voltage and low current portion of the antenna, the radiation pattern is least affected by modifying the geometry. The ends must however, be kept away from metallic structures

Low angle radiation remains essentially constant, since the vertical arm has not been altered. Further shortening of the horizontal arm would show a gradual further reduction in maximum gain and in the take-off angle. Higher-angle radiation is decreased, although the antenna remains eminently usable.

Like many wire antennas, the inverted-L will tolerate moderate alterations of geometry to fit the space available and still yield good, if not peak, performance. Two designs were described in *PW* by **Len Paget GM0ONX** (see notes). So, bending wires does not necessarily detract from performance in a major way.

Buy Something?

Of course, you can short circuit all the experimenting if you wanted and go out and buy something like the Cushcraft 40/80 vertical antenna, that I reviewed a couple of months ago. Even with this, you still need some garden for the radials, but the antenna is only about 8m tall so would possibly fit into small gardens better than some long wire designs.

The choice of antennas is yours, but whatever you do choose, the DX will be there on 1.8, 3.5 and 7MHz for the next few years at the bottom of this present cycle. So, enjoy it! **PW**

Further Reading

An inverted L for small gardens by Len Paget GM0ONX, p32 *PW* Feb. 2004. Adding Top Band To The Inverted L by Len Paget GM0ONX, p38 *PW* Jan. 2005.

Back issues are still available from the *PW* Book Service.

ML&S martin lynch & sons

Suppliers of Communications Equipment

Outline House, 73 Guildford Street,
Chertsey, Surrey KT16 9AS

TEL: 0845 2300 599 FAX: 0845 2300 339

E-MAIL: sales@hamradio.co.uk

WEB: www.hamradio.co.uk

MFJ Products at Lower Prices!

MFJ-461 Pocket size Morse Code Reader with built in display. Just place in front of your speaker to copy CW - instantly! Fully self contained, battery powered. **£69.95**

MFJ-418 Pocket size Morse Tutor with built in display. Random sending of Morse characters with confirmation on screen of what has been sent. Fully self contained, battery powered. **£69.95**

MFJ-1704 Probably the best 4 way antenna switch available. Cast Alloy construction, Power 2.5kW ● Isolation 60dB at 30MHz, 50dB at 500MHz ● Range DC ->500MHz. **£59.95**

MFJ-971 An ideal QRP ATU. Easy to use and very compact. QRP Portable ATU ● 1.8 - 30MHz ● 300W/30W 6W selectable ● Cross needle meter ● 12V DC Ext ● SO-239 sockets ● Tunes wire, coax, balanced lines ● Terminals & earth post ● Size 160 x 150 x 60mm ● Weight 870g. **£89.95**

MFJ-902 Tiny Travel Tuner. Tiny 4½ x 2¼ x 3 inch tuner handles full 150 Watts! Covers 80-10 Meters, has tuner bypass switch, tunes nearly anything! **£65.95**

MFJ-904H Tiny Travel Tuner/ SWR/Wattmeter & Balun. Tiny 7½ x 2¼ x 3 inch tuner handles full 150 Watts! Covers 80-10 Meters, has tuner bypass switch, tunes nearly anything! **£109.95**

MFJ-949E 300 Watt Antenna Tuner. More Hams use MFJ-949's than any other antenna tuner in the world! Why? Because the world's leading antenna tuner has earned a worldwide reputation for being able to match just about anything. **£139.95**

MFJ-974H 160 Thru 6 Meters Balanced Line Antenna Tuner. The MFJ-974H is a fully balanced true balanced line antenna tuner. It gives you superb current balance throughout its very wide matching and frequency range. **£159.95**

MFJ-993B 300 Watt IntelliTuner Automatic Antenna Tuner. The MFJ-993 IntelliTuner lets you tune any antenna automatically balanced or unbalanced - ultra fast. It's a comprehensive automatic antenna tuning center complete with SWR/Watt-meter, antenna switch for two antennas and 4:1 current balun for balanced lines. **£209.95**

MFJ-994 Similar to 993 above but 600 Watts. 1.8-30MHz Auto ATU **£269.95**

MFJ-259Z Special * With Batteries, Charger & Loop *. Range: 1.8-170MHz. MFJ's favourite Antenna Analyser with HF frequency coverage. It's simple to operate and keeps your antennas in check. MFJ-259B gives you a complete pictures of your antenna's performance. You can read antenna SWR and Complex Impedance 1.8 to 170MHz. **£199.95**

MFJ-259B As above without battery, charger and loop. **£189.95**

MFJ-269 Range: 1.8-450MHz. MFJ's latest Antenna Analyser with UHF frequency coverage. Based on the successful MFJ-259B it combines all of the features plus more. **£269.95**

You can buy any product over £250 from ML&S and not pay a penny for a whole TWELVE MONTHS?

No Catch - pay NOTHING, keep the money in your bank earning interest. In 12 months time settle the amount in full. Offer subject to status.

Take Away Now and Pay NOTHING Until This Time Next Year!!

Having many years of experience offering specific finance packages for our customers, we can now offer various options on payment. We have added "Take-Away Now & Pay Later" to all our products over £199. It works like this: 0% APR An example of our Take-Away Now: Discounted price of £300. Pay no interest provided you pay by the date the amount is due, in full. After the 12 months period has expired pay £15.76 for 36 months. TAP £567.43 Please note that interest is calculated from the date of the original agreement. 29.8% APR.

Call us 6 days a week, mon-sat 9.30-5.30

0845 2300 599

local call number

Don't forget! ML&S are approved stockists for the following: AOR, bhi Ltd., Icom, Kenwood, Maldol, MFJ, Miracle Antenna, Hustler, Tokyo-Hypower, Tom Tom, Diamond, Yaesu and many more!

Icom IC-7000

NOW AVAILABLE FROM STOCK

IC-7000. The best selling All Band Transceiver for 2006? Almost certainly!

A full blown mini-IC-756pro111 that you can use in the car or at home. We've all been waiting for this World Class Transceiver from Icom for over a year. In a package no bigger than the original IC-706, Icom have produced a FULL DSP HF/6m/2m & 70cm rig with many many features including a first - TFT Colour Display built into a mobile size radio.

Only £999.95 - If you see it cheaper then call!

Icom IC-7000 Bundle Only £1199.85.

The New IC-7000 bundled with the IC-5LD TFT 5" Display & a MyDEL MP-4128 compact PSU. **Full details see web under Base Stations.**

Yaesu FTdx9000D
ML&S were the first UK company to supply the new FTdx9000D & continue to offer the earliest deliveries. 200 Watts or 400 Watts, TFT Screen or not. You choose. Call for more info or see www.FTdx9000.com
'D' spec now shipping at £7299

FT-1000MP mkV 200W
Identical to the FT-1kField but 200 Watts, External PSU. With Desk Mic & Speaker.
MODEL DISCONTINUED
ML&S: £1899

Yaesu FT-1000MP mkV Field + MD-100 & SP-8
The FT-1k Series has never been such good value. Offered with the matching Desk filtered Speaker and Base Microphone at an even bigger saving.
Package Price £1699 (Rig only £1499)
Full set of filters £299.95 LIMITED STOCK

Yaesu FT-847 + LDG AT-100 & MP-250A Bundle! FREE MD-100 Base Mic!
Still our best selling All Band Base Transceiver. Bundled with the new LDG AT-100Pro Auto ATU, MyDEL MP-250 metered 25A PSU & a FREE MD-100 Desk mic. **Please note that this offer is very limited.**
Total Package £1249.95 (Rig only £999)

Yaesu FT-897 + LDG AT-897 + MP4128 Package
High Power version of the FT-817. Use as a transportable, (20W) or as a base/mobile (100W). Now bundled with the LDG bolt-on Auto-Tuner & compact MP-4128 22AMP ATU.
ONLY £895 (Rig Only £Call)

Yaesu FT-857+ ATAS-120A
Nobody can match the flexibility of the 857 & ATAS-120A Auto Antenna. Just plug the ATAS into the FT-857 & operate anywhere from 7MHz-432MHz, without having to change or touch the antenna! (Duplexer is required for 2/70). We can even offer a professional car install service. **Only £799 for both**
(Rig only: £579)

Yaesu FT-817ND Latest Version
The latest FT-817ND comes complete with HF+6+2+70 and Metal-hydride batteries, charger, mic & antenna.
Call for best price (FT-817ND-DSP Version available)

Yaesu FT-2800M
2M brick-built 65W rig. **RRP: £179, ML&S: £159**

Yaesu FT-7800
Bar make the tea it'll give you 2m/70cm @ 50W/40W.
RRP: £239, ML&S: £239

Yaesu FT-8800 Similar to the FT-7800 but can receive on 2 & 70 simultaneously.
RRP: £289, or 48 x £8.26 p/m

Yaesu FT-8900
One-stop solution to high-power FM on 10m, 6m, 2m & 70cm. When your local repeater is busy, slip onto 10m & work DX!
Only £339

Yaesu VX-2E Micro Handie 2/70 with scanner. Complete with Li-ion battery, charger & antenna.
NEW LOWER PRICE Now only £119

NEW Yaesu FT-60E Latest Twin Band 5W Handie from Yaesu. **Only £169** Or buy the FT-60E with a lapel speaker microphone for only **£189.95!**

Yaesu VX-7R The U.K's best selling Triple Band Handie.
Only £209 or with lapel microphone: Only £229

NEW Icom IC-E7E

The latest micro Twin Band Handie from Icom!

2m/70cms. Lithium-Ion battery pack provides long battery life. The stylish appearance is a refreshing change of design in this category. If you want a quality handheld, this is for you. **ONLY £199.95 in stock now!**

Kenwood TS-2000E Just superb on all bands 160m-2m with optional 23cm (X-Version).
RRP: £1699, ML&S: £1299

Kenwood TS-2000X As above but with 23cm fitted.
RRP: £1999, ML&S: £1699

Kenwood TS-480SAT The best selling Kenwood H.F. Can be used mobile or base. Includes ATU.
ML&S: £699.95

Kenwood TS-480HX with As TS-480SAT but 200 Watts, no ATU. **ML&S: £799.95**

Kenwood TS-570DGE Still the ideal choice if you are keen on H.F. and want an easy to use radio.
RRP: £999, ML&S: £799 or 48 x £23.64 p/m

Kenwood TS-50S It's been around 10 years but if you want an HF rig in a compact package with excellent performance then buy one of these. As used by the recent DX-pedition FT5XO to Kerguelen Island.
Only £595

Kenwood TMD-700E The unique 700E is not only a dual-band FM rig but has APRS and TNC built-in.
RRP: £519, ML&S: £439 or 48 x £12.99 p/m

Kenwood TH-D7E A 2/7- Handie with TNC and APRS capability. **RRP: £359, ML&S: £319.95**

Kenwood TH-F7E 2/70 Handie with Gen Cov RX. If you must have SSB RX on your dual-bander then buy one! **RRP: £289.95, ML&S: £249**

Icom IC-7800 The worlds best H.F. Transceiver? Probably.

RRP: £6400.00. Defer payment for 12 months - interest free (s.t.s.)

NEW Icom IC-756Pro mkIII The latest in the IC-756Pro Series
RRP £2495 ML&S £2099 or 36 x £76.31
Package deal:
IC-756ProIII, SM20 Microphone, SP-23 New Base Speaker with filters.
RRP £2768, ML&S £2299
(Rig only: £2099)

Icom IC-7400 + SM-20 + SP-21 + MP-250A
What a package! New IC-7400 with Matching Desk Mic, Speaker & MyDEL Metered Base PSU. **Only £1349**

Icom IC-718 Basic ready to go 100W HF Transceiver supplied with Microphone & DC Lead.
RRP: £649, ML&S: £449 or 48 x £13.29 p/m

Icom IC-703 10W Portable/Base HF Transceiver with built-in ATU. **RRP: £703, ML&S: £449**

Icom IC-910X The best 2/70 & 23cm dedicated all mode base. 23cm included.
RRP: £1675,
ML&S: £1239 or 48 x £36.66 p/m
Basic Version (without 23cm). also available **£1089 or 48 x £31.93 p/m**

Icom IC-E208 2/70 mobile 50/55W Transceiver with host of additional features. Remote head leads included.
RRP: £365, ML&S: £239

Brand New IC-E90 Triple Band Handie.
Only £199.95! or with 4m and extra antenna £239.95 (Limited Stocks)

ML&S for Ham Radio Top Sellers, Antennas & Accessories · much more on show at the store

"Classic" Finance example: Kenwood TMD-700E. RRP: £519. Payment illustration: Zero deposit and 48 payments of £12.99 per month. Total amount payable: £623.52. APR: 19.9%. ML&S is a licenced credit broker. Finance offered subject to status. Full written details on request. E&OE.

Apply now for your very own ML&S Store Card Conditions Apply

LDG Tuners & Accessories

ML&S have been appointed Main Distributor for the US built LDG Product range.

LDG Z-100 100W Auto ATU 160M-6M
Only £119.95

LDG AT-100Pro & AT-200Pro 100W or 200W Auto Tuner, 160M-6M with 2 Antenna outputs

AT-100Pro £169.95 AT-200Pro £179.95

LDG AT-1000 1kW Auto Tuner, wide tuning range (10:1 SWR) 160M-6M **Only £499.95**

AT-897 Bolt-on Alternative Auto Tuner for the FT-897. Wider tuning range and cheaper too!
Only £179.95
Special 'Intro' price

LDG Z-11Pro Portable compact & tunes 100mW to 125W **£139.95**

LDG RT-11 Waterproof remote ATU 1.8-54MHz **£149.95**

LDG RBA-1:1 & RBA 4:1 Probably the best 1:1 & 4:1 baluns out there. **£29.95 each**

LDG TW-1 & TW-2 Talking Wattmeters! TW-1 HF 0-2kW TW-2 6/2/70 250W.
£109.95 each

LDG DTS-4+4R & DTS-6+6R Remote Antenna Switchers. 1.5kW 1-54MHz. Either 4 or 6 way, **£89.90 & £119.90**

If you see LDG advertised cheaper in this magazine (or on the web) from a UK stockist we will try and BEAT it! Please call.

For the full range of LDG Products visit our web site!

DAIWA METERS

Daiwa CN-101L: SWR/PWR Meter 1.8-150Mhz
Power range: 15/150/1.5kW ..... **ML&S only £59.95**

Daiwa CN-103LN: SWR/PWR Meter 140-525MHz
Power range: 20/200W ..... **ML&S only £65.95**

Daiwa CN-801H: SWR/PWR Meter 1.8-200Mhz
Power range: 20/200/2000W ..... **ML&S only £109.95**

Daiwa CN-801:V SWR/PWR Meter 140-525MHz
Power range: 20/200W ..... **ML&S only £119.95**

Daiwa CN-801S SWR/Power Meter 0.9-2.5Ghz
Power rating: 2/20 watts..... **ML&S only £139.95**

MIRACLE ANTENNAS

Miracle Whip Others try & copy it but never quite get there. £109.95

Miracle Ducker Like the Miracle Whip but has BNC socket in lieu of whip to connect random wire. £109.95

Miracle Ducker IL Latest model! Identical to Ducker but has BNC plug for mounting instead of PL-259. £109 95

QPAK The best QRP ATU money can buy. £149 95

HUSTLER 6-BTV Only £229.95

We have literally sold hundreds of these with fantastic customer reports. At last a vertical that gives you REAL PERFORMANCE on 80m and 40m, as well as the other bands. No radials required. Just mount 18 inches above the ground, connect to a decent earth spike close by and operate.

MyDEL MultiTrap

Forget the G5RV. Install a proper TRAPPED wire dipole MutiTrap for 80-10M. Only 66'. Must be centre supported. **£99.95**

MyDEL MegaTrap

Same as Multitrap but 160m/80/40m, 105' long . **£109.95**

NEW ! MyDEL ML-S Hands Free Mic

Complete system for Yaesu, Icom & Kenwood transceivers.

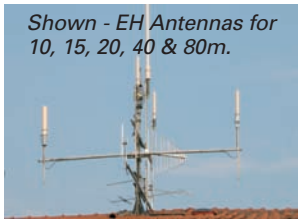
The New MyDEL ML-S Mobile Microphone with gooseneck boom fits under the sun visor hinge. Features a PTT remote control with rubber O-Ring for connecting to gear lever. Unit is powered from transceiver. Includes FREE connecting lead to your rig.

£39.95

TIGERTRONICS Sound Card - Radio Interface

For all available Digital modes, the SignaLink SL-1+ also supports the latest Voice modes such as Internet Repeater Linking (EchoLink, VOIP, etc.), Remote Base, and Voice Keyer operation. We sell four versions of the enhanced model the SL-1+8R with 8-pin round mic. connector, the SL-1+RJ45 with RJ-45 mic. connector, the SL-1+RJ11 with RJ-11 mic. connector and the SL-1+6PMD with 6-pin mini Din Data Port connector SL-1+8xxx Interface with rig lead (you specify!) **£69.95**

Extra leads £14.95 (8 Pin, RJ-45, RJ-11, 6-pin mini DIN) **£19.95** (SL-CAB-13I 13-Pin Icom), (SL-CAB-13K 13 Pin Kenwood)



SMALL GARDEN? NO GARDEN?

arno elettronica EH ANTENNA™

Install an EH Antenna for HF today!

Introducing a new range of antennas from Arno Electronics. Available for any band 10m-160m, ML&S stock this exciting new product available for immediate despatch.

All antennas are beautifully built and pre-tuned at the factory. Supplied with fixing clamps & clear installation instructions. Easily fine tuned with outer ring sleeve. You will be totally amazed at how well they work. No ATU required. Just plug-in and work!

Cobra 10	28-29.8MHz,	2kW	90cm long	(500W RTTY/AM) **£105.00**
Cobra 12	24.890-24.990	2kW	90cm Long	(500W RTTY/CW).....**£105.00**
Cobra 15	20.7-21.7MHz	2kW	90cm long	(500W RTTY/AM) **£105.00**
Cobra 17	18.068-18.168MHz	2kW	90cm long	(500W RTTY/CW).....**£105.00**
Cobra 20	13.8-14.8MHz	2kW	90cm long	(500W RTTY/AM) **£105.00**
Cobra 30	9.9-10.3MHz	2kW	93cm long	(500W RTTY/AM) **£105.00**
Cobra 40	7-7.2MHz	2kW	93cm long	(500W RTTY/AM) **£105.00**
Venus 80	3.5-3.8MHz	2kW	248cm long	(500W RTTY/AM) **£179.00**
Venus 155	1.913-1.933MHz	2kW	248cm long	(500W RTTY/AM) **£179.00**
Venus 160	1.830-1.850MHz	2kW	248cm long	(500W RTTY/AM) **£179.00**

Delivery and Insurance: Cobra £20, Venus £25. (England & Wales, phone for other destinations)

MYDEL POWER SUPPLIES

A new rage of PSU's from MyDEL. The neatest smartest looking desk top power supplies that money can buy. Ideal for powering any main rig or accessory requiring 13.8V DC at up to 25 Amps.

MyDEL MP-250A

25 Amps maximum, 22Amps constant, ideal for most modern HF Transceivers

- Variable Voltage 9-13.8VDC
- 110-234V input
- 2 x outputs: 25A Binding Posts, 7A Cigar Socket
- Fan cooled, speed variable to voltage supplied
- Two huge back-lit meters, Volts/Amps
- Fully protected, supply shut off if more than 25A is drawn, re-setable by switching off for 25 seconds.
- Only 5 3/4"W x 4 1/2" H x 6" D in size
- Less than 35mV peak-to-peak ripple under full 25AMP load
- Full exchange warranty for 2 Years

Only £89.99 incl VAT!

MyDEL MP-4128

Another new switch mode PSU from MyDEL. Similar in spec to the MP-250A but without meters or cigar lighter o/p. 22-25 AMP output with heavy duty binding posts on the front panel and push on terminals for lower current output on rear. Fully protected. **£69.99**

Yaesu FP-1030A

A power supply for Life? Probably.

25 30 Amp **£179.00**

BARENCO

BUDDIPOLE

W3-BP Buddipole Compact Portable Dipole 40m-2M **£179.95**
W3-BM Buddipole Mast for Buddipole **£44.95**
W3-BPT Tripod for Buddipole **£79.95**

For the full range, please see our website.

PALM KEYS

MP-817 The smallest retractable paddle key - ever! **£59.95**
Code Cube Bolt-on memory keyer for Mini-paddle. **£79.95**

EMTRON HF LINEAR AMPLIFIERS *"The Best Built Amplifiers in the World"*

DX-1D Cool 1kW, small foot print. **£1699.95**

DX-2 Slightly larger than the DX-1 but offering 1500W key down. **£2799.95**

DX-2SP Already the most popular of the range, same as DX-1 but a minimum of 2kW output (2500W PEP). **£3199.95**

DX-3 Emtron's "Big Gun" using a GU-78B and producing in excess of 3kW key down. **£4599.95** **DX-4** The DX-4 produces over 4kW, or run on 3-phase for 5kW! **£6399.95**

A Project In Miniature

Paul Wilton M1CNK describes tackling a surface mount project. Paul insists you can see it and shares the experience

Since its introduction in the 1980s, Surface Mount Technology (SMT) has revolutionised the electronics industry. It has reduced the size of electronic appliances massively while, at the same time, reducing assembly costs. Modern devices such as mobile phones, MP3 players and PCs just couldn't be made with conventional through-hole components. As a result, more and more components are only available in SMT packages with the through-hole components becoming scarcer.

The question arises whether this push towards SMT is going to prevent amateurs from building projects, since the first reaction when looking in a modern rig is often "Gosh, they look small!" followed by "How am I supposed to fix parts that small?" The common perception then arises that surface mount devices (SMDs) can only be soldered using lots of expensive equipment.

The good news for project-builders is that although designed for automatic placement, SMT circuits **can** be assembled by hand with a standard soldering iron by the average person. I found this out in assembling an **American QRP (AMQRP) Club** Micro908 kit, which contains about 80% SMT.

Multi-Purpose

The Micro908 is a multi-purpose station accessory/software development platform produced by the AMQRP club. It comprises a number of useful functional circuit blocks connected together by a microcontroller core. By installing different software, its functionality can be changed. A copy of its block diagram is given in **Fig. 1**.

Currently, software is available to allow the unit to function as: An high performance antenna analyser covering 1-30MHz: A direct digital synthesis (DDS) precision r.f. signal source, again covering 1-30MHz: And as an audio digital signal processor (DSP) offering noise reduction, bandwidth filtering and notch filtering. Future upgrades planned include a portable PSK31 terminal, a memory Morse keyer and a transceiver controller.

All of the software is available free of charge as open source and users are encouraged to add new functions. In producing the kit, the AMQRP Club wanted to create a product that would encourage experimenters to combine digital and analogue/r.f. hardware with an easily programmable microcontroller to produce new designs for use in QRP radio. Thus, as well as supplying a hardware kit, it also set up an Internet based support community to encourage development.

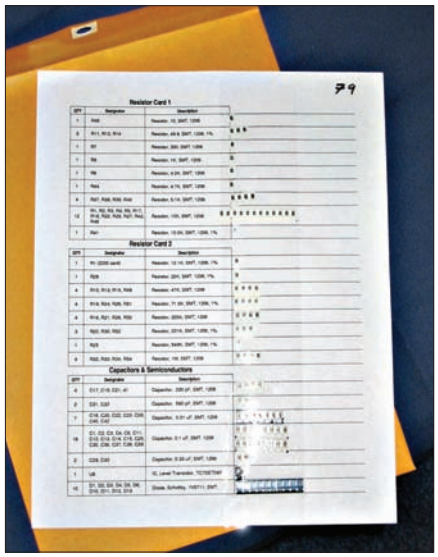


Fig. 2: The surface mounted component sheet as supplied in the kit

Why did I decide to purchase the kit? Well firstly, I've wanted an Antenna Analyser for some time now and was giving serious thought to buying one of the ubiquitous MFJ analysers. However, these were right on the limit of my budget and are only available ready-made. I then

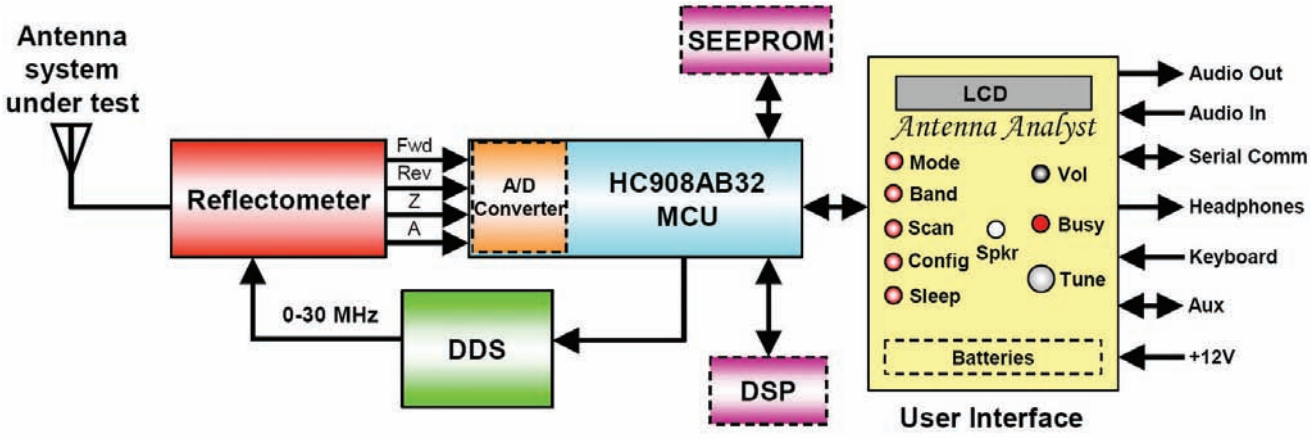


Fig. 1: The block diagram of the basic Micro908 unit.

happened across the web pages of the New Jersey QRP Club (now part of the AMQRP) and read about the new antenna analyser they were developing.

The product became the Micro908. Here was a quality antenna analyser at a price significantly below that of a ready made device. Also, it has the potential to do far more that just be an antenna analyser. Initially there was the issue of it containing a lot of SMDs though. But in the end, I figured that this would give me another reason for buying the kit – it would give me some hands-on experience building such a project.

Incidentally, I ought to make the following observation, that whilst I'm a reasonably experienced constructor, (I have built an Elecraft K2 for example); I would not rate my workmanship and abilities as much beyond average. I am certainly not up to the standards of the technicians we employ where I work.

Projects with SMDs present some unique challenges. Fortunately, with some foresight and planning they can be overcome. In designing the Micro908 kit, the AMQRP tried to cover most of them.

Looking At Size

Firstly let's look at the sizes of the devices, which come in standardised dimensions. Passive components such as resistors and ceramic capacitors typically come in rectangular packages with the sizes described as a four digit number such as 1206. These four digits give the package size in hundredths of an inch. Thus a 1206 resistor is 0.12 by 0.06 inches (or 3 by 1.5mm). To put this into some context, a typical 1/8watt leaded resistor is 3.5mm long and 1.8mm in diameter, so a 1206 resistor isn't too much smaller.

There are, however, families of far smaller SMDs. For example, devices 'labelled' 0805, 0603, 0201, 0101 and even smaller. Fortunately, the Micro908 kit uses 1206 devices, which I think is a good choice.

Component Markings

One of the byproducts of having a small package is that often there is little space to write the component values/markings. This isn't an issue for a SMD placing machine, since all the components come on a reel of the same value with multiple reels being mounted on a machine as needed. However, for a human builder, the lack of marking isn't so helpful. Therefore, the AMQRP supplied all the SMT components taped to an A4 sheet marked up with their values – see **Fig. 2**. This sheet made it very easy to use the correct component, especially as the instructions were written so that you installed all of a given component value at a time.

Fig. 3: The Micro908 kit before assembly.

Manipulative Abilities

A little know fact that our manipulative abilities are generally limited by our ability to visually resolve items rather than our ability to actually control and move small items. So, with adequate optical magnification, it's usually possible to place items carefully with far greater accuracy than with just the naked eye. At the company I work for, engineers and technicians regularly hand solder the smallest SMDs – however they need to use microscopes to see them!

Thus, bright light and good magnification are vital if you're to build a SMD based kit. I found that with a good desk light, I could solder the 1206 devices without needing a magnifying glass. However, for some of the multi-connector components, I had to use a x5 jeweller's loupe to inspect my workmanship.

Key Issue

The key issue with soldering SMDs is ensuring that you don't use too much solder. Thus, you need to use fine solder – preferably with a diameter less than 0.5mm. Trying to solder these small components with the 2mm diameter solder that 'you picked up at a rally 10 years ago' is bound to fail! Since solder this small isn't common, the Micro908 kit includes just enough to complete mounting the SMDs (I though that a little more would have been helpful).

If you do apply too much solder, then the best way to remove it is to use solder wick, and thoughtfully, a reel of this is included in the kit. Finally, in order to prevent dry joints, it pays to apply some liquid flux to the pads before applying solder – despite the solder containing multi-cored flux. And, yet again, a flux pen was included in the kit.

Soldering Iron

A fine soldering iron tip is essential for SMT work. I used the smallest tip I could get for my Weller WTCP Magstat soldering iron station – a 0.7mm diameter tip. I thought that this might be too large but in the end I found that it was OK, provided the correct technique was used. Professional electronic technicians have access to more specialist tools such as hot air guns, hot plates and solder tweezers but even they use soldering irons with tips of between 0.4 to 0.7mm at times.

I would recommend having a temperature controlled soldering iron though – otherwise there's a real danger of either overheating the component, or not being able to supply enough heat quick enough. I have found that the quality of my soldering has improved considerably since I picked up my second hand Weller WTCP temperature controlled soldering station a few years ago.

Cocktail Stick!

To populate a SMT board by hand, first get yourself a cocktail stick! Next, use a pair of side cutters to cut off the point at one end. That's so you don't jam the point into your hand! This tool is used to hold down components during the soldering process.

To solder a component such as a resistor or capacitor, first apply some liquid flux to

Fig. 4: And the completed kit.

the pads. Then tin one of the pads where the component is to be soldered. This has to be done with the absolute minimum of solder – otherwise the component will not lie flat. If too much solder is used, don't panic – simply use the solder wick to remove the excess. Carefully place the component over the two pads – use either tweezers or fine nosed pliers.

You can use the modified cocktail stick to gently push the SMD into place. Gently place the soldering iron against the tinned pad whilst using the cocktail stick to hold the component in position by pushing down on it. The idea is to tack the component in position so that it doesn't move whilst the second end is soldered properly. Once the second end is soldered, the first tacked end can be remade properly.

To solder large components such as integrated circuits (i.c.s), a similar 'stick and tack' strategy is used. When soldering i.c.s, one corner pad is first tinned; the component moved into position and this first corner leg is 'tacked' onto the board. Then carefully check the alignment of the other leads before the opposite corner is carefully soldered in place. Now you should reconfirm the alignment before the rest of the legs are soldered.

Fine Pitch

For really fine pitch components, the soldering of the legs is likely to result in solder bridges between them. There's no need to panic though, the bridges can be easily removed using the solder wick – enough solder will be left behind to make the contact between the legs and the pads. The key to success is having just enough solder on the first pad. Remember: Too much solder will stop the i.c. from lying flat on the pads.

So, how did I get on building the Micro908? Well, I am pleased to say that I was surprised how straight forward it turned out to be populating the majority of the resistors and capacitors. In the end I found I could place these at about a rate of 40 per hour, although I found that I needed to take a break after 45 minutes because of the concentration needed.

The placing rate of SMDs is, I found, comparable with normal wire ended components for me as it's simpler with SMDs. There's no need to bend the leads, insert the part, turn the board over, solder and then crop the leads.

Placing SMD i.c.s, again proved to be straightforward – even the DDS chip that has legs that are far closer than the width of my soldering iron. Whilst I did create some solder bridges, they were easily removed using the solder wick.

Tricky Parts

I only found two tricky parts in the assembly process. The first was with IC U6 which is a fine pitch 5-pin device that also needed a wire modification made to correct a p.c.b. layout problem. This IC is difficult because it has too few pins! It proved difficult to solder only one pin on the first side. Had it had more pins, it would have been far easier. The other difficult device was a pre-set resistor on the DDS 'grand-daughter' card. This resistor had very little clearance between the pads and the edge of the device and hence was a bit fiddly to get the soldering iron to heat both at the same time.

With patience, both the tricky items were completed though and the kit worked first time. In total, it took me 12 hours building time between the photographs of **Fig. 3** and **Fig. 4**, the before and after pictures of the kit.

As a kit, there was very little to fault it – the quality of the p.c.b. was very good, (although it required a couple of minor modifications to correct some track faults), all the components were present and the documentation was good and thorough. The two most difficult modules (the HC908 daughter board and the optional DSP module) are supplied ready assembled. The post sales support was also good.

As well as a mailing list, the original designers are available via E-mail to help out with fault finding. Although at first, it seems a little daunting not to be able to go and show someone your problem, in reality, such support can work really well despite the distances. It's a model that has worked very well for Elecraft for example.

To Be Picky

If I wanted to be picky, I'd comment that it would have been nice if the kit had included a little more solder and also a 2.1mm power plug since once I had

assembled everything, I then found that I needed to buy a plug before I could power it up! Also, as I mentioned earlier, the 'fix' for i.c. U6's layout problem was particularly nasty. Hopefully this will be corrected in a later build.

So what does the does the finished kit offer? Well, first off, it's a very capable and easy to use antenna analyser covering the range 1-30MHz. For a full description of its features, have a look at the review of the Palstar ZM30 in the August 2005 edition of *PW* – the Micro908 runs the same antenna analyser software. The only difference is that the ZM30 has a backlit display whereas on the Micro908 this is only available as an after-assembly modification.

The uses that you can put the Micro908 to are: Accurately measure the impedance, both resistance and reactance over the full frequency range up to about 600Ω: Scan over a frequency range and automatically find the resonance point – be the device under test an antenna, a filter, a crystal or a trap: Using a PC, Macintosh or a Palm hand-held computer produce a graph of the impedance against frequency as shown in **Fig. 5**, a plot of my home antenna plotted using the *Link908* programme. And finally, you can use it as a precision frequency source with a resolution of 10Hz. Not bad for something that you build yourself!

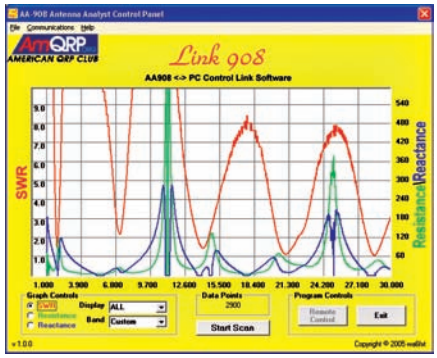


Fig. 5: The plot of the home antenna of Paul M1CNK.

Optional Module

By adding the optional DSP module, you have a very capable audio filter that's ideal for adding to rigs that don't already have the facility. There's also a case for using it with rigs that already have DSP! I found it to be far more effective than the DSP filters included in the Yaesu FT-857 for example. At home I share the Micro908 between my Elecraft K2 and my Yaesu FT-726 by plugging it into the appropriate headphone socket. The DSP code is the same as that used in the DSP option for the Elecraft K2.

One nice touch with the current software is that you can have both the antenna software and the DSP software on the Micro908 at the same time. Thus, if you are operating portable, you can first set up your antenna and then use the DSP whilst operating without having to change the software build.

In the future, the kit will be able to act as a portable PSK31 terminal by loading new software. Provision has been made in the design for connecting a keyboard. There are other ideas in the pipeline as well such as a Morse keyer. If you are feeling enthusiastic then full software development tools are available.

Optional Module

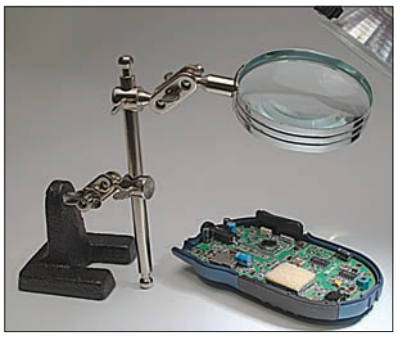
In conclusion, the Micro908 is a challenging kit but is probably within the capabilities of the average constructor who has the patience. It has a unique set of components which together form a really useful station accessory. It can be purchased from the AMQRP club via the internet. I should mention that since the AMQRP a voluntary club, the kits are made up in batches and so are only available every so often. There is an E-mail waiting list if you wish to join it.

Go on get the magnifier and soldering iron out - have a go! **PW**

Website To Watch

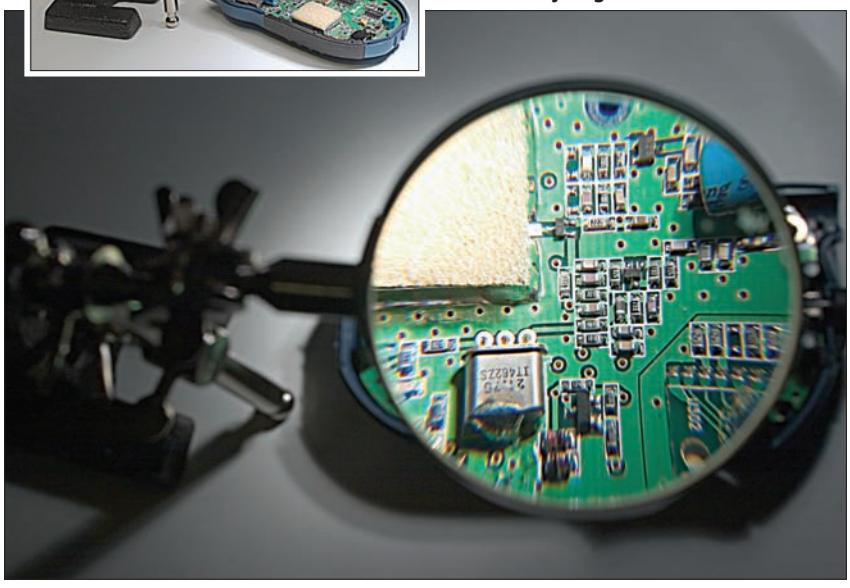
www.amqrp.org

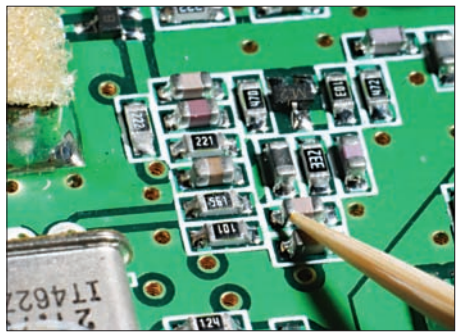
Bright light and good magnification are vital



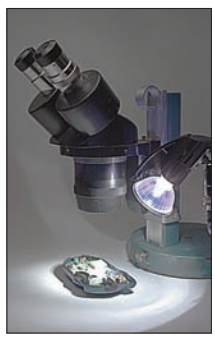
A simple magnifier helps.

And what you get with it.





The 'tree trunk' is a cocktail stick!



'Rolls Royce' magnification for the amateur.

A quartz-halogen light is ideal.

A 70cm Pre-amplifier - it's a v.h.f.

Introduction by Rob Mannion G3XFD.

"I take pleasure in presenting yet another of the occasional series of *PW* 'Classic' v.h.f. Projects. This article - presented by J. L. Oliver G8ANJ was first published in the June 1967 issue of *PW*. I enjoyed building it when originally published in the magazine and it's still useful if you've got the necessary components. The article was written before the band was extended to 430MHz. I found that the project covered the lower end of the band well. And, as the author suggests - it will also work on the u.h.f. television Band IV/V. Wherever necessary I've noted important details to be taken into account in 2006." Editor.

The original article:
Many users of the v.h.f. and u.h.f. bands are not satisfied with the equipment they operate and have at some time or other thought about adding a pre-amplifier to boost gain. I've had several previous attempts at building pre-amplifiers with little success. In fact, they tended to make matters worse instead of better!

However, failure is not the case for the project described in this article. The number of QSOs that I've had literally doubled since it was introduced. Stations that were R3, S5 are now coming in R5, S8-9. So, let's now look at the design.

Developing The Circuit

In developing the final circuit, I took a number of design considerations into account. Noise was the most important factor, as I was not prepared to accept anything falling below commercially made wide-band amplifiers.

Bandwidth did not create too much of a problem, for the 70cm/432MHz (now 430MHz) band is quite narrow (originally it only covered from 432 to 434MHz. However, I feel the pre-amplifier should be adaptable to be used on other bands, especially BBC2. To this end, coil details for the London BBC2 transmissions are included in **Table 1** along with data for the 144MHz band. (Please note that Band IV/V channel allocations have changed)

Note: On no account must a strong signal be connected to the pre-amplifier (direct transmitter connection) otherwise damage may result.

The idea of using valves was rejected for they consume rather a lot of power and their noise figures are no better than (if comparable to) semi-conductor devices. Also it makes thing tricky should the pre-amplifier be used in mobile applications.

I considered using field effect transistors (f.e.t.s), but their price tags still put them out of reach of most Amateurs. When they come down in price, they will certainly be worth considering (They certainly are in 2006! **Editor**).

So, back to the transistor. Several types were looked at before the AF239 was chosen: a compromise of price and noise figures. Alternative transistors that will work in the circuit are the AF139 and GM0290. The former is not quite so "hot" as the suggested device and the latter might need some bias adjustment for optimum performance.

A circuit diagram of the pre-amplifier is shown in **Fig. 1**. As it can be seen from the diagram, the circuit is conventional, using a common-base configuration. This was adopted to avoid the problems of neutralisation. In the author's opinion, the noise figure if fractionally better using this method – although it may well be at the expense of a little gain.

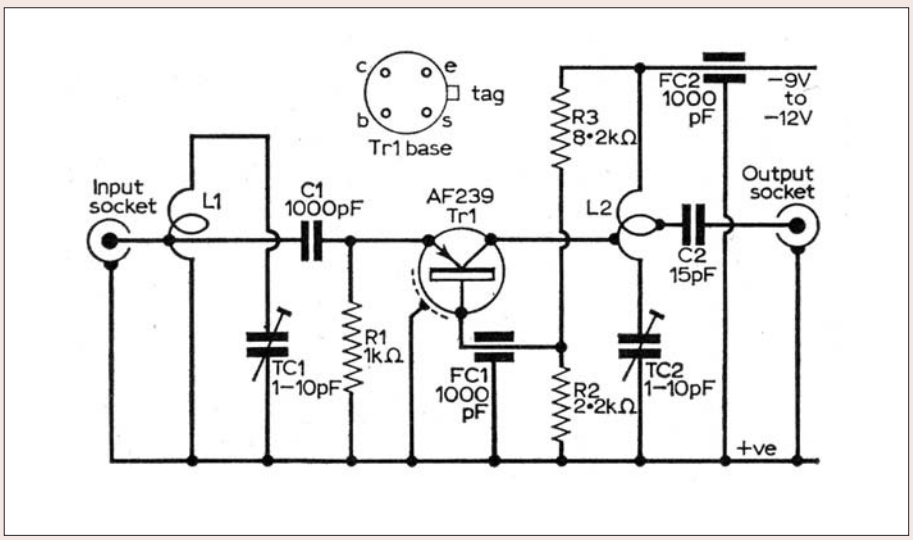


Fig. 1: Circuit diagram of the 70cm (430MHz) pre-amplifier. An alternative for the AF239 is the AF139. (See text notes regarding Amateur Band allocation changes).

Brass Or Copper

The sealed chassis can be fabricated in brass or copper sheeting, or can be built into a discarded tin. I used an old tobacco tin. In my opinion, aluminium is not suitable for it's almost impossible to solder directly to it.

Once all the holes have been drilled in the chassis (see **Figs. 2** and **3**), the screen can be cut from a small piece of tinplate, brass or copper (even a piece of printed circuit board will suffice). Care must be taken to leave enough room for the transistor, which lies beneath the screen. The emitter and screen leads of the transistor should go to the input side and the collector and base leads to the output side of the chassis screen.

classic!

The next components to be fitted should be the trimmers, feed-through capacitors and the coaxial sockets. The trimmers, may be 1-10pF or 1-5pF for 70cm; provided the range 1-4pF is covered.

The coils can be made by winding 18s.w.g.(1.3mm) around a 0.25in. (6.3mm) diameter mandrel: leaving 0.25in (6.3mm) at the ends for mounting. Silver plated wire can be used, but the improvement is only marginal. See Table 1 for details.

Component interconnections should be kept as short as possible, using only the component leads for the connections. Any positive-earth supply between 9 and 12V d.c. (5mA) will suffice.

Alignment & Setting Up

Before alignment of the pre-amplifier can take place, it is necessary to thoroughly warm-up the associated receiver and converter if they are of the valved type. With the pre-amplifier out of circuit, tune in a weak signal using the beat frequency (b.f.o.) to help you identify the signal.

Next, connect the pre-amplifier and peak it with TC1 and TC2. If this method fails, the stray pick-up of the third harmonic of a 144MHz transmitter may be used. **Note**: On no account must a strong signal be connected to the preamplifier (direct transmitter connection) otherwise damage may result. Some adjustment may be necessary to the coils, but this was not the case on the prototype.

On The Air

When using the unit on the air, the pre-amplifier should not be used adjacent to the converter (or main receiver if a single superhet) as this could lead to direct feedback causing instability as the gain of the pre-amplifier is quite high.

Should you wish to use the pre-amplifier at the mast head, it's a simple matter to adapt the unit for coaxial line powering. A radio frequency choke (r.f.c.), consisting of six turns of 32s.w.g. close-wound 0.125in (3.5mm) diameter, is required from the centre conductor of the output socket to the feed-through FC2.

In some cases it may be necessary to run the unit with a negative earth. To do this, complete inversion of the circuit is necessary.

PW

Table 1

The pre-amplifier may be used on any v.h.f. or u.h.f. band provided that the tuned circuits are at resonance. This table details coil and trimmer changes necessary for BBC2 London* and the 2-metre band. 18 s.w.g. is used air spaced, wound on a 0.25in diameter mandrel; taps are from the 'cold end.

*The Band IV/V u.h.f. channels have changed since the article was first published.

Editor.

	Coils		Trimmers
	L1	L2	
BBC2 2 metres	6 turns tapped at 1 turn	6 turns tapped at 3 and 1 turns	0-15pF
(London)	1 turn tapped at 0.25 turn	1 turn tapped at 0.5 and 0.25 turns	0-3pF

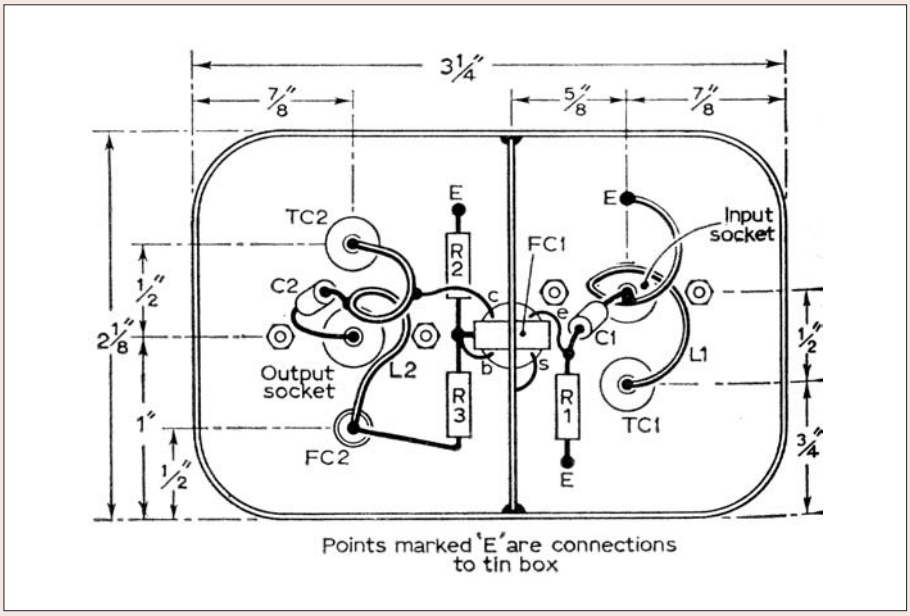


Fig. 2: (right) Underside view of the pre-amplifier.

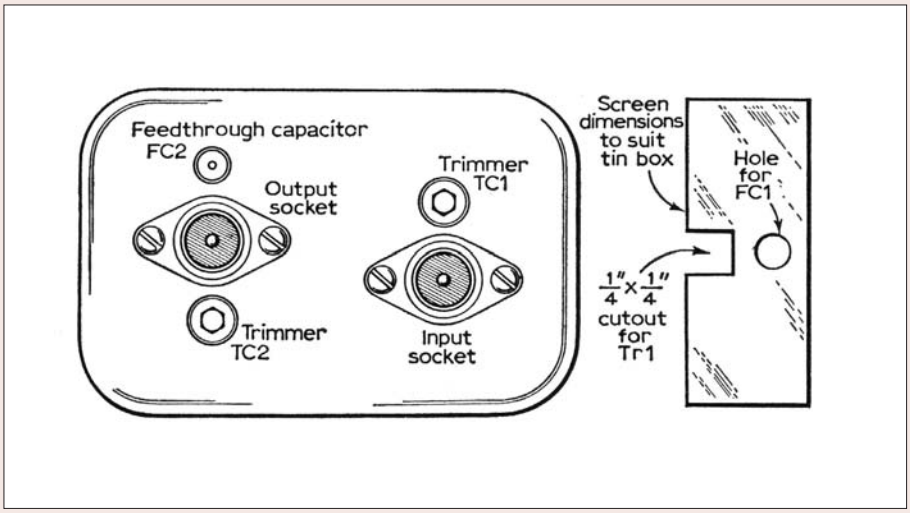


Fig. 3: Top view of the pre-amplifier, plus the screen.

Carrying On The Practical Way

This month the Rev. George Dobbs looks at dancing needles and lights while he returns to discussing audio derived S-meter circuitry and simple ideas. The special quotation sums up his approach!

"Lo! Men have become the tools of their tools".

Henry David Thoreau

I remember when I built my first crystal set as a boy and put it into a small wooden box. I was impressed by what it did - but not by how it looked! There was just one knob on the front and that was not enough. So I glued several more army surplus knobs to the front.

Perhaps it was the 'Flash Gordon' films at the Saturday morning children's cinema club, but I believed that technical instruments needed plenty of controls. The technological mind was one that knew how to make the correct adjustments to an array of knobs and could tell the results from a row of meters.

However, I now know that real technical sophistication produces equipment with very few controls and adjustments to make! At least I thought that was so, until I bought my MP3 player; a wonderful little machine which boasts only one control. This is a stubby joystick which supposedly does all the required functions.

The problem is that the joystick requires a very agile forefinger and a brain capable of recalling all the nuances of each press, pull and shove and combinations thereof. Over time I have found listening to the wrong music track to be preferable to accidentally switching it off.

My ideal piece of equipment is one where it is self-evident how to use it from the controls and the control markings. Equipment is getting ever smaller, to the extent that the size of the controls may govern the size of the packaging.

Clever software engineers have come to the rescue by providing us with cunning multi-function controls. However, I must admit to not being fond of thumbing through badly translated manuals hunting for functions somewhere deep in the bowels of multi-layered software.

Thankfully the little projects presented in this column never run into such problems. They tend to have the boyhood crystal set problem in that they do not look very technical.

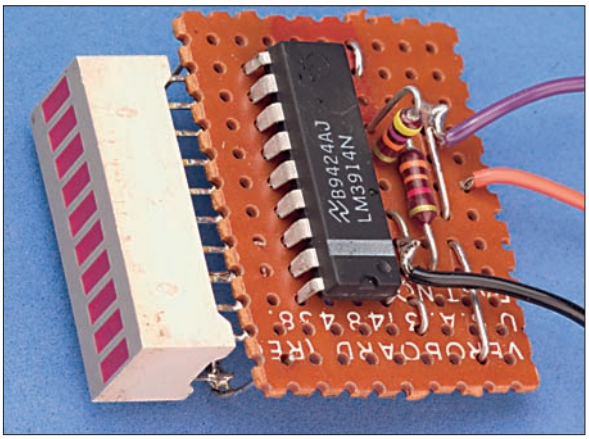
I don't recommend gluing extra knobs on the front panel but there are little additions which could enhance their technical appearance. What I present for you this month is one of the simpler ways of adding a little more sophistication, and even added usefulness, to the simplest of receivers.

Audio Derived S-meter

Some years ago I described adding an audio derived signal strength meter (S-meter) to a simple direct conversion (DC) receiver. This month I return to that idea with another circuit design.

What I'm describing is not an accurate signal strength meter; there are very few of those anyway! Instead, the project is simply an audio strength meter that can give a relative signal strength indication.

Many S-meters derive their measurements from the receiver automatic gain control (a.g.c.) voltage, but most of the simple receivers we've looked at in this column don't have the luxury of a.g.c.



This month George G3RJV says the project is all about 'dancing lights and flickering meters' as he describes a simple add-on audio derived S-meter project (see text).

The following circuit indicates the relative 'loudness' of one signal in relation to another to the operator, and it could also act as a tuning guide. Some constructors might be tempted to say that its chief virtue is adding a bit of decoration to the front panel!

It is essential that the sample of audio signal to be measured is taken from the receiver before the audio gain (volume) control. This is obvious, as this control would alter the strength of the signal, for that's its job.

The best place in a receiver circuit to take the sample signal is from the top of the volume control potentiometer. This signal level will be quite low, so the first task is to amplify it to a usable level.

After amplification the audio signal must be then converted to d.c. (direct current) to drive a meter or indicator. All audio S-meters work in this way and there are many circuit ideas around.

For this month's project I've borrowed an idea from an old issue of *Sprat*, the journal of the G QRP Club. It was originally submitted by **Bill Bartlett G4KIH**, and I've used it in little receivers from time to time.

The Circuit

The circuit is shown in **Fig. 1** and has very few parts. The bipolar transistor, Tr1, is the amplifier for the sampled signal. This is a relatively high gain single stage audio amplifier. The diagram shows how the signal is taken from the input to the receiver volume control, the unmarked variable may be in the receiver circuitry.

Individual readers might like to experiment with the value of the 330kΩ resistor (R1). Increasing the value of R1 will increase the gain of the amplifier.

Like many of my projects I pulled out a 2N2222A device from my large stock but many other similar bipolar devices would do the job. Perhaps the commonest type would be a BC108 or similar.

The output from transistor Tr1 is coupled to a voltage-doubler detector circuit, D1 and D2. Ideally these should be germanium diodes.

The diodes 'eat up' some of the signal voltage but some diodes are better than others in this respect. **Note:** A germanium diode is better than a silicon diode and a Schottky diode also better still.

Germanium diodes clip at about 0.3V and silicon diodes at about 0.7V. But readers can

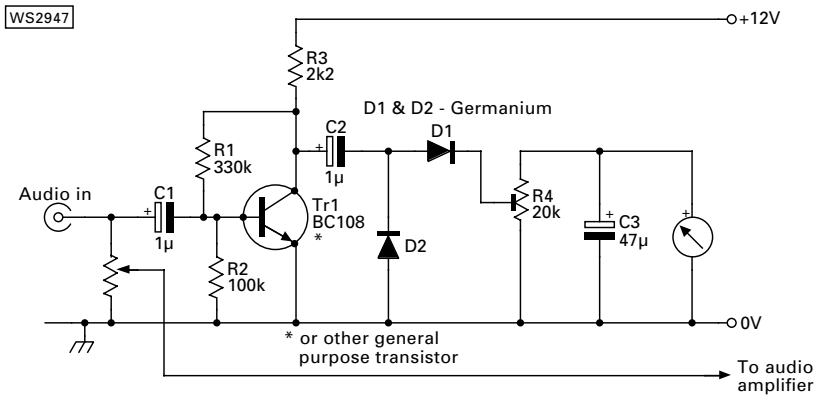


Fig. 1: The circuit for the audio derived S-meter has very few parts. The bipolar transistor, Tr1, is the amplifier for the sampled signal.

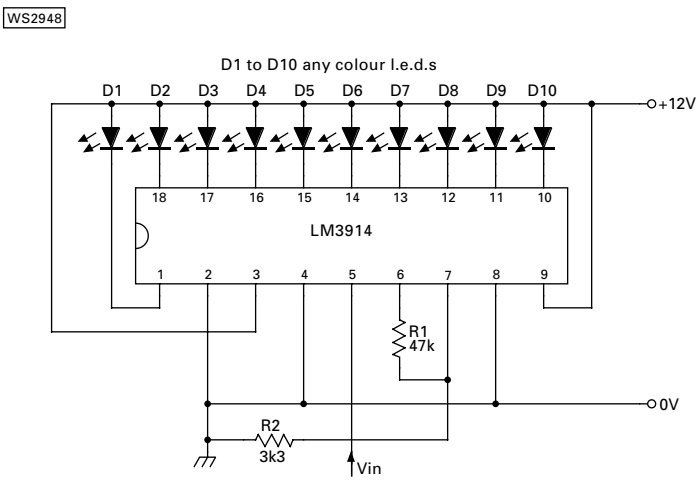


Fig. 3: The circuit to provide the bargraph readout. The resistor R1 sets the voltage range of the chip. The value of 47kΩ suits measurements in the typical range required here (see text).

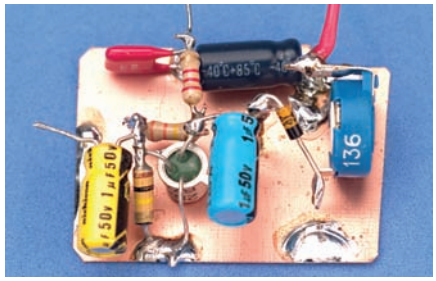


Fig. 2: The circuit lends itself to 'Ugly' construction (see text).

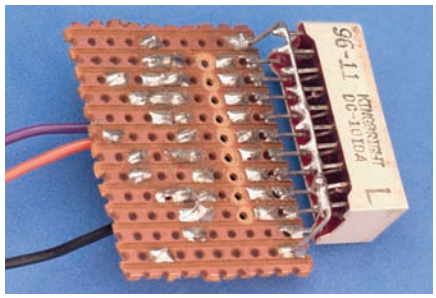


Fig. 4: Photo of completed bargraph display.

use what they have to hand. In practice, I've usually built such a circuit with two germanium diodes of the OA81, 1N34A, or similar type, and the version shown in the photograph used a pair of 1N4148 silicon diodes with good results.

The resultant d.c. signal goes to a pre-set potentiometer, R4, which acts as a sensitivity control for the meter. A capacitor, C3, is wired across the whole track of R4. This acts as a damping control for the fluctuations of the signal. Without it, the needle of the meter would dance around too much!

The value of C3 can be altered to tailored the sort of meter response required. Increasing the value of C3 will damp the fluctuations more. Decreasing the value will allow the meter needle to swing around more. The 47µF value given here seemed to work well for me.

Recommended Meter

I have recommended a meter with a full scale deflection of some 100µA. This is probably the maximum value that will work well with this circuit.

I tried some surplus CB radio S-meters and these seemed to have a full scale deflection around 200µA and hardly moved the needle enough to be useful in this application. So, I suggest that you try what you have; and of course, more sensitive meters can be used by backing off the signal with R1.

Ugly Construction

The circuit lends itself to ugly construction, **Fig. 2**, and I built the whole thing on a scrap of plain printed circuit board (p.c.b.) material measuring 40 by 30mm. The transistor is mounted 'legs-up' and is secured to the board by the emitter lead and the other parts are soldered to hang around the device.

If you are using a metal-cased transistor for Tr1, mount it so that the case does not touch the board ground-plane. The whole circuit board was secured to the back of the meter using a blob of Blutack stationery putty.

Adding LED Bargraph

So, we now have an easy way to add a meter to a simple little receiver. But how much better to be able to add an l.e.d. bargraph!

An obvious candidate to do this simply is the LM3914 Dot/Bar Display Driver Chip. The LM3914 lights up to ten l.e.d.s (in the Bar Mode) or one of 10 l.e.d.s (in the Dot Mode) in response to an input voltage.

The chip contains a voltage divider and 10 comparators that turn on in sequence as the input voltage rises. There's an internal reference voltage source which can be used to set high and low reference points on two pins at either end of the voltage divider chain, to adjust the range of measurement. Another pin sets the LM3914 to operate in the dot or bar mode.

The circuit to provide the bargraph readout is shown in **Fig. 3**. The resistor R1 sets the voltage range of the chip. The value of 47kΩ suits measurements in the typical range required here.

The LM3914 is used in the bar mode by connecting pin 9 to the positive line. The resistor, R2, controls the l.e.d. current and could be altered to give a brighter or dimmer display. Individual l.e.d.s could be used as indicators but a purpose made 10 segment bargraph l.e.d. display does look better.

The LM3914 is a delightful chip to use. It uses few external parts and the sequence of the l.e.d. display follows the order of the pin numbers down one side of the package.

The indicator circuit was built on Veroboard, **Fig. 4**. The only sections of the track that need to be cut are those between the pins of the LM3914. (Use a spot cutter or small twist drill to cut the tracks).

Note: Observe the usual precautions when working with Veroboard. It's very easy to bridge tracks with solder and the tracks should be cleaned before soldering begins.

The l.e.d. cathode pins to the LM3914 are soldered direct to the edge of the Veroboard at right angles to the board. The anode connections are made by linking all the anode pins and bringing a lead down on each side of the display.

The display board can directly replace the meter in the circuit of Fig. 1. The overall result is a nice little addition to any simple receiver and there's no need to glue on any extra knobs! **PW**

Valve & Vintage

Welcoming readers to his first 'shop' opening of 2006, Phil Cadman G4JCP has a variety of subjects to chat about, including miniature hearing aid valves and wooden adapter sockets!

Hello and a very warm welcome to my first V&V column of 2006. I do hope you all had a good Christmas and that the New Year has started well for everyone. Unfortunately, the entire Christmas period at G4JCP was very busy and so my soldering iron has - like the weather - remained cold these past few weeks. Consequently, I've no new circuits for you this time; a situation that will be remedied by my June column.

Going back to my December column for a moment, I must thank everyone who wrote or E-mailed me concerning the VT103 and CV359 valves I asked about. Lack of space doesn't permit me to name everyone here, but I have (I hope) acknowledged each of you individually. With the exception, that is, of one anonymous correspondent. So, to that person, thank you!

Right, so what is the commercial equivalent of the Post Office valve VT103. Well, it was unanimously agreed that the number should be VT103B. There's no sign of a plain VT103 anywhere. All the various lists I received gave the equivalent of the VT103B as the CV1672, which, in turn, is equivalent to the Pen 36C, a rather old audio output pentode. Having to supply a large customer like the Post Office with 'obsolete' valves must have been a real annoyance to valve manufacturers.

Valve Data Manual

Incidentally, there are GPO VT-equivalents lists to be found in: the *AVO Valve Data Manual* (1968), *Service Valve and Semiconductor Equivalents* (published in 1967 by the RSGB) and the CV Register.

The pencil-like CV359 neon tube, which I already knew was some kind of S-band r.f. power indicator, turned out to be very interesting indeed. **Philip Taylor** of Billingshurst kindly sent me a copy of the official **Ministry of Aviation Royal Research Establishment** (RRE) specification sheet for the device. Dated 25 September 1964, it specifies (relative to a standard tube) the height of the glow when measuring a peak power of 100 to 200kW at 3350MHz, with 600, 1µs pulses per second. No wonder I couldn't get it to light with a 5W, 144MHz hand-held transceiver!

What I hadn't spotted - and was certainly not apparent in the photograph in my December column - was a tiny slit in the black paint running the length of the indicator. The height of the glow along this thin slit gives an indication of the peak power output of, presumably, a radar transmitter.

Additionally, far from giving only a rough indication, I was surprised at the accuracy of the device. Yet it's such a simple method of measuring high powers at microwave frequencies.

More Radar

Still on the subject of Radar, some months ago **Richard Youard G8UDB** wrote to me asking if I had any information on the CV72 or the CV73. He'd bought a job lot of surplus electronic equipment (junk) and he'd found several examples of both valves. Then, in response to my query about the VT103, **Tim Packer** from Llangammarch Wells mentioned that he too has some CV73s.

Fig. 1: The bayonet bulb adapter socket was once very popular- Phil G4JCP says that this wooden version still works! (see text).

Physically, both valves look very similar to the 12E1, a popular series regulator valve. (If you've never seen a 12E1, it's rather like a beefed up 807 with an Octal base.) Whilst I couldn't find any detailed information on the CV72 (commercial equivalent: V1120), I did find a data sheet on the 11E3, the commercial equivalent of the CV73.

By the way, has anyone used a 12E1 in an Amateur Radio transmitter? It looks like it should be okay at l.f.

Intended for 'break' or series modulator service (anyone know what a break modulator is?), the 11E3 has a maximum working anode voltage of 3,500V (allowable peak is 12,500V!) and a peak cathode current of 3.5A. However, the maximum anode dissipation is only 10W.

To operate at these extremes of voltage and current, the valve has to be driven by very short pulses (typically 10µS) with a very low duty cycle. There's also a note about limiting the screen voltage when the valve is used at reduced atmospheric pressure.

The specification makes me suspect that both the CV72 and CV73 were used in airborne Radar installations. Can anyone confirm my suspicions?

Convention In 1947

In his letter, Tim also made reference to an IEE paper he has from a radio communications convention held in 1947. It deals with the (r.f.) radiation from receivers (local oscillator, b.f.o., etc.), which might allow an enemy to fix the position of a receiver. This subject came up last year on a news group on the Internet and there were conflicting views as to whether it was ever a significant problem.

I'd like to cover unwanted r.f. radiation from receivers in a future V&V column and, hopefully, come to a firm conclusion. In the meantime, if anyone has any first hand experience of the problem, or has some authoritative documentation, I'd very much like to hear from them.

Solid State VFOs?

Everybody knows that solid state v.f.o.s are superior to those that use valves - right? Well, maybe not. There was an article by **Dr. Andrew Smith G4OEP** in the Summer 2005 issue of *SPRAT* (the journal of the **G QRP Club**), in which he asserted quite the opposite. This article was interesting enough to be mentioned by **Pat**

Hawker G3VA in his Technical Topics column in the October 2005 *RadCom*.

In the article, G4OEP described how he built a 5MHz v.f.o. using an XFY43 miniature hearing aid valve. Valves made for hearing aids use very little power. Indeed, the XFY43 has a filament, which draws only 10mA at 1.4V and is meant to pass an anode current of 0.6mA at 23V. In G4OEP's design the valve runs from a regulated 12V anode supply and draws only 0.4mA. All told, the valve dissipates no more power than a comparable transistor.

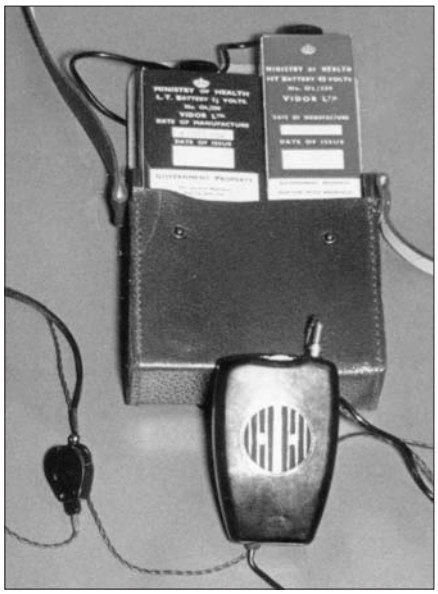


Fig. 2: The Mesdresco miniature valved hearing aid was the first to be available from the National Health Service in 1948. For its time the hearing aid was a marvel of miniaturisation- although the batteries had to be carried in a separate pouch! Photograph courtesy of the Royal National Institute for the Deaf.

The stability of a v.f.o. can be severely compromised by variations in temperature, and when you have a valve in an oscillator dissipating 2W or more, keeping temperature sensitive components away from this amount of heat is difficult. But with the XFY43 dissipating only 20mW, internally generated heat is not a problem. All other things being equal, the result is a v.f.o. which beats a solid state v.f.o. for stability. This is worth thinking about!

The stability of both valve and solid state v.f.o.s will suffer equally with changes in the value of those capacitors and inductors which determine the oscillator's frequency. That's where the similarity ends.

Semiconductors have internal capacitances, which vary significantly with both voltage and temperature. But the internal capacitances of a valve are - at least as far as we are concerned - solely dependant on the physical dimensions of the electrodes.

Therefore, with the internal capacitances of the XFY43 all but immune to changes in both temperature and applied voltage, the stability of the v.f.o. is effectively dependant only on its passive components. As these are subjected to no more heat than in a solid state v.f.o., the overall stability of the XFY43 v.f.o. ought to be better, as G4OEP found to be the case.

There are other hearing aid valves around, and many ought to be suitable for use in a v.f.o., albeit they are somewhat rare and expensive compared to most modern battery valves. It's possible that acceptable results may be obtained with the DF96 and similar types, although they really are designed to run at higher anode voltages. More relevant perhaps, is the desirability of only using valves which have wire connections. A valve plugged into a socket - no matter how good the socket - has to be inferior to a valve with soldered connections held in a secure clamp.

According to G3VA, **Ray Cracknell G2AHU** also found (some years ago) that LC oscillators based on valves were less sensitive to changes in ambient temperature than those using field effect transistors (f.e.t.s), and could provide better long term stability. And this was with normal valves, not hearing aid types. Given the interest some enthusiasts - me included - have in using valves at low anode voltages, I think this is one area where further experimentation could prove fruitful.

It makes me wonder, had the invention of the transistor been delayed by ten or 20 years, just what kind of progress would valve manufacturers have made without the distraction of Germanium and Silicon? Might we be designing communications equipment incorporating valves today? Klystrons, Magnetrons and c.r.t.s excepted, of course!

Philip Taylor's letter struck a chord. Despite some valves being in short supply, principally those that will never be manufactured again, there are still millions of unused valves still around.

True, they're common types, often made for use in televisions, but they're perfectly usable. Yet who knows how long they'll last? There's no great rush, but one day all these old valves will lose their vacuum and become useless, except for mounting on bits of wood, like dead insects. In my shack there are dozens of valves which I'll never use, but I'll probably hang on to them regardless. Still, I ought to make an effort and use some of them.

I think we're inclined to segregate valves, transistors, digital integrated circuits and microprocessors. But as G4OEP has (re)discovered, valves can complement transistors, so do mix and match where appropriate. It's fine to have an all valve receiver or transmitter. But it's also fine to have a PIC-based iambic keyer coupled to the cathode of an 807.

Finally, we tend to picture our valve radios in isolation, but they were once part of someone's home. Back when mains electricity was only installed for lighting, it was often necessary to power a set from a light socket. Fortunately, two-way bayonet adapters were available so you could listen to the radio and have the light on. All the set needed was a bayonet cap plug - like the one shown in **Fig. 1** - on the end of the mains flex. Yes, the plug in Fig. 1 is beautifully made - out of wood and it still works!

Hmm! I'd better stop before I get into trouble with the Health and Safety people. Please send your comments and letters to me, either via E-mail to: **phil@g4jcp.freeserve.co.uk**, or by mail to: **21 Scotts Green Close, Scotts Green, Dudley, West Midlands DY1 2DX**.

PW

Fig. 3: In March 1957 PW carried a project to enable readers to convert a surplus hearing aid into a simple receiver. Phil G4JCP plans to discuss this project in a future V&V column.

WEB DIRECTORY

Rocket Radio
E-mail: sales@rocketradio.net
www.rocket-group.co.uk

Nevada
E-mail: sales@nevada.co.uk
www.nevada.co.uk

Waters & Stanton
E-mail: sales@wsplc.com
www.wsplc.com

LAM Communications
E-mail: sales@lamcommunications.net
www.lamcommunications.net

To advertise here call
020 7731 6222

VHF DXer

REPORTS & INFORMATION BY THE LAST SATURDAY OF EACH MONTH.

DAVID G4ASR HAS REPORTS OF AN INCREASE IN VHF ACTIVITY

There was a small but noticeable increase in activity on the v.h.f. bands during December. This was partly due to the holiday break and also due to a variety of propagation openings and organised events.

Stations reported a number of openings via auroral backscatter (Au), Auroral-E (Au-Es), Sporadic-E (Sp-E), tropospheric enhancement (tropo) and meteor scatter (m.s.). Some operators reported making contacts via low earth orbit (l.e.o.) 144 and 430MHz satellites and with the *International Space Station* (ISS).

In association with the German specialist v.h.f. magazine *Dubus* regular moonbounce activity periods were arranged. The first event in December proved very popular and caused a flurry of Earth-Moon-Earth (e.m.e.) activity on the v.h.f., u.h.f. and microwave bands. The Radio Society of Great Britain (RSGB) v.h.f. contest committee also arranged a series of short contest events over the Christmas period and these increased activity on the 50, 70, and 144 and 430MHz bands.

Auroral backscatter openings were reported on December 1, 9, 11, 12, 27 and 31 with associated Au-Es events being noted on December 11, 27 and 31. All were quite weak and caused by coronal hole activity 'showering' the Earth with ionised solar material. The only DX stations reported on the 50MHz band were those of OZ1DPR and SM0LQB and beacons GB3LER (Shetland Islands 50.064MHz) and OY6SMC (Faroe Islands 50.035MHz).

During the Au-Es openings the beacon stations of JW7SIX (Svalbard 50.079MHz), JW9SIX (50.048MHz) and JX7SIX (Jan Mayen 50.079MHz) were reported by stations in Scotland and northern England with signals peaking up to 559. Openings were reported on the 144MHz band during December 11 and 27, the latter though being very weak and restricted to stations in the far north of Scotland. The opening on December 11 between 1615-1800UTC was a little more extensive with stations making c.w. and s.s.b. contacts over much of the UK. Scottish stations reported making QSOs into Belgium (ON), Germany (DL) and the Netherlands (PA).

A Sporadic-E opening that reached the 50MHz band was reported on December 2 between 1600-1700UTC. Operators in England, Scotland and Wales worked stations in Italy (I) and Switzerland (HB9). Two larger 50MHz openings occurred during the first week of the New Year on January 1 and 7.

The Sp-E event on January 1 consisted of two separate openings between 1100-1215UTC to Austria (OE), Croatia (9A), Italy, Poland (SP), Romania (YO), Yugoslavia (YU) and between 1530-1700UTC to Austria, Czech Republic (OK), Poland, Slovakia (OM) and Slovenia (S5). Among the c.w. and s.s.b. stations worked on the 50MHz band were those of IW0GPN, IK5YJY, OE1SOW, OE5MPL, OK2POI, OK2RX, OM3CUG, OM5CW, SO5AS, SP5ENA, S51UF, YO2IS, YU1EU, YU1TK, 9A5ST and 9A8A.

The opening on January 7 also consisted of two separate events, between 1100-1145UTC from GW to Italy and GM to the Czech Republic and between 1545-1800UTC from all regions of the UK to Croatia, Germany, Italy, Malta (9H), Poland and Slovenia. Some of the DX worked during these 50MHz openings included the stations of DK1MAX, IC8FAX, IH9YMC, SP6MLK, S57RR, 9A1Z and 9H1TM. None of the Sp-E events in December and early January were reported to have reached the 70MHz band.

There were a few tropospheric openings on the 144MHz band during December but reported events didn't last very long. All enhancements were fairly transitory and path lengths were considerably less than 1000km. The beacon EA1VHF (IN53) operating on 144.404MHz was heard in central and southern England on December 10, 11, 22, 23 and 24 but hardly any other Spanish activity was reported. The only day with active stations was on December 11 when EA1DDU (IN73), EA2AVM (IN82) and EB2CTZ/P (IN83) were worked on s.s.b. from southern England.

A c.w. activity contest organized by REF (the French national society) created some activity during the morning of December 18. Stations such as F0DKT (JN18), F5MFI (JN07), F5NQL (JN17), F6ACU (JN38) and F6KIF/P (JN19) were contacted by keen UK c.w. operators. Tropo propagation was good on December 23 with many French stations being worked from central England. Among those contacted on s.s.b. were F1DRN (JN23), F1MJC (JN06), F4CYH (JN26), F4DSD (JN23), F4DZF (JN16), F5JMI (JN24), F5RRS (JN36), F6FMB (JN24), F8IXZ (JN36) and F8NZQ (JN35).

METEOR SCATTER

The total number of contacts made via aurora, auroral-E, Sporadic-E and tropospheric propagation, however, pale into insignificance compared to the huge amount of QSOs reported each month made via meteor scatter on both the 50 and 144MHz bands. Everyone is now using JT6M (on 50.230MHz) or FSK441 (on 144.370MHz) and achieving results thought impossible a few years ago. The great advantage of this digital mode is the increased transmission speed of 147 characters per second or 8820 letters per minute compared to high-speed c.w. (normally around 2000 l.p.m. via a computer) or the very much slower spoken voice on s.s.b!

The *WSJT* program (Weak Signal communications by Joe Taylor K1JT) has been designed specifically for high-speed meteor scatter communication using `pings' reflected from the under dense ionised trails of random meteors. Such pings are typically a few decibels above the noise and last anywhere from ten to a few hundred milliseconds. And because of the high transmission speed of JT6M or FSK441 it is possible to extract meaningful information from millisecond-long pings whereas with h.s.c.w. or s.s.b. you need bursts lasting a few seconds or longer. When you add in the superb signal processing power of the WSJT program it now enables a low-power s.s.b. station with a small Yagi to make meteor scatter QSOs on the v.h.f. bands over typical distances of 1000 to 2000km. Such contacts can be successful without waiting for major showers utilising instead the very minor showers and daily sporadic meteors.

Of course when a major shower does occur the results are even more impressive! WSJT is designed for computers running the Windows operating system and Windows 95, 98, ME, 2000, XP have all been used successfully. Unlike h.s.c.w. it does not require the user to play back received pings and decode the message by ear. Instead the decoded text appears in a scrolling window on the computer screen.

Meteor trail activity was very good during December with one major shower (Geminids; December 6-19, peaking on the 19th), one moderate shower (Ursids; December 17-25, peaking on the 22nd) and ten minor streams occurring throughout the month. As WSJT operators can utilise very minor showers it meant that there was not a single day during

Fig. 1: The 144MHz antennas at the QTH of OK1DIG (with the half moon above).

the month without meteor shower activity. In addition, right at the end of the month, another major shower (Quadrantids; December 28-January 7, peaking on January 3) also encountered the Earth's ionosphere.

Activity was very brisk on the 50MHz band with many JT6M contacts being reported every day of the month during December. Among the DX worked from the UK were the stations of EA7DUD, EA9IB, ES3BR, F1RLF, HB9QQ, IK1EGC, IS0/I0JU, LA8NK, OE5MPL, OK1KT, OZ6OM, PA5JS, SM0LQB, SP9HWY and S59F. No contacts were reported on the 70MHz band, which is surprising as there are a few countries (OZ, S5, 9A) within easy m.s. range of the UK.

Much DX activity was reported on the 144MHz band especially as the Bavarian Contest Club (BCC) had organised their annual meteor scatter contest during the Geminids shower period. Some of the stations worked by FSK441operators included DL5ZA, EA1FBF, ES2RJ, F5ODA, HA3UU, I6WJB, IS0EBO, LA4YGA, LY2WR/P, LZ2FO/P, OE3FVU, OH1NOR, OM5CM, OZ8ZS, RX1AS (1993km), SM3BEI, SP8WJW, S51AT, UT5ST, YL3GDF, YT7WA, 3A/PA2CHR and 9A1CCY.

STATION REPORTS

Martin Andrew GM6VXB (IO97 Aberdeenshire) reports that he has recently completed some upgrades to his v.h.f. and u.h.f. station. On the 50MHz band he has obtained an Acom 1000 amplifier but may have to modify the gamma match on his 6-element Yagi, as he is not sure if it will handle the full power available.

Martin has also started building a 4CX250B amplifier for the 70MHz band that will enable him to run full legal power. A low-noise masthead pre-amplifier has been built to overcome the deficiencies in his station transceiver that is rather 'deaf' at 70MHz. The antenna for this band is a 6-element Sandpiper Yagi.

On the 144MHz band he now uses a Heatherlite Explorer 4CX250B tetrode amplifier and has carried out modifications so that it will run 200 to 240W output for about an hour, key down, without cooking the valve. A new masthead pre-amplifier has been constructed and although only using a BF981 bipolar device he has noticed a slight improvement in received signals. The antenna for this band is an 11-element F9FT Yagi.

Martin mentions that he now has 100W available on the 430MHz band and is running this into a 25-element Yagi. His existing equipment for the 1.3, 2.3 and 3.4GHz bands remain unchanged and he plans to operate portable from nearby Stirling Hill (IO97) when tropospheric conditions look favourable.

Martin goes on to report that at his QTH he caught three 'Scottish' type Aurora's since mid-December but all with absolutely no activity. (This is exactly what I was highlighting last month, with 'plug and play' DXers just watching computer screens!) The beacon GB3LER on 50MHz was 59A and SK4MPI on 144MHz was also 59A but no other stations heard.

On December 31 Martin noticed an Au-Es opening on the 50MHz band with the JW7SIX (JQ68) beacon peaking 20dB over S9 for 15 minutes. As usual no activity from there, although he did hear a station on 1.8MHz from Svalbard early in December. Martin also reports catching a 50MHz Sp-E opening on New Years Day when he heard stations in Austria, Czech Republic and Italy. Unfortunately, all signals disappeared within a few minutes but stations further south of his QTH enjoyed a much longer opening.
On January 7 at 1700UTC Martin worked the station of 9A1Z (JN86) via Sp-E on the 50MHz band. The Slovenian beacon S55ZRS (50.022MHz) was heard 20 minutes later. Nothing was noted on the 70MHz band at around the same time. These transitory openings show that you have to be monitoring the bands all the time.

Regarding tropospheric enhancement Martin mentions that this mode has been non-existent at his location since last October and he wonders whether climate change is affecting tropo propagation. This is something I picked up on last month when I remarked that the excellent tropo openings of a decade ago don't seem to occur very much nowadays.

Martin GM6VXB was also active during two recent meteor showers. Because of gale-force winds he could only operate for a short time in the December Geminids. On the 50MHz band using JT6M he worked LA7AJ (JO59), OH6MIK (KP13), SM3BIU (JP73), SP9HWY (JO90) for best DX at 1594km and G4IGO (IO80). Although this contact was quite a short distance the QSO only took 5 minutes to complete.

On the 144MHz band using FSK441 he made random (unscheduled) contacts with the stations of DD3SP (JO72), DL1ANA (JO50), DL5ROB (JN68), OH6JKW (KP02), OK1UAK (JO70), OK1XOD (JN75), OM3WBC (JN98) his best DX at 1781km, SM2CEW (KP15), SP2JYR (JO92) and SP2MKO (JO93). The January Quadrantids shower was quite good and he thinks that the shower peaked at his QTH around 1200UTC on January 3. On the 144MHz band he made random FSK441 contacts with the stations of DH2UAK (JO71), F4CYZ (JN38), IW2HAJ (JN45), OE5MPL (JN78), OH3AWW (KP11), PE2SVN (JO21), PA3FPQ (JO22), SM3JBO (JP93), SP9HWY (JO90), S54M (JN86), S54T (JN75) and 9A3JH (JN75) best DX of the shower at 1773km. Got-aways were OH3NGT, OK1DFC (JN79) and YU1EV (KN04) with many bursts received from other stations already in contact with another station.

DEADLINES

That's it again for another month. Why don't you download the *WSJT* software free of charge from **http://pulsar.princeton.edu/~joe/K1JT** and see what results you can achieve. Thank you for your reports and please keep sending them in to the address and by the date given at the top of the column.

73 David G4ASR

DAVID BUTLER G4ASR
YEW TREE COTTAGE
LOWER MAESCOED
HEREFORDSHIRE HR2 0HP
TEL: (01873) 860679
E-MAIL: g4asr@btinternet.com

Trader's 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.

THE SHORTWAVE SHOP

01202 490099

TRANSCEIVERS

ICOM IC 703 HF+50Mhz QRP TCVR....£350
ICOM IC 7400 HF/VHF TRANSCEIVER....£895
ICOM IC 718 HF/DSP TRANSCEIVER....£395
ICOM IC2725 VHF/UHF MOBILR TCVR....£199
ICOM IC706MK2G HF/VHF TRANSCEIVER....£475
YAESU FT8900 4 BAND TRANSCEIVER....£255
YAESU FT690/R2 50Mhz TCVR + AMP....£195
YAESU FT1000 MK5 HF TRANSCEIVER....£1495
KENWOOD TS450S HF TRANSCEIVER....£450
KENWOOD TS140S HF TRANSCEIVER....£275
KENWOOD TH G71E VHF/UHF H/H TCVR....£135
TRIO TR7500 VHF TCVR WITH PS6 PSU....£95
TRIO TS811 UHF BASE TRANSCEIVER....£325
ALINCO DX70TH HF/50MHZ TCVR....£325
KENWOOD TM 707E VHF/UHF TCVR....£165
PALSTAR KH-6 50Mhz HANDIE....£65
STANDARD C5800 VHF ALL MODE TCVR....£135
YEASU FT290R1 VHF PORTABLE TCVR....£95
ALINCO DJS41 UHF TRANSCEIVER....£50
YEASU VX5 50/VHF/UHF HANDIE TCVR....£125
KENWOOD TH F7E VHF/UHF TCVR....£179
NAVICO AMR1000 145Mhz TRANSCEIVER....£50
ICOM M15 MARINE TRANSCEIVER....£90

RECEIVERS

SANYO WS1000 WORLDSPACE RCVR....£85
YUPITERU MVT7100 WIDE BAND RX....£165
FAIRHAVEN RD500 RECEIVER....£450
HITACHI KH WS1 WORLDSPACE/SW RX....£85
AOR8200 WIDE BAND RECEIVER....£250
SANGEAN AT818 PORTABLE HF RCVR....£75
ROBERTS 9914 PORTABLE HF RECEIVER....£55
AOR 3000A WIDE BAND RECEIVER....£350
GRE PSR225 BASE SCANNER....£135
LAFAYETTE HA 600A HF RECEIVER....£95
REALSTIC DX395 HF RECEIVER....£85
AOR AR7030 PLUS HF RECEIVER....£550
ICOM IC R75 HF RECEIVER....£450
ICOM IC R10 HF/VHF/UHF H/H RECEIVER....£165
YAESU FRG7700 HF RECEIVER....£125
YAESU VR5000 WIDE BAND RECEIVER....£325
REALISTIC PRO 2042 BASE SCANNER....£110

ACCESSORIES

ICOM SM 6 BASE MICROPHONE....£50
SEM TRANSMATCH ATU....£55
MFJ 259B ANTENNA ANALYSER....£155
DATONG D70 MORSE TUTOR....£45
WATSON HUNTER FREQUENCY COUNTER....£39
WONDERWAND ANTENNA....£45
WELTZ SP220 HF/VHF SWR-PWR METER....£39
ICOM SP21 SPEAKER....£45
KENWOOD RM-1 REMOTE FOR TS850....£25
YAESU SP8 SPEAKER (FT1000)....£90
YAESU MD100 BASE MICROPHONE....£85
NRD 525 RTTY BOARD....£85
AOR AS5000 AUTO ANTENNA SWITCH....£65
DATONG FL2/3 FILTER....£55
WATSON W30 DUAL BAND RF AMP....£45
MFJ 462B MULTIREADER....£89
DIAWA SW110 SWR/PWR METER....£39

For latest list please see www.shortwave.co.uk

NEVADA

023-9231 3090

Alinco DJC7 Handy TX c/w Soft Case/Earphone/ERW4C Interface Lead....£149
Alinco DJG5E Twinband Mobile with EMS47 Speaker Mic....£199.95
Kenwood TM231E 45w 2m FM Mobile Transceiver....£95
Kenwood TR7730 2m FM 25w Transceiver....£89
Trio TS700s 10w All mode 2m Base Tx with Ext VFO....£299
Yaesu FT726R 2M/70CM All Mode 10W Base TX....£499
Alinco DJX3 Handheld Scanner c/w accessories & book....£159
Commtel COM213 100 channel Handheld Scanner....£75
Fairmate HP2000 All Mode Scanning Receiver....£107
Uniden UBC180XLT Handheld Scanning Receiver....£99
Yaesu VR500 All Mode Handheld Scanner....£149
Yupiteru MVT7100 Wideband Scanning Receiver....£149
Yupiteru MVT9000 1000ch Handheld Scanning Receiver....£149
Yupiteru MVT9000 MK I Wideband Scanning Receiver....£229
Icom R75 General Coverage Receiver with 50Mhz....£499
Sangean ATS303 Portable Receiver 13 SW bands & FM/MW....£39
Icom 718 10-100w (LSB,USB,CW,AM) HF Base/Portable....£375
Kenwood TS870SAT 100w DSP HF Transceiver with Auto Tuner £999
Realistic HTX-10 10m 25w All Mode Mobile....£145
Yaesu FT1000 Mk V 200W HF TX (IF mod & 2 cw filters fitted)....£1699
Yaesu FT897 HF/VHF/UHF 100w Portable Transceiver....£595
Perstel Bluenote Personal DAB Radio....£59
Zetagi M27 Antenna Matcher....£20
ADONIS AM-601 Desk Microphone (Wired 8 pin Yaesu)....£39
Alinco EDX2 Automatic Antenna Tuner....£225
Amdat ADC60 Frequency Standard Clock....£99
Aor CT8200 CTCSS Card....£55
BNOS LPM50 50-10-100 Amplifier....£175
Dewsbury S/TUNER Super Tuner....£25
Elmic CONTROLS Noise Limitor....£10
Heil Proset Plus Studio Headphones....£119
Icom AT160 Coaxial Auto ATU....£179
Icom RSR75 Remote Control Software for R75....£25
Jim NF96XI Filter....£15
Kenwood MB201 Mounting Bracket....£10
Kenwood PS30m 20amp Power Supply....£110
MFJ 9406 6m SSB TX c/w microphone & manual....£139
MFJ 948 Antenna Tuner....£99
Pakratt 232 Data Terminal & Leads....£99.95
Samlex 1223 20amp Switch Mode Power Supply....£79.95
Trio TL922 HF Amplifier....£895
Trio TL922 HF Linear Amplifier....£795
Uniross Charger and Batteries....£12
Watson WM2000 Base Microphone....£80
Yaesu CD24 Charger for FT897/FNB78....£75
Yaesu FC902 Antenna Tuner....£159
Yaesu MH35A2B Speaker/Mic for older models....£19

Check our web site for latest Items available. E&OE Prices quoted are in pounds sterling and exclude carriage.

WATERS & STANTON

01702 206835

Alinco EDX-2 1 6-30MHz Automatic 200W ATU for DX-70, DX-77....£199
Icom IC-82 H 2m, 70cm All Mode Base Transceiver 45/40W 12V....£649
Icom IC-3230H 2m 70cm FM Mobile,45/35W Ful Duplex....£249
AOR AR-3000 100kHz-2036MHz All Mode Receiver 400ch. 12V + psu....£449
Kantronics KAM plus Multimode Dua Port Data Controller + Pactor....£199
SGC Power Clear DSP Audio Noise Filter + 5W amp, Band Pass Filter..£179
Icom IC-M11 VHF Marine FM H/held Transceiver 6W + sp mic....£149
Icom IC-2SRE 2m FM H/held transceiver + 25-950MHz AM, FM, WFM receiver....£129
Yaesu FT-1 R 2m FM H/Held T ansceiver + DTMF keypad....£99
MFJ MFJ-784B Tunable DSP Audio Noise Filter....£189
Alinco DJ-190T 2m FM H/held Transceiver + CTCSS....£99
MFJ MFJ-852 Power Line Noise Meter....£69
ADI AT-400 70cm FM H/Held wi h Battery box 420-465MHz RX....£89
BNOS TL50-144-25 6m 25W Linear T ansverter wi h 2m IF at 1W 12V DC (5A max)....£89
Realistic Pro-39 68-960MHz (wi h gaps) H/held scanner AM,FM 200Ch. Hype scan....£69
Yaesu FRT-7700 150kHz-30MHz Receive ATU for FRG-7700/8800....£69
Roberts R-827 Portable 0-30MHz w th FM Stereo & SSB via BFO....£119
Team EURO-8000 80ch 4w UK CB Base Station 12V or mains....£99
Team EURO-8000 80ch 4w UK CB Base Station 12V or mains....£99
Kantronics KAM plus Multimode Dua Port Data Controller + Pactor....£199
M.Modules MMT-144-28 2m 10W T ansverter 28MHz IF....£69
Alinco DJ-C1 2m FM Micro Hand Held + CTCSS & Wide RX....£69
Global AT-1000 0 5-30MHz SWL ATU....£59
Alinco DJ-191 2m FM H/Held with DTMF keypad....£119
AKD AKD-7003 70cm FM Mobile Channelised 3W....£89
MFJ MFJ-382 Amplified Speaker 1W (36 dB max) 9V batt or 12V DC....£29
Kantronics KAM Multimode Data TNC....£99
ADI AT-200 2m FM H/Held Transceiver with Nicad & Charger....£89
Alinco DJ-480E 70cm FM H/Held Transceiver + Nicad & Charger....£89
Ameritron ALS-600XCE 10-160m Solid State 600W Amplifier....£849
Yaesu VR-120 100kHz-1300MHz AM,FM,WFM Receiver 640Ch....£109
ADI AR-446 70cm FM Mobile 35W + CTCSS....£129
Yaesu FT-290RII 2m All Mode Portable 2 5W....£199
Yaesu FL-2025 2m clip-on 25W Linear (for FT-290R II)....£99
Ameritron AL-80B 10-160m 1kW Linear Amplifier with 3-500 Tube....£799
Icom IC R8500 100kHz-2GHz All Mode Receiver 1000ch. 12V + PSU....£899
Palstar KH-6 6m FM H/Held w th CTCSS....£75
MFJ MFJ-910 1 8-30MHz 200W Automatic Matcher....£16
MFJ MFJ-9340K 1watt 40m QRP CW T anceiver Kit....£139
Kenwood MC-55 Mobile "Gooseneck" Microphone wi h 8-pin mic plug £29
Yaesu VR-500 100kHz-1300MHz All Mode Receiver 1000Ch Alpha....£149
Yupiteru MVT-3300 66-1000MHz (wi h gaps) AM,FM 200Ch....£95
Yaesu FT-8100 2m,70cm FM 50W,35W Ful Duplex + Remote Head....£229
MFJ MFJ-934 1 8-30MHz 300W ATU wi h Artificial Ground....£139
TGM Comms MΩ-34SR Four Band Three Elemen Hybrid Quad Antenna£349
Alinco DJ-446 446MHz PMR H/Held + Nicad & Charger....£89
Alinco DJ-C7 2m / 70cm Handheld Wi h CTCSS....£89
Fai haven RD-500 10kHz-1750MHz All Mode Receiver wi h PC Control, CD ROM, 13000+ Ch. 12V + PSU....£525
Yaesu FT-790R 70cm All Mode Portable T ansceiver 1W Batt....£149
Icom PS-55 12V 20A Matching PSU....£149
Icom IC R8500 100kHz-2GHz All Mode Receiver 1000ch. 12V + PSU....£899
SML SWR-25 3 5-150MHz SWR / Power Meter 100W....£29
MFJ MFJ-616 Speech Intelligibility Enhancer....£119
Icom IC-706 MkII HF,6m,2m All Mode Mobile/Base T ansceiver w th Gen Cov....£499
Yaesu FT-290R MkII 2m All Mode Portable Transceiver 2 5W....£199
Icom IC-703 HF& 6m All Mode QRP Mobile T ansceiver + Auto ATU, Gen Cov. 10W....£449
Kenwood SP-31 Matching Extension Speaker w th Filters....£59
Icom IC R3 0 5-2450MHz AM,FM,WFM Hand Held Receiver 450Ch + 2" TFT colour TV....£249
JPS NIR-12 Noise & Interference Reduction Unit....£199
Tokyo HL-50B 3 5-28MHz + 6m Linear Amplifier 5W in, 50W out....£199
Icom IC-703 HF& 6m All Mode QRP Mobile T ansceiver + Auto ATU, Gen Cov. 10W....£449
Yupiteru VT-125 II 108-142MHz Handheld Airband Receiver 20Ch....£89
PLL WAB-10 108-140MHz Airband Receiver + MW & FM mono/stereo..£25
Icom IC R8500 100kHz-2GHz All Mode Receiver 1000ch. 12V + PSU....£899
SML SWR-25 3 5-150MHz SWR / Power Meter 100W....£25
M.Modules MML144/30-LS 2m 1-3W in, 30W out Linear wi h Preamp....£69
AKD 2001 2m FM Mobile Transceiver Channelised 25W....£89
MFJ MFJ-1276 HF / VHF TNC w th Precision Tuning + Pactor 12V....£99
Uniden UBC-780XL 25-1300MHz Desk/Mobile Receiver + Trunk Tracking 500Ch. 12V + psu....£159
Optoelectronics Model 40 "Scout" 10MHz-1.4GHz Frequency Counter + Reactive Tune & 400ch....£199
Alinco DJ-G5E 2m/70cm FM Transceiver + Wide RX, DTMF keypad & CTCSS....£149
CDX SWR-7RM 7MHz HF PWR/SWR meter 60W w th Antenna Matcher £39
MFJ MFJ-418 Pager size Mo se Tutor wi h LCD Display....£49
SEM QRM Eliminator Interference Reduction Unit....£69
Skiptech RPS1210HQ 13 8V 10A (14A max) PSU....£35
Global AT-1000 0 5-30MHz SWL ATU....£59
Fai haven RD-500 VX 10kHz-1750MHz All Mode Receiver w th PC Control, CD ROM, 13000+ Ch. 12V + PSU....£549
KENT KSKA Brass Straight Morse Key on Wood Base....£45
Lowe HF-225 30kHz-30MHz All Mode Receiver 12V + psu....£249
Watson WS-2090H 2m 0 5-5W in 80W out Linear Amplifirer w th 15dB Preamp 12V....£89
Kenwood TM-G707E 2m,70cm FM Mobile T ansceiver 50W,35W + Full CTCSS & Remote Head feature....£189
Yaesu FC-700 3 5-30MHz 150W ATU with Dummy load....£109
HORA C-408 70cm FM Micro Transceiver (2 x AA batteries)....£59
Yaesu VX-1 2m/70cm FM Micro H/Held T ansceiver + Full CTCSS & Wide RX....£89
Palstar KH-6 6m FM H/Held w th CTCSS, NiCd, Charger, DC lead....£75
Yupiteru MVT-9000 II 0 5-2039MHz All Mode Receiver 1000Ch + voice inverter....£259
Icom IC-725 Base Transceiver wi h Gen Cov. 100W 12V....£349
MFJ MFJ-901B 1 8-30MHz 200W ATU + Balanced/Wire inputs....£49
Sharman PS-205 13 8V 20A Regulated PSU 25A Surge No Meters....£59
Yaesu MD-1C8 Matching Dynamic Desk Microphone wi h Tone Control £69
Yaesu FT-990 AC HF Base T ansceiver + Gen Cov. , ATU & Audio filter 100W mains....£699

Please check our website for latest list.
www.wsplc.com

HF Highlights

AS USUAL, INFORMATION, REPORTS AND PHOTOGRAPHS TO ME PLEASE BY THE 15TH OF EACH MONTH.

The shopping trolley Amateur Radio station used by Andy Foad G0FTD.

CARL GW0VSW HAS ALL THE LATEST HF NEWS AND REPORTS

Celebrating his 80th birthday in December was keen DXer **Denzil 'Denny' Evans GW3CDP** and to mark the occasion his wife Ann had a special cake made decorated with his QSL card. This not only looked good but tasted rather nice too!

Denzil's h.f. activities began as a short wave listener in the 1930s using a Bush three band radio. In 1943 he was accepted into the RAF and was soon posted to the Far East serving with 20 Communications and Maintenance Unit in India. In 1946 he obtained the call **VU2QY** while serving at RAF Bhopal and he also used this callsign while stationed in Delhi.

Denzil received GW3CDP in July 1947 just before he was demobbed and returned home to Resolven in South Wales where his station consisted of a home-brew transmitter using 6V6, 6J5 and 6L6 valves and a BC348 receiver that had been carried home from India in his kit bag. By 1966 he had worked and confirmed 321 mixed a.m. and c.w. countries only to lose all the QSL cards during a severe storm in March 1966, which blew the roof off his house.

Later that year Denzil moved to Skewen and concentrated h.f. activities on s.s.b. and finally made the top of the DXCC Honour Roll in 1991. Currently he has 291 countries confirmed on c.w., he holds five Band DXCC and is now working towards the DXCC WARC Bands award. Good luck Denzil.

Denzil 'Denny' Evans GW3CDP celebrates his 80th Birthday.

DX NEWS

On to some DX news now and to the volcanic Marquesas Islands, French Polynesia, which lie between 400 and 600 miles South of the equator and approximately 1000 miles Northeast of Tahiti. **Elemer 'Ely'Bielek HA9RE** will be active from here on Nuka Hiva Island OC-027 until the 18 February and from Ahe, King George Islands (Îles du Roi Georges) OC-131 for about ten days starting on the 20 February. Ely plans to operate on all bands from 1.8–28MHz using c.w., s.s.b. and RTTY and all QSL requests are via **Szabo Karoly HA8IB, Aradi u. 42, H-5525 Fuzesgyarmat, Hungary.**

Listen out for operators **Siegfried Presh DL7DF, Frank Rutter DL7UFR, Robert Busch DL7VOA, Leszek Fabianski SP3DOI** and **Wolfgang Kunicke DL4WK** who will be active from the French and Dutch sides of St. Martin/St. Maarten NA-105 (FS/FJ) between February 21st and March 8th. This island has been shared by the two countries for almost 350 years and the border is almost invisible with visitors crossing back and forth without ever realising they are entering a new country.

The group will operate one week in each location using the FS/homecall first. With their activities on all bands from 1.8 to 28MHz including WARC and using c.w., s.s.b., RTTY, PSK31 and SSTV, you stand a very good chance of working them. Especially as they plan to have two stations active using amplifiers and various antennas including a V80e vertical antenna, Hexbeam and Cushcraft R7 for 14, 21 and 28MHz and a vertical for 10MHz. Their intention is to concentrate on the 1.8, 3.5, 7 and 10MHz bands and they all plan to operate in the ARRL DX SSB Contest in March. If you work them you can QSL via DL7DF at **Wilhelmsmuehlenweg 123, Berlin 12621, Germany** direct or via the Bureau and online logs will be available at **http://www.dl7df.com**

Finally a special event station, **LZ13ARDF** will be active on all bands and modes until the 31 December to celebrate the 13th Amateur Radio Direction Finding World Championships, which are being held in Primorsko, Bulgaria on 12-17th September. The QSL route is via **LZ1KZA P.O. Box 36, Karlovo, 4300 Bulgaria**.

SHOPPING TROLLEY STATION

Early last year **Andy Foad G0FTD** decided to convert an ordinary shopping trolley into a portable station for his h.f. activities. A 7m vertical made from an old CB antenna is fixed to a strong aluminium plate fixed to the back of the trolley. The 27MHz matching coil is bypassed and has been replaced with a wire link from the SO239 socket to the vertical section. Then a short length of coaxial connects the vertical to an LDG Z100 auto tuner and an Icom IC-706. Two 9ft wire radials are connected by a banana plug socket mounted just below the antenna and this allows the system to tune 5 - 30MHz and perform well on all bands.

The local beach is only 10 minutes walk from Andy's home and provides an ideal location for operating. There is even a breakwater, which acts as seat and workbench and is a useful windbreak assuming the wind is not a northerly! This set up has proved very successful for long distance DX but also works

well for more local contacts especially on the lower bands. Tests from 1.8 to 7MHz with local stations around the UK and further away in Europe show the system often outperforms the G5RV used by fellow local Amateur.

Now I am sure this 'shopping trolley Amateur station' will fire the imagination of some of you and may even give you some ideas for an 'alternative' suiting your particular operating interests or situation. Take the time to read a full write up at **www.southgatearc.org/articles/g0ftd/shopping_trolley_wally.htm** and judging by Andy's report this month his station does pull in the DX.

YOUR REPORTS

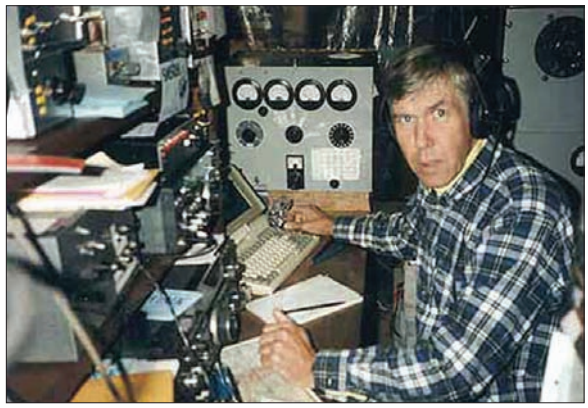
On to your reports now and the first is from Trelewis, Mid-Glamorgan where **Leighton Smart GW0LBI** found 'Top Band' in good shape. Using his Yaesu FT-100 with 5W c.w. to a long wire antenna Leighton worked LY2EJ (Lithuania) 0041, OJ0B (Market Reef) EU-053 at 0046 making his Top band QRP total to 53 countries, SP3BQ (Poland) 0135, OY9JD (Faroe Islands) EU-018 at 1700, DR60HES (Germany) at 2100, OZ5E (Denmark) 2105, OH2BHI (Finland) 2300, R1MVW (Malij Vysotski Island) EU-117 at 2325UTC. One s.s.b. station was worked, EI5HW (Ireland) at 2250 using just 5W again.

The 3.5MHz c.w. log of **Jim Pedley GM7TUD** in Locharbriggs, Dumfries lists R1MVC 0725, 8P5A (Barbados) NA-021 at 0819, OY1CT (Faroe Islands) 0830, PJ2T (Netherlands Antilles) SA-006 at 0838, VE3RM (Canada) in L'original, Ontario at 0851, FP/K8DD (St. Pierre & Miquelon) NA-032 at 0855 and UN2C (Kazakhstan) at 1734UTC using a Kenwood TS-450S and 1000 watts into a full size G5RV.

THE 7 & 10MHz BANDS

On to 7MHz where **Martin Addison M3JUQ** in East Finchley, North London used his Yaesu FT-840 at 10W into a folded half-size G5RV to log voice contacts with I5REA (Italy) 0737, OZ7AEI/P (Denmark) operating from Grisetaodde Lighthouse 0836, F6IWD (France) 0852, GM4LGR Jack in Glasgow 1015 and DG9BEM (Germany) at 1548UTC.

Roy Walker 2E0RAF in Cumbria uses a new Yaesu FT-897 transceiver with an 80m wire loop around his garden at an average height of only 1.5m, which is fed via a G5IJ transformer and is interfaced with a Yaesu FC40 antenna tuner. This set up is working very well looking at the large log submitted this month with SV8/G4EDG (Greece) on EU-113 at 1641 and T94DT (Bosnia & Herzegovina) at 2033 were worked on 7MHz while on 10MHz calls included HF675TA (Poland) 1045, 4N35CW (Serbia & Montenegro) 1618, 3A/N9NS (Monaco) 1628, J41A (Greece) 1650, W1MK (U.S.A.) Robye in Boxford, Massachusetts 1139 and later HB9Z (Switzerland) at 1915UTC all being worked even though Roy is also being kept busy with other radio activities having recently been appointed Air Training Corps Wing Radio Officer for Cumbria and North Lancashire. All c.w. man **Ted Trowell G2HKU** on the Isle of Sheppy, Kent found 9H3MR (Malta) EU-023 and VA5DX (Canada) Douglas in Clavet, Saskatchewan around 1700UTC using his Ten-Tec Omni V and full size G5RV.



Robye Lahlum W1MK in his shack who was worked by Roy Walker on 10MHz.

THE 14MHz BAND

On to 14MHz where new reporter **Richard Roberts MW0CPZ** in Whitemill, Carmarthen worked a huge number of stations using his Icom IC-756 ProII and Carolina Windom antenna. Voice contacts include SV9/HA6NL (Crete) EU-015 at 0858, DK1MAX (Germany) 0951, P40L (Aruba) SA-036 at 1246, YB9/DL3KZA (Indonesia) 1307, ZA/SP5EAQ (Albania) 1340, XU7TAS (Cambodia) 1420, XV2T (Vietnam) 1443, UA2FR (Kaliningrad) 1350, V26B (Antigua & Barbuda) NA-100 at 1808, 6Y2Z (Jamaica) NA-097 at 1823UTC.

Richard also enjoys RTTY and spent a good deal of time using this mode. Calls listed include RX8SS (Asiatic Russia) 0846, (EA4BT (Spain) 0911, CN8KD (Morocco) 1019, SM3JUR (Sweden) 1225, OH4LRP (Finland) 1242, C31BO (Andorra) 1257, IO1ARI (Italy) 1321, Z37M (Macedonia) 1358, EP3SMH (Iran) 1425, W4GKM/VP5 (Turks & Caicos Islands) 1503UTC.

In Nuneaton **Chris Colclough G1VDP** had voice contacts with OZ/DL2JRM/P(Denmark) on the Sjaelland Archipellago, EU-029 at 1127, J3/SP9BQJ (Grenada) NA-024 at 1616, 7X4AN (Algeria) 1701 and D44TD (Cape Verde Islands) AF-086 at 1959UTC using his Cushcraft MA5B mini beam and Yaesu FT-1000 Mark V Field. Another s.s.b. operator is **Martyn Medcalf M3VAM** in Chelmsford, Essex who used an Icom IC-746 and long wire antenna with SGC-237 auto tuner to work 4N0W (Serbia & Montenegro) 1205, YL7A (Latvia) 1209, CT8T (Portugal) 1214, S50K (Slovenia) 1233, YP3A (Romania) 1236 and K3LR (USA) Leslie in Patterson, New Jersey at 1959UTC.

THE 18 & 21MHz BANDS

As mentioned earlier new reporter Andy G0FTD in Whitstable, Kent has enjoyed some portable operations on the 18MHz band from his local beach. Using an Icom IC-706 with a 250Hz narrow filter installed for serious CW work and LDG Z100 auto tuner with 100W out and his 7m long vertical he managed PP5OW (Brazil), HI9CF (Dominican Republic) NA-096, XE2WW (Mexico), VE4XR (Canada) George in Manitoba, KG6JMJ (U.S.A.) in Santa Barbara, California and K1YCM/6Y5 (Jamaica). On 21MHz Ted G2HKU worked VY2TT (Canada), VP5W (Turks & Caicos Islands) NA-002 and N3RS (USA) Ronald in Glenmore, Pennsylvania all around 1600UTC on the 'key'while Chris G1VDP used s.s.b. logging 3B8/OM2TW (Mauritius) AF-049 at 0912, F6CAM (France) 1403, XE1KK (Mexico) 1605 and TI8CBT (Costa Rica) at 1619UTC.

Martin 2E0MCA found TF3ZA (Iceland) EU-021 at 1204 followed by 9A2YM (Croatia) at 1313 while Jim GM7TUD had just one s.s.b. contact with 5Z1A (Kenya) 0924 followed by a c.w. QSO with J79DW (Dominica) NA-101 a little later at 1324UTC. Conditions were reasonable for Martyn M3VAM who operated late morning with 3V5A (Tunisia) 1108, RF3A (European Russia) 1119, US3IZ (Ukraine) 1124, LZ9W (Bulgaria) 1127 and YO50HY (Romania) at 1151UTC all making the log.

THE 28MHz BAND

On the 28MHz band Jim GM7TUD found conditions 'reasonable' at times logging IH9P (Italy) 0956, 5Z4LS (Kenya) 1000, 6W1EA (Senegal) 1137, 4Z5LZ (Israel) 1151, 5U7JB (Niger) 1208, OZ1HXQ (Denmark) 1237 using s.s.b. and OH3RR (Finland) at 1848UTC using c.w. There was one contact here for Chris G1VDP with FR1AN (Reunion Island) AF-016 at 1215 while the RTTY of Richard MW0CPZ reached HA9RU (Hungary) 1314, I2VDX (Italy) 1318, 9A2CY (Croatia) 1322, YU7AM (Serbia & Montenegro) 1328, 9G5A (Ghana) 1350, DK0IU (Germany) 1357, UY1HY (Ukraine) at 1359 and one s.s.b. QSO at 1218UTC with 5X1VB (Uganda).

SIGNING OFF

Well that is all there is space for once again this month. Special thanks to all our reporters for sending in their logbooks and to **Tedd Mirgliotta KB8NW** editor of the *OPDX Bulletin* and **Mauro Pregliasco I1JQJ/KB2TJM** editor of the 425 DX Newsletter for the DX information. Until next time have a good DX filled month.

73 Carl GW0VSW

CARL MASON GW0VSW
12 LLWYN-Y-BRYN
CRYMLYN PARC
SKEWEN, WEST GLAMORGAN SA10 6DZ
Tel: (01792) 817321
E-MAIL: carl@gw0vsw.freeserve.co.uk

Data Burst

JACK WEBER LOOKS AT USING FIBRE OPTIC CABLES TO PREVENT INTERFERENCE AND AT HOW HELPFUL THE INTERNET CAN BE

A few months ago I wrote about how to avoid the r.f. interference that PCs and computer peripherals can cause to radio equipment. This prompted an interesting E-mail from **Geoff Rigby M0UNI**. Geoff lives in a flat where one of his neighbours is another Amateur, **M0DQS**. The two of them run an extensive computer network linking both their homes and providing a range of services including an on-line logbook and website hosting.

The easiest way to link-up such a network is by using ethernet cabling, but, as I mentioned in my previous article, r.f. interference is a real problem with ethernet. And it doesn't all go one way – as Geoff discovered, it wasn't only that he could hear the ethernet noise in his receiver but, whenever he was transmitting, his signal would knock out the computer network.

Geoff tried wireless networking, but found this insufficiently reliable. Although radio interference shouldn't be a problem with wireless networks, they do sometimes struggle to get through multiple walls and floors. Also, antenna positioning can be quite critical.

At a frequency of 2.4GHz, the wavelength is just 12.5 cm so even fairly small metallic objects can produce reflections and set up standing waves. The result may be a dead spot precisely where you want to place the wireless hub, even though signal levels nearby are very good. My own network took quite a bit of careful positioning. Though, having found the sweet-spots, it now works very reliably throughout the whole house. For Geoff, the solution was to replace all the ethernet cabling with high speed fibre optic cables, which are, of course, completely free of r.f. interference.

I deliberately didn't mention fibre optic networks in my earlier article because the hardware is generally considered to be for 'professional' rather then 'consumer' users, and so isn't very readily available at the usual computer shops and online retailers. What hadn't occurred to me was that quite a lot of this equipment finds its way onto eBay. Some of this is brand new and being sold by dealers, but there is also a fair amount of second-hand kit that's been pulled out of commercial installations. Obviously, you won't normally get a guarantee if its used equipment, but the prices that I've seen are very reasonable so the risk shouldn't be all that great. As with anything else on eBay, it's worth using sellers who seem to know what they're talking about and have a good feedback rating.

Although fibre optic networks use standard ethernet protocols – in other words, the pattern of binary ones and zeroes is the same as on a copper network – there are some important differences to bear in mind. The first is that the fibre optic connections are not bi-directional so you need two cables for each cabling run.

To be more precise, the actual fibre optic isn't fussed about which way the pulses are going, it's just that the transducers that fit on the ends are either receiver or transmitter, but not transceivers.

Transducers come in a unit known as a Media Converter because it converts electrical pulses to optical ones and vice versa. Some are available as PCI cards that fit inside the computer, but many come as small external boxes that need a normal ethernet cable to link them to the PC. Obviously, in this case, it's important to make this cable as short as possible and to keep the media converter well away from antenna feeders.

It's generally best to try and put matching media converters from the same manufacturer at each end of the fibre. With most computer connections you can plug together any mix of different manufacturers' equipment, using any make of cable, and be confident that it will all work. Fibre optics are more temperamental and you may end up with a pair of media converters that don't communicate very reliably. Often enough, it won't be a problem but, if you can buy matching pairs, that will reduce the risk.

The other point to bear in mind is that fibre optic cables can't be bent around tight corners. At worst this could break the fibre but, even if it doesn't, you'll certainly lose a lot of transmission at the corner. So do plan your cable runs in advance to ensure that gentle curves are possible and allow extra cable length to accommodate them. Most media converters and fibre optic cables will work up to 2km so, distance isn't a problem.

Overall, I think most people will find a wireless network less fiddly to set up and somewhat cheaper to install than fibre optics. However, if wireless doesn't work well in your situation, then the optical approach provides a very effective solution. And the fact that it's completely immune to r.f. makes it an obvious choice for Amateurs and s.w.l.s looking to minimise interference.

Fig 1: The Amateur Radio website of Geoff Rigby M0UNI has more information about his fibre optic computer network.

Thanks to Geoff for letting me know about his optical network. You can read more about it and see photographs of the installation on his Amateur Radio website, which you'll find at **www.netcentral.co.uk/~geoffana/radio/amateur_radio_01.html**

INTERNET USEFUL

We're all used to the Internet providing information and entertainment, but it can also be useful in other, less obvious, ways. Recently, I'd acquired a small selection of ferrite-cored baluns and r.f. matching transformers at an auction. Before putting any of them to use, I wanted to know what frequency ranges they would usefully cover.

The ferrite materials were unmarked so the obvious solution was to use a signal generator and oscilloscope, and to plot the results. At one time this would have involved a lengthy trawl through various teetering piles and cluttered drawers in search of a suitable piece of graph paper.

Not any more. These days, you can turn to the Internet whenever you need a piece of graph paper. There are several websites that provide accurate images of graph paper, which you can simply download and print in whatever quantity you need and it doesn't cost anything apart from the price of the paper and ink.

The above approach is particularly worthwhile if you need to produce something quite specialised such as a circular Smith Chart, which is used in transmission line design for plotting complex impedances. Of course, it's possible to buy Smith Chart paper, but you won't find it at your local stationers and buying a whole pad of the stuff may provide more than you'll need in a lifetime. The same applies to things like isometric paper for engineering drawings or hexagonal graph paper for... well, for whatever it is that hexagonal graph paper is used for.

There are quite a few sites that offer free graph paper images. Among the best ones for radio use I'd pick **http://www.engj.ulst.ac.uk/sidk/graph/graph.htm** which provides a range of log, log-lin and linear papers, as well as Smith Charts and a useful graticule image for sketching oscilloscope traces. Another good source is **http://www.pdfpad.com/graphpaper/** The default paper size on this site is US Letter, but there is an A4 option that you can select instead.

Once you start to look, you'll find dozens of esoteric graph papers ranging from Gumbel paper, which is apparently used by hydrographers for plotting the frequency of floods, to specialist designs for laying out knitting and tapestry patterns. If you can't find what you need – and I don't think that's very likely - there are also some programs available for generating your own custom designs.

Obviously, the quality of the graph paper you produce will depend on the quality of your printer. A 600 dpi laser printer will give very good results, but I wouldn't recommend using a cheap inkjet printer for anything except the coarser linear papers. Certainly something like a tightly packed log paper or Smith Chart will look pretty horrible from a budget inkjet. If you have to use one, be sure to get some good quality inkjet paper to minimise ink spread. It may seem expensive, but it's still cheaper than having to find and buy a whole pack, if you only need one or two sheets.

In my case, it quickly established that most of the ferrites I'd bought had a fairly even response up to about 8MHz, but a couple had definite peaks at around 4MHz. Just what I needed to know. Of course, I could have entered the measurements into a spreadsheet program, such as Microsoft Excel, which will plot a graph automatically. Excel is an expensive program though and, if you don't already have it, it would be hard to justify just for the occasional graph.

Printing your own graph paper means that you can create only as much as you need, when you need it, and you get access to a much wider range of specialist papers than any spreadsheet can offer. It's well worth trying the next time you need to plot a graph.

Jack

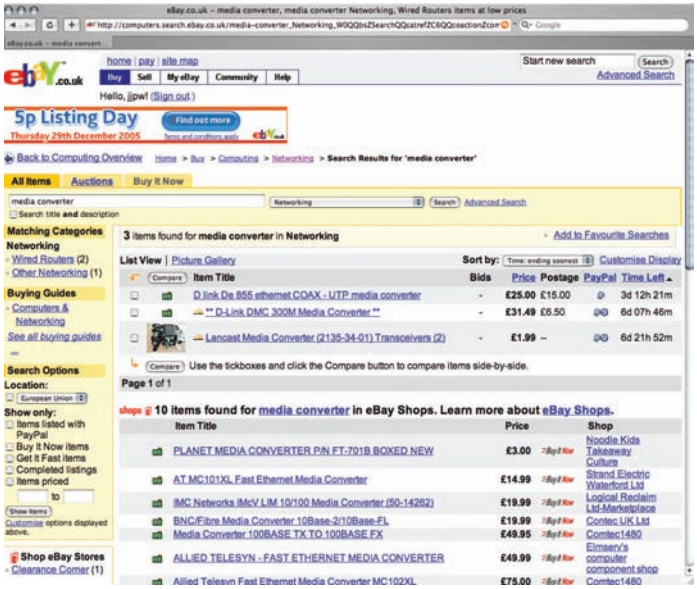


Fig. 2: The Internet auction site eBay is a good place to find affordable fibre optic media converters and cables.

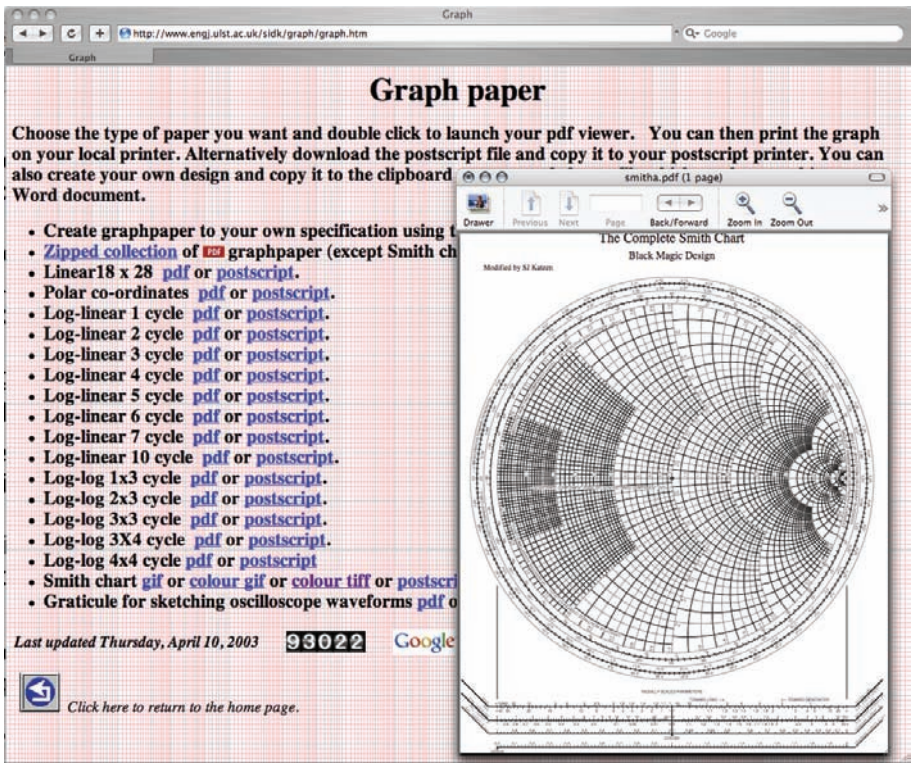
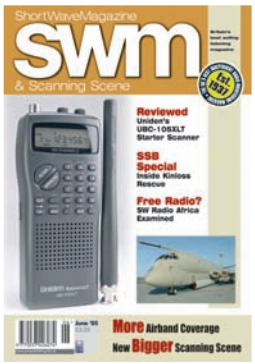


Fig. 3: There are several websites providing graph paper images that will be of use in radio and electronics.

JACK WEBER
C/O PW EDITORIAL OFFICES
ARROWSMITH COURT
BROADSTONE
DORSET BH18 8PW
E-MAIL: databurst@pwpublishing.ltd.uk

back issues
from PW Publishing Ltd

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



Short Wave Magazine and Radio Active have now combined to bring you the very best of both in radiouser - ON SALE NOW!

There are back issues of Short Wave Magazine and Radio Active available, plus current issues of RadioUser and not forgetting a huge selection of radio-related books, from our bookstore.

Practical Wireless Back issues are available too!

PW Publishing Ltd.

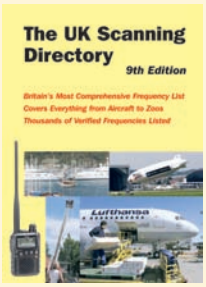
Quality, value for money hobby radio magazines.

Please call 0870 224 7830 for availability & prices.

the pw publishing

RADIO BOOK STORE

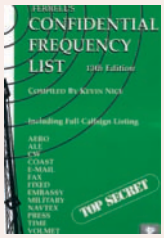
UK Scanning Directory - 9th Edition



This book will not disappointent!

The UK Scanning Directory is Britain's largest and best selling VHF/UHF frequency directory and the undisputed leader in the field. No other book dares to list so many frequencies and in such great detail. More details on page 47 of this issue.

Ferrell's Confidential Frequency List

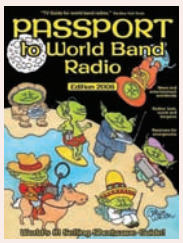


The 13th Edition of 'The Definitive HF Utility Guide' has been updated and includes MIL-STD-PSK modes, high speed HF E-mail services, extensive callsign listing, international call allocations, utility abbreviations and much more. **£21.50**

Klingenfuss 2005/6 Guide to Utility Radio Stations + FREE 2006 Supplement

One of the most comprehensive, reliable and up-to-date manuals containing over 11,200 frequencies, 1900 stations, meteo radiofax, radiotelex and NAVTEX schedules, abbreviations, frequency allocations and radio regulations. **£30.00**

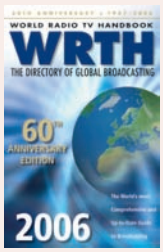
Passport to World Band Radio 2006



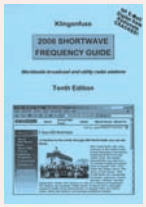
This book includes what's on world band radio, what to buy, how to get started and is written to make interesting reading. It contains a mix of articles, from an idiot's guide, to a five-minute start and ten easy catches to best times to listen. It also has a channel by channel guide to what's on the air. Everything the short wave broadcast listener needs to know. **£17.50**

World Radio TV Handbook 2006

A handy reference book that contains the names, addresses, programmes and frequency details of radio stations all round the world. Radio stations are listed under the country and all countries are split up into continents making it much easier to turn to the station you need. Also included are articles on HF broadcasting conditions, radio reviews and a section on how to use the book. **£22.50**



Klingenfuss Shortwave Frequency Guide 2006



Tenth Edition, 500 pages. There are over 9,000 entries covering broadcast stations world-wide and 10,000 entries covering utility stations world-wide. **£23.00**

Radio Listeners Guide

This handy annual publication contains radio product reviews and general information for listeners. Frequencies and locations of radio stations all over the UK and Ireland are given for BBC and commercial radio stations, as well as DAB services. All-in-all a very handy reference guide. **£5.45**

Airband

	Pages	Price	Code
AIRBAND RADIO GUIDE (abc) 6th Edition	122	£8.99	ABRG6
AIRBAND RADIO HANDBOOK (Sutton) David Smith	190	£12.95	ABRHB
AIR TRAFFIC CONTROL (ABC) 9th Edition		£8.99	ATC9
AIRWAVES 2005 (Photavia)	144	£10.95	AIR25
AIRWAVES SELCAL - CIVIL & MILITARY DIRECTORY (Photavia)	176	£11.95	AIRSEL
CALLSIGN 2005 (Photavia)	2005	£10.95	CAL25
CIVIL AIRCRAFT MARKINGS 2005 (abc) Alan Wright	368	£7.99	CIVAIR
FLIGHT ROUTINGS 2005 Williams	180	£10.00	FR25
MILITARY AIRCRAFT MARKINGS 2005 (abc) March & Curtis	-	£7.99	MILAIR
BRITISH ISLES ATLANTIC TRANSITION CHART (AERAD)	1020x520mm	£10.50	UKH6
BRITISH ISLES LOW ALTITUDE CHART (AERAD)	1020x520mm	£10.50	UKL2
NORTH ATLANTIC ROUTE CHART (AERAD)	1020x520mm	£10.50	NATHL1

Scanning & Shortwave Frequency Guides

BUYING A USED SHORT WAVE RECEIVER - 4th Edition. F. Osterman	78	£5.95	BUSWRX
FERRELLS CONFIDENTIAL FREQUENCY LIST 13th Ed.	540	£21.50	FERR13
KLINGENFUSS GUIDE TO UTILITY STATIONS 2005/6 plus free 2006 supp'	552	£30.00	KFUTIL
KLINGENFUSS SHORTWAVE FREQUENCY GUIDE 2006	496	£23.00	KFSWFG
KLINGENFUSS SHORTWAVE FREQUENCIES CD 2006.	-	£17.00	KFSWCD
PASSPORT TO WORLD BAND RADIO 2006 (IBS)	592	£17.50	PASS26
RADIO LISTENERS GUIDE 2006	160	£5.45	RLG26
SCANNERS 4 SCANNING INTO THE FUTURE. Bill Robertson	245	£9.95	SCAN4
THE ESSENTIAL GUIDE TO SCANNING. Martin Peters.	108	£6.00	EGTS
UK SCANNING DIRECTORY - 9th Edition	544	£19.75	UKSD9
WORLD RADIO TV HANDBOOK 2006 (WRTH)	688	£22.50	WRTH26

Antennas/Transmission Lines/Propagation

25 SIMPLE INDOOR & WINDOW AERIALS			
E.M. Noll (Babani)	50	£1.75	BP136
25 SIMPLE TROPICAL & MW BAND AERIALS			
E.M. Noll (Babani)	54	£1.75	BP145
AN INTRODUCTION TO RADIO WAVE PROPAGATION			
J.G. Lee (Babani)	116	£3.95	BP293
ANTENNA FILE (RSGB)	285	£18.99	ANTFIL
ANTENNA TOOLKIT (inc. CDROM). Joseph J. Carr	214	£25.00	ANTOOL
ARRL ANTENNA BOOK (inc. CDROM) 20th Edition	944	£32.00	RRAB20
BACKYARD ANTENNAS. Peter Dodd G3LDO (RSGB).	200	£18.95	BYANTS
BASIC RADIO PRINCIPLES & TECHNOLOGY.			
Ian Poole G3YWX	262	£15.99	BRPRIN
EXPERIMENTAL ANTENNA TOPICS. H.C. Wright.	70	£3.50	BP278
HF ANTENNA COLLECTION. Edited by Erwin David			
G4LQI (RSGB)	233	£19.95	HFANTC
INTERNATIONAL ANTENNA COLLECTION			
G. Brown M5ACN (RSGB)	250	£11.95	IANTC
INTERNATIONAL ANTENNA COLLECTION 2.			
G. Brown M5ACN (RSGB)	200	£11.95	IANTC2
MORE WIRE ANTENNA CLASSICS (ARRL)	200	£10.50	MWANTC
RADIO PROPAGATION PRINCIPLES & DESIGN.			
Ian Poole G3YWX	102	£14.95	PROPPR
RECEIVING ANTENNA HANDBOOK. Joe Carr (HighText)	189	£17.50	RXANHB
VHF UHF ANTENNAS. Ian Poole G3YWX (RSGB)	128	£13.99	VUANTS
WIRE ANTENNA CLASSICS (ARRL)	200	£10.50	WANTC

Beginners/Licence/Manuals

ADVANCE! THE FULL LICENCE MANUAL.			
Alan Betts GOHIQ & Steve Hartley GOFUW (RSGB)	104	£11.99	ADCFLM
AMATEUR RADIO EXPLAINED. Ian Poole G3YWX			
(RSGB)	150	£9.90	AREXPL

25 Simple Tropical & MW Band Aerials

This concise book describes how to build 25 simple and inexpensive antennas for operation on the medium wave broadcast band (550 - 1600kHz) and on the 60, 75, 90 and 120 metre tropical bands. There are also designs for the 49m band. **£1.75**

An Introduction to Radio Wave Propagation

This book provides a broad, yet clear picture of radio wave propagation in a consise way without the use of too much technical language or mathematics. Included are explanations of the phenomena that is propagation dealing with everything from the Sun, through the ionosphere to noise. **£3.95**

ARRL Handbook

Radio amateurs and professionals rely on The ARRL Handbook for current antenna theory and a wealth of practical, how-to construction projects. This 20th edition is extensively revised and includes contributions from leading antenna experts. Many designs are the result of the latest advances in computer modelling. **£32.00**

Antenna Toolkit

This book acts as a miniature antenna manual with very good technical explanations without ever over-doing the maths for the not-so-keen mathematicians! The drawings and illustrations are very clear and the section on instrumentation is very helpful. **£25.00**

RSGB Yearbook 2006

UK & Ireland callbook. Everything you need is covered within its pages: contact names, addresses, phone numbers, websites and E-mail addresses. Supplied with a DVD entitled 'RSGB Today' that has a running time of 22 minutes. **£16.95**

Receiving Antenna Handbook

Your receiver is only as good as your antenna or so says the author of this book. It is a complete guide to high performance receiving antennas for long wave all the way to the upper end of the short wave spectrum. The designs aren't slightly modified amateur transmitting antennas but ones intended specifically for receiving purposes. **£17.50**

The Amateur Radio Operating Manual

This new edition of the RSGB Operating Manual reflects the huge impact in the past few years of licensing changes and the ubiquity of PCs and the internet. To deal with these, the author has taken a completely new look at the content and approach. For example, some of the traditional demarcations between HF and VHF and between the various operating modes have been overturned, but new and comprehensive chapters on topics such as PCs in the shack and Operating Modes added. **£19.95**

VHF/UHF Antennas

With both the basic theory and constructional details for many antenna designs, the reader is taken through the essentials in an easy-to-understand way. All kinds of antennas are described from dipoles to Yagis and verticals to log periodic designs. **£13.99**

AN INTRODUCTION TO AMATEUR RADIO.			
I.D. Poole (Babani)	150	£4.99	BP257
FOUNDATION LICENCE NOW! Alan Betts G0HIQ (RSGB)	32	£4.99	FLNOW
HF AMATEUR RADIO. Ian Poole G3YWX (RSGB)	120	£13.99	HFAR
INTERMEDIATE LICENCE - BUILDING ON			
THE FOUNDATION Steve Hartley GOFUW (RSGB)	76	£6.99	INTLIC
SECRET OF LEARNING MORSE CODE. Mark Francis (Spa)	84	£6.95	SOLMC

Design & Construction

COIL DESIGN & CONSTRUCTION MANUAL (Babani)	106	£3.95	BP160
PRACTICAL PROJECTS. G. Brown M5ACN (RSGB)	208	£13.95	PRPROJ
PROJECTS FOR RADIO AMATEURS & SWL. R.A. Penfold (Babani)	92	£3.95	BP304
RADIO & ELECTRONICS COOKBOOK (RSGB-Newnes)	319	£16.99	RECOOK

RF COMPONENTS & CIRCUITS. Joe Carr (RSGB-Newnes)	398	£22.50	RFCOMP
TECHNICAL COMPENDIUM (RSGB)	288	£17.99	RSTECO
THE ART OF SOLDERING. R. Brewster (Babani)	84	£3.99	BP324
UNDERSTANDING BASIC ELECTRONICS (ARRL)	314	£15.50	UNDBEL
THE SUPERHET RADIO HANDBOOK. I.D. Poole (Babani)	104	£4.95	BP370

Shack Essentials

AMATEUR RADIO MOBILE HB. P. Dodd. (RSGB)	114	£14.99	MOBHB
AMATEUR RADIO (VALUE) LOGBOOK (RSGB)	80	£4.95	TXLOG
ARRL HANDBOOK 2005 inc CD	1152	£32.00	RRHB25
ARRL OPERATING MANUAL 7th Edition (WSL)	420	£18.50	RROPM
DIGITAL MODES FOR ALL OCCASIONS. M. Greenman. (RSGB)	208	£16.95	DMFAO
GREAT CIRCLE MAP (PWP)	400 x 400mm	£1.50	GCMAP
LF TODAY - GUIDE TO SUCCESS 136kHz. M Dennison (RSGB)	128	£11.95	LFTOD
RADIO AMATEURS MAP OF THE WORLD	-	£8.00	ARMAPW
RADIO AMATEURS WORLD ATLAS (A4 size) (DARC)	20	£8.00	ARWAT
RSGB AMATEUR RADIO OPERATING MANUAL (RSGB)	224	£19.95	OPMAN
RSGB PREFIX GUIDE (RSGB)	34	£8.95	PFXGDE

Foundation Licence Now!

A 32-page soft-covered book that takes you through the syllabus, reinforcing what you will learn on the foundation Course. The course has been designed and introduced for people of all ages and abilities. To take the course you need no formal qualifications. **£4.99**

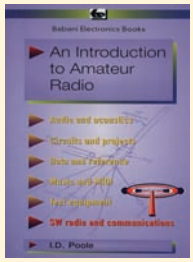
Intermediate Licence Building on the Foundation

The second course book in the RSGB's series, which is structured to progressively obtaining an Amateur Intermediate Licence, this book contains practical exercises, broken down into half-hour worksheets. The ideal companion book for all Amateur Radio Intermediate Licence students. **£6.99**

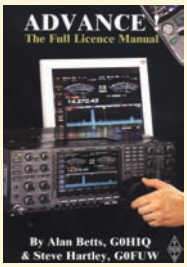
HF Amateur Radio

This could be the considered as the natural 'follow-on' volume to accompany Basic Radio Principles & Technology. Aimed at the more active radio amateur who is just beginning to get to grips with their new HF transmitting station, it will also appeal to the newcomer. **£13.99**

An Introduction to Amateur Radio

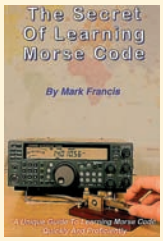


Amateur radio can be a fascinating hobby that has attracted many people all around the world. It encompasses a wide range of subjects from the historical to the latest technology and from operating to construction. Perfect for the fledgling enthusiast. **£4.99**



Advance! The Full Licence Manual

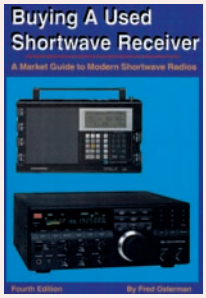
This is the third course structured to obtain an Amateur Radio Licence. Advance is the final stage in gaining the full licence and has been updated to suit the new syllabus structure. Broken down into logical sections, it's presented in an easy-to-understand way, making it perfect for home study. **£11.99**



Secret of Learning Morse Code

Don't be fooled, the requirement for Morse may have been removed, but Morse code still has a place in the scheme of things for the radio amateur. It can consistently be used to 'talk' to others around the world, you don't even need to speak their language to hold a conversation. **£6.95**

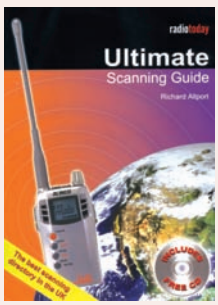
Buying a Used Shortwave Receiver



Buying a second hand radio can provide great savings if you have the facts. This book provides the information you need to intelligently select the right short wave receiver at the right price. It contains information on the 100 most commonly traded short wave radios both portable and table top models. **£5.95**

Ultimate Scanning Guide & CD

For those not familiar with Scanning directories, this book provides a simple way to work out exactly who is broadcasting on a given frequency. The reader is provided with clear guidance as to what is available to listen to and what should be avoided. This makes the Radio Today Ultimate Scanning Guide the most accurate and useable directory available. The book also contains a free searchable frequency CD. If you are a long standing scanning enthusiast or new to the hobby then you will find this book a 'must have' for your book shelf . **£19.95**



Scanners 4 Scanning into the Future

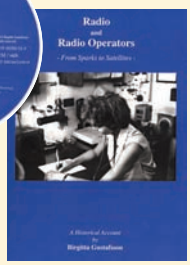
Scanners 4 includes radio spectrum changes and frequency allocations so you know exactly where to listen. Chapters are devoted to Low-Earth Orbiting satellites, the use of personal computers digital and computer-controlled radio communications, as well as a comprehensive section on available scanners and acessories. **£9.95**

The Essential Guide To Scanning

Aimed at beginners to scanning this 108 page publication should help you to get the most out of hobby listening. Topics covered include: Choosing a scanner and understanding its features, antennas, accessories, what to listen for and where and much more. **£6.00**

Book Review

Radio & Radio Operators From Sparks to Satellites by Birgitta Gustafsson



Rob Mannion G3XFD takes a look at a truly fascinating book by a Swedish author who unwraps the history of marine radio operating. Rob found the book to be totally absorbing, and in some cases shocking - particularly the number of innocent lives lost in neutral shipping during the Seond World War.

Rob G3XFD writes: The word neutral often conjures up the impression of a nation, or an invidual who steps back from an argument and simply obseves, often making some form of profit from the neutrality. Unfairly perhaps, neutral nations have been stigmatised for their apparent aloof approach but behind the scenes a terrible price has often been paid as those nations attempt to maintain their neutrality, allow their own commerce to continue and be fair to all. Such is the case of Sweden and its large shipping fleet, which in the days when ships carried radio operators - often led to heroic actions and dreadful loss of life.

Birgitta Gustaffson's book is truly fascinating. When I first saw the book only the Swedish language edition was available, but even then - with the help of a Swedish/English dictionary I was able to discover how brave the merchant seamen (and women) were during the war. Covering from the very earliest days, the book is filled with stories of radio operators (the Swedes were pioneers in using female radio officers at sea) through the First World War and on to the next major conflict, bringing us up to modern times.

The main book is if course in Swedish (details on translation, etc., at end of review). The publishers fortunately then provided me with an excellent English translation, it was then that the full impact of the early days, and the tragedies became fully apparent. In fact, one of the best aspects of this beautifully printed hardback book is that many individual radio officers - and their equipment- are features. No nameless statistics here - the human story is there for the reader to absorb. From radio operating in the Antarctic to Amateur Radio - it's all there.

However, by far the most poignant aspects for me have to be the occasions when neutral Swedish ships were attacked by Axis forces and the Allies during the Second World War. Even in those days - the neutral Swedish flag didn't guarantee safety. Who said belligerence was a product of recent years? If you want to see and read an excellent pictorial history of marine radio - with many personalities and their dramatic stories - I thoroughly recommend this book to you. It's well worth learning Swedish to read and absorb a lot of important, poignant work. Superb reading, very highly recommended.

A limited number of these collectable hardback Swedish books are available complete with a printed English translation and a CD with printable PDF files for £25 plus P&P.

RSGB YEARBOOK 2006 Edition (RSGB)	504	£18.95	RSYB26
CALLSEEKER GB AMATEUR CALLSIGN LISTING CD 2006		£14.95	CALLCD
RECEIVING (VALUE) STATION LOGBOOK (RSGB)	80	£4.95	RXLOG

Microwaves

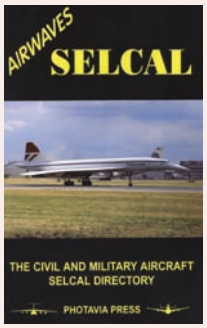
AN INTRODUCTION TO MICROWAVES. F.A. Wilson (Babani)	134	£3.95	BP312
INTERNATIONAL MICROWAVE HANDBOOK. A. Barter (RSGB-ARRL)	474	£24.95	IMWHB

QRP

LOW POWER COMMUNICATIONS 2nd Edition (ARRL)	240	£13.95	LPCOM
LOW POWER SCRAPBOOK (RSGB)	320	£12.99	LPSCRA
QRP BASICS. George Dobbs G3RJV (RSGB)	204	£14.95	QRPBAS

Air Traffic Control 9th edition

Apart from visits to airports, the only contact point between the enthusiast and the actual world of air traffic control is through an airband radio. This book has been written to give the reader an understanding of the voice messages you hear. **£8.99**



Airwaves Selcal

Containing over 13000 civil and military aircraft Selcals this publication is a must for all aviation listening enthusiasts. The information is provided in three different ways: Selcal order, Airline/Operator then registration order and airline or Operator Decode. A handy reference book that should be sitting next to your h.f. receiver - order yours today! **£11.95**

Air Band Radio Guide 6th Edition

Fully updated, this is a comprehensive handbook for the well-informed aviation enthusiast on the subject of air to ground radio. The subjects covered include the legal position of the listener, airband receivers, antenna systems, HF radio, an airfield directory, en route frequencies weather broadcasts and 8.33kHz channel spacing. **£8.99**

Military Aircraft Markings 2005

This annual pocket favourite has been revised with a huge number of changes that have affected military serials over the past year. If you can see it or hear it, MAR 2005 will tell you who runs it or owns it! The accuracy of the contents can be relied on. **£7.99**

Callsign 2005 9th Edition

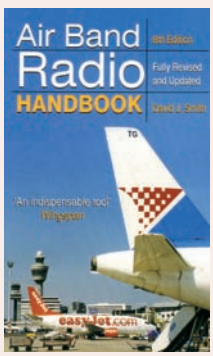
Civil and military aviation callsign directory, fully updated with over 3000 additions and changes. It's A5 and spiral bound for ease of use and contains over 8000 aviation callsigns. **£10.95**

Civil Aircraft Markings 2005

Now fully revised for 2005 this book lists the UK civil aircraft callsigns alphabetically as well as overseas aircraft too. Details such as the callsign, type of aircraft, the owner or operator and any extra notes that are applicable. **£7.99**

Airwaves 2005 11th Edition

This A5, spiral bound book has been updated with all the latest airband information for the civil and military aviation enthusiast. It contains frequency information, airfield information as well as military frequencies and VOLMET information. **£10.95**



Air Band Radio Handbook

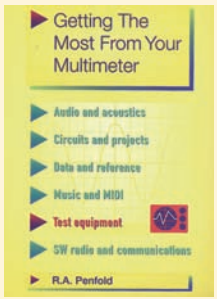
For over 15 years The Air Band Radio Handbook has been regarded as the essential reference source for ground-based air band listeners and flyers. Now fully updated this book is an indispensable guide to every air band enthusiast. **£12.95**

Flight Routings 2005

The A to Z guide to airline flights within the UK. Now in its 15th edition, this book continues to pack its pages with all the information air band listeners could ever wish for. Flight details for airlines including schedules, charter and freight flights. **£10.00**

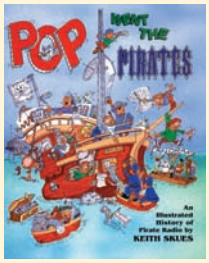
Back Issues & Photocopies

We have a limited selection of back issues. However, if you are looking for an article or review that you missed first time around and we don't have the whole issue, we can supply a photocopy of the article.



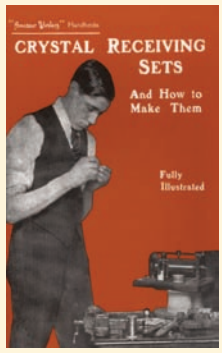
Getting the Most from Your Multimeter

The multimeter's capabilities are often overlooked by many owners, there's much they can do other than continuity testing! The book discusses how you can choose a meter, the advantages and disadvantages of analogue and digital types and then leads you through the many tests they can perform. **£4.99**



Pop Went the Pirates

This book sets out to produce the definitive history of pirate radio ships, with a comprehensive account from the earliest pirates in the 1930s to the present day. The text is illustrated with 230 black and white photographs, many of which have never been published before. You can find out about the ships and forts that played such important roles in changing radio broadcasting into the format that exists today. **£14.99**



Crystal Receiving Sets

This handbook deals, in a simple, straightforward manner, with the making of a number of different kinds of crystal sets representative of those in present-day use. Basically, everything you need to know regarding valve and crystal sets and how to make components. **£7.95**

VHF & Higher

ALL ABOUT VHF AMATEUR RADIO. W. I. Orr W6SAI (ARRL)	163	£8.95	AAVHF
GUIDE TO VHF/UHF AMATEUR RADIO. Ian Poole G3YWX (RSGB)	180	£8.99	GTVUHF
VHF/UHF HANDBOOK. Dick Biddulph G8DPS (RSGB)	180	£22.00	VUHFHB

Crystal Sets

CRYSTAL RECEIVING SETS & HOW TO MAKE THEM (Lindsay)	124	£7.95	XTHTM
CRYSTAL SET LOOPERS, A THREE TUBER & MORE Volume 8 Xtal Set Society Newsletter	128	£10.50	XTLOOP
CRYSTAL SET BONANZA Vol 9, 10 & 11 Xtal Set Society Newsletter	226	£15.00	XTBONZ
THE XTAL SET SOCIETY NEWSLETTER Volume 1 & 2 Combined. Phil Anderson WOXI	96	£14.00	XTNL12
THE XTAL SET SOCIETY NEWSLETTER Volume 4. Phil Anderson WOXI	88	£7.00	XTNL4
THE XTAL SET SOCIETY NEWSLETTER, Volume 5. Phil Anderson WOXI	88	£7.00	XTNL5

Historical

100 RADIO HOOK UPS 2nd Edition (reprinted)	48	£3.35	100RHU
1934 OFFICIAL SHORT WAVE RADIO MANUAL. Edited by Hugo Gernsback (Lindsay Publications) (WSL)	260	£11.85	1934SW
AMATEUR RADIO - A BEGINNERS GUIDE (1940 REPRINT) (Lindsay Publications). Douglas Fortune W9UVC	156	£7.70	ARABG
COMMUNICATIONS RECEIVERS - THE VACUUM TUBE ERA. R.S. Moore	141	£17.95	COMRXV
MARCONI'S ATLANTIC LEAP (H/B). Gordon Bussey (Marconi)	96	£6.99	MALEAP
POP WENT THE PIRATES. Keith Skues	568	£14.99	POPPIR
RADIO & RADIO OPERATORS FROM SPARKS TO SATELLITES. (Package with Swedish hardback book. English spiral-bound translation and CD with printable PDF files) Birgitta Guftafsson	255	£25.00	RRO
SAGA OF MARCONI OSRAM VALVE (Paperback). B.Vyse & George Jessop.	346	£25.00	SMOV

Valves

HOW TO BUILD THE TWINPLEX REGENERATIVE RECEIVER. T.J. Lindsay	63	£6.75	HTBTRR
HOW TO BUILD YOUR FIRST VACUUM TUBE REGENERATIVE RECEIVER. T.J. Lindsay	127	£8.25	HTBFVA
HOW TO BUILD YOUR RADIO RECEIVER (A4) (Popular Radio Handbook No. 1)	100	£6.70	HTBYRR
HOW TO MAKE A NEUTRODYNE RECEIVER. Webb	63	£5.95	HTMNRX
SECRETS OF HOMEBUILT REGENERATIVE RECEIVERS C.F. Rockey	127	£8.75	SHBRRX

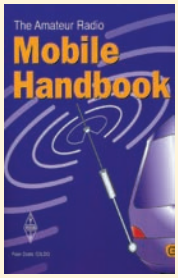
Electronics

ELECTRONIC PROJECT BUILDING FOR BEGINNERS. R.A. Penfold (Babani)	110	£4.95	BP392
GETTING THE MOST FROM YOUR MULTIMETER. R.A. Penfold (Babani)	102	£4.99	BP239

mail order...huge range in stock...fast delivery...

Binders

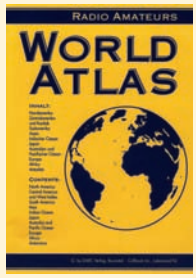
Practical Wireless	£6.50	BINDPW
Short Wave Magazine	£6.50	BINDSW



The Amateur Radio Mobile Handbook
Every aspect of mobile working is covered from basic bicycle mobile to the maritime operations for the keen sailors who abound in amateur radio. Extremely well illustrated with many photographs, diagrams and charts. **£14.99**

Great Circle Map
A Great Circle map centred on London, UK. Find direction and distances to any part of the world quickly and efficiently via the shortest hop. Invaluable shack aid. **£1.50**

Radio Amateurs World Atlas
Each country has the respective prefix shown on both the map and in an alphabetical list. Sixteen pages of maps from the North to the South Pole! **£8.00**



how to order

By Post: Write to the Book Store, remembering to include your name, address, daytime telephone number and payment details (Sterling, cash not accepted), at:
Book Store, PW Publishing Ltd., Broadstone, Dorset BH18 8PW.
By Telephone: Call the Book Store, Monday to Friday 9am to 4pm. Outside these hours your order will be recorded on an answerphone. **Call: 0870 224 7830**
By Fax: If you wish to FAX your order to us please mark it for the attention of the Book Store and send it to: **FAX: 0870 224 7850**
By E-mail: bookstore@pwpublishing.ltd.uk
Photocopies & Back Issues: To order a Back Issue please call the Order Line to check availability. We can photocopy articles from issues that are not available and we have a Review List going back years!
Back Issues (non-current): *SWM* @ £5.00 (£5.50), *PW* @ £4.75 (£5.25), *RA* @ £4.60 (£5.10).

Postal Charges: (UK) one item £1.75 / Two or more items £2.75.
EUR/RoW: One item £2.75 / two or more items add 75p for every item.
Review List: £2* (* includes P&P - add a further £1 for EUR/RoW)
Photocopies / Reprints: (Articles over 3 years old) £3.00, UK £4.00 overseas

E&OE

order form

Photocopies are acceptable

Please send me the following books:

.....Code ..... Price (£).....
.....Code ..... Price (£).....
.....Code ..... Price (£).....
.....Code ..... Price (£).....
.....Code ..... Price (£).....
.....Code ..... Price (£).....
.....Code ..... Price (£).....
.....Code ..... Price (£).....

Total cost of Books Ordered: .....Price (£).....

Postage Charges
Please remember to add postage to your order. (£).....

UK
£1.75 P&P for one item, £2.75 for two or more (UK)

Airmail
£2.75 P&P for one, £4.25 for two, 75p extra per item for three or more

Total cost of order including postage.....Price (£).....

Send this completed form to:

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

Payment Details. Please note: For security purposes, you must include your house number and postcode.

Name .....

Address.....

.....

.....

Postcode.....

Telephone (Daytime) .....

I enclose my Cheque/Postal Order for £.....

(Cheques MUST made payable to PW Publishing Ltd.)

MasterCard DELTA AMERICAN EXPRESS VISA

or please debit my Access/Visa/Amex

☐☐☐☐ ☐☐☐☐ ☐☐☐☐ ☐☐☐☐

Expiry Date ..... Security No. ☐☐☐

or please debit my Maestro/Solo Maestro

☐☐☐☐ ☐☐☐☐ ☐☐☐☐ ☐☐☐☐ ☐☐☐

Expiry Date ..... Security No. ☐☐☐

Start date ..... Issue No (if on card).....

Signature.....

Orders are normally despatched by return of post but please allow 28 days for delivery. Prices correct at the time of going to press.
Please note: all payments must be made in Sterling, cash not accepted.

Classified Ads

To advertise on this page see the booking form below.

DISCLAIMER Some of the products offered for sale in advertisements in this magazine may have been obtained from abroad or from unauthorised sources. *Practical Wireless* advises readers contemplating mail order to enquire whether the products are suitable for use in the UK and have full after-sales back-up available. The publishe s of *Practical Wireless* wish to point out that it is the responsibility of readers to ascertain the legality or otherwise of items offered for sale by advertisers in this magazine.

Whilst prices of goods shown in advertisements are correct at the time of going to press, readers are advised to check both prices and availability of goods with the advertiser before ordering from non-current issues of the magazine.

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

Valves

VALVES AND ASSOCIATED COMPONENTS Available from stock as well as manuals and service information. Phone or SAE for your requirements. Chevet Book Supplies, 157 Dickson Road, Blackpool FY1 2EU.
Tel: (01253) 751858 or Fax: (01253) 302979.
E-mail: chevet@globalnet.co.uk

VALVES:- OVER 50000 STOCKED Ham, Vintage, Military, Audio. SAE for FREE list to: Wilson Valves, (Jim Fish G4MH), 28 Banks Ave., Golcar, Huddersfield, West Yorks HD7 4LZ.
Tel: 01484 654650/649380/650725.
Mobile:- 07733 283084.
Fax: 01484 655699.
E-mail: wilsonv@zoo.co.uk
Visa etc. Fast & personal service.

VALVES AND ELECTRONIC COMPONENTS Large stocks. Send for list to: Stuart Scott, 19 Portway, Steyning, W. Sussex BN44 3QF.
E-mail: triumph.76@btinternet.com

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

TOP PRICES PAID

for all your valves, tubes, semi-conductors and ICs.

Langrex Supplies Ltd.

1 Mayo Road, Croydon, Surrey CR0 2QP.

TEL: 0208-684 1166. FAX: 0208-684 3056.

Repairs

REPAIRS TO ALL AMATEUR AND VINTAGE Rx/Tx Cost effective service. Phone or call in for details. Medway Aerials, Rear of 14 Luton Road, Chatham, Kent ME4 5AA.
Tel: 01634 845073.

REPAIRS TO ALL AMATEUR EQUIPMENT call for details. G0PGY Electronics, 56 Bassenhally Road, Whittlesey, Cambs PE7 1RR. 01733 351538.

Aerials

GAREX ELECTRONICS VHF/UHF accessories and aerials, PMR equipment and spares. www.garex.co.uk
Tel: 0771 4198 374
PO Box 52, Exeter EX4 5FD.

Antennas

VARGARDA ANTENNAS ARE BACK! All antennas are pre-tuned. NO matching required. UK Distributor, Steve Burrows M5BXB. www.qsl.net/m5bxb
E-mail: steve.m5bxb@ntlworld.com
Tel: 01992 623335

Societies

ROYAL NAVAL AMATEUR RADIO SOCIETY seeks your support and membership. Qualify? Join today!
www.rnars.org.uk

For sale

Qtz x-tals 455kHz to 150MHz Std 10.106, 10.245, 10.7, 11.155MHz £1.00/unit. Callg 3.56, 7.030, 21.06, 28.06 £1.00/unit. 1.4MHz fltrs £14.00. 10.7MHz 10kHz fltrs £3.25 P&P £1.00 + VAT. IQ Electo 0208 391 0545. vincent@jakomin.fsnet.co.uk

Wanted

OLD HALF INCH FERRITE RODS Must be half inch in diameter and be six inches long or more. Tel: Peter Tankard 0114 2316321.

OMRON RELAY LZN20312VDC for the repair of SEM Transmatc aerial tuner. Tel: 01305 770139.

WANTED FOR CASH

COMMUNICATION RECEIVERS

Valve or solid state – working or not. Older or obsolete amateur radio equipment. Transceivers, station accessories, etc. Ex-Govt. wireless equipment. Radio books and magazines. We can collect anywhere in U.K. We also have a selection of the above items for sale in our shop. Open Tuesday, Thursday, Friday and Saturday 10am-6pm. Prior phone call before visiting appreciated.

Chevet Supplies, 157 Dickson Road, Blackpool FY1 2EU. Tel: 01253 751858. Fax: 01253 302979.

E-mail: chevet@globalnet.co.uk

QSL Cards

FULL COLOUR QSL CARDS for all your QSL needs. Shirts and caps with callsigns and also ham cartoons by GW3COI. For free samples contact Chris M0DOL. E-mail: qslers@aol.com P.O. Box 184 Northampton NN3 9JH

ORDER FORM FOR CLASSIFIED ADS

PLEASE WRITE IN BLOCK CAPITALS

The prepaid rate for classified advertisements is 42 pence per word (minimum 12 words), box number 70p extra. Semi-display setting £13.90 per single column centimetre (minimum 3cm). Please add 17.5% 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: 0870 224 7820, Fax: 0870 224 77850.

Please insert this advertisement in the ..... **issue of Practical Wireless** (if you do not specify an issue we will insert it in the next available issue of PW) for ..... insertion/s. I enclose Cheque/P.O. for £.....(42p per word, 12 minimum, please add 17.5% VAT to total).

Name: .....
Address: .....
.....
.....
.....
Telephone No.: .....
Box Number @ 70p: Tick if appropriate ..... ☐
Category heading: .....

Please photocopy this form or write on a separate sheet if you prefer

Bargain Basement

SEND YOUR ADVERT TO:-
***PRACTICAL WIRELESS*, BARGAIN BASEMENT, ARROWSMITH COURT, STATION APPROACH, BROADSTONE, DORSET BH18 8PW**

For your advert in Bargain Basement please remember to include your dated, coloured corner flash from this page along with your entry.

YOUR ATTENTION PLEASE!

Bargain Basement rules - £4 per advert

Please write your advert **clearly** in **BLOCK CAPITALS** up to a maximum of **30 words**, plus **12 words f**or your contact details on the form provided and send it together with the dated corner flash and your **payment of £4** (**subscribers** can place their advert **free of charge** as long as they provide their **subs number and corner flash**), cheques should be made payable to **PW Publishing Ltd.**, credit card payments also accepted.

Send your advert to **Bargain Basement, Practical Wireless, Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW** or E-mail your advert to **peter@pwpublishing.ltd.uk** (If you don't want to include your credit card details on your E-mail, just 'phone us on **0870 224 7820**.

Please help us to help you by preparing your advert carefully. Any advert which contains **??** marks indicates that the advertiseng dept. could not read/interpret the wording.

Please avoid FAXing your advert - it could delay publication.

Advertisements from traders or for equipment that it is illegal to possess, use or which cannot be licensed in the UK, will not be accepted. **No responsibility will be taken for errors and no correspondence will be entered into on any decision taken by the Editor on any of these conditions.**

You should state clearly in your advert whether equipment is professionally built, home-brewed or modified.

The Publishers of *Practical Wireless* also wish to point out that it is the responsibility of the buyer to ascertain the suitability of goods offered for purchase.

FOR SALE

BHI NES-10-2 DSP noise eliminating speaker, eight filter settings. Brand new, bought 3.10.05, cost £99.95. Sell £60 inc P&P. Tel: John 01204 301502 (Bolton).

COBRA 40 EH ANTENNA 7.0-7.1MHz. very compact 930x125mm. Never used and still boxed. No ATU required. 2KW SSB/CW. £80. Buyer collects or pays postage. Tel: Alan 07715 709208 (Nottingham) or E-mail: alan.matthews@g0slz.com

CT-160 VALVE TESTER, AR88 set unused, spare valves. Shure military hand-mic type SW-109. Russian communications receiver type R-326. All item VGC. Tel: Richard 01895 270772 (Uxbridge).

DENTRON MT-3000A ATU, 3kW, large manual, £150 o.n.o. Collect , carriage extra. Many other items for sale. E-mail for list. Tel: G4DED 07775 981088 (Oxfordshire). E-mail: g4ded@ukonline.co.uk

KENWOOD R-2000 RECEIVER HF/VHF very good condition. Receive 0-30MHz amateurs plus marine airband. 2 metre, some books, LSB, USB, AM/FM, CW. Memories tuning speeds, two clocks, lovely radio, £200. Tel: 01608 663745 (Warwickshire).

KENWOOD TS-2000X (X = 23cm) boxed with manual. Ill health forces sale, £1250. Tel: Martin Juhe 2E0MJD QTHR 07973 793770 (Knebworth). E-mail: 2e0mjd@mjdesignprint.com

KENWOOD TS-5700 HF transceiver, VGC, boxed, manual, £500. Watson PSU, new, £60. Nevada TM-1000 1kW ATU as new, £100. Tel: G3NYD 01278 789692 (Somerset).

OSKER BLOCK SWR METER. Osker SWR 200. 52/75Ω, power range to 2kW, mint, £20 including postage and packing. Tel: Arthur GM4LBE 01595 694270. E-mail: arthurtait@tiscali.co.uk

RADIO TELEVISION COMPONENTS including valves, resistors, condensers, transformer switches, etc. Also magazines, books, service sheets, etc. Collected over the past 50 years. Offers invited for job lot. Buyer collects. Tel: Roy 01704 508779 (Southport, Lancashire).

SIMPSON MODEL 260 multimeter analogue dial case size 7 x 5 x 4". Good condition, no manual, £50. Crystal set 1920s/30s ebonite panel coil in coil tuning, headphones, crystals, in wooden case. Requires TLC, £50. Tel: 01241 878182 (Angus, Scotland).

SONY CRFV-21 all-mode, mint condition. Slight fault but working. Realistic offers. Yaesu FT-101ZD clean condition, working order, £150. Eddystone EA-12 PSU, Fault, VGC, £100. Tel: 01279 815020 (Essex).

TRIO R-1000 with manual. Rx with built-in PSU. Coverage 50kHz to 30MHz. SSB, CW, AM with separate IF widths, clock with alarm. Two antenna sockets, built-in speaker and carrying handle, £100 o.n.o. Tel: John 01964 731661 (Kenley, Shropshire).

YAESU FT-7800 £150. 15MHz dual trace oscilloscope, £15. Sphinx Tx 160-8020, need attention, £15. Icom 10 metre transceiver, £15. Howes 80 metre Rx part built, £30, buyer collects. Tel: Tom 01606 597342 (Cheshire).

YAESU FT-902DM spares and PC panels. Genuine W2DU Balun. Yaesu microphones YM-48 condenser. MH-1B8 dynamic, Collins 70Hz VGO unit with handbook and calibration stability certificate. Control unit for CD-45 rotator. Tel: 01904 794680 (York).

YAESU VR-5000 all-mode receiver, 100kHz-2.6GHz. Boxed, PSU, £285. Icom IC-251E boxed with manual, £125. Icom 20 Amp PSU, £50. New EH-40 antenna, £55. EH-80, £65. Prefer buyer collects. Tel: Brian G4TGN 020-8476 1083 (West Drayton).

WANTED

1.5mm FLAT TWIN (no earth) cable (remnant of a drum?) Coal briquette. Tel: Godfrey G4GLM QTHR 020-8958 5113 (Middlesex).

23cm MOBILE OR BASE for use with our local repeater as a Rx unit. Ours has gone for a ball of chalk. Will collect. Tel: Gary G6NYH 01604 714806 (Northampton).

ANALOGUE JVC MODEL No GR-C7E comes complete with charger, power supply, all leads and brand new tape, in perfect working order. Suitable for ATV-Security Pleasure, £20 plus £10 P&P. Tel: Mike Evans M3EMB 01986 896658. E-mail: wndy-michael@wmevans.wanadoo.co.uk for web cam.

AUTO ATU UNIT 3.5/60MHz. Must be GWO and under £50. Must be GWO and over 60W. Selector switch for MFJ 949E ATU. Tel: 0161 775 8444 (Manchester).

CIRCUIT DIAGRAM AND OPERATING MANUAL or any info on Azden PCS 3000, 2m FM transceiver. All expenses reimbursed. Tel: Brian G4FIG QTHR 07986 506279 (West Sussex).

EDDYSTONE 830/2 880 51-S1 51-J4. Tel: 01279 815020 (Essex).

ICOM IC-720A HF transceiver and matching PSU. Must be VGC, in perfect working order. Non-smoker owner! Tel: 0779 297 8767 evenings only (Dorset).

ICOM IC-T81 for cash or exchange for Yaesu VX-7R6 (black) in perfect condition + soft case and charger + AA cell battery case. Tel: 07753 409154 (Surrey).

OBSCURE YAESU FT-815 owner's handbook, plus circuit layout. Searched the web extensively, little information found. Did Yaesu know they made this one? BNC 70cm rubber duck antenna, Yaesu battery packs, FT-815 reviews. Tel: Mike 01986 896658 (Bungay).

OLD HALF INCH FERRITE RODS must be half inch in diameter and be six inches long or more. Will pay good money for the rods. Tel: Peter Tankard 0114 2316321 from 9am to 10pm (Sheffield).

PLESSEY SL6270C VOGAD IC's in 8 pin DIL format. Does anyone have a complete set of G3TSO HF transceiver (WARC bands version) PCB's they wish to part with? Tel: Simon M5POO 01434-633913 (Northumberland). E-mail simon@nomis.co.uk

WIRELESS SET No. 21 for nostalgic reasons by OAP. Tel: Bob Titcombe MW0RHT 01244 549946. 82 Liverpool Road, Buckley, Flintshire CH7 3NB.

YAESU FC-10 ATU for FT-840. All offers considered. Contact John G8BXO 3 West Park, Sough Molton, Devon EX36 4HJ. Tel: 01769 573382.

YAESU FC-10 ATU for FT-840. Dealer replies welcome. Tel: John G8BXO 01769 573382. 3 West Park, South Molton, Devon EX36 4HJ.

bargain basement order form

Please insert this advertisement in the next available issue of *Practical Wireless*.

❑ **For Sale** ❑ **Wanted** ❑ **Exchange**

Please note: For security purposes, you must include your house number and postcode. Don't forget the corner flash!!

Name.....

Address .....

.....

..... **Post code** .....

Telephone Number.....

please write in block capitals

CARD NUMBER

Signature..... Security number

Switch issue number (if on card).....

Start date of card..... Expiry date of card .....

My Subs Number is.....*(or mailer label)*.....

	(30)		

CONTACT DETAILS FOR ADVERT.

Please only write in the contact details you wish to be published with your advert, ie. do you want your name & address, or just your telephone number?

Your advert, you decide! PLEASE - No FAXed Ads!

			(12)

B.B. Mar '06

Subscribe

to Practical Wireless

- *Never miss an issue*
- *Have it delivered to your door*
- *Subscribers get their copies before they reach the shops*
- ***PW** is Britain's best selling Amateur Radio magazine*

On-line facilities are now available as well as the usual way to pay by cheque, postal order and credit card.

order a new subscription

Simply pay with a credit card on-line using our secure server.

check the status of a subscription

Existing subscribers can now log in to their own accounts and see how many issues they have left to run.

update your details

If you move or change your personal details, you can now update them on-line without having to write in to let us know.

renew an existing subscription

We've made renewing easier too. Everything you need to renew is now available on-line as well as by regular mail.
(Subscribers still get a reminder in the post when it's time to renew).

To order a subscription please contact our new subscription agency:

Practical Wireless Subscriptions
PO Box 464
Berkhamsted
Hertfordshire HP4 2UR. UK

Credit Card Orders taken on:
(01442) 879097
between 9am - 5pm. Outside these hours your order will be recorded on an answering machine.

FAX Orders taken on
(01442) 872279

Internet Orders can be placed at:
www.webscribe.co.uk

or **via E-mail** to:
pw@webscribe.co.uk

Please note cheques should be made payable to PW PUBLISHING LTD and CASH is NOT accepted.

Subscription Rates

(Please tick appropriate box)

		PW	
1 YEAR	*UK*	*£33*	❑
	Europe Airmail	*£41*	❑
	ROW Airmail	*£50*	❑
3 YEARS	*UK*	*£89*	❑
	Europe Airmail	*£111*	❑
	ROW Aimail	*£143*	❑

I wish to order a one/three year subscription to Practical Wireless starting with the.....issue.*

Payment Details

I enclose my Cheque/Postal Order for £.....*
made payable to PW Publishing Ltd.
or please debit my Access/Visa/Amex* card No.

☐☐☐☐ ☐☐☐☐ ☐☐☐☐ ☐☐☐☐

Security Number: ☐☐☐

Expiry Date.....

or please debit my Switch card No.

☐☐☐☐ ☐☐☐☐ ☐☐☐☐ ☐☐☐☐ ☐☐☐

Security Number: ☐☐☐

Date.....Switch Issue Number (if on card) .....

Switch Expiry Date.....

Signature .....

Name .....

Address .....

.....

.....

.....

.....

Please note: For security purposes, you must include your house number and postcode.

Postcode .....

Daytime Tel. No .....

Orders are normally despatched by return of post but please allow 28 days for delivery. Prices correct at time of going to press.

Please note: All payments must be made in Sterling. Cash not accepted.
Cheques made payable to PW Publishing Ltd.

*(*Delete as necessary)* **Photocopies of this page are acceptable**

rob mannion's topical talk

The Amateur bands within the UK are thriving - thanks in no small part to the keen activities of the M3 operators. However, Rob G3XFD comments on some disturbing reports on operational behaviour on the bands and possible breaking of Licence conditions. As usual - he looks forward to your own comments.

Over the Christmas period I found myself not feeling up to much - my plans to build some little projects and re-arrange our garage came to nothing due to the 'Winter Blues'. However, I was able to sit at my operating desk and enjoy many QSOs, mainly on c.w., but some using s.s.b. Incidentally, the 'Winter Blues' - of course - had passed at the end of the holiday and I was back to normal for returning to the office. Typical - in the same way we have sunshine in the week and it rains at weekends!

Due to the large numbers of M3 stations coming on the air I was pleased to work several of them on 7MHz and those I worked had impeccable manners. It's a real pleasure to have 7MHz so busy - just as it was 40 years or so ago when most of us used a.m. My old KW Vanguard literally lived on 40 metres and I made many friends and worked much DX using the band.

The 7MHz band is absolutely ideal for communications within this group of Islands off the northern coast of mainland Europe, and many of us tend to think of '40' being 'our band' rather than a worldwide allocation.

Propagation changes on 7MHz during the day can be rapid - and particularly so in the short days of winter. These changes can be an embarrassment at times - especially when a QSO (nets in particular) have occupied a frequency for a long time. Sometimes, up will come a previously unheard DX QSO on the same frequency due to the propagation changes.

Operator behaviour in these conditions can become quite coarse and I've sometimes heard basic Anglo-Saxon expletives, along with their modern German and Gallic equivalents being returned. Because I'm usually busy, I don't have time to join in many nets - but I often listen in as I work. Often they have many topics of interest in discussion (no doubt this topic will join the list!).

However, even when provoked - I think it's not a good idea to discuss our nearest neighbour's problems (as we see them!) over the air. Perhaps a little diplomacy is needed on both sides at these times? Bad language is never a good idea - and even in the small hours on the 3.5MHz band. Someone will be listening - you can be sure of that!

Higher Power?

During my Christmas holiday operating I noticed one or two comments from non-M3 stations mentioning the relatively strong signals being received from some M3 operators. Sitting listening in my shack I started to think on the subject; are M3 operators enjoying getting the most out of their antennas to ensure the last drop of r.f. is radiated efficiently, or is higher power being used?

Keen QRP operators ensure they get the most with 10W and often much less. Recently I worked a c.w. operator on 7MHz and he was using 500mW. Yet his signal was a good 599 with me! On the other hand my 10W was only earning a 579RST report. I wasn't unduly worried - the other station was using an excellent antenna system and I was using a relatively inefficient short wire with an auto-antenna tuner (a.a.t.u.).

Even though I have several reports of M3 Amateurs openly claiming on the air that they use higher power than their licence permits, and have had comments from readers - I'm left wondering: Is this possible breach of trust a common occurrence?

The privilege of Amateur Radio operating needs trust and generally **it is a trusting** hobby. Only very occasionally do I hear of Radio Amateurs failing in this trust - whether it involves Licence conditions or something directly effecting fellow hobbyists. Perhaps you know more than I do? Is there a widespread problem? Personally I doubt it very much - but I would certainly like to learn of your own informed opinions and I look forward to hearing from you. **PW**

YOUR SPECIALIST & LOCAL DEALERS

CHESHIRE

www.hamradiosupplies.co.uk
H.R.S. MØJPM
A dedicated website for amateur radio supplies

Ham Radio Supplies
37 Marina Village,
Runcorn WA73BH

CORNWALL

WORSLEY COMMUNICATIONS
Robin C Worsley G0 MYR
'Onaru', Pennance Road,
Lanner, Redruth,
Cornwall TR16 5TQ
www.hamradiosales.co.uk
Tel: 01209 820118

ESSEX

WATERS & STANTON PLC
Spa House, 22 Main Road, Hockley
Essex SS5 4QS
Tel: (01702) 206835/204965
Fax: (01702) 205843
Web: http//www.waters-and-stanton.co.uk
E-mail: sales@wsplc.demon.co.uk
Open 9am to 5.30pm Monday to Saturday inclusive
MAIN AGENTS – ALL BRANDS
PHONE/FAX FOR FREE PRICE LIST

EAST YORKSHIRE

LINEAR AMP UK LTD
Field Head, Leconfield Road, Leconfield,
Beverley, East Yorks HU17 7LU
Tel/Fax: 01964 550921
E-mail: sales@linamp.co.uk www.linamp.co.uk
Manufacturers and suppliers of top quality HF and VHF valve amplifiers and antenna tuning units.
Repairs of most make of amplifier undertaken

IRELAND

CELLCOM IRELAND
DEERPARK, ORANMORE,
CO. GALWAY, IRELAND
www.cellcom.ie
Approved dealers for: ICOM,
TENNADYNE & LINEAR AMP UK
Several other brands also available
We can supply and install your experimental radio station!
info@cellcom.ie
Tel: +353 (0)91 790222/4 Fax: ++ 790223

MID GLAMORGAN

SANDPIPER AERIAL TECHNOLOGY
Unit 5, Enterprise House, Cwmbach
Industrial Estate, Aberdare,
Mid Glamorgan CF44 0AE
Tel: (01685) 870425 Fax:(01685) 876104
A full range of transmitting & receiving antennas available for the amateur commercial market.
www.sandpiperaerials.co.uk
e-mail: sales@sandpiperaerials.co.uk

SCOTLAND

JAYCEE ELECTRONICS LTD
20 Woodside Way, Glenrothes, Fife KY7 5DF
Tel: (01592) 756962 (Day or Night)
Fax No. (01592) 610451
New opening hours: Tuesday-Friday 9am to 5pm. Saturday 9am to 4pm. Closed Sunday & Monday.
KENWOOD, YAESU & ICOM APPROVED DEALERS
A good stock of new and secondhand equipment always in stock

SCOTLAND

TENNAMAST SCOTLAND LTD
Masts from 25ft - 40ft
Adapt-A-Mast
(01505) 503824
81 Mains Road, Beith, Ayrshire KA15 2HT
E-mail: nbrown@tennamast.com
Web site: www.tennamast.com

SOUTHWEST & WALES

QSL COMMUNICATIONS
● For all amateur radio and listener needs.
● New and secondhand equipment.
● Part exchange welcome.
Unit 6, Worle Industrial Centre, Coker Road,
Worle, Weston-Super-Mare BS22 6BX
Tel/Fax: (01934) 512757

SOUTH YORKSHIRE

LAM Communications
71 Hoyland Road, Hoyland Common
Barnsley, South Yorks S74 0LT
www.lamcommunications.net
E-mail: lamcommunications.net
Tel: 01226 361 700
Specialists in amateur radio equipment, new and second hand. Scanners, receivers, C.B. radio, and taxi. We buy, sell and broker equipment and will part exchange.
Opening times:- Monday 12.00noon to 8.00hrs
Tuesday - Friday 9.00hrs to 17.00hrs. Saturday 9.00hrs to 5.00hrs
SPECIAL EVENING TIMES CAN BE ARRANGED WITH LEE *We also accept Switch/Visa/Cash/Cheques*

WEST SUSSEX

Adur Communications
Belmont Buildings, The Street,
Bramber, W. Sussex BN44 3WE.
Tel: (01903) 879526
E-mail: service@adurcomms.com
Repairs and alignment to all amateur and commercial radio equipment.

YORKSHIRE

LEEDS AMATEUR RADIO LTD
SUPERSLAB CB CENTRE
The home of GB3YW operating on 145.7875MHz. CTCSS 82.5Hz
★ The complete radio suppliers ★
CONTACT STEVE POUNDER
BRADFORD ROAD, EAST ARDSLEY,
NR. WAKEFIELD WF3 2DN
Tel: 0113-252 4586 Fax: 0113-253 6621

Phone 0207 731 6222 to advertise in Practical Wireless

Don't Miss Out!

PW Direct

Did you know that you can buy the current issue of *Practical Wireless* direct from the publishers?

Some readers may be experiencing difficulties in finding copies of *PW* in their local WH Smith stores or independent newsagent. So, as we don't want you to miss out on your favourite radio read, we'd like to remind you that you can buy current issues at cover price direct from us.

Simply send a cheque (payable to **PW Publishing Ltd.**), Postal Order or Credit Card details for the cover price (**£3.00** inclusive of P&P, UK only, overseas customers please add £1.00) with your name and address to **Clive Hardy G4SLU** in the Book Store and your copy will sent out to you (**cash not accepted**).

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

Tel: 0870 224 7830 Fax: 0870 224 7850

E-mail: bookstore@pwpublishing.ltd.uk

Please check wi h bookstore for price and availability of back issues.

Index to Advertisers

With all the best features, articles, news and reviews from two superb magazines together in one place, radiouser is not only a terrific read but it's also marvellous value for money.

Did you like Issue One?

Here's a taster of what's in Issue Two!

- **Signal Analysis:** Using your computer to understand the signals you are receiving.
- **DRM**: More on this up and coming types of broadcast.
- Dip into the world of **clandestine broadcast** stations on the short wave bands.
- **Looking Back:** A trip back through significant happenings in radio history from the pages of Short Wave Magazine and Radio Active.
- **Military Matters:** Kevin Paterson tells you all the frequency changes that you need to know and more on the 352nd Special Operations Group.
- **Scanning Scene:** All about those data bursts on PMR.
- **Reviewed:** The **Bearcat BC330T** direct from the States.
  Roberts travelling lite 2 short wave radio.
  Perstel 301 DAB personal radio and MP3.
  Moonraker CB radio.
- **Airband Basics:** Godfrey Manning goes Sky High.
- **Scanning in Action:** From the Flight Deck - sit in the jump seat of a 737 for our flight.
- **LM&S Broadcast Matters:** Chris Brand will delves into the Long, Medium and Short Wave bands looking for the most interesting broadcast signals.
- **Off the Record:** Looking at 'non-licensed' and underground radio broadcasts.
- **New Products:** All the latest and most interesting radios and accessories to interest the scanning, airband and broadcast listener.
- **Comms from Europe:** Your chance to win a pair of PMR 446 radios.
- **Software Spot:** All the latest and very best listening software compiled exclusively for the RadioUser reader.
- **Maritime Matters:** All things marine from low frequency to satellite are covered by Robert Connolly, including lots of frequencies to try.
- **Info in Orbit:** Howard Long, AMSAT-UK committee member, looks at the world of the International Space Station.
- **News:** If it affects radio listeners from clubs to airshows and frequencies to new books, you'll read about it in RadioUser.
- **Feedback:** Your letters. Got anything you want to share with other readers? Drop RadioUser a line and start a debate.

...and lots more!

Join in: Join the radiouser E-mail Forum. Send an E-mail to **http://uk.groups.yahoo.com/group/RadioUser_Readers/** and join like-minded readers in discussion, debate and information exchange.

radiouser February 2006 issue. 84-pages filled to the brim with radio, radio and more radio!

Incorporating the very best of both Short Wave Magazine & Radio Active

On sale at your newsagent 26 January 2006. Only £3.25

IF YOU'VE SEEN ISSUE 1 AND LIKE WHAT YOU'VE READ, MAYBE YOU'D LIKE TO SUBSCRIBE.
RADIOUSER IS ONLY £36 FOR A YEAR - SAVE £3 AND GET YOUR VERY OWN COPY DELIVERED EACH MONTH!

see www.radiouser.co.uk for a special trial subscription offer.

E-Mail: ru@webscribe.co.uk
Website: www.webscribe.co.uk
Mail: RU Subscriptions, PO Box 464
Berkhamsted, Hertfordshire HP4 2UR, UK.
Tel: 01442 879097 Fax: 01442 872279

PW Publishing Ltd.,
Arrowsmith Court, Station Approach,
Broadstone, Dorset BH18 8PW, UK
web: www.pwpublishing.ltd.uk

If you're already a subscriber to **Short Wave Magazine** or **Radio Active** you don't need to do anything as your new look magazine will be delivered to you automatically.
If you're not, see **www.radiouser.co.uk** for a special trial subscription offer.

The World's First HF/VHF/UHF Multimode Portable/Base Station!

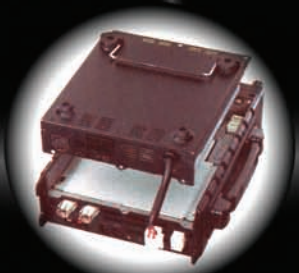
FT-897

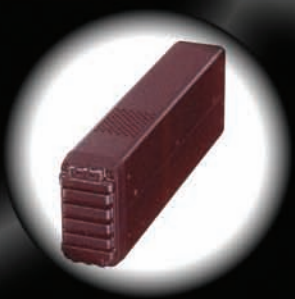
Multi-Band:	HF/6m/2m/70cm
All Mode:	CW/SSB/AM/FMN/FMW/PACKET/DIGITAL
Ultra Compact size:	7.87" x 3.15" x 10.3" W.H.D.
High Power Output:	HF/6m 100W, 2m 50W, 70cms 20W w/AC or 13.8VDC or 20W, (10W on 70cms) w/optional Ni-MH Battery

Optional Accessories include

FNB-78 Internal Ni-MH Battery Pack

FP-30 Internal AC Power Supply





FC-30 External Automatic Antenna Tuner

YAESU
Choice of the World's top DX'ers

Visit us on the internet! http://www.yaesu.co.uk