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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.

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The superb transceiver as above plus 17" flat screen, keyboard and SM-20 base microphone.

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HF/VHF 160m - 2m transceiver 5 - 100W. SSB CW FM AM. 12V DC. Nice big display. Lovely price.

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

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

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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.

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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!

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Designed for the 21st century. You get HF - 70cm with PC software for direct PC control. It works great.

TS-570DG *Lower Price* £799 C
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

Buy a TS-480SAT & get Free Of Charge a Heil Microphone Package. To claim send a copy of invoice to Kenwood

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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 C

FT-1000 FIELD £1699 C
The HF choice for DXers. With this rigs reputation on DXpeditions what more persuasion do you need?

FTV-1000 £729 C
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 *SPECIAL OFFER* £489 C
The ultimate QRP self-contained radio. Up to 5W output 160m - 70cm. New low price. UK warranty.

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FREE CSC-83 CARRYCASE WITH FT-817ND/DSP

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

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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 (5 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 C**
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 C

FT-2800M *FREE MLS-100 SPEAKER* **£149 C**
*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

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

IC-2E SPECIAL! ~~£199.95~~

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

IC-T22A **£149 C**
2m FM 5W handheld transceiver

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 C**
2m/70cm dualband FM handheld transceiver with data communications

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

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

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

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

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

FT-60E See top of page **£169 C**
VX-2E 2m/70cms min **£119 C**
VX-110 2mhandheld **£94 C**

Alinco
VHF/UHF Handhelds

DJ-V5E **£159 C**
2m/70cm FM 5W dualband handheld transceiver

DJ-193E **£91 C**
2m FM transceiver no keypad, Ni-Cds & charger

DJ-195E **£99 C**
2m FM transceiver with keypad Ni-Cds & charger

DJ-C7E **£124 C**
2m, 7cm 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 *Toroidal 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 B

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

W3FF
NEW Mini Buddipole

Portable 40 - 2m Ant
Just 14" long packed!
£199

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 C
HF + 6m linear amp. 1kW comes with PSU

Super Antennas
40 - 2m Screwdriver

A very efficient portable vetical 185cm long when fully extetended approx 40cm packed down. Coil is continuously hand adjusted for resonance. Covers 80 - 10m plus 6/2/70 with just whip. Supplied with universal base table clamp and SO-239 plus radials. 100W Max. "Superb performer" says G3OJV
Order MP1-SA **£139.95 B**
Mini tripod support **£22.95 A**

NEW STOCK & OFFERS

YAESU FT-60E NEW
*Wide band Reception 108-520MHz & 700-999.990MHz (Cellular blocked) *New Emergency Automatic ID System *High 5W Power Output *Ni-MH Long-Life Battery FNB-83 (7.2V,1400mAh) *Programmable Keys for user convenience *Split CTCSS/DCS and DCS Encode-Only Capability.
LOWER PRICE **£169 B**

MFJ-936B "Magic Circle" Loop Tuner NEW
This is 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.
£229.95 B

bhi
DSP Equipment

bhi NES10-2 MkII
NES10-2 Combined speaker and programmable DSP unit. Offers dramatic noise reduction, even reduces annoying hetrodynes. Power On/Off switch with audio bypass, 8 Ohms, 8 filter settings, 3.5mm plug, 12-24V 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

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

ANTENNAS

W-2LE	1/4 wave 2m 0.48m 200W	£9.95 B
W-285	5/8th 2m 1.33m long 200W	£14.95 B
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 B

BASES

WM-08	8cm diam magnetic	£9.95 A
WM-14B	14cm diam magnetic	£12.95 A
W-3HM	Hatch mount	£14.95 A
ECH	Cable kit	£10.95 B

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

Watson
Mobile Antennas

Carriage Charges: A=£3, B=£6, C=£10

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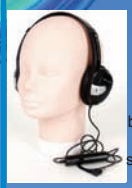
NOISE CANCELLING HEADPHONES — NEW



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 B

FUJIKON NC-4 £19.95 B

POCKET MORSE READER MFJ-461

Reads CW
Just hold near receiver speaker

£79.95 B

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

SG-2020ADSP QRP 20W HF Radio

160m - 10m
0.1 - 20W
Full DSP
Diecast Chassis

Perfect for QRP. SSB / CW and DSP processing. Passband down to 100Hz. Built-in SWR meter and electronic keyer. Max Tx drain 4A. Size 15 x 6.5 x 18cm. 680g.

£589.95 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-l	Large ceramic egg insulator	£4.99	A
Egg-s	Small ceramic egg insulator	£1.75	A
WS-2580	25pcs 3" ladder line spacers	£9.95	A

Diamond 50 Ohm Balunas

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	£45 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 £479.99 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 £289.95 C
1.8 - 30MHz 150W long wire tuner designed for use with DX-70 transceiver. Waterproof.

MFJ Internal Auto ATU's

MFJ-993

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

£209.95 C

MFJ-991 £179.95 C
1.8 - 30MHz auto ATU. Similar to MFJ-993 but no digital display. Works with any HF transceiver. 150W PEP

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

SGC Internal 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 Internal 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 Internal 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 Internal 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

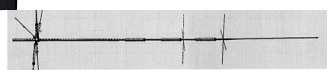
R-6000 £329.95 C
6-band vertical 20m - 6m. No separate radials needed. 1.5kW. Height 5.8m. Great small garden ant.

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

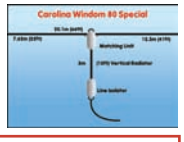
Radio Works HF Antennas

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 £89.95 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 C

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

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November 2005
On Sale 13 October
Vol 81 No.11 Issue 1183
(December Issue on sale 10 November)

Published by
PW Publishing Limited
Ar owsmith Court
Station App oach
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Dorset BH18 8PW
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All our 0870 numbers are charged at the BT Standard National Rate

Cover subject

Sam Machin M0SVM helped out **Richard G0RSN** in his review by testing the effectiveness of IC-V82's digital capabilities when operating in front of a nosiy steam traction engine. Find out what happened by reading G0RSN's review. We hope you'll agree this issue is bursting at the seams with real radio goodies, why not let us know which articles you particularly enjoyed?

Design: Steve Hunt
Photograph: Mike Buck M3BUK

november 2005 contents

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Published on the second Thu sday of each month by PW Publishing Ltd., Arrowsm th Court, Station Approach, Broadstone, Do set BH18 8PW. Tel: 0870 224 7810 P inted 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 - Gordon and Gotch (Asia) Ltd.; South Africa - Centra News Agency. Subscriptions INLAND £32, EUROPE £40, REST OF WOR D £49, payable to PRACTICAL WIRELESS, Subscription Department PW Publishing Ltd., Arrowsm th Court, Station Approach, Broadstone, Do set BH18 8PW. Tel: 0870 224 7830 PRACTICAL WIRELESS is sold subject to he following conditions, namely that it shall not, w thout written consent of he publ she s firs having been given, be lent, e-sold, hired out or otherwise disposed of by way of trade at more than the recommended selling price shown on he cover, and hat it shall not be lent, e-sold, hired out or otherwise disposed of in a mutilated condition or in any unau horised cover by way of Trade, or affixed to or as part of any publication or advertising, ite ary or pictorial matter whatsoever. *Practical Wireless* is Published mon thly for $50 per year by PW Publ shing Ltd., Arrowsm th Court, Station App oach, B oadstone, Dorset BH18 8PW, Royal Mail International, c/o Yellowstone Inte national, 87 Burlews Court, Hackensack, NJ 07601. UK Second Class Postage paid at South Hackensack. Send USA address changes to Royal Mail International, c/oYellowstone Inte national, 2375 P att Boulevard, Elk G ove Village, IL 60007-5937. The USPS (United States Postal Se vice) number for Practical Wireless is: 007075.

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NewsFlash!

General Electric Rangr 6Mtr

The GE Rangr was designed jointly between the General Electric Company (USA) and the Japanese Radio Company (Japan). The main radio unit was manufactured by JRC to the highest standard as the majority of the radios we destined for the internal security forces of the USA. The radio is available in three bands Lowband 50Mhz Midband 150Mhz and UHF 440Mhz. The Rangr is available in two models (The Rangr and the Rangr 89) with two versions in each band (60w and 110w) Radios with 50 within the serial number are earlier than those with 51 within the serial number (Rangr and Rangr 89 respectfully). P7 denotes 60w P8 denotes 110w.

All of the units that we are supplying are the following type P19C852051P8 110w model with 32ch (The radios will be set at 50w ONLY) The radio is in fact a 64ch however the control head has only the facility for 32ch. I am sure that before very long some brainy person will find a modification to throw a switch to give the extra 32ch (We will keep you informed) These radios are ALL USED with only one owner and have been removed fully operational from New York Police Department Vehicles mainly Police Cars (95%). FYI They have gone to 800Mhz (!!!)

We have learnt our lesson on the supply of the FM1200 4Mtr radios, so the price of the Rangr on any 32ch of your choice with in the 6Mtr band is £75.00 plus £7.50P & P you send us a cheque or ring with your card details (you may visit and we will accept cash) we will then select your radio give it a number and by means of a post card or E-Mail send you a confirmation. We will also keep your name and address & call sign (Data Protection Thingy) with your permission so that we may update you on delivery and also any modifications that the brainy person comes up with.

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Or by the written word to G6NYH@AOL.COM www.tetra.tv

rob mannion's keylines

Looking at friendship, history and the Mayo rally.

Amateur Radio is a hobby of friendship and this was proved more than adequately during my recent flying visit to Northern Ireland to the **Glengormley Electronics Amateur Radio Society** (GEARS) in Carrickfergus, County Antrim on 5 September. This club had been kept waiting for the visit, and I was very pleased to eventually fulfil my long standing promise!

The trip was made much easier for me because my good friends **Jeff Smith MI0AEX** and his delightful wife **Jane** not only provided accommodation at their house on the Ards Peninsula - they also operated a taxi service, a guided tour and a superb evening meal. Thanks to Jeff & Jane - you are great ambassadors for the hobby!

The club visit was held at the **Knockagh Lodge Hotel, Greenisland**, County Antrim. It was a great evening ending up with some challenging requests in the Question & Answer session!

The club is very active, although like many it's struggling for members. Because of the enthusiastic core membership I'd not hesitate to join them myself and recommend that anyone interested, pay the club a visit.

Thanks for the wonderful evening everyone! (see news pages for story and photographs).

Heritage & History

The recent occasional, to be continued series of articles on the theme of Heritage & History generated a tremendous response from a large number of readers. Indeed, I've had E-mails and letters from those not so keen on 'vintage' style articles - but who are very interested in the heritage and history features.

Because of the excellent response, I'm delighted to say that we intend to produce a number of special H&H supplements to satisfy readers' interests. The reason behind the special supplements is that we're anxious not to unbalance the Editorial coverage in *PW* to the extent we upset readers who are firmly rooted in 2005!

For some time now I've planned the amount of pages dealing with V&V so that keen vintage enthusiasts can enjoy what we provide. On the other hand - those who are turned off by valves won't be overwhelmed by the demands of high tension and grid bias supplies!

We could easily satisfy some readers by producing *PW* with nothing other than V&V articles, and another *PW* with nothing else other than modern day radio. But I'm afraid we can only produce one *PW* a month and I must do my best to produce an editorial balance within one magazine.

So, I'm now planning to publish the occasional V&V special supplement, and this will be in addition to the normal editorial pages of the main issue. Those of you who love the subject can enjoy it - whereas those who don't can either dump it, or ignore the pages. Whatever happens I hope everyone wins.

Finally on this topic, when the H&H supplement is published in 2006 there will be a very short list of questions provided. By answering the questions and writing to me or E-mailing the answers and your suggestions we'll know exactly what you think of the ideas. In return I can then keep you informed of our plans to provide what interests our valued readers the most.

Article On TVI

Due to the fact we're bursting at the seams this month - I have to apologies for the fact the promised article on TVI by **Stan Brown G4LU** has been held over to appear in a future issue. My apologies go Stan and to those of you waiting for the promoted feature.

Irish Trip

In common with many PW readers in the Republic of Ireland and Northern Ireland, I look forward to the now well established **Mayo Rally at Knock**, County Mayo on Sunday 20 November. I'm pleased to have found time in my schedule to attend again this year and look forward to meeting *PW* friends during this visit as a guest to our 'next door neighbours' in a friendly, informal fashion.

As a visitor to Ireland I'm always provided with a marvellous welcome due to the natural, overflowing hospitality. I'm getting a double dose this time as I'm again visiting friends at the **South Eastern Amateur Radio Group** (**SEARG**) in Waterford City, County Waterford. After what will undoubtedly another enjoyable evening on Thursday 17 November - hosted by **Mark Wall EI7IS** and friends, I'll be driving up to Mayo via Limerick and Galway the next day. I look forward to meeting more friends during the rally, before returning to Dorset via Rosslare on the night ferry on Monday.

I shall also be operating **EI5IW** mobile on 70 and 144MHz and plan to work on the bands as I travel. Hope we can work each other!

Rob Mannion G3XFD/EIS

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

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

Photocopies & Back Issues

We have a selection of back issues, covering the past three years of *PW*. If you are looking for an article or review that you missed first time around, we can help. If we don't have the whole issue we can always supply a photocopy of the article. See page 59 for details.

Placing An Order

Orders for back numbers, binders and items from our Book Store should be sent to: **PW Publishing Ltd., Post Sales Department, Arrowsmith Court, Station Approach, Broadstone Dorset BH18 8PW**, with details of your credit card or a cheque or postal order payable to PW Publishing Ltd. Cheques with overseas orders must be drawn on a London Clearing Bank and in Sterling. Credit card orders (Access, Mastercard, Eurocard, AMEX or Visa) are also welcome by telephone to Broadstone **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 **clive@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

Talking To Himself?

Dear Rob

How desperate is the activity becoming on 144MHz simplex when, the other evening, I heard a local Amateur having a QSO **with himself?** Now, that was something new!

It was quite entertaining too, in a sad sort of way. Surely, someone, somewhere must have heard his plaintive "CQ" calls? Where were all those new M3s for example? 73s

David Harris
Weymouth
Dorset

Editor's suggestion: David - perhaps the new stations - and the lonely chap calling "CQ" would like to join the *PW* 144MHz QRP contest? They'd make some new friends there! Also, whenever I'm active on 70MHz working /P I shall make a point of working on 144MHz whenever possible, before and after the 70MHz exercise. Let's put some sparkle into 144MHz too!

Thank You Repeater Keepers!

● **Dear Editor**

Like many Radio Amateurs I owe a debt of gratitude to the efforts over the years of our repeater keepers and members of committees of the various repeater groups. In rural areas like mine the these stalwarts have contributed greatly to local communications.

However, it has occurred to me that with the introduction of the Novice Licence, how long will it be before we run out of people with the knowledge and experience to take on the position of a Repeater Keeper? If ever there was a glaring example of why Novice Licence holders should be encouraged to move on to intermediate and advanced level - this is it!

In my response to Ofcom, I expressed the view that the Novice Licence should be like a Motorcycle Licence. Here the rider is required to move on to the next stage within, say two years, and it should be like-wise with the Intermediate Licence, It's necessary if we are to maintain the pursuit of technical excellence within the hobby, otherwise it may not be too long before age catches up with our present Repeater Keepers. Otherwise, we could have nobody capable of taking over from them.

The Novice Licence may well have brought more people into the hobby, but they need to be encouraged to proceed to higher technical levels. The hobby needs more than just operators to survive, otherwise the spectre of Repeater Keepers struggling to gain access to remote sites with the aid of Zimmer Frames may not be that far off!

Best regards

John Young GM6LYJ
Dumfriesshire
Scotland

Pulse Interference On HF

● **Dear Rob**

I wonder if anyone else has been noticing the high level of pulse interference that has been affecting very wide swathes of the high frequency (h.f.) spectrum in the past few months? It's a pulse type signal with a rate of about five pulses per second, not unlike those transmitted from the **WWV**'s 15MHz frequency standard. But these transmissions can be heard over a spread of h.f. from about 7MHz right up to about 25MHz from about 1100UTC until darkness.

Pick a quiet frequency around 20MHz and wait for the 'dat dat dat' type QRM. It's definitely not locally produced as it varies in intensity across the h.f. spectrum day by day, and in any case I've also heard it - whilst on holiday - in South Eastern Spain.

To produce the interfering pulse at such an intensity across almost 20MHz must take some whopping power! Has anyone any ideas what it is and where it is coming from? From observations over the years I've noticed the gradual rise of man-made noise across h.f. frequencies. These ranged from initially noisy motors, and other electrical appliances to TV line timebases, to vast amounts of fluorescent lighting and switched-mode power supplies. Even being out in the middle of a field you can hear many electric fence (spark transmitters?). Electromagnetic pollution marches on, and no-one shouts "stop"! I'm afraid h.f. radio is being forgotten.

Des Walsh EI5CD
County Cork
Republic of Ireland

Editor's comments: Thanks for your letter Des - I too am very concerned about the man-made QRM/QRN on h.f. It's a real problem. The pulse interference has been noticed by myself and others on this side of the Irish Sea. Personally, after hearing it in Ireland, Holland and Belgium, I've formed the opinion the dat dat dat noises are yet another form of ionospherically refracted over the horizon warning device. No doubt the culprit will eventually be identified! Please join me in Topical Talk - page 65 - for further comments and discussion on the topics.

Heritage & History

● **Dear Rob**

Congratulations on *PW*'s Heritage and History (H&H) series. The history of our hobby is a fascinating and educational one. May I suggest that *PW* readers who, like me, are enjoying the H&H series should consider becoming a member of **RAOTA** - the **Radio Amateur Old Timers' Association**. It's a UK based International association with the aim of promoting the history, traditions and spirit of Amateur Radio.

Our motto is; *Enjoy the Present, Honour the Past, Ensure the Future*, which itself is indicative that RAOTA is mindful of both the history and future of our hobby.

Our quarterly journal is *OT News*, which regularly carries a wide range of articles covering all manner of Amateur radio topics. Many RAOTA members have more than just an interest in the history. Many of them, including **Stan G4LU** (one of the authors involved with *PW*'s H&H) are a part of that history and saw it first-hand.

Incidentally, it's rumoured that you have to be retired or to be a G3 or to be licensed (class A!) for at least 25 years, or to be licensed before the Second World War in order to become a RAOTA member. Thankfully, none of these rumours are correct! All that's required of any would-be member is to be active in Amateur Radio (either licensed or listener and regardless of age).

Information about RAOTA can be readily found on our website at: **www.raota.org** by E-mail to **edit@raota.fsnet.co.uk** by post to **Edward Rule G3FEW**, **15 Norwich Road, Lenwade, Norwich NR9 5SH**.

73!

Ian Brothwell G4EAN/9H3YI
Secretary & Publicity Officer
RAOTA
56 Arnot Hill Road
Arnold, Nottingham NG5 6LQ
Tel: (07941) 302654 or 0115-926 2360

Editor's comments: Pleased to give RAOTA a plug Ian! Readers can often meet Ian helping me out on the *PW* stnad at the Rochdale and South Normanton QRP rallies - he combines both jobs very well readers! Incidentally, If your club/organisation could benefit from a plug (with an appropriate letter) we'll be pleased to provide a platform fro you too. If you see the idea opportunity - grab it!

Bristol Amateur Radio Club Demise

● **Dear Editor**

I was very sorry to learn of the closure of another club - in this case **Bristol Amateur Radio Club**. It seemed to happen very quickly, an extraordinary general meeting (EGM) at the end of July and the club closed, with all equipment sold - all in a couple of weeks.

I was particularly sorry to

read in *PW* letter pages of the apparently unfortunate experience the Secretary had in trying to get his club programme on to GB2RS news. It would be interesting to hear why this was.

It's a pity, though, that he didn't contact me, as we might well have been able to help. News readers have to adhere to the official script, but most also have an informal net after the news, under their own callsign. This is of course the opportunity for them and others to tell people what's going down in their particular street. I'm sure our local news readers would have helped out. The regional network exists to help clubs and individuals. Volunteers all make regular contact with affiliated clubs, and sometimes non-affiliated clubs, repeater groups indeed any relevant entity if we think we can help or they help others. Every part of UK is covered in this way and we can sometimes make a real difference.

Perhaps the ex-members of Bristol ARC are lucky in one way, as there are three other clubs in the area (**North Bristol**, **South Bristol** and **Shirehampton**) all of whom, I'm sure, would welcome new members.

Dick Elford G0XAY (RSGB Deputy Regional Manager, Somerset, Bristol & South Gloucestershire)
***Prospects*, Tormarton Road**
Acton Turville
Badminton
South Gloucestershire GL9 1HP
Telephone: (01454) 218362
E-mail: g0xay@aol.com)

Heritage & History Site

● **Dear Rob**
Here's a site for the Heritage & History list; The former military satellite communication station at Friar's Cliff near Mudeford Hants, grid ref SZ194928. I worked on this as a young Marconi Engineer in the mid to late 1960s.

Christchurch Borough Council has put a plaque in the centre of the concrete base on which the dish antenna was placed. The plaque reads:

"From the early days of the Second World War through until 1980, this area was the trials ground for the Ministry of Defence Signals Research and Development Establishment (SRDE), and the nearby concrete plinth was the foundation on which stood the first British military communication satellite station. On it was placed an aerial dish of 40ft diameter which received and transmitted signals from the first launched British military satellite. It also tracked foreign satellites. Over the dish was a weatherproof covering called a Radome (shaped like a beehive) and the whole structure became a landmark for mariners for miles around.

Two similar structures were subsequently built and installed in Cyprus and Singapore and formed the beginning of the world wide defence communication network called Skynet.

In the early days of the Second World War this site also saw secret radar developments for the Army and some twenty years later much of the early research in night vision was also done here. The Establishment was actively involved in the research into optical fibres for communication purposes - which since produced profound benefits for world-wide telephone systems.

The SRDE finally moved to Malvern in Worcestershire in 1980 and joined forces with the Royal Radar Establishment".

Hope this is of interest!
Dave Hills
Dorchester
Dorset

Editor's reply: Thanks for the reminder Dave. I'm fairly certain (no doubt readers will confirm either way!) that this site was involved in the H_2S ("It stinks" - quote attributed to Lord Cherwell, it then was adopted as the name!) air to ground radar system. Any reader with further information is invited to contact *PW* - I'm sure it will make an interesting article for an H&H feature.

Letters Received Via 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.

October 23
Galashiels & District ARS's Annual Open Day & Rally
Contact: **Jim GM7LUN**
Tel: **(01896) 850245.**
Website: **mail@gm7lun.co.uk**
The Galashiels & District ARS's Annual Open Day & Rally will be held in The Volunteer Hall, St. Johns Street, Galashiels, Scottish Borders. Doors open 1100 (1045 for disabled visitors) and admission is just £2. There will be trade stands, a Bring & Buy and refreshments.

October 29
The Rochdale & DARS Traditional Radio Rally
Contact: **John G7OAI**,
Tel: **(01706) 376204** (evenings)
E-mail: **RADARS@radars.me.uk**
Website: **www.radars.me.uk**
The Rochdale & DARS Traditional Radio Rally will be held at St. Vincent de Paul Catholic Church Hall, Caldershaw Road, off the A680 Edenfield Road, approx 3km west of Rochdale. Follow the orange arrows from M62 J20. Opening time is 1015/1030 and admission is £1. There will be ample **free** car parking, plenty of trade stands, a Bring & Buy stall and a large chat/refreshment area. Talk-in on S22.

October 30
The Rusty Radios Contest Group Rally
Contact **Sean**
Tel: **(01462) 459724**
Website: **www.rustyradios.com**
The Rusty Radios Contest Group Rally will be held at Cottered Village Hall, Hertfordshire. Doors are open from 1030 to 1400. There will be Amateurs and traders selling components, surplus equipment and good old fashioned junk.

November 5/6
The 19th North Wales Radio, Electronics & Computer Show
Contact: **Jenny MW3BET**
Tel: **(01492) 549413**
E-mail: **rally@nwrs.org.uk**
Website: **www.nwrs.org.uk**
The 19th North Wales Radio, Electronics & Computer show & annual rally takes place at the North Wales Conference Centre, The Promenade, Llandudno. With new and used equipment, components, cables and connectors, computers and parts, RSGB stand, large Bring & Buy, SOTA, club rooms, Repeater Groups,Restaurant & Bar and loads more. Talk-in on S22. Admission £3, accompanied under 14s Free. Doors open 1000.

November 20
The 16th MARS Rally
Contact: **Norman Gutteridge G8BHE**
Tel: **0121-422 9787** or (**07808) 078003**
E-mail: **NLgutteridge@aol.com**
The 16th Midland Amateur Radio Society (MARS) Birmingham Rally takes place at a new Venue at Alderbrook School, Blossomfield Road, Solihull. Approx 3 miles from M42 either Jctn 4 or 5. There will be separate areas for Traders to load/unload with ample adjacent car/van parking. Open to the Public from 1000 to 1500hours.

November 26
The Reddish Rally
Contact: **John G4ILA**
Tel: **0161-477 6702**
E-mail: **john@mckae.freeserve.co.uk**
The Reddish Rally takes place at St. Mary's Parish Hall, Reddish Road/Broadstone Hall Road South, Reddish, Soptckport. Doors open 1000. Admission £1. There will be refreshements available and at talk-in.

November 27
Red Rose Winter Rally
Contact: **Steve**
Tel: **(01942) 895198**
Website: **www.wmrc.org.uk**
The West Manchester Radio Club is holding its Red Rose Winter Rally, at Lowton Civic Centre, just off the A580 East Lancs Road, this is a superb venue, all on one level, with disabled facilities and **free** parking. There will be a low cost Bring & Buy, RSGB bookstall, usual trade stands, component and special interest groups, licensed bar, excellent catering and large social area in which to mingle with fellow amateurs. Talk-in on S22. Opening at 1000.

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

Lights Go Out On Electrovalue

The following statement was issued to the *PW* Newsdesk on 22 September 2005 by Wilkins Kennedy on behalf of Electrovalue Limited.

The directors of **Electrovalue Limited** (Electrovalue) have announced that after 33 years in business the company has ceased trading. The directors have instructed **Keith Stevens** of **Wilkins Kennedy**, Business Recovery and Insolvency specialists to assist them in placing the company into Creditors' Voluntary Liquidation.

Electrovalue incorporated in March 1972 had been trading from Unit 5, Beta Way Thorpe Industrial Park, Egham, Surrey TW20 8RE. The company sold electronic components to hobbyists and home electronic engineers and was an authorised Siemens distributor selling to industrial and educational concerns. The loss of their Siemens distributorship in 1998 together with increased competition are cited to be the main reasons for the company's loss of market share and consequent failure.

Commenting on the decision, Keith Stevens says "it is always regrettable when businesses cannot be rescued. In the case of Electrovalue a combination of factors including pressures from the global market and growing competition domestically, made it increasingly difficult to sustain the business. After carefully reviewing the business it was decided that the best course of action would be to agree to voluntary liquidation".

All enquiries should be directed to **Keith Stevens** or **Mike Grieshaber** at **Wilkins Kennedy on (01784) 435 561. Details of any further developments to this story regarding this *PW* advertiser will be published as and when they are received.** Editor.

Thanks From Andover

Andover Radio Amateur Club would like to thank all those people, sellers or buyers who helped to make their Autumn Boot Sale on 4 September 2005 such a good day. The weather was amazing and there was a good turnout. The club look forward to seeing many visitors again next April for their Spring Boot Sale. More information on the activities of the Andover RAC can be found at **www.arac.co.uk/**

Mountain Goat Award

Steve G1 NK activating another summit on Horse Head Moor G/NP-021.

Steve Green G1INK, from Buxton in Derbyshire, has become only the third Radio Amateur in the England to achieve the coveted Mountain Goat award for achieving 1000 activator points. Steve achieved the award on one of his favourite peaks, Great Gable G/LD-005 in the Lake District on 14 August 2005. At the start of the day, Steve was sat on 980 activator points but put in a mammoth 24 point expedition as he traversed between three 8-point summits in Cumbria - Pillar G/LD-006 (892m ASL), Kirk Fell G/LD-014 (802m ASL) and finally Great Gable G/LD-005 (899m ASL).

Steve began with SOTA in November 2003 and he achieved his Mountain Goat status on his 199th summit activation. He is the fifth person in the UK to achieve Mountain Goat status and only the eighth in the world.

Summits On The Air is an international scheme with 12 DXCC entities participating with their own SOTA associations. The Programme is set to grow further with several more international associations being developed, including the USA.

If you'd like to get involved with the SOTA activities take a look at **www.sota.org.uk**

International Lighthouse Weekend

The Dover Radio Club took part in International lighthouse weekend over the weekend of 20 and 21st August. The club members activated **GB2SFL** (South Foreland Lighthouse) using a long wire antenna from the top of the lighthouse to their shack in a small building next to the lighthouse, which was used on the h.f. bands throughout the weekend.

The Club also used a small horizontal beam for 144MHz s.s.b., as well as trying some f.m. repeater work. During the event the Dover Club made around 124 contacts over the weekend and worked 22 official 'Lighthouse' stations, and 33 different countries.

For more information on the Dover Radio Club or to join in with future activities take a look at **www.darc.org.uk**

Darren 2E1BVX with David M0DTI.

British Astronomical Association Radio Group

The **British Astronomical Association** (BAA) **Radio Astronomy Group** (RAG) is a group interested in Radio Astronomy. They listen on 2695, 151MHz and 30kHz and have developed receiver kits for these bands, which may also be of interest to Radio Amateurs.

Members of the RAG, have just published their first newsletter, which can be downloaded from **www.britastro.com/radio/** The RAG *Circular* has been compiled by gathering information and material over the last couple of months, resulting in a 48 page newsletter. Because of its size the *Circular* is available as a downloadable PDF from the above mentioned website.

The RAG team have worked hard to produce the first issue of *Circular* and would welcome feedback, both positive or negative. They also encourage readers to write a 'Letter to the Editor', write an article or send in a photograph for the next issue.

The SOTA Challenge

Each year, SOTA Beams invites entries for The SOTA Challenge. The idea of the Challenge is to encourage younger Radio Amateurs to participate in the Summits on the Air (SOTA) award programme, to discover the fun that can be had from portable radio operating.

The Challenge is open to Amateurs who will be under 18 on the 31 December and the winner is the person who does the most SOTA activations in the year. The winner of the Challenge wins a complete 144MHz SOTA Beam set-up while the runner-up wins a Waterlog.

For full details of the Challenge take a look at **www.sotabeams.co.uk/Challenge.htm**

The 2004 SOTA Challenge winner, Bobbie M3DNC who managed 24 SOTA activations between August and December.

Sole Distributor For Elad

On the 26 August 2005 Martin Lynch & Sons were appointed sole distributor for the Italian ELAD range of communications products. One of the ELAD range includes the FDM77, an all-mode h.f. software defined radio, which has been receiving some rave reviews among the user groups.

If you want to see an FDM77 in action then you can go along to Martin Lynch & Sons' Chertsey store, where they have a unit on permanent demonstration. Alternatively see the forthcoming review in our sister magazine *SWM*. The receiver provides 50kHz-60MHz continuous coverage and among many other features has user defined tuning steps down as low as 1Hz.

The FDM77 uses a USB2 connection to the PC, which is required to perform the DSP functions in Software. The user application runs under *Windows XP*. The FDM77 is available now from ML&S for **£449.95** plus **£10 P&P**.

For more information on the FDM77 and other products in the Elan range take a look at **www.eladit.net/DRMCon.htm**

Martin Lynch & Sons Ltd.
Outline House
73 Guildford Street
Chertsey
Surrey KT16 9AS.
Tel: (01932) 567333
FAX: (01932) 567222
Website: www.HamRadio.co.uk

Northern Ireland Friends

Editor **Rob Mannion GI3XFD/EI5IW** recently paid a visit to the **Glengormley Electronics Amateur Radio Society** in Carrickfergus during a trip to Northern Irish shores as the photo shows below.

The club was formed in November 1995 and was started by four former members; **Jim Hoey GI0BJH, Peter Lowrie MI5JYK, Alan Stewart GI6IXD** (Now left) **and Robert Stewart GI7PJF** (Now left). All four paid the first £5 each into the pot in Jim's house back in 1995 to get the Club off the ground.

The Glengormley Club holds the callsigns: **GN0XYZ** (Club Callsign), **MI6X** (Contest callsign), **GB0BL** (Black Head Lighthouse for Light Houses on the air) and **GB0BIG** (Broad Island Gathering event). Meetings are held at the Knockagh Lodge, 236 Upper Road Greenisland, Co. Antrim, Northern Ireland, every Monday from 2000, with around 30 members attending, all of whom are licenced Radio Amateurs. For a taster of activities that the club offer take a look at **www.gn0xyz.com**

From left to right, Jim MI5AMO, Jim GI0BJH, Patrick MI3KIL, Deane MI3MDZ, Peter MI5JYK (Club member & Deputy Regional Manager for RSGB), Terry Barnes GI3USS, Rob Mannion GI3XFD, William MI3AEX, Jeff MI0AEX, Brian GI6DKQ, David MI1VOX and Mervyn GI4OYG (Webmaster).

The club were very proud and pleased to welcome **Rob GI3XFD** to their club and are already making plans for him to return. Apparently, Rob also had the opportunity to enjoy the Guinness, (he drank the bar dry!) and true Irish hospitality!

South Essex ARS

The **South Essex Amateur Radio Society** (SEARS) will be operating from Furtherwick Park School Canvey Island as **GB2FPS** during October in a bid to make contact with the *International Space Station* They will be setting up an h.f. station and two v.h.f. stations, one as a back up and one as the main station,

The students of Futherwick Park School have been working hard on the questions that they will be asking the crew. Members of SEARS and the students of Futherwick have been waiting 18 months for the opportunity so there's much excitement in the school and also in the club, after all its not every day you get the chance to have a QSO with astronauts!

If you're interested in joining the South Essex Amateur Radio Society, they meet at 2000 at The Paddocks Community Centre Canvey Island on the first and third Wednesday of each month. They cover many aspects of Amateur Radio, so if you're interested in Amateur Radio, Computing. Electronics, etc. then just go along as you will be made most welcome. You can ring the Secretary **Betty Maynard G6LUO on (01268) 695474.** You may also like to check out their website at: **www.southessex.ars.btinternet.co.uk**

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

Rare WAB Square Activated

Members of **Brickfields Amateur Radio Society** on the Isle of Wight, recently operated a special event station from the rare WAB square SZ28 to celebrate the 60th anniversary of the end of World War Two. The station callsign was **GB2VJD**. Pictured in the photo are some of the BARS members at the site of the station at The Needles Old Battery at the extreme western tip of the Isle of Wight.

Castles and Stately Homes on the Air

John Williams G8LGC writes: "Back in the 1970s there was an attempt by a Northampton group with Castles on the Air, although it never caught on, people are still talking about it!

In June 2003, **Special Events Amateur Radio Educational Group (SEAREG)** contacted the Ivanhoe Trust, who administers Conisbrough Castle, which is located about 6km west of Doncaster in South Yorkshire, with the proposition of putting on a public demonstration of Amateur Radio over a weekend free of charge. This was readily accepted as each QSL card would have their website address (**www.conisbroughcastle.org**) on it: and these it was hoped would be going all round the world.

The SEAREG were lucky enough to get sponsorship for the QSL cards and on placing the order with the printer **Chris M0DOL**, he suggested that they considered getting Castles on the Air operational again. After some discussion, it was decided to go with: Castles and Stately Homes on the Air (CASHOTA), as it affords more flexibility for participants.

There must be a lot of Amateurs who enjoy going out portable or doing special-events, so why not consider your local heritage sites? There is so much history wrapped around us. Scattered the length and breath of the United Kingdom are countless venues just waiting to be put on the air. Some grand, while others paint a picture of our turbulent past.

Throughout Europe, there are a lot of other Amateurs, just like you, I and groups doing the same thing from their heritage sites. When activity here in the UK takes off we could contact these other groups and arrange a fantastic weekend activity, thereby stimulating greater interest.

There is so much fun to be had, either on your own or as a club outing. What have you got, virtually on your doorstep? Why not talk it over with your friends and join us and activate a venue near you? Either, use your own callsign /p or apply for a special event callsign, but remember, your GB demonstration must be on view to the public. From our experience at Conisbrough Castle, we have found the public are more than just interested.

New activations gain one point, anyone activating ten venues will be able to apply for an award. In order for an activation to become official you would be required to have a minimum of 10 h.f. contacts or 30 v.h.f. direct contacts, not using IRLP or repeaters.

We are not at this time suggesting a single weekend like some other groups, but rather to get these venues on the air throughout the year, so as an operator, you can fit them in to suit yourself. To register your venue, you will need to provide your regional controller with some information about your proposed site and they will issue your venue a unique CASHOTA number for the collectors of certificates. This registration number will be composed as follows: G for England, followed by the number /xxx followed by the suffix of /C for a castle or /SH for stately home. Conisbrough Castle has the registration No: G/001/C and it is also listed with International Museums Weekend No: 5124, as the demonstration here each year is over the third weekend in June.

You may be interested in transmitting from just one castle or stately home, or as many as pleases you, on your own or with friends making a day of it. Remember that it would be courteous to ask permission before any sustained period of operation is considered, explaining that you are introducing other Radio Amateurs and listeners the world over to their portion of our heritage.

Whatever your interest is, then please contact either: **Arthur MM0DHQ** for Scotland, **Melfyn GW1AKT** for Wales and myself **John G8LGC** for English sites, all of whom are QTHR. We are still looking for area representatives in Guernsey, Jersey, IOM and Northern Ireland, so get in touch if this also interests you: **John Williams G8LGC. E-mail: john-williams@tinyonline.co.uk**

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 or (07990) 760920
E-mail: nancybone2001@yahoo.co.uk
Website: www.glares.org.uk
Great Lumley Amateur Radio & Electronics Society meet at the Community Centre, Front Street, Great Lumley, Chester Le Street, County Durham every Wednesday from 1930 to 2130. The group have a guest speaker every second Wednesday and committee meeting every fourth Wednesday. **Wednesday 19 October** is an On The Air Night from 1930 to 2030 - why not go along and take to the air?; **26th:** Committee Meeting And On The Air Night.

HAMPSHIRE

Andover Radio Amateur Club
Contact: Terry Cull
Tel: (01980) 629346
Website: www.arac.co.uk
Meetings take place at the Village Hall, Wildhern just North of Andover on the 1st and 3rd Tuesday of each month at 1930. Why not go along to one of these meetings? **November 1**: The Biddipole Antenna by **Cieman G0TRT** and **15th**: Wifi and Wimax Radio Links - A practical Approach by **Jan G0BBL**.

KENT

Hilderstone Radio and Electronics Club
Contact: Ken Smith G3JIX
Tel: (01304) 813175
Website: www.g0hrs.org.uk
The Hilderstone Radio and Electronics Club meet at the Hilderstone Adult Education Centre, St. Peters Road, Broadstairs on the second and fourth Friday of the month at 1930 hours. Forthcoming meetings include: **October 11:** AGM! Followed by slideshow and talk on building of 'Le Shack'; **25th:** Talk on Navigation aids at Manston Airport.

SHROPSHIRE

Telford & District ARS
Contact Mike Street,G3JKX
Tel: (01952) 299677
E-mail mjstreetg3jkx@aol.com
Website: www.tdars.org.uk
The Telford & District ARS meet at the Community Centre, Bank Road, Dawley Bank, Telford, Shropshire TF7 2AX. Meetings commence at 2000 every Wednesday (unless otherwise stated and are subject to amendment). Forthcoming meetings are: **October 19:** 'My favourite Radio Reference Book' Bring your most used tome; **26th:** Club Project - Low Voltage Add-on unit, Building Night; **November 2:** Open evening/HF OTA/Committee meeting and **9th**: PSU project completion/testing. Also planning for Club Calls Contest.

Mounting Hardware (All galvanised)

6" Stand Off Bracket *(complete with U Bolts)*.....**£6.00**
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These heavy duty aluminium (1.8mm wall) have a lovely push fit finish to give a very st ong mast set
1.25" set of four 5ft sections.....**£24.95**
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RG58 best quality standard per mt.....**35p**
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Please phone for special 100 metre discounted price

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BNC to PL259 adapter (Female to male).....**£2.00**
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Please add just £2.00 P&P for connector only orders
PLEASE PHONE FOR LARGE CONNECTOR ORDER DISCOUNTS

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MB-4X 4:1 Balun 1000 watts power **£29.95**
MB-6X 6:1 Balun 1000 watts power.....**£29.95**
MB-Y2 Yagi Balun 1.5 to 50MHz 1kW.....**£24.95**

Tri/Duplex & Antennas Switches

MD-24 HF or VHF/UHF internal duplexer (1.3-225MHz) (350-540MHz) SO239/PL259 fittings **£22.95**
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All mounts come complete with 4m RG58 coax terminated in PL259 (different fittings available on request).
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(Other lengths available, please phone for details)

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Alignment 5pc kit.....**£1.99**

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HF Yagi

HBV-2 2 BAND 2 ELEMENT TRAPPED BEAM FREQ:20-40 Mtrs GAIN:4dBd BOOM:5.00m LONGEST ELEMENT:13.00m POWER:1600 Watts.....**£399.95**

ADEX-3300 3 BAND 3 ELEMENT TRAPPED BEAM
FREQ:10-15-20 Mtrs GAIN:8 dBd
BOOM:4.42m LONGEST ELE:8.46m
POWER:2000 Watts **£329.95**

ADEX-6400 6 BAND 4 ELEMENT TRAPPED BEAM FREQ:10-12-15-17-20-30 Mtrs GAIN:7.5 dBd BOOM:4.27m LONGEST ELE:10.00m
POWER:2000 Watts.....**£599.95**
40 Mtr RADIAL KIT FOR ABOVE.....**£99.00**

HF Verticals

VR3000 3 BAND VERTICAL
FREQ: 10-15-20 Mtrs
GAIN: 3.5dBi HEIGHT: 3.80m POWER: 2000 Watts (without radials)
POWER: 500 Watts (wi h optional radials).....**£99.95**
OPTIONAL 10-15-20mtr radial kit.....**£39.95**

EVX4000 4 BAND VERTICAL FREQ:10-15-20-40 Mtrs GAIN: 3.5dBi HEIGHT: 6.50m POWER: 2000 Watts
(wi hout radials) POWER: 500 Watts
(wi h optional radials).....**£119.95**
OPTIONAL 10-15-20mtr radial kit.....**£39.95**
OPTIONAL 40mtr radial kit **£14.95**

EVX5000 5 BAND VERTICAL FREQ:10-15-20-40-80 Mtrs GAIN: 3.5dBi HEIGHT: 7.30m POWER: 2000 Watts (without radials) POWER: 500 Watts (wi h optional radials).....**£169.95**
OPTIONAL 10-15-20mtr radial kit **£39.95**
OPTIONAL 40mtr radial kit.....**£14.95**
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EVX6000 6 BAND VERTICAL FREQ: 10-15-20-30-40-80 Mtrs GAIN: 3.5dBi HEIGHT: 5.00m RADIAL LENGTH: 1.70m(included) POWER: 800 Watts.....**£299.95**

EVX8000 8 BAND VERTICAL FREQ:10-12-15-17-20-30-40 Mtrs (80m optional) GAIN: 3.5dBi HEIGHT: 4.90m RADIAL LENGTH: 1.80m (included)
POWER: 2000 Watts **£319.95**
80 MTR RADIAL K T FOR ABOVE.....**£89.00**
(All verticals require grounding if optional radials are not purchased to obtain a good VSWR)

Trapped Wire Di-Pole Antennas
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ALL PICTURES ARE FOR REFERENCE ONLY

doing it by design

This month Tony Nailer G4CFY adds a postscript to the balanced mixers discussed in the last DiBD column. And, as usual Tony's provided a p.c.b. for the project.

In the last Doing it By Design (DiBD) in the September 2005 *PW* I explored double balanced mixers including the four quadrant multiplier integrated circuit (i.c.) SA602/612. Unlike other i.c.s of its type it included a transistor with base and emitter available for use as an oscillator.

Various articles on the use of the device showed it functioning as a Colpitts oscillator and this gave me confidence that it would function as an impedance inverting overtone oscillator.

I laid out the board to allow parallel and overtone modes and subsequently incorporated to work as an overtone oscillator in the prototype Mellstock 70MHz receiver. This is when I found it would not function in that mode. The transistor for the oscillator is starved of current to keep dissipation to a minimum and does not have enough drive for the usual overtone oscillator.

The discovery is an important lesson for me and all the readers and one that I shouldn't have ignored. Never assume a circuit will work just because it looks right on paper, especially if it is going into print, always test it first!

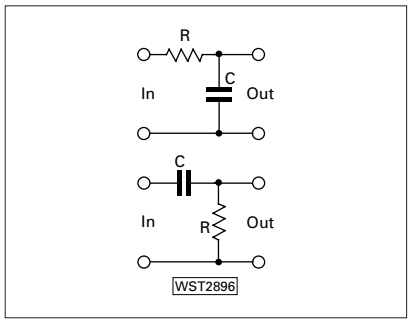

Fig. 1: The simplest low-pass filter (l.p.f.) is made from a series resistor and a shunt capacitor (top circuit). The high-pass filter (h.p.f.) is made from a series capacitor and shunt resistor (lower circuit).

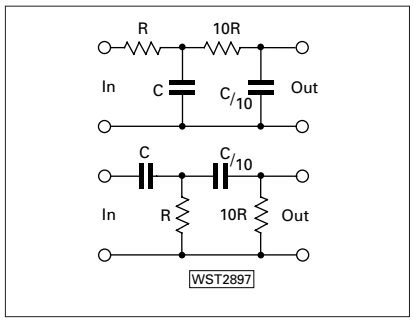

Fig. 2: It's common to cascade two RC sections by making the second section ten times the impedance of the first (see text).

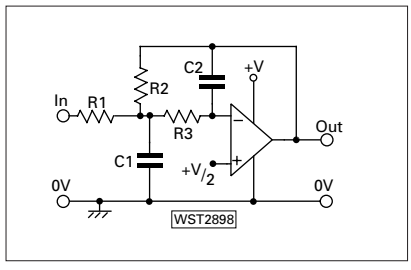

Fig. 3: A low-pass active filter circuit.

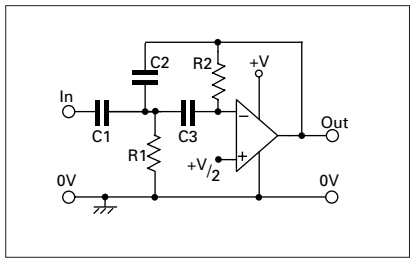

Fig. 4: A high-pass active filter circuit.

Audio Filters

Let's take a look at audio filters now. These generally find application as frequency tailoring of microphone audio or noise reduction in receive audio stages.

Radio frequency (r.f.) filters are matched input and output impedances and are characterised for minimum power loss. However, audio filters are more concerned with shape and ultimate attenuation - and insertion loss is relatively unimportant.

Stephan Niewiadomski showed in his article Sharper by Design (*PW* September 2004) that although his passive LC filter was designed for equal input and output impedance, it actually worked a lot better with the output terminated at ten times the design impedance.

My article DiDB November last year explored the use of the Op Amp as an amplifier. Here I'll show how its exceedingly high input impedance and low output impedance makes it function really well as an active filter.

Passive R-C filters

The simplest low-pass filter (l.p.f.) is made from a series resistor and a shunt capacitor. The high-pass filter (h.p.f.) is made from a series capacitor and shunt resistor, shown in **Fig. 1**. Now the resistor maintains its value while the capacitor changes its reactance inversely with frequency.

At low frequencies the capacitor has a high reactance and at high frequencies the capacitor is low reactance. There will be a frequency where the reactance of the capacitor is the same as that of the resistor.

This occurs at $f = 1/(2*\pi*R*C)$. Then $R = 1/(2*\pi*f*C)$ and $C = 1/(2*\pi*f*R)$

To calculate the value of a simple l.p.f. filter for 2.5kHz using an R & C. First choose a possible capacitor, how about 4.7nF.

Now $R = 1/(2*\pi*2.5*10^{3}*4.7*10^{-9})$

$R = 1/ 23.5*10^{-6}$. $R = 10^{6}/23.5 = 42.55k\Omega$.

Using 39kΩ would make the cut off frequency 2.7kHz.

Using 47kΩ would put the cut off at 2.26kHz.

The filter will function quite well when driven from a low impedance source and fed into a high impedance load. It's common to cascade two RC sections by making the second section ten times the impedance of the first (see **Fig. 2**).

In the example just done it would be practical to have a first section using a 3.9kΩ and 47nF feeding into the 39kΩ and 4.7nF section. A high-pass filter can be calculated and created in the same way by transposing the R & C.

Active Filters

An Op Amp used in conjunction with two RC sections allows feedback to the middle of the filter providing gain within the pass-band, which may make the circuit tend towards oscillation. This is used to beneficial effect to overcome the progressive roll-off caused by cascaded filter sections.

Active filters come in a number of variants. Among the most common are Sallen-Key, Voltage Controlled Voltage Source, and Multiple Feed-Back (MFB). The latter has no real restrictions on values or gain or damping factor and is the one I use mostly. A low-pass and high-pass version are shown in **Figs. 3** and **4**.

A two section l.p. f. will have a smooth pass-band and then beyond the cut-off frequency a response which falls at 12dB for every doubling of frequency, otherwise referred to as 12dB/octave. This has also been found to correspond with a slope of 40dB per decade. Similarly the h.p.f. has a roll off of 12dB/octave for every halving of frequency below cut-off.

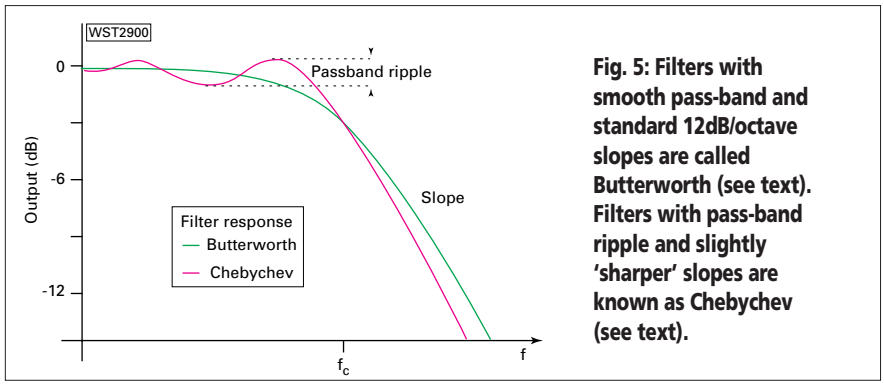

Fig. 5: Filters with smooth pass-band and standard 12dB/octave slopes are called Butterworth (see text). Filters with pass-band ripple and slightly 'sharper' slopes are known as Chebychev (see text).

Steeper slopes from pass-band to stopband can be achieved by sacrificing the flatness of the pass-band and incurring areas of loss. Filters with smooth pass-band and standard 12dB/oct slopes are called Butterworth, see **Fig. 5**, and filters with pass-band ripple and slightly sharper slopes are known as Chebychev.

The characteristic that affects this property is the damping factor and is usually given the symbol Z. The Butterworth characteristic has damping factors as follows: Single section;

Z =1. Two section Z = 0.707. Three section Z = 1 for first single section, and Z = 0.5 for next two section. Four section Z = 0.383 for first two section, and Z = 0.924 for second two section. Five section Z = 1 for first single section, Z = 0.309 for first two section, Z = 0.809 for second two section.

The Chebychev response is even more complex as the damping factor is also dependant upon the allowable ripple of the pass-band and the slope to the stopband. This means that for every ripple factor and slope there will be a specific table of damping factors. The calculation of the Z factors for various ripples and slopes is beyond the scope of this article.

The Chebychev filter with a 0.5dB pass-band ripple has damping factors as follows: Single section Z =2.863. Two section Z = 0.712. Three section Z = 0.626 for first single section, and Z = 0.313 for next two section. Four section Z = 0.175 for first two section, and Z = 0.423 for second two section. Five section Z = 0.362 for first single section, Z = 0.112 for first two section, Z = 0.2931 for second two section.

Low-Pass MBF

The starting variables we have to define are; gain A between 0 and 10; cut-off frequency f in Hertz; damping factor 0.707 for Butterworth two section or 0.712 for Chebychev two section; a first guess choice for capacitor C1 in pF. Values of capacitance in the formula are in pF.

$C2 = (C1*Z*Z)/(1+A)$
$R2 = (Z*10^{12})/(2*\pi*f*C2)$
$R3 = R2/ 1+A)$
$R1 = R2/A$

Let gain A = 1.5, cut-off frequency f = 6kHz, damping factor Z = 0.707, C = 1000pF.

C2 = (1000*0.707*0.707)/(1+1.5) = 500/2.5 = 200pF
R2 = $0.707*10^{12}/(2*\pi*6000*200)$ = 93.768kΩ
R3 = 93768/(1+1.5) = 37.507kΩ
R1 = 93768/1.5 = 62.512kΩ

I re-ran the calculations several times just scaling the results up or down and found that if; C1 = 1350pF, C2= 270pF, R2 = 69.440kΩ, R3 = 33.339kΩ, and R1 = 55.566kΩ.

Then C1 can be made of

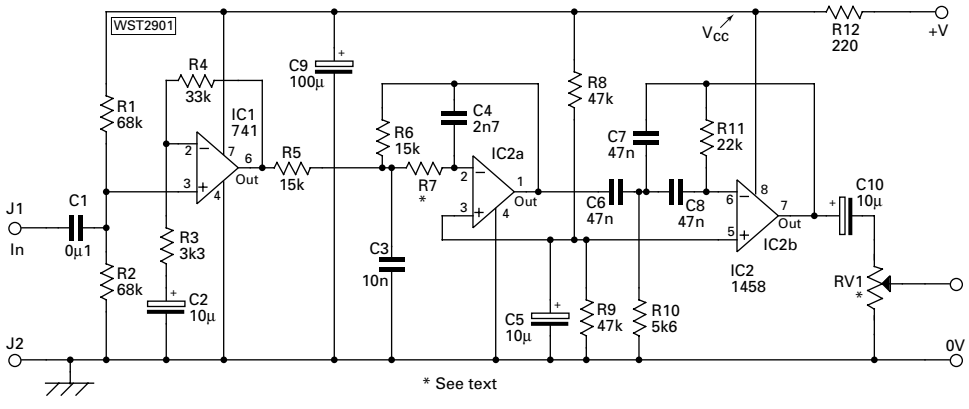

Fig. 6: The filter sections are preceded by a buffer amplifier to ensure the source for the first filter is low impedance. Such a filter designed for the audio band of 300Hz to 2.7kHz could be used as a microphone filter or a receive audio filter.

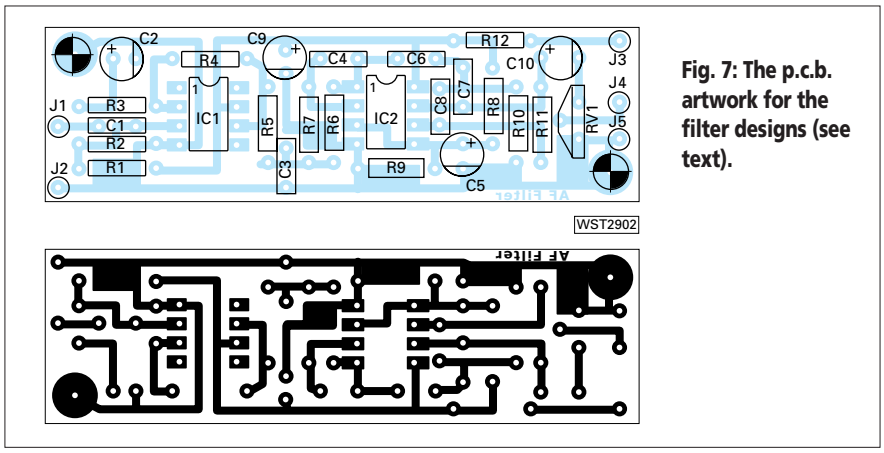

Fig. 7: The p.c.b. artwork for the filter designs (see text).

1200 + 150pF in parallel, C2 = 270pF, R2 = 68kΩ, R3 = 33kΩ, and

R1 = 56kΩ.

In the case of a four section Butterworth filter, simply do the calculation for the first two section using Z = 0.383. Then do the calculation for the next two section filter using Z = 0.924.

The non-inverting (or+ input) of the Op Amp can go to the junction of two equal resistors between Vcc and 0V. Values can be anything from 4.7 to 47kΩ.

High-Pass MBF

The starting variables are the same as before; gain A between 0 & 10; cut-off frequency f in Hertz; damping factor 0.707 for Butterworth two section or 0.712 for Chebychev two section; a first guess choice for capacitor C2 in pF. Values of capacitance in the formula are in pF.

C1 & C3 = A*C2
R1 = $(Z*10^{12})/(\pi*f*C2(2+1/A))$
R2= $10^{12}*((2*(A+1)*10^{12}/(4*\pi*f*C2*Z)$
Let gain A = 1, cut-off frequency f = 250Hz, damping factor Z = 0.707, C2 = 10000pF.

C1 & C3 = 1*10000 = 10000pF
R1 = $(\pi*250*10\ 000*(2 + (1/_{2.2}))$
R1 = $10^{12}*0.707/1928*10^4$ = 36.674kΩ.
R2 = $10^{12}*(2*2.2+1)/(4*\pi*250*10000*0.707)$
R2 = $10^{12}*6.4/2221.1*10^4$ = 288.145kΩ

Re-doing the calculations again by scaling for different values of C1 & C3 the best fit with standard components would be C2 = 10nF, C1 & C3 = 10nF + 1nF in parallel, R1 = 33kΩ and R2 = 270kΩ.

Designing A Band-pass Filter

The multiple feedback circuit is also available as a band-pass filter using a single low pass section together with a single high pass section. The slope from pass-band to stopband is only 6dB/octave, which in many cases will be inadequate.

The easiest solution is to cascade a two section low-pass active filter with a two section high pass filter as shown in **Fig. 6.** The filter sections are preceded by a buffer amplifier to ensure the source for the first filter is low impedance. Such a filter designed for the audio band of 300Hz to 2.700kHz could be used as a microphone filter or a receive audio filter.

Buffer Stage

In the circuit Fig. 6, the input is fed via C1 to the non-inverting input of IC1, which is extremely high impedance. The resistors, R1 and 2 are equal values and have to maintain a high resistance. If they are chosen to be - let's say - 68kΩ each, the parallel total will be 34kΩ. The capacitor C1 should be a poly block which is low noise ,and a value of 100nF should be high enough.

Resistor R4 should present the same resistance to the inverting input as seen by the non-inverting input, so 33kΩ will be the best choice. The gain A of the stage can be anything from 1 to say 15 and is defined by A = 1 + R4/R3. If R3 and C3 are left off the board the stage will be unity gain. For a gain of 11, R4/R3 = 10Ω, so R3 = R4/10 = 3.3kΩ.

If C2 is chosen to be 10µF it will have a reactance of X=1/(2*π*f*C) and at 300Hz will be X = 1/(2*π*300*10*10^{-6})

X = 1/(6*π*10^{-3}) = 53Ω.

Low-Pass Section

Let A = 1. f = 2.7kHz. Z = 0.707.
C3 = 10000pF.
C4 = C3*Z*Z/(1+A)
C4 = 10000*0.707*0.707/(1+1)
C4 = 5000/ = 2500pF, let C4 = 2700pF.

R6 = Z*10^{12}/(2*π*f*C4)
R6 = 0.707*10^{12}/(2*π*2700*2700)
R6 = 0.707*10^{12}/45804420 = 15.435kΩ, let R6 = 15kΩ.

R7 = R6/(1+A)

R7 = 15000/(1+1) = 7.5kΩ, use two 15kΩ in parallel.

R5 = R6/A = 15kΩ / 1 = 15kΩ.

A half rail is created using R8 and R9 in this case each 47kΩ and decoupled by C5 10µF.

The parallel value of R8 and R9 is 23.5kΩ, which is close to the resistance seen by the non-inverting input of IC2A, which is 22.5kΩ.

High-Pass Section

Let A = 1. f = 300Hz. Z = 0.707. C7 = 47nF.

C6 and C8 = A*C7 = 1*47nF = 47000pF.

R10 = $10^{12}*Z/(\pi*f*C6(2+1/A))$
R10 = $10^{12}*0.707/(\pi*300*47000(2+1/1))$
R10 = $10^{12}*0.707/1.3288*10^8$
R10 = $0.707/1.3288*10^4$
R10 = 5.321kΩ, let R1 = 5.6kΩ.

R11 = $10^{12}*(2*A+1)/(4*\pi*f*C6*Z)$
R11 = $10^{12}*(2*1+1)$ /
(4*p*300*47000*0.707)
R11 = $10^{12}*3/1.2527*10\text{^}8$
R11 = $3/1.2527*10^4$
R11 = 23.948kΩ, let R2 = 22kΩ

Current & Voltage

The three Op Amps will consume about 7.5mA and for filter purposes we should drop 1 or 2V across R12. If R12 is 220Ω the drop will be 220*0.0075 = 1.65V. To provide adequate decoupling will require C9 to be 100µF which is 5.3Ω at 300Hz. Together with R12 this will attenuate audio signals incoming from the supply by a factor of 40:1.

The output of IC2b feeds through another 10µF capacitor to a trimpot which could be 2.2kΩ ohms. This will not heavily load IC2b and will provide a sufficiently low source for any following stage. A p.c.b. has been laid out and the artwork and overlay are shown in **Fig. 7**.

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Kits & Bits

Active filter p.c.b. £3. Components £3 (P&P) 50p. Cheques payable to **A. J. & J. R. Nailer, Spectrum Communications, 12 Weatherbury way, Dorchester, Dorset DT1 2EF.**

Fig. 1: Furness Amateur Radio Society, GX4ARF/P, on Black Combe in Cumbria. (Operator shown – Sam Jones M0SJJ).

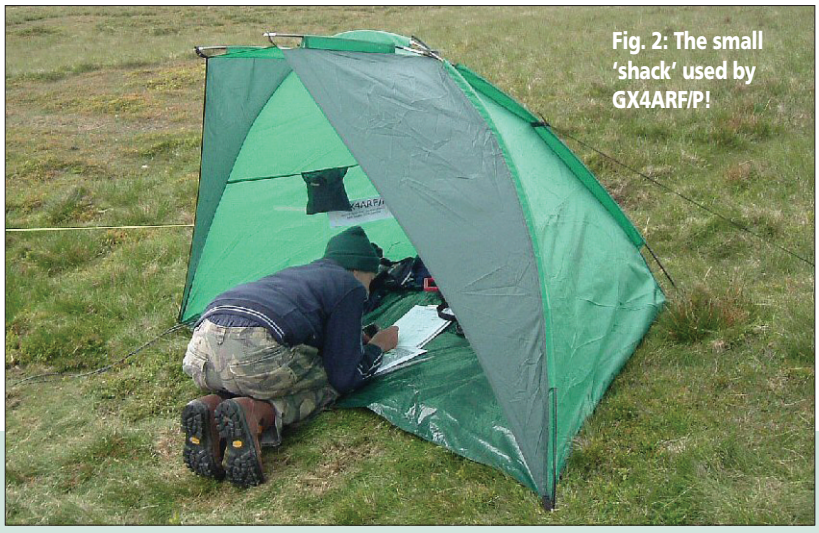

Fig. 2: The small 'shack' used by GX4ARF/P!

The Practical Wireless 144

The station of Dave Wright M0EQD during the 2005 contest.

How did you do this year? Neill Taylor G4HLX breaks the suspense as he provides the final results for the 2005 event. So, if you didn't join in this year, make sure you're ready for 2006!

Editor's thanks and acknowledgements: I thoroughly enjoyed my short time on the air during our 'fun' contest this year. And even though I only managed two hours, it was enormous fun and even though conditions weren't so good from readers' reports - I managed to work up to Morecambe, York and East Anglia - seemingly not so easy from the deep south. All the enjoyment comes about because of the continuing hard work from contest originator and adjudicator **Dr Neill Taylor G4HLX**. Thanks for all your efforts Neill and I'm sure everyone who enjoys the contest hopes that your work commitments in 2006 and onwards will allow you to carry on your excellent work on our behalf.

Rob G3XFD

Sunday 12 June 2005, which was an unseasonably cold day in most parts of the UK, saw many stations taking to the hills for the 22nd annual PW 144MHz QRP contest. A total of 67 entries were received, halting the gradual rise in numbers in recent years, and returning to the same level as 2002.

Competition near the top of the table was fierce, with less than 10% difference in the score achieved by stations from third down to eighth positions. The first and second places were won by clear margins, though.

First Place

In first place - by a large lead - is the **Coventry Contest Group M0CUS/P**. This group is made up of **Mack M0CUS**, **Tim M3SDE**, **George G8AIM**, **Marti M1DCV** and **Ian M0KCM**, who operated from Cutsdean

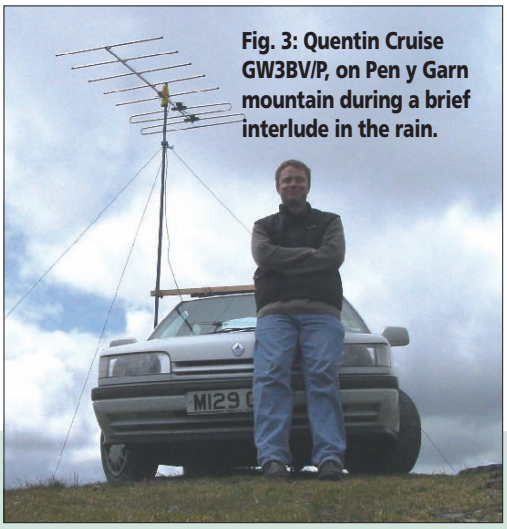

Fig. 3: Quentin Cruise GW3BV/P, on Pen y Garn mountain during a brief interlude in the rain.

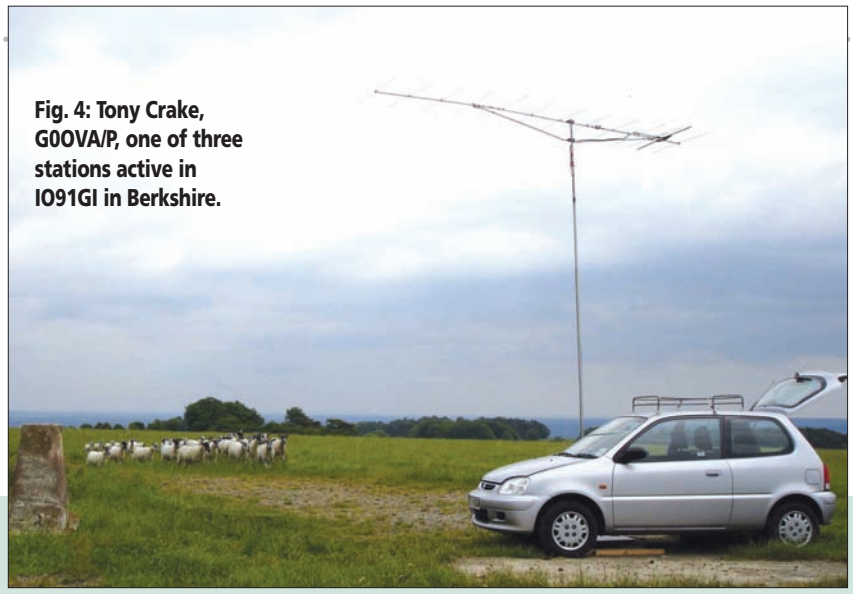

Fig. 4: Tony Crake, G0OVA/P, one of three stations active in IO91GI in Berkshire.

MHz QRP Contest 2005

Hill in Gloucestershire. Congratulations to them – they receive the *Practical Wireless* QRP Contest Winner's Cup.

In second place, and leading Single Operator, is **Dave Hewitt GW8ZRE/P**, operating near Llangollen in north Wales. Dave was also leading Single Operator last year and in five earlier contests in the late 1990s.

He evidently knows what the winning formula is, and he sticks with it, even down to the frequency on which he can be found calling "CQ" for most of the day, as regular entrants will recognise. Although this year for a change he spent the first four hours on a somewhat lower frequency. As leading Single Operator, Dave is awarded the Nevada Trophy, sponsored by **Mike Devereux G3SED** of **Nevada**.

Those two stations, M0CUS/P and GW8ZRE/P, were also, of course, the leaders in England and in Wales. But there was a disappointing number of entries from elsewhere.

Leading Stations

The disappointing lack of entries means that the leading station in Scotland and the leading station in Eire and Northern Ireland achieved the 'Leader' position with no competition.

North of the border, it's **Evan Michael GM0PKX/P**, operating from Cairn O'Mount in north-east Scotland, who takes the leading title. Despite being far from the bulk of the activity, Evan managed to work 15 locator squares. He wins the **Tennamast Trophy** in memoriam to Frank Hall GM8BZX, sponsored by **Tennamast (Scotland) Ltd**.

The leading station in Eire or Northern Ireland wins The **PW EI/GI Trophy Clock**, donated by **Rob Mannion G3XFD/EI5IW**. There being no EI activity this year, the winner is the sole Northern Ireland entrant, **Martin Hunter MI0CLP/P**, operating from Carrigatuke Mountain in County Armagh.

Congratulations to both leaders and thanks for activating the locator squares IO86 and IO64. This was much appreciated by operators who managed to work these for multipliers.

Locator Square Leaders

Appreciation of those who put stations on the air in the outlying areas is one reason why we present a special certificate to the leader in every locator square (see table). And thanks to the continued support of **Chris Rees GU3TUX**, every entrant who sent in the corner-flash coupon printed with the rules will receive a certificate stating their position in the results.

We know that everyone puts a lot of effort into their stations, so everyone deserves a certificate to recognise it! A full detailed results table will be found on the contest website **www.contest.org.uk**

Checklogs Received

In addition to the 67 entries, five stations sent in Checklogs: they were from **G0THY**, **G3BDQ**, G3MEH, M3OVL, and our editor, Rob G3XFD/P, who seemed to be enjoying himself during the contest. These Checklogs are very gratefully received.

Crowded Lake District!

If some of the outlying parts of the British Isles were sparsely populated with stations, other parts had rather a concentration! As GW8ZRE/P notes; "there was a lot of activity from IO84, the Lake District must have had an Amateur on each hill top"!

And further south, one locator, IO91GI, had no less than three portable stations within it. Not surprising, perhaps, as this is Walbury Hill, one of a very few 'Marilyns' (i.e. Summits in the SOTA sense) in the south of England. Generally, as GW4EVX/P writes, there was a "very pleasing level of portable activity".

Unfortunately, the good level of activity was offset by rather poor v.h.f. propagation conditions. Here's a selection of opinions on this subject... GW3BV/P: "Radio conditions

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The ultimate HF excitement in a small package. HF + 6m + 2m + 70cm. Incl's digital signal processor unit.
DTMF £59.99
£569.99
Includes free detatch kit
FT-857D + ATAS-120 Package Price £789.99

YAESU FT-7800

2m/70cm. Includes FREE in-car kit.
Rx:- 108-520/700-1000MHz
BEST BUY **£219.00**

YAESU VX-7R

Yaesu heavy duty tribander 50/144/ 430MHz. (Lithium ion battery) high power (5W) as standard. Includes charger.
Includes free VC-27 mic
£269.00

ALINCO DJ-596

2m + 70cm Handie. Includes: (NIMH) Battery/Charger. Wide + narrow switchable. High power (4.5W) OP as standard. Alpha Numeric channeling.
Now includes free remote mic
£129.95
Optional case £16.99
Cigar lead.....£19.99
Optional headset (Boom mic) £24.99

YAESU FT-1000MP MkV

200 watts of shear delight from a radio that is without peer when it comes to performance and innovation. Limited stock available. Latest 2005 spec.
FREE MATCHING SPEAKER
£1949.00
Yaesu FT-1000MP (Field) MkV (100W) £1599.00

YAESU FT-897D

HF + 6m + 2m + 70cm all mode. An amazing DSP Tcvr for base/mobile or portable use. Very little has been left out!
INCLUDES FREE HEADSET
PRICE **£639.99**
FT-897 + PS-300 bundle £729.99

NISSEI PWR/SWR METERS @ LOWER PRICES!

RS-502 1.8-525MHz (200W) .....£69.95 P&P £5
RS-102 1.8-150MHz (200W) .....£49.95 P&P £5
RS-402 125-525MHz (200W).....£49.95 P&P £5
RS-3000 1.8-60MHz (3kW) Incls mod meter £39.95 P&P £5
RS-40 144/430MHz Pocket PWR/SWR .....£24.95 P&P £2
DL-30 diamond dummy load (100W max) ...£29.99 P&P £3

KENWOOD TH-F7E

Transceiver & scanner 2m/70cm Tx (5W). Rx:- 0.1-1300MHz, all mode (incl SSB). Incls:- Lithium ion battery & charger.
Incl's free remote mic
OUR PRICE **£229.99**
Optional case £19.99
Optional cigar lighter lead.....£19.99
Optional headset (Boom mic) £24.99

ACCS

D-308B DELUXE DESK MIC

(with up/down). Many amateurs using this mic (over 4000) have expressed extreme pleasure with its performance. Includes 8-pin round Yaesu mic lead.
Adapters available!
£49.95 P&P £6.00

MFJ-259B

UK VERSION
HF digital SWR analyser + 1.8-170MHz.
NOW **£169.99** P&P £7.00
Optional case.....£22.99

MFJ-259Z	Analyser	Now £184.99
MFJ-269	160-70cm analyser	Now £259.99
MFJ-969	HF + 6m ATU	Now £159.99
MFJ-260C	300W dummy load (0-600MHz)	£39.99
MFJ-901B	Superb versiitle ATU	Now £72.99
MFJ-784B	DSP filter ~~£249.00~~	Now £129.99
MFJ-902	Travel tuner (10 - 80m)	Now £59.99
MFJ-160	Random wire tuner (HF)	Now £45.00
MFJ-264	(0-600MHz) 1.5kW dummy load	£49.99
MFJ-260	(0-600MHz) 300W dummy load	£30.00
MFJ-1118	Multiple DC outlet board	Now £49.99
MFJ-1117	High current outlet unit	Now £35.00

MFJ-949E

NOW **£110.00**
- 1.8-30MHz 300W ATU
- Large cross needle meter
- 30/300W PEP power meter
- VSWR ● 3-way antenna selector
- Internal balun

MFJ-969

The world's only 300 Watt Aircore™ roller inductor A.T.U. (covers 160 meters to 6m). Handles almost any antenna + wires.
NOW **£159.99**

SGC-230

200W remote weatherproof ATU. Connect a wire and simply go! (Minimum length applies.)
£299.99
SGC-239 Mini Tower (1.8-30MHz) £169.99
SGC-230 Smart-lock.....Was £59.99 NOW £39.99
SGC-231 HF + 6m £299.99

YAESU G-450C

Heavy duty rotator for HF beams, etc. Supplied with circular display control box and 25m of rotator cable.
OUR PRICE **£299.99**
G-650C .....our price £359.99
G-1000DXC.....our price £449.99
G-5500 (azimuth/elevation) rotator .....our price £499.99
GC-065 thrust bearing.....£48.00
GC-038 lower mast clamps.....£25.00

UBC-180XLT

A brand new state-of-the-art scanner with 8.33kHz spacing on airband. Covers 25-960MHz (with gaps). Includes battery and charger. 8.33kHz tuning. Back-lit display along with alpha-numeric tagging.

RRP ~~£129.95~~ OUR PRICE **£99.95**

GRE PSR-225

25-550/760-1300MHz. AM/FM/SF. VFO tuning/direct frequency entry/direct-limit search/auto frequency storing/anttenuator 240V or 12V. Was ~~£199.00~~

NOW **£149.99** Del £10.00

SONY SW-30

The ideal holiday partner!
★ Fully digital world receiver ★ FM/MW/SW ★ Covers all short wave broadcast/MW plus FM stereo (on head phones) ★ Programmable memories ★ Sleep timer + alarm function ★ 1kHz tuning for short wave.

RRP £79.95. SPECIAL OFFER **£19.99** P&P £8.50

HUNTER

Frequency counter covers 10MHz-3GHz. Incl's nicad, charger, antenna.

OUR PRICE **£39.95** P&P £6

Optional padded case £7.50

MFJ-115

24 hour quartz clock. Major cities shown on rim. World map on face. "Know what time it is around the world".

£19.99 P&P £5.00

MFJ-125

12" Dxer's quartz wall clock. give:- 24hr time + 3 smaller dials give 12 hour time/day of week/date.

£24.99 P&P £6.00

HHC-2 Police style holster

A unique "stretch case" designed to fit atatched to your belt or fixed to your body via the 3-point body harness (supplied). (Ideal for hand-held/mobile phones).

£10.00 P&P £2.50 **2 for £15.00**

New station log books (A4) £2.99 P&P £2.00
5 Logbooks £12.00 P&P £6.50

TH-887 headset

DAP ERS OR MOB LE CVRS AVAIL BLE - PHONE

Superb headset for most handies.
887K (fits Kenwood) £24.95.
887 fits most twin socket-Alinco, Icom, Yaesu, etc.

Now **£15.00** P&P £3

CUSHCRAFT BARGAINS

Delivery £12.00

MA5B	Mini beam 10, 12, 15, 17, 20m	SPECIAL OFFER	£299.99
A4S	4 ele beam (10 - 20m)	~~£500.95~~	£425.00
R-8	Vertical (40 - 6m) "special"	SPECIAL ~~£499.95~~	£299.99

CAROLINA WINDOM P&P £8.50

CW-160S	(160-10m) 40m long	NOW £110
CW-80	(80-10m) 40m long	NOW £79.95
CW-80S	(80-10m) 20m long	NOW £99.95

BRAND NEW CLEARANCE ITEMS

Kenwood D-700 2m/70cm + packet.....£399.99
Kenwood PS 52 (matching PSU - TS-870S) £169.99
Kenwood MC-60 (desk mic).....£99.99
Icom AT-130 commercial version of AM-4.....£199.99
DCI-145-2H-2N professional bandpass filter....£69.99
2-Way - 2M power splitter (N-type).....£15.00
4-Way - 2M power splitter (N-type).....£20.00

Phasing Harnesses:

6M 2-Way.....£10.00	2M 2-Way.....£10.00
4M 2-Way.....£10.00	2M 4-Way.....£15.00
88 - 108MHz	70cm 4-Way.....£15.00
2-Way £5.00	23cm 2-Way £7.50
	137MHz 2-Way £5.00

MAST HEAD PULLEY

A simple to fit but very handy mast pulley with rope guides to avoid tangling. (Fits up to 2" mast).

£8.99 + P&P £3.50

30m pack (4.4mm) nylon guy rope.....£12.50

NEW EASY FIT WALL PULLEY

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

£8.99 + P&P £3.50

Wall bracket, screws not supplied. Simply screw to outside wall and hang pulley on

WALL BRACKET **£2.99** P&P £1.00

BARGAIN WINCH

500kg brake winch.
BARGAIN PRICE

£59.95 Del £8.50

Winch wall bracket.....£19.99

COAX BARGAINS

RG-213 Mil spec x 100m.
£59.99 or 2 for £100.00 P&P £10

RG-58 Mil spec x 100m.
£29.99 or 2 for £50.00 P&P £10.00

Coax stripping tool (for RG-58).....£4.50

COAX SWITCHES (P&P £4.50)

2 way CX-201 (0-1GHz) SO239 .....£19.95
2 way CX-201 'N' (0-1GHz) 'N'.....£24.95
4 way CX-401 (0-500MHz) SO239 .....£69.95
4 way CX-401 'N' (0-500MHz) 'N'.....£79.95

LOW LOSS PATCH LEADS £3.50 P&P

Connectors	Length	Price
PL-259 - PL-259	0.6m	£5.99
PL-259 - PL-259	4m	£9.99
BNC - BNC	1m	£6.99

MOBILE ANTENNAS P&P £8.50

DB-770M	2m/70cm (3.5 - 5.8dB) 1m PL-259	£24.95
DB-7900	2m/70cm (5.5 - 7.2dB) 1.6m PL-259	£39.95
PL-62M	6m + 2m (1.4m) PL-259	£21.99
PLT-20	20m mobile whip (56" long)	£24.95
PLT-40	40m mobile whip (64" long)	£24.95
PLT-80	80m mobile whip (64" long)	£24.95
PLT-259	PL-259 converter for above	£5.95

NEW NOISE FILTER!

A superb TDK 'snap fix' ferrite clamp for use in Radio/TV/ Mains/PC/Phone etc. *Simply close shut over cables and notice the difference!* Will fit cables up to 13mm diameter. Ideal on power supply leads/mic leads/audio leads/phone leads.

2 for £10.00 or 6 for £25.00 (P&P £3.50)

DOUBLE THICK FERRITE RINGS

A superb quaility ferrite ring with incredible properties. Ideal for "R.F.I". Width 12mm/OD35mm. 6 for £12.00
12 for £20.00 P&P £3.50
50 for £40.00 P&P 7.00

METAL WORK & BITS P&P available on request

2.4m/2"	alloy poles	£19.99
2"	Mast base plate	£12.95 P&P £5
6"	Stand off	£6.95 P&P £5
9"	Stand off	£8.95 P&P £5
12"	T&K Brackets	£18.00 P&P £8
18"	T&K Brackets	£22.00 P&P £8
24"	T&K Brackets	£26.00 P&P £8
U bolts (1½" or 2")		£1.20 each
8 nut universal clamp (2" - 2")		£5.95
2" - 2" cross over plate		£10.95
3-way guy ring		£3.95
4-way guy ring		£4.95
2" 3-way rotary guy ring		£29.99
2" mast sleeve		£9.95
Heavy duty guy kits (with wire)		£29.95 P&P £6
Ground fixing spikes (3 set)	powdered coated	£24.00 P&P £8
30m pack nylon guy 4.4mm/B/load 480kg		£12.50 P&P £3
132m roll nylon guy (4.4mm)		£40.00 P&P £7.50
Self amalgamating tape (roll)		£6.50
'Nylon' dog bone insulators		£1.00 each
PL-259 plugs (large or small entry)		£1.10
N-type plugs (large or small entry)		£3.95

DIAMOND CP-6

A superb (diamond quality) 6 band trap verticle antenna with trap radials – "rotary" trap system allows "flat wall" mounting. 80m/40m/20m/15m/10m/6m. 200W SSB, HT 4.6m

SEND SAE FOR DATA SHEET

OUR PRICE **£219.99**

Q-TEK PENETRATOR

"We've sold 100s all over Europe"

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

ONLY **£179.95** Del £10.00

SEND SAE FOR LEAFLET

DELUXE G5RV

P&P on either full/half size £6.50

Multi-stranded heavy duty flexweave wire. All parts replaceable. Stainless steel and galvanised fittings.

Double size - 200ft (160-10m).....£84.95
Full size - 102ft (80-10m) £42.95
Half size 51ft. (40-10m) £36.95

Inline (SO-239) line isolator (ideal for G5RV).....NOW ~~£24.99~~

STANDARD G5RV

Full size 102ft (now includes heavy duty 300Ω ribbon)....£28.95 P&P £6
Half size 51ft (now includes heavy duty 300Ω ribbon).....£24.95 P&P £6

Q-TEK INDUCTORS

80mtr inductors + wire to convert ½ size G5RV into full size. (Adds 8ft either end).....£25.00 P&P £4.00 (a pair)

G5RV PARTS

Open wire dipole centre.....£5.99
SO-239 dipole centre.....£5.99
SO-239 to 300Ω joiner.....£9.99
300Ω ribbon (Extra heavy duty).....£1/mtr

Q-TEK COLINEARS (VHF/UHF) P&P £10.00

X-30 GF 144/70, 3/6dB (1.1m) £39.95
X-50 GF 144/70, 4.5/7.2dB (1.7m) £54.95
X-300 GF 144/70,6.5/9dB (3m)... SPECIAL OFFER £45
X-510H GF 144/70, 8.5/11dB (5.4m) £120.00
X-627 GF 50/144/70, 2.15/6.2/8.4dBi (2.4m) ..£79.95

BALUNS & TRAPS

1.1 Balun			£25.00 P&P £4
4.1 Balun		1kw Handling	£25.00 P&P £4
6.1 Balun			£25.00 P&P £4
40 mtrs	Traps	(a pair)	£25.00 P&P £4
80 mtrs	Traps	(a pair)	£25.00 P&P £4
20 mtrs	Traps	(a pair)	£25.00 P&P £4

TELESCOPIC MASTS

6 section telescopic masts. Starting at 2"/2" in diameter and finishing with a top section of 1"/4" diameter we offer a 8 metre and a 12 metre version. Each mast is supplied with guy rings and steel pins for locking the sections when erected. The closed height of the 8 metre mast is just 5 feet and the 12 metre version at 8 feet. All sections are extruded aluminium tube with a 16 gauge wall thickness.

8 mtrs **£199.95** 12 mtrs **£149.95** *Carriage £12.00.*

Tripod for telescopic masts £89.95

REPLACEMENT POWER LEADS

DC-1 Standard 6-pin/20A fits most HF £20.00
DC-2 Standard 2-pin/15A fits most VHF/UHF £10.00

BARGAIN ALUMINIUM POLES

2.4m x 2" aluminium pole. **£19.99 each**
(del £10.00) or **4 for £50** (del £15.00)

BARGAIN MAST SET

5 section 16ft long (1⅛") mast set **£15.00**
Del £10 (2 sets £25.00)

TWO FOR £25

NEW 20' SLEEVED MAST SET

A heavy duty-sleeved, mast set that will tightly slot together. 4 x 5' (2" dia) 16 guage heavy duty aluminium tubes. (Dimensions approx).

£49.99 Del £10.00.

THREE FOR £100 DEL £150

ALUMINIUM POLE CLEARANCE

We have sets of 4 (2") poles (3 of which are swaged) that slot together to make a (approx) 20' pole. Each section is approx 5' long – some have small dents in – some have been swaged slightly off centre – hence the price.

3 FOR £40.00 DEL £15 00 **£15.00** Del £10 00

were appalling". G4RQI/P: "Conditions were abysmal". G2CP/P: "The conditions did not seem good, only one hop across the water to ON land". GW6YB/P: "Short period QSB made some contacts difficult". G7TBJ/P: "Only wish conditions had been better on the day".

And it's certainly true that the logs show very little in the way of DX being worked, with no Sporadic-E openings as we have enjoyed in some previous events. But perhaps it's when conditions are flat that the most difficult test to show what can be achieved with just 3W.

Several operators seemed happy with how it went. G2XV/P was one: "Impressive what can be achieved on 144MHz using a modest system. Long live QRP"! As always, it's newcomers to the contest who are most surprised; "It was the first time that we had entered and really enjoyed it", writes G1RCV/P, "we were surprised, yet pleased, how far our 2.5W reached". G4PDF, too, writes; "my first time in this contest. Very pleased to have many contacts at QRP power".

The Weather!

The biggest complaint from the portable stations was the weather. GW4EVX/P sums it up; "Great contest but a pity about the weather. It was more like November than June"! GW8ZRE/P found the low temperature uncomfortable: "enjoyable as usual but bitterly cold, approximately 45°F (7°C), with mist, cloud and rain; I packed in early, my hands were so cold"! G2CP/P describe it as "a seriously foul day with continuous rain and bitter winds". G8LED/P shivered - "a really cold day for June"!

As anyone who has operated portable will know, the most important thing is that it stays dry and calm while setting the station up and again when packing everything up at the end. But G4CDD/P found out how the weather seems to conspire to be as awkward as possible: "It rained while we set up the station, stayed fine throughout the event, then guess what? Correct, it rained very heavily as we tried to pull down"!

However, their problems did not end there - "Finally, wet and cold I got into my Landrover to find the battery was flat (and we did not even use it for the contest). So I then sat for well over an hour with the outside temp 4.5°C before the recovery people could come and sort things out. Well it's all part of the fun isn't it"?

However, not absolutely everyone had such awful weather; G7TBJ/P, at Penzance, Cornwall, writes; "I had a great

Overall placings

Pos	Points	Callsign	Station	Pos	Points	Callsign	Station
1	7035	M0CUS/P	Coventry Contest Group	35	784	G3ZMS/P	Mid Sussex ARS
2	3190	GW8ZRE/P	Dave Hewitt	36	770	G4VRC/P	Bob Doran
3	2470	GW0CCR/P	North Wales Wafflers	37	742	G1POS/P	Jon Page
4	2358	M0WEN/P	Chris Owen & Stuart Dobbs	38	615	G0MOH/P	Rob Greaves
5	2310	G7WAY/P	Stuart Foster / Roger Davis	39	570	GM0PKX/P	Evan Michael
6	2300	G4ARI/P	Tim Raven	40	540	G4TJE/P	Keith Lewis
7	2280	GW6YB/P	Bristol Contest Group	40	540	G6SFP/P	Nigel Ramsey
8	2261	GW0PZO/P	Charlie Jordan	40	540	G4VFG/P	Peter Lewis
9	1649	G3BPK/P	Wigan-Douglas Valley ARS	43	520	2E0SUD/P	Adrian Greenhalgh
10	1520	G2CP/P	Scarborough ARS	44	494	G0TUK/P	Ian Pomfret and Steve Tucker
10	1520	G0OVA/P	Tony Crake	45	462	G4HRS/P	Horsham Amateur Radio Club
12	1479	G1WKS/P	West Kent ARS	46	459	G4FAA/P	Lawrie Atkinson
13	1408	G4BWW/P	Peter Briggs	47	444	G4JYN/P	Waterside (New Forest) ARS
14	1392	M0SUM/P	M0SUM/P	47	444	M3IWR/P	Julian Chapman
15	1376	M0TWA/P	David Simmonite	49	418	GW3BV/P	Quentin Cruse
16	1350	GW4EVX/P	Ron Price	50	416	G7NZO/P	Stephen Bate
17	1309	G4CDD/P	Denby Dale ARS	51	374	G3MAE/P	Hamblton ARS B Team
18	1296	G2XV/P	Cambridge & District ARC	52	330	M0EQD/P	Dave Wright
19	1246	G0HDV/P	North East Ex Pats	53	297	G7KNQ	Chris Martin
20	1216	G0EYX/P	Derek and Paul	54	242	PI4ALK/P	ContestClub Alkmaar
21	1190	G1RCV/P	Cray Valley Radio Society	55	165	G4PDF	R Copeland
22	1168	M3NFL/P	Neil Leddington	56	152	G7TBJ/P	Jeremy Kewn
23	1155	M0ERG/P	Eagle Radio Group	57	144	G0OIW/P	Mark Palmer
24	1110	G8AWO/P	Stevenage and District PW Group	58	135	MI0CLP/P	Martin Hunter
25	1008	G4XBG/P	KMTM	59	104	G0NWT/P	North Norfolk ARG
26	984	GX4ARF/P	Furness Amateur Radio Society	60	98	G7TUA	Amanda Hambidge
27	938	G4MCQ/P	G4MCQ/P	61	96	2E1GUA	James D Beatwell
28	900	GX1WOR/P	Worthing & District ARC	62	84	G0MTN	Lee Volante
29	855	M0SCG/P	Sands Contest Group	63	60	2I0RPM/P	Ralph Gault
30	854	G4RQI/P	David Warr	64	48	M0WEM	The Man from Wem
31	845	G2HDF/P	The Midland Contest Group	65	25	G3XBM	Roger Lapthorn
32	832	M1VPL	Anne and Duncan Westland	66	20	M0BQE	Mr. C.R. Margetts
33	812	G8LED/P	Northampton Radio Club	67	1	M/PA9RZ/P	Robert van der Zaal
34	795	M0IOW/P	Barry Cant				

Leading multi-operator stations

Pos.	Name	Callsign	Score	QSO	Sq	Loc	Tx/Rx	Antenna	asl(m)
1	Coventry Contest Group	M0CUS/P	7035	201	35	IO91	IC-910	2 x 17 ele Tonnas	300
3	North Wales Wafflers	GW0CCR/P	2470	130	19	IO82	FT-736R	4 x 17 ele Tonna	560
4	Chris Owen & Stuart Dobbs	M0WEN/P	2358	131	18	IO93	TR751E	17 ele Tonna	415
5	Stuart Foster / Roger Davis	G7WAY/P	2310	110	21	IO92	FT-847	17 ele Tonna	320
7	Bristol Contest Group	GW6YB/P	2280	114	20	IO81	FT-290R	9 ele Tonna Yagi	750
9	Wigan-Douglas Valley ARS	G3BPK/P	1649	97	17	IO83	IC-746	12 element Yagi	168
10	Scarborough Am. Radio Society	G2CP/P	1520	80	19	IO94	FT-221	2 x 9 ele Tonna Yagis	296
14	M0SUM/P	M0SUM/P	1392	87	16	IO83	FT-290R	4 element beam	477
17	Denby Dale ARS	G4CDD/P	1309	77	17	IO93	FT-736	14 element beam	274
18	Cambridge & District ARC	G2XV/P	1296	72	18	IO92	FT-290R/Mutek	9 ele Tonna	77

Leading single-operator stations

Pos.	Name	Callsign	Score	QSO	Sq	Loc	Tx/Rx	Antenna	asl(m)
2	Dave Hewitt	GW8ZRE/P	3190	145	22	IO83	TR751E	7 ele ZL Special	561
6	Tim Raven	G4ARI/P	2300	115	20	IO92	FT-817	14 ele Yagi	236
8	Charlie Jordan	GW0PZO/P	2261	133	17	IO83	FT-817	9 ele Tonna	554
10	Tony Crake	G0OVA/P	1520	95	16	IO91	IC-706 Mk2G	13 ele Tonna (modified)	297
12	West Kent ARS	G1WKS/P	1479	87	17	JO01	FT-817	2 x 9 ele Vargardas	144
13	Peter Briggs	G4BWW/P	1408	88	16	IO84	TR751	8 element Yagi	130
15	David Simmonite	M0TWA/P	1376	86	16	IO93	FT-817	9-e Tonna/5-e J-beam	350
16	Ron Price	GW4EVX/P	1350	90	15	IO83	FT-817	9 Ele Yagi	526
30	David Warr	G4RQI/P	854	61	14	IO93	FT-897	10 ele Cushcraft	198
33	Northampton Radio Club	G8LED/P	812	58	14	IO92	FT-290R	7 ele ZL Special	135

Leading Stations

Category	Name	Callsign
Overall Winners	Coventry Contest Group	M0CUS/P
Runner Up	Dave Hewitt	GW8ZRE/P
Leading Single Operator	Dave Hewitt	GW8ZRE/P
Leading Fixed Station	Anne and Duncan Westland	M1VPL
Leading English Station	Coventry Contest Group	M0CUS/P
Leading Welsh Station	Dave Hewitt	GW8ZRE/P
Leading Scottish Station	Evan Michael	GM0PKX/P
Leading N. Ireland Station	Martin Hunter	MI0CLP/P

Leading stations using a single antenna

Pos.	Name	Callsign	Score	Antenna
2	Coventry Contest Group	M0CUS/P	7070	17 ele Yagi
6	Salisbury and District Grand International Transmitting Society (SADGITS)	G4RLF/P	4032	6 ele quad
8	Oldham Radio Club	G1ORC/P	3600	9 ele Tonna Yagi
9	Ken Coxon	G0HDV/P	3224	13 ele Yagi
10	Charlie Jordan	GW0PZO/P	3175	9 ele Tonna Yagi
11	Tim Raven	G4ARI/P	3050	14 ele MET Yagi
12	G7WAY / G1UNQ	G7WAY/P	2898	17 ele Tonna Yagi
13	Worthing and District Amateur Radio Club	G1WOR/P	2794	11 ele Tonna Yagi
14	RADARS (Rochdale & District ARS)	G3RIK/P	2714	10 ele ZL
16	Alex Rowley, Mark Tuttle and Steven Rope	M0UKR/P	2175	13 ele Cushcraft 13B2

Leading station in each locator square

Square	Name	Call	Entrants In square
IO64	Martin Hunter	MI0CLP/P	1
IO70	Jeremy Kewn	G7TBJ/P	1
IO74	Ralph Gault	2I0RPM/P	1
IO80	Peter Lewis	G4VFG/P	1
IO81	Bristol Contest Group	GW6YB/P	2
IO82	North Wales Wafflers	GW0CCR/P	7
IO83	Dave Hewitt	GW8ZRE/P	7
IO84	Peter Briggs	G4BWW/P	3
IO86	Evan Michael	GM0PKX/P	1
IO90	Worthing & District Am. Radio Club	GX1WOR/P	5
IO91	Coventry Contest Group	M0CUS/P	13
IO92	Stuart Foster / Roger Davis	G7WAY/P	8
IO93	Chris Owen & Stuart Dobbs	M0WEN/P	7
IO94	Scarborough Amateur Radio Society	G2CP/P	2
JO00	KMTM	G4XBG/P	2
JO01	West Kent ARS	G1WKS/P	5
JO02	Anne and Duncan Westland	M1VPL	5
JO03	Eagle Radio Group	M0ERG/P	1
JO22	ContestClub Alkmaar	PI4ALK/P	1

day in the baking hot sunshine overlooking Mount's Bay"! (A reward for activating another out-of-the-way square, IO70!).

Electronic Entries

I'd like to record particular thanks to all those entries who responded to my request for entries to be sent 'electronically', i.e. by E-mail, wherever possible. I was delighted that over 85% of logs arrived this way! This really did make my job as adjudicator much easier, as well as making the cross-checking more reliable, and meaning that entrants are not penalised for errors such as unmarked duplicates or mis-counting of squares worked (a surprisingly common mistake in the past).

My encouragement seems to have led to a number of operators trying contest logging software for the first time. Not all found it easy! To save embarrassment I will not identify the operator who sent me a sequence of e-mails which revealed his frustration.

"Serial no. 042 is incorrect and my computer will not let me change it! I don't know why... one of the many things that I don't know about these blasted things... the callsign for that QSO is GW6YB/P.... however, I originally entered it as GW06YB/P for reasons best known to myself (been at the beer again) and now even though it allows me to change it on the screen ... it remembers it as GW06YB/P! I've tried every way to change it but its not having it! I don't know if you can help me Neill. [*And later*...] I think I've managed it... by a miracle! Pulling the plug now... gonna take a hammer to this computer! I really must sit down one day and learn about this thing"!

Contest Rules

It's always clear to me that a few people entering the contest have either not read the rules or not read them properly. This is evident from some of the queries I receive just before and after the event.

This year, one operator either didn't read, or somehow misunderstood, the rule that says; "The output power of the transmitter final stage shall not exceed 3W p.e.p.", and interpreted this as permitting 3W at the antenna terminals, after allowing for some attenuation in the feeder.

Although the UK Licence schedule regulates transmit output in terms of power delivered to the antenna, in contest rules it's normal for the transmitter output power to be the quantity that is restricted. For one thing, this is much easier to measure, and for another the feeder should be regarded as part of the antenna system and certainly something that entrants should try to optimise (for receive performance as well as for transmit, of course). So, to be clear: the 3W limit refers to the power coming out of the socket on the transmitter itself!

The 2006 Contest

Time now to look forward to next year's 144MHz QRP Contest. This will be on **Sunday 11 June 2006**, a date that has been agreed with the RSGB VHF Contests Committee to co-ordinate with the second 144MHz Backpackers' session as usual.

With various contests scheduled every weekend around that time of year, there is really no flexibility over the date. So I apologise to those who find an inconvenient clash with some other (non-contest) event.

Full details of the 2006 contest will, of course, appear in *Practical Wireless* next year. And keep your eye on the contest **website www.contest.org.uk** for more information. **Neill Taylor G4HLX**

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Radio Basics

This month Rob Mannion G3XFD continues with his 'building block' circuits theme. Rob encourages you to try out circuits you've seen - perhaps in this column - and use them to make up your own projects.

Continuing with my theme on using circuit building blocks I'm planning to give those readers who are not so confident (some of you have written to me asking for help) a friendly push to taking a dive into the deep end. Once you have taken a circuit, and modified it for your own use, I can assure you that it really does build confidence!

Although there aren't many constructors nowadays who build large, projects such as complete single sideband (s.s.b.) transceivers (for example) there are large numbers of us who build smaller, simpler equipment.

Although there's tremendous satisfaction to be gained from building a big rig, there's equal pride to be felt on building something smaller. Another great benefit of smaller circuits is the fact they're easier to follow and learn. There's nothing to beat hands-on experience!

Simple RF Amplifier

Many of us have simple receivers to hand - including the cheap multiband portable sets that can be bought for less than £10. These little sets perform well but they're even better when provided with an external radio frequency (r.f.) amplifier.

The circuit I'm concentrating on this month is an extremely simple r.f. amplifier. It can be used to couple (crudely but effectively) to a cheap portable broadcast reciver improving its short wave coverage performance and allowing the use of an external antenna.

The circuit building block has often featured in Radio Basics (RB) before, **Fig. 1**, but not used in isolation (as a building block). It's a proven, effective design. The building block circuit itself is shown and all you have to do is to couple the ground (chassis or earth) line and the power supply line (+ positive, supply line) to the supply.

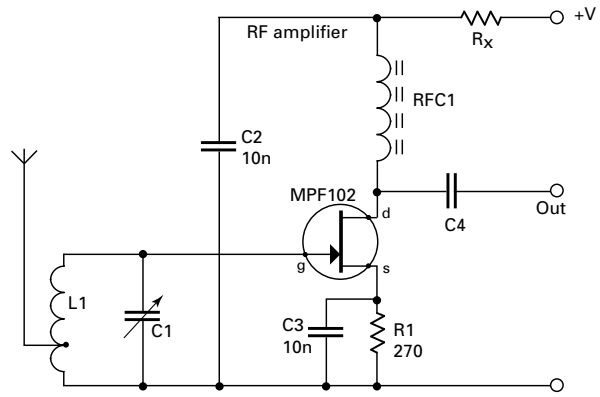

Fig. 1: The r.f. amplifier uses the MPF102. To use the circuit as a 'building block' don't forget to link the earth/ground/chassis line to the project/circuit the amplifier feeds (see text).

If you've never built an amplifier of this type before, I recommend that you have a go. It's extremely effective when used to feed into a basic 'crystal' (diode detector) set. In fact, by building this circuit you'll discover just how effective an r.f. amplifier is and how much more you can hear on your simple receiver.

Another part of the learning process will also become apparent! You'll learn that with increased sensitivity the diode detector receiver will demonstrate its lack of selectivity (Inability to separate individual channels) - especially on the medium wave band where high power transmitters are spaced only 9kHz apart. Quite a challenge for a simple receiver but the project is enjoyable and you listen and learn!

Simple Detector

The simple detector circuit is shown in **Fig. 2**. Again, this s a circuit that's appeared many times in the RB series. The challenge this time is for you to use it with the simple r.f. amplifier circuit building block.

As many readers will remember, I've advocated the wooden board and drawing pin method for simple circuits. Rough and crude it may be, but it's also a wonderful teaching aid. The look on my eldest (6 year old) Grandson's face when he built a simple diode receiver and tuned into a medium wave station had to be seen to be believed! **Freddie's** face literally lit up from under the headphones and he grinned from ear to ear saying: "I can hear voices and music Granddad"!

You too can experience the same pleasures and go on to make up other circuits. I suggest that you wind coils (inductors) for the medium wave band first. Previous RB articles explain how you can do that and as part of the training process I suggest you look back through your *PW*s to find the details!

To ensure the best results, make sure the tuning ranges on the simple diode detector are the same as used in the r.f. amplifier. The simplest way to do this, is to wind them and try the tuning range on the diode receiver first. In this way you'll get the best results.

However, and I won't apologise for reminding readers of this advice again, you should do your best to build or buy a dip meter. For simple radio receiver and antenna projects - this wonderful little instrument can't be beaten!

Finally, for this month - you can help yourself by dedicating a notebook/scrapbook to place circuits into for reference. Some of mine go back to the 1960s and are still useful! So, start collecting now! Cheerio until next month.

PW

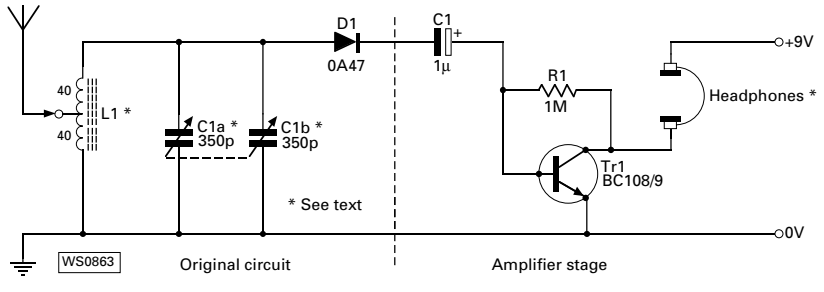

Fig. 2: A simple diode detector circuit. The amplified r.f. (the unmarked capacitor C4 can be between 100 and 1000pF) can be fed straight into the tuning inductor (see text).

The IC-V82, posed with a pen for size comparison.

Icom IC-V82 144MHz Hand-Held

Richard Newton GORSN takes a look at the new offering from Icom. As a professional user of p.m.r. equipment Richard evaluates the unit using his practised eye, and much experience of other hand-helds.

The Icom IC-V82 144MHz f.m. hand-held, heading photograph and **Fig. 1**, has the appearance of a radio that has been designed for the p.m.r. market. It looks as though it would be used in applications such as private security firms, or operated on construction sites and the myriad of other commercial uses for two-way radio. It's not surprising that the rig has this appearance - because it actually was designed for and is used for that very market!

Icom seem to have hit on the idea that some of the features, in particular one rather advanced feature, on the Icom IC-V82 would be of interest to the Amateur Radio market. Having now played with this rig, I'd say Icom were absolutely right!

The Benefits?

So, what are the benefits to the Amateur Radio enthusiast who may decide to purchase the Icom IC-V82? Let's take a closer look and see.

The 'V82 is a rugged rig, built for the most testing of conditions and perhaps for operators that don't have the same affinity with their radio that most discerning Amateurs would. It also boasts an impressive 7W high power setting, which must - perhaps? - make it one of the most powerful hand-held rigs on the market.

All the functions you would want for our hobby are provided on the IC-V82. It has memories, different scan options, functions, full CTCSS DTCS capability and DTMF encoder to mention but a few. (A DTMF decoder is available as an optional extra).

However, I think by far the most exciting and interesting aspect of this rig and the reason that it will be of interest to the Amateur market is the fact that with an optional Digital Mode operation board, the UT-118, the 'V82 will transmit and receive digital speech and perform other digital features. I have to confess that it was this digital audio capability that interested me the most. So I was delighted when the team at *PW* told me that not only was the review radio supplied with one of the optional digital boards installed but that I was also to get another 'V82 equipped with the digital mode so that I could test this aspect of the rig.

What's In The Box?

So, what's in the box? When it arrived I discovered that the IC-V82 is presented in a no frills kind of way. It comes in a modest brown cardboard box, and it's supplied with a re-chargeable battery, a helical antenna, belt clip and a 'wall plug' type charger. The transceiver itself mounts into a rather impressive stand-in charger unit, shown on the next page.

The review rig was supplied with a 7.2V d.c. 1100mAh NiCad battery pack although other battery packs are available, including Nickel Metal Hydride (NiMH) and Lithium Ion (Li-Ion).

The detachable battery pack. The IC-V82 can only be powered by the battery pack, no external d.c. input socket is provided (see text).

The battery pack is mounted on the rear of the rig, and makes up most of the back of the radio! It snaps snugly into place and the whole radio has a very well made professional feel to it. It 'oozes class' and at the same time gives a real impression of rugged durability.

The helical antenna connects to the IC-V82 using a BNC bayonet type fitting. It's unusual to see this type of fitting used these days and I know some operators prefer the more ridgid TNC screw type fitting. Despite this, I like the BNC; it makes quick installation into a vehicle or connection of a main antenna system so much easier.

The Icom IC-V82 is a large radio in

modern terms; it measures (not including protrusions) 54mm wide, 139mm high and 36.7mm deep. It weighs about 200g without battery pack and helical antenna, this weight could almost double depending on which battery pack is used. Not an easy radio to lose!

Incidentally, the 'V82 has no facility to be powered externally and is powered by battery only. The rig will operate with voltages between 6 and 10.3V d.c.

The rig has an f.m. transmit frequency coverage of 144 to 146MHz and will receive f.m. signals from 136 to 174MHz. It is able to tune in 5, 10, 12.5, 15, 20, 25, 30 and 50kHz steps.

Hides Capabilities

The Icom IC-V82 presents a very simple exterior that I think somewhat hides its advanced capabilities. It has a control knob on the top of the radio; this is a multi-function control, used to select the volume setting, or menu settings. This knob can be configured to control tuning if the user desires.

Tuning of the rig is achieved by the use the **Up/Down** arrowed buttons on the front panel. Besides these buttons, there's an alphanumeric keypad, with large, well-labelled buttons. You can also input a frequency direct using the keypad - a very useful feature!

I soon realised that the 'V82 has a rather small display window. This is another indicator that this rig was not primarily designed for the Amateur Radio market. My guess is that the small display keeps cost to a minimum and the primary market users would not be too concerned with having a display at all.

Despite its reduced size the display is informative and the frequency or channel display is adequate. It's a simple l.c.d. and therefore the letters displayed have a rather 'retro' feel to them.

The transceiver's side panel has a speaker/microphone connection; this is the normal Icom 3.5/2.5mm jacket socket configuration.

Choices & Facilities

In use there's the choice of several power settings, 7W high power, 4W mid power and 500mW low power. There's full CTCSS capability for repeater access or full squelch control. The operator can also choose DTCS squelch control if it's preferred.

There are 207 memory channels; these includes three pairs of scan edge memory channels and a **Call Channel** and 200 ordinary memories. These can be organised using 10 memory banks, labelled A – J.

Ordinary memories can be programmed with frequency, offset and CTCSS or DTCS information. Memories can also be given an alphanumeric name up to five characters long.

The 'V82 has several scan features; the programmed scan feature uses the three pairs of scan edge memory channels. This is where you set two scan edges for the rig to scan between - for example - you may only want to scan the f.m. simplex portion of the 144-146MHz band. To do this you would programme the band edges to be 145.200 and 145.5875MHz. By setting the v.f.o tuning steps to 12.5kHz and the 'V82 would cycle a scan between those two frequencies only.

All programmed memory channels can also be scanned. However, using the **Lock Out** feature and locking out memories that you may not wish to scan, can enhance this feature as it makes scanning a little more selective. Another way to be more selective (on what memories are scanned) can be achieved by using the **Bank Scan** function.

Living near the sea I enjoy listening to Marine band. The 'V82 covered this band and seemed to receive signals extremely well, even with the helical antenna.

I programmed some Amateur frequencies into one bank, and Marine radio frequencies into another. I could either scan the lot or just Marine or just Amateur, whatever took my fancy!

Digital Mode Operation

As I've already mentioned, for me, the most interesting feature of the Icom IC-V82 was using the optional Digital Mode Operation module, UT-118. This enables the transceiver to be used for digital voice communications, low speed data operation for transmit and receive and also allows it to be connected to a GPS receiver that's compatible with RS232/NMEA format at 4800bps. In this mode the transceiver is able to transmit and receive position data.

The rig has a 2.5mm data jack on the side panel, this is to connect the rig to a PC or GPS receiver via an RS-232 cable. (The wiring required for this is described in the handbook).

It's clear to me that the digital mode board opens up a huge range of possibilities as far as data communications go. The 'V82 will send short messages to another 'V82 and this in itself could be very useful. However, it very much looks as if the rig will do the function of a TNC, but it requires a computer with third party software to make the most of the facilities.

Location Via GPS

The Icom IC-V82 will send current location information - received from the GPS unit attached to it by the RS-232 cable already mentioned - and a callsign. The callsign sent is the one programmed into the radio as the operator's own call.

The position information is sent as Latitude and Longitude and is displayed on the receiving radio in this format. So this information would then have to be converted manually to pinpoint the position of the calling station on a map, or relative to the receiving station's location.

Having read the manual thoroughly I'm still unsure if the Icom IC-V82 is able to transmit location and callsign information in a format that is compatible with APRS software such as UI-View, which is used to plot stations on maps. (*Icom UK confirm that the transceiver will not work with UI-View. **Editor***).

Unfortunately, I didn't have the opportunity to look at the GPS or Data communications in great depth but it appears that there is real potential there, that's for sure.

The IC-V82 on charge in its stand-in charger unit (see text).

Impressive Digital Option

I did however, get the chance to try out the digital voice capabilities of the rig and was I impressed? Yes I was!

When you set up the digital option on 'V82 you have to programme the rig with your callsign. One of the features you can with the 'V82 in digital voice mode is a type of advanced squelch control. This means can then elect to only allow the squelch to open when calls are received from specific callsigns.

When in digital mode the callsign of the station calling you (provided they're equipped with the digital module) - scrolls across your screen!

On The Air

It was time to put the rig through it's paces on the air. So, I enlisted the help of my father-in-law **Terry Wood G7VJJ** and got him to take up position at base camp (my house) while my son, **Oliver M3ORN**, and I went on a cycle ride.

When Terry saw the IC-V82 his first comment was; "Now that looks like a radio!" It obviously impressed Terry but I wondered - would it appeal to the youngest generation of the family? I gave it to Oliver and he really liked it, commenting, "It's very comfy and easy to hold Dad".

Off we went and had no problem at all communicating with 'base camp' at a distance of 6km (4 miles) over mixed terrain, even on low power. Terry was using the other Icom IC-V82 and also monitoring using my Alinco DJ-140 in the shack.

Terry reported on the received audio; "Sounds excellent Richard, very clear". Likewise Oliver and I were impressed with the received audio from Terry, it was extremely crisp and easy to hear him - even while cycling along.

We then switched over to Digital Voice Mode. What an amazing difference, the background noise had gone, the signal was clean, crisp and the voice seemed to have been enhanced and anything else had been eliminated

My thanks go to Oliver, who ended up cycling for a bit further than he thought he was going to, in order to put the 'V82 through its first on air tests. I asked Oliver for his comments on the radio after we returned, he simply said, "it was good fun to use"! What more could you ask for?

Dorset Steam Fair

The next test was taking the radios to the 2005 **Great Dorset Steam Fair** near Blandford Forum here in Dorset. I go up there every year and do voluntary work with St John Ambulance Brigade, along with friends of mine; **Sam Machin M0SVM**, **Mike Buck M3BUK** and **Rob Harvey M3PIL**.

Unfortunately, I was unable to get on air much, but Sam, Mike and Rob had great fun putting the pair of 'V82s through some rigorous tests. And Sam decided to give the digital audio the ultimate test!

Sam stood next to a full size showman's steam engine and music organ near the fairground (front cover) and transmitted back to Rob. With an analogue signal Rob could hardly hear Sam over the background noise of steam engines, fairground rides, large musical organs and crowds of people.

After switching to digital voice mode the difference was breathtaking. Sam could be heard as plainly as if he was next to Rob with no background noise at all. The Icom 'V82 had identified the speech, isolated and encoded that - and dumped everything else, fantastic!

At home again after the Steam Fair I decided to try and get a normal analogue contact with the rig connected my base antenna to see how it would do. I connected the V82 up to my WX2 collinear antenna at about 8m (25ft) above ground, selected the 7W high power setting and called "CQ".

Pat G6LVI answered my plaintive cries. He was operating an Icom IC-2725 and a collinear antenna at about 11m (35ft) in the village of Alderholt, about 12km (8 miles) away from me. His reply to my "CQ" was; "You're a stonking great signal up here near Fordingbridge! You must be nearby"?

I explained to Pat that I was writing a review on the 'V82 and in fact I was about 12km away. We had a wonderful contact, in fact I even worked Pat just using the helical antenna and although I dropped a couple of S-points at his end, the contact was still solid as a rock.

I asked Pat to comment on the received audio from the IC-V82 and he replied; "It's very punchy Richard, very sharp and very clear. Ideal communication audio, very pleasing to the ear, I would not have said it was a hand-held, sounds more like a base station rig".

Product
Icom IC-V82 144MHz hand-held transceiver

Company
Icom UK Ltd.

Contact
Tel: (01227) 741741, FAX: (01227) 741742

Pros & Cons
Pros
7W output, Digital voice capabilities, Rugged durability

Cons
Small display, Not as user friendly as some rigs

Summary
I thoroughly enjoyed using the 'V82. Due to its build quality and rugged durability and all the enhanced digital features it offers, I should imagine it will appeal to users such as RAYNET and indeed anyone who enjoys taking radio out and about.

Price
£176.19 RRP
(Digital add-on unit £166.17)

Supplier
My thanks for the loan of the two review transceivers goes to **Icom UK Ltd, Sea Street, Herne Bay, Kent CT6 8LD. E-mail info@icomuk.co.uk**

Thoroughly Enjoyable

I thoroughly enjoyed using the 'V82. Due to its build quality and rugged durability and all the enhanced digital features it offers. I should imagine it will appeal to users such as RAYNET and indeed anyone who enjoys taking radio out and about. **PW**

Close-up view of the small display and alpha-numeric keypad (see text).

The data input jack (see text).

Richard G0RSN's keenest assistant - Oliver M3ORN - enjoyed using the IC-V82 even though it entailed a longer cycle ride than expected (see text).

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OPC-581 Sep Cab . £32.99
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HF 100W TX. Dual VFO. Auto Notch.

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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
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Tune - Approx SWR Rating of 10:1

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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.

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W4RT Electronics Microphone with One BIG Punch Speech Compressor included.

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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.

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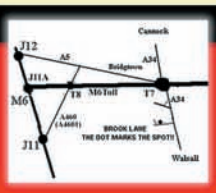

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The PW Mellstock 70MHz Receiver

Tony Nailer G4CFY presents the expected receiver to accompany the Mellstock a.m. transmitter. And it seems the receiver has a connection with the Fire Brigade!

The Mellstock 70MHz transmitter project seems to have been well received according to feedback I'm getting. It was always a possibility that a matching receiver might be needed to go with it and it's with pleasure everyone involved with *PW* present it for you this month.

For many years Firemen have wanted a crystal controlled receiver suitable for monitoring Fire Station transmissions in their homes for themselves and their wives/partners. They operate around 77MHz in my area of Dorset.

A design for such a receiver has been on my drawing board for maybe 10 years or more. So when the need for the Mellstock receiver occurred I resurrected the design.

Two circuits were designed, one using the SA602 mixer oscillator. This is as appeared in *PW* September 2005 Doing it By Design, the other using a m.o.s.f.et. mixer and discrete oscillator.

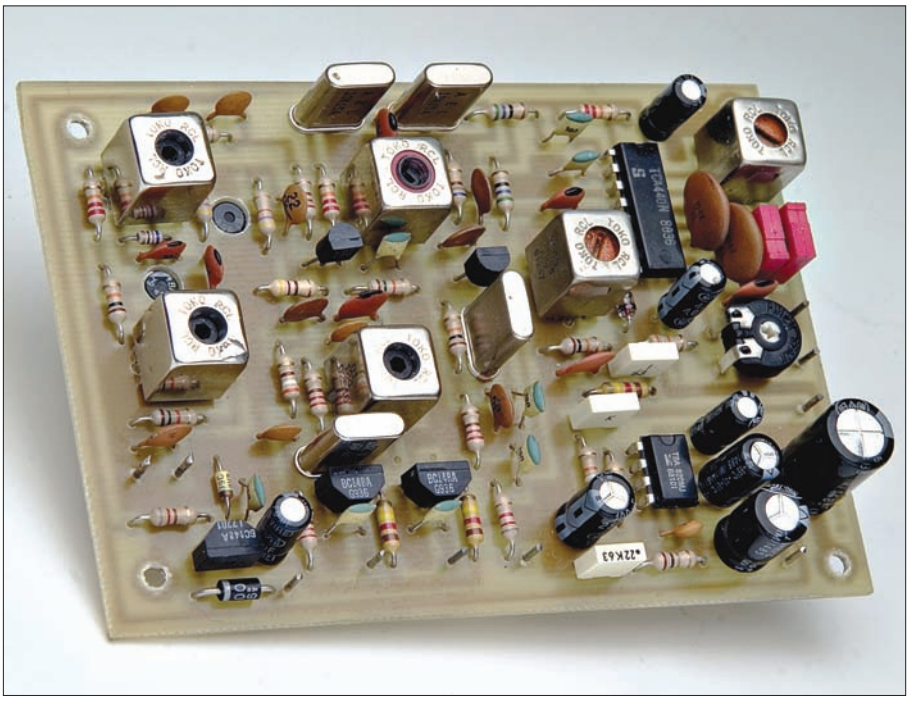
Receiver With SA602 Mixer

The circuit using the SA602 was laid out on a printed circuit board (p.c.b.) and a board produced. It was populated and cleaned and checked. Of course I expected it to work first time, it didn't !!

Determined to see what the problem was I worked back from the speaker - and everything functioned up to the output of the SA602. The impedance inverting Colpitts oscillator using the transistor in the SA602 would not function. Next I tried various capacitor ratios but it refused to oscillate.

I then built the SA602/612 board - which was the subject of the DiBD article - and it worked fine as fundamental oscillator but not as an impedance inverting overtone type. Clearly the oscillator transistor is not as uncommitted as articles on the device have suggested.

Subsequently, I found that I had the full data on the device in a Philips 1995 Data Book. All the circuits use crystals in the high impedance parallel mode either as fundamental or as third harmonic, not as third overtone. The reason is that the internal biasing for the transistor runs it at very low current. The results is there's insufficient drive for the overtone mode crystals.



The finished p.c.b. for the Mellstock crystal controlled 70MHz a.m. receiver (see text).

Discrete Front-End

Drawing a line under the episode, I have since moved forward again by laying out the p.c.b. for the receiver using the conventional discrete front-end. Again a board was produced, populated and cleaned.

Again I expected it to work first time but had some trouble with the impedance inverting Colpitts oscillator! This was traced to the use of a 63.6MHz crystal from my junk box which was marked with 30pF loading.

Overtone crystal are usually specified for infinite capacitance in series, so this was an oddball. I thought it might have been the cause of my trouble with the SA602 but tests using other overtone crystals proved that not to be the case.

A different crystal on 66.4875MHz worked fine, but with the usual 560Ω across it fired up on its third overtone of 39.8925MHz. However, with 220Ω of shunt resistance it fires reliably on the correct frequency.

Circuit Description

The receiver circuit is shown in **Fig. 1 (a&b)**. It's a crystal controlled double superhet with 10.7MHz first intermediate frequency (i.f.) and 455kHz second i.f.

The radio frequency (r.f.) stage is Tr1, a BF964 dual-gate metal oxide field effect transistor (m.o.s.f.e.t.) as a tuned input, tuned output, conventional amplifier. It has a drain stopping resistor R4 to prevent the device oscillating at ultra high frequencies (u.h.f.) due to internal feedback between drain and gate 1. A resistor R1, of 15kΩ is employed to discharge static build up on the antenna and downlead.

The transistor, Tr2 is also a BF964 dual-gate m.o.s.f.e.t. in this case used as a mixer with signal fed to gate 1 and the oscillator signal to gate 2. Both devices are third generation m.o.s.f.e.t.s, which operate in directly grounded source mode, with no source resistor or decoupling capacitor.

Notes: I've biased both gates to ground, which makes the device act like a switching mixer with good signal handling and low

Fig. 1a.

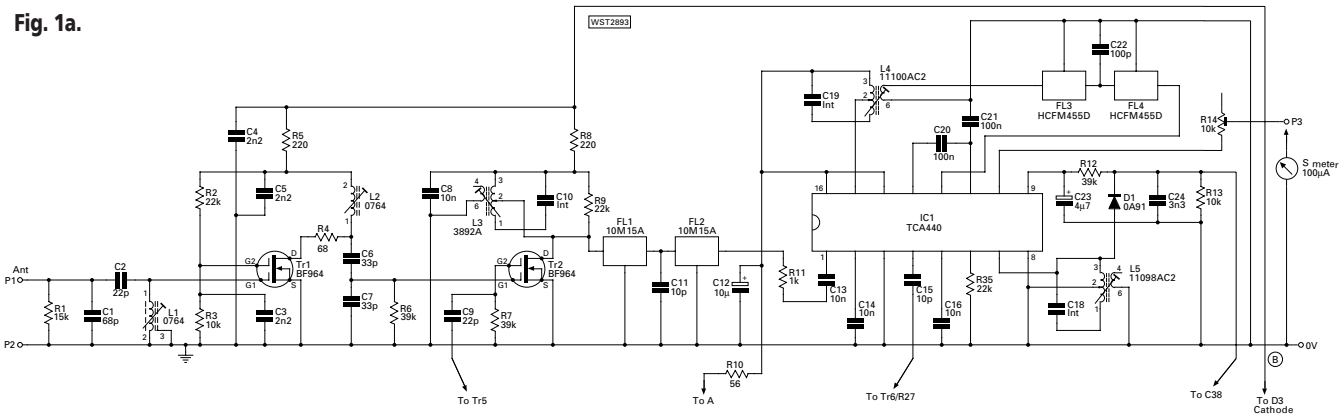


Fig. 1b.

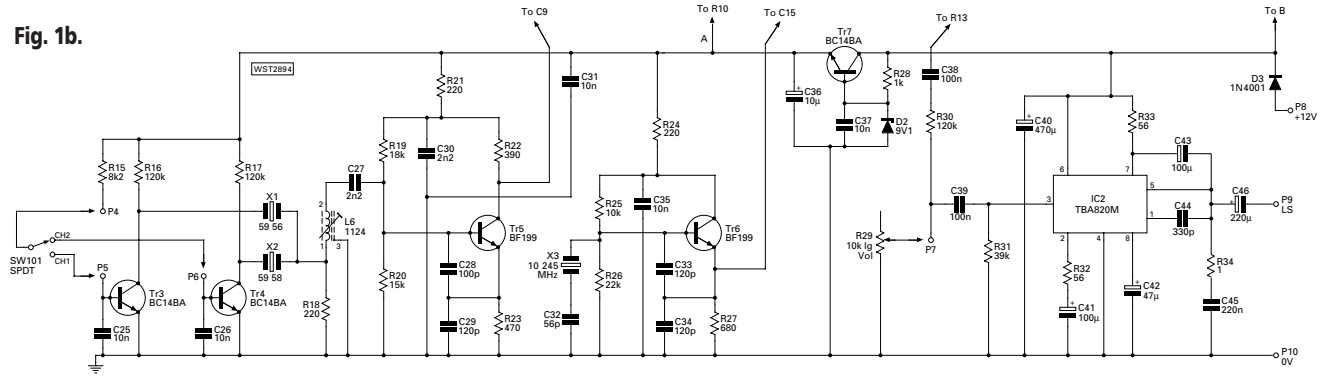


Fig. 1a&b: The receiver circuit. It's a crystal controlled double superhet with 10.7MHz first intermediate frequency (i.f.) and 455kHz second i.f. (see text).

noise. The oscillator signal is provided by an impedance inverting Colpitts oscillator, Tr5, with two crystals switched by Tr3 and 4. It's also possible that when the correct crystals have been cut, that it may be necessary to increase the shunt resistance from 220 up to 560Ω. This will depend on whether the crystals are the fifth overtone of 11.9MHz or the third overtone of 19.85MHz. Output from the oscillator is taken from the collector where there's a bit of gain compared with emitter take off, also the collector ouutput exhibits lower levels of second harmonic output.

Following the mixer is two 2-pole 10.7MHz centre frequency 15kHz bandwidth crystal filters in cascade. Together they'll achieve nearly 40dB of attenuation at 25kHz above and below the wanted channel.

Output from the mixer is matched to the 3kΩ input impedance of FL1 by tapping down the winding of L3. The match isn't exactly right, but it's corrected by the addition of R9 (22kΩ).

Filter FL2 feeds into IC1, a TCA440 which is the heart of the receiver. The input impedance is 2kΩ and 5pF. Resistor R11 brings the impedance up to 3kΩ to correctly load the filter.

Complex Integrated Circuit

The integrated circuit, IC1, is a complex device and comprises an r.f. stage, mixer, Hartley oscillator, 4-stage i.f. amplifier, automatic gain control (a.g.c.) amplifier, and meter drive circuit. Not surprisingly it was originally designed for use in domestic amplitude modulated, (a.m.) receivers.

The input frequency range of the r.f. amplifier in the device is 0-50MHz. The input frequency of the 4-stage i.f. is 0-2MHz. The r.f. stage has an a.g.c. input whilst the first three i.f. stages are connected to the a.g.c. amplifier.

The i.f. stages, when run at 455kHz, have a control range of 62dB. This is quite adequate for use in this receiver without needing to apply a.g.c. to the r.f. stage as well.

Having not worked out how to use the internal oscillator as a parallel mode crystal Colpitts circuit, I used an external stage Tr6 with 10.245MHz crystal. This signal is fed to one of the differential inputs of the TCA440 oscillator (which is pin 4) whilst the other (pin 5) is decoupled to ground.

In this design the oscillator signal mixes with 10.7MHz to produce 455kHz and of course also 20.945MHz. The mixer is a four quadrant multiplier and has two open collector outputs, pins 15 and 16. (One I have taken to an i.f. transformer, the other to the regulated rail).

Mechanical Filters

Years ago I came into possession of a large quantity of 4-element 455kHz mechanical filters designed for a.m. receiver use. At last I'm able to put then to good use with this project! The filters, Type HCFM455D, are 10kHz bandwidth, with a rejection of 9dB at plus and minus 9kHz and with an ultimate attenuation of 30dB.

A pair of the filters cascaded will give 18dB attenuation of the adjacent channels. They will further add to the adjacent channel attenuation provided by the first i.f. filters, to allow comfortable working on 70.28MHz without problems from the 70.26MHz calling channel.

The output impedance of the mixer is 250kΩ and 4pF. However, no off-the-shelf parts are really close to providing a match from the mixer to the input of the first of these filters. The nearest usable part is the Toko YHCS11100AC2 which provides about 3kΩ at the secondary when driven at its tap by the mixer.

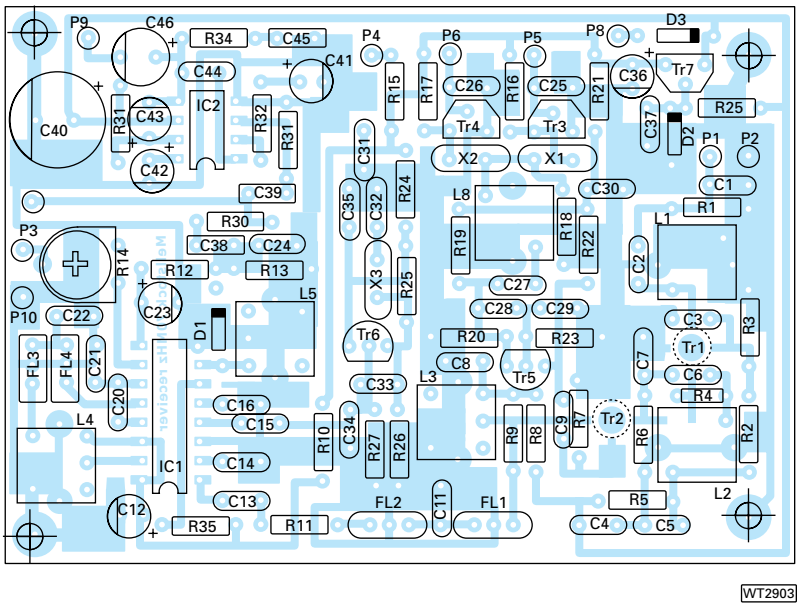


Fig. 2: The Mellstock receiver p.c.b. and associated overlay.

Output from the second filter feeds into the input of four stage i.f. which also has an input impedance of 3kΩ. Output from the 455kHz amplifier on pin 8 is an open collector of a *pnp* transistor, which allows the final i.f. transformer to be earth referenced.

The signal is demodulated by diode D1, and is then split into two paths. One is back via R12 and C23 forming a low-pass filter for a.g.c. control, and the other is the demodulated audio. The a.g.c. signal is internally connected to an emitter follower which outputs on pin 10 and via a 10kΩ trimpot will drive a standard 100μA S-meter.

Demodulated Audio

The demodulated audio amplitude is too large for the audio amplifier, IC2, and needs to be attenuated. An attenuator of 12:1 is formed by R30, 120kΩ, and the volume control R29 of 10kΩ.

Note: Since producing the receiver I've found useful data on the TBA820M audio amplifier, IC2, which shows that if R32 is increase to 120Ω the gain is reduced by 6dB. Resistor R30 could then be changed to 56kΩ, giving the attenuator a 5.6:1 step down together with lower audio amplifier gain would result in an even quieter background noise level at the speaker.

The TBA820M is rated at 1W output into an 8Ω speaker on a 12/13.5V d.c. supply. Quiescent current of the device is typically only 4mA. The whole receiver only draws 40mA quiescent which makes it ideal for portable battery operation.

The supply rail for the two crystal oscillators and the TCA440 at 8.5V is supplied from a series regulator TR7 referenced to a 9V1 zener D2.

Post Design Work

The prototype was sent to *PW* for photography and has not been available for post design work. Sensitivity was such that a signal of 0.4μV was easily discernible. I now realise that I had used a Toko 11098 i.f. coil for L4 ,which gives a massive step down from the mixer to filter FL3, as well as presenting only about 80Ω to the filter.

At the earliest opportunity I'll test the receiver with the 11100AC2 type as L4 together with the resistor changes at the audio stage. Whilst it works really well already, I'm keen to tweak it and see if it can be further improved.

Construction & Assembly

Let's now look at the construction and assembly stages, and to assit the main p.c.b. design and asscoiated overlay are shown in **Fig. 2**. And here, (I'm assuming that you will be using the kit, or pins in the same way as the kit/board design) like the Mellstock transmitter and most projects, I advise starting with the lowest profile components first; the resistors and the diodes. Fit them into position and bend the leads over enough to hold them in position. Solder them all and then crop the leads off.

Next fit the pins from the underside and force them into position with pliers, until the head is flush with the track. Solder them as a group.

Next fit IC1 and IC2 holding them in place while dabbing solder at opposite diagonal pins. Then lay the board down and carefully solder the other pins and re-do the pins originally dabbed. Fit and solder transistors Tr3 - 7. (Leave T1 and 2 until later).

Then it will be time to fit the trimpot into place - and hold it while soldering.
Warning: Keep your fingers away from the two exposed metal end tabs while doing this. They get hot!

Next, fit the ceramic capacitors and bend their leads to hold them in place. Again, do all the fitting of these parts and solder them as a group before cropping them off.

Note: The polyblock capacitors, and electrolytics should be fitted individually. They should held in place during soldering to keep them upright and close to the board.

The Toko coils should be fitted as a group, and soldered. The crystals and filters can then be done, one at a time, soldered as they're held in place.

Finally, carefully tin the board where Tr1 and 2 are to be fitted. (I usually crop the leads a bit shorter to make it easier to solder them). The long lead, which is the drain for Tr1, has to be towards L2 and the identification of the device should be

readable from the top side of the board.

Place Tr1 into position and solder the drain first, then the lead with the small protrusion which is the source, then the other two leads. Similarly place Tr2 into position with the long lead (drain) towards L3 and identification readable from topside. Solder the leads in the same sequence as Tr1.

Check all components are in the correct positions. You may clean the board if you have suitable solvents. Then carefully examine the track side of the board for any imperfections in the soldering or solder splashes or shorts. When you are happy with the construction proceed to commissioning.

Mellstock Signal Source

Many of you will have the Mellstock transmitter. This can form a most useful signal source if you don't have a signal generator!

Connect a link or wire a switch to activate either of the channel crystals. Connect a 10kΩ log potentiometer between pin P7 and ground. Next, connect a 100µA S-meter between P3 and ground.

Then connect a small 8Ω speaker between P9 and ground. Connect a coaxial lead to pins P1 and P2 to connect to a signal generator or connect a length of wire say 300mm long to J1 to 'sense' the Mellstock transmitter.

Connect 12 or 13.5V d.c. supply to the receiver. Provided any faults had been detected previously - a hiss should be heard from the speaker. If you're using the Mellstock transmitter - first connect it to a dummy load and select the right channel. If using a signal generator, tune it to 70.26MHz or 70.28MHz as appropriate.

You may now discern a signal and audio if the signal generator is modulated, or if you talk into the transmitter microphone. If a signal is indicated on the signal meter you can then proceed to tune the coils for maximum deflection. **Note:** Do this in reverse order - L5 back to L1 and then repeat the process.

If all appears in order the final adjustment is to tune L3 and L4 while listening for audio quality. (This is effected because adjustment of these coils affects the matching to the filters). **Note:** The best audio quality may not necessarily coincide exactly with absolute maximum reading on the S-meter but it should be near.

Correct functioning of the first local oscillator can be checked by connecting the probe of a frequency counter across the gate 2 bias resistor R7 of the mixer Tr2. The frequency should be 59.56 or 59.58MHz if the crystal is firing on its correct overtone.

There may be a slight error of a few hundred Hertz only, which may be corrected by tuning L6. No two crystals of slightly different frequencies are going to have exactly the same loading. So it may be necessary to adjust the coil L6 for an equal small offset. (This is likely to be less than 100Hz).

If either crystal is not firing then increase the value of R17 which can be as high as 680Ω. **Note:** Any higher resistance is likely to allow the crystal to switch into parallel mode.

The frequency of the second local oscillator can be checked by testing at pin 4 of the TCA440. The capacitor, C32 of 56pF together with C33 and 34 (each 120pF) gives a total series value of 29pF which should be just right for 30pF loading 10.245MHz crystals. If the crystal frequency is high then increase C32 to 68pF. If the frequency is low reduce C32 to 47pF.

To check if Tr1 is functioning correctly test across R5 with a voltmeter, the result should be 1.0-1.5V. Likewise with Tr2 test across R8 where the result is likely to be 0.5V. The chip, IC1, should draw about 10mA which will drop about 0.6V across R10. The supply rail to the oscillators should be checked from the top of R21 or R24 to ground as being 8.3-8.6V.

Calibrating S-Meter

Calibration of the S-meter using a signal generator is simple, just set R14 to give S9 for an input of 50µV. Without the aid of a signal generator the setting of this will be arbitrary.

So, there we are! That completes the alignment and is likely to allow this little receiver to hear much further than the 1W transmitter can get back to ***(see note)**.

I hope that constructing and using this neat little unit will give you much pleasure. I look forward to your feedback. **PW**

** There's a real QRP challenge for you readers. We'd be delighted to hear how far you can work with a Mellstock transmitter-receiver combination! **Editor.***

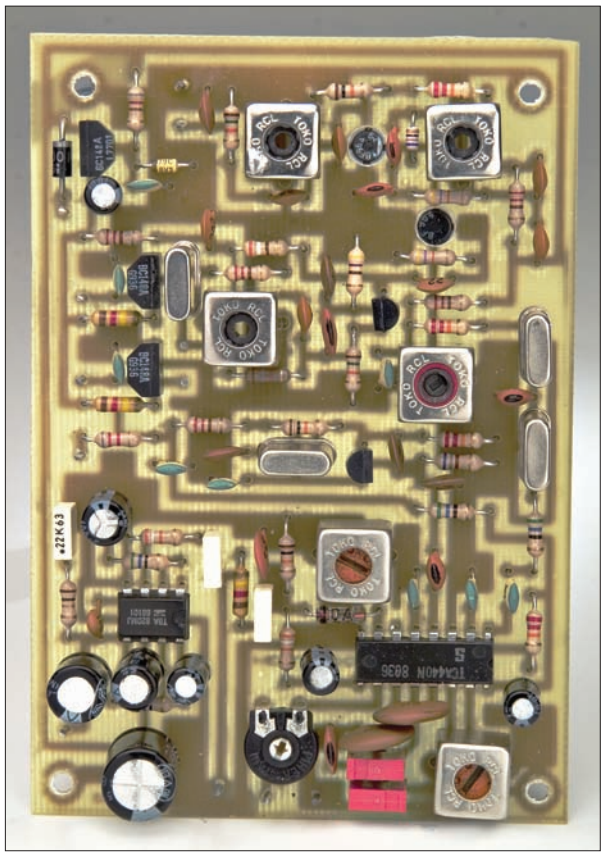


Fig. 3: The Mellstock receiver board with light arranged to show component side and track shadow from beneath (see text).

Kits & Bits

The p.c.b. on its own costs £10 including P&P. Components including external volume control and channel switch but excluding S-meter and crystals costs £31 including P&P. The S-meter costs £9 including P&P. Crystals are available for £8 for the pair including P&P. The p.c.b. component kit without meter or crystals costs £40, including P&P.

Please make cheques payable to **A.J. & J.R. Nailer**, and address to; **Spectrum Communications, 12 Weatherbury Way, Dorchester, Dorset DT1 2EF**.

Feedback On Projects

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Evaluation on the Move! The Icom IC-2200

Rob Mannion G3XFD shares his experience of evaluating - not really reviewing - a tough and powerful 144MHz f.m. rig. Read on to find out what he thought.

Fig. 1: The Icom IC-2200H posed with a pen for size comparison. "It's a neat and powerful rig", says G3XFD.

I'm not so keen on attempting reviews for *PW* so much nowadays, mainly because the day-to-day work on the magazine precludes the process. However, when the chance of evaluating (rather than reviewing) Icom's IC-2200H, new higher power 144MHz narrow band frequency modulation (n.b.f.m.) mobile transceiver - it went home with me!

It's a remarkable package too, and at first glance it seems to be all heat sink, **Figs. 1** & **2**. And the need for efficient cooling provided by the design became very obvious when I used it for long periods. It worked very well during the extremely hot days during my mobile on trips to take my wife Carol to Stroud in Gloucestershire and elsewhere during the school holidays.

What's In The Box?

So, what's in the box? Simply stated the transceiver is a 144MHz f.m. (f.m. only on transmit) unit with a maximum output power of 65W, with tone squelch, DTCS squelch as standard, provided with a dual colour (amber and green l.c.d. backlight, remote control microphone, **Fig. 3** and with the options of digital modulator/demodulator. There's also the possibility of adding an optional DTMF decoder.

The unit arrived packed in a waste free cardboard package and it came with everything I needed - except the coaxial cable and antenna - to get me on 144MHz. The rig was exceptionally easy to unpack, set up and get on the air.

The transceiver covers the entire UK band from 144 to 146MHz together with receive only on the aircraft band from 118 to 174MHz. Amplitude modulation - a.m. - is available on receive only, for use on the aircraft band and 144MHz.

The transceiver has 207 memory channels (including six scan edges and one call memory). The frequency resolution provided by the synthesiser is selectable between 5, 10, 12.5, 15, 20, 25, 30 and 50kHz.

Current drain on the air is; 15A at 65W and 800mA on receive standby. Current rises to 1A at maximum volume on the audio output.

The transceiver measures 140 x 40 x 146mm. It weighs in at 1.25kg (2lb 2oz).

The receiver is a double conversion superhet, with a first intermediate frequency (i.f.) of 21.7MHz and of 2nd of 450kHz. Icom quotes sensitivity as being (at 12dB SINAD) 0.14µV typical (more on this later) and the squelch threshold is quoted as 0.1µV typical.

Icom record that the selectivity (wide setting) is more than ±6kHz/6dB down and less than 60dB down at 14kHz. On the narrow setting it's more than ±3kHz for 6dB down and less than ±9kHz for 55dB down. Spurious and image rejection is quoted at 75dB down as typical.

Audio output for the IC-2200H is more than 2.4W at 10% distortion. (This is measured at 13.8V d.c.).

The Evaluation

I had decided to evaluate this transceiver as part of my search for a 144MHz rig to fit in the parcel shelf above my head in 'Katie' my Toyota Yaris Verso. In the four years I've owned this remarkably versatile car we've travelled almost 80,000 miles together and it's a case of "Katie did well" carrying me about!

For sometime I've not carried 70 or 144MHz equipment in the Yaris, not because I don't enjoy mobile operating but because the temporary mag-mounts I'd used had damaged the metallic paint. Eventually though, I bought some Toyota custom roof bars for the vehicle and now have antenna bases bolted to that. Once re-equipped with the v.h.f. antenna mounts I decided to look around for a suitable 144MHz f.m. rig with full tone squelch facilities, to replace my reliable (but basic) old favourite - the AKD 2001.

It only took me a few minutes to install, using a temporary mounting unit, the IC-2200H into the car. It was placed on a special board, which slides between the passenger seat and locks onto a small dash holder above the gear selector mounting. The rig protrudes a little into the passenger space but fortunately my wife Carol is a small lady!

Originally, as I've mentioned, I had intended to place the IC-2200H in the parcel shelf above my head in the car. Unfortunately, I discovered a problem! The rig fitted well and would have been ideal for use either on the driver's side or over on the left (passenger side) except that the figures on the otherwise bright display weren't visible. It turned out that the clear, bright l.c.d. display wasn't readable from below.

Puzzled, I contacted Icom and the staff there set about doing some tests on the display. It turned out that the IC-2200H has a display optimised for a viewing angle from above. In other words it's best used in a dash-mount or below a parcel shelf. Here the viewing angle is not at all critical. In fact the display is beautifully clear and ideal for mobile purpose. Unfortunately, though, for my long-term use - it wasn't!

In the end, for the evaluation process, the rig was mounted on the left side of the transmission tunnel/gear selector housing. It worked very well there during the 1000 miles or so it travelled with me.

On The Air

The IC-2200H arrived with me just as my wife, **Carol**, was planning to attend an art course holiday in the attractive Gloucestershire town of Stroud. It's a difficult train journey for Carol and as we've friends in the area it was no problem to take her one Sunday and collect her the next Friday. It also gave me the chance to have a large number of QSOs at the same time.

Many of my QSOs took place as I drove along the western ridge of the Cotswolds between Bath and Stroud. After dropping Carol off in Stroud, and while waiting for her the following week, I had many QSOs. At all times the received audio was excellent and the radio received by the other stations was also good.

The microphone was easy to use and friends I worked reported that my voice was instantly recognisable. However, I must say that although there are many useful facilities I quickly learned to use it properly.

In fact, I found the remote facilities offered by the microphone to be very helpful. It just took some time to master it. Just think - the microphone can be more complicated than the main rig nowadays!

Memories & Digital

Generally, I'm not a 'memory man' and it's rare for me to use the many memories available in modern transceiver. I suggest that readers who demand such facilities to check for themselves, when looking at this remarkably sturdy and easy-to use rig. Suffice to say the 207 memories provided would more than cope with my requirements normally. However, as you'll read later, I was soon to find just how useful they can be for a mobile operator using the different repeaters on long journeys!

Note: I only discovered, after the review, that the optional digital unit for the IC-2200H was fitted on the review unit. However, as readers can see elsewhere in *PW* this month (pages 27 to 29) the Icom IC-V82 hand-held transceivers for review were supplied with the digital units. Having heard from **Richard Newton G0RSN** just how effective the digital mode is - we plan to ask Richard to do a further article on the digital aspects of the IC-2200H and a 'V82 using them together.

Tone Coding

Personal travel, plus the additional driving on behalf of *PW* means that I can drive anything up to 25,000 miles a year. During that time I can hear many different repeaters, although nowadays an increasing number require the use of sub-audio tones for continued access. For this reason I was keen to see just how easy it was to set up the tones for various repeaters. That's when I found just how useful the memories can be to store all the information required to work individual repeaters.

Setting up the memories to store the various parameters was a doddle - even for computer unfriendly G3XFD. Youngsters may be 'menu friendly' but I struggle with menus I'm afraid. It was then I realised just how useful this facility could be for me when travelling (for example) to Rochdale to the QRP Convention in October of each year. Before I left I could set all the repeater parameters before leaving Dorset.

It's a pity I can't go to Rochdale this year because I would have tried the facility out in the best way. However, despite not attending this rally, I will be making sure I make full use of the memory facilities for storing these essentials in the future.

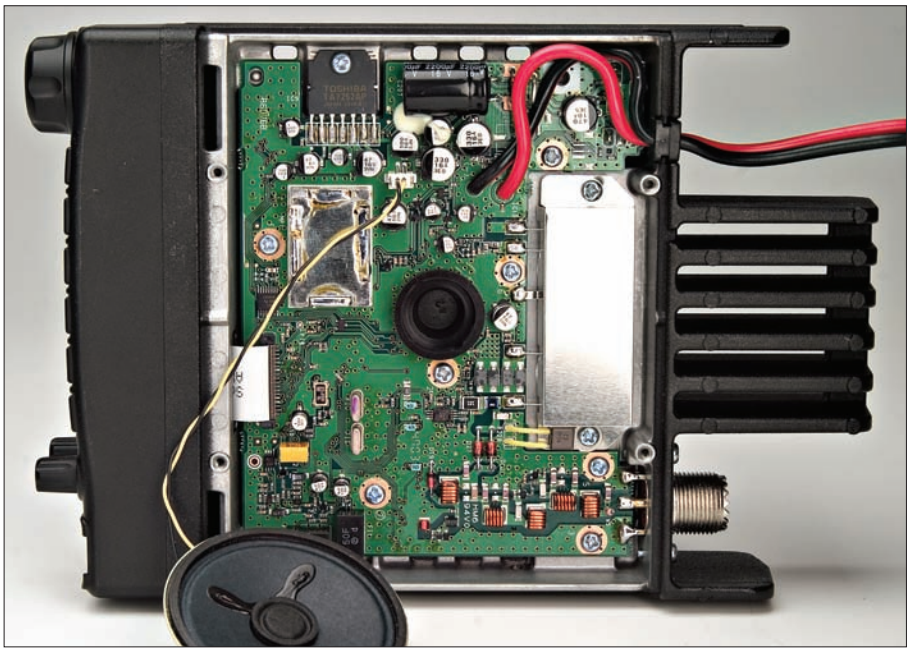

Fig. 2: The chassis looks almost bare due to integration and is backed on to the external heat sinking for cooling purposes to assist with the heat due to the maximum output of 65W (see text).

Fig. 3: The transceiver can be controlled from the microphone together with menu controlled memory addition and deletion. Even G3XFD found it user friendly! (see text).

Finally, on the memory topic, I must mention that all the memory store operations were carried out by using the microphone controls. The superbly illustrated and well written manual shows even duffers like me how to carry out the necessary options. Icom deserve full credit for a well laid out manual - as radio equipment becomes more complicated and with an amazing number of features - the manual is essential reading. It helps when it's been as well prepared as it has for IC-2200H!

Air Band

Even though the transceiver was evaluated for Amateur Radio use I feel I must briefly mention the Air Band coverage. The IC-2200H helped me enjoy watching gliders at several airfields, including the active club on the outskirts of Stroud, on the A419 from Cirencester.

The receiver works exceedingly well on a.m. (considering performance is optimised for f.m.). Icom confirmed that a.m. reception is posible on 144MHz and with the help of **Tex G1TEX** the appropriate setting in the menu was found in the manual.

Good Performance

Following over 50 QSOs on the IC-2200H I can recommend the rig for its performance and easy-to-use nature. The only problem I discovered was the reduced viewing angle as previously mentioned. However, only Amateurs who drive MPV type vehicles or anything fitted with roof mounted shelving will lose out here.

Whether using high power or milliwatts the IC-2200H proved very reliable and user-friendly. Icom certainly have squeezed a lot of power into this (recommended price **£199**) and many facilities into a neat mobile rig. Well done Icom!

PW

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Antenna Workshop

Guitar Quad-Loop Bea

Strum along with John Heys G3BDQ, as he tunes up his 'Guitar-quad loop' beam for the 144MHz band!

The word 'Serendipity' has the definition: "The faculty of making happy and unexpected discoveries by accident". Well this 'guitar-quad' must be serendipity, as it came about by accident when I was chasing a nice low s.w.r. by changing the shape and spacing of the elements.

The shape of the antenna I'm describing here has a different shape from the original quad-loop antenna that was created in the early 1940s by **Clarence Morre W9LZX**. The development took place when he was employed at the Missionary Radio Station HCJB in Quito, Ecuador.

At Quito's high altitude, there had often been serious corona discharges from the tips of the Yagi antenna that was being used for transmitting the signals from HCJB. In suggesting the use of a quad-loop antenna, Clarence had taken into consideration that a quad-loop's two high voltage points are at potentials considerably lower than those present at the element tips of a Yagi beam.

An additional advantage is that the quad-loop's bandwidth is also considerably better. A quad-loop beam also has a theoretical 2dB gain over a Yagi antenna with the same number of elements. Taking all the quad-loop's plus points into account, the quad-loop antenna has become popular with amateurs for both h.f. and v.h.f. work.

So, with the quad-loop in mind, in the autumn of 2004 I decided to return to some c.w. and s.s.b. operation on the 144MHz band. I began using just a simple indoor antenna, as it wasn't to be a 'serious' return to the band. I settled for a two-element quad-loop arranged to beam north-west from my location on the Sussex coast.

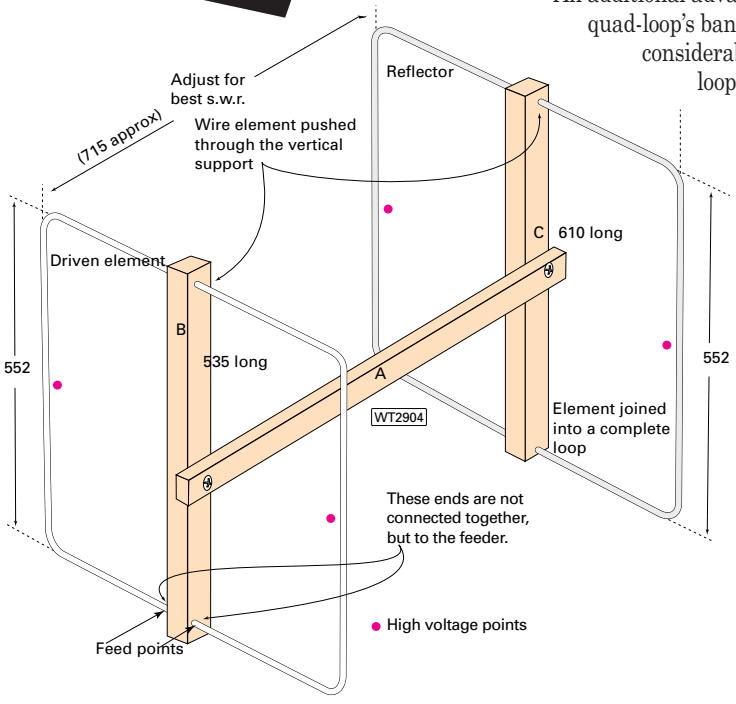

Fig. 1: The quad-loop beam before the driven element was distorted into a 'guitar' shape.

Antenna Library

A look through my antenna 'library' revealed a design that has appeared in the *ARRL Antenna Handbook* for over 30 years, a fact that suggested it being a 'sure-fire' design. The 'not-to-scale' drawing, **Fig. 1**, shows the simplicity of the beam's construction, which involves a few lengths of timber, a few screws and the two quad-loop elements.

The driven element is 2108mm (83in) long overall and the reflector is 5% longer at 2210mm (87in). Some very thick insulated domestic earth wire (coloured green and yellow) was used for the driven element and a length of thin 5mm wide brass strip from my junk cupboard made up the reflector loop. I used the brass strip because it was on hand but as an alternative, more normal thicker wire, copper or aluminium tube will be ideal.

The antenna is arranged to be horizontally polarised, which means that the mid-points at the top and bottom of both loops are at very low impedance and there is no need for careful insulation at these points. The conductors simply pass through holes in the vertical timbers. I've shown the ends of the driven element as sticking in the vertical support. **It's important to remember that they do not touch each other**, but are connected to the feeder.

I used a small rectangle of clear plastic or similar insulating material with a couple of holes just large enough to allow the conductor ends to go through tightly. And instead of the commonly used 50Ω coaxial cable feeder, I used a length of white double-screened 75Ω cable. A 'clamp-on' ferrite Balun was added to prevent unbalanced currents flowing in the feeder and antenna 'squint'. (Antenna squint can happen when r.f. currents run along the outside of the coaxial feeder rather than on the inside).

As we're dealing with signals up at 144MHz, the choke balun doesn't need be

m for 144MHz

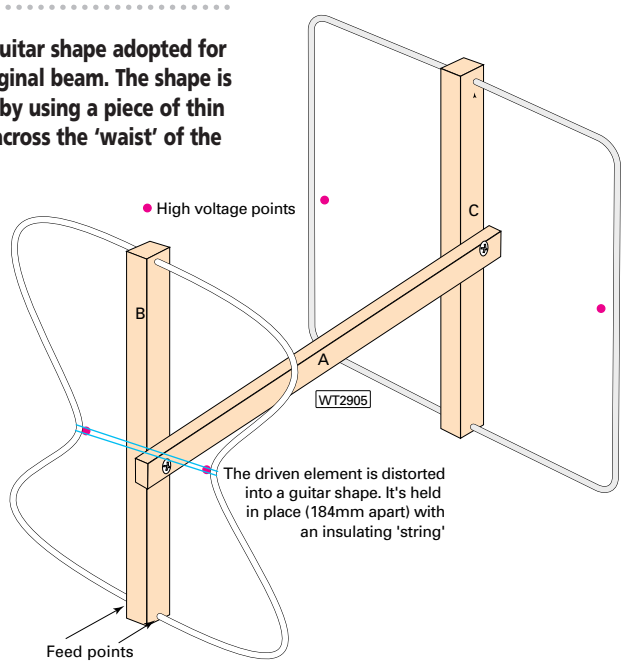

Fig. 2: The guitar shape adopted for G3BDQ's original beam. The shape is maintained by using a piece of thin nylon cord across the 'waist' of the shape.

very big. A suitable balun can be made by forming a three turn 50mm diameter choke coil from the feeder just below its connection to the driven element.

The vertical support (C) for the reflector loop should not be screwed into position until all the final tests and adjustments have been made. The spacing between the driven and reflector elements will lie somewhere between 0.15 and 0.25 of a wavelength; the actual spacing can be adjusted to allow the use of either 75 or 50Ω coaxial cable as the feeder.

When my antenna was initially assembled, to test it, I rested it on top of wooden stepladders set up in the landing just outside the shack. The s.w.r. right across the 144MHz band was at first very high (I used only 5W or less when making these initial tests) so the reflector loop was moved to and fro along the boom in an effort to adjust the matching.

Eventually, I found a spacing position that reduced the s.w.r. to about 2:1 at the higher band edge. But this figure rose as the transmitter was tuned towards the lower band edge.

I don't know why, but I then pushed the vertical wires of the radiator loop towards one another, changing the antenna's geometry away from the square shape. To my surprise this new shape, resembling the outline of a guitar, now gave the antenna a much more respectable s.w.r. By alternately adjusting the element spacing and the positioning of the sides of the driven element I achieved a near unity s.w.r. over most of the band.

To preserve the final spacing between the vertical wires of the driven element a short length of nylon cord was tied into position. The reflector loop was also held into position with a screw through the boom and into the vertical part labelled 'C'.

It was, after these successful tests, rather late at night so, the next day found me in the roof space putting the antenna into position by hanging it from strings attached to the roof joists. The photo, **Fig. 3**, shows the antenna in its position, together with numerous odd bits of string dangling down. These extra strings are 'echoes' of antennas experiments long past.

An Explanation

I've searched in vain through all my relevant antenna books for an explanation of the effects arising from the distortion of the normal quad-loop shape, but I've found nothing relevant. Perhaps I am looking through the wrong books! In my opinion there seems to be two factors that can arise from the bending of the sides (when at high impedance) of the radiator loop.

The first factor that comes to mind, is the change of feed-point impedance at resonance. A conventional square quad-loop has a feed-point impedance of 100Ω or so, but if it's flattened out to make a folded dipole the impedance rises to around 280Ω. A 'guitar' shape should therefore have a higher feed impedance than a square full wave loop.

A second factor effecting the s.w.r. may be a change in the natural resonance of the loop when the capacitance between the two high impedance sides is increased. This capacitance will lower the resonant frequency. Whichever of these suggestions, or combination of them is responsible for the measurements I found after the change in the square quad-loop's normal parameters I cannot determine.

By the way, the square quad-loop's 100Ω feed impedance will be brought down to about half this value when a second element is introduced in close proximity. The gain of the guitar quad-loop element will be slightly less than a square loop, because the gain of a full wave loop diminishes as the enclosed area is reduced.

Fig. 3: The completed beam installed in the G3BDQ roof space.

Performed Well

The antenna has worked well and under 'no lift' conditions gives me solid QSOs with stations up to 250km away when using 80W of transmitted power. The broad main lobe allows contacts with stations away from the main beam heading. I've found that the front/back power ratio is not brilliant and from experiments I reckon that to the rear everything is some 15dB or so down.

The loop front-to-back ratio, though distinct, is not deep and allows me to work French stations some distance away across the Channel with ease. This is even when not 'pointing' in their direction. As expected there are good nulls off to both sides of the antenna, but during a 'lift' in conditions I could easily contact stations on the Isle of Wight and in the Netherlands without changing the antenna's direction.

Adjustment of the spacing between the driven and the reflector elements can give a better front-to-back ratio. But the forward gain will very likely to reduce and the s.w.r. will go up or be more difficult to reduce.

The antenna as described is fine for indoor use but if a version is made for use out of doors the normal weatherproofing precautions should be taken. The woodwork will need treatment to prevent rot. Yacht varnish is probably a good treatment if not the best to use. Brass screws must be used throughout for joints and the end of the coaxial cable should be well covered with silicone-rubber sealant.

So, there you have it, a simple guitar-shaped quad-loop antenna to accompany your signals on the two-metre band!

PW

Valve & Vintage

It's Ben Nock G4BXD's turn once again to look after the V&V 'shop' and lay out this month's offerings. It's been a good summer and a good period for the collection - so let's look at what's on offer.

Welcome to the shop! I've managed to get to a few rallies this year, and along with purchases from around the world, some interesting and long sought after radios have been acquired.

For a long time I've wanted a Wireless Set No. 11. I don't know why, but it has an appeal that's different from the general run of the military radio equipment. Maybe it's the age of the set or the period when it was in use I'm not sure on, but suffice it to say I was really happy to acquire one.

Developed In 1938

The Wireless Set No.11 was a portable transceiver developed in 1938. It's role (as is quoted in the manual) was as a general purpose, low power set. The No.11 was used as a vehicle station (truck/AFV*), a ground station and even as an animal pack station (Mules mainly).

Frequency range of the No.11 set is 4.2-7.5MHz with Master Oscillator (MO) control (v.f.o.) and a quoted radio frequency (r.f.) output of between 600mW and 4.5W.

Modes of operation are radiotelephony (R/T) and continuous wave (c.w.) Morse code telegraphy. Typical quoted range of the set in vehicle use could be up to 32km (20 miles) but when used with bigger antennas (long wire, Windom, etc.) the range could be extended to several hundred miles.

The No.11 was a very successful design, apparently around 19,000 were produced. They were used by such forces as the Long Range Desert Group in North Africa to great effect.

The eight valve set has two operating arrangements, a low power set-up, 600mW R/T and 1.5W c.w. or high power (!) at 1.5W R/T and 4.5W c.w. output!

In the high power mode there are in fact two power supply units used - the basic one as used on the low setting, and an additional unit. This provides an increased high tension (h.t.) supply for the transmitter.

Although used in tanks in the early days the set proved unsuitable for this role, and it was replaced with the WS 19 in that application. Further advancements meant that the WS 21 and WS 22 equipment replaced the WS 11 in other roles.

*Armoured Fighting Vehicle

British Expeditionary Force

An interesting aside regarding the WS 11 is that many were used by the British Expeditionary Force (BEF), at the start of the Second World War. With the strategic withdrawal in June of 1940 from Dunkirk, many WS 11 sets fell into German hands and were used by them for a while. The Germans even producing an operators manual for the equipment.

I started to look at my 1938-dated example and changed a few capacitors in the power supply unit (p.s.u.). These included the decouplers and filter capacitors that handled the high-tension side of things and powered up the set.

The only problem I could see was that the transmitter would not key on c.w. It worked on R/T but there was no output on c.w. at all and the keying relay was not operating. So, I looked at the circuit diagram and deduced that a certain capacitor was probably short circuit and sure enough, a quick check with the AVO meter proved this to be the case.

I was slightly concerned as I didn't have a comprehensive component layout. But luck was on my side, as there are three chassis mounted capacitors on the top side of the chassis near the relay. And, as all components have their part number on them I spotted the offending capacitor which was quickly dealt with. Hey presto! Keying on c.w. was restored.

The first 7MHz contact with around 1W into my long wire was with **Bill GM3KHH**, up in Buckie, north east Scotland (between Fraserburgh and Inverness) with a RST539. Next, a second contact was with **PA3DSJ** in Vlaardingen, Holland at RST427. Not fantastic reports - but the contacts were made! At least the set is now operational, which is no mean feat for a radio 67 years young.

Wireless Set No 21

Another set, which has eluded my sticky little fingers for quite a long time, in the shape of the WS 21 finally surfaced. It came my way after a conversation on the Arnhem battlefield in Holland last September brought forward the offer. Sure enough, after a false start, the set finally arrived here in Kidderminster.

The WS 21 is a portable transmitter/receiver and was developed in 1940. Its original role was in Infantry Brigade and Royal Artillery (RA) Regiment

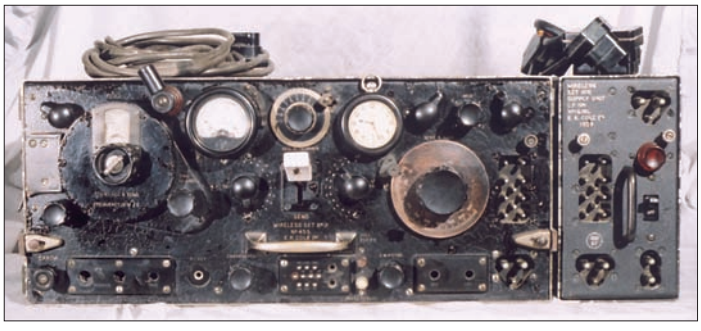

Fig 1: Wireless Set No. 11, main tuning on the left, transmit-receive switching is by the large centre mounted white switch, low power supply unit on the right (see text).

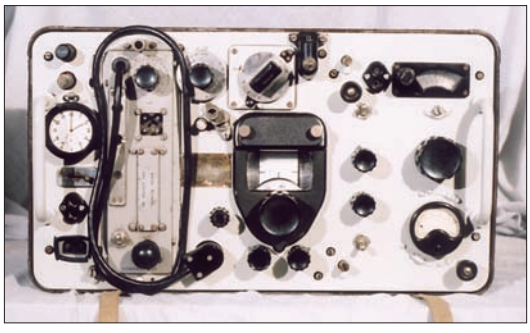

Fig 2: Wireless Set No. 21, receiver tuning top right, transmitter tuning lower centre. Morse key, microphone and fine tuning on removable unit is just right of the pocket watch (see text).

communications, but later it was also employed as a general-purpose ground and vehicle station.

Frequency range for the WS 21 is the normal 4.2-7.5MHz and together with the rather unusual 19-31MHz. The set is MO (v.f.o.) controlled, and has no provision for crystal control. The quoted r.f. output is around 800mW (high band) and 1.5W (low band). Modes of operation include R/T, modulated c.w. (m.c.w.) and c.w.

Typical quoted range of the set was up to 8km (5 miles) using vehicle mounted antennas, or short whip systems, although again, on bigger and longer wire arrays the range would be increased.

Incidentally, the WS 21 was designed as a replacment for the No. 11 Set. However, it's a little unclear what the high band (19-31MHz) was used for and in fact, apparently, was hardly used in practice.

Modular Form

The No. 21 Set is constructed in modular form. The power supply, the transmitter and receiver are independent and bolt to the front panel. Either can be removed without affecting the other units by removal of knobs, a few screws and unsoldering a few wires.

There are nine valves in the 21 set's receiver and two in the transmitter. The set has the unusual feature of running from a 6V supply and is basically an R109 receiver with a transmitter unit bolted on.

Sockets for headphones, microphone and transmit-receive switching are mounted on a removable control unit, which also houses the Morse key. This unit also has a novel fine tune knob fitted for the receiver.

The arrival of the WS 11 postponed the on air testing of the WS 21, which was placed back on the shelf for another day. I fully expect the set to perform well though, maybe even being usable on the 21MHz band depending upon band conditions. (More on these tests in the future).

Note: Much information and detail for both the WS 11 and 21 was gleaned from the pages of the wonderfully researched volumes *Wireless for the Warrior* by **Louis Meulstee**. A very useful book indeed!

An Australian Wonder

Now to the other side of the planet, where the radio manufacturers in Australia during the Second World War made many sets based on British designs. But in doing so they modified them to suit the availability of components in their location. One such modification was to the British WS 22 design, which became the WS 22(Aust).

Built by the **Radio Corporation (Eclipse Radio Pty* Ltd)** their first design mirrored the British WS22 quite closely but with a modified design to use American and Australian designed valves resulting in the WS 22 (Aust), which has an 807 in the p.a.

Fig 3: Wireless Set 122 (Aust), the main tuning is on the left, the large knobs centre and right are the antenna coupling and loading controls (see text).

stage. The same company then made the WS 122 (Aust), which was almost identical to the 22 but had the additional feature that it could be crystal controlled on two spot frequencies.

** Pty. (Proprietary) is the approximate equivalent of the British Limited (Ltd.). **Editor**.*

The WS122 (Aust) uses seven 2V battery valves in standard single conversion superhet design. The transmitter uses two valves as oscillator and power amplifier (p.a.) stages and three of the receivers valves in a dual role. A further valve modulates the p.a. stage in anode and screen mode.

My particular example arrived at Camp Kidderminster via Canada and has seen a little action. Although unmodified as far as I can see, the rubber surrounding the power and headset drop leads had perished and turned very brittle.

I can replace the two headset drop leads with those from WS 19 control boxes, but I'll need to find a length of decent quality 8-core cable to replace the power supply lead. Restoration of the set is currently underway and I'll keep you all informed of progress.

The power unit is very similar to the British WS 22 type but used two vibrators to power the set. The construction of the WS 122 (Aust) is very sturdy, there are numerous bracing bars across the internal chassis and the engineers at the Radio Corporation managed to squeeze quite a few components into the set. Changing all the old capacitors should prove quite a challenge!

Power Amplifier

Another recent find at a rally was the Royal Navy version of a 100W wide-band amplifier along with its power unit. The actual driver was also available at the rally, but the lack of connecting cables forced me to reject it.

The amplifier, a Redifon GA481, will accept either 100 to 300mW of input or 10 to 15W of input to produce 100W output. Internal links are set for the respective input and a small metal tag around the input socket can be fitted either way round to state under which condition the amplifier is operating.

Fig 4: The Redifon GA481 100W amplifier and power unit. Note the substantial heat sink on both amplifier and supply cases.

The power unit for the more usually seen army green-version consists of nothing more than a transformer, very big rectifiers and a huge bank of capacitors. I was surprised to see inside the Navy PU220 not only a very big transformer, but circuit boards with numerous components producing the regulated 24V output supply.

Unfortunately, the amplifier was designed to be hard wire switched from the driver unit so there is no provision for r.f. switching when using other equipment with the unit. However, modifying it should be a simple matter making the amplifier an ideal bench and testing aid.

Cheerio For 2005!

Well that's about it for now. As I shall not be with you again this year, I'll take the opportunity to wish you all the very best for the coming festive season and the New Year. And I look forward to the first column in 2006.

As usual, I can be contacted via E-mail at **military1944@aol.com** or via the old fashioned way at: **62 Cobden Street, Kidderminster, Worcestershire DY11 6RP**. Further pictures of the above sets and many more can be seen at **www.qsl.net/g4bxd**

PW

Carrying On The Practical Way

This month the Rev. George Dobbs G3RJV listens to some noise and then becomes inspired. His inspiration ends up with several little projects for his readers, using the zener diode as a noise source.

There's a noise bridge project to be built this month using zener diodes.

"NOISE, n. A stench in the ear. Undomesticated music. The chief product and authenticating sign of civilisation".
Ambrose Bierce (American Writer, Journalist and Editor, 1842-1914)

Despite the 'appropriate quotation' - not everyone agrees with noise as "a stench in the ear". I mention this because when in the USA earlier this year, I stumbled across a set of audio CDs, which were simply CDs of noise. "Sleep with a snoring partner?" the cover said. Intrigued by the concept, I picked up the flyer which accompanied the CDs.

It begins; *"At last, an alternative to a bulky white noise machine or white noise generator - convenient white noise CDs! Play our digitally mastered Pure White Noise™ CDs at home, school or office, with or without headphones. Also known as white sound, each White Noise™* (trade marking noise!). *"CD offers a full hour of soothing sound that creates an oasis of relaxation and calm, promotes sleep, blocks annoying noises for a more restful sleep, improves concentration, and eases the symptoms of colic, tinnitus, ADD/ADHD and hyperacusis".*

Note: In passing you may ask what's Hyperacusis? The answer is that it's over-amplification of environmental sounds within the ear, when everyday sounds seem too loud and the dynamic range is poor.

What's more – the company was also offering a choice of white noise or pink noise! My sheltered life had never introduced me to the concept of pink noise. In fact, I learned that pink noise is white noise, which has been filtered to reduce the volume of each increasing octave.

When white noise is generated by a sound synthesiser, each octave multiplies the frequencies in the former octave and not only has more frequencies but greater volume. In pink noise successive octaves are reduced by 6dB to give equal sound energy in each octave. The resulting sound does not appear to have more high frequency content than low. So, is perhaps pink noise a better option for masking snoring bed fellows?

Noisy Idea

Always fishing around for new ideas to try in this column, it occurred to me that I'd never looked at the concept of noise generation and noise bridges. And, as readers will know, I'm not an antenna expert but some years ago I did build an Antenna Noise Bridge, which was my copy of a popular kit of the day.

I used the bridge for several years, although it was never in the forefront of my test equipment armoury. But it's certainly worth taking a look at what is a simple instrument to build. So, let's look at using noise in a practical and useful way.

Classic Noise Bridge

The diagram, **Fig. 1**, shows the classic circuit for a Noise Bridge. The diagram at the top shows the layout of the bridge arrangement. Like most bridge circuits, the circuit uses a balanced system for measurement, which means when all the arms of the bridge are equal - a null occurs.

A noise source is amplified so that there is sufficient signal to use a receiver as the null indicator. The noise is fed to a transformer where two phase windings provide arms of the bridge. A variable resistance is the third arm to adjust for a balance against the antenna in the fourth arm.

When the value of the variable resistance equals that of the antenna, the bridge is balanced and the receiver will indicate a null point in the noise. Next, the receiver tuning is adjusted for balance at a resonate frequency.

Zener Diode Source

The necessary noise source is based on a zener diode. When biased in a forward direction, zener diodes behave like ordinary diodes and pass current.

However, if zener diodes are reverse biased they don't conduct current until the voltage applied exceeds a certain value. If that voltage value is exceeded they then begin to conduct. This is called the diode's reverse-avalanche characteristic, or 'zener voltage'. And this is why zener diodes are used to provide constant voltage levels.

The point at which conduction begins generates a considerable amount of r.f. noise, which is usually removed by adding a filter capacitor. So, leave out the filtering and provide a broadband amplifier and you'll have a wideband r.f. noise source!

Full Circuit

In the full circuit diagram, R1 and D1 form the noise source. A 2.7kΩ resistor and a 6.8V zener diode worked well for me and **Fig. 2** shows a simple circuit for choosing suitable combinations of resistance and zener diode.

To use the circuit insert a zener diode, in the five to eight volt range, and adjust the variable resistor until the maximum noise is heard in the receiver. **Note:** In practice some zener diodes produce more noise them others, so the avid experimenter could try several types. (I found I had no trouble in generating noise very easily from all the diodes I used).

If using the circuit Fig. 2. to select values, just transfer the best diode to the final circuit. Then add a fixed resistor as near as possible to the optimum value of the variable resistor.

Broadband Amplifier

The circuit, Fig. 1., shows the noise generator followed by a three stage broadband amplifier. The choice of transistors, and indeed most of the values, aren't very critical.

I resorted to my abundant supply of 2N2222 devices. Other devices like the BC109, 2N3904, 2N918 or almost any small signal, high frequency, *npn* transistor should amplify the noise successfully.

I began by building up the Fig. 1 circuit 'ugly' style over a piece of scrap printed circuit board (p.c.b.) material. It went together very easily and my first attempt produced lots of noise when feed into a receiver.

The next stage is to build the bridge. This is best done by wiring those components around the potentiometer and the sockets for the receiver and antenna. I found a suitable aluminium box large enough to take the sockets and the potentiometer.

Note: The potentiometer must be a linear

type with a carbon track. A wire wound component is unsuitable because of the inductance it will introduce to the bridge. The bigger the track, the more accurate will be the readings. Don't forget to leave enough space on the box to make markings of resistance values (something I still have to do!).

Made With Care

The transformer, which couples the noise signal to the bridge and forms two arms of the bridge must be made with care. The two windings that form arms of the bridge need to be equal and is arranged so that the arms are out of phase.

As usual the dots on the drawing in Fig. 1. indicate the same end (start or finish) of each winding on the core. This is a broadband r.f. transformer and is wound on a single ferrite core. I used an FT50-43 core but many similar ferrite ring cores would serve the purpose. Try some junk box cores; they'll probably work.

The transformer, T1, in Fig. 1. shows four windings and this is shown again in **Fig. 3(a)**. I've also shown it with the windings in the positions they occupy on the core. **Note:** Both diagrams show the same arrangement - but the one on the right shows how the windings occur on the core.

Some readers complain about winding trifilliar transformers, so a quadrifilliar transformer could frighten them even more! So, to make it easier I opted to use two bifilliar windings either side of the core.

For each side two wires are twisted and wound as one wire for four turns. On each side, the beginning of one wire is connected to the end on the other wire. The appropriate ends of each winding can be checked with a continuity tester such as an ohms range on a multi-meter. (The drawing shows how the wires are connected to the circuit).

An alternative approach is shown in **Fig. 3(b)** using a trifilliar transformer. This is the version I opted to use in my final version and it works very well. All the usual rules for making a trifilliar winding apply and I used 5 turns but a few more, or less, would probably work.

The wiring was done with short leads, directly on the sockets and potentiometer. It makes sense to have the value of the variable resistance increase in a clockwise direction. The diagram, **Fig. 4**, shows how to wire the potentiometer for a clockwise reading variable resistance.

Completed Project

When the bridge is completed, connect a 50Ω, non-inductive, resistor across the **Antenna** socket. A null should occur at about the half way setting of the variable resistance.

When the bridge is in use, a null should be found when the receiver is tuned to the frequency of the antenna. The bridge can be used to adjust antenna lengths, check the ratio of baluns and make adjustments of trapped antennas. For further tips, readers can refer to antenna books for the correct use of a noise bridge.

Simple Resistive Bridge

The next version is a simple resistive bridge and **Fig. 5** shows how to add a reactive variable reference. In this example, a 100pF reactance offset capacitor is connected across the **Antenna** socket. Next, a variable capacitor of twice that value is added enabling it to measure either side of the value of C2.

Note: A noise bridge is simple to build but like many simple items of test equipment - it does require careful application. Enjoy the projects!

PW

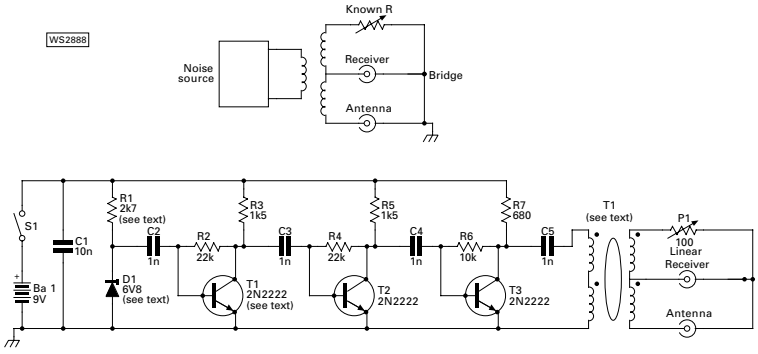

Fig. 1: A classic circuit for a noise bridge (see text).

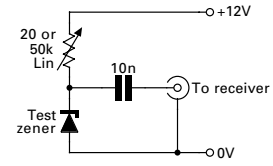

Fig. 2: A simple test circuit (see text).

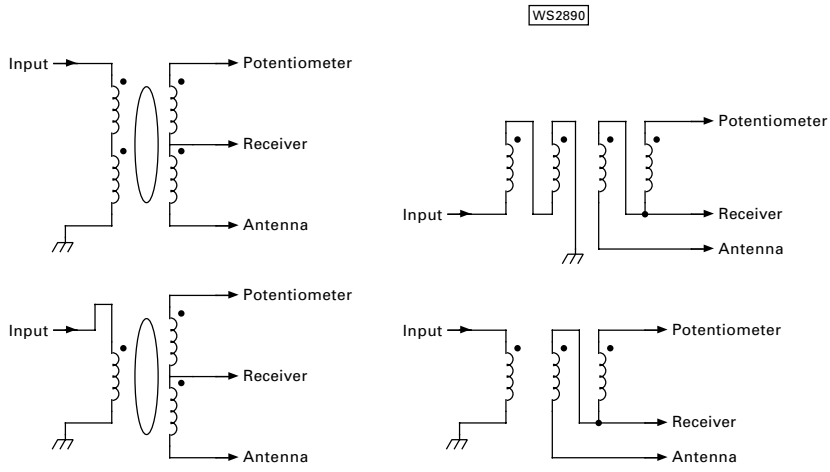

Fig. 3: Winding toroids can be difficult - these diagrams are designed to help overcome the problems (see text).

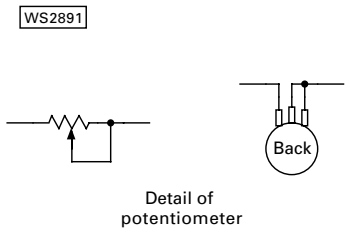

Fig. 4: It makes sense to have the value of the variable resistance increase in a clockwise direction. This diagram shows how to wire the potentiometer for a clockwise reading variable resistance.

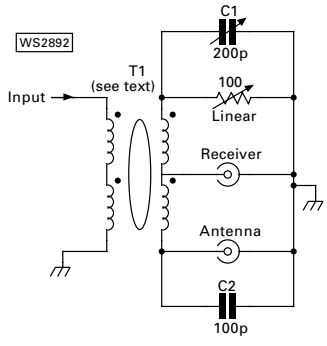

Fig. 5: A simple resistive bridge can have a reactive reference added. (See text).

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VHF DXer

REPORTS & INFORMATION BY THE LAST SATURDAY OF EACH MONTH.

In recent months the v.h.f. radio scene has been very active in various aspects. Numerous Sporadic-E (Sp-E) events have provided attractive band openings on the 50 and 70MHz bands. Multi-hop Sp-E propagation to North America, the Caribbean Islands, the Middle East and other areas of Asia livened up the 'Magic Band' to a great extent.

It was also very pleasing to note a large increase in DX working on the 70MHz band with direct and crossband c.w., f.m. and s.s.b contacts being made. On the 144MHz band there were a total of 19 days during the summer season when E-layer ionisation was sufficient to enable long-distance DX contacts to be made.

Sporadic-E openings were reported on April 28, May 19, 21, 23, 25, 29, 30, 31, June 1, 3, 11, 22, 29, July 2, 5, 6, 7, 15 and 17. It's interesting to note that this year many of these Sp-E events occurred very early in the season away from the traditional mid-June to mid-July peak. Other ionospheric events during the summer have included trans-equatorial propagation (t.e.p.) deep into Africa and South America on the 50MHz band, auroral (Au) backscatter openings, auroral-E (Au-Es), field-aligned irregularities (f.a.i.) propagation and daily meteor scatter (m.s.) contacts.

You may find it interesting how these ionospheric propagation modes interleave themselves during a 28-day rotation of the Sun. For example the month of July looked very much like this: The period July 1-8 saw very good Sp-E on the 50MHz band including daily transatlantic openings to North America, Sp-E openings on the 70MHz band and four days of Sp-E openings on the 144MHz band.

Between July 9-12 there were daily auroral openings with all of these events reaching as high as the 144MHz band. As a consequence 50MHz Sp-E was considerably reduced and no Sp-E openings were reported on higher bands. In the following period it all changed and between July 13-17 the intense Sp-E openings (including transatlantic openings on 50MHz) returned to the 50, 70 and 144MHz bands. Auroral activity was then reported in the period July 18-21 this completely wiping out any Sp-E on 50MHz and higher bands.

It was situation normal again between July 22-31 with daily Sp-E openings being reported on the 50MHz band (including more transatlantic openings) and a further four Sp-E openings on the 70MHz band. This cyclic effect of some v.h.f. ionospheric propagation modes are directly attributable to solar activity. Please note, however that this type of solar activity does **not** have any influence with tropospheric modes all of which occur very close to the surface of the Earth.

Radio signals like all other electromagnetic waves travel in straight lines unless reflected, refracted, defracted or scattered by something. When E-layer ionospheric propagation modes reach the 144MHz band the DX opportunities are greatly enhanced. That's because the reflecting layer for aurora, Sporadic-E or meteor scatter is approximately 100km above the Earth's surface and this enables contacts to be made up to 2000km away or sometimes even further. The existence of these layers explains most sorts of world-wide short-wave propagation including the elusive Sp-E but what about ordinary day-to-day tropospheric contacts made on the v.h.f. bands? These local contacts of a few hundred kilometres are certainly beyond line of sight but they do not arrive by any sort of reflection from an ionised layer.

DAVID G4ASR HAS REPORTS OF A RECORD BREAKING TROPO CONTACT OVER A 3751KM PATH ON THE 144MHz BAND!

Under normal conditions radio waves do not travel in straight lines through the Earth's atmosphere. They are actually refracted (gently bent) downward slightly so the horizon for radio waves is about a third farther away than for light. This refraction is caused by the normal variation in the refractivity of the air, itself caused by the decreases in temperature, humidity and pressure at increasing altitudes. Even so this normal tropospheric refraction can only account for a very small extension of v.h.f. radio paths beyond line of sight.

Some unusual weather conditions can refract radio waves even more extending the effective radio line of sight much farther. Under super-refracting conditions radio waves can be bent back toward Earth. A tropospheric duct is formed when this takes place continuously over long distances. Ducted signals can be amazingly strong over distances of 1000km or more but these are unusual circumstances. However, super refraction does not explain what causes radio waves to go well beyond the horizon and therefore the mechanism of scattering v.h.f. signals need to be considered.

When radio signals encounter objects that are about a wavelength in size, a small portion of the signal may be scattered away from the main signal direction. In the lowest weather-producing part of the atmosphere known as the troposphere the wavelength-sized objects are naturally occurring blobs of air with subtle variations in density and water vapour content. A radio signal encounters so many irregularities as it passes through the troposphere that it is constantly being subjected to scattering and rescattering.

A small portion of these signals are ultimately scattered in directions that create useful beyond-the-horizon communications paths. Radio signals that arrive via tropospheric scatter are thus much weaker than signals that arrive by a line of sight, ducting or via the ionosphere. Indeed scattering is among the least efficient ways to propagate v.h.f. radio signals but in many day-to-day situations it is the only way that signals can arrive from beyond the horizon especially on frequencies above the 70MHz band.

Troposcatter propagation is limited by the maximum distance two stations can remain within radio line of sight of a common volume of the troposphere. The maximum altitude for useful tropo scatter is about 10km and a little geometry suggests that the maximum troposcatter path distance for stations at sea level is around 800km. For this reason the best location for an ordinary troposcatter station is as high as possible with a clear view of a distant horizon.

Mountain tops increase the troposcatter distance and that's why contest stations always head for the hills or at least to a site with no obstructions to the horizon. In practice the maximum practical distance is considerably shorter than 800km. Higher ground often blocks part of the horizon resulting in a smaller common scattering volume and thus weaker scattered signals. For each degree of horizon lost troposcatter signal strength decreases by about 10dB.

The strength of scattered signals also drops off very rapidly with the distance between stations. Ordinary path losses increase but more importantly the common scattering volume also becomes smaller. At 800km spacing between stations it effectively disappears from view and not even QRO

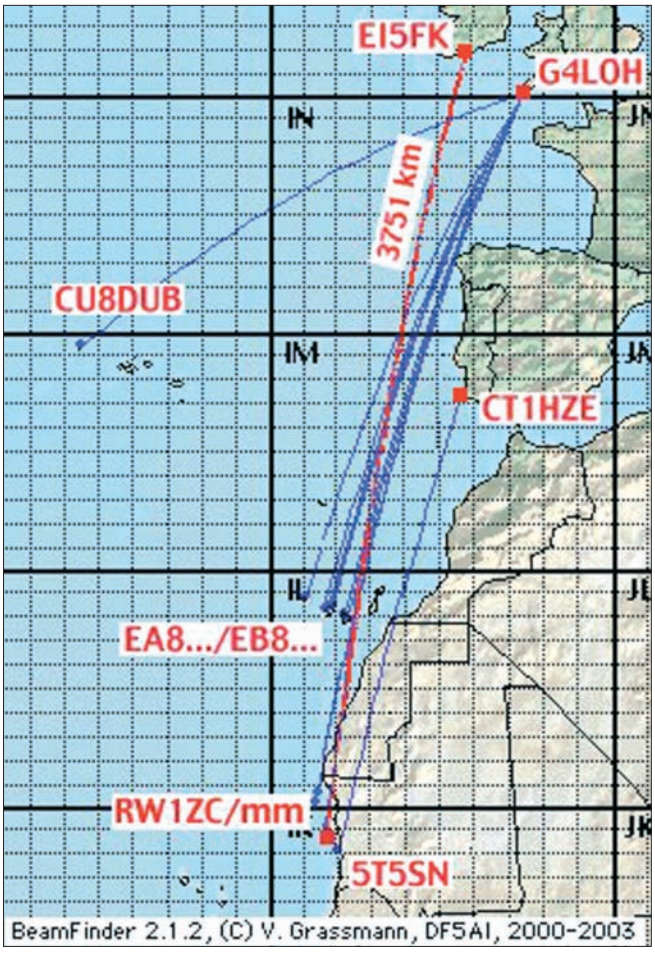

Fig. 1: Tropo contacts made on the 144MHz band

power and large antennas can compensate.

Troposcatter is our normal everyday propagation mode on the bands above 70MHz. Local contacts beyond the horizon are made possible by troposcatter and the limits of ordinary troposcatter determines normal working distances. Although contacts made on the 144MHz band via tropospheric modes are often quite short there are occasions when tropo contacts can be made that far exceed distances normally achieved via ionospheric means and during this summer v.h.f. radio amateurs reported extraordinary results in tropospheric DXing.

TROPOSPHERIC DX

On July 16 some operators in southern England reported hearing the low-power 144MHz beacon CU8DUB located in the Azores at a distance of around 2500km. This unit, activated on July 4, is part of the Dubus beacon project that aims to deploy 50 and 144MHz radio beacons around the Atlantic Ocean region. Incidentally the Dubus team which includes Joachim (DL8HCZ/CT1HZE), Dithmar DF7KF, Nicholas 5T5SN, Fred CU8AO and many others have already put the Bermuda beacon (VP9DUB) and the Mauritania beacon (5T5SN) on air.

The 5T5SN beacon has been operational since May 2005 and CT1HZE has already received its signals several times at his QTH in Portugal. The group plans even more beacons with a unit expected to be operational from Tunisia some time next year.

During this summer there has been even better 144MHz tropospheric DX reported as the regular marine path from the UK to the Canary Islands (EA8) was open on at least 22 days during the period from May to August. That's four months in a row that tropo contacts over this 3000km path could be achieved on the 144MHz band!

Tropo paths over large bodies of water are excellent as there's a natural tendency to create a refractive duct due to the changes in moisture and temperature at the water/atmosphere interface. The duct may not always be very sharply defined but it's usually enough to help boost signals well beyond line of sight. The mechanism works best under calm conditions and disappears in rough weather when the atmosphere is strongly mixed.

From the UK the opportunities for super-DX on the 144 and 430MHz bands are very good especially for stations located in southwest England, south and west Wales, Isle of Man and the west coast of Scotland. Stations located in the Republic of Ireland on the south and south coasts also have an excellent chance in making these 3000km contacts into the Canary Islands. Stations situated within sight of the coast will experience S9+ signals when the marine duct forms and contacts may be achieved with very low power. As the signals move further inland their strength weakens considerably but contacts are often made by stations 200km from the coast and sometimes much further inland.

NEW 144MHz TROPO RECORD

While travelling on a fishing boat close to the African coast off Mauritania the station of **Alex RW1ZC/MM** has managed to make a number of c.w. and s.s.b. contacts into England (G4LOH) and Ireland (EI5FK) breaking the IARU Region 1 long distance record in 144MHz tropospheric radio propagation. The first contact came during the morning of August 7 when **Tim G4LOH** (Cornwall IO70) running 400W into a pair of 16-element I0JXX Yagis worked several EA8 stations and then managed two QSOs with RW1ZC/MM. The distance of 3493km landmarked a new 144MHz DX record in IARU Region 1 (Europe, Africa and parts of Asia). But this wasn't the end of the story.

On August 15 the station of **Charles EI5FK** (Ireland IO51) running a GS-35 amplifier and a 17-element Yagi also worked RW1ZC/MM in four separate QSOs. Meanwhile, Alex who was running 100W into a 9-element Yagi had changed position to locator square IK18 extending the IARU Region 1 record to 3751km. Two weeks later on August 29 it was the turn of G4LOH who managed another contact with RW1ZC/MM (IL10) corresponding to 3444km. These results as shown in the diagram, **Fig. 1**, are tremendous especially as all were achieved via tropospheric radio propagation. Meanwhile both EI5FK and G4LOH are keen to work the station of D44TD (Cape Verde Islands) located even further south at around 4000km from the UK.

Another well-recorded marine path is the Pacific duct between Hawaii and the west coast of the United States. This reliable path has supported tropo contacts on the 144MHz through to 5.6GHz bands at distances of 3700 to 4330km. On August 21 1999 the stations of KH6HME (Hawaii BK29) and W1LP/MM (DL51) established a two-way s.s.b. QSO on 144.170MHz creating a world record 4754km tropo contact. There has been good reason to think that these distances could be extended, perhaps considerably. This speculation has recently been given a huge boost by a report from Shel Remington NI6E (Hawaii BK29) who has been monitoring the f.m. broadcast band for signs of stations from mainland United States.

On February 13 NI6E began hearing XHME a Spanish language station on 89.5MHz located in Jalisco, Mexico. Within an hour he also heard XHPVA (90.3MHz) also from Jalisco and XHMZO (92.9MHz) from Manzanillo. All these are Pacific coast cities about 5200km to 5300km from Hawaii.

The next step is to encourage some dedicated v.h.f. operators along the Mexican coast to take advantage of future occurrences of such ducting. Employing maritime mobile stations and deploying radio beacons in strategic positions will open doors to new experiences in v.h.f. DXing and I'm convinced more results will follow in the future.

DEADLINES

Good luck with your tropo DX contacts and please let me know what you managed to work or hear. Please send any reports or news, preferably by E-mail, to reach me by the last weekend of the month. **73, David G4ASR.**

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HF Highlights

AS USUAL, INFORMATION, REPORTS AND PHOTOGRAPHS TO ME PLEASE BY THE 15TH OF EACH MONTH.

CARL GW0VSW ROUNDS UP THE LATEST HF NEWS

The Publicity Officer for **Warrington Amateur Radio Club** (WARC) **Ron Davies G0WJX** sent in news of the club's recent DXpedition to St George's Island (Looe Island), which went ahead as planned earlier this year with the help of the Cornwall Wildlife Trust. A party of ten club members were permitted to operate from St George's Island, activating it for only the fourth time. They all set off by open boat on Sunday 12 June with a two hour window for the crossing and setting up of three h.f. stations ready for their operation the following day.

The photo, **Fig. 1**, shows **Tim** the boatman taking the team along with three masts and a mass of equipment to the island together with two gazebos that provided temporary shacks during the activity. On Monday, day 1, three Icom IC-756 Pros were networked and connected to a Carolina Windom 160 and a Cushcraft dual-band vertical.

A VK2ABQ 'cane' beam was also available for the 14 and 21MHz bands and worked very well pulling in 412 stations. The following day the team made 447 contacts even though conditions were relatively poor. On their arrival on day three they found that wind and rain had found its way into the shelters and some equipment that had not been removed and stored in a more secure location and so, had become waterlogged. Despite this WARC can confirm that once water is drained out of a computer and flat screen monitor and they have had the benefit of sun and breeze they will recover!

A wireless keyboard and mouse however are still on the sick list. Nevertheless a further 183 QSOs were added to their total once the equipment had dried out.

The Thursday morning dawned with a heavy sea mist that remained all day and the team were unable to get to the island. This left Friday for a few more contacts before the stations had to be dismantled and returned to Looe. A five day programme was effectively reduced to two and a half by a combination of tides and weather. Always a problem on this type of DXpedition!

One station was kept running even as the gazebo was taken down around the last operators and 288 more callsigns were added to the log. The grand total for the week was 1330 QSOs with Europe providing most of the action with Germany taking first place with 222 different stations worked. This was followed by Italy with 152 followed by Poland 79, England 75, Scotland 63 and France 60.

A planned overnight operation would have made more use of 3.5MHz was abandoned because of a combination of weather conditions and wet equipment. Only nine 3.5MHz contacts were made with 509 on 7MHz and 812 on 14MHz. Pick of the DX were five contacts with Japan and one each with Panama, the Philippines and West Malaysia.

Amateurs who wish to confirm their contacts with the DXpedition can do so by following the GB0SGI menu item on the club website at **www.warc.org.uk**

Fig. 1: Tim the boatman ferries the Warrington team to the island.

A Spanish DXpedition team will travel to the Maldives and plan to be active before the contest as **8Q7EA**. Activity is expected to be on 3.5, 7, 14, 18, 21, 24 and 28MHz using an Icom IC-706MkII-G an Yagi beam, dipole and a G5RV antennas. All QSLs will be via EC1KW to the bureau or direct to **Oscar Luis Fernández Lanza EA1BXN, P.O. Box 38 - C.P. 39.400, Los Corrales – Cantabria, Spain**. For further information and rules of the CQ contest log on to **www.cq-amateur-radio.com/WWDXConRules8905.pdf**

DX NEWS

The **CQ World-Wide DX Contest** takes place between the 29 and 30th October and many stations will be active from all parts of the globe. This is your chance to boost your s.s.b. country totals with all participants looking to work as many Amateurs in as many countries and zones as possible during the 48 hours the contest runs.

Even operations close to home may enable you to increase your band totals. One of these will be on the Isle of Man where **Joe Blinick K1JB** and **Mike Russo K1EU** will be active as **GD6IA** EU-116 as a Multi-Single entry.

A team of operators will be active as **8P9R** from Barbados NA-021 as a Multi-Multi/High-Power entry. The team will arrive on the island on 25 October and depart 1 November so there will be plenty of time to work them. Activity both before and after the contest, will be on all h.f. bands including WARC using s.s.b. and some RTTY and PSK.
The following are the operators and the callsigns they will be using: K3LP – 8P9LP & 8P9R (contest callsign), N3VOP - 8P9OP, K1LZ - 8P9LZ, W3ADC - 8P9DC, W3ARS - 8P9AS, W3ADX - 8P9DX, N3KS - 8P9KS and WB6CBU - 8P9HC. Send QSLs for all QSOs to their QSL Manager **Nathan King W3ADX, 4040 Gill Avenue, PO Box 64, Hampstead MD 21074, USA.**

SPECIAL EVENT STATION

This month keep an ear open for the first Italian Red Cross Amateur Radio station to be activated using the callsign **IZ4GQA**. This station is managed by the Radiocommunications Technical Office for the Emilia Romagna region of the Italian Red Cross. You can visit their web page **http://radio.cribo.it** for more information related to their work and activities, timetables and frequencies used. Incidentally, you can also subscribe to a free newsletter and be swiftly informed of IZ4GQA's radio activities.

YOUR REPORTS

On to your reports now and **Keith Winward M3KWI** in Middlesbrough who has a new callsign after passing his Intermediate Exam at Bishop Auckland Radio Amateur Club with the help of ex-Mayor, **Tim Bevan M0ACV** who threatened to jail him if he did not pass!

Keith now holds the callsign **2E0JKD** and has also changed his transceiver from a Kenwood to a Yaesu FT-990. His antenna is still a Carolina Windom, which he managed to tune up on 1.8MHz. Although he has yet to work any DX he was pleased to log M0BNZ in Bath and G3LYW in Helston, Cornwall around

Fig. 2: Operators in the Warrington group pictured from left to right are: Chris G7GZB, Ron G0WJX, Phil G3TEX, John M0ANM, Keith G8MKO, Mike M0ACK, Mike G4VSS, Cliff M0MRC, Ian M0BXR and Bill G0PZP.

2215UTC proving his s.s.b. signal is getting out! Changing to 3.5MHz Keith worked OO7QT (Belgium) at 2240UTC.

On 7MHz **Chris Colclough G1VDP** in Nuneaton found MM0/N5ET operating from St Kilda EU-059 at 1725 followed by G4NXG/M on Lindisfarne EU-120 at 2001UTC using a yaesu FT-897 and Cushcraft MA5B Beam antenna.

Also on 7MHz was **Martin Addison M3JUQ**, East Finchley, North London who uses a Yaesu FT-840 running 10W s.s.b. into a half size G5RV bent to fit in his available space in the garden. Contacts here included IK2SSW/P (Italy) 0601, OO4LJA (Belgium) 0834, TM0BZH (France) a special call for the Inter Celtic Festival in Quimper at 0902, LA6Q (Norway) on EU-055 on Utsira Island 1151, CU4T (Azores) EU-175 on Graciosa Island 1622, SM6DOI (Sweden) 2031, PA2000N (Netherlands) a special call celebrating 2000 years of the City of Nijmegen at 2051 and UT5MD (Ukraine) at 2208UTC.

On 10MHz Morse man **Ted Trowell G2HKU** on the Isle of Sheppy, Kent managed two stations around 2000UTC. The first was with 4S7NE (Sri Lanka) AS-003 and a QRP contact with EA6/DJ7TO (Balearic Islands) EU-004 using a Ten-Tec Omni V or Icom IC-723 (QRP Rig) and G5RV or Butternut HF-6 vertical.

THE 14 & 18MHz BANDS

On 14MHz Martin worked UA3QKA (Uzbekistan) 0640, OL200BA (Belgium) a special call for the battle of Austerlitz at 0712, UT/ER3ZZ/P (Ukraine) on EU-175 Kalanchakskiye Island at 0725, VE3OGZ (Canada) in Toronto for his first contact 'across the pond' at 1138SP5XSD/1 (Poland0 EU-132 on Wolin Island at 1232, SV1JMO (Greece) at 1305, HB9DWR/LH (Switzerland) at Geneva lighthouse at 1938, YU1JW (Serbia & Montenegro) 1959, EA7ELY (Spain) 2022 and finally HA200CVM (Hungary) a special call for the Anniversary of Csokonai at 2028UTC. Not bad going for such a bent antenna! In Chelmsford, Essex **Martyn Medcalf M3VAM** worked s.s.b. stations LY3BH (Lithuania) at 0804, SM5QU (Sweden) 1505, RK3DZB (European Russia) 1558, EA7GV (Spain) 1956 and CN2DX (Morocco) at 2111UTC using a Icom IC-746 and long wire antenna with SGC-237 auto tuner.

The mobile log of **Mark Taylor G0LGJ** shows just two contacts as he has been away on holiday. Using a Kenwood TS-480 and a DK3 screwdriver antenna mark logged ZS6CCY (South Africa) at 0545 and VE9MY/M at 2133UTC.

Over to Newtonabbey, Northern Ireland now and **Peter Lowrie MI5JYK** who said "IOTA 2004 was disappointing propagation wise and given that h.f. conditions have been generally poor of late I wasn't expecting 2005 to be much of an improvement. The portable antenna system I use was to be improved for the IOTA contest this year with a Sandpiper half-wave vertical for 14MHz based on a 9m roach pole. However, a few 'teething' problems meant that this system couldn't be employed so my old two radial wire quarter-wave antenna taped on a roach pole was used instead. The radio was my 'old faithful' MFJ-9420 with a power output of just 5W p.e.p. A short trip into Belfast for a huge bacon bap and steaming mug of mocha prior to kick off ensured that the operator would be ready to face 'Kilowatt alley' and all the delights she had to offer. The band seemed lively though Saturday's conditions did seem poor. The log would suggest otherwise but from time-to-time even the 'big' stations had trouble working each other. As you can expect I heard more than worked"

Well, Peter's log was vast and included K5MI (U.S.A.) on NA-052 at 1128, CU4M (Azores) EU-003 1201, DL5AXX/P (Germany) on EU-129 at 1215, 9A7B (Croatia) EU-003 at 1230, EA8BVX (Canary Islands) AF-004, CT3MD (Madeira Island) AF-014 at 1308, OZ1BTE (Denmark) on EU-029 at 1313, OH9A (Finland) on EU-173 at 1337, VO1TA (Canada) on NA-027 at 1344, 8S4Z (Sweden) and SV8AQY (Greece) on EU-052 at 1616UTC. This gives you an idea of what can be worked with low power and simple antenna!

In Biggleswade, Bedfordshire **Owen Williams G0PHY** had a quiet month but found time to switch on his Yaesu FT-757 and with 100W s.s.b. to work 2U0GSY (Guernsey) at 1105UTC. Also spending a good deal of time here was Chris G1VDP who's long list included s.s.b. stations 4Z17M (Israel) 1742, SV9FBZ (Crete) EU-015 at 1803, RA1QQ/1 (European Russia) 1844, A45WH (Oman) 1854, XU7TZG (Cambodia) 1857, ZD7VC (St Helena) AF-022 at 1905 and A2GS (Botswana) though this could be a pirate at 1907UTC.
Ted G2HKU found c.w. stations 8P6CF (Barbados) NA-021, 8R1J (Guyana), EA6UN (Balearic Islands), FM/JJ2RCJ (Martinique) NA-107, Vp2E (Anguilla) NA-022 and W9QVB (U.S.A.) around 2100UTC while Keith 2E0JKD managed three voice QSO's with HB9CCL (Switzerland) 1155, RK3DZB (European Russia) 1610 and DR1A (Germany) at 2005UTC.

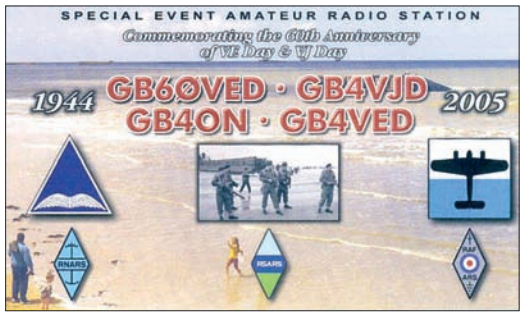
THE 21MHz BAND

Just three reporters logged calls on the 21MHz band. Martyn M3VAM found EJ0GI (Ireland) on EU-006 at 1039, 9A1CDO (Croatia) 1538, IQ3AZ (Italy) 1551 and OH0Z (Finland) at 1651. Ted G2HKU logged VY2/KD4D (Canada) at 1610UTC while Owen G0PHY called YN4SU (Nicaragua) for an s.s.b. QSO at 2145UTC.

SIGNING OFF

Well that is all there is space for this time around. The 14MHz band was by far the best with openings throughout the day but once again the higher bands have suffered with very little DX reported. When are these conditions going to improve?

As usual my thanks go to all our reporters 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**



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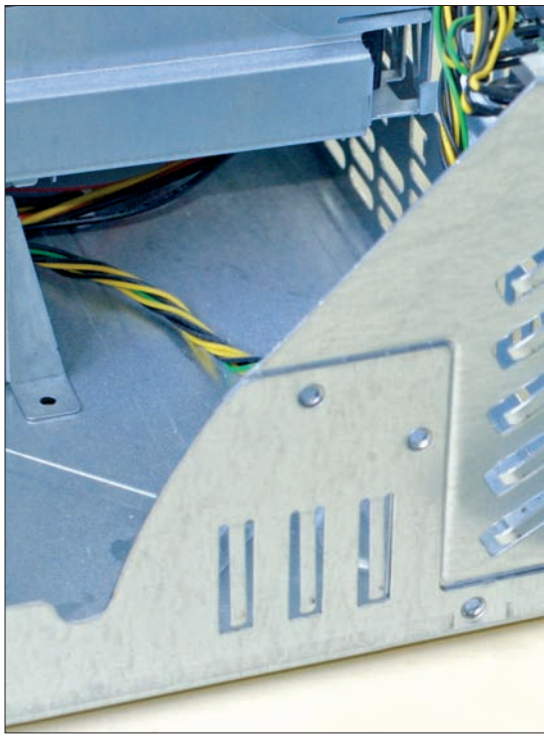

JACK LOOKS AT THE PROBLEMS OF INTERFERENCE BETWEEN COMPUTERS AND RADIO - AND OFFERS SOME USEFUL SOLUTIONS

I was at the Stevenage Radio Show earlier this year. While I was looking at one of the stalls, I overheard a snatch of the conversation next to me – "No way am I putting a PC in the shack – all that **** interference". Hmmm... I thought of my own radio set up sandwiched between two computers and suffering no significant interference, but I'm sure they didn't want my opinion so I went back to buying a rather useful power supply.

It's a widely held belief that PCs produce enormous amounts of r.f. interference, and there's no denying that sometimes they can do, but it's not as bad as it's made out to be and what there is, can often be dealt with fairly easily. So, if you've ever had a bad experience with computer interference or have been put off by horror stories about it, here are a few suggestions for how to avoid the problems.

The first point to note is that PCs seem to have become much less troublesome over the years and this is probably due in part to the steady rise in processor speeds. Not so very long ago, a 100 or 133MHz machine was considered pretty fast. Now, the state of the art is at 3GHz and above. That old PC probably had a data bus running at around 20MHz and various peripheral chips with frequencies spread right across the h.f. and low v.h.f. spectrum.

In today's computers, many of those frequencies will have been pushed well up into the u.h.f. range. This may be more worrying if u.h.f. is where you operate, but let's face it, screening is generally easier and there's more spectrum in which the interference can get lost.

Whatever the clock speed, screening is important so do check the PC's construction before you buy. I've seen some older computers with plastic cases and nothing more than pieces of aluminium foil glued inside to provide r.f. screening. Where the case came apart, a single sprung finger was meant to make contact with the foil, but it wouldn't take much to bend it out of position, tear the foil or simply lose the good connection because of tarnishing.

There's no need to put up with this sort of thing when there are plenty of computers in all-over metal cases – if you can get to see inside, check that there's a good r.f. seal around the joins (see **Fig. 1**). If it's done well, this can create an effective Faraday cage around the computer, and that really makes a difference.

However well the PC itself is screened, a common source of interference is the display, especially if it's an old style c.r.t. monitor. Just like a TV, these can radiate a lot of r.f. from the high voltage signals inside and, if you do nothing else, I'd suggest replacing any c.r.t. monitor with a modern flat panel l.c.d. screen - the prices have fallen dramatically in the past year. Flat screens aren't completely problem-free, but the level of interference is vastly reduced. I have two l.c.d. screens close to my radio equipment – one of them is just about detectable around 40-50MHz, but I haven't managed to find any sign of interference from the other one, though checking with a spectrum analyser reveals a tiny increase in broadband noise when it's on.

It's also worth paying attention to the monitor cable. When I first installed one of my displays, it was clearly audible, but then I noticed that the cable linking it to the PC was running parallel and right next to an antenna lead-in. Moving them apart cured the problem instantly.

COMPUTER PERIPHERALS

Then there are all the computer peripherals to contend with and this is where we get to potentially one of the biggest problems. Peripheral devices such as scanners, modems, USB hubs, external hard disks and so on don't generally cause very much interference themselves. However, they all require power supplies and these days, that usually means a small switched-mode supply fitted directly onto the mains plug or as an in-line box fitted to the mains lead. Some of these generate quite appalling levels of r.f. interference and I'm sure that often when the computer is being blamed, it's really these supplies that are the culprits.

A well designed and screened switched-mode PSU needn't cause problems. Indeed, the big power supply blocks inside PCs are usually of this type and, in my experience, they aren't a major problem (though this is another reason for making sure that the PC case provides thorough r.f. screening). Unfortunately, the small external supplies that are provided with such things as computer peripherals, battery chargers, low-voltage lamps and even some radios, can be really bad.

If you look at **Fig. 2** you can see the problem very clearly. This is a spectrum analyser plot at around 11.2MHz taken with the RF Space SDR-14 that I described in the last Data Burst. The four evenly spaced peaks that look like steep-sided mountains are typical of the interference you get from low quality switched-mode supplies (this particular one came with an external hard disk). They're not confined to just a narrow band of frequencies, the peaks repeat for many MHz on either side. The narrow vertical lines on this plot are actual received signals – notice that the interference is stronger than most of these. Any signal that coincided with one of the interference peaks would be completely lost.

Just like computer processor speeds, the frequencies used by switched-mode supplies seem to be rising. Some older ones that I have mostly affect frequencies around 1-4MHz, but all the recent ones peak at around 8-10MHz. However, in every case, the comb of evenly-spaced noise peaks is spread over a wide range so you can't easily escape it.

A spectrum analyser makes it very easy to spot the troublemakers and to identify them by switching them off one at a time. However, I don't even bother doing that now. I just try to replace them all with linear power supplies that use a normal transformer running at 50Hz. These may be larger and may run hotter, but they certainly cure the problem.

Electronics suppliers such as Farnell, Maplin and others sell small linear supplies, often with interchangeable connectors that should fit most devices. Do make sure though

Fig. 1: Some PCs are much better screened than others. This one (an IBM ThinkCentre A30) has a two-part metal case. Notice the combs of springy teeth – over 80 of these all round the join ensure that little r.f. can leak out.

that the linear supply is rated for at least the same current as the one it's replacing. One reason why switched-mode supplies are so widely used is their ability to deliver lots of current from a small package without melting. As the voltages employed in computer electronics have fallen, so the currents have risen and it's not unusual to find peripherals taking 4-5A at 5V.

Also be sure to check the polarity of the connector – centre positive, outer negative is the most common arrangement, but they do vary and failing to check could lead to a very expensive mistake. Alternatively, if you're experienced in electronics construction and can work safely with mains circuitry, linear power supplies are easy to build using a transformer, rectifiers, smoothing capacitor and voltage regulator integrated circuit (i.c.).

Some people say that they prefer to use laptops rather than desktop PCs with their radio equipment because they're less prone to causing r.f. interference. I'm not sure that's really so – there are some advantages and some disadvantages to laptops.

On the plus side, there's no long radiating cable attached to the display (good) and the display is always an l.c.d. (even better). On the minus side, screening doesn't always seem to be as thorough and the external power supply, invariably switched-mode, can be a big nuisance. However, if the internal batteries are in good shape, you could consider running the laptop on batteries alone while your radio gear is in operation. Used like this, a laptop should be trouble-free.

NETWORKING HARDWARE

One final source of potential problems is networking hardware. With multiple computers becoming more common in the home, there's been a big growth in domestic networking, if only to share a common broadband connection. The easiest approach is to link PCs together with ethernet cables (often known as CAT-5 cables) either directly or through an ethernet hub. Unfortunately, ethernet tends to radiate quite a lot of r.f. hash.

What solved the problem for me was switching to wireless networking. I now have not only an interference-free and cable-free network, but the convenience of being able to carry my laptop into the garden and remain connected. Many PCs, and especially laptops, now come with this wi-fi or IEEE 802.11 networking built-in. Otherwise, internal adapter cards or external boxes are widely available.

Although it's not as cheap as ethernet, the prices of wi-fi gear have dropped significantly. This equipment operates in the license-free 2.4GHz band, which it shares with microwave ovens and all sorts of other short-range devices. It's unlikely to cause problems for most amateurs or listeners, though the data cable leading from a PC to an external wireless adapter might do if it runs too close to the antenna lead-in. I've certainly had no interference problems at all from my wireless network, even with four wi-fi transmitters operating in the same room as my radios.

If this long list of potential problems and solutions has driven you back to thinking that computers and radio don't mix, it really shouldn't do. Provided you can deal with those switched-mode p.s.u.s and you're not trying to use an ancient PC and c.r.t. display, then you should have no problem running computers in proximity to radio gear, provided you pay attention to cable layouts.

MYTHOLOGY OF INTERFERENCE

A lot of the mythology of computer interference originates from a time when neither computers nor radio equipment had much attention paid to screening because no one considered that these disparate systems belonged together. These days, when every transceiver and receiver contains a microprocessor, as well as digital memory chips, a digital display and quite possibly a d.s.p. system, both radio and computer designers have to pay a lot more attention to avoiding the problems.

The result is that most of the domestic interference you're likely to encounter will come from other equipment and not your PC. By far the biggest sources of interference in my house have been the TV set in the lounge, which blankets half of h.f. with a clicking noise even when it's on standby, and a small switched-mode p.s.u. that was supplied, not with a computer, but with an expensive item of radio equipment!

The TV now gets switched off when not in use and the p.s.u. went into the bin five minutes after I first switched it on. I replaced it very successfully with the one that I was in the process of buying when I overheard the conversation that first set me off on this train of thought.

See you next time, Jack.

JACK WEBER
C/O PW EDITORIAL OFFICES
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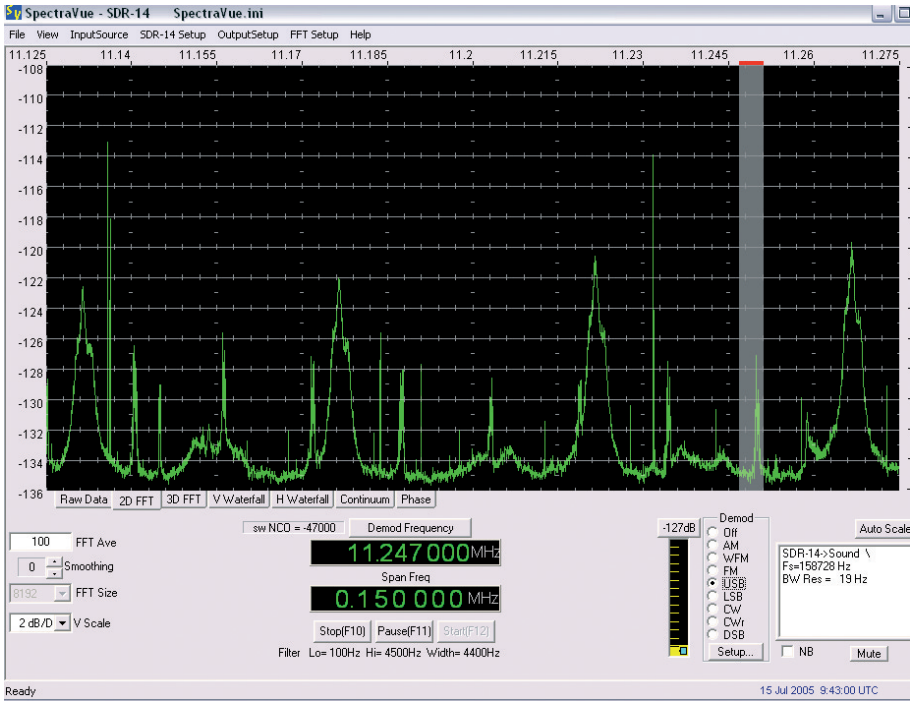

Fig. 2: A spectrum analyser plot showing a comb of evenly-spaced noise peaks – typical interference from a low quality switched-mode power supply.

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rob mannion's topical talk

As usual, a topical subject has caught the Editor's attention. This month a letter from Des Walsh EI5CD prompts Rob G3XFD to voice his own concerns regarding man-made pulse noise on the h.f. bands.

The letter from **Des Walsh EI5CD** in County Cork, Ireland, in the letters pages (this issue), highlights a problem for Radio Amateurs around the world operating anywhere in the h.f. part of the spectrum. Unfortunately, for us however, if the interference is from one of immensely powerful over-the-horizon (OTH) radar type detection systems - there's not much we can do about it.

I say this because I have no doubt at all that any purposeful enthusiast drawing the attention of their government to the subject would soon be enjoying a holiday - free of expenses! (note to Mr Blair and his trench-coated friends - I'd prefer Dorchester Prison to The Tower of London!).

Governments promote freedom of information but don't usually extend the freedom to their own activities. Secrets, however trivial are often kept for 30 years or so by which time most of the observers and equipment have passed into history!

As Des mentions in his letter, such systems (if the interference is caused by the OTH radar) have transmitter output power beyond most people's imagination. And it's not a new problem either!

In 1984 the Mannion family lived in the far north west of Scotland, just south of Ullapool in Wester Ross. So, when the 'Russian Woodpecker' OTH system started to be heard on the telephone systems, over the local school's audio system, and on one or two hearing aids (yes - hearing aids!) my amateur activities were suspected. However, when I was away, and the problem continued - they realised I wasn't the culprit.

The 'Woodpecker' transmissions were so incredibly powerful in the Scottish highlands that I once heard a strange ticking noise in my shack. On investigation it turned out to be a moving coil multimeter. The leads were touching and it was set onto the 2V full scale deflection (f.s.d.) range.

The ticking noise was the meter's pointer hitting the end of the scale! I seem to remember the frequency agile system worked from 11 to 26MHz but I'm sure readers will be able to confirm it for me!

Overhead Wires

There were still a few long distance overhead telephone wire systems in Wester Ross during our time there. It was fascinating to see the multiple overhead wires on wooden poles striding over the mountains heading from Little Loch Broom, and on into Ullapool. I often wondered how much r.f. was picked up by those wires.

While were living in Wester Ross, British Telecom laid what was then one of the longest fibre optic routes installed in the UK. It was a great success and I often wondered if BT were spurred on to do this job because of the 'Woodpecker' interference as the buried line was immune - until the 'local loop' wire to the subscriber of course!

Pulse & Ionospheric Sounding

We have to hope that - if the latest pulse noises are linked to some form of OTH radar - that the operators will end up finding a better, less spectrum polluting system to use. However, even if they do - there are innumerable others to bother us - including the various frequency sweeping ionospheric sounders. (These are those odd transmissions that rapidly sweep by our working frequency, sounding similar to a crude musical instruments).

The research work might be important, and I'm not sure how many ionospheric sounder stations there are in the UK or Europe. But it would be interesting to know if the operators realised how much they can be heard!

We may not be able to silence the various external r.f. polluters - but we can tackle those nearest to home. Recently, while working on 14MHz c.w. I was really annoyed when switch mode power supply interference disrupted my QSO. At my wits end I was most upset - until I saw my shack DVD player was switched on (used to play recorded radio programmes). The noise disappeared immediately - one lesson learned and one ferrite filter bead was fitted immediately!

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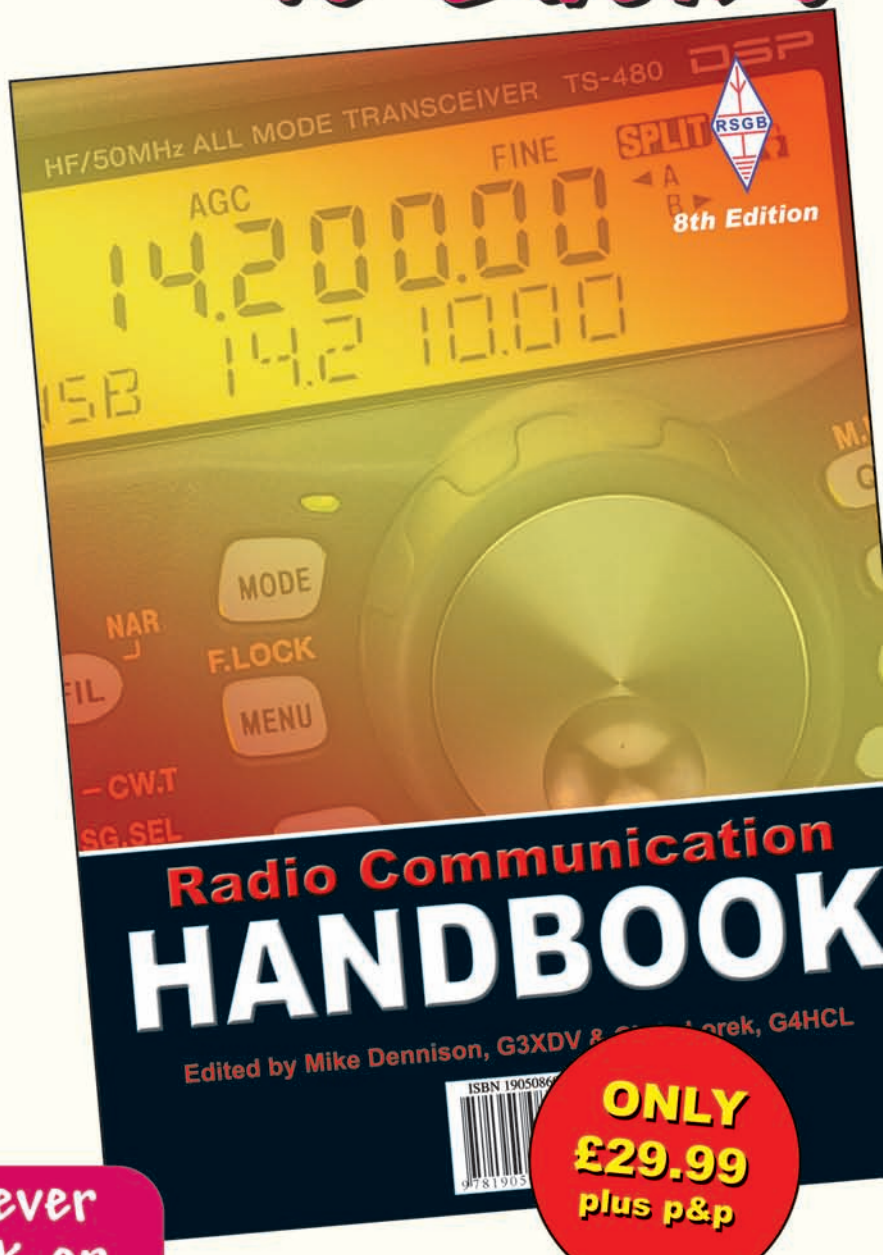

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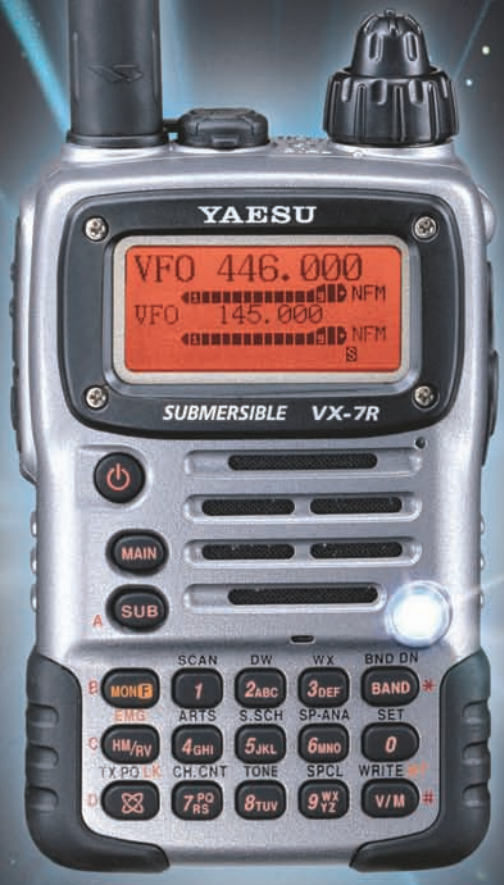

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