December 2010 £3.50 ISSN 0141-0857

NOW IN ITS 78th YEAR!

Practical WIRELESS

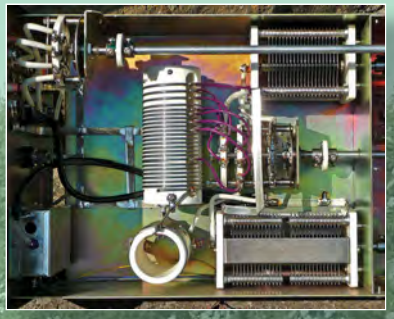
Britain's Best Selling Amateur Radio Magazine

Reviewed This Month

The Walford Electronics Tone Receiver

Antennas

A magnetic loop for the h.f. bands



In the Shop

The FC-902 is on Harry's workbench

HF Highlights

A round-up of your activities

2010 PW 70MHz Contest Results

9 770141 085105 12

WATERS & STANTON

SCOTTISH STORE • W&S @ JAYCEE, 20 WOODSIDE WAY, GLENROTHES, FIFE, KY7 5DF - CLOSED MONDAYS
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Yaesu Christmas Sale Day!

Saturday 18th of December

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

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

ICOM

ID-E880 NEW

* 2m/70cm 50W Mobile
* D-Star +D-Star Repeat Mode
* Extensive GPS Compatability
* CTCSS & DTCS + Airband Receive
* 1000+ Memories
* Detachable Head

£429.95 D

NEW IC-9100

VHF/UHF Satellite + HF + D-Star

£TBA

Arriving Soon

100W on HF-2m
75W on 70cms &
10W on 1296MHz
Some items optional

NEW FIND IT CHEAPER? We'll Match it!

IC-T70E

Dual Band 2m/70cm Handy

£159.95 D

IC-E90

Triple band 6m, 2m, 70cms.

£234.95 D

NEW IC-E80D

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

FREE software on Icom site

In Stock Now **£314.95 D**

IC-E92D

A great dual band handheld woth D-Star fitted. Wide receive

£369.95 D

IC-E2820

Great dualband mobile.

£424.95 D

Fitted with UT-123 D-Star module. £579.95

HF Transceivers

IC-7600 FREE USB keyboard!

This HF-6m transceiver is the successor to the IC-756 series. It takes features from the flagship IC-7800 and the more recent IC-7700, putting them into a package that brings the price within reach of many more hams.

£3379 D

IC-7800	Deluxe HF / 50MHz All-Mode 200W Transceiver	£7999 D
IC-7700	1.8-54MHz 200W with built-in PSK-31 + keyboard	£5499 D
IC-7200	HF & 6m DSP 0.005-3335MHz wideband receive with USB port	£799 D
IC-7000	160m-70cm 100W (hf) Mobile, portable or base station	£1089 D
IC-718	160m-10m 100W transceiver that brings HF to those on a budget	£519 D

Other Radios

IC-910H	£1249 D	IC-R20	£389.95 C
IC-910HX	£1449 D	IC-R1500	£449.95 C
IC-2200H	£199 D	IC-R2500	£569.95 C
IC-R3	£389.95 C	IC-R8500	£1379.95 D
IC-R6	£174.95 C	IC-R9500	£9999.95 D

AOR UK Distributors

AR-8200mk3

Handheld Scanner 530kHz - 3GHz.

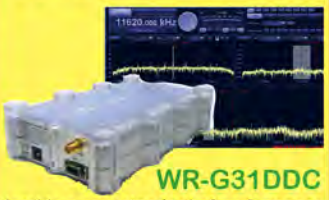
£439.95 D

AR-8600mk2

Mobile / Base Receiver. Wide range 530kHz - 3GHz AM NFM WFM SSB, 1000 memories.

£599.95 D

WiNRADiO NEW 'Excalibur' Receiver



WR-G31DDC

Heralds a new standard of performance at a very affordable price.

- *9kHz - 49.999MHz*
- *Software Defined Radio*
- *USB Interface*
- *3 Parallel Demodulator Channels.*

£649.95 D

FlexRadio Systems® FLEX-3000 Special Offer!

*100W Transceiver *160-6m Great Audio
*Auto ATU *Selectivity to 50Hz

The Flex-3000 experience! A 100W 160-6m software defined radio. The hardware package contains the receiver front end, band pass filters, transmitter driver, PA & ATU. But the main signal generation & signal processing is inside your PC. Any modern PC or laptop with Windows & a fire wire socket, will run it. Superb audio, Razor sharp selectivity, & Complete programming options!

Limited Time Only Save £100!
Was ~~£1399.95~~ Now £1299.95 D

Flex-1500 5W 160m-10m

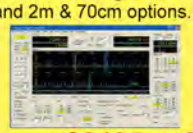
NEW Includes auto ATU! Firewire connection.

160m - 6m All Modes Transceiver 5 Watts of clean RF Power - USB connection - Selectivity to 25Hz! - Use with laptop for easy portable.

£599.95 D

Flex-5000A 100W 160m-6m

The ultimate SDR radio with amazing front end, extra RX option and 2m & 70cm options.



£2495.95 D

FLEX-5000A-ATU with ATU £2795.95 D

YAESU Choice of the World's top DX'ers

We still have the largest, most up to date stock of Yaesu in the UK!

NEW VX-8DE

* Triple Band - 6m/2m/70cm
* Upgraded APRS features
* Rugged & Submersible
* Increased Memory

New Low Price £359.95 D

VX-8GE 2m/70cm 5W + GPS Ant *New Low Price* £349.95 D

NEW FT-DX5000 Series!

All 3 radios offer 200W from 160m to 6m. The "D" adds SM-5000 & the "MP" adds the SM-5000 & roofing filters.

FT-DX5000	£4999 D
FT-DX5000D	£5349 D
FT-DX5000MP	£5799 D

New Mobiles In Stock Now...

FT-1900E

55W 2m Mobile with 200 memories.

£129.95 D

FT-2900E

75W 2m Mobile + 200 memories.

£139.95 D

FT-7900E

50/45W 2m/70cm Mobile + 1000 Memories.

£229.95 D

HF Transceivers

FT-2000	100 Watt HF - 6m Dual Receive with built-in PSU.	£2299.95 D
FT-2000D	200 Watt version of FT-2000 with built-in PSU.	£2899.95 D
FT-950	100W HF - 6m transceiver with DSP & Auto ATU	£1289.95 D
FT-450AT	100W HF - 6m with automatic ATU & latest updates	£699.95 D
FT-450	100W HF - 6m transceiver - great value.	£619.95 D
FT-DX9000contest	200W HF - 6m "formula one" contest machine	£4899.95 D
FT-DX9000D	Deluxe fully loaded base station	£8199.95 D
FT- DX9000MP	Amazing 400W "legal limit" radio	£8995.95 D
FT-857D	HF to 2m mobile. portable or base - up to 100W	£659.95 D
FT-817BHIDSP	Fitted with DSP module exclusive to W&S	£599.95 D

VHF Mobiles & Handhelds

FTM-350E	*NEW LOW PRICE* 2m/70cm Mobile	£469.95 D
FTM-10SE	50/40W 2m/70cms stereo FM	£299.95 D
FT-8800E	Dualband Mobile 50W / 30W	£299.95 D
FT-8900R	10/6/2m & 70cm Mobile	£359.95 D
VX-3E	2m / 70cm Handheld Wideband receive	£149.95 D
VX-7R	Waterproof dualband handy (silver / black)	£279.95 C
VX-6E	2m/70cms handy, 5W Wideband Receive	£229.95 C
FT-60E	2m/70cms, 5W handy Wideband Receive	£169.95 C

VX-3E

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

Orderline

01702 206835

Online Catalogue

www.wsplc.com

"Merry Christmas To All Our Customers From All At W&S"

TEN-TEC

FREE MIC! On All Tentec HF radios!
[not including kits]

Experience TenTec performance with the Jupiter-538 HF Transceiver that "reads" CW

Jupiter-538B	160-10m 100W	£1499 D
Jupiter-538AT-B	160-10m 100W + ATU	£1799 D
Omni-VII-588	160-6m + ethernet	£2499 D
Omni-VII-588AT	160-6m + ethernet + ATU	£2799 D
Orion-II-566	160-6m flagship radio	£3899 D
Orion-II-566AT	160-6m flagship radio + ATU	£4199 D

TG-UV2

2m/70cm Dual Bander

QUANSHENG

The TG-UV2 is a dual band 2m/70cm handheld. It covers 136.00 - 173.995 - 400 - 469.995MHz and FM broadcast 88-108MHz. The radio includes 7.2v 2Ah Li-ion battery for extended life.

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

NEW

£79.95

FAST SAME DAY DESPATCH SERVICE!
Orders must be received before 3pm.

KENWOOD TS-590S JUST ARRIVED!

The New HF Radio

Get A Great Price From Us Or A Super Part Exchange Deal!

PLUS 2 Year Warranty!

160m - 6m with superb receiver inc. dual roofing filters, Auto ATU, 32 bit f/p DSP and USB PC connection.

£1489.95 D - PHONE FOR BEST PRICE!

WATSON Wireless Weather Stations

W-8681-SOLAR NEW

W-8681 Complete Weather Station with Solar Transmitter instead of battery transmitter. **£99.95 C**

W-8681MKII Batt Transmitter £79.95 C

W-8683 *Best Seller!*

Compact Weather Station with external temp +humidity sensor.

£24.95 C

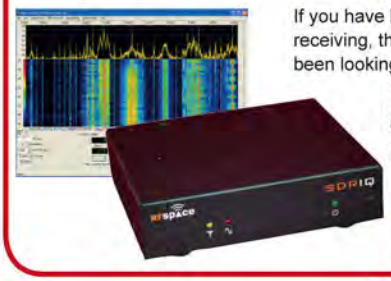
W-2001 *Special Offer!*

5-day World forecast via internet connection!

~~£49.95~~
£24.99 C

RFSPACE SDR-IQ

Advanced Receiver Tunes down to 100Hz! NEW



If you have been pondering about buying into SDR receiving, this design may be just what you have been looking for. The SDR-IQ is a high performance receiver covering 500Hz to 30MHz. It is powered directly from PC USB socket & work with Windows or Linux systems. A highly stable unit with dedicated software.

£469.95 D

New IF-2000 SDR IF feed for FT-2000 & FT-950. Feed your transceiver IF out into an SDR receiver at 10.5MHz **£219.95**

KENWOOD HF Transceivers

TS-2000E **£1489.95 D**

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

TS-2000X +23cm **£1749 D**

TS-480HX Ideal for mobile, portable or base station. Gives a massive 200W on HF and 100W on 6m. **£849 D**

TS-480SAT This model gives 100 Watts on all bands up to 6m, but adds a built-in automatic ATU. **£749 D**

Handhelds

TH-F7E	2m/70cm 5W (2-pin Kenwood) SMA +FREE Clip Mic	£229.95 D
TH-K2E	2m 5W 4-Key Keypad (2-pin Ken) SMA +FREE Headset	£159.95 D
TH-K2ET	2m 5W 16-Key Keypad (2-pin Ken) SMA +FREE Headset	£165.95 D
TH-K4E	70cm 5W (2-pin Kenwood) SMA +FREE Headset	£159.95 D

VHF Mobiles TM-V71E £289.95 D

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

TM-271E	2m FM 60W mobile. CTCSS, 200 Memories, DTMF Mic	£165.95 D
TM-D710E	2m/70cms 50/50W mobile. APRS +EchoLink, DTMF Mic	£429.95 D

bhi

NES10-2-MK3 NEW

New DSP speaker for any receiver or transceiver.

£109.95 C

DSPKR

10 Watt integrated DSP speaker.

£154.95 C

NEIM-1031 Mk II

An in-line DSP module giving complete noise cancelling control

£139.95 C

www.bhi-ltd.com

Watson Cross Needle Meters

NEW

These are high quality, accurate VSWR meters with large, clear display featuring X-needle movements.

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

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

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

Butternut Vertical Antennas

These antennas are extremely efficient and use no traps. The large, air-spaced coils are the secret, and resonant adjtments can be made at ground level.

HF-2V 80, 40m DX vertical. 9.75m, Easy erect. **£289.95 D**

HF-6V 80,40,30,20,15,10m self support 7.9m **£389.95 D**

HF-9V As HF-6V but adds 17,12 & 6m. 7.9m **£449.95 D**

Watson Power Supplies

Power-Mite-NF **£69.95 C**

Compact Cont. 22 Amp Switch Mode PSU variable voltage & noise offset.

Power-Max-25-NF

Slightly larger than the Power-Mite and ideal companion for any 100W radio. **£89.95 C**

Power-Max-45-NF

£129.95 C

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

Power-Max-65-NF

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

£239.95 D

W-5A 5A Analogue fixed 13.8V £29.95 C

W-10AM 10A Analogue variable £59.95 D

W-10SM 10A Switched fixed £49.95 D

W-25AM 25A Variable PSU £89.95 C

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

WATERS & STANTON

General Enquiries
01702 204965

UK's Lowest Prices

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W&S On The Internet! We Twitter at twitter.com/wsplc

(We also Blog and have a Facebook account ~ Just follow the links from our homepage)

MFJ HF Antennas

MFJ-1792 80 - 40m

80/40 Meter vertical. Full size quarter wave radiator for 40 Meters, 10m tall. Handles 1500 Watts PEP, requires guying and radials counterpoises or ground screen. A great antenna for LF DX.

£189.95 D

MFJ-1795 40 - 10m

Only 9ft 1500 Watts

4-Band antenna, great for small gardens and portable work. 9ft tall, easily packed away in a few minutes. Yet can handle full power. Use ground mounted with earth or elevated with wire radials (not inc).

£169.95 D

MFJ-1796 40 - 2m

No Radials!

12ft High 1500W Has tiny 24 inch footprint! 40, 20, 15, 10, 6, 2m. Mount anywhere - ground level to apartments, trailers. Perfect for vacations, field day, DXpedition, camping.

£239.95 D

MFJ-1798 80 - 2m

All bands HF - VHF!

10 Bands - No Radials! Self supporting 20ft antenna gives great performance from LF to VHF inc WARC bands. Needs no radials. Mount it on a stub mast or high in the air.

£299.95 D

Heil Sound Audio Equipment

Pro-Set-4 & 5

Standard headset with a choice of NC-4 or 5 inserts. Requires AD-1 patch lead. **£114.95 C**

For Icom transceivers, choose the Pro-Set-IC with "Icom" Element **£129.95 C**

Pro-Set-Plus

Pro-set Plus has the benefit of dual NC-4 / NC-5 mic capsules that can be selected. Requires AD-1 patch lead. **£189.95 C**

Pro-Set-PLUS-IC Icom Element **£194.95 C**

AD-1 Connector Leads One to suit any ham rig, tell us your radio. **£16.95 A**

GM-4 & 5

"Gold Line" mics contain the NC-4 or NC-5 capsule. Handheld or mounted on a stand. Requires CC-1 cable kit for rig. **£119.95 C**

CC-1 Cable Kits One to match every ham rig, tell us the radio you need it for. **£29.95 A**

Avair X-Needle Meters

Cross Needle Models - Even Lower Prices!

AV-20	200W 3.5 - 150MHz	£34.95 C
AV-40	150W 144-470MHz	£34.95 C

MFJ Radio Accessories

MFJ-998 W&S £649.95 C

• 1.5kW SSB & CW • Digital & Analogue X-needle VSWR • 1.8 - 30MHz • 20,000 memories • Radio interfaces optional • Built-in antenna selector • Field upgradeable firmware • Auto bypass protection

MFJ-925	Compact auto tuner	£169.95 D
MFJ-927	200W remote auto atu	£249.95 D
MFJ-928	Basic auto atu	£199.95 D
MFJ-931	Artificial ground	£112.95 C
MFJ-932	Mini loop tuner	£139.95 C
MFJ-934	Artificial ground + ATU	£199.95 C
MFJ-935B	Portable loop system	£199.95 C
MFJ-945E	Mobile atu 300W	£129.95 C

MFJ-929 AUTO TUNER 1.8-30MHz 200W

LCD readout, 20,000 memories, long wire & coax, radio interface.

W&S £209.95 C

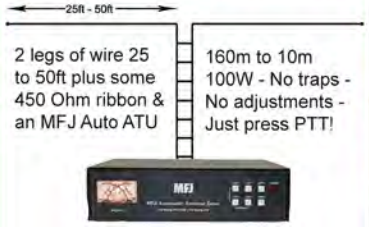
MFJ-991B	Auto atu 150W	£209.95 D
MFJ-994B	Auto atu 600W	£339.95 D
MFJ-962D	1.5kW ATU	£289.95 D
MFJ-969	160m - 6m 300W	£209.95 D
MFJ-971	Portable atu	£118.95 C
MFJ-974B	Balanced ATU 3.5-30MHz	£189.95 D
MFJ-986	3kW differential tuner	£349.95 D

MFJ-993B Rugged 300W Auto ATU

A true "Plug & Play" Auto ATU. Covers 160m to 10m. Capable of handling up to 300W - tunes almost any antenna, has X-needle meter & digital data display.

W&S £249.95 D

Build an All-Band Antenna Indoors or Outdoors - Do It Now!



MFJ-1260	Mic control 1 in/2 out	£99.95 C
MFJ-1263	Mic control 2in/2 out	£109.95 C
MFJ-1275	Sound card adaptor	£109.95C
MFJ-1625	Window Ant + Tuner	£199.95 D
MFJ-16B01	Dipole centre SO-239	£21.95 A
MFJ-16C06	6x dog-bone insulators	£4.95 A
MFJ-16E01	300Ω end fed SO-239	£10.95 D
MFJ-1796	40m-2m vertical	£239.95 D
MFJ-1798	80m-2m vertical	£299.95 D
MFJ-1908H	43ft fibre glass mast	£239.95 D
MFJ-1922	Digital screw driver control	£99.95 D
MFJ-1924	Prog. screw drvr control	£129.95 C
MFJ-1925	ATAS-100 controller	£72.95 C
MFJ-202B	Receiver noise bridge	£79.95 C
MFJ-250X	1kW dummy load (x-oil)	£55.95 C
MFJ-260C	300W dummy load	£44.95 C

Hustler HF & Mobile Antennas

Verticals

Hustler verticals are known around the world for their performance and sturdy construction.

6-BTV	6 band inc 30m	£259.95 D
5-BTV	5 band 80-10m	£219.95 D
4-BTV	4 band 40 - 10m	£179.95 D

Mobiles

Base Whip Sections

MO-1	137cm Folds 1/3rd Up	£38.95 C
MO-2	137cm Folds Halfway Up	£38.95 C
MO-3	137cm Non Folding	£29.95 C
MO-4	67cm Non Folding	£26.95 C

Resonator Top Section

RM-10	10m	150-250kHz	£21.95 C
RM-11	11m	150-250kHz	£21.95 C
RM-12	12m	90-120kHz	£21.95 C
RM-15	15m	100-150kHz	£21.95 C
RM-17	17m	120-150kHz	£26.95 C
RM-20	20m	80-100kHz	£26.95 C
RM-30	30m	50-60kHz	£29.95 C
RM-35	40-30m	7-10MHz	£29.95 C
RM-40	40m	40-50kHz	£29.95 C
RM-50	60-40m	5-7MHz	£29.95 C
RM-60	60m	5MHz	£32.95 C
RM-80	80m	25-30kHz	£32.95 C

Diamond HF Antenna

BB7V

The small space answer!

** HF 2 - 30MHz Vertical*
** No radials needed*
** 250W PEP 6.7m length*
** VSWR less than 2:1*
** Weight 2.3kg*
** 50 Ohms SO-239*

£325.95 C

Tigertronics SignaLink Interfaces

Tigertronics Signalink Sound Card Interfaces do not require the use of a com port to trigger PTT on the rig. SignaLink have internal links which make them compatible with most of the rigs on the market. Radio lead is supplied, state which when ordering. Extra mic leads are available.

SL-USB-4R	4-Pin Round	£89.95 C
SL-USB-13PDI	Icom 13-Pin Din	£94.95 C
SL-USB-13PDK	Kenwood 13-Pin	£94.95 C
SL-USB-8R	8-Pin Round	£89.95 C
SL-USB-RJ11	Modular RJ-11	£89.95 C
SL-USB-RJ45	Modular RJ-45	£89.95 C

MFJ-269

The Antenna Analyser has been refined over the years & the MFJ-993B tells you just about everything you need to know about your antenna system - resonance, impedance, reactance & can even measure coax losses & identify the position of open & short circuits. All in a compact unit that covers 160m to 70cms. Can you afford to be without one? **W&S £349.95 C**

** 1.8 -170 & 415-450MHz*
** Frequency Counter*
** LCD readout*
** SWR & impedance*
** N-socket (Ant), BNC (Counter)*
** AAx10 or ext. 12V DC*
** Size 103w x 173h x 60d mm*
** Weight 750g*

Watson VHF/UHF Antennas

VHF-UHF Verticals

W-30	2m/70cms 3/6dB length 1.15m 150W SO-239 £49.95 C
W-50	2m/70cms 4.5/7.2dB length 1.8m 150W SO-239 £54.95 C
W-300	2m/70cms 6.5/9dB length 3/1m 150W SO-239 £74.95 D
W-2000	6m/2m/70cms 2.15/6.2/8.4dB length 2.5m 150W £89.95 C

VHF-UHF Mobile Whips

W-2LE	2m 0dBv length 0.48m	£10.95 C
W-285	2m 3.4dBv L. 1.33m	£14.95 C
W-77LS	2m/70cm 0/2.4dBv L. 0.43m	£14.95 C
W-770HB	2m/70cm 3/5.5dBv L. 1.1m	£19.95 C
W-7900	2m/70cm 5/7.5dBv L. 1.58m	£31.95 C
W-627	6/2/70cm 2/4.5/7.2dBv L.1.6m	£34.95 C

Miracle Antennas Miracle-Whip

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

£119.95 C

Ducker **£109.95 C**

HF Mini ATU for helical whips

TGM Compact HF Beams

MQ-24SR 4-Bands £499.95 D

This antenna covers 4-bands, 20-6m & up to 5.5dB gain.
** Element: 3.58m*
** Boom: 1.37m*

MQ-26SR as above + 17m & 12m **£599.95 D**

B-245 1kW 5-Bands £899.95 D

5-band compact beam antenna that will get you on 40m!
** Element: 21ft 6in*
** Boom Length: 10ft*

MFJ HF Loop Antennas

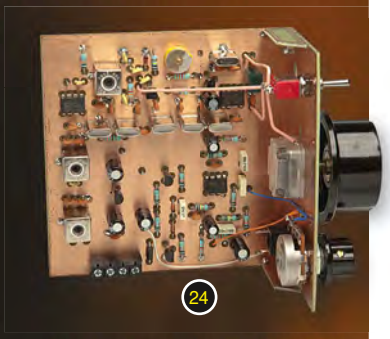
Fit in the loft!

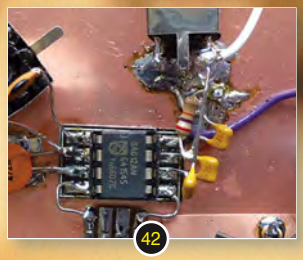
MFJ loops are around 3ft diameter and can fit in many lofts (the loop is in one piece for efficiency). Each loop has its own built-in tuner and is remotely operated from the supplied control box with DC fed up the single coax feeder cable. Loop efficiency is comparable to a dipole and a by-product is the superb receiver front end selectivity because of the loop's high Q.

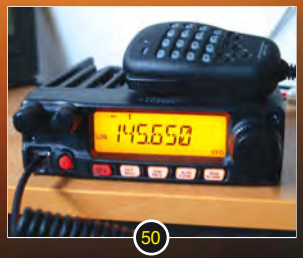
MFJ-1786X
Full coverage from 10-30MHz. No gaps. 150 Watts max.
£429.95 D

MFJ-1788X
Full coverage from 7 - 21MHz. No gaps. 150 Watts max.
£469.95 D

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







Practical Wireless December 2010

Volume 86. Number 12. Issue 1243. On sale 11 November 2010

Front Cover
Tone receiver reviewed plus the winning PW 70MHz contest station being set-up by a member of the Bolton Wireless Club.

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

Rob Mannion's

keylines

It seems that the Editor really enjoyed meeting readers at the Newark show!

I thoroughly enjoyed meeting readers at the Newark show – hosted by the **Lincoln Short Wave Club** and the **Radio Society of Great Britain**. I missed out last year – but this time I made sure I'd get there!

Normally, at the old Leicester Show, the Friday would have meant a long queue of readers waiting to chat to the *PW* Editor – with me usually starting to lose my voice towards the end of the day. This certainly wasn't the case at the Newark Showground event – but I was still kept busy for most of the day.

Although I met many old friends at the second year of the new show, I was pleasantly surprised to be greeted by the comment, "You don't know me – it's the first time we've met", throughout the day. In other words, I was getting the chance of meeting many *PW* reader friends for the first time – some of whom were pleased to tell me that they'd been buying the magazine for 50 years or more.

In recent months, the *Letters* section of *PW* has been fortunate enough to receive letters from a number of readers who don't hold transmitting licences and during the show I was delighted to meet more of these rather special readers. One gentleman told me a fascinating story of how he and his late father had built a small TV receiver using a VCR97 tube in time for the 1953 Coronation of our Queen Elizabeth II and were joined by all their neighbours to watch the Coronation!

I was truly fascinated by TV constructor reader's stories – together with the other varied experiences I heard from other non-transmitting (NT) 'Amateurs'. Interestingly, none of the NT readers I met regarded themselves as short wave listeners (s.w.l.s) – preferring the title of 'radio constructors' (R-Cs). It's a title that seems to fit very well – judging by the photos I've seen of their efforts over the years. However, my only concern is that we just don't hear enough from this, mostly silent section of the *PW* readers.

Hopefully though, we might be hearing a little more from some of the R-Cs – I certainly tried hard to encourage them to share their stories in our rather special 'inclusive' hobby radio publication!

Slower Morse Operators

Another rather interesting group of *PW* readers I met at the Newark Show came to chat about how much they enjoy their c.w. operating – at slower speeds. I was rather intrigued when in fact – several different and independent groups of readers came to talk about the same topic – the lack of understanding demonstrated by some of the 'speed merchants'.

All the 'medium pace' c.w. fans – like me – were over 50 and I can understand their frustration when the speedy types won't slow down for them. However, every one I spoke to on the topic were determined – like myself – to carry on enjoying Morse, albeit slower than we once were. So, how about it folks – try slowing down a bit? Some of the best hand-keyed c.w. I've heard has been sent by slower operators.

If you are keen but slow – don't hesitate to contact **Roger Cooke G3LDI** who collates our *Morse Mode* column. He'll be pleased to hear from you!

The *World Of VHF*

Tim Kirby G4VXE is a very keen v.h.f. operator and it seems that readers (along with **Tex Swann G1TEX** and I) are thoroughly enjoying his *World of VHF*. I was also delighted at the number of our readers who have expressed their pleasure with Tim's own 'inclusive' approach.

I've passed on the information to Tim – but I urge everyone who is enjoying the column to contact him directly as your feedback is very important!

The 2011 Newark Show

I'm pleased to pass on the news that – as the *PW* Editor – I've has been invited to present a talk during the 2011 lecture stream at the Newark Show. I was delighted to accept, as the occasion will take the place of the annual *PW* talk at the former **Rochdale QRP Convention**. So, the *PW* team and I look forward to meeting you at Newark next year. It'll come round very quickly I'm sure!

Rob Mannion G3XFD/EI5IW

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

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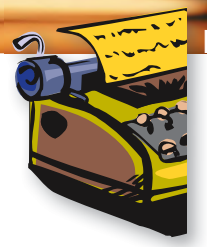
We regret that due to Editorial time scales, replies to technical queries cannot be given over the telephone. Any technical queries by E-mail are very unlikely to receive immediate attention either. So, if you require help with problems relating to topics covered by PW, then please write to the Editorial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



readers' letters

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

British Law?

Dear Rob,
As I expected, the case of **Carl Johnson M3VWP** has provoked quite a few comments in the letters page. However, I would like to take issue with one point made by **Mark**, the serving police officer who had his letter published in the November issue. Mark makes reference to "British law", may I point out that there is no such thing as "British law" – Scotland, England, Wales and Northern Ireland each have their own legal system. From experience, Scots law requires most types of evidence to be corroborated. Regards.
Colin Topping GM6HGW
Glenrothes
Fife
Scotland

Radio Amateur Prosecuted

Dear Rob,
I am a recently retired Police Officer with 30 years experience, a licensed Radio Amateur and a former ship's radio officer. I am a little concerned that you have published a letter from **Bob Wilkinson** in your November edition which only confused the whole issue of using radios whilst driving.

Bob mentioned that he carried around a copy of The Road Vehicle (Construction and Use) (Amendment) (No.4) Regulations 2003 and that this exempted radio users of the offence of using a mobile phone whilst driving. The regulation mentioned is the introduced mobile phone legislation - which amended (though actually not amended – it was broadened) the original regulations introduced in 1986. Regulation 104 of the Road Vehicles (Construction and Use) Regulations 1986 refers to the offence of "not being in proper control of a vehicle". This is a catch-all offence – from eating an apple whilst driving, or map reading at the wheel whilst driving to even smoking whilst driving (to name but a few possible breaches). Regulation 104 was not amended by the mobile phone legislation and remains in force. Bob should not confuse readers by his interpretation that it also exempts radio users from the offence of Regulation 104. It does

Star Letter

Radio Enrichment Course Third Year

Dear Rob,
I am pleased to report that my Radio Enrichment course is underway for a third year. The first such course was featured in a two-part article in *PW* in 2009. The basic idea is that two curriculum hours per week are allocated for me to teach pupils aged 11 to 13 about radio. After an introduction involving tuning in to short wave broadcast and local f.m. stations, we undertake the Foundation Amateur Radio course. The opportunity for children to gain a recognised qualification relatively early in their secondary education has been a welcome one.

The first two years produced eleven new Radio Amateurs, most of whom made their on-air debuts by doing a SOTA activation of local summit The Cloud G/SP-015, at 343m. The challenge then has been to maintain the students' participation in the hobby beyond that year. Stoke-on-Trent North is ranked amongst the most deprived areas of the UK, and it is perhaps unsurprising that parents haven't invested a significant amount of money for an activity they may have never heard of.

In order to address that situation, I decided that the school needed a 'stock' of suitable radios for loaning out to licensed students until such time as they owned their own gear. Local Amateurs in the city sourced and donated several rigs and power supplies for this purpose, while SOTA participants **Roy Clayton G4SSH**, **Mark Walmsley G0VOF** and myself have provided sponsorship to purchase three Wouxun 2m hand-portable transceivers, ideal for young Radio Amateurs starting out in the hobby. It is envisaged that licensed students will use these radios until such time as they have their own station, and the transceivers can be passed onto another.

With no less than fifteen pupils signed up for the 2010-2011 Foundation course, I am hoping that there will be an unprecedented demand for radios to borrow in a year's time. May I ask your readers to contact me if they would like to help? My school email address is: **tread@sgfl.org.uk** 73
Tom Read M1EYP
Head of Mathematics
The Co-operative Academy at Brownhills
Brownhills Road
Tunstall
Stoke-on-Trent ST6 4LD

Editor's comment: *Congratulations on the success of your continuing initiative Tom! I'm sure readers will be able to help your most worthwhile cause. Please join me on the* Topical Talk *page – page 77 – for further comments on the hurdles that have often to be overcome by willing tutors keen to help youngsters.*

Send your letters to:
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not. You cannot be in proper control of a vehicle if you drive with one hand on the wheel, and one hand on a microphone!

I should also like to make this point as a former Copper. Most of my former colleagues (clearly not including **Mark** whose letter also appeared in the same edition) have no intimate knowledge of the mobile phone legislation. If a police officer chooses to issue a fixed penalty notice for a mobile phone offence where a driver is actually using a two-way radio – the ticket should be accepted out of hand without argument. A court hearing should be requested by the driver by returning the slip on the ticket. At court the case will be dropped because (of course) the driver will refer the court to Amendment 4 of the 2003 regulations which clearly exempts two-way radio users. Amateur radio operators are exempted because their frequency usage is not within the mobile phone bands.

You can of course argue with the officer (as **Carl Johnson** did) who will take the easier option of summonsing for the Regulation 104 offence. That is why Carl received a nasty fine and penalty points. It's not what you know – its how you interpret it and how you use that to your own benefit –isn't it Carl? That said - please don't use a hand-held microphone whilst driving. Its dangerous and stupid. Offenders deserve a heavy fine..and penalty points.

By the way - Metropolitan Police policy prevents officers from using their hand-held radios whilst driving. The TETRA radios used by all police services in the UK can also be used as mobile phones. There is no secret made of that. However, the radios work on frequencies out of the mobile phone bands – so they are exempt under the mobile phone legislation.
Regards,
James
Surrey
(full details provided)

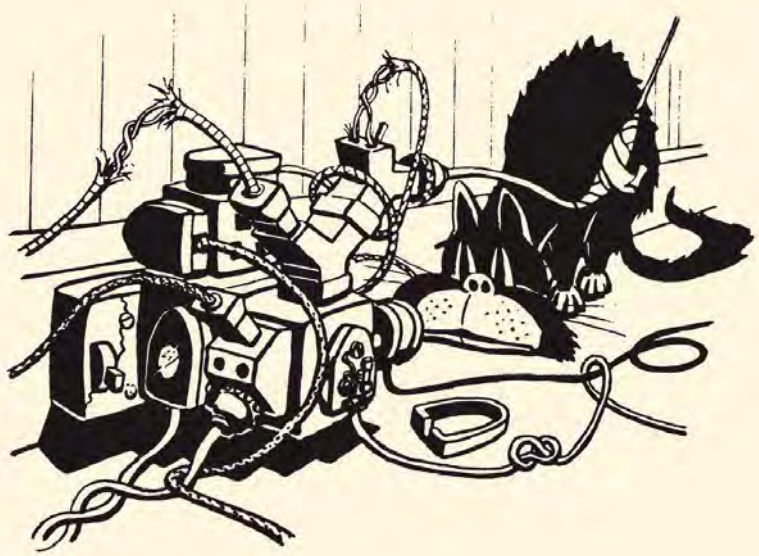
Editor's comment: *Thank you for you valuable feed-back James, which I have permitted to be published without identifying you fully. However, as this topic is likely to generate letters for some time – I cannot accept any more letters featuring Carl Johnson's case to be published without full identification with the given name, surname (and callsign if one is held) and postal district and county published. I hope that readers will support my attempts to keep the* PW Letters *pages as 'open' as possible, expressing the opinions of identifiable readers.*

Plug Problems

Dear Rob
I enjoy reading **Harry Leeming G3LLL**'s *In The Shop* article and in November's *PW* he writes about mains plugs and sockets and he brought back a few memories of my younger days. There seemed to be no standards at all.

My Dad used to plug in the christmas tree lights to the room light socket via a 'Y' adaptor. It had a cord pull switch where the tree lights could be switched on and off and the main light stay on.

I saw a cartoon in a publication in a magazine in the early 1960s. I think it was in *The Radio Constructor* but I'm not sure. I saved it as it seemed to sum up the state of the plug and socket situation at the time.
Mick McDermott
Stockwell
London



Editor's reply*: Thanks for the cartoon Mick – it certainly summed up the problems with the lack of mains sockets leading to the use of many adaptors 50 years or so ago! I also remember seeing the cartoon in* The Radio Constructor *myself. The cartoonist wasn't named and unfortunately, as far as I'm aware all the publishers of* 'RC' *are now dead. However, if the cartoonist is still 'with us' so to speak – we'd like to get in contact and if any reader can identify the person involved I would be pleased to hear from them.*

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

news & products

A comprehensive round-up of what's happening in our hobby.

Christmas Island (Kiritimati) DXpedition

The 2011 Amateur Radio DXpedition to Kiritimati is to be undertaken by the Five Star DXers Association (FSDXA). It's hoped to operate using the call sign T32C and the Global sponsor will be **Yaesu**, with the UK list of sponsors including Chertsey-based **Martin Lynch & Sons Ltd**. and **Nevada Radio** of Portsmouth, Hampshire.

The Five Star DXers Association (FSDXA) press release states: **"**Why Kiritimati? And to answer the question our Club Log shows Kiritimati as 36th most wanted DXCC entity by European operators and 61st most wanted worldwide. It is even more sought after on the l.f. bands.

The team will arrive on the island on the afternoon of Wednesday 28th September 2011 and depart on the morning of Wednesday 26th October 2011. Allowing for set up and take down of the stations, operations should extend over four full weekends.

"During our time on the island we want:

- To operate to the highest standards
- To make contact with 40,000 different stations
- To give every DXer, wherever based, a chance to contact T32
- To exploit all openings to Europe
- To contact between 1,000 and 2,000 different stations in the UK
- To exceed 150,000 QSOs
- To win back some of the world records previously held by FSDXA
- To place an emphasis on the LF bands
- To have up to 15 stations on the air simultaneously
- And, oh yes – to have some fun!

"We will be taking over the Captain Cook Hotel with its north facing beach which will give great over-sea take off for the short paths to Europe, North America and Japan. The take off in other directions is also good as the highest point on the Island (Joe's Hill) is only 13 meters (43ft) high, and the centre of the island is mainly sea water lagoon. The DXpedition will make heavy use of vertical antennas to take advantage of the sea water".

So, look out for Kiritimati Christmas Island T32 IOTA: OC-024!

Further details from **Don Field G3XTT** FSDXA Publicity Officer via **don.field@gmail.com**

HamTests.co.uk

So you're interested in Amateur Radio, but how do you build your knowledge to a point you are confident to take the exam? **Peter Goodall 2E0SQL** explains how Ham Tests can help!

Peter writes: "Hamtests.co.uk exists to offer mock Amateur Radio questions for the three UK level exams (Foundation, Intermediate & Advance/Full), & the complete USA (Technician, General & Amateur Exam class) question pools. And we don't stop there! We also have an Advance question pool that doesn't offer UK licencing questions as we noticed people were coming to the site from outside the UK or US. Since 2005 we have offered the service free to people wishing to become Amateur Radio operators and today we have over 6,300 members and 1,500 questions. Please don't hesitate to use the site (it's there for everyone to use!) and if you want to contact me – please do so via the E-mail address below. 73."

Peter Goodhall 2E0SQL
Oxford
England
E-mail **peter@magicbug.co.uk**

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Amateur Radio Communications Support For Successful Chilean Mine Rescue

As the world watched via television the rescue of 33 trapped miners at San Jose in Chile, the **Radio Club de Chile** (RCCH) was giving its full support to boost the availability of communications in the area. President of the Radio Amateurs of the Region of Atacama, **Jose Maldonado CE1RXY** has reported that support was offered to overcome the lack of communications facilities in this desert region of Chile. The support provided by Radio Amateurs then enabled links for various authorities with emergency equipment inside the San Jose site and also with family and authorities in the city of Copiapo.

While this collaboration continued, everyone involved shared the common hope for the safe rescue of the miners, trapped 700 metres (2,300 ft) below the ground in the copper mine since August 5th, leading to their successful rescue on October 13th, which was watched by an estimate TV audience of over a hundred million people.

Radio Club de Chile website (in Spanish) **www.ce3aa.cl/**

New Site For Old RAE Papers

David Pratt G4DMP contacted *Newsdesk* to provide an up-date on his historic RAE papers website: "Dear *PW*, I have had to change the URL of my website, which means that the old written RAE papers are now in a different place. The new address is **www.g4dmp.fsnet.co.uk/rae**

As the address is fairly new it hasn't yet found its way onto the search engines – but will no doubt do so as time goes by! 73".

David G4DMP/G3KEP
Kippax, Leeds, England
david@g4dmp.fsnet.co.uk
Website: **www.g4dmp.fsnet.co.uk**

The UN International Day of Persons with Disabilities GB0IDD December 3rd 2010

David Evans G0EVA contacted *Newsdesk* to announce: "This year Kirklees Council is celebrating the International Day of Disabled People on December 3rd. Kirklees Council covers quite a large area of West Yorkshire, the main towns being Huddersfield and Dewsbury.

David G0EVA – who is visually impaired – provides the background story of GB0IDD: "The overall aim of the events is to raise awareness and understanding of disability issues and to promote the independence, inclusion and choice of disabled people and their rights, abilities and well-being.

"The event will be run in three different venues across Kirklees. At the Queensgate Market Hall there will be a special event station run by myself (G0EVA and others on the microphone) to publicise this special day with the call sign GB0IDD (International Day of Disability). Watch out for us on the air – on h.f. between 7 to 28MHz running s.s.b. from 10am to 4pm UTC".

David Evans
Business Support Officer - Equality & Diversity Unit
Tel: **(01484) 416884**
E-mail: **David.Evans@kirklees.gov.uk**

The RSGB 2010 Convention

New Venue In Milton Keynes

Roger Cooke G3LDI enjoyed his time working as the *Practical Wireless* Correspondent at the RSGB's Milton Keynes Convention – as his story and photographs clearly demonstrate.

Roger G3LDI reports: This year the 2010 RSGB Convention moved location this year to the **Horwood House Convention Centre in Milton Keynes**. From our homes in Norfolk, we drove past the old location and from the SatNav we noted it was another 45 minutes driving. This entailed 16 roundabouts on the outskirts of Milton Keynes – no wonder it's known as 'Roundabout City'!

We – **Jim Bacon G3YLA** and I, eventually arrived in good time and glad that we had a SatNav guiding us – as Horwood House is quite well hidden! We were both giving a talk, as was local friend **Steve Nichols G0KYA**. So, yet again, Norfolk was well represented on the Convention's speaker list.

Huge Venue

Horwood House is a huge venue and navigation around the various lecture rooms is just as difficult as the new town itself. Several people were seen aimlessly wandering around and we were among them! Balls of string and lines on the carpet were mentioned for next year!

However, finding our way around did become easier – the more miles we covered. Bearing in mind our exploring – the lecture rooms were aptly named after famous explorers, Cook, Shackleton, Frobisher and so on. I found this quite amusing inasmuch that we really had to have an explorer's survival kit in order not to miss the next lecture! Luckily, a map of the Convention Centre was provided though there wasn't a survival kit!

Fig. 1: (Left to right) Ian Lockyer M3INL from Icom, Steve Nichols G0KYA and Jim Bacon G3YLA.

Fig. 2: Mike Cooke G4DYC and Roger Greengrass G4NRG.

The midday lunches were slightly fraught too. Keeping up with a deluge of a hundred or so all arriving for their meal at once ended with long queues and empty dishes. However, the Saturday evening meal was superb, see **Fig 1** and **2**.

This year I stayed overnight and I was pleased that I did! The standard of talks and lectures were so good it was difficult to make a decision which to attend. They were arranged into four sections, IOTA/DX Operating, Technical, VHF & up, and the usual Contest University.

My talk this year was aimed at the beginner in contesting and I was very pleased with the attendance. The talk was scheduled first thing Saturday morning which gave me the opportunity to take advantage of the rest of the weekend.

I found it a good idea to vary the mix, taking in the DXpedition to the Line Islands by **Derek Cox G3KHZ** followed by the Canadian Arctic by **Cezar-Loan Trifu VE3LYC**. This was fascinating and quite scary for Cezar-Loan had to keep a rifle on hand all the time in case the polar bears invaded! These presentations are always like the 'Wish you were here' tourist films, always very interesting, both from the operating and the scenery and wild-life perspectives.

Lunch next, and I got hung up with chatting and socialising, plus visiting the room with the displays and the large Martin Lynch layout. Here I caught Steve Nichols, G0KYA and **Simon Jude, G7SOZ**, **Fig 3**.

Displays & Stands

Amsat-UK was well represented this year, **Fig. 4** with the RSGB doing quite a business with their, larger than last year bookstall, **Fig. 5**. Linear Amp UK was there

Fig. 3: Steve Nichols G0KYA and Simon Jude G7SOZ.

Fig. 4: shows Jim Heck G3WGM giving a wave from the AMSAT-UK stand.

too, although I didn't get a chance to talk to anybody on the stand, **Fig. 6**.

The **Chiltern DX Club** (CDXC) was well represented by **Neville Cheadle G3NUG** and **Michael Wells G7VJR**, getting everybody to sign in and grabbing new members of course, greeting everybody with a smile! **Fig 7.**

The **Islands On The Air** (IOTA) group had a large display and **Fig 8**, shows the President of the RSGB, **Dave Wilson M0OBW** heavily involved.

The **American Amateur Radio Relay League** (ARRL) were represented by **Carl** and **Vicky Luetzelschwab K9LA** and **AE9YL**, **Fig 8A** Carl also gave a very good talk on 1.8MHz propagation.

Last, but by no means least, is the Martin Lynch display of the latest equipment. I was reliably informed that a few FT-DX5000MPs were sold too, and **Fig. 9** shows **Martin Lynch G4KHS**, with **Don Field G3XTT**, who had perhaps just bought a rig?

Huge Audiences For Lecture

The star lecture of the day, with a huge audience, was the lecture by our guest

Fig. 5: The RSGB was doing quite a business with their bookstall, a larger one than last year, Fig 5. I am sure that the President Dave Wilson M0OBW has a double – as seemed to be everywhere I went. (I wonder if he was lost too).

Fig. 6: Linear Amp UK was there too, although I did not get a chance to talk to anybody on the stand.

Fig. 7: The Chiltern DX Club (CDXC) was well represented by Neville Cheadle G3NUG and Michael Wells G7VJR, getting everybody to sign in and grabbing new members of course, greeting everybody with a smile!

Fig. 8: he President of the RSGB, Dave Wilson M0OBW heavily involved!

Fig. 8a: The ARRL were represented by Carl and Vicky Luetzelschwab, K9LA and AE9YL.

Fi. 9: Martin Lynch G4HKS (centre) and colleague Laurence Knott M0LSK, with Don Field G3XTT on the right.

Dr. Lucy Green from the **Mullard Space Science Laboratory**, at the University of London's Department of Space and Climate Physics. The lecture was on Coronal Mass Ejections from the Sun, which is of great interest to anybody concerned with h.f. communications, **Fig. 10**.

During the Saturday afternoon I chased from one talk to the next, trying to catch part of one and part of another, not too successfully it has to be said!

Sunday was just as hectic, decisions, decisions (which lecture to attend?)! However, I managed the **Chesterfield Island DXpedition** lecture by **Tomi Pekarik HA7RY** and **Chris Hilderbrand HA5X/M0XXA** and then the second half of the talk by **Ian Wade G3NRW** on the AIM4170 antenna analyser. I found both very interesting. I rushed for a coffee which I managed to find (getting used to the navigation now!) the Eyre suite for the Top Band propagation lecture by Carl K9LA. It seems that I am not the only one suffering the S-9 plus noise on that band. I found that quite reassuring – although quite annoying – that there is so much noise on the band.

Following the talk by our very own **Jim Bacon G3YLA**, (always very well attended) on Sporadic E predictions. I was then ready for a rest and found a comfortable chair and plonked myself into it! After a brief rest I made my way to the room where the raffle was being held. Jim Bacon G3YLA won a nice book but the star prize, a Yaesu FT-450, went to Steve Nichols G0KYA. I missed that by just one book of raffle tickets!

Another Convention Passes

Another year drew to a close and it was time to leave. On the way out we bumped into Steve Cole, GW4BLE. I usually work Steve in all the RSGB CC contests, but have never met him, **Fig 15**.

Jim and I had an easy drive home in the sunshine and although it was a very tiring weekend, with all the exploring, we had a great time!

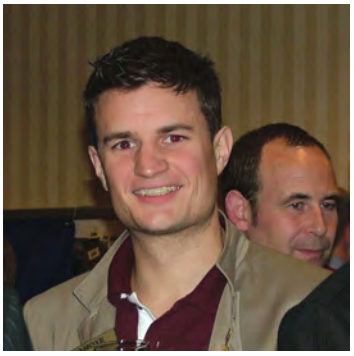
It was a new, untried venue and I'm sure that, with a few tweaks, Horwood House will prove to be quite successful. However, the rooms were fully booked so, if you're planning a full weekend in 2011, it would pay to book early!

Well done yet again to those in the RSGB involved with the organisation, including **Mark and Gemma Haynes M0DXR** and **2E0WPX**, and also for the Contest University. Finally, Congratulations are in order for Mark and Gemma on their lovely little daughter. **73 de Roger G3LDI**

Fig. 10: shows Dr. Lucy Green at the start of her lecture.

Fig. 11: Colin Thomas G3PSM with Alan Betts G0HIQ.

Fig. 12: Mark Haines M0DXR.



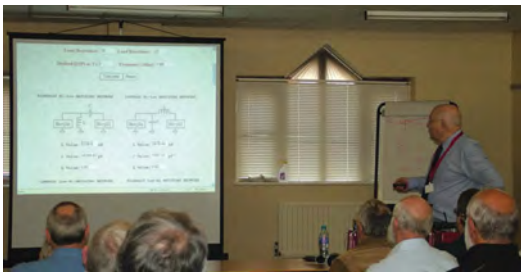


Fig. 13: Ian Wade, lecturing on the AIM analyser.

Fig. 14: Roger Brown G3LQP and his wife relaxing!

Fig. 15: (Left to right) shows Steve Cole GW4BLE, Steve Emlyn-Jones GW4BKG and Rob Spenser-Pitman GW0RYT.

Peter Dodd's

antenna workshop

Peter Dodd G3LDO, investigates using a magnetic loop antenna on the h.f. bands.

Welcome to *Antenna Workshop* (*AW*). This time, I'm looking at the magnetic loop antenna, which would appear to provide an ideal solution for those wishing to operate on high frequencies (h.f.) from a restricted site. It can be hidden very conveniently in the loft, a balcony of a high-rise apartment or a rooftop.

Many of us, as Radio Amateurs, are facing the prospect of having to give up a much loved hobby due to strict rules against erecting outside antennas. In spite of these restrictions, a practical and viable solution to actively continuing the hobby may be the small magnetic loop antenna.

Unfortunately, the magnetic loop antenna has been the subject of some controversy in the past – with some experts claiming that the magnetic loop is very inefficient. Additionally, a conventional magnetic loop antenna requires a good quality low-loss split stator, butterfly, or vacuum variable capacitor of adequate r.f. voltage and current rating. This restriction imposed by the capacitor may be circumvented by using a capacitor arrangement using hinged plates, as described by **Martin Ehrenfried, G8JNJ**[‡1]. So, I'll now describe my experience constructing such an antenna.

Loop Construction

Most designs seem to use a one metre-diameter loop for the bands 14 to 29MHz. However, if you are considering constructing a small transmitting loop antenna, there are a few interactive computer programs on the Internet. I used the one obtainable that's based on *ARRL Antenna Handbook* material[‡2]. In view of the state of the sunspots at the time of writing, I used a larger 1.5m diameter loop to hopefully cover 7 to 22MHz. But the design didn't go quite to plan! – as I will describe later.

The loop is made from 22mm copper tubing in an octagonal configuration as shown in **Fig. 1**. Each section of the octagon is 580mm long. Almost all of the material used to construct this loop was obtained from a local DIY shop, although the eight 45° couplings used on my loop weren't available locally and had to be sourced from a plumbing supplies outlet. A T-coupler was used at the base of the loop to provide a short stub mast for fixing the loop to a support pole.

The small loop antenna has a very low radiation resistance order of 0.1–0.3Ω. This competes with the ohmic resistances of the loop conductor itself and the resistances from connections and soldered joints, including the tuning capacitor connection. This means that, depending on the frequency, every additional bit of resistance caused by a poor contact, will cost you in the loop's efficiency.

I checked the resistance of my soldered joints by passing 10A through each joint and measuring the voltage drop (in mV) across it. The current was provided by a battery charger charging a lead acid battery, with the joint in the charging path as shown in **Fig. 2**. (A current limited power supply would be a more convenient current source). Most joints registered 0.1mV but one faulty joint resisted 0.2mV until remade. My digital voltmeters have a resolution of only 0.1mV – but the readings were adequate to show up the faulty joint.

Capacitor Construction.

The capacitor comprises two aluminium plates fixed on hinges at the copper loop ends with brass nuts and bolts. A drawstring and bungee cord arrangement is used to adjust the angle of the capacitor plates relative to each other. This, in turn, adjusts the value of the capacitance. The ends of the loop were flattened, which made a convenient point onto which to solder the brass hinges.

All descriptions of small transmitting loop construction emphasise the importance of overcoming the r.f. resistance of the capacitance to loop connection. This arrangement is no exception – the hinge, although made of brass, would probably present a relatively high r.f.

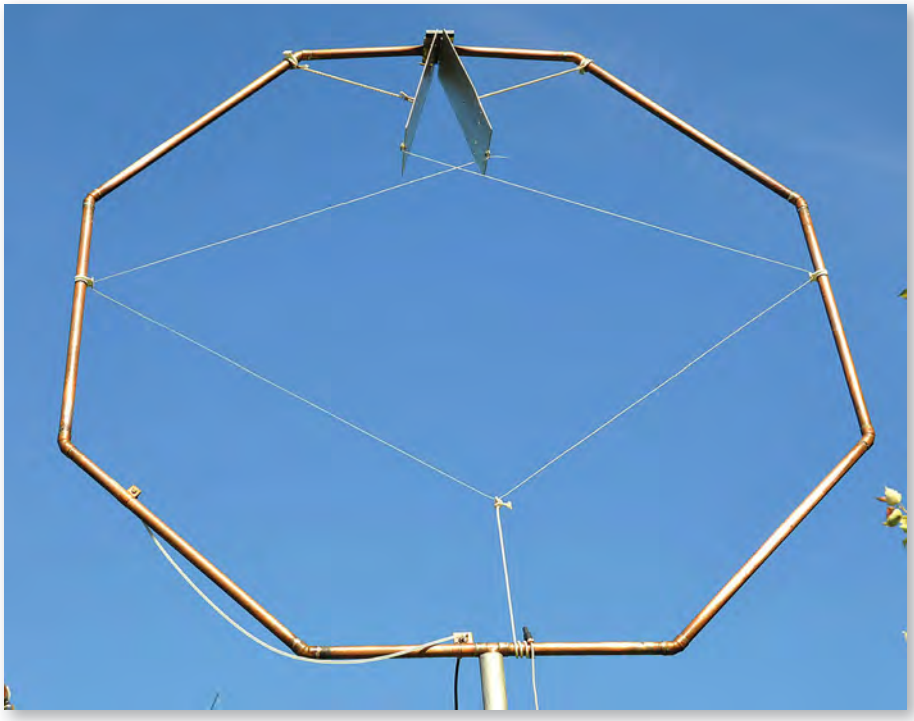


Fig 1: The G3LDO magnetic loop antenna with mechanical capacitor tuning.

resistance, which is circumvented using coaxial cable braid as shown in Fig. 2. Copper pads are used to make the connections to the aluminium capacitor plates.

The capacitor plates are held in the open position with 5mm thick bungee cord. Capacitor variation is achieved using strimmer and nylon cord to pull the capacitor plates together against tension created by the bungee cord, which is best seen in Fig. 1.

The tension in the bungee cords is found by trial and error. The strimmer cord is connected to the ends of the aluminium capacitance plates in a cross-diagonal manner using 22mm plastic tube clips as shown in Fig. 1. The strimmer cord runs through small holes drilled in these plastic clips.

I orginally constructed the loop with two rectangle aluminium capacitor plates 150 x 300mm. This gave a maximum capacitance with the plates 4mm apart of 100pF, which theoretically should have tuned the loop down to 10MHz. In the event the loop would not tune down to 10MHz, so I replaced the rectangle capacitor plates with larger elongated hexagonal plates to reduce the minimum and increase the maximum value of the capacitance.

Fig 3: Detail of the capacitor with the coaxial cable braid to provide an r.f. bypass of the hinges.

An insulation block is required to fix the distance between the two hinges. I used a block of 10mm thick dark coloured Perspex of unknown pedigree. The complete capacitor is shown in **Fig. 3**. Almost all loop

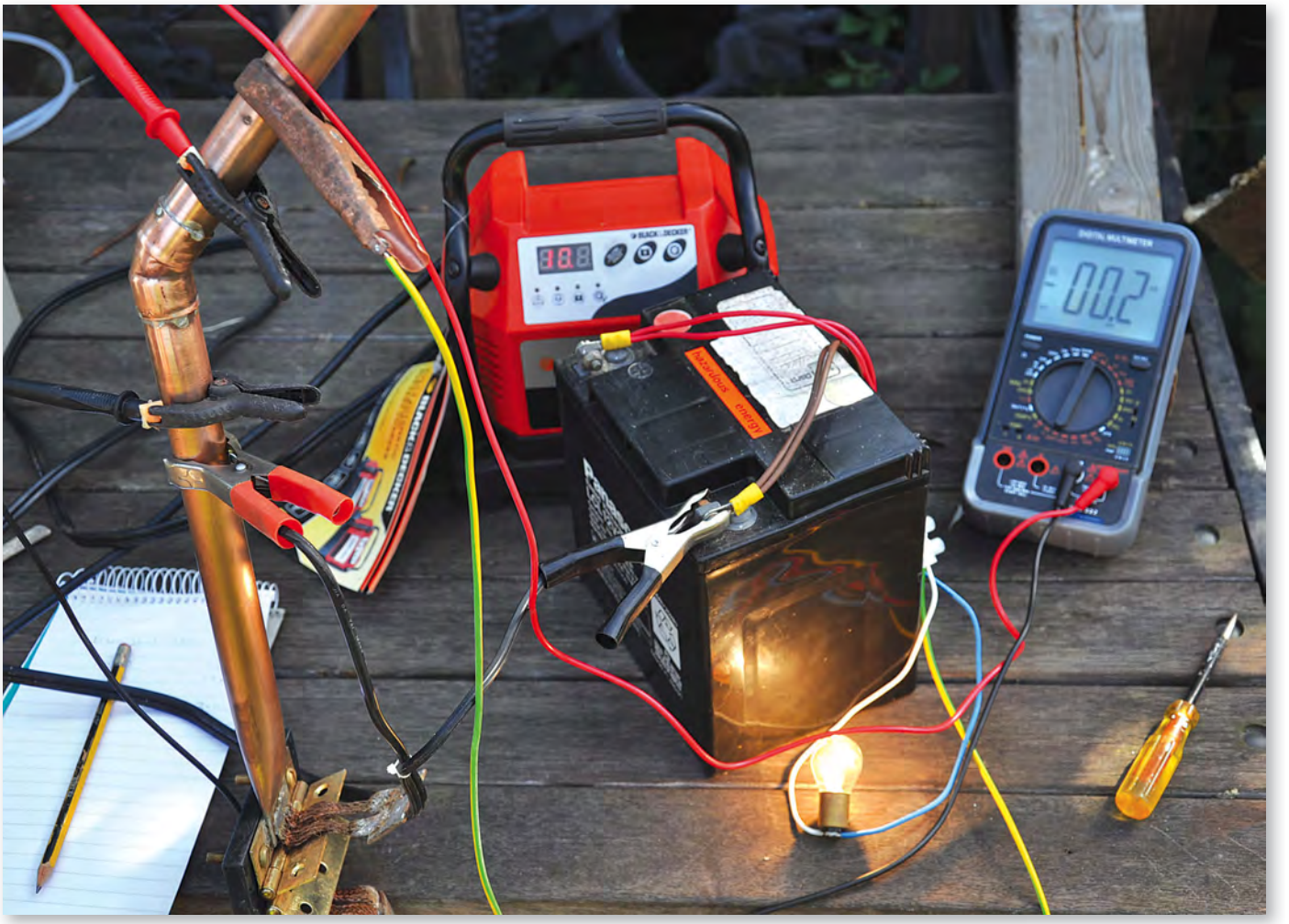
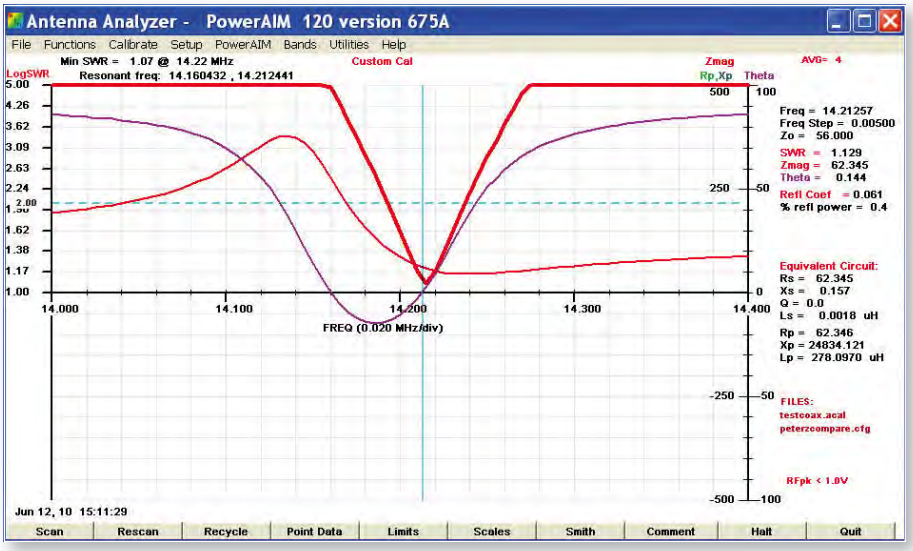


Fig 2: Method of testing a copper pipe joint using 10A battery charger. The bulb provides a current limiting load to prevent the battery over-charging during the test.



capacitor methods use a motor/gear box arrangement to vary the capacitor and tune the loop.

I used a simple arrangement where the lower part of nylon cord section was wrapped around the lower part of the loop and secured with a plastic clip when the tuning point is found. This method of tuning was fine for testing the viability of the loop although impractical as a usable loop. A small motor/gearbox with the nylon cord round a miniature winch would provide remote tuning of the antenna.

Feed Method & Tuning

I chose the simple shunt feed (some call it a Gamma match) as shown in Fig. 1. I made a best guess, as to where to connect the shunt feed clip to the loop. Then I connected the MFJ 265 analyser (set to 14.2MHz) to the feed point and pulled the cord of the tuning mechanism.

The MFJ 261 dipped to an s.w.r. of 1.5:1 on the first attempt. A small position adjustment of the shunt feed clip to the loop reduced the s.w.r. to a much lower value. An s.w.r. and impedance plot of the antenna after adjustment is shown in **Fig. 4.**

Operational Tests

Tuning the loop was quite straightforward, particularly with an active s.w.r. meter such as the MFJ 259/269 type of instrument. Otherwise you can tune for maximum noise and signals on receive and fine tune on low power transmit with an s.w.r. meter. The tuning arrangement performed reasonably well with just a bit of friction where the strimmer cord goes through the plastic pipe clip holes.

The tuning range wasn't as great as I hoped and the practical range covered only the 10, 14 and 18MHz bands. The reason for this is that the minimum capacitance of the hinged plate capacitor is greater than I had thought. (Although it wasn't possible to measure this capacitance with it connected to the loop).

Adjustment of the capacitance at the lowest frequency range proved to be rather critical with the tuning arrangement adopted. Readers will no doubt – appreciate why when we consider that the difference in capacitance with plate spacings ranging from 4 to 8mm, results in a capacitance change of 60pF.

The solution is to add a fixed capacitor in parallel with the variable one when using the antenna on the lower frequencies. This has the effect of 'bandspreading' the tuning on the lower frequencies at the expense of loss of coverage on the higher frequencies.

I tried a short length of RG-213 coaxial cable and this worked quite well up to 100W, however, it flashed over at 200W. A better arrangement would be a fixed capacitance made from two aluminium plates fixed to the brass bolts and nuts holding the hinges in place.

Loop Tested

This loop was tested on the 10, 14 and 18MHz bands, though most of my tests were conducted on 14MHz. My initial impressions were that it performed very well for such a small antenna. The loop was mounted on the roof of the house extension around four metres high. The comparison antenna was multi-band rotary dipole 11m high on top of the house chimney.

Peter Dodd G3LDO

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Fig 4: Measurements of s.w.r., Z magnitude and Theta of the finished loop using the AIM 4710.

There was very little difference between the two antennas on short skip contacts. Sometimes the loop gave the best results, at other times, the dipole performed better. On average the dipole was 2dB better, measured using the *WSPR* programme, than the loop on DX contacts with stations at a distance of over 6000km. (I hope to publish details of the comparative performance antennas using this method in a later *Antenna Workshop)*.

Unlike conventional antennas, compact loop mounting height isn't so important, as long as it is at least one loop diameter above the ground. It should mounted as far away as possible from electrical wiring. The ideal position for a loop antenna is on a raised flat roof or in a large loft with the loop above an earth mat of a dozen or so radials twice the loop diameter in length.

The coaxial cable feed to the loop should ideally be routed vertically down from the loop to the ground to get the best s.w.r. and to minimise common-mode currents on the cable.

Reasonable Efficient

This design was investigated to gain some experience with small transmitting loop antennas and the good news is that it appears to be reasonably efficient. The down side of this capacitor arrangement is that it requires protection from the weather because any wind can move the capacitor plates. A frictionless arrangement for the strimmer cord at the sides of the loop, such as small plastic pulleys, would make tuning easier. Cheerio until next time! ●

References

[‡1] **http://g8jnj.webs.com/**

[‡2] **www.66pacific.com/calculators** Then go to Magnetic Loop Antennas.

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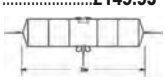

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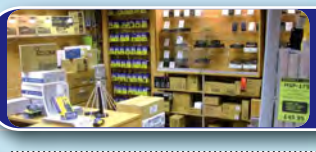

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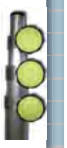

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Mike Richards'

data modes

This time, Mike Richards G4WNC, takes a closer look at operating tips and details of PSK-31 and its variants.

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Welcome to *Data Modes* (*DM*) where I'm starting off this month by suggesting we take a PSK-31 'Driving Lesson'! By PSK-31 'driving lesson', I really mean learning to 'drive' your rig. This is because when operating PSK-31, one of the first things to get right is the quality of your transmitted signal and to help, I've shown the modulating waveform of a PSK-31 signal in **Fig. 1**.

As I mentioned last month, the PSK-31 signal looks – and is the same as – the two-tone test signal used to measure inter-modulation distortion in amplifiers. The reason a two-tone signal is used in test labs is because it exposes any non-linearity in the amplifier and any resulting inter-modulation products are very easy to spot on a spectrum analyser.

Of course, that also applies to the transmitter and power amplifier (p.a.) that we're using for our PSK-31 QSOs. This state can be both good and bad news!

First, I'll deal with the bad side – this is because we have to be very careful not to overdrive the rig to avoid generating splatter and

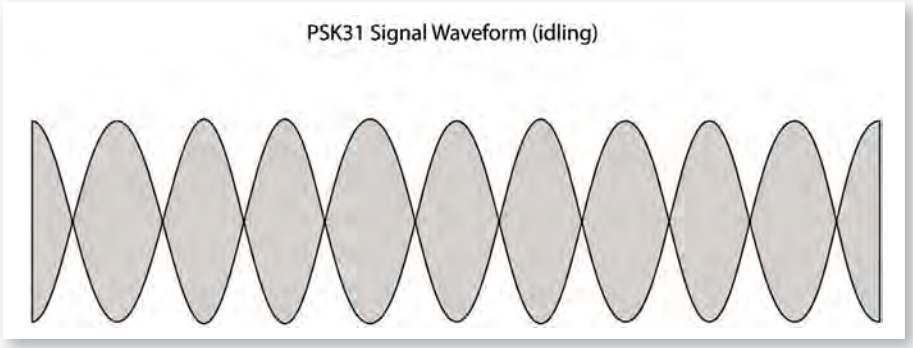

Fig. 1: PSK-31 Modulation waveform – it looks and is the same as a two-tone test signal.

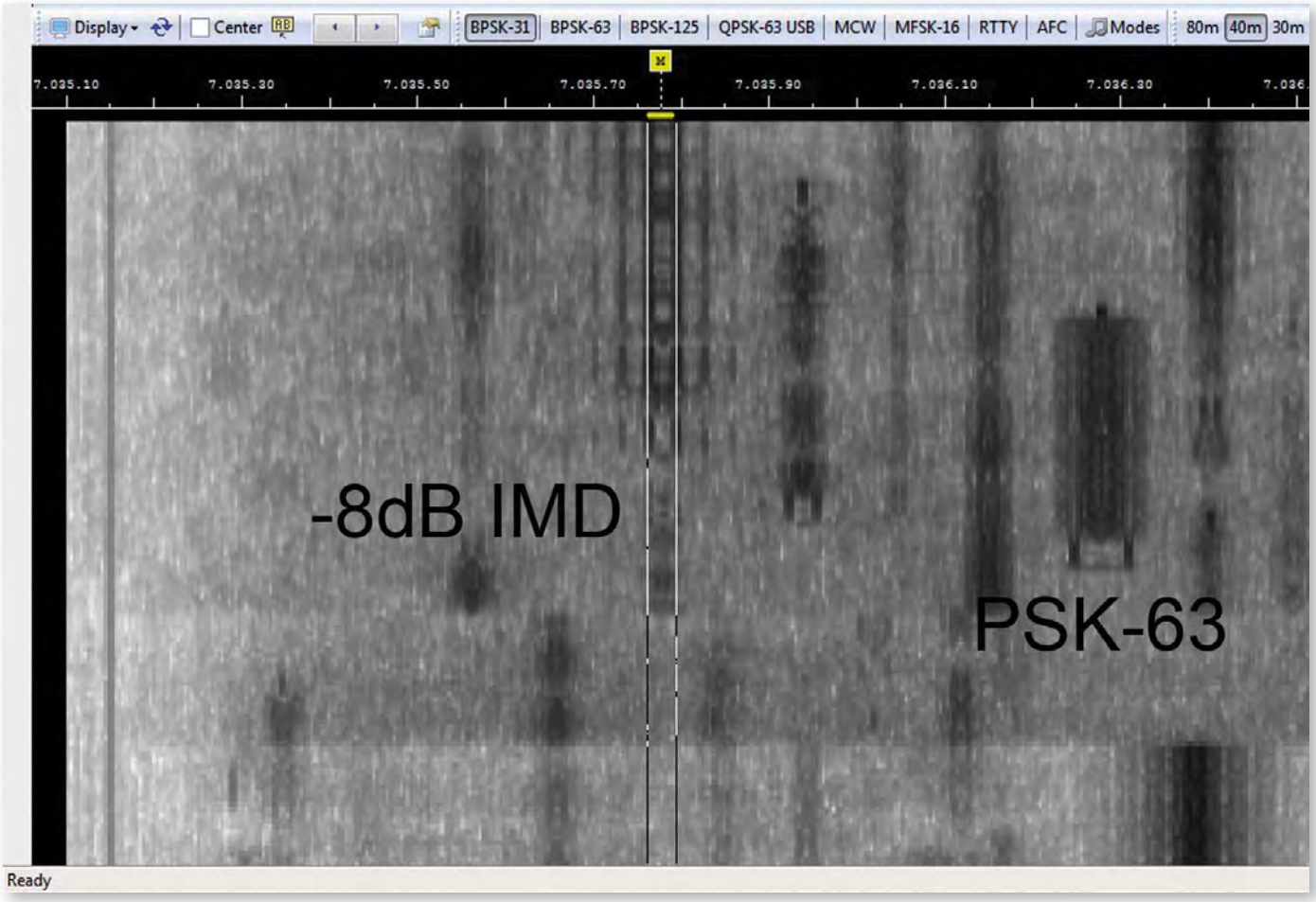

Fig. 2: Poor quality PSK signal with IMD of -8dB (you can also see a wider PSK-63 signal on the waterfall).

spurious signals. But on the good side, if we do overdrive, the resulting distortion is very easy to spot and measure. The quickest way to spot someone else's overdrive problems, is by using the waterfall display that's included in many PSK-31 decoding programs – see **Fig. 2**.

In Fig. 2 you can see the multiple inter-modulation products evenly spaced from the main PSK signal. You'll also find that many of the current PSK-31 decoding programs provide an Inter-Modulation Distortion (IMD) measurement in dB. The IMD figure to aim for an IMD figure in the range -20 to -25dB, meaning that inter-modulation products will be 20 to 25dB below the main signal. Providing you don't have a fault in your rig, achieving a clean signal is just a matter of controlling the audio signal level being fed to the transmitter.

As well as limiting the drive to the rig, you'll also need to make sure the transmitter's speech compression is off as that doesn't help PSK-31 signals. The other vital point to appreciate is that PSK-31 is an excellent QRP mode – so you don't need to operate with high power at all! Indeed, most experienced operators run with 30W or less and in my own case I rarely exceed 5W. In fact, running high power will often make you very unpopular with other users, as I'll explain later.

One of the simplest ways to get the PSK drive signal right, is to start by connecting a dummy load to the antenna socket and setting your rig's output power control to the desired setting, say 5W in my case. If you have a monitoring setting on your rig, set it to show Automatic Level Control (ALC). One of the functions of ALC is to reduce the transmit drive once the desired or pre-set power has been reached. This is ideal for our purpose as the ALC will just start to operate as the PSK-31 signal reaches the level that drives the rig to the pre-selected output.

Dummy Load Transmission

To make the adjustment all you have to do is start a test transmission into the dummy load from your PSK-31 software – and then adjust the audio level from the computer to the rig until the ALC just starts to operate and then back the drive off slightly.

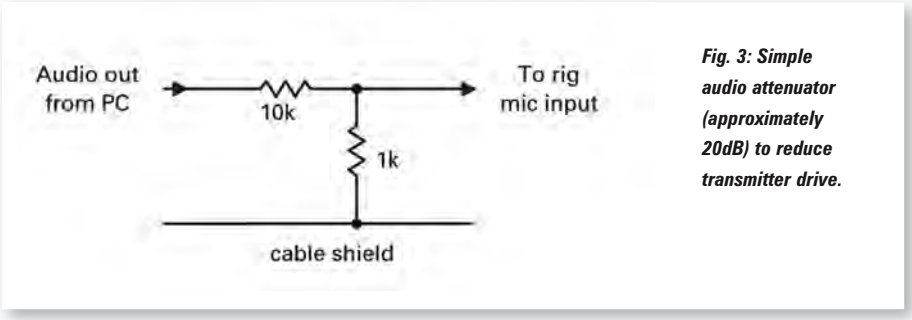

Fig. 3: Simple audio attenuator (approximately 20dB) to reduce transmitter drive.

Adjusting the audio level from the computer can be done in a number of ways. If you are using a proprietary interface between the PC and rig you may well find that you have a drive-level control on the front panel. If not, you can use the *Windows Mixer* to adjust the level. (*On Macintosh computers, in addition, there's also the two audio output level buttons available on the keyboard* ***Ed.***)

The most convenient way to open the *Windows Mixer* is to 'right-click' on the speaker icon at the bottom right of the screen and select Volume Mixer. In most cases, when the PSK-31 software is transmitting, a new volume slider will appear for that program and you just adjust that slider to set the level. If you find that the adjustment is very sensitive and you are operating right at the bottom-end of the slider, the difference between your drive level and the rig sensitivity is too great (the soundcard is overdriving your rig) you'll need to insert an attenuator in the lead to make this more manageable.

If you need to use an attenuator, I'd suggest a nominal 20dB attenuator, for which I've shown a suitable circuit in **Fig. 3**. This attenuator is very simple with just two resistors and could, with care, even be mounted inside a jack plug at the rig end of the lead. (*Its actual attenuation is one-eleventh or almost 21dB.* ***Ed.***)

Once the tests with the dummy load are complete, the next step is to go on-air and find a friendly PSK-31 operator to measure your IMD figure. As I mentioned earlier, most of the current PSK-31 software includes an IMD measurement facility as standard so this should be straightforward.

Try to get the IMD measurements from a few stations, just to check that the figure really is around -20dB or better (the larger the figure the cleaner your signal is). If your IMD is still too high, try reducing the audio drive a 'tad' more to bring it under control. Once this is complete you can be confident that you have a good quality PSK-31 signal.

Receiving PSK-31

We'll now move on to PSK-31 reception. As PSK-31 is a very narrow-band mode, a large number of individual signals can be processed within the speech band of standard single sideband's 300Hz to 3kHz spectrum. As a result, most decoding software provides visibility of the full speech band using a waterfall display (See Fig. 2) this gives a panoramic view of the PSK-31 band segment.

The waterfall display is ideal for PSK-31 signals as each signal shows-up as a very distinctive vertical trace with two narrow parallel lines when idling between characters or phrases. But, when actively transmitting characters, the waterfall will show a trace rather like a decorative vertical 'chain'.

Selecting a particular station's signal to monitor is usually simply a case of clicking on the centre line of the trace you want to monitor. This makes for a very effective system where the level of activity is immediately apparent – and a few mouse clicks will give you a view of the current band conditions. Additionally, some software such as *Ham Radio Deluxe* (*HRD*) includes a parallel decoding system where all the signals within the band segment can be decoded at the same time! I've shown an example of activity on 7MHz (40m) in **Fig. 4**. Here you can see the ticker-tape style display of each contact.

Whilst a panoramic view of the band segment is very helpful, problems can occur when a very strong or overdriven station appears on the band. In the case of a particularly strong signal, the receiver's automatic gain control (a.g.c.) will kick-in and reduce the radio frequency (r.f.) gain to bring the

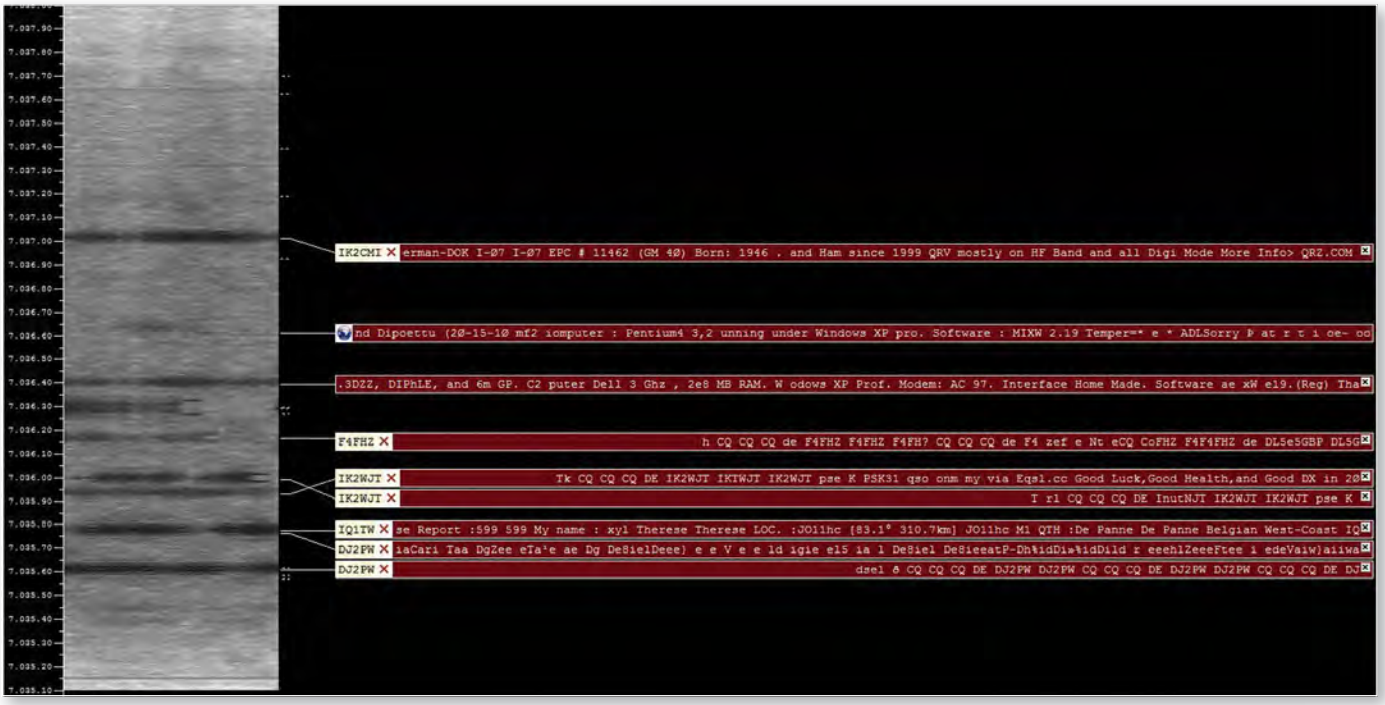

Fig. 4: **Ham Radio Deluxe** ***parallel decoding PSK-31 signals on 7MHz.***

strong signal under control.

Unfortunately, the reduced signal gain means that the level of the weaker signals is also reduced, often to the point where some signals are lost altogether! Fortunately, there are a couple of ways to deal with this problem. The first is to switch the gain control to manual and adjust the r.f. gain control to try and achieve a compromise that saves the weaker signals. This is not ideal – but it can offer enough adjustment to let you to finish a QSO.

An alternative technique is to use a narrow intermediate frequency (i.f.) filter – such as a 500Hz c.w. filter – to limit the receive bandwidth. This can be very effective – providing the interfering signal is far enough away from the wanted signal.

However, when it comes to dealing with a badly overdriven signal there's little you can do by way of filtering! But you could always try and work the station and make sure they know they have a problem!

You can also report on a station's signal quality via the RST report you send. Incidentally, I see so many stations sending 599 (to just about any signal!) and I would dearly love to see more operators using the system properly and providing helpful signal reports. The T in RST is for Tone and this is the figure that should be changed to reflect the quality of the PSK-31 modulation or IMD see **Table 1**.

Giving a lower, more realistic, report might just get the message through to the operator that their signal needs some attention!

Variants Of PSK-31

The success of PSK-31 has inspired the development of a number of variations on the theme and the most obvious are the speed changes. These use the same principles as we've already discussed for PSK-31 signals but higher speeds and bandwidths are used with the following currently available PSK-63 (63 bauds), PSK-125 (125 bauds), PSK-250 (250 bauds) and PSK-500 (500 bauds). In each case the bandwidth increases proportionately with the baud rate.

So, why do we need a faster link? Let's take a look. If you recall the original design ideal of PSK-31 was to develop a new mode that would support hand-typed QSOs and I think there's little doubt that PSK-31 has achieved that and 31 bauds is plenty fast enough for hand-typed messages. However, the success of the system has suggested that it may work well in other applications.

One of the first variant developments was PSK-63 which was produced with contest operation in mind. Most contest operators rely heavily on pre-recorded messages for much of their communications, so a faster data mode helps get through more contacts in a given time. The PSK-63 variant is simply a faster PSK-31 as there's no change in alphabet or modulation system other than running it at twice the speed of PSK-31 and consuming twice the bandwidth.

Table 1 – Suggested Tone reporting system – feel free to use intermediate values.

IMD (dB)	T value
-20 or better	9
-15 to -19	7
-10 to -14	5
-5 to -9	3
0 to -4	1

In practice PSK-63 signals are easily recognised in waterfall displays as the trace is exactly twice as wide as PSK-31. The higher speed variants, PSK-125, PSK-250 and PSK-500 are all simple speed increases and are used more for data transfer applications. A good example being the PSKmail system (**http://pskmail.wikispaces.com/**) that provides a free Internet and E-mail access for Radio Amateurs.

Next Time

I'm running out of space again this month – but next time I'll be stretching your mind with a look at the QPSK modes and convolutional coding! So, cheerio until then.

Mike G4WNC. ●

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FT-2000D

FT-2000D (200W)..... £2749.99
FT-2000D + SP-2000..... £2899.99

FT-5000

FT-5000 (200W HF + 6m)..... £4299.99
FT-5000D (above + monitor)..... £4749.99
FT-5000DMP (above + filters).. £5149.99

FT-950

HF + 6m IF DSP

OUR PRICE **£1239.99**
OR WITH NISSEI PS-300
£1359.99

FT-450

HF + 6m/ IF DSP

FT-450 only..... £599.99
FT-450 + MS-1228..... £649.99
FT-450AT..... £689.99
FT-450AT + MS-1228 ... £739.99

FT-897D

Includes DSP

OUR PRICE **£719.99**
OR WITH MS-1228
£779.99

FT-857D DSP

HF + 6m + 2m + 70cm.

OUR PRICE **£629.99**
OR PACKAGE DEAL FT-857 + MS-1228
£675.99

FT-817 ND

HF + 6m + 2m + 70cms. Incl's battery/charger + antennas. Optional case £22. Extra spare battery £49.99
OUR PRICE **£479.99**
STAR BUY - FT-817ND + extra battery + case..... £529.99
Optional miracle whip..... £1199.99

SP-2000

External speaker + audio filters. features a large 4.7"/120mm speaker along with a 3-selection hi-cut and 2 section low cut. Dual switched input + headphone socket.
£169.99

MD-200

Broadcast quality dynamic mic. It sounds & looks superb. Fits 8-pin round & 8-pin modular radios. (Optional 6-pin modular adapter £19.99)
£239.99
Yaesu MD-100A8X..... £119.99

YAESU FP-1030

Superb, high quality Yaesu. 30 amp PSU with variable voltage & multiple outlets. Fully metered & protected professional power supply.
£179.99

TS-2000E

HF + 6m + 2m + 70cm. Not only is this Kenwood's top machine with IF DSP, it also uses cutting-edge technology in a streamlined package.
£1475
TS-2000E + MS-1228 **£1519.99**
TS-2000X + FREE MS-1228 PSU £1735.99
TS-480HX..... £839.99
TS-480SAT..... £735.99

IC-7000

HF + 6m + 2m + 70cm. Superb IF DSP. Colour display.
£1049.00
or IC-7000 + MS-1228 £1089.00
IC-9100 new HF to 23cm... £phone

PSUs

NISSEI PS-300

Features: ★ Over voltage protection ★ Short circuit current limited ★ Twin illuminated meters ★ Variable voltage (3-15V) latches 13.8V ★ Additional "push clip" DC power sockets at rear. Dim'ns: 256(W) x 135(H) x 280(D)mm. A truly professionally made unit built to outlast most PSUs.
30 AMP/12 VOLT PSU
TRUE 'LINEAR' PSU
OUR PRICE **£149.99**

NISSEI MS-1228

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

DIAMOND GZV-4000

Includes built-in extention speaker
OUR PRICE **£174.99**
GZV-2500 25 amp version of GZV-4000. Sale price £119.99

DIAMOND GSV-3000

"Linear power supply". 30 amp @ 13.8V. 1-15V variable.
Diamond quality PSU **£189.99**

WATSON PSU

Power-Mite NF 22amp..... £69.95
Power max (25A)..... £89.95
Power max (45)..... £115.00
Power max (65)..... £119.99
Power max (85)..... £219.99
W-25AM..... £89.99

ANTENNAS

INTRUDER II

11 band (80-10 6/2/70cm). PL-259 fitting. Colapses to 95cm (~ 3 ft).
£37.99
(2 for £70.00)

NEW INTRUDER III

13 band (80-10/6/2). PL-259 fitting. Includes WARC bands. 13 band version of Intruder II.
£49.99
(2 for £95.00)

ATAS-120A

Military spec mobile antenna – superbly made. Covers HF + 6m + 2m + 70cm. *Fully automatic. (*certain Yaesu radios).
OUR PRICE
£269.99

DIAMOND CP-6

A superb (diamond quality) 6 band trap vertical antenna with trap radials – "rotary" trap system allows "flat wall" mounting. 80m/40m/20m/15m/10m/6m. 200W SSB, HT 4.6m (15ft tall).
SEND SAE FOR DATA SHEET
OUR PRICE **£299.99**

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HF-2V (80/40m) £279.99
HF-6V (80/40/30/20/15/10m) £375.00
HF-9V (as HF-6V + 17/12 & 6m) £425.00

VHF/UHF TX

YAESU FT-2900 R/E

Latest 2m FM (75W) mobile. Built like a tank. Incl's DTMF mic
£135.00

YAESU FT-7900 R/E

Latest commercial built 2m/70cm mobile + wide Rx. (Incl's DTMF mic)
£229.00

NEW YAESU FT-270 R/E

2m FM handie (keypad). Incl's batt/charger.
£99.99

YAESU FT-7800E

2m/70cm + wide Rx. (50W/35W) includes DT, MF, mic.
BRAND NEW. LAST ONE
In-car kit £30.00. Extra DC lead £15.00
£219.99

YAESU FT-8900 R

10m + 6m + 2m + 70cm. (up to 50W).
+ FREE 6m/2m/70cm mobile antenna
Includes DTMF mic + wideband receive
£359.99

YAESU VX-7R

6m/2m70cm + wide RX. An amazing 6W water proof hand-held. Case £19.99/spk mic £32.99. Cigar lead £24.99/ BNC adapter £6.
Silver
£259.99

YAESU VX-8E

6m/2m/70cm. "APRS" with Rx:- 0.5-1GHz. ncl's battery & chgr.
FREE EXTRA BATTERY THIS MONTH
£349.99

ACCS

MFJ-993B INTELLITUNER

Fully automatic (1.8-30MHz). 300W SSB.
Easy to use ATU. SALE PRICE **£239.99**

MFJ-949E

SALE PRICE **£174.99**
● 1.8-30MHz 300W ATU ● Large cross needle meter ● 30/300W PEP power meter ● VSWR ● 3-way antenna selector ● Internal balun + dummy load.

MFJ-259B ANALYSER

1.8-170MHz
£259.99
Case 259B £29.99

MFJ-269B ANALYSER

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

MFJ-269 pro version..... £359.99
MFJ-260C 300W dummy load..... £49.99
MFJ-264 1.5kW dummy load..... £79.99
MFJ-969 Rollercoaster ATU (300W)..... £199.99
MFJ-962D 1.5kW (metered) antenna tuner..... our price £269.99
MFJ-994B (600W) intelli tuner..... £319.99

SGC BARGAINS

SGC MAC-200 New auto tuner 1.8-54MHz (200W) wire, vertical, dipole. You name it. (5 selectable outputs).
£289.99

SGC-239 Mini tower ATU (1.8-30MHz)..... £199.99
SGC-237 HF+6m Tuner..... £309.99
SGC-230 (HF-200W) ATU..... £449.99
SGC-Smart lock (specify model)..... £69.99

GIZMOS

ALINCO DJ-596E

2m + 70cm Handie. Includes nickle metal N.M.H.I and charger.
Includes free speaker mic
ONLY **£99.99**

KENWOOD TH-F7E

2m/70cm Tx. Rx: 0.1-1000MHz (AM/WFM/FM/SSB). Incl's battery pack (Lion) + charger.
Includes free speaker mic
£229.99

D-308B DELUXE DESK MIC

(with up/down). Many amateurs (over 4000) have been pleased with it's performance. Includes 8-pin round Yaesu mic lead. Icom/ Kenwood & other leads available. Phone (£19.99 each). Replacement foam windshield £3.00 + P&P.
Back in stock – 8-pin modular 8-pin round Yaesu adapter £19.99
SALE PRICE **£79.99**

WINRADIO EXCALIBUR

9kHZ-50MHz (all mode) receiver with spectrum analyser. Most manufacurers try to follow standards - WINRADIO sets them! WR-G3100C pack includes:- receiver + software + PSU + USB cable + BNC adapter. Requires PC.
ALL THIS FOR **£649** Inc del

ETON SATELLIT 750

0.1-30MHz SSB/AM 88-108MHz (FM stereo) 118-137MHz airband/rotary antenna. 1000 mems/rotary tuning/ wide-narrow filters & more.
+ FREE HD-1010 headphones
£299.99 Incl del

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 £13.99 or 6 for £32.99 (P&P £4.00)

NISSEI PWR/SWR METERS

RS-502 1.8-525MHz (200W) ..... £79.95 P&P £6.50
RS-102 1.8-150MHz (200W) ..... £49.95 P&P £6.50
RS-402 125-525MHz (200W) ..... £49.95 P&P £6.50
RS-3000 1.8-60MHz (3kW) Incls mod meter ..... £59.95 P&P £6.50
RS-40 144/430MHz Pocket PWR/SWR ..... £34.99 P&P £5
DL-30 diamond dummy load (100W max) ..... £29.99 P&P £5

HEAVY DUTY SWAGED MAST SET

New extra heavy duty 2" mast set. 4 sections x 5½ foot slot together.

£79.99 each. TWO FOR £135.99 DEL £15.00

NEW SWAGED MAST SETS

20 foot mast. 1½" – 4 x 5 foot sections. (Swaged) **£49.99**

20 foot mast. 1¼" – 4 x 5 foot sections. (Swaged) **£46.99**

H/DUTY CAR BOOT MAST SET

18 foot (1½" dia).
18 foot – 6 x 3 foot (1½") slot together ally sections.

£44.99 each. TWO FOR £79.99 DEL £13.00

NEW CAR BOOT MAST SET

Superb 18 foot (6 x 3 foot sections) that slot together. Dia: 1¼" ideal to take anywhere. **£43.99**

2 for £74.99 del £13.00

HANGING PULLEY

Heavy duty die-cast hanging pulley. Hook and go! **£24.99**

MAST HEAD PULLEY

A simple to fit but very handy mast pulley with rope guides to avoid tangling. (Fits up to 2" mast) **£12.99** + P&P £4.50
30m pack (4.4mm) nylon guy rope £15.00
132m roll 4.4m nylon guy (480Kg b/f) ..... £45.00 Del £7.50

NEW EASY FIT WALL PULLEY

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

£12.99 + P&P £4.50

Wall bracket, screws not supplied. Simply screw to outside wall and hang pulley on WALL BRACKET £2.99 P&P £1.00
30m pack (4.4mm) nylon guy (480kg) £15.00
132m (4.4mm) nylon guy (480Kg) £45.00

BARGAIN WINCH

500kg brake winch. BARGAIN PRICE **£79.99** Del £10.00
(Now includes cable grip)
Winch wall bracket £22.99

LOW LOSS PATCH LEADS

Connectors	Length	£4.50 P&P Price
PL-259 - PL-259	0.6m	£11.99
PL-259 - PL-259	1m	£14.99
PL-259 - PL-259	4m	£19.99
PL-259 - PL-259	20m	£49.99
BNC - BNC	1m	£12.99

EP-300

Over the ear earpiece. **£9.95** P&P £4.00

DB-770H (BNC)

2m/70cm Tx + wide Rx. High gain up to 5.5dB. **£54.99** P&P £5.00

MT-3302

Heavy duty universal mount. Includes 5m cable **£29.99**

MT-6601

Adjustable roof rack/window bar mount **£19.99**

LIMITED STOCK

10m PNEUMATIC MAST

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

SUPER VALUE **£1089.99** Del £40.00.

CAROLINA WINDOM

CW-160S	(160-10m) 40m long.....	£149.95 P&P £10.00
CW-160	(160-10m) 80m long.....	£159.95 P&P £10.00
CW-80	(80-10m) 40m long.....	£129.99 P&P £10.00
CW-80S	(80-10m) 20m long.....	£149.99 P&P £10.00
CW-40	(40-10m) 20m long.....	£119.99 P&P £10.00
G5-RV	(80-10m) + balum	£74.99

CUSHCRAFT BARGAINS *Delivery £15.00*

MA5B	Mini beam 10, 12, 15, 17, 20m.....	WOW £449.99
A4S	4 ele beam (10 - 20m).....	£649.99
A3S	3 ele beam (10-20m).....	WOW £539.99
R-8E	Vertical (40 - 6m) "special".....	SPECIAL £499.99

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). **£215.99**

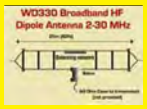
SEND SAE FOR LEAFLET

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

W-8010 DIAMOND SHORTENED DIPOLE

80-10m & only 19.2m long! (Up to 1.2kW) Includes 1:1 Balun. Bargain. Superb Japanese quality antenna system. **£169.99**

NEW DIAMOND WD-330



Amazing performance. Twin folded dipole. 2-30MHz – and it really works. No ATU required (25mts long). Supplied with 30 mtr PL-259 feeder – ready to go. If you want great transmission, look no where else. Japanees quality made product WOW **£199.99**

Q-TEK INDUCTORS

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

TRAPS BACK IN STOCK

BALUNS & TRAPS (1kW)

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

DOUBLE THICK FERRITE RINGS

A superb quaility ferrite ring with incredible properties. Ideal for "R.F.I". Width 12mm/ OD35mm. 6 for £12.00 P&P £4.00
12 for £20.00 P&P £5.00
30 for £40.00 P&P £10.00

COAX SWITCHES (P&P £6.00)

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 ..... £79.95
4 way CX-401 'N' (0-500MHz) 'N' £89.95

WATSON COAX SWITCHES

(POST £4.00)

CX-SW4N DC-1.5GHz (5xN) £59.99
CX-SW4PL DC-800MHz (5 x SO-239). £56.95
CX-SW3N DC-1.5GHz (3 x N) £49.95
CX-SW3PL DC-800MHz (3 x SO-239). £41.95
CX-SW2W DC-3GHz (3 x N) £32.95
CX-SW2PL DC-1GHz (3 x SO-239) £26.95

REPLACEMENT POWER LEADS

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

YAESU REPLACEMENT MICS

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

COAX BARGAINS

True military spec real UK coax

RG-58 Military spec x 100m.
£49.99 or 2 for £90.00
Coax stripping tool (for RG-58)..... £4.99
RG-213 Military spec x 100m (10mm dia).
£129.99/100m or 2 for £229.99

Q-TEK TRI-MAGMOUNT

Very heavy duty. Available:- SO-259 or 3/8 – specify. **£44.99**

YAESU G-450C

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

WOW **£309.99** or £349.99 with 25m cable/plugs

G-650C extra heavy duty rotator. £355 or £399.99 with cable
G-1000DXC extra heavy duty rotator. £425 or £479.99 with cable
G-2800DXC The goliath of rotators £845.99
GS-065 thrust bearing £54.99
GC-038 lower mast clamps £32.99

AR788

Quality rotator for VHF/UHF. Superb for most VHF-UHF yagis, 3 core cable required. 3 core cable £1 per mtr.

OUR PRICE **£81.99**

AE-201 thrust bearing £24.99

DIAMOND YAGIS

No tuning required

2m/10 element No tuning required SO-239 feed £79.99
70cms/10 element No tuning required SO-239 feed £49.99
6m/2 element No tuning required SO-239 feed £84.99

Q-TEK COLLINEARS (VHF/UHF)

Del £12.50

X-30 GF 144/70, 3/6dB (1.1m) £44.99
X-50 GF 144/70, 4.5/7.2dB (1.7m) £59.99
X-300 GF 144/70,6.5/9dB (3m) £79.99
X-510H GF 144/70, 8.5/11dB (5.4m) £139.99
X-627 GF 50/144/70, 2.15/6.2/8.4dBi (2.4m).... £89.99

DUPLEXERS & TRIPLEXERS

MX-2000 50/144/430MHz Triplexer £69.99
TSA-6011 144/430/1200MHz Triplexer £64.99
MX-72 144/430MHz £34.99
MX-72 "N" 144/430 ..... £35.99
MX-62M (1.8-56MHz + 76-470MHz) £64.99

MOBILE ANTENNAS

Del £10.00

DB-7900 2m/70cm (5.5/7.2dB) 1.6m (PL-259) £39.99
DB-770M 2m/70cm (3.5/5.5dB) 1m (PL-259) £24.99
Diamond HV-7CX 7/14/21/28/50/144/430 ..... £129.99
Diamond CR-8900 10/6/2m/70cm (1.26m) £99.99
Diamond AZ-506 2m/70cm – only 0.67m long £39.99
PL-62M 6m/2m (1.4m) PL-259 ..... £23.99
PL-627 6m/2m/70cm (1.7m) PL-259 ..... £44.99

DIAMOND V-2000

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

Superb quality

£124.99

RH-9000 BNC

40cm flexible whip for the ultimate in gain. **£29.99** P&P £5.00
Tx:- 2m + 70cm (Rx:- 25MHz-2.9GHz).

RH-9090 SMA

40cm flexible whip that is ideal as replacement. Tx:- 2m + 70cm.
Rx:- 25MHz-2.9GHz
£34.99 P&P £5.00

SPEAKER MIC

U-120 Fits Alinco, Icom and Yaesu. (Kenwood version available)
£16.99 P&P £4.00

EARPIECE/BOOM MIC

Over ear earpiece + boom mic. Available in Kenwood version or Yaesu/Alinco/Icom.
£24.99 P&P £4.00

ALUMINIUM POLES

20 foot (collection only) 2" £69.99
10 foot (collection only) 2" £34.99
2.4m (2") Ally pole £32.99
SPECIAL OFFER 2.4m x 2" poles (4 off) £100.00
5 foot x 2" pole £17.99

COPPER ANTENNA WIRE ETC

Hard drawn (50m roll) ..... £40.00 P&P £7.50
New: 50m roll, stranded antenna wire ..... £19.99 P&P £7.50
Flexweave (H/duty 50 mtrs) ..... £44.99 P&P £7.50
Flexweave H/duty (18 mtrs) ..... £21.99 P&P £7.50
Flexweave (PVC coated 18 mtrs) ..... £24.99 P&P £7.50
Flexweave (PVC coated 50 mtrs) ..... £59.99 P&P £7.50
Special 200mtr roll PVC coated flexweave ..... £180.00 P&P £10.00
Copper plated earth rod (4ft) ..... £14.99 P&P £8.00
Copper plated earth rod (4ft) + earth wire ..... £24.99 P&P £8.00
New RF grounding wire (10m pack) PVC coated ..... £14.99 P&P £5

METALWORK & BITS (Del Phone)

2" mast-floor base plate £14.99
6" stand off brackets (no U-bolts) £8.99
9" stand off brackets (no U-bolts) £10.99
12" T & K brackets (pair) £18.99
18" T & K brackets (pair) £22.99
24" T & K brackets (pair) £26.99

All bracket measurements are from wall to end of bracket

U-bolts (1.5" or 2") each £1.50
8mm screw bolt wall fixings £1.70
8-nut universal clamp (2" to 2") £7.99
2" extra long U-bolt/clamp £6.99
2" crossover plate with U-bolts £14.99
15" long (2") sleeve joiner (1.5" also available) £18.99
3-way guy ring £5.99
4-way guy ring £6.99
Heavy duty guy kit (wire clamp, etc.) £49.99
Set of 3 heavy duty fixing spikes (~0.7m long) £29.99
30m pack (4.4m) 480kg B/F nylon guy £15.00
Roll of self-amalgamating tape 25mm x 10mtr £8.99
Special offer:- Self-amalgamating 3 rolls £20.00

Phil builds an ideal 'starter' superhet project.

The Walford Electronics *Tone* Receiver

I'm sure many readers will have heard – if not seen – at least some of the range of kits from **Tim Walford G3PCJ**, which are produced under the name of **Walford Electronics**. Transmitters, receivers, audio filters and an antenna matching unit (a.m.u.) have all been designed and supplied by Tim over the years.

The majority of the kits have a distinctive appearance in that they are of an 'open' type construction, complete with a glass reinforced plastic (g.r.p.) printed circuit board (p.c.b.) material as a front panel.

The *Tone* receiver is a recent addition to the Walford range and follows the same construction methods mentioned above. It's described by Tim G3PCJ as a "Simple superhet for 80 metres giving single sideband (s.s.b.) reception."

Receiver Description

The *Tone* is a single conversion superhet receiver – based on an intermediate frequency (i.f.) of 6MHz, is constructed on a double-sided printed circuit board with the top layer forming a ground plane. The front panel is also of p.c.b. material with pre-drilled holes for mounting the controls and connectors. Overall size of the completed kit measures 100mm wide by 100mm deep and 50mm high.

The kit comprises of all the components necessary to complete the receiver including detailed instructions and helpful hints and tips on its construction. The receiver has only three controls, these are: **Tuning**, **Audio Volume** and a three position **Range** switch. The audio output is suitable for headphone use or driving a small loudspeaker. The receiver requires a direct current (d.c.) supply of between 9 and 16V.

Building The *Tone*

Before any soldering was attempted, I carefully checked all the components against the parts list both for identification and quantity. It's worth noting, that only components with leads are used and all sensitive items are supplied in an anti-static bag. There are no coils or toroids to wind either! Having found everything present and correct, I read the instructions through several times before commencing construction.

The first operation involved soldering the front panel to the ground plane side of the main p.c.b. I found the easiest way to do this was to use some small wooden blocks to support the front panel while soldering took place. Small side cheeks were then soldered to make the front panel rigid.

Tim provides a grid lay-out to aid the location of the components when mounting on the p.c.b. Some components require one of their leads to be soldered on both sides of the circuit-board, these connections are clearly marked.

Small areas of circuitry were built at a time, thus allowing testing to be completed before moving to the next stage. Constructing the receiver in this way, any problems could be identified and corrected easily.

Starting at the audio output and working towards the antenna terminals, proved to me that the 'build and test' approach to be very worthwhile. Indeed, whilst testing the product detector circuit, I found a very small section of copper track missing, this being simply and quickly repaired using a solder 'bridge'.

If I had built the complete receiver first, before testing, finding this would have been considerably more difficult – the 'build and test' approach had proved itself. The rest of the assembly of the *Tone* proceeded without any problems occurring.

Alignment Easy

As the *Tone* receiver covers the 3.5MHz (80m) band only, the alignment proved to be easy. A frequency counter would be beneficial for adjusting the oscillator stages, but if this isn't available, another receiver can be used to 'sniff' the local oscillator signal.

The variable frequency oscillator (v.f.o.) has a three

Phil Ciotti G3XBZ – a keen constructor – has been busy trying out a new kit from Tim Walford G3PCJ's Somerset range.

position switch for selecting different sections of the 3.5MHz band. With the switch in the '**M**' position and the tuning capacitor at its midpoint the v.f.o. coil was adjusted for the middle of the 80m band. Selecting either H or L moves the tuning range up or down in frequency. Lastly, the bandpass filter coils were adjusted for maximum signal strength.

Listening Tests

Once completed, I used the receiver extensively over a period of several weeks, during which time it gave a good account of itself. The receiver was stable on 3.5MHz and could be left while listening to some of the large nets. A generous size tuning knob helps to tune in s.s.b. signals quickly and accurately.

There was more than adequate audio output, enough to drive a small loudspeaker to room level so that several people could listen at the same time. However, I did use an antenna matching unit (a.m.u.) to get the best performance I could from the *Tone*.

I heard Amateur stations on s.s.b. from all over the UK and later in the day, Continental stations appeared along with (briefly) one Italian. My impression was that the sensitivity was good without being overdone. During alignment and use the receiver was powered from a 12V sealed lead acid battery.

Constructor's Comments

The *Tone* receiver kit comes complete, with no extra components to be purchased. All parts are of good quality and clearly marked. The main p.c.b. is counter-sunk on the ground plane to allow component leads to pass through easily without short-circuits occurring.

The p.c.b.s are covered in a lacquer which allows soldering to take place but prevents tarnishing from fingerprints when handled. As a result, the boards still look bright and shiny once the receiver has been built.

The instructions are good, containing a technical description of the receiver as well as helpful tips on getting the best out of the *Tone*. The receiver works well and would be an ideal step-up from a direct conversion (DC) unit.

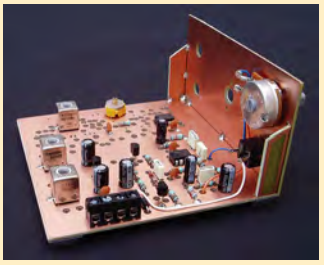
I took the opportunity to take the completed *Tone* to my radio club, the **Poole Radio Society**, where it was left running for members to try. During the evening, a lot of positive comments were made regarding both the kit and its instructions. I enjoyed building the *Tone* and its performance was a pleasant surprise. Well done Tim!

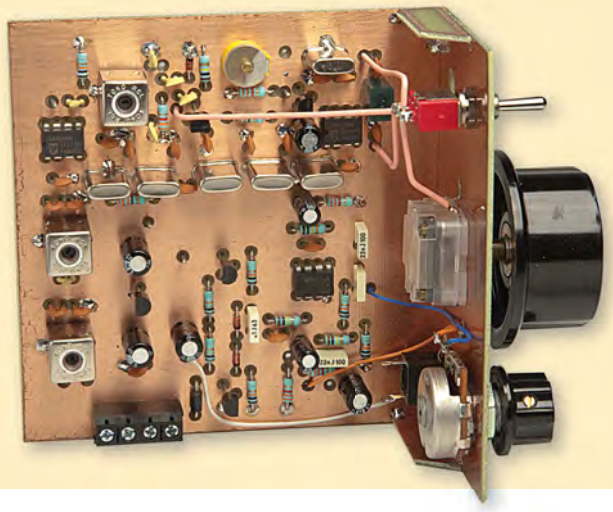
To enhance the receiver's c.w. capabilities a **Mini CW** kit is available as an add-on. If you would like to transmit as well, the Parrett 1.5W s.s.b. kit matches the receiver. My thanks go to Walford Electronics for providing the *Tone* receiver for review and I'm looking forward to building the companion Parret s.s.b. transmitter – very soon. ●

Pros: The instructions are clear and precise. Good quality components are provided. The kit works well and provides an ideal first superhet radio receiver project.

Cons: Bear in mind that the *Tone* is a simple receiver and that it has limitations.

Kits & Bits information:
The *Tone* kit costs £44, plus £3 p&p. Paypal orders can be taken for £2 extra making £49 total. The *Tone* and the associated s.s.b. 1.5W Parret transmitter (also to be reviewed by Phil) can be ordered together for £75 plus £3 P & P, or £81 by Paypal. See The Walford Electronics website at **www.users.globalnet.co.uk/~walfor** or by post to Walford Electronics,
Upton Bridge Farm,
Long Sutton,
Langport,
Somerset TA10 9NJ.
Tel: (**01458**) **241224**,
FAX (**01458**) **241186**.





Tim Walford G3PCJ comments: I am delighted that the Poole Club were able to have a play with the completed receiver and following this I shall be going down to give them a talk on its design and the various kits that can be added to the *Tone*. I was especially pleased that Phil did take up my wish that I should be told about how builders get on with my projects – his discovery of a broken track turned out to be due to a crack in the p.c.b. master, which I was very glad to be told about. It would have reproduced on all subsequent kits until reported by somebody else! Thank you! Tim G3PCJ

KITS & MODULES

NEW PRODUCT

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

SPEECH PROCESSOR increases the average sideband power of SSB transmitters without driving the PA into clipping. Includes filtering to enhance the higher voice tones to increase intelligibility, and it sounds nice too. Panel control for clip and output level. Supplied with plugs & sockets to suit most popular rigs. Type **SP1000, PCB & Hardware kit £42.50, Ready built £60.00**.

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

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

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

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

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

NEW SUPPLY OF DG MOSFETS

TYPE	Package	F MHz	Gfs mmhos	Idss mA	Nf dB	Price £
3SK45	TO72	200	14	17	2.2	2.00
3N201	TO72	300	12.8	15	2.0	2.25
40673	TO72	400	12	15	3.5	2.50
BF964S	SOT103	1000	18.5	10	1.0	1.50

P&P £1.00 any quantity

NEW TRIBAND ACTIVE RECEIVE PRESELECTOR for 80,40, & 20m. Tuneable on 80m, fixed tuned on 40 and 20m. Can be configured for maximum gains of 16dB on 80m, 23dB on 40 and 20m, or 11dB on 80m 17dB on 40, and 18dB on 20m. Complete kit comprises amplifier and switch PCB's and components, 2 pole 3 way switch, polyvaricon, and 10K log gain pot. **£20.50**.

SPECTRUM 10mm COILS, pin compatible with TOKO types. Coil values 1.2, 2.6, 5.3, 11, 23, 45, and 90uH. Some types have the primary tapped at ¼ turns and a low impedance secondary winding. Others have centre tapped primary and relatively high impedance secondary winding. Full details of turns ratios, etc. can be found on the components page of the website. **1-9 qty 75p each plus £1 P&P**.

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

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

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

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

CLASSIC
20/80m SSB RECEIVER

Classic superhet receiver for 20 and 80m using a 9MHz IF and a 5.0-5.5MHz VFO. Uses a 6 crystal ladder filter with near symmetrical passband, 2dB insertion loss, 1.8:1 shape factor, and 70dB stopband. Minimum discernable signal 0.2uV. Fixed tuned bandpass preselector on 20m, tunable preselector on 80m. Logarithmic AGC and Signal meter response. Maximum signal handling 1mV. 500mW audio output. Supply requirement 13.5V at up to 250mA. **VFO with its drilled box, preselector and main board PCB's and component kits including crystals £92. Complete kit including box and hardware £147.00. Ready built £240.00.**

UPWEY 160m AM/LSB RECEIVER

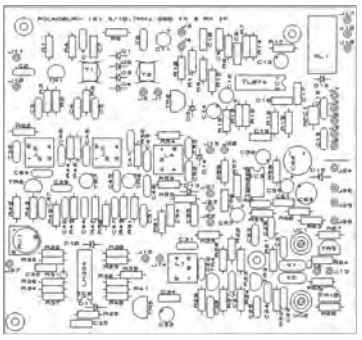
Single conversion superhet receiver for Top Band using a 4 pole ceramic IF filter LTW455HT. Stopband –40dB at + - 9KHz, -60dB at + - 100KHz. Ultra stable Colpitts VFO, and resonator-stabilised high-side BFO. Minimum discernable signal 0.1uV. Tuneable preselector and S meter. 500mW audio output. Supply requirement 13.5V at up to 250mA. **PCB & parts kit including Main board, VFO with its box and tuning capacitor, preselector with polyvaricon, and BFO £92.50. PCB and parts kit plus drilled and labelled case and all hardware including meter, speaker, and slow motion drive £175.50. Ready built £241.50.**

SYNTHESIZER CONVERSION CB to 10FM, suitable for the old style UK CB rigs with LC7136/7 or TC9119P synthesiser IC's. Puts the rig onto 29.31-29.70 MHz. Each board is aligned prior to despatch. State rig type when ordering. PCB size 64 x 40 x 17mm.
Type **SC29**. **PCB Built & aligned £26.50**.

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

TRANSMIT AMPLIFIERS, for 2 or 4 or 6 metres, single stage RF switched, class AB linear. Diecast box with heatsink and SO239 connectors. **TA6SA** 2W in 25W out, **TA4SA** 2.5W in 25W out, **TA2SA** 5W in 25W out. **Complete kit £63.00, ready built £82.00**.
TA6SB 5W in 50W out, **TA4SB** 7W in 50W out, **Complete kit £70.00, ready built £89.00**.

TRANSMIT AMPLIFIER & RECEIVE PREAMP, for 2 or 4 or 6 metres. Receive gain adjustable 0-20dB. Switching for either part or straight through. RF switched on transmit. Diecast box with suitable heatsink and SO239 connectors. RF input and output as detailed in paragraph above. **TARP6SA, TRRP4SA, or TARP2SA complete kit £89.00, ready built £123.00. TARP6SB, and TARP4SB complete kit £92.00, ready built £126.00**.



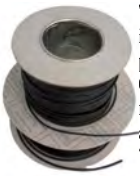
POUNDBURY (ver2) 9MHz SSB TX GENERATOR & RX IF. Speech processor and diode ring modulator with carrier suppression greater than 50dB. IN/OUT termination impedance 560Ω to match external SSB filter. Receive section FET and MOSFET IF amplifiers and a singly balanced diode product detector, discrete audio derived AGC, 0.5W IC audio amplifier. Includes USB and LSB carrier crystals, which are DC switched. PCB size 125 x 115 x 17mm. **PCB and components £66.00**.

G2DYM / G4CFY AERIALS

Guy — 7 1 rap — -piece — 7 1 rap — Guy

TRAP DIPOLE for 80/40/20/15//&10m. 106 feet long. Supplied with 70 feet of low impedance twin feeder. Low TVI and low noise. 2S points quieter than a G5RV with same feeder length. PVC covered wires with lugs. Regular duty 150W rated £157.00.
600W rated. £164.50, inc. carriage.

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



TWIN FEEDER 100 Ohm, 2kW rated, 24/0.2 in individual polyethylene sheaths with an outer cover of polyethylene. Solid construction to avoid water ingress. Good flexibility to overcome work hardening and fracture. Typically 0.5dB/m quieter than wide spaced 300 and 450 Ohm feeder and coax. Loss 0.04dB/m at 10MHz. 75p/metre plus £3 P&P. 100m drum. £70 inc P&P.

TRAPPED INVERTED L AERIAL 80/40/20/15 & 10m, for a small garden. Coax driven from far end of garden and tuned against ground. A good all round aerial with 6dB more gain than a 24 foot trapped HF vertical. That's 4 times power on TX and one S point extra on RX. £74.00 inc. carriage.

E-mail: tony@spectrumcomms.co.uk

Prices inclusive of postage unless stated. Payment by Credit/Debit card, Cheque or Postal Order. Cheques or Postal Orders payable to Spectrum Communications.

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

Tony Nailer's

technical for the terrified

This time around, due to reader requests, Tony G4CFY, takes another look at the superhet system.

Amongst my following of readers there's **Dave Patrick** in Carlisle and **John Dickinson** in Tamworth, Staffordshire, who are both fascinated by the superhet system. They 'phone me regularly to discuss ideas and to buy filters and other components to experiment with.

John often pleads ignorance and wishes to learn more about the superhet so, maybe it's time to consider the topic again – and in a manner slightly different from that previously published.

Amplitude Modulation Reception

Originally, when amplitude modulated (a.m.) broadcasting started, stations were relatively widely separated in frequency. Single tuned circuits and band-pass coupled tuned circuits were able to select the wanted station and reject enough background noise. The selected signal was then amplified and demodulated before the audio was amplified to drive a loudspeaker. Such a simple arrangement was called a tuned radio frequency (t.r.f.) receiver, see **Fig. 1.**

When the bands became more densely populated with stations it became increasingly difficult to select just one station using multi-stage tuneable filters. This led to the idea of the super-heterodyne (superhet) receiver – a technique that translated the incoming wanted signal to a fixed (usually) lower frequency for processing.

The wanted signal was converted to that frequency with the aid of a local oscillator and mixer, see **Fig. 2.** The fixed intermediate frequency (i.f.) passed through a high selectivity filter and operates as a fixed tuned t.r.f. from that point onwards.

Intermediate Frequency

Broadcast transmissions were originally in the long wave region and concentrated between 100 and 300 kilohertz (kHz). Steadily, new stations started to occupy the medium wave band between 600 to 1000kHz (600kHz to 1MHz). For reception of both of these wavebands, domestic receivers adopted an i.f. of approximately 465kHz.

A signal selected by the front-end radio frequency (r.f.) circuits that was separated from the local oscillator signal by 465kHz, which when mixed with the oscillator, would result in a difference signal at the intermediate frequency (i.f.). Clearly, there could be one signal 465kHz above the local oscillator and another the same separation below it. The selected one is designated the 'wanted' signal, the other is called the 'image' signal.

The two signals are separated by 930kHz and when receiving long and medium wave bands, the image

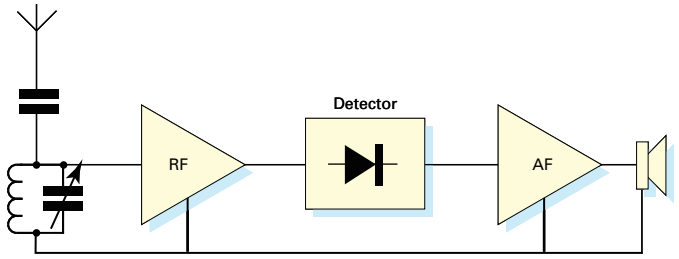


Fig. 1: A simple arrangement for the early radios was called a tuned-radio-frequency (t.r.f.) receiver. This is a familiar sight to those having taken the Foundation course.

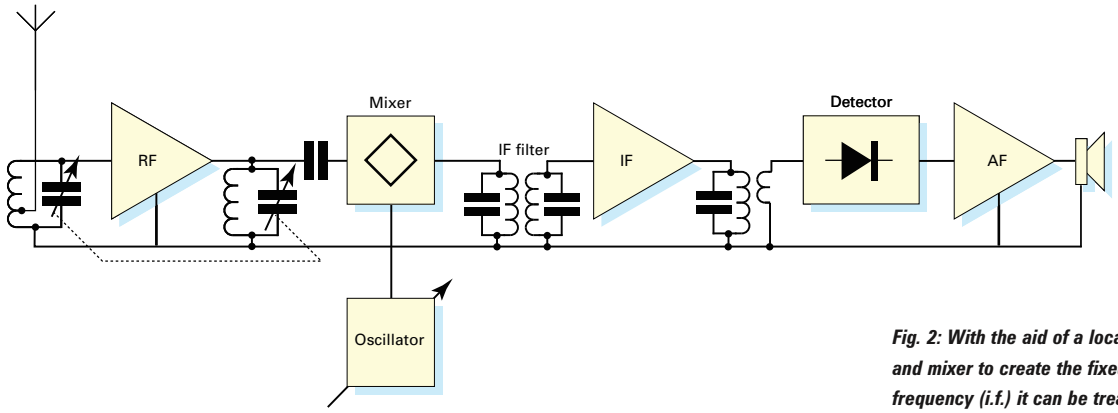


Fig. 2: With the aid of a local oscillator and mixer to create the fixed intermediate frequency (i.f.) it can be treated as a t.r.f. from that point onwards.

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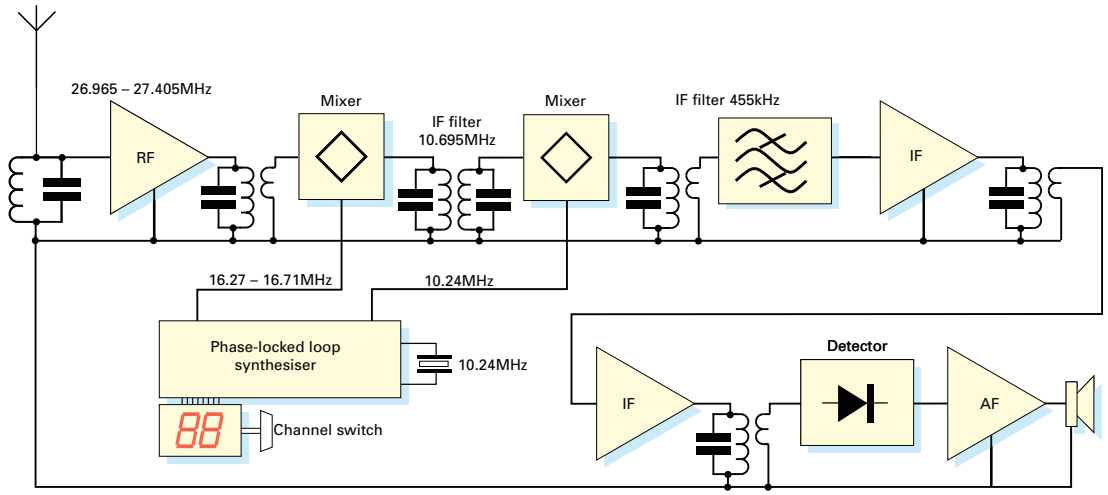

Fig. 3: A very economic receiver with just five transistors used in the signal processing stages and a detector diode, feeding an integrated circuit audio amplifier.

signal is easily attenuated by the front-end tuned circuits. However, when using an i.f. of around 465kHz, and with received signals in the short wave bands from 1.5 to 30MHz, it becomes increasingly difficult to separate the image signal from the wanted one at the high frequency end.

To combat this difficulty, early h.f. communications receivers adopted an i.f. of 1.6MHz – so that they separated the wanted and image separated by 3.2MHz. This separation represents a factor of about 10 at 30MHz. Such a choice still requires at least two front-end tuned circuits at radio frequency (r.f.) to sufficiently reduce the image. At still higher reception frequencies the 1.6MHz i.f. would be inadequate.

Morse Code Reception

Morse code reception was facilitated by the injection of another signal into the i.f. chain from a beat frequency oscillator (b.f.o.), which could be tuned a few kHz either side of the intermediate frequency. In bands crowded with Morse code stations this would result in audio signals at a variety of different pitches. The wanted signal could be selected and the others attenuated relatively easily using highly selective audio bandpass filters.

Reception Of VHF FM

The advent of frequency modulated (f.m.) broadcasting in the very high frequency (v.h.f) band originally in the range 88-103MHz (Band II) – required a much higher i.f. and so, 10.7MHz became the norm for i.f.s in domestic receivers. Using an i.f. of 10.7MHz meant that the image would be separated by 21.4MHz from the wanted signal and could be easily attenuated – at reception frequencies even as high as 200MHz.

In Amateur Radio receivers the 10.7MHz i.f. would work really well up at 30MHz. Unfortunately, it wasn't suitable for use in a transmitter where twice the i.f. (21.4MHz) falls in the 15m band of 21.00-21.45MHz. The solution for many manufacturers was to use 9MHz as the i.f., where on transmit the i.f. harmonics are at 18 and 27MHz.

At that time there were no Amateur (or CB radio) bands at either of the 18 and 27MHz frequencies. However, in 1979 the **World Amateur Radio Conference** (WARC) agreed the addition of new bands at 10.1-10.15, 18.068-18.168, & 24.89-24.99MHz. So, with these new bands, even 9MHz could not be used with transmitters.

Single Sideband Reception

The single side-band mode was successfully integrated into conventional receivers with the use of the b.f.o. By the 1960s the high frequency (h.f.) Amateur bands were a complete mix of Morse code, a.m. and single sideband (s.s.b.).

As the years moved on, s.s.b. proved to be a more successful mode than a.m. for long distance 'phone work, because all the power was concentrated in a single sideband instead of being in two sidebands and a carrier.

With the increase of the number of Amateurs, the Amateur bands started to fill up with s.s.b. stations and it became increasingly difficult to separate them. The solution to this was to add an i.f. crystal filter, with a bandwidth of about 2400Hz and stop-band rejection of a least a factor of 100, (or 40dB).

With such a tight i.f. passband the variable frequency

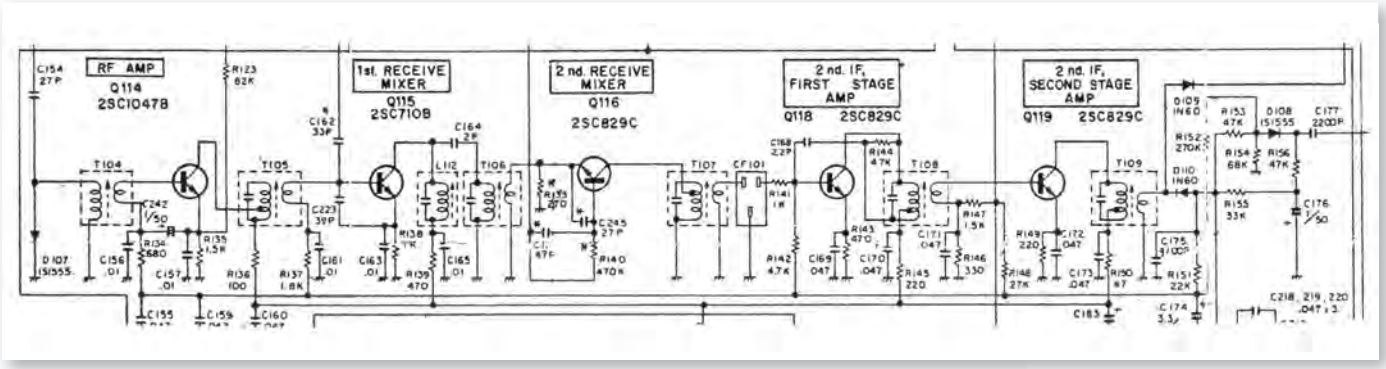

Fig. 4: A partial circuit of an early Cybernet PTBM036AOX CB from the early 1970s is shown here. These are the five transistor stages outlined in Fig. 3.

b.f.o. was no longer useable and the s.s.b. signal required to be demodulated with the assistance of a crystal controlled carrier insertion oscillator, (c.i.o.).

When produced in quantity, crystals are relatively cheap if they're cut for fundamental and overtone modes in the frequency range 3-72MHz. So together with image constraints, the designs of Amateur Radio receivers and transceivers for s.s.b. reception were usually a single conversion superhet, using a crystal filter at 9MHz or 10.7MHz.

Citizen Band Radio

Citizen Band radio was legal in the USA as far back as 1945 – but only became really popular in the late 1970s when petrol supply problems required motorists to communicate to find out where petrol was available.

The original CB transceivers were equipped with 22 channels, from 26.965MHz in 10kHz steps and often contained 22 discrete switched crystals in the local oscillator. In between the CB channel frequencies were five frequencies allocated to radio controlled (RC) model use. However, increased use of the CB bands quickly made these RC frequencies unusable.

The cost of crystals prompted the development of the phase locked loop (p.l.l.) digital synthesiser. The original p.l.l. devices were developed by Motorola and were coded in binary. The channel change switch included one wafer for receive, another for transmit, and further one to drive the light emitting diode display for a channel display.

When the US authorities – the **Federal Communications Commission** (FCC) permitted the use of 40 channels, it was found that a simple modification to the binary code switch wafer would allow all 40 channels to be achieved – except that channel 25 was out of sequence. In relation to frequency the sequence went 22, 23, **25, 24**, 26, 27 and so on.

Nevertheless, the CB channel sequence created in the USA gained worldwide adoption, with its five 'gaps' at the lower end and channel 25 'out of sequence'. Subsequently, bands above and below the original mid-block, as it became known, also have this crazy sequence!

The CB Radio IFs

Let's now take a look at the development of CB radio i.f.s. In the 1970s the Japanese developed ceramic resonators at 455kHz to provide the necessary filter passband for domestic portable radio a.m. reception. These were quickly incorporated into transistorised CB radios with a double-conversion superhet configuration.

A very economic receiver could be made using just five transistors in the signal processing stages, followed by a detector diode and an integrated circuit audio amplifier. See the block diagram in **Fig. 3.** A partial circuit of an early Cybernet PTBM036AOX CB from the early 1970s is shown in **Fig. 4.**

The line-up for the simple receiver comprised of a single tuned circuit, r.f. amplifier, first mixer, 10.695MHz band-pass coupled tuned circuit first i.f., second mixer, single tuned circuit, 455kHz ceramic filter, i.f. amplifier, i.f. amplifier, diode detector and audio amplifier.

The choice of 10.695MHz as the first i.f was because the digital synthesiser used a 10.24MHz crystal feeding a 1024 divider to achieve the 10kHz channel steps. The same crystal oscillator could also used for the second l.o. converting from first to second i.f. (10.695-10.24 = 0.455).

Single Sideband CB

The generation of an s.s.b. signal is better done at 10.7MHz than at 455kHz because harmonics of the lower frequency would inevitably fall in the transmit band. Harmonics of the 10.7MHz signal are more easily filtered out.

Additionally, the cost of crystals at 10.7MHz are a lot cheaper than those cut for 455kHz. As a result of this some early s.s.b. and a.m. transceivers used a single i.f. at 10.7MHz or at 7.8MHz with a 6-pole crystal filter for selectivity. An s.s.b. signal would pass through the filter unharmed and be demodulated in a product detector together with a signal from the carrier insertion oscillator.

On receive (using a.m.) the signal would be 'forced' through the s.s.b. bandwidth crystal filter, which would slice off one of the sidebands and attenuate the carrier a bit. The resultant signal would then be detected in the usual manner using a diode detector.

Other designs of CB transceiver included Morse code or continuous wave (c.w.) mode and later on also frequency modulation (f.m.). Invariably, these designs used a single conversion path for s.s.b. and c.w. through to the product detector. They were double conversion for a.m. and f.m. – splitting off after the first mixer through a bandpass coupled pair of tuned circuits or a ceramic resonator, then out to a second mixer and 2nd i.f. amplifier before detection.

Frequency Modulation

When f.m. is demodulated the recovered audio level is

dependent upon the ratio of the modulation to the signal frequency. To make this clear, if the applied frequency modulation is say ±2.5kHz and is referenced to 10.7MHz, there will be a 4280:1 ratio between carrier frequency and modulation, so the recovered audio will be low. If it is referenced to a 455kHz signal the ratio will be 182:1. So, at the lower i.f., there will be much greater recovered audio.

Single sideband filters are not only too narrow to pass f.m., they are also not necessarily smooth across the passband, neither will they have a smooth phase change across the passband. Filters suitable for a.m. though, are likely to be wide enough to pass f.m. and will also have a smoother phase change across the passband. So, f.m. and a.m. require much the same signal processing and thus both favour a 455kHz i.f.

A Cybernet CB radio chassis type PTBM134AOX designed for the new UK legal f.m. band adopted in 1981 uses a push-pull mixer, otherwise is identical to the PTBM036AOX. There's also a limiting i.f. amplifier and quadrature f.m. detector integrated circuit (i.c.) linked to the last i.f. transformer.

Simple Double Superhet

I have an idea for a general purpose a.m./f.m./u.s.b./l.s.b. receiver for my friends Dave and John and all our other enthusiastic constructors. Starting with a band-pass coupled front end pre-selector feeding a dual gate m.o.s.f.e.t. mixer, fed from a Portland VFO local oscillator. Then you could have a choice of s.s.b. bandwidth or a.m./f.m. bandwidth 10.7MHz 4-pole first i.f. filters, maybe diode and d.c. switched.

Use the receiver board ,which featured in January 2010 *PW's Doing it by Design* (*DiBD*). Make a dual-frequency version of the ceramic filter controlled b.f.o. for upper or lower sideband. Add on the Spectrum FD455NS board, which contains a limiting f.m. amplifier and quadrature detector and noise squelch.

Finally arrange switching for audio between a.m., f.m., u.s.b., and l.s.b. detectors ganged with the switching for the b.f.o. As a final touch add one section of the peak/notch filter from *DiBD* September 2010 *PW* as a narrowband c.w. filter!

Final Words

Previously in *Technical for the Terrified* (*T4T*) I have dealt with superhet receiver theory in October 2006 with the Superhet System, also in October 2008 with The HF Receiver. Remember, you can re-read the first 27 articles in this series have been compiled into a spiral bound book *Technical for the Terrified*, available form the PW Bookstore or from myself at **Spectrum Communications**. Any reader wishing to contact me regarding the contents of this article or previous ones, please E-mail **tony@pwpublishing.ltd.uk** ●

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The Second Practical Wireless 70MHz Low Power Contest Results 2010

Editor's thanks: *My thanks go to Colin G6MXL for his efforts in running the new 4m contest and also to those keen types who matched his efforts by entering. With your continuing support our latest v.h.f. contest could become an established event each year. Thank you everyone!* ***G3XFD****.*

The 10 entrants to the second *Practical Wireless* 70MHz Low Power contest on Sunday June 6th 2010 made a total of 154 valid contacts with 79 different stations in 21 different squares. The number of entries and number of contacts are both down in comparison with the first contest in 2009.

Radio conditions were variable, and although some DX was worked, many stations complained of a lack of activity. However, I'm pleased to report that several Foundation callsigns appeared as stations worked or as part of a team.

The Winners

The overall winner, winning team and leading English station is **The Bolton Wireless Club G0BWC/P**, operating from IO83RO. They used an Icom IC-7000 transceiver with a Spectrum transverter and a home-brew 5-element yagi antenna.

In second place overall and leading single operator and fixed station is **David Martin M0EMM**, operating from IO82SQ.

Full details of the results can be found in the tables in this article. As usual, certificates will be sent to all the leading stations and the leaders in each square.

Checklog Appreciated

Many thanks to **Rhys Thomas GW4RWR**, operating from IO83HE for his useful check log.

The Weather

Entrants found a mixture of weather! **Owen Wheeler G0NCE** operating from home in Hoo, near Rochester in JO01 square reported that, "Storms and lightning kept me away for an hour or two – but enjoyed the few contacts I made."

Mark Palmer G0OIW/P remarked on the, "Lovely Sunny Day" from his portable location at the Aston Clinton Nature Reserve, Oxfordshire, in IO91 square.

No DX

David Martin M0EMM wrote, "Please find attached my log for the *Practical Wireless* low power 70MHz contest. I enjoyed the contest and 4m is a great band. And I think that it's superb that *PW* organises this contest to encourage activity. I heard some eastern European broadcast f.m. stations during the contest – but unfortunately no

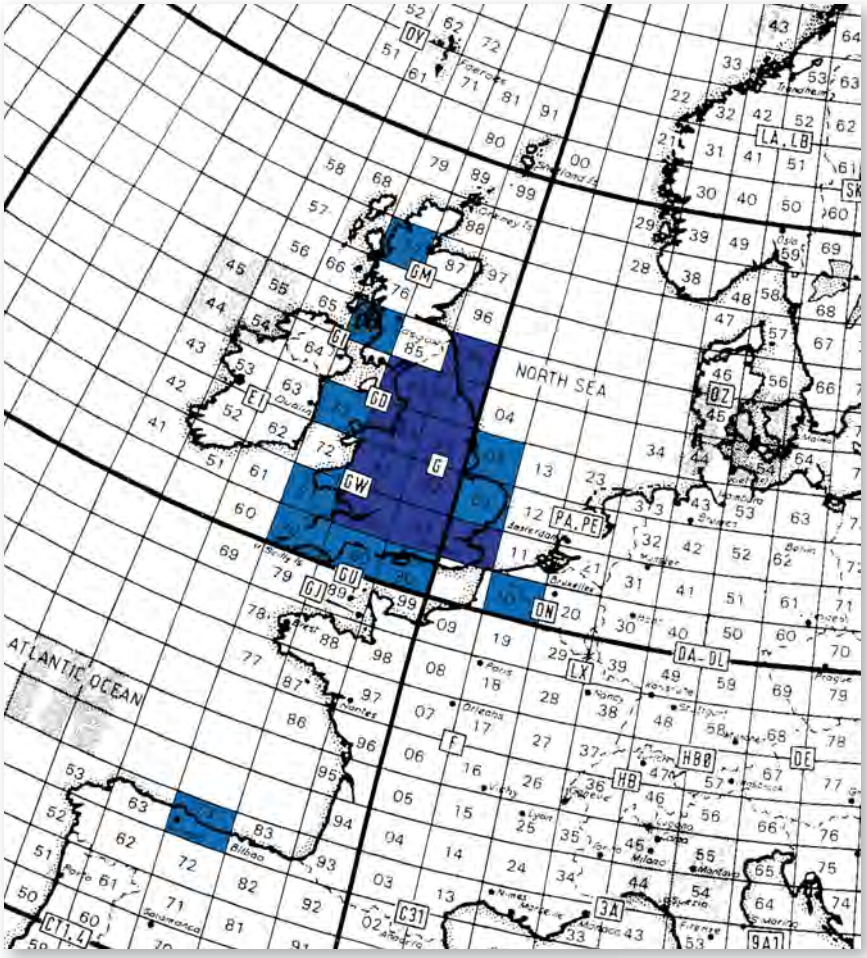

Fig. 1: Map showing locator squares of stations that entered (in dark blue) and other stations worked (light blue).

Colin Redwood G6MXL – the Contest Adjudicator – presents the results of the second annual 70MHz contest.

Fig. 2: Wining team, Bolton Wireless Club G0BWC/P, were not content with just entering the **PW** *70MHz contest, they also had two other stations G6GVI/P and G8TDF/P on the air on 23cm and 13cm respectively taking part in the UK Microwave Group Low-Bands contest.*

Fig. 3: The two-element HB9CV antenna built and installed by Owen Wheeler, G0NCE, can be seen on his mast above his 50MHz and 144MHz yagis.

DX worked, activity seemed low in comparison to other contests on this band with no EI or GM stations worked."

David Thorpe G4FKI, wrote, "Conditions were not very good, only heard one DX station in OM (Slovak Republic) very briefly, not much activity heard at all. Heard three other stations that I was unable to work including G4ASR."

Despite the poor conditions **Gordon Emmerson G8PNN/P** managed to work EA1DDU (Spain) in IN73 square.

Multi-Band

Not content with just entering the *PW* 70MHz contest (and winning it!), the Bolton Wireless Club G0BWC/P, also had two other stations **G6GVI/P** and **G8TDF/P** on the air on 23cm and 13cm respectively taking part in the **UK Microwave Group Low-Bands Contest** (**Fig. 2**).

First Time

For Owen Wheeler G0NCE the contest was his first activity on 4m. He even built a two-element HB9CV antenna to have more of a chance and installed it on his mast above his 50MHz and 144MHz yagis (**Fig. 3**), but he found that his FT-847 proved as deaf as a door post!"

Bob Varcoe M0RHV, of the **Weston Super Mare Big Wheel Contest Group** wished he, "had longer to operate, it seemed very quiet this year. I did my best and it looks like we will keeping our position of coming last again. However, I had to resort to using the f.m. calling frequency to raise the **one contact**. Although I had a part contact with another station in Shropshire.

"He came back to me, made a funny buzzing noise, went off suddenly and I never heard him again. I did not even get his callsign. I think he must have blown up! Only on for an hour, had to help dismantle the **NFD CW** site two miles away. No good on 4m as the NFD site was on low ground. Thanks for all you have done for us."

Logging Accuracy

Logging accuracy was generally much better than on the *PW* 144MHz QRP contest. Few /P errors were noted. One station also made use of c.w. in addition to other modes to gain a few extra points or a multiplier.

The Entries

Entries in 2010 were roughly half of those in 2009, although three stations contacted me to let me know that for a variety of personal and logistical reasons they were unable to participate this year. Nevertheless this was rather disappointing especially as two requests from 2009 had been acted upon, namely to have the contest on a Sunday and not the same weekend as the *PW* 144MHz QRP contest. In addition several stations in 2009 had indicated that they intended to participate for the first time in 2010.

Power Limit

Feedback from non-participants and some participants suggests that the

10W power limit for the contest is discouraging participation, especially from more outlying areas. There were no entries this year from Scotland, Isle of Man, Northern Ireland, Eire or the Channel Islands.

From the correspondence I've received – there's a feeling that 10W is insufficient to overcome the heavy QSB often encountered on 70MHz. In addition, many PMR transceivers are used on the band, and it is not easy to turn these down to achieve the 10W power limit. Both of these factors are discouraging potential entrants.

A typical comment came from **David Martin M0EMM**, who wrote, "10W and the deep QSB that's prevalent on this band made some contacts difficult but that's part of the fun. I made a few contacts on f.m., notably **Walt Davidson G3NYY**, who was using a hand-held and home-made 'Slim Jim' antenna to activate a SOTA summit. I also tried 'ancient modulation' (a.m.) but had no takers."

"On speaking to some GM stations later they felt 10W was too low under flat conditions to guarantee many contacts to make their efforts worthwhile. I don't think I agree – but it would probably have been a disadvantage for them. Maybe a QRO section could be formed rather than a single or multi-operator section, or change the date so that it runs in conjunction with the Fourth RSGB cumulative contest in pretty much the way the 2m QRP contest and the backpackers contest do."

Rule Changes

To address these comments, the rules will be revised for 2011, to introduce low and high-power sections replacing the single/multi-operator sections. The 'Open Section' will be for single and multi-operator stations running up to the maximum power permitted by the station's licence.

The 'Low Power' Section will be limited to the current 10W at the output of the transmitter/transverter for single and multi-operator stations. This will still enable Foundation Licence holders and others who prefer low power to compete on a reasonably level playing field.

Suitable Date?

Finding a suitable Sunday in June for the *PW* 70MHz Contest that avoids clashing with major 50MHz contests, the *PW* 144MHz QRP contest and the RSGB's HF CW field day is proving impossible. So, in 2011 it's likely that the contest will move to another date, probably in the second half of September, to avoid clashes with other contests and while still getting some reasonable weather.

Simple Scoring

One of the main reasons for the success of the 144MHz QRP contest over the years is that it is simple to enter. This means that paper log sheets can be accepted as scoring is simple (one point per contact). This simple approach has encouraged many newcomers to dabble their feet in contesting waters for the first time, which was one of the main aims of **Neill Taylor G4HLX** when he launched the 144MHz QRP contest. For this reason I am not proposing to change the scoring for the 144MHz contest.

I sense that at 70MHz, there are fewer newcomers to contesting than at 144MHz, although this might change as more commercial equipment becomes available for the band.

Changing to another scoring method (e.g. points per km) would require re-keying those logs submitted on paper. I'm reluctant to insist on computer files, and I would prefer to avoid the risks of transcription errors by re-keying paper logs to calculate distances for each contact. Because of this I'm therefore proposing to keep

Setting up the station at G0BWC/P that went on to become the overall winner and leading English station is The Bolton Wireless Club G0BWC/P, operating from IO83RO.

The setup for G0BWC/P was an Icom IC-7000 transceiver with a Spectrum transverter, feeding a home-brew 5-element yagi antenna, with 'Armstrong rotator'.

the current scoring system for the 70MHz contest, at least for 2011.

Plans For 2011

For 2011 I am hoping that the change of sections, one with a higher power limit, and the change of date will encourage much greater participation and return entries back above 20. This I consider to be the minimum for the contest to be viable long-term.

I'm expecting the rules for the 2011 *Practical Wireless* 70MHz Contest to appear in the September 2011 issue due in the shops mid-August 2011.

Congratulations & Thanks

Congratulations to the 2010 winners and on behalf of all entrants a big "Thank You" **to all stations** that participated. Let's all hope that with the changes proposed for 2011, support will improve and the contest will go from strength to strength. ●

Table 1: Leading Stations

Descritpion	Name/Team	Callsign
Overall Winner	Bolton Wireless Club	G0BWC/P
Runner Up	David Martin	M0EMM
Leading Fixed Station	David Martin	M0EMM
Leading Single Operator	David Martin	M0EMM
Leading Multi-Operator	Bolton Wireless Club	G0BWC/P
Leading English Station	Bolton Wireless Club	G0BWC/P

Table 2: Overall Results Table, *Practical Wireless* 70MHz Lower Power Contest 2010

Pos	Call	Name	Single	QSOs	Squares	Score
1	G0BWC/P	Bolton Wireless Club		36	14	504
2	M0EMM	David Martin	S	21	16	336
3	G0EHV/P	Eddie Ashburner	S	23	13	299
4	G8PNN/P	Gordon Emmerson	S	21	13	273
5	G2CP/P	Scarborough Amateur Radio Society		18	10	180
6	GB2BP/P	Milton Keynes Amateur Radio Society		12	6	72
7	G0NCE	Owen Wheeler	S	10	6	60
8	G0OIW/P	Mark Palmer	S	7	4	28
9	G4FKI	Dave G4FKI	S	4	4	16
10	MORHV/P	Weston Super Mare Bigwheel Contest Group	S	1	1	1

Table 3: Leading multi-operators

Pos	Call	Name	Single	QSOs	Squares	Score	Locator	Transceiver	Antenna	Ht. asl
1	G0BWC/P	Bolton Wireless Club		36	14	504	IO83RO	Icom 7000 + Spectrum TVTR	homebrew G0KSC 5-ele OWA	335
5	G2CP/P	Scarborough ARS		18	10	180	IO93OX	Yaesu FT450 + Spectrum TVTR	HB9CV	258
6	GB2BP/P	Milton Keynes ARS		12	6	72	IO91PX	Yaesu FT897 + R.N.Electronics TVTR	3-ele Delta Quad from Sandpiper	77

Table 4: Leading single operators

Pos	Call	Name	Single	QSOs	Squares	Score	Locator	Transceiver	Antenna	Ht. asl
2	M0EMM	David Martin	S	21	16	336	IO82SQ	Icom7600 + Spectrum TVTR	4-ele Vine Antennas LFA	175
3	G0EHV/P	Eddie Ashburner	S	23	13	299	IO84XT	Yaesu FT847	5 Element Yagi	490
4	G8PNN/P	Gordon Emmerson	S	21	13	273	IO95CI	Kenwood TS 140S + Spectrum TVTR	5-ele HB Yagi	192
7	G0NCE	Owen Wheeler	S	10	6	60	JO01GK	Yaesu FT847	2-ele HB9CV HB	70
8	G0OIW/P	Mark Palmer	S	7	4	28	IO91MP	Wouxun KG699E hand-help	Five-eights vertical	260
9	G4FKI	Dave G4FKI	S	4	4	16	IO92SA	Yaesu FT847	3-ele Yagi	60
10	MORHV/P	Weston Super Mare Bigwheel Contest Group	S	1	1	1	IO81MH	Ascom 550	vertical	80

Table 5: Square Winners

Square	Name	Call	No. entries
IO81	Weston Super Mare Bigwheel Contest Group	MORHV/P	1
IO82	David Martin	M0EMM	1
IO83	Bolton Wireless Club	G0BWC/P	2
IO84	Eddie Ashburner	G0EHV/P	1
IO91	Milton Keynes Amateur Radio Society	GB2BP/P	2
IO92	Dave G4FKI	G4FKI	1
IO93	Scarborough Amateur Radio Society	G2CP/P	1
IO95	Gordon Emmerson	G8PNN/P	1
JO01	Owen Wheeler	G0NCE	1

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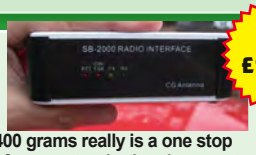

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The Rev. George Dobbs'

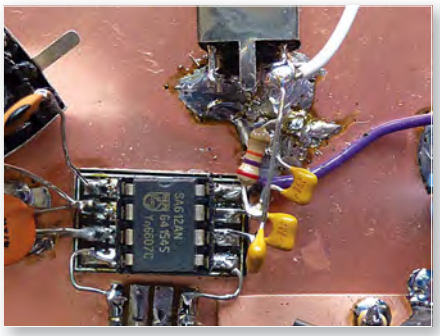
carrying on the practical way

The Rev. George Dobbs G3RJV says he's "Improvising on a theme" – after the appropriate quotation, of course!

Sometimes it works, sometimes it fails, but that's what we face when we're dealing with improvisation.
Jan Garbarek (Norwegian jazz saxophonist. Born 1947)

Welcome to *Carrying on the Practical Way* (*COTPW*)! After nearly 15 years writing this column, I have managed to quote Jan Garbarek! I'm delighted in doing so because in 1994, during heightened popularity of Gregorian chant, his album *Officium*, a collaboration with early music singers the **Hilliard Ensemble**, became a best-selling CD. And when my sons dragged me into the modern world by buying me an iPod for Christmas, it was the first CD I added to the wonderful machine!

Nowadays – if I feel below par at any time – listening to the Ensemble's rendering of *Parce Mihi Domine* usually rescues the situation. But enough of music in a radio column – although there is a connection! This is because there are times when an enjoyable evening can be had improvising with a soldering iron and a few radio parts – a sort of radio jazz!



The mixer oscillator of the direct convertion Sudden-style receiver, the white wire goes off to the local oscillator tuning capacitor.

There is no amplification at the i.f. from the first mixer, just a tuned matching transformer. This and the b.f.o. feed a double diode second mixer and the audio output goes straight to the input of the LM386.

Keeping this monthly column going does mean that I build up a lot of little circuit boards. What happens to those projects? The answer is – not very much. There are some that I keep because I will use them but many of them are dropped into an blue two-litre ice cream box marked 'PW Projects'. Then, from time to time I retrieve parts from the boards as I need them for other projects.

If the box gets too full, I spend an evening stripping worthwhile parts from unwanted boards before the rest of the board is consigned to the waste bin.

Manhattan Technique

A short time ago (November 2009) I described building a version of the Sudden receiver using Manhattan construction techniques. The complete receiver used parts soldered to small pads glued onto a blank printed circuit board ground-plane. This receiver was the Rishworth (Yorkshire) QRP Convention 'Buildathon' project and I know that it was also built by a number of *PW* readers.

Recently, the Sudden board board emerged from the ice cream box ready for the salvaging of parts.

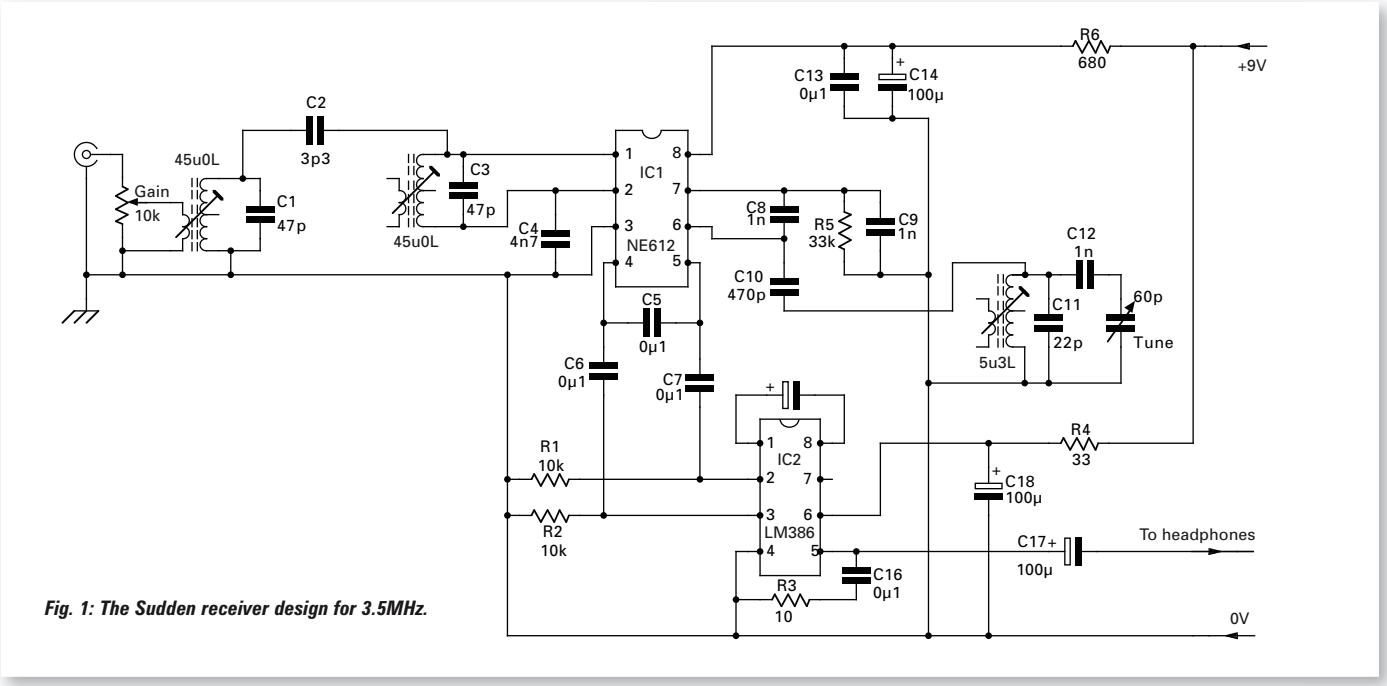


Fig. 1: The Sudden receiver design for 3.5MHz.

Rev. George Dobbs G3RJV
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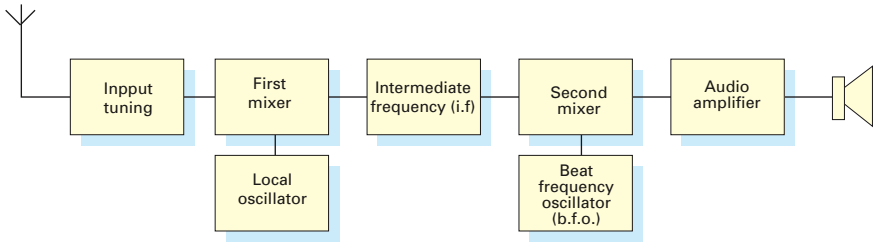

Fig. 2: Block diagram of a typical superhet receiver.

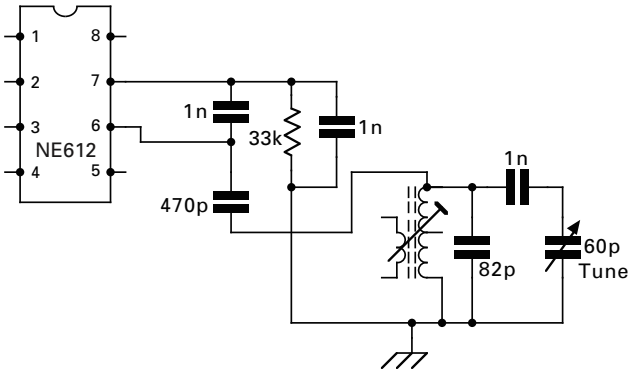

Fig. 3: Changes to the l.o. tuned circuit to allow it to oscillate 455kHz below the desired signals in the 80m band.

Somehow however, I didn't have the heart to 'trash' the board, as I remember watching newcomers to radio construction build their versions of it both at the Rishworth Convention and at the QRP event at the Dayton Hamvention in Ohio. Incidentally, readers can even view a short video of me commenting on the project at **http://www.flickr.com/photos/mustbeart/3544283336/in/photostream/**

Then I recalled once trying to convert the Sudden receiver into a superhet receiver and thought I might try it again using the salvaged board. This eventually became true improvisation as the photographs clearly show. They bring a whole new dimension to the term 'ugly construction'!

The Manhattan style receiver I described was for the 7MHz (40m) band although the one pulled from the ice cream box was built for the 3.5MHz (80m) band. The diagram, **Fig. 1**, shows the circuit of the 80m version; it differs from the 40m version in the values for the input band-pass filter and the local oscillator.

All the inductors are from the 10mm 10K coil range sold by **Spectrum Communications**. Naturally beginning with an 80m receiver, I decided to proceed with an 3.5MHz superhet version. This would allow me to use an intermediate frequency of 455kHz easily.

Superhet Described

For those readers who are not familiar with the idea of an 'intermediate frequency', usually simply called the i.f. frequency, I will briefly describe the superhet receiver. And putting it very simply – a superhet is like two direct conversion (DC) receivers in line. The diagram **Fig. 2**, shows the block diagram for a typical superhet receiver.

The radio signal from the antenna is processed in the Input tuning. This will have tuned input circuits for the desired frequency. The tuned signal passes into the first mixer where it is mixed with the signal from a local oscillator. This is a variable oscillator whose frequency is offset from the desired radio frequency (r.f.) above or below by the intermediate frequency. The result of this mixing is that the modulation on the required signal, at whatever its original frequency, is now present at the intermediate frequency (i.f.).

The frequency changing enables further processing to be done in the i.f. stages. It also has the advantage that filtering and further amplification can all occur at a fixed frequency.

Typically (for Amateur Radio use) the processed signal passes to a second mixer and mixed with a signal from the beat frequency oscillator (b.f.o.). The b.f.o. frequency is offset from the i.f. by a desired audio frequency (typically 800Hz) so that an audio tone can be derived to read Morse or single-sideband signals. The resultant audio signals are then amplified to a listening level.

The whole process is really quite simple. Instead of the single conversion from radio to audio frequency signals in the DC receiver, two conversions take place to allow for i.f stages. Take out the i.f. stages, second mixer and b.f.o. and we are looking at a DC receiver. Not only that, the stages we have removed also look like another DC receiver!

Chosen Intermediate Frequency

My chosen intermediate frequency is 455kHz because this is a common i.f. in commercial amplitude modulation (a.m.) receivers and parts are easy to obtain. The receiver is for 3.5MHz (80m).

Since the i.f. is 455kHz, the required tuning range of the local oscillator is 3.045MHz upwards; tuning on the low side of the i.f. frequency. This requires some adjustment of the local oscillator frequency. The values required to obtain this frequency range are shown in **Fig. 3**. These values will cover all of the c.w. (Morse) and most of the s.s.b. sections of the 80m band. The tuned circuit is made up from a 5u3L (5.3 micro-Henry) coil and a polyvaricon variable capacitor with a maximum capacitance of 60pF.

The frequency of the local oscillator can be checked by connecting a frequency counter to the unused winding of the 5u3L coil. Failing this, listen for it on another receiver with a length of wire from the receiver antenna input draped close to the oscillator.

The suggested changes to the circuit for the superhet version of the 3.5MHz Sudden is shown in **Fig. 4**. Here, I've replaced the two stage input filter with a single tuned circuit with a 60pF peaking capacitor. However, my original version simply had the inductor with a fixed

capacitor peaked at the centre of the band by adjusting the core of the coil (L1). This works very well for those who do not want to add an extra variable capacitor.

A 47pF or 68pF capacitor can replace the 60pF variable capacitor, as either value will tune the band by adjusting the core of L1. The low impedance winding on L1 provides the antenna input. A linear potentiometer on the input offers the gain control for the whole receiver. The more usual place for the receiver gain control would be at the input to the audio amplifier but having the gain control on the antenna input works well for a simple receiver. Reducing the source signal can help to prevent overloading and cross modulation problems.

Minimalist Superhet

The part circuit in Fig. 4, is really a minimalist version of a superhet receiver. In fact, all this receiver does is perform two frequency conversions; input frequency to i.f. frequency and then i.f. frequency to audio frequency. There's none of the filtering or amplification at the i.f. frequency usually associated with the superhet receiver.

Pins 4 and 5 from the NE612 mixer, offer a balanced output of the mixed products produced by the input and local oscillator. What we are looking for is the difference between the input frequency and the local oscillator when they are 455kHz apart. This is the information contained in the input signal emerging as a 455kHz signal.

The desired 455kHz signal is tuned, by using an i.f. transformer that resonates at 455kHz. These are often available as surplus items or could be culled from and old a.m./f.m. radio. If doing this, try to get the final i.f. transformer and this matches well into the second mixer.

The tuned winding will be the side of the transformer with 3 pins. Just connect pins 4 and 5 of the NE612 (NE602 or SA602 are the same chip) to the outer pins. The winding is tuned to 455kHz by an internal capacitor, marked 'C int' in Fig 4. Two diodes, D1 and D2, at the output pins of the transformer act as the second mixer. These can be almost any common silicon diodes (1N914, 1N4148 etc.) although I used the rather better option of a pair of Schottky diodes (BAR28, 1N5711, etc.). The beat frequency oscillator (b.f.o.) signal is introduced at the point where the diodes connect.

The b.f.o. is a simple oscillator that can be off-set slightly from 455kHz; see the description of the superhet receiver earlier in this article. Probably the easiest option is to use another 455kHz i.f. transformer in a version of the Hartley oscillator shown in **Fig. 5**. This uses a field effect transistor (f.e.t.) and very few parts. The centre pin on the tuned winding is used as the feedback point to maintain oscillation. Oscillator output is taken from the drain of the f.e.t. and fed to the mixer via a 100pF capacitor.

Constructors who have a frequency counter can connect it to the unused winding of the i.f. transformer and adjust the frequency using the core of the transformer coil. However, this is not very critical as I will mention below.

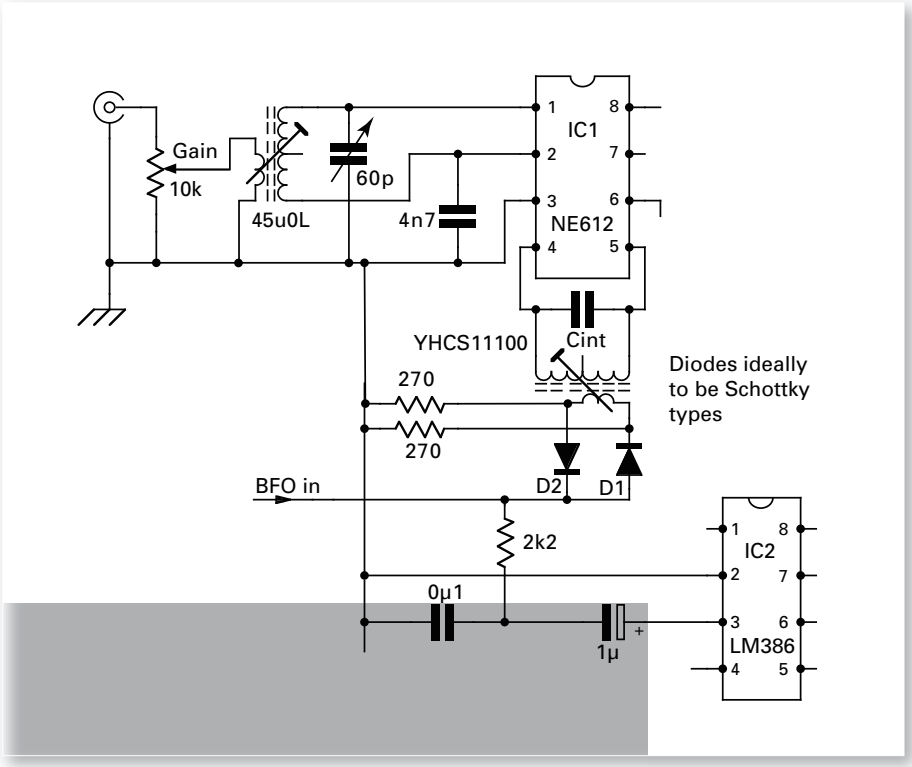

Fig. 4: The part circuit of the 'minimalist' superhet design discussed by G3RJV.

A Little Drift

Once I finished the receiver project, I noticed a little frequency drift in the b.f.o. of my prototype receiver. Despite the slight drift – it wasn't enough to spoil the resolution of c.w. or s.s.b. signals.

For readers who would like to try a better b.f.o. circuit, I can commend the circuit of **Fig. 6**. I have used this several times in the past and it has always worked very well. One slight problem is that the reader will have to find a 455kHz ceramic resonator. Having said that, several UK component traders list them in their current stock.

The Murata CSB455E works well in the circuit as does the ZTB455kHz – but I guess that any generic 455kHz resonator would do the job. The 60pF trimmer and 1mH inductor produce a frequency swing of some 454.9 to 455.7kHz.

The Amateur band signals we require (audio products from the mixing of the i.f. signal and the b.f.o.) undergo crude r.f. filtering with the 2.2kΩ resistor and 100nF (0μ1) capacitor and pass via the 1μF electrolytic capacitor to the input of the LM386 audio amplifier chip. The output from the LM386 will drive a pair of MP3/portable cassette player type headphones or a small loudspeaker.

Bare Bones Design

This month's project is a very much a 'bare-bones' superhet design but one advantage is that the exact i.f. frequency isn't very critical. Somewhere around 455kHz will serve the purpose if the b.f.o. is adjusted

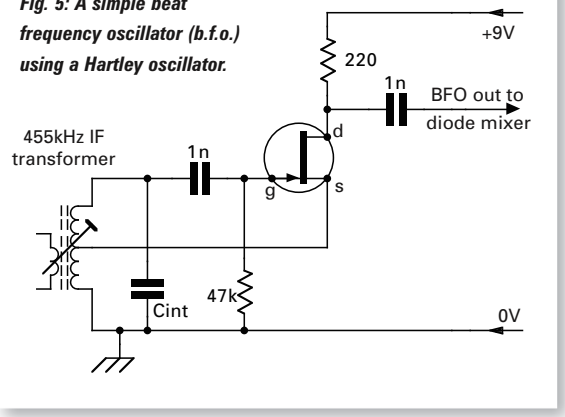

Fig. 5: A simple beat frequency oscillator (b.f.o.) using a Hartley oscillator.

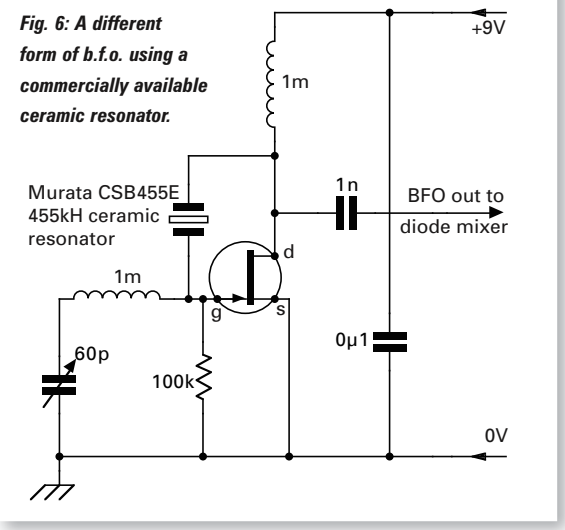

Fig. 6: A different form of b.f.o. using a commercially available ceramic resonator.

for a suitable off-set. All of this can be done by ear.

Simply check that the circuit is correct and switch on and tune the local oscillator for signals. Morse (c.w.) signals should be heard at the lower end of the tuning range. If no signals are heard – or the signals are very high, or low pitched – adjust the core of the i.f. transformer and/or the core of the b.f.o. coil until they can be heard at an appropriate pitch. The same procedure can be carried out for s.s.b. signal higher up the band.

Retaining the settings for the s.s.b. signal should also produce reasonably pitched signals for c.w. stations. Using the receiver requires a little experimentation – but the results are self-evident when you get it right.

I was pleasantly surprised by the Sudden superhet. It yielded plenty of signals on the band using a reasonable antenna matched to the input via my antenna tuning unit (a.t.u.). Indeed, I think it would make a good 'first superhet' project. And as, unlike a DC receiver, it only resolves the signal on one side of the centre frequency of the station and it also sounds like a 'real receiver'! Cheerio until next time – keep your soldering irons busy! ●

Please check with the organisers that the rally is 'on' before leaving home.

rallies

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Radio rallies are held throughout the UK. They're hard work to organise so visit one soon and support your clubs and organisations. PW Publishing Ltd. is attending at rallies marked *.

November

November 13th

The Rochdale Rally

The Rochdale and District Radio Society Traditional Radio Rally will be held in St Vincent's Church Hall, Caldershaw Road, Rochdale OL12 7QL. Doors will open at 10.30am (10.15am for the disabled) and entrance will cost £2.50 with concessions for seniors and children under 12. There will be a Bring & Buy and catering.

Dave G0PUD
Tel: 07710 243107
E-mail: dave.shaw1@sky.com
www.radars.me.uk

November 21st

The Plymouth Rally

The Plymouth Radio Club will be holding their rally at the Elm Community Centre, Leypark Walk, Estover, Plymouth PL6 8UE. Doors will open 10.00am, admission will be £2.00 and there will be a large adjacent free car park (limit 3 hours), trade stands, a Bring & Buy and refreshments.

Bob G7NHB
E-mail: freebobx@yahoo.com

November 28th

The Bishop Auckland Rally

The Bishop Auckland Radio Amateur Club (B.A.R.A.C.) Rally will take place at the Spennymoor Leisure Centre, 32 High Street, Spennymoor, Co. Durham DL16 6DB. The doors will open at 10.30am (10.00am for the disabled) and admission will be £1.50 (children under 14 free of charge). There will be talk-in on S22, plenty of parking, catering with a bar, traders, a Bring & Buy, attractions for all the family and facilities for the disabled.

Mark G0GFG
Tel: 01388 745353
Brian G7OCK
Tel: 01388 762678
http://barac.m0php.net/rally

January 2011

January 16th

The Dover Rally

The Dover Amateur Radio Club Rally will be held at the Whitfield Village Hall, Dover CT16 3LY. The doors will be open from 9.00am to 1.00pm and admission will be £1.00. There will be talk-in via GB3KS, trade stands and catering.
www.doverradiorally.com

January 16th

The Red Rose Winter Rally

The West Manchester Radio Club will be holding its Red Rose Winter Rally at a brand new venue – The George H Carnall Leisure Centre, Kingsway Park M41 7FJ. This is just off Junction 9 of the M60, opposite the Trafford Centre. The doors will open at 11.00am and there will be a free car park, trade stands, a low cost Bring & Buy, special interest groups, a café area with a licensed bar and facilities for the disabled.

Steve
Tel: 07502 295141
www.wmrc.org.uk

February

February 6th

The Canvey Rally

The 26th Canvey Radio & Electronics Rally will be held at The Paddocks, Long Road, Canvey Island, Essex SS8 0JA, which is at the southern end of the A130. The doors will open at 10.30am, admission will be £2.00 and there will a free car park, trade stands, catering and facilities for the disabled.

Dave G4UVJ
Tel: 01268 697978 (evenings)
www.southessex-ars.co.uk

February 13th

The Harwell Rally

The Harwell Radio and Electronics Rally will take place at the Didcot Leisure Centre, Mereland Road, Didcot OX11 8AY – 3 miles from the A34 between Oxford and Newbury. The doors will open at 10.30am (10.15am for the disabled) and admission will be £2.50 (children under 12 free). There will be talk-in (GX3PIA) on 145.550MHz, free car parking, trade stands, special interest groups, a flea market, catering with a licensed bar and facilities for the disabled.

Ann G8NVI
Tel: 01235 816379
E-mail: rally@g3pia.org.uk
www.g3pia.org.uk

March

March 6th

The Exeter Rally

The Exeter Radio and Electronics Rally will be held at the America Hall, De la Rue Way, Pinhoe, Exeter EX4 8PW. The doors will open at 10.30am (10.15am for the disabled) and admission will be £2.00. There will be talk-in, trade stands, a Bring & Buy and catering. All profits from the event will be shared between the local 2m and 70cm repeaters, GB3SW, GB3EW and GB3EX.

Pete G3ZVI
Tel: 07714 198374
E-mail: g3zvi@yahoo.co.uk

March 19th

The Lagan Valley Rally

The Lagan Valley Amateur Radio Society Rally will be held at The Village Centre, 7 Ballynahinch Road, Hillsborough. The doors will open at 11.30am and there will be car parking, trade stands and catering.

Jim GI0DVU
Tel: 02892 662270
E-mail: jim.henry@ntlworld.com

Colin Redwood's

what next?

This month Colin Redwood G6MXL sets about helping readers to choose a suitable rig.

Welcome to *What Next?* (*WN?*) where this month I'm planning to try to help with a very difficult task! The difficulties often appear because one of the most common questions readers ask me is, "Which transceiver should I buy?" Unfortunately, I find this one of the most difficult questions to answer as there are so many factors to consider!

What suits one Amateur might be unsuitable for another. In any case, I'm not familiar enough with the wide range of transceivers on the market to be able to recommend one transceiver over another. So, rather than attempt to answer the question specifically, I think it's better to help readers to consider the various factors, to help them decide what's important to them in their own circumstances.

Four Main Categories

Broadly speaking most amateur transceivers fall into one of four main categories. Mobile transceivers are designed to fit into and be operated from cars. They require 13.8V, most likely to be supplied from the car's electrical system. Those intended only for the v.h.f. / u.h.f. bands are generally frequency modulation (f.m.) only transceivers. Power output varies between models, but generally speaking rarely exceeds about 50 Watts for v.h.f. / u.h.f. models.

Hand-held transceivers are small compact 'walkie-talkie' light-weight transceivers with internal batteries, designed to be held in the hand, **Fig. 1**. They are usually small enough to slip into a shirt pocket when not in use. Handhelds are generally f.m. transceivers and cover one or more v.h.f. or u.h.f. bands, with the 2m and 70cm being the most commonly encountered. Hand-held transceivers are normally supplied with a flexible whip antenna.

If you also intend to use a hand-held transceiver in a car or at home, you may find that you need an adapter to connect a feeder terminated in a PL259 or BNC plug to the SMA connector usually found on the top of the transceiver. Power output varies between models, but rarely exceeds 5W. Smaller handhelds generally have lower output power.

Fixed transceivers are generally bigger and much heavier than mobile or hand-held transceivers, **Fig. 2**. They can weigh up to 20kg or more, so they're not the sort of transceivers to carry around! Generally speaking ,the specifications of fixed transceivers are higher than hand-helds and mobile transceivers. Output power is usually 100W, although a few are available with higher or lower power out.

Multi-Purpose is a classification that I have chosen to use for transceivers such as Yaesu's FT817 (**Fig. 3**) which can be used portable, mobile or as a fixed station transceiver.

Fig. 1: The new Icom IC-T70E hand-held v.h.f. and u.h.f. transceiver, reviewed by Tim Kirby G4VXE in the October 2010 issue Practical Wireless.

Frequency Bands

The frequency bands that a transceiver covers will probably be major criteria for most Amateurs. Over time the range has increased considerably. Many older h.f. transceivers didn't cover the **World Amateur Radio Conference** (WARC) bands of: 10MHz (30m), 18MHz (17m) and 24MHz (12m), others didn't cover Top Band 1.8MHz (160m). The 50MHz (6m) band is also relatively new and again some older transceivers didn't include it.

Next, it's on to v.h.f. and up, where the 70MHz (4m) band is rarely available in multi-band transceivers. Above 430MHz (70cm), only a small number of transceivers have included 1296MHz (23cm), the lowest of the Amateur microwave bands. Generally speaking, hand-held transceivers offer between one and four bands, whereas fixed transceivers offer the greatest choice of bands.

To save space, it may be an idea to choose one transceiver that covers all the bands you may want to operate on, rather than having several transceivers each covering a small number of bands.

Power Supply

Whilst hand-held transceivers will use internal batteries as their main source of power, most have a socket to enable an external power source to be used. Mobile transceivers require 13.8V, typically from a car. There is no reason why they cannot use a mains power supply unit capable of delivering 13.8V d.c. with sufficient current.

Some fixed transceivers have a built-in mains power supply unit (p.s.u.). Others require a 13.8V d.c. supply. A few fixed transceivers have a built-in mains supply, but can optionally be used with an external 13.8V d.c. supply. This can make them useful for an occasional field-day activity.

Automatic ATU

For h.f. transceivers, unless you have

Fig. 2: The Kenwood TS-570D is a typical modern h.f. transceiver with a built-in automatic a.t.u. Output power can be adjusted between five and 100W, making it suitable for those with a Foundation Licence intending to upgrade to an Intermediate and Advanced Licence. It needs an external power supply unit (p.s.u.) for mains operation.

Fig. 3: The popular Yaesu FT-817N is a low power multi-band, multi-mode transceiver with built-in batteries enabling it to be used anywhere.

resonant and matched antennas, consideration will need to be given to an antenna tuner unit (a.t.u.). Some h.f. transceivers have a built-in automatic a.t.u. (a.a.t.u.). Some others have these as an optional extra. Built-in a.t.u. may not cover all bands (for example 1.8MHz and 50MHz) and they may have a limited matching range in comparison with a separate a.t.u.s.

The Cost?

The most expensive transceivers on the market now cost several thousand pounds and most Amateurs simply can't afford that amount of money. However, this needn't be a problem, as there are many transceivers available that perform well and will give very good results at well under £1000 when new. These can cost considerably less, when second-hand as *PW* author **Chris Lorek G4HCL** describes in his regular series *Buying Second-hand*.

In budgeting, it's worth bearing in mind what extras might also be needed. You may need a p.s.u., a.t.u., antenna and feeder – items that are all likely to feature on the shopping list, although the a.t.u. and p.s.u. may be built-in with some transceivers.

Operating Modes

If you're interested in a particular operating mode – it makes sense to make sure that it's available on your transceiver. For example, if you're a keen c.w. operator, I can't think of any suitable hand-held transceivers – since I can think of none that have c.w. (Morse) mode. With other transceivers you may want to check that they have a good c.w. filter, either as standard or as an available optional extra. If you're interested in data modes, you may want to check that the transceiver has suitable input and output sockets for data operation.

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Output Power

If you enjoy low power operation (QRP) or have a Foundation or Intermediate Licence, then you'll want to choose a transceiver that allows you to run low power. **Note:** Not all 100W transceivers can easily be turned down to operate low power. Additionally, if you want to use your transceiver with a transverter (usually to transvert up to v.h.f. and u.h.f.), then the ability to get the power down to very low levels will be a key consideration.

On the v.h.f. and u.h.f. bands, older transceivers generally had maximum output power of 25W or less. This meant that many Amateurs bought, or perhaps built, linear amplifiers to increase the total power output from their station. These days, many fixed transceivers provide 100W output power on the v.h.f. bands, so dispensing with the need for separate linear amplifiers.

Non-Amateur Band Reception

Some Radio Amateurs may enjoy listening to broadcast stations on the h.f. and v.h.f. bands. If this is important to you, then I would certainly suggest checking that your proposed transceiver allows you to do this. Also check that in providing wide-band coverage, the transceiver's Amateur band reception has not been compromised by leaving the front-end wide open to out of Amateur band signals.

The Display

The displays on transceivers differ a lot. At one extreme, there are some that show little more than the operating frequency, whilst at the other extreme there are some that look as though they would be more at home at NASA mission control! While many Amateurs will be quite happy to settle for a simple display, I think it's important that the rest of the front panel clearly shows things like operating mode, whether operating split frequency, etc.

Local Net Or DX?

If most of your contacts are going to be participating in the local net, then features such as being able to operate split frequency are probably not needed. If you want to chase DX, then split frequency will be desirable (some would argue essential).

Repeater Operation

On the v.h.f. and u.h.f. bands, access to repeaters is achieved by use of either an audible 1750Hz tone burst or of sub-audible continuous tone coded squelch system (CTCSS) tones. Some older transceivers only have 1750Hz tone burst, which may make them unsuitable for your purposes if your favourite repeater only has CTCSS fitted.

Some modern transceivers may not have 1750Hz tone burst fitted or it may be difficult to use it. Repeaters are very slowly moving to CTCSS from 1750Hz tone burst. My advice therefore is to try to go for a transceiver that supports both methods.

Whilst on the subject of repeaters, it is also worth checking that your proposed v.h.f. or u.h.f. transceiver supports the repeater splits used in the UK. These are -600kHz on 145MHz, +1.6MHz at 433MHz and the newer +7.6MHz at 430MHz. If you may want to use your transceiver abroad, be aware that some countries use different shifts, so again it makes sense to check this.

If you're in range of a D-Star repeater, you may wish to consider including D-Star facilities on your transceiver. I would suggest talking to local amateurs before deciding whether it is worth paying extra for this new mode.

Satellite Operation

If you want to operate through satellites, then you'll need to choose a multi-band v.h.f./u.h.f. transceiver that's capable of receiving on one band whilst transmitting on another. To operate through those satellites that use single sideband, an optional inverting arrangement is desirable, whereby as you tune higher on band, the transceiver automatically tunes lower frequency on the other.

Antenna Sockets

Whilst many transceivers have just a single antenna socket, some transceivers have more than one antenna socket (**Fig. 4**). This may be to allow a separate antenna to be used for each band. This is not uncommon at v.h.f./u.h.f. Separate antenna sockets can be useful on transceivers covering both l.f. and h.f. bands, where you may wish to have a wire antenna for the lower bands, and a beam for the higher bands.

Fig. 4: The rear panel of an Alinco DX-70 showing the separate h.f. and 50MHz antenna and other sockets.

Whilst it's unlikely to 'swing the case' for one transceiver over another, not all transceivers use the same type of socket. Modern hand-held transceivers generally employ SMA sockets, as they're smaller than the BNC of previous generations of hand-helds. Transceivers covering the h.f. bands use SO239 sockets (requiring feeder fitted with PL259 plugs). On the v.h.f. bands larger transceivers mainly use SO239 or N-type sockets. On the 70cm band and above, N-type sockets are much more common.

Other Sockets

The number and purpose of any additional sockets varies greatly. Most handheld transceivers provide some arrangement to attach at least an external microphone and headphone. The connectors used for these are usually some form of jack plug. On most transceivers, except hand-helds and mobile transceivers, there will usually be a socket for a Morse (c.w.) key. On larger transceivers these sockets tend to be quarter-inch jack sockets, whilst 2.5mm or 3.5mm jack sockets are often used on smaller transceivers.

Note that the pin-outs of microphone sockets vary between the main manufacturers, even if the plug is the same type. This may be one reason why many Amateurs stick to one particular manufacturer for their main station equipment.

Ease of Use

Regardless of how simple or complex your proposed transceiver is, I think it's a good idea to see how easy it is to use in practice. Concentrate on the things that you will want to do – switching on and off, adjusting the volume, tuning around on a band, changing band, using a repeater etc. If the seller can't demonstrate these to you so that you can do these basics with confidence, is this really the transceiver for you?

New Or Second-Hand

Buying second-hand can be a little risky if you're not buying from a reputable dealer. If you are new to the hobby, then I think it makes sense to get a well established amateur to examine anything you plan to buy second-hand.

The main things to watch with older equipment are whether the transceiver you are thinking of buying has all the bands now available to amateurs. For an h.f. transceiver check whether it has 1.8MHz (160m), 10MHz (30m), 18MHz (17m) and 24MHz (12m). For a v.h.f. / u.h.f. transceiver check for repeater shifts, CTCSS and tone burst.

Useful Book

The RSGB publish a useful book, *The Rig Guide*, which summarises the key features of many current and older transceivers. Unfortunately, for many transceivers the book does not make it clear what the power supply arrangements are. Apart from this, I find the book valuable for finding out basic information about both current and older transceivers.

That's it for now. See you next month! ●

Tim Kirby's

the world of vhf

Incorporating VHF DXer

This month Tim Kirby G4VXE presents your v.h.f. news and view and looks at some useful Yaesu equipment.

Welcome to the *World of VHF* (*WoVHF*) and a question. What would you say if I told you that I'd received a message from a station travelling at 17,500MPH, 225 miles away? You'd be curious, I expect! The start of the answer is that I run a program for Automatic Packet Reporting System (APRS) on my computer. The APRS allows Amateur Radio stations to send information, along with a location which can then be plotted on a map. For example, our local repeaters are shown on the APRS map, so that visitors to the area can see where they are located and what frequencies they use. Indeed, the APRS system is an interesting mix of radio frequency (r.f.) and Internet technology.

Quite a number of mobiles carry APRS equipment which operates on 144.800MHz sending their position along with their callsign as well as other messages. The transmissions are packet radio – if you listen to 144.800MHz, you may well hear bursts of signal. Stations, called iGates receive the data from 144.800MHz and pass it onto the APRS-IS network on the internet where it can be plotted using websites such as **http://aprs.fi** or using programs such as *UI-View* or *APRSIS-32.*

The High Speed Contact?

So, back back to my high speed contact – the station travelling at 17,500MPH, 225 miles away. You've probably guessed that means the *International Space Station* (*ISS*) which is constantly orbiting the earth.

The *ISS* has various bits of Amateur Radio gear on board and one of the experiments that they do is to run a packet radio digipeater. This usually operates on 145.825MHz. So, when the space station is in range, it's possible to send a 'packet' from your v.h.f. station, have it 'digipeated' by the space station and sent back down to earth. Of course, because of the height of the space station, your digipeated packet can then be heard over a very wide area – in our case all over Europe.

On September 19th, I received a message, shown here,

The message received by Tim via the International Space Station, travelling at 17,500m.p.h at around 225 miles distance.

from **Julian Moss G4ILO** located in Cumbria. Julian had sent an APRS packet message up on 145.825MHz, where it had been received by the International Space Station's digipeater and sent back down to earth! There it had been picked up by one of the iGates which had sent the message onto the Internet and found me! As well as sending me a message, Julian was also able to have a real time, packet chat contact with a station in the Netherlands via the ISS digipeater.

You can read more about using the ISS as a packet digipeater at **http://www.ariss.net/** If you want to find out when the ISS is in range, you can use the Heavens Above website **http://www.heavens-above.com** – and actually, with my astronomical hat on, I recommend you try and see it one evening – it's quite spectacular as it passes overhead.

Natural Bowl Living

I recently speculated that living in a natural bowl, surrounded by hills, wasn't necessarily the end of the world as regards being active on v.h.f./u.h.f. After he'd read my comment – **Kevin Jackson M0XLT** has sent an E-mail about his activities, which I think you will find interesting.

"I live in Gargrave, North Yorkshire, IO83WX. When you stand in the garden there is a view of hills for the full 360°. I am situated in the centre of a ring of three concentric circles of hills that become higher as one moves away from my QTH, in fact in a natural parabola!"

"My experience at v.h.f. from this location is one of multi-path on Tropo signals which are diffracted from the edges of the bowl. My Fresnel zone scatter to the South takes me down as far as Derbyshire. Signal focussing on all signals is taking place with me, thankfully at the centre. Due to the multi-path the best antenna is a vertical, being omnidirectional and it then sees all of the reflected signals. The multi-path sometimes enhances or subtracts the signal".

"My antenna is a tri-band collinear at 6m above ground. I find that I can hear things that the stations in Skipton, four miles away, can't. I can regularly open and work through GB3YR in Rotherham at 54 miles away using just 20W. Slightly enhanced conditions brings in GB3LM in Lincoln, GB3FR near Boston, GB3KY in Kings Lynn and GB3NB in Norwich. None of the locals ever hear any of these! On s.s.b. on 144MHz, again using the collinear I have regular contacts to Essex and the SW of England using 20 Watts. A beam is useless due to multi-pathing." (*As testament to this, I know I have worked Kevin from my home in Oxfordshire and I had no idea he was 'just' using a collinear – G4VXE*).

"With regard to skywave propagation, I work stations during the Sporadic E season with very strong incoming signals. Since 2003 on 50MHz I've worked 71 DXCC and this includes A4, TT8, HI, KP4, VE, all with an Icom IC-706 MKII and a tri-band collinear."

Thanks for your fascinating feedback Kevin! However, even

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Twitter id: G4VXE

The FT-7900E provides 50W of power on the 144MHz and 40W on the 430MHz band, along with simplicity of use.

TheFT-2900E B2 has also been updated with increased output (75W), but without a cooling fan.

though Kevin is modest enough to say his success isn't down to him or his equipment– but to his location. I suspect that's not entirely true – being on at the right time and knowing what to do and where to look has a lot to do with it too! Well done, Kevin and I hope his interesting comments will serve as encouragement to people who don't live in an obviously good v.h.f. location.

Sporadic-E & The Geminids Shower

Most people associate Sporadic-E propagation with June. However, what is not quite so well known is that there's a secondary peak of Sporadic E propagation in December. Quite why, no-one really seems sure – perhaps it is connected with some of the meteor activity in December (the Geminids shower peaks on December 13/14th). Whatever the cause, it's well worth keeping an eye out on the lower v.h.f. bands; 50 and 70MHz. Additionally, it's not unknown for short openings to reach 144MHz too, so be vigilant!

The Geminids meteor shower is capable of producing some good meteor scatter QSOs too, with rates of up to 60 meteors per hour. Listen around 144.200MHz, which tends to be a centre of activity for s.s.b. activity during meteor showers, but even listening on 144.300 will normally reveal some good meteor bursts.

If you've not tried listening before, try turning your beam to a roughly north-easterly heading, from about 2100z onwards. On 50 or 70MHz, listen around the calling channels or perhaps to some beacons. On the lower bands, you should find that reflections are longer, but weaker.

On 50 and 70MHz in particular and don't be put off if you don't have a beam – you should find that you hear good reflections on a dipole or even a vertical. Operating on the s.s.b. c.w. or the WSJT modes are the best choice for meteor scatter. **It is possible** to use frequency modulation (f.m.), but it does require more patience and good signals!

The 50MHz Band

On to your 50MHz reports now and **Mark Marment CT1FJC** had JT6M contacts with SM0RCL, GM8RBR and G4DEZ in late August and early September. Mark's best DX heard, although not worked on September 28th and 29th via moonbounce was 3D2LR (RH92CQ). 3D2LR's signals peaked with Mark at -25dB, with the moon at 6° above the horizon. As Mark says, 'not a bad way to check out your receiving system.'

Mark's been listening to the south, using trans-equatorial propagation in the evenings. He's particularly been looking for **9X0TL** (without success), but has heard the TR0A and ZD8VHF beacons, although rather weakly. This is good news for us too – because if there's a trans-equatorial opening from the Mediterranean to Africa at the same time that there is a Sporadic-E opening from the UK to the Mediterranean then the two openings can couple together and we can work some great DX.

Here at **G4VXE**, it's been nice to get back on 50MHz f.m. mobile again. My FT-8900R went very deaf on 50MHz, but after a transistor was replaced, it's all working well once more. When I first got on 50MHz f.m., I was very pleasantly surprised how well it works from a mobile. The Farnham 50MHz repeater, **GB3FX** provides superb coverage in the Oxfordshire area and further afield.

To the west, **GB3ZY** on Dundry Hill is very useful over a wide area. Simplex on 51.510MHz is generally

quite quiet but I've made some surprising QSOs in the past over paths that really wouldn't have worked on the higher v.h.f. bands. And don't forget – it would be good to hear from other 50MHz mobile users about your results!

The 144MHz Band

John Blick MM6KSJ has been active on APRS as well as f.m./Echolink. On September 13th he travelled from his home on the Isle of Bute to Wemyss Bay. The lift on the ferry was out of order, so they had to stay on the car deck. John kept his VX-8E running on APRS and when he returned home in the evening, he was able to see the path that the ferry had taken!

John has also been very pleased and surprised with what can be achieved with low power on 144MHz and particularly enjoyed a three way simplex QSO with MM1HMV in Dunoon and GM7KFS in Toward. John was only running 200mW and encourages others to see what they can do with low power on v.h.f and u.h.f.

I have received quite a number of reports of activity from the ISS on 145.800MHz using f.m.. **Ken Eastty G3LVP** reported hearing astronaut activity on voice in mid-September and **Ken Powell G0PPM** got some great slow scan TV (SSTV) pictures, by leaving his SSTV program hooked up to his FT-817 and external antenna while he was out. When he came home, there were some excellent decodes of pictures, taken from space and sent by the astronauts from the *ISS*!

From my end at **G4VXE**, the most interesting activity was during the RSGB 144MHz Activity Contest on September 7th. There seemed to be good activity and I worked a fair number of stations out to around 322km (200 miles) or so. The most interesting signal from a propagation point of view was from **Richard Baker GD8EXI** from the Isle of Man.

I first heard Richard when I was beaming South East. I assumed that I was hearing him off the back of my beam, so I turned my beam to the North West and he promptly disappeared! I then brought the beam back to the South East and the signal came up again. Having a fairly small beam I'm used to it not having the 'cleanest' of patterns but this was quite unusual and I could only conclude that signals were being scattered from somewhere to the South East of me.

The updated FT-1900E B2 model has a good output power (55W).

The 432MHz Band

On to 430MHz, 70cm now and **John Blick MM6KSJ** has also enjoyed some f.m. QSOs on the band when he's been out and about. John tells me that GB3DM, the Dumbarton repeater works well for him and he particularly enjoyed a contact with **John Joyce MM6IAB/P**.

Thanks for your report John – working from the G4VXE mobile, it's always interesting to listen around and I'm forever finding new repeaters that I haven't heard before. Just the other day, I was listening on the low end of 430MHz, around the outputs to the 'wide split' band and discovered that the Bromley repeater **GB3OK** is a weak – but surprisingly consistent signal in South Oxfordshire. There's good activity there too, it seems, so maybe a good place for you to find QSOs on 430MHz f.m. if you are around London?

At the time of writing, October 2nd and 3rd, the **IARU October UHF Contest** is taking place. It's always fun to see what signals are coming through. Incidentally, here at G4VXE, my best DX has been to DF0MU (JO32) with PA6NL (JO21) another nice one. Conditions have been strange, with DX inaudible one minute, S7 the next!

Three Up-Dated Mobiles From Yaesu

Yaesu UK have just released updates to three of their already successful mobile rigs and I was delighted to be asked to test them for *Practical Wireless.* As these rigs are up-dates to previous models, which we've already tested, we haven't done full and detailed reviews, but we hope you will find my impressions useful.

The FT-7900E VHF/UHF Mobile

Yaesu introduce the rig the FT-7900E by saying, "*The FT-7900E provides 50W of power on the 144MHz band, and 40W on the 430MHz and is designed for simplicity of operation along with high performance in the receiver section. The FT-7900E is ideal for the active Radio Amateur who has a need for simplex, repeater, or f.m. satellite operation on both bands, but without the complication of cross-band repeat capability, which is available on our FT-8800E and FT-8900E models".*

So, what did I think of the rig? I used it for a couple of weeks on my commute from home to the railway station, some 24km (15 miles) away. I used it on a variety of repeaters on both 144 and 433MHz as well as some simplex QSOs.

The first bit of good news was that the transceiver fitted easily into my car. I used the rig in conjunction with a Diamond SG9600 on a magnetic mount. I really liked the display on the rig which was large – easy to see

quickly when you're mobile. The audio was clear and loud enough to hear in a relatively noisy environment.

The received audio seemed a little more 'toppy' than other mobile rigs that I have used in the past, which made for easier copy – another plus. The tuning knob was a good size and easy to use quickly without 'looking'. Setting up the rig with the appropriate shifts and Continuous Tone Coded Squelch (CTCSS) tones and writing them to memory was straightforward through the Menu system (My normal mobile is a Yaesu FT-8900E, so I'm familiar with the user interface, which was identical in operation).

Performance on the air was great and the receiver worked well on both 145 and 433MHz. There was a sense that the 433MHz receiver was just a touch more sensitive than my FT-8900E, dealing with some 'black holes' in GB3TD coverage very well. The 40W output on 433MHz worked well for accessing more distant repeaters such as GB3UK on the Cotswolds, some 64 – 80km (40-50 miles) away from parts of my commuter route. The morning commuter nets agreed that it "sounded like me" and that the audio quality was good. I liked the DTMF microphone as standard – it's handy for Echolink contacts.

The only downside for me was that the rig is not able to monitor both 144 and 433MHz simultaneously. As noted before though, scanning sets of memories all but gets around this issue – and of course, a rig with 'real' simultaneous/dual-band capability will attract a higher price. I'd have no hesitation in recommending the FT-7900E to *WoVHF* readers..

The FT-1900E-B2 144MHz Transceiver

Next, there's the FT-1900E and Yaesu comments: *"The FT-1900E is a ruggedly-built, high-performance 55 Watt 144MHz mobile f.m. transceiver with outstanding receiver performance and crisp, clean audio. Optimised for ease of operation day or night, the FT-1900E is one tough radio for operating in a tough world!"*

Once again, the first bit of good news is that the rig easily fitted into the console in my car. Like the FT-7900E that I'd tested before, the display was nice and clear and easy to read. Received audio was good quality and had enough 'punch' to be easily audible in the mobile environment.

On transmit, 55W is a good level of power and I found I was a **very consistent** signal into the GB3WH repeater from parts of my route where – with lower power – things can get a bit scratchy. Transmitted audio reports were good. The DTMF equipped microphone allowed access to *Echolink* nodes and changes of power level and frequency etc. Default button programming was a little different to the FT-7900E/8900E – but that was easily sorted out! Programming memories, setting repeater shifts and CTCSS tones all worked exactly as I expected.

A novel feature was the inclusion of a c.w. (Morse) trainer on the rig, which will send you five character groups at speeds of your choosing. So, if you're learning Morse or fancy doing so, then this might be a fun facility for long journeys when the radio is quiet!

If you're after a single band transceiver – this should work well for you, but do compare it with the FT-2900E.

The FT-2900E-B2 144MHz Transceiver

Next, there's the FT-2900E. Yaesu say, *"High power output with no cooling fan Needed, a huge, easy-to-read display, and one-touch WIRES™ Internet Linking Access capability are yours with the rugged new FT-2900E!"*

The big feature of the FT-2900E is the 75W power output! This could be brilliant if you are in a very remote part of the country with repeaters or centres of activity well away from you. Make sure how you wire it into the car though – using the cigar lighter plug is not going to be a good idea at these higher power levels! I was a little disappointed in the pre-set power levels; 5/10/30/75W. I would have liked an additional one at around the 50W level.

The rig is heavy at 1.9kg and the chunky size of the heat-sink explains why Yaesu don't use a cooling fan on this model. For those with larger fingers, you may enjoy the fact that the **Volume**/**Squelch** and **Tuning** knobs are significantly bigger than on the FT-1900E. 'Bigger' comes at a slight price – it only just fitted in the space I have for the mobile in the car.

The rig has a pleasing, simple, robust feel to it. The display is great and the received audio is 'punchy' enough for a noisy cab. Once again transmitted audio was good and I found it straightforward to set up memories with CTCSS tones, power levels and so on. The receiver seemed sensitive and I was able to hear the GB3CF repeater in Leicestershire from outside our home in Oxfordshire during indifferent conditions.

Note: WIRES Internet Linking is not widely used in the UK, but once again, the supplied microphone has DTMF capability, so you'll be able to use it to connect through Echolink enabled repeaters and nodes.

Also, I think that the FT-2900E would make a great 145MHz f.m. rig for the shack, running off a power supply unit (p.s.u.), with 75W available for making those more distant QSOs. Like the FT-1900E, it has a c.w. trainer which you may find useful.

Overall results

I enjoyed using all the rigs. Having dual band capability gives you more options, so the FT-7900E was my favourite of the trio. Both single band mobiles worked well too, I had a slight preference for the **very** chunky FT-2900E, it's slightly greater size making it easy to operate – and of course, the 75W output a real bonus. Very many thanks to Yaesu UK for the loan of the rigs.

Cheerio until next month – keep those reports coming in – it's your column! ●

I hope you have enjoyed *The World of VHF*. However, to make it really work well, I really need to hear from **you**, so I hope readers will take the opportunity to get in touch. You can E-mail me **tim@g4vxe.com** or find me on Twitter where my id is G4VXE. If writing a letter works better for you, then you'll find my address at the top of the article. I look forward to hearing from you!

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Carl Mason GW0VSW presents his roundup of your h.f. activities. As usual, please send your reports and photographs to Carl by the 15th of each month.

Welcome to *HF Highlights* (*HH*) where I'm beginning with the some news about the **North American QRP CW Club (NAQCC) http://home.windstream.net/yoel/** which was set up to promote QRP and c.w. operation on the Amateur bands. The club now has over 4760 members around the world and to encourage more activity and participation in the club's events a new 'European Chapter' has been formed under its first president **Matt Ireland MW3YMY**.

As many readers will recall, the NAQCC is the largest Amateur Radio club dedicated to QRP and c.w. operating in the world. One reason for this success is that the club is open to anyone with c.w. and QRP interest and membership is completely free of charge.

Since its formation in 2004, the club has spread into 88 countries, a third of which are in Europe. However, many of the benefits of membership enjoyed by American Amateurs were not available to those separated by different time zones, geographical distance or language.

Various time zones make universal participation in events or contests almost impossible with members this side of the 'pond' having to operate the key between 0130 and 0330 hours local time. Additionally, the large distances, especially for those members who live outside North America make the delivery of any awards very expensive.

However, with the introduction of a European chapter and an additional 'EU' newsletter it's hoped that more events will be open European members. Volunteers from all countries are needed to write columns in their own language – so hopefully language will no longer be a barrier to anyone with a passion for QRP and c.w.

The European chapter is just the beginning as there are many other areas where members may feel cut off from the rest of the community and no able to participate in NAQCC events due to their time zones and/or distance. For example, there are members in Australia who operate on UTC+10, Japan UTC+9 and Thailand UTC+7.

Anyone interested in helping out with the European Chapter, whether it's writing regional columns for the newsletter, setting up a QRS net suitable for European time zones or donating and distributing awards, is asked to get in touch with Matt at **matt@mattireland.co.uk**

I can highly recommend membership even if your interest doesn't include Morse code as the newsletter has something for everyone including operating techniques to antenna construction, etc.

Colin Topping GM6HGW.

What's That Contest?

Like them – or loathe them – contests can be heard regularly on the high frequency (h.f.) bands, though it's not always clear what they are or the exchange details required. One site that can be helpful is that of **Bruce Horn WA7BNM**, which can be found at **www.hornucopia.com/contestcal/index.html** The site lists almost all the contests you can find on the h.f. bands and it allows you to customise a search to suit your particular interests. This can be done either by band and mode or by the day, week, month or even year.

Once the contest is located brief details are given and where possible a link to the relevant site for the full contest rules! Another resource that I have found very useful is called 'Amateur Radio Contesting Resources and Information' which is maintained by **Bill Feidt NG3K** at **www.ng3k.com/index.html** This has links to a large variety of DX related information including contest software, propagation tools, QSL info, callbooks and packet clusters as well as a comprehensive list of other contesting sites. They are both well worth a look!

A DXCC Award & ZD9HGW

Regular contributor **Colin Topping GM6HGW** has had some interesting mail when he was recently contacted by Nils Lundell SM5AAP concerning an application for an ARRL DXCC award. It would appear that the DXCC

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comm˙ttee was not prepared to accept a contact made with Colin while he was living on the island of Tristan Da Cunha in September 1999 and in receipt of an Amateur Radio licence, callsign **ZD9HGW**, as the ARRL believes it to be an invalid call!

Colin has been in contact with both Nils and the ARRL and has assured both that the callsign ZD9HGW is indeed valid and is correctly licenced by the relevant authorities on the Island. He said, "My UK call is GM6HGW and I was given the callsign ZD9HGW. As Tristan Da Cunha is a territorial dependency of the United Kingdom UK Amateurs are, in the main, allowed to use their three character suffix when applying for a Tristan callsign rather than the two character suffix normally issued to Tristan residents."

It now seems that many North American stations refused to work Colin while he was there saying he was a 'pirate' call. The ARRL DX desk has been in conversation by E-mail and copy of the 'ZD' licence has now been sent via air mail but it seems that the validation has yet to be accepted.

Thanks for that news Colin! However, I'm sure that like many of you, when an unusual call is heard, it's best to work it first and worry about the validity later!

The DX News

On to some DX news now and we begin with the Turks and Caicos Islands NA-002 located 550 miles south east of Miami, Florida and technically located in the Atlantic Ocean and not the Caribbean Sea. It's from here that **Giuseppe Solimano I8UZA** who will be active as **VP5/ I8UZA** from Providenciales until the end of November, where he will operate s.s.b. on all bands except 10, 18 and 21MHz (QSLs via the home call please).

The 'Venetian Lagoon' is an enclosed bay of the Adriatic Sea in which the city of Venice is situated. The city was founded in the 5th century and has gradually expanded beyond its original historic boundaries. Currently nearly two thirds of the region's inhabitants live on the mainland next to the lagoon while slightly over a third of the city's population are spread over 118 islands within the lagoon. On the Amateur Radio side – and active on most h.f. bands from several of islands during November will be **IL3A**. The QSLs should be sent via IK3HHX either direct or through the bureau.

Also, we should look out for **Vadim Mikhin UN7FW** who has been granted permission to operate as **UP25F** until November 30th. The special callsign is to mark the 25th anniversary of the Vostochny open-cast coal mine in Ekibastuz a town in the Pavlodar region in the Republic of Kazakhstan which has a population of 130,000 people. Its major industrial sites are the Ekibastuz Power Plant 1 (AES), Power Plant 2 and the open-cast mine controlled by Eurasian Energy Corporation (ENRC). The QSL route is via IK2QPR.

Your Reports

On to your reports now and the first is from **Eric Masters G0KRT** in Worcester Park, Surrey. Eric used a Kenwood TS-570 at 100W s.s.b. to his home brew modified W3EDP antenna which is 25m (84ft) long. Contacts on the 7MHz band included 5Q1A/P (Denmark) at 0905 the special event and contest callsign of Eksperimenterende Danske Radioamatører (Experimenting Danish Radio Amateurs) who are an independent department under the national Amateur Radio Society, which was founded in 1937 QSL via OZ5ESB. Using his Yaesu FT-817 and running just 5W c.w., Eric logged F8CRM/P (France) at 1842. Switching to 10MHz, he logged Norman Munro GM4KGK on the Isle of Lewis EU-010 at 1107 and SP1CVP (Poland) at 2002UTC.

The 14MHz Band

The 14MHz band was chosen by **Martyn Medcalf M3VAM** in Chelmsford, Essex, who used his Yaesu FT-897 and Comet CHA-250BX to work s.s.b. stations IK2IGS (Italy) 0951. Then came CS29NR (Portugal) 1006 from the Faro Motorcycle Meeting QSL via CT1EHX, 9A7V (Croatia) 1105, KT1AHU (USA) 1117, OE3K (Austria) 1307, the contest call of the Austrian Military Radio Society – QSL via OE1DIA. Martin then worked DK1ROB (Germany) 1325, SP9LJD (Poland) 1336, S51CK

(Slovenia) 1352 and YO3CZW (Romania) at 1624.

Meanwhile in Biggleswade, Bedfordshire **Owen Williams G0PHY** made two voice contacts with JT5DX (Mongolia) at 1425 (QSL via JT1CO). Then came UA0FM (Asiatic Russia) at 1420UTC using a Yaesu FT-747GX at 100W to a dipole antenna.

Operating from Spain once again was Martin Juhe M0XJP, who set up a station at La Romana, near Alicante as EA5/M0XJP, using a full size G5RV up about 10m (30ft). He used an Alinco DX-70TH matching EDX-1 a.t.u. and the small Alinco DM30MV p.s.u. running about 75W, with his Heil Traveller headset.

Apart from all the usual European countries, some of the more interesting stations worked by Martin included VK6MV (Australia) 0749 about 200km south-east of Perth, and G4AKC/M Dave in Blackpool – operating bicycle mobile at 1049!

Then came SX7W/P (Greece) 1207 with a special call by the Thessaloniki Amateur Radio Group QRV from Nigrita's alpine club shelter on mount Vertiskos 565m ASL (QSL via SV7CUD), then 9M2GET (West Malaysia) 1745, RK9DM (Asiatic Russia) at 1752, UN7QFT (Uzbekistan) 1809. Next came ZS6TQ (South Africa) 1824 from the Kruger National Park (QSL via K3IRV) and finally he worked PY7RP (Brazil) at 1953UTC.

In Utrecht, Netherlands **Jos Van Gelder PA3ANF** used a Yaesu FT-2000D and 180 watts s.s.b. to a 2 element tri-band yagi to work YB0BCU (Indonesia) 1525, V85TX (Brunei) 15.42 QSL via W3HNK, XU7ATM (Cambodia) 1549 QSL via F8ATM, FM1FV (Martinique) NA-107 at 1949 QSL via W3HNK, CO6LP (Cuba) NA-015 at 2100 and 9Y4W (Trinidad & Tobago) SA-011at 2101UTC QSL via DL4MDO.

The 5W QRP c.w. transmissions from **Tom Kelly EI2AJ** in Ireland found R3ZZ (European Russia) at 1038. Then came N2YO (USA) Chantilly, Virginia at 1042, RV9WMZ/P (Asiatic Russia) 1056, and then 5N7M (Nigeria) at1945 (QSL via OM3CGN). Finally Tom worked PY2ZEA (Brazil) 2101UTC, using a Yaesu FT-817 and half-sized G5RV.

The 18, 21 & 24MHz Bands

Next, it's on to **George Davis G3ICO** who lives in Mudford, Yeovil. George tried 18MHz with his K2 at 10W and a 40m long doublet antenna to work SO200FCM (Poland) 1318 – a special call to celebrate Fryderyk Chopin. Then came SG150ITALY (Sweden) at 1328, R1000YR (European Russia) at 1434 to commemorate 1000 years of Yaroslavl city (QSL via RM3M). Then George worked 9M2TO (West Malaysia) at 1403 and 3B8CF (Mauritius) AF-014 at 1418.

On 21MHz George's log notes he worked PY2MTV (Brazil) and KP2B (Virgin Islands) NA-106 at 2110UTC. This is the call of the STX Contest Club – who operate mostly from Fredericksted, ST.Croix (QSL direct to K2DER).

The **GB1DCT** special event station run by **John Wakefield G0XIG** from Dalwood Common in Devon was popular on the h.f. bands – another 633 QSOs made his logbook. On 21MHz John had several contacts using his Yaesu FT-1000MP Mk5, ACOM 1000 amplifier and True Talk G5RV antenna about 9m above ground. The contacts included DO5OT (Germany) at 1922, ON4AZP (Belgium) at 1928, PY1SX (Brazil) 1935 and LU7FSM (Argentina) at 1950UTC. John said, "I'm having a few problems with my Comet H-422 'V' dipole, especially in wind or heavy rain.

"This is probably because it is being put up and taken down so often when operating on my 'telegraph' special events. The traps seem to be the suspect area and they'll need some attention soon! Until then I hope to use a Butternut vertical."

John G0XIG's comments are interesting as **Brian Parsons GW0KZK** had a few problems with the Comet antenna he purchased after reading my review in the September 2006 issue of *Practical Wireless*. If anyone has this antenna and has had a similar experience please get in touch. Both John and I would be interested to hear what you found and how you fixed it.

On 24MHz there was just one report from Martin EA5/M0XJP as he logged PY1FC (Brazil) at 1225UTC.

The 28MHz Band

In Spennymoor, County Durham, **Jeremy Smith M0XVF** was tuning around the bands early one evening and found an opening on the 28MHz band – hearing several stations from Denmark. He worked OZ9PBS/P 1703, OZ5DD/P 1701 and OZ0W at 1712. This is the callsign used by the contest group of the Danish Radio Amateur Association (EDR) Aalborg branch, OZ7A/P 1714 on North Sealand 'Melby' EU-029. Then came OZ9HMN 1721UTC before the band suddenly closed. Jeremy's equipment was a Yaesu FT-857 running at 30W to a half size G5RV.

Also on this band was **Jos PA3ANF** who logged D4C (Cape Verde) AF-005 at 1941 (QSL via the bureau to CT1ESV). Then came PY7ZY (Brazil) at 2000, LU8SAN (Argentina) at 2024 and CE2WZ (Chile) at 2033 (QSL via the bureau or direct to W3HNK). All were achived using 180W and s.s.b.

Meanwhile Eric G0KRT caught EA2CTQ – also using s.s.b. – at 1619UTC.

Signing Off

Well that's it for another month and as usual my thanks to all our reporters and to **Maurio Pregliasco I1JQJ/KB2TJM,** Editor of the ***425 DX Newsletter*** for all the DX information. Until next time I wish you all good DX.73,

Carl GW0VSW

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Graham Hankins G8EMX presents his bi-monthly look at the Amateur TV scene.

Welcome to *In Vision* (*IV*) and the world of ATV. I'll start this time by mentioning that I think there were two big surprises that would have hit members of the **British Amateur Television Club** (BATC) when the August issue of its magazine *CQ-TV* arrived in September! The first was when, in his 'Editor's Preamble' **Chris Smith G1FEF** admitted: *"This has been the hardest issue so far for me to produce.....there simply isn't enough copy coming from you, the members, for me to put a 40 page magazine together, which is very disheartening."*

Now there are many very clever people within ATV – they're adding digital facilities to some of the repeaters, making or modifying antennas, improving or developing software and generally 'playing with' the massive world of television technology. Some of them are still members of the BATC, but not enough of them are writing about their projects for the club's magazine.

So, the BATC has decided to take the ultimate action of persuasion – to offer payment to anyone – BATC member or not, who submit copy that complies with the 'rules' listed in the magazine.

Was it a good idea – or desperation? Magazines published by voluntary groups usually rely on unpaid voluntary contributions – but what if nobody volunteers? I counted four 'non-committee' names who had written copy in the August issue, which stretched to 38 pages after all, so a few members are prepared to write. The BATC does have funds available, so it can run with this idea at least for a while and the fee paid for £50 per page published should perhaps be fairly 'persuasive'?

Copy From Members

In a Press Release, BATC chairman **Trevor Brown G8CJS** adds, "Being a small club with no salaried staff, we cannot pay for every page of *CQ-TV* but being an Amateur organisation we still believe and hope that copy will come from our members. This was a difficult decision for the committee to take, nobody wants to generate costs that will ultimately be paid for by the members but in the present circumstances we feel we have no other option but to take this step to keep *CQ-TV* at the leading edge of Amateur Television."

Trevor continued, "We would also like to recognise the hard work and efforts that all our contributing members make, so we have decided to award a free year's Cyber membership to the contributor of any article that is accepted for publication, but doesn't meet the full requirements for payment, e.g. non-constructional articles".

Note: A 'Cyber' BATC member receives their *CQ-TV* by E-mail, not a paper copy.

The second 'surprise' again related to the magazine – it seems the BATC is 'still looking' for a 'Co-Editor'. I have again expressed an interest and wait to see what response I receive this time – if any!

Newark Amateur Radio Convention

Not having been to a radio rally for some years, it was great to meet up again with **Stuart Marshall G6NHG** at the Newark, Nottinghamshire Amateur Radio Convention on October 1st and 2nd. Stuart is still in Tamworth and is still making ATV microwave antennas; horns and slots for 10GHz, 13cm and 24cm along with other antennas. He's now thinking of making some of these available as kits and has a new web site at **http://www.g6nhg.com/** I tried to persuade him to advertise again in *CQ-TV* and also in *Practical Wireless*!

A Government Yes?

Finally for this time, a 'sort of' "Yes" – or perhaps a 'definite maybe' from the new Government! Last year I wrote to three museums, plus the Department for Culture, urging the 'powers that be' to preserve some of the analogue television transmission equipment and masts. However, I heard absolutely nothing! Until, just a couple of months ago, when one **Saima Mirza**, Dept. of Culture, replied.

The letter read, "Dear Mr Hankins, thank you for your E-mail of 12 August about the preservation of analogue television transmission equipment. I have been asked to reply. I should explain that the Department for Culture, Media and Sport does not intervene in the day-to-day running of its sponsored museums such as the National Museum of Science and Industry (NMSI). Decisions on the acquisition of objects for the collection, are entirely a matter for the Trustees of the Museum. However, we have shared your request with the NMSI and the Museum has provided the response below."

Ms Mirza continues: "The NMSI (which includes the Science Museum in London and the National Media Museum in Bradford) has collected and preserved several items of analogue television transmitter technology over the years. Historically significant items already in NMSI collections include portions of the original Alexandra Palace television transmitter of 1936 and an STC Ltd. Band-I transmitter from 1955. In relation to the digital switch over, NMSI, represented by National Media Museum and Science Museum (London), will be liaising with contacts at Arqiva (the company refitting the national terrestrial transmitter network) to monitor what is available. The suggestions for selected items put forward by Mr Hankins will receive full deliberation." (Excellent!)

Saima Mirza concludes: "Any items selected for preservation will initially be held in store, probably at Science Museum Wroughton, Wiltshire, pending any display. While NMSI storage resources are extremely limited at this time, we also consider that the analogue shut-down represents a 'last chance' opportunity to preserve this equipment. Therefore, interested parties should be reassured that very careful consideration will be given to instances where such equipment becomes available."

So, 'the last chance" has been acknowledged and "full deliberation" promised! Not a definite "No" then! ●

Harry Leeming's

in the shop

Harry Leeming G3LLL reflects on his days as an Amateur Radio dealer and having quartz crystals especially made.

Welcome to *In The Shop* (*ITS*) where I'm starting off this time by remembering the problems my customer '**Sammy**' encountered after he purchased a rather nice looking Yaesu FT-101B from a car boot sale. He connected it to his antenna system, worked a few stations on 14MHz (20m) and his first impressions were every favourable. However, when he tried the 7 and 28MHz (40 and 10m) bands, all he could hear were CB operators –it was then he realised that the rig was full of CB band crystals.

To replace the lot was going to be rather expensive. Due to the age of the rig he presumed that Yaesu would no longer have replacements available and so he sent off to a crystal manufacturer for a 7MHz crystal to be made, very clearly specifying the frequency.

Sammy soon received the new crystal and fitted it in place, and everything seemed fine, but why were there so many c.w. stations operating just out of the band? He switched on the calibrator and found that on 7MHz the calibration was almost 10kHz different, to what it was on the other bands. So, (he thought) was the new crystal faulty?

Fortunately, the answer is quite simple! The exact frequency that a crystal operates at is determined by the load that is presented to it and often this is not made clear by the manufactures of equipment. Indeed, when I was operating the shop, I found the 'fail safe' way when ordering band change crystals, was to send as a sample a crystal from the nearest band, in this case it would be 10MHz and to tell them to make it the same but 3MHz lower in frequency, or whatever difference applied.

Likewise, if I wished to order a replacement for a faulty upper side band (u.s.b.) crystal, I would send the lower sideband (l.s.b.) crystal, and tell them to use this as a reference. This seemed to work every time and enabled the manufacturer to produce a crystal that was 'spot on'.

A Faulty Master Oscillator Crystal

Last month, I mentioned that I had a problem obtaining a new master oscillator crystal, to replace one that was intermittent in an FT-757. And although I don't know much about the internal construction of miniature crystals – but there is a 'kill or cure' approach that sometimes works and it's worth trying if a crystal is otherwise definitely unusable.

My method is to hold a hot soldering iron against the crystal until it gets extremely hot, leaving it to cool and then the crystal will either work or not work at all! Sometimes – as occurred in this case – it will function perfectly. How long it would last was another question – so I left the owner searching E-Bay for a suitable replacement.

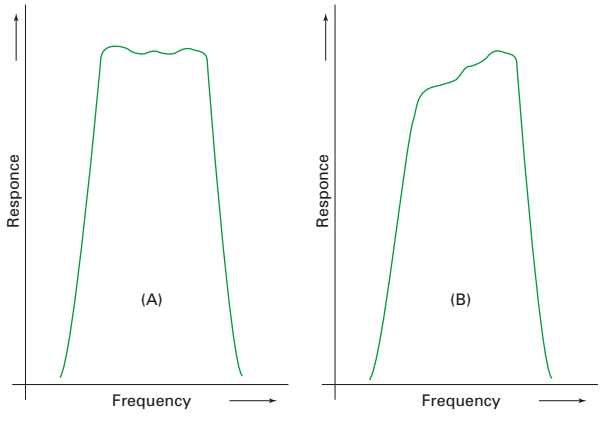

Fig. 1: Comparing a 'good' crystal filter pass-band at (A) and that of an 'aged' one at (B).

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

How Old Is It?

While running the shop I often found that customers' memories were strange, as they seemed to shrink or expand, depending on the transaction that was taking place! When equipment failed and was brought into me for repair at the shop I was often told, "I've only had it a few months," or "It's only a short while since you repaired it" – but a check in our records would often reveal that was a couple of years or more since we had seen it! Conversely, equipment that was offered to us for purchase was often years older than the customer remembered.

So, how do you check on the date of birth of older Yaesu equipment? The answer is that on equipment made in the 1970s and 1980s just look on the back and you'll find a serial number such as 3E 010723. The '3E' represents the last figure of the year, and the batch number, so in this case it could be 1973 or 1983. Even better go to **http://www.sarl.org.za/RadioLookup.asp?Manufacturer=Yaesu**

The web-address is a page run by the **South African Radio Society**, as this gives the approximate manufacturing date for most Yaesu equipment. So, if you want to track down the manufacturing date of other equipment go to **http://www.sarl.org.za/RadioLookup.asp** and then follow the link 'search again'.

Setting The SSB Carrier Frequency

'**Freddy**' E-mailed me to say that

Radio Spectrum under threat!

As users of the Spectrum, the issue is simple: PLA devices are causing interference and if we don't do something now we might not have a hobby take part in – it's that serious. Now is the time to start a Spectrum Defence Fund – not just to fight the PLT issue but other threats as and when they come up. The RSGB intends to challenge Ofcom's interpretation of the various Acts and Directives in respect of the PLA/PLT threat. We aren't looking to remove Comtrend and other such devices from the market place – that's an expectation too far, neither are we likely to see rapid results. What we are looking for, among other things, is to challenge Ofcom on their duty to ensure that in the future, non-compliant items such as Comtrend, are not put on the market.

A Judicial Review would likely cost in the region of £75,000 but could be a lot more as we'd be taking on organisation with almost unlimited funds to defend their corner who could, if they so desired, play a very long game that in turn we'd have to match. If every amateur in the UK pledged £10 to the Spectrum Defence Fund we'd probably have enough to fight the case and so we need your donations (no matter how small) to help us meet the threat.

Please help amateur radio and the radio spectrum by donating to the fund today!

Help us protect the future of Amateur Radio

Please donate online at

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Spectrum Defence Fund

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he was having problems with his 35-year old rig. The receive sound quality differed on upper and lower sidebands, one was rather over 'bright' and the other sounded muffled. Additionally, judging from reports it seemed that the transmitted audio quality was similar. But what was wrong? He'd set the s.s.b. carrier crystals at precisely the correct frequency, using a good quality frequency counter – but still he had the problem, had I any suggestions?

The first move with this kind of problem is to test the s.s.b. filter – and no – you don't need a set of lab equipment to do this, only the built-in crystal calibrator and S-meter. Find a band where the S-meter reads about half scale at a calibration point and tune slowly across this. The response should be similar to **Fig. 1(A)**, and if it's more like Fig. 1**(B)**, then the filter is showing its age. However, in some rigs there may be a tuned circuit at the input or the output of the filter, if so try adjusting these and see if you can get a more even response.

When crystal filters are new they do have an even response, but as they age some of the internal crystals can either go off frequency or lose activity, hence the problem. The obvious cure is to fit a replacement filter but with an old rig, unless you can obtain a scrap item, the chances of obtaining a replacement filter are rather slim; you can however usually improve things by slightly off setting the carrier frequencies.

First remove the antenna lead, switch off the calibrator, and listen carefully to the change of background hiss as you switch sidebands. On the sideband with the highest pitch of hiss adjust the s.s.b. carrier trimmer until this falls a little, and then tweak the other sideband carrier trimmer until the pitch increases a little. Once you have got the two pitches of hiss a little more similar sounding, plug the antenna back in and try listening to a broadcast station when switched to the s.s.b. mode.

Finally, see how the quality compares on each sideband and then if it's necessary repeat the operation. You can't – of course – cure a rig with a completely unserviceable filter – but by adjusting the carrier trimmers you can to some extent cancel out of the effects of old age. (without even having to buy a jar of anti-wrinkle cream from Boots!)

A Super ATU

I got a 'phone call from '**Jerry**', who had inherited a rather old Yaesu antenna tuning unit (a.t.u.) with built in power and standing wave ratio (s.w.r.) meters. His problem was that the power meters weren't giving sensible readings, "will it be worth repairing?" he asked, telling me, It's an FC-902."

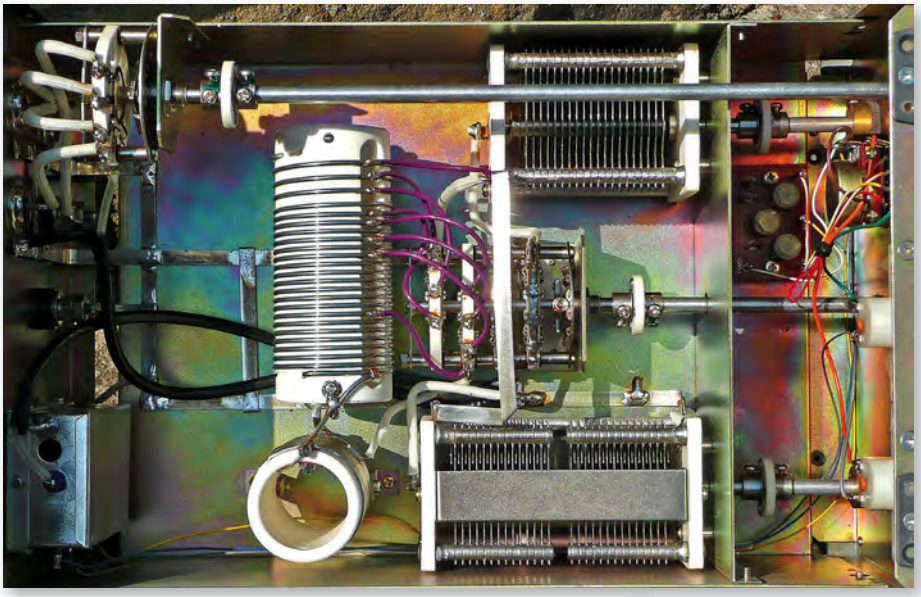
Worth repairing? In my opinion the FC-902 is one of the nicest pieces of equipment Yaesu ever made, it's simple, robust and does just what it is supposed to do. The unit is only rated at 500W – but a glance inside shows that it is fitted with switches and coils that are larger than those found in some units rated at over a kilowatt.

Rating an a.t.u. isn't an exact science, as the voltage at the end of an antenna feeder depends on the s.w.r., together with (whether or not) a voltage peak is present at the point on the feeder to which the a.t.u. is connected. Indeed, I can remember a well known a.t.u. being rated by its makers as "1kW at 50Ω", which is absolute nonsense because, if the load is 50Ω you don't need an a.t.u. at all!

The only really sure way of rating an a.t.u., is to look at the size of the parts and then see what happens when they are used by different stations under different conditions. The FC-902 passes with flying colours and I've never had an FC-902 brought into me with burnt out switches or coils, even when used with linear amplifiers rated at well over the legal limit!

The FC-902 was a development of the FC-901, the only difference being that the addition of the new 10, 18, 24MHz, (30,17 and 12m bands). This addition brought an extra advantage – I'm sure that most of my readers have met the situation when tuning up, that on some band the point of minimum s.w.r. seems just beyond the range of adjustment of the controls on a.t.u..

The extra bands on the FC-902 are simply additional taps on the coil and these taps can be used to great



Looking at the insides of the FC-902, you can see why Harry rates this as great!

The front panel of what Harry reckons is the peak of antenna matching units - the Yaesu FC–902.

advantage. If you find that you cannot set minimum s.w.r. (let's say 14MHz) – no problem, just switch the a.t.u. to say 10 or 18MHz and you'll almost certainly be able to find the correct point for minimum s.w.r. In fact, it's almost as good as having a roller coaster type inductor fitted – but it doesn't come with any of the attendant disadvantages.

The Weak Link?

Over the years I've had a few faulty FC-902 units brought to me and just like the unit 'Jerry' had, they all suffered problems with the s.w.r. and power sensing circuitry. The sensing unit is in a screened box and is shown at the bottom left hand side of the internal photo, the circuit of this and the rest of the a.t.u., being reproduced in **Fig. 2**.

The items that give trouble are the two diodes D101 and D102, and with any fault in the s.w.r./power metering of an a.t.u., replacing these diodes should be the first move. To get a good balance in the bridge circuit, you should fit two identical diodes, and I always replaced them with a couple of OA91 germanium types.

Calibration After Replacement

Once the new diodes have been fitted, connect a dummy load and an accurate power meter. Then switch it to **Through** and fire up a rig on the 14MHz band. If you have fitted the OA91s you'll find that the power readings are now low, as the diodes have a higher forward resistance than the originals. Then you should reset VR201,202, and 203 to get the correct readings on the three ranges,and TC101 for minimum reflected power.

In practice, TC101 has a wide null which interacts with the power readings, adjust the setting of this so that the power shown on the meter on the three ranges can be set correctly with the pots and that there's very little reflected power registered. The OA91 has a higher voltage rating than the originals, and once these are fitted I have never had further trouble.

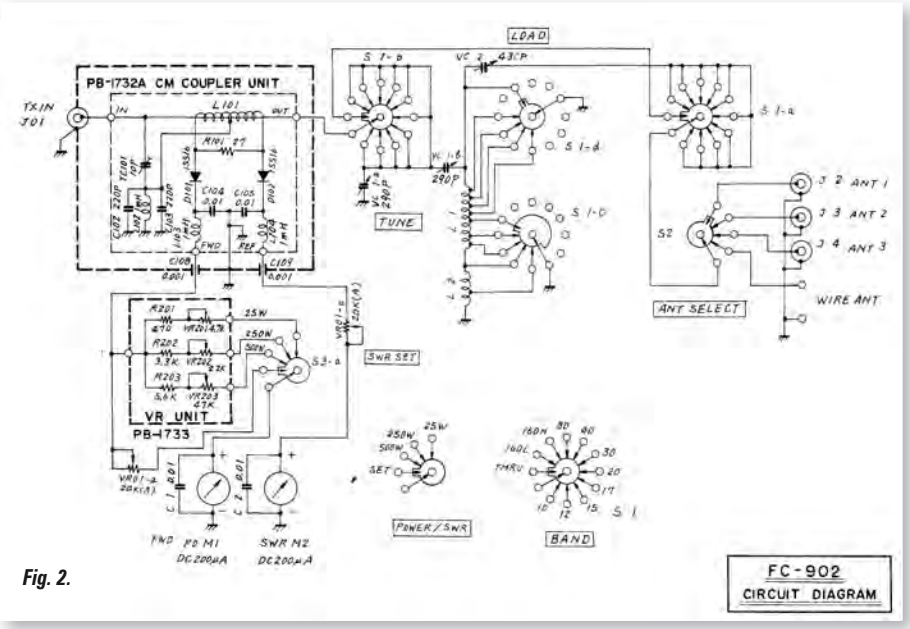


Fig. 2.

The FC-102

Yaesu's successor to the FC-902, the FC-102, was rated at 1.2kW – although strangely – I've had a few of these in with burnt out switches, even when only run at 100W. The problem would seem to be that they incorporate switching so that they can be used with two different rigs – fire up the 'wrong' rig and you send power into an open circuit, with resultant high voltages and fireworks. This is a point to watch

Touch Up Paint

I asked about matching paint a few months ago, and got a few replies. I'm told that Halfords and B&Q have electronic means of matching paint, apparently you can take a sample in, and they'll match it. Although I've not tried this myself – it sounds a very good idea.

I also got the following helpful advice from **Ray Atthill G3KTM** who said, "I can suggest that most colours are listed in BS381C, which is available on the web, Dark Admiralty Grey and Light Admiralty Grey are very popular.

"I was able to buy small 'cans' of these paints from a local (Salisbury) modellers' shop so I'd imagine they are available from any good modellers' shops nation-wide. A procedure, which I recollect from a short employment in the early 1960s, was to rub down with the finest grade emery paper and use artist style brushes to apply undercoat and then one or more top coats, rubbing down between each coat. This, with some expertise, could produce an almost 'as new' finish. But please remember that finishes can be matt, semi-gloss and gloss."

Thank you very much gentlemen, I am sure that will help someone, I only hope Brenda does not see it or she will be wanting me to touch up the house!

A Novel Keying Monitor

'**Peter**' had been running an FT-101E for many years when he decided to up-grade to an FT-990. A few weeks later he was on the 'phone wanting a little advice. "I disconnected the FT-101 and left it in a corner, now sometimes when I operate c.w. on the '990, I see a light flashing behind the '101, what on earth is going on?"

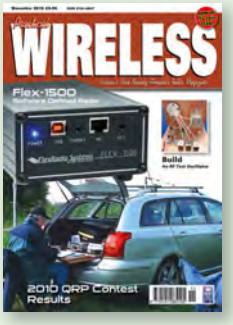
Fortunately, the answer is quite straightforward – the FT-101E has a little plastic dome on the rear panel just underneath the fan. Inside this dome is a pilot lamp, which is in series with the antenna input to the receiver and acts as a fuse. With the rig 'Peter' had – he'd left a patch lead connected to his old rig, this was picking up his transmissions and injecting just enough voltage to cause the lamp to light. Yaesu use this idea on quite a few rigs, more on this subject next time. 73 for now.

Harry G3LLL

Problems

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

Practical Wireless Index 2010



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Advertisements from traders or for equipment that it is illegal to possess, use or which cannot be licensed in the UK, will not be accepted.

No responsibility will be taken for errors and no correspondence will be entered into on any decision taken by the Editor on any of these conditions.

You should state clearly in your advert whether equipment is professionally built, home-brewed or modified.

The Publishers of *Practical Wireless* also wish to point out that it is the responsibility of the buyer to ascertain the suitability of goods offered for purchase.

FOR SALE

AOR AR7030 with later type display and NB7030 option giving notch filter, noise blanker, 400 memory channels plus alpha-tagging, nice condition complete with operating manual and service manual etc. £300 ono. Also, Uniden Bearcat UBC9000XLT scanner, fine working order, manual £150 or offers.
Tel: Steve 01582 503806 (Bedfordshire).

COSSOR FM RECEIVER alignment generator model 1324, £15. Would consider swapping for other item of valved test gear.
Tel: 01591 620747 (Mid-Wales).

ELECTRONIQUES 445kHz I.F. transformers.
Tel: G3MCK QTHR 01572 756444 before 10:00pm (Oakham).

KW-2000A TRANSCEIVER good condition with PSU but faulty mech filter. Circuit and handbook, £50. No offers, buyer collects. Tel: 01843 582202 (Kent).

MARCONI INSTRUMENTS Signal generators FM/AM, 1.5-220MHz, £58. AM 300-600MHz, £35. Video 25Hz-12MHz, £25. AM/FM deviation meter, £35. Audio wave 25Hz-70kHz analyser, £50. Wens 2GHz fixed - 30GHz variable, £25. AVO original valve tester, £60. MI Q-meter 50-300MHz, £50.
Tel: 01234 354767 (Bedfordshire).

TWO JACKSON VARIABLE CAPACITORS 17-500pF, £15 each. One Jackson style variable capacitor 250pF, £10. Two slow motion ball drives, £10. P&P extra.
Tel: Dave 01443 683912 (Rhondda).

YAESU FT-817 5 amp PSU, Yaesu PSU, MFJ-945D ATU, 30W linear, 3-way aerial switch and tele tape recorder. Yaesu multi-frequency aerial, several rod aerials, 40-channel CB and much more, £300. No offers.
Tel: J Williamson M0JWE 0161 775 8444 (Manchester).
E-mail: j.williamson133@btinternet.com

WANTED

HOWES KITS built or not. Dead or alive. Types CB-A2 and ST-2. Also, distress radios, e.g. EPIRBS 121.5MHz. No SABREs.
Tel: Chas 01775 766398 evenings (Lincolnshire).

OLD HALF INCH FERRITE RODS must be half inch, 12.7mm, in diameter and be six inches long or more. Will pay very good money for the rods.
Tel: Peter Tankard 0114 2316321 between 9am and 10pm (Sheffield).

PANASONIC RF-3100L DR-31 SW/LW/MW/FM receiver in good condition. With box and instructions if possible but not essential. Please call if you have one to sell. Tel: 07595 332101 (Kent).
E-mail: lawrence007@ntworld.com

PYE REPORTER MF6AM transceiver working or for spares. Any reasonable condition. Frequency range 110-140MHz.
Tel: 07850 119453 (Sheffield).
E-mail: tnealapple@onetel.com

EXCHANGE

HEATHER LITE – Explorer 1.5kW HF linear amp. Would consider Ameriton AS-500 Solid State or similar. Tel: Conrad 07932 473601 (Croydon).
E-mail: c.james1@sky.com

SWAP WANTED! I have a clean/fully working, unmodified aligned R1155A with untarnished dial and perspex window and smart boxed PSU. In return I require an HRO in similar condition. I will come to you and make you a reasonable deal! For a good HRO and coils I will even throw in a Radiovision hand bander 5.
Tel: Brian 01843 594732 or 07944 418259 (Kent).

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Name .....

Address .....

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Signature..... Security number

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Switch issue number (if on card) .....

Start date of card..... Expiry date of card.....

My Subs Number is.....(or send mailer label)

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B.B. Dec '10

TRADERS TABLE

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

Disclaimer

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

NEVADA

023-9231 3090

TRANSCEIVERS

ALINCO DJ596 D/BAND H/HELD £89
ALINCO DJC7 HANDHELD TX £99
ALINCO DJV17 VHF/FM H/HELD £99

HANDHELD SCANNERS

ALINCO DJX2 AM/FM/WFM RADIO £79
BEARCAT 72XLT H/HELD £80
ICOM R5 HANDHELD SCANNER £145
REALISTIC PRO 2006 SCANNER £129
YUPITERU MVT7100 SCANNER £149

RADAR

KINETIC SBS1 REALTIME RADAR £289

RECEIVERS

AOR AR8600 MK II RECEIVER £475
ETON MINI 300 PORTABLE £13

ACCESSORIES

ALINCO EJ47U DIGITAL BOARD £46
AOR VI8200 VOICE INVERTER £40
JIM M75 SCANNER PREAMPLIFIER £54
KENWOOD MC85 MICROPHONE £79
TOYO SA450 ANTENNA SWITCH £17
UNIROSS CHARGER & BATTERIES £12
YAESU FC30 ATU £165
YAESU MH35A2B SPEAKER MIC £19
INTELLIGENT DIGITAL MULTIMETER £25
CLAMP ON DIGITAL MULTIMETER £10
ROBIN ANALOGUE MULTIMETER £15

B-GRADE ITEMS

ALINCO DJC7 HANDHELD TX £124
AMPLICOM POWERTEL 501 PHONE £30
AMPLICOM POWERTEL 500U PHONE £47
COLOMBO TWIN PHONE BLACK £43
ETON G6 RADIO £69
MAGIC BOX KITCHEN DAB RADIO £39
MAHA C9000 CHARGER £39
MAYCOM FR100 H/HELD RECEIVER £55
PALSTAR PS30M POWER SUPPLY £80
PURE CHRONOS CD ALARM CLOCK £79
PURE EVOKE 3 DAB RADIO £149
PURE SIESTA IDOCK DAB RADIO £74
PURE EVOKE 1XT DAB RADIO £59
VENTUS 928 WEATHER STATION £169

SHORTWAVE SHOP LTD

01202 490099

TRANSCEIVERS

YAESU FT-900 ..... £595
YAESU VX-3E £95
YAESU FT-108M/E £95
RCI – 2950 10mtrs Multimo de £125
ICOM IC-756 HF/50 ..... £655
ICOM IC-M401Euro Marine £90
ALINCO DJ-V5 ..... £200
ALINCO DJ-195 ..... £100
ALINCO DJ-S11 ..... £75
ALINCO DR-430 70cms £85
ICOM PMR 446x2Water Resist/w.charg £200
MIDLAND CB 77-250K £50
MIDLAND CB 77-805UK £55
MAXON ALERT 7E CB £65
STANDARD HX260E Marine H/H New £99

RECEIVERS

RCA AR-88 With Matching Spkr ..... £POA
AOR 8600 Mk2 inc CT-8200+RU-8200 ..... £499
YAESU FRG-9600 ..... £225
YUPITERU MVT 7300 ..... £99
GRE PSR 275 ..... £45
UNIDEN UBC-800XLT Ex Demo/software £265
BEARCAT UBC-278 BASE Ex Demo £139
REALISTIC PRO 2042 Base £129
REALISTIC PRO 34 ..... £55
REALISTIC PRO 50 ..... £25
REALISTIC DX 394 HF Rx £85
AMI DIGI SAT RX ASR WS201 ..... £129
ALINCO DJX3 ..... £70
WORLD RECEIVER WR2100 ..... £80
GOODMANS GCD200 DAB Special Price £50
BPL WORLD SPACE £25

ACCESSORIES

HI-MOUND HK-708 Straight Key £35
Air Ministry 1940 Straight Key £45
Military Straight Key Circa 1940 ..... £35
BHI NEIM 1031 ..... £55
BHI NOISE AWAY ANEM £55
ICOM AH7000 DISCONE £85
CREATE CLP 5130 Log Periodic NEW £250
ICOM HS-51 Special Bulk Price £29
YAESU MD1 B8 Desk Mic £50
YAESU XF-110CN Filter £55
YAESU XF-110S Filter £55
YAESU YSK-900 Separation Kit £65
AKD WA3 ABS Wave Meter £25
AEA PK-88 PACKET CONTROLLER £35
WATSON W20SM PSU £55
WATSON W25AM PSU £75
WATSON HUNTER Freq Counter £50
CG SB-2000 DATA CONTROLLER £75
DAIWA CN620A 1kw POWER/SWR £65
DAIWA PS-304 30A PSU £65
ZETAGI HP1000 SWR METER £65
MFJ 948 TUNER £75
MFJ 1278B DATA CONTROLLER £65
WELZ SP-220 SWR/PWR METER £65
PM-2000 2Kw Pwr Meter £70
Various CB PSU's From £10
LOWE FX-1Complete £75
Trailer mounted SCAM 40 Pump Up Mast £925

WATERS & STANTON

01702 206835

Icom	IC-A3E	Airband H/Held + NAV/COM 50ch Alphanumeric	£180
Ameritron	AL-82X	10-160m 1.5kW Linear Valve Amplifier with 2x 3-500 Tubes	£1,599
Microset	PT-110	12V Stabilized 10A PSU with Over V / A protection	£69
Nevada	PSDL	50ohms Dummy load Dc-3000MHz max 15W	£30
Heil	AD-1-Y4	Cable for pro set and yaesu 4 pin round	£10
Midland	SWR-25	3.5-150MHz SWR / Power Meter 100W	£29
Roberts	R-862	HF/VHF receiver AM/WFM 0.15-0.281 / 0.522-1.62 / 4.6-21.95 / 87.5-108 MHz 3 VDC (2*R6 / AA)	£49
Alinco	DJ-X3E	100kHz-1300MHz AM, FM, WFM Hand Held Receiver 700Ch + 8.33kHz step	£95
Optoelectronics	Model-2810	10Hz-3GHz Frequency Counter	£145
Academy	CB-34	3-way SWR Bridge and Field Strenght Meter 25W (3.5MHz) 15W (7MHz)	£15
Microset	PM-110	10Amp 13.5V PSU with inbuilt Speaker and Transceiver Frame	£110
Microset	RU-45	70cm 3-15W in,45W out Linear + GaAsFET Preamp	£149
Microset	PT-105A	12V 5A (max) Protected Stabilized PSU	£29
Microset	PT-107	12V Stabilized 7A PSU	£39
Kenwood	BC-10	Desk Charger for PB-5, 6, 7 & 8 Ni-Cd's with PB-6	£29
Roberts	R-861	Portable 150kHz-30MHz SSB , FM stereo RDS	£139
MFJ	MFJ-9320W	20m CW QRP 1W Transceiver Assembled 12V	£95
Microset	VUR-30	2m & 70cm 1-6W in, 20/30W out Max FM + GaAsFET Pre-amp	£179
Moonraker	FA-5000	80ch 4w UK/CEPT CB Mobile Transceiver	£49
	Moorse Prac	Home Made Morse practice oscillator	£10
Timewave	DSP-59	Multi-mode Audio Noise Filter with Gain Control 12V DC	£89
MFJ	MFJ-940A	28-30MHz 10m Mobile ATU + meter 150W	£39
AirNav Systems	Radarbox	Real-time Aircraft Virtual Radar using ADS-B + Internet Networking via USB	£249
Hi Mound	HK-706	Standard Straight Morse Key + Cover	£39
Watson	CX-201	0-1GHz 2-Way Coax Switch with SO-239 1kW	£12
AOR	LA-350	High Perforrmance active loop aerial,	£99
Win-Radio	WIN-108	108-136MHz Airband Hand Held Receiver 20Ch	£79
AOR	AR-8000	500kHz-1300MHz All Mode Hand Held Receiver 1000Ch.	£149
Yaesu	CD-24	12V DC Charge Adapter for FT-897D Ni-MH	£69
Yaesu	PA-26U	AC Adapter for FT-897 CD-24 Charger	£39
Win-Radio	WR-G305i	9kHz-1800MHz All Mode PCI Internal Computer Controlled Communications Receiver	£399
Icom	IC-T8E	6m,2m,70cm FM Transceiver + wide RX & CTCSS	£149
Midland	Alan-78Plus	Multi 40ch 4w CEPT CB Mobile Transceiver	£59
General Electric	Search-40	40ch 3w AM CB Hand Held Transceiver	£29
Watson	FC-130	1MHz-3GHz Frequency Counter + Hold Function & Ni-CD 9-12V DC	£55
Alinco	DR-M06T	6m FM Mobile Transceiver 10W + CTCSS	£89
Uniden	UBC-60XLT	66-512MHz (with gaps) FM Hand Held Receiver 80Ch. 4 x AA cells	£59
Kenwood	R-5000	150kHz-30MHz All Mode Communications Receiver mains	£289
Alinco	DJ-175T	2m FM H/Held Transceiver + DTMF keypad & CTCSS	£55
Realistic	Pro-2026	66-956MHz (with gaps) AM,FM Scanner 100Ch. 12V	£49
MFJ	MFJ-784B	Tunable DSP Audio Filter with Noise Reduction 12V	£189
Kenwood	AT-130	7.1-30MHz 150W Compact ATU with meter	£99
MFJ	MFJ-931	Artificial Ground	£69
Kenwood	TH-F7E	2m,70cm FM Palm Held Transceiver + 0.1-1300MHz All Mode RX	£149
Yaesu	FRV-7700 A	118-130, 130-140, 140-150MHz Converter for FRG-7700/8800	£59
MFJ	MFJ-949E	1.8-30MHz 300W ATU + Dummy Load & Cross Needle Meter	£119
Icom	IC-R8500	100kHz-2GHz All Mode Communications Receiver 1000ch. 12V + PSU	£959
Yaesu	FT-60E	2m/70cm FM Mil. Spec. 5W Hand Held Transceiver + Full CTCSS & DTMF keypad	£119
Watson	Power-Mite-NF	12V Variable 20A (max) Switch Mode PSU with Noise Offset Feature	£39
Uniden	UBC-780XLT	25-1300MHz AM, FM, WFM Desk/Mobile Receiver + Trunk Tracking 500Ch. 12V + psu	£149
Maas	SPS-9250	12V variable 25A Regulated Switch Mode PSU + Digital Meters	£39
Yaesu	FC-902	1.8-30MHz 500W Matching Manual ATU + Meters	£125
Yaesu	FTV-901R	20W Matching 2m Transverter for FT-901D & FT-101ZD	£199
Shure	526T	Dynamic Desk Microphone + Mic-lock VOX & Amplifier 1x PP3	£59
LDG	AT-1000	1.8-54MHz Automatic ATU 6-800 ohm 1000W max (100W 6m) + X-Needle Meter 12V at 1A	£279
SGC	SG-230	1.8-30MHz Microprocessor controled ATU 150W	£319

RADIOWORLD

01922 414796

C-3210 Dual Band FM Mobile	£109
Kenwood TM-255E 2m Mobile	£349
Icom IC-271E 2m multi mode	£299
Icom IC-490E 70cms Mobile	£250
Kenwood TS-271E	£165
Yaesu FT-8000	£150
Yaesu FT-8100R 2m / 70cms Mobile Transceiver	£220
Yaesu FT-736R 2m/70cm Base Multimode	£599
Yaesu FT-1500M	£129
IC-7400 HF, 6m & 2m transceiver	£899
Kenwood TS-2000 HF, 6m , 2m & 70cm Transceiver	£1,099
Yaesu FT-857D Multi-band Mobile	£519
Yaesu FT-690R II 6m transceiver	£275
Yaesu FT-736R 6m, 2m & 70cm Base	£799
IC-275E	£399
Yaesu FT-480R 2m Transceiver	£220
Yaesu FTV-901R 2m / 70cm Transverter	£275
Kenwood TS-790E Dual-Band Base / Mobile Transceiver	£999
Icom IC-910H 2m/70cms base 100w	£999
Kenwood TM-702E VHF/UHF transceiver	£149
ICOM IC-2200H 144?146	£189
The TINY-2 MK-II - With Open Squelch Board	£109
Kenwood TM-741E - VHF/UHF transceiver 144-146 / 430-	£229
Yaesu FT-726R Base Transceiver 2/70/6m	£399
DR-635E Alinco 2m/70cm FM Dual Band Mobile T..	£230
Alinco DR-620 remote cables	£12
ADI-146 7w/25w/50w 2-meter mobile	£89
ICOM IC-E2820 dual-band mobile transceiver	£369
ADI AR-146 2m FM Transceiver	£89
Icom IC-W31E Dual Bander	£159
Kenwood TH-F7E Dualband Handheld Transceiver	£179
FT-60E Yaesu 2m / 70cm FM 5W	£129
IC-E91 Icom 2m/70cm Handheld Transceiver	£209
Icom IC-E92D transceiver	£295
Alinco DJ-V17E	£105
Yaesu VX-8 full 5 watts FM on 50/144/430 MHz	£279
FDC-450A 70cm Handheld	£79
FDC-150A 2m Handheld	£79
Quansheng 70cm Handheld	£79
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Kenwood TS-50S	£399
Yaesu FT-767GX	£599
Atlas 210-X HF Transceiver	£229
Kenwood TS-50	£399
Kenwood TS-680S HF / 6m	£399
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Q-Mac HF-90E Military Grade HF Transceiver	£399
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BNOS LPM432-10-50 70cm 50W linear amp	£149
Nietzsche NB-30W - RF Amplifier	£59
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Kenwood VB-2200GX 2M Amplifier	£79
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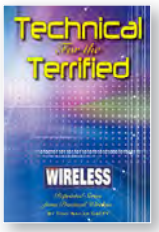

TECHNICAL FOR THE TERRIFIED

This book started out as a series of articles by Tony Nailer G4CFY in *Practical Wireless* aimed at introducing the more technical aspects of the hobby to readers who, unnecessarily perhaps, felt that it was beyond them. It is aimed at bridging the gap between basic understanding, as gathered by students of the Intermediate and Advanced Radio Amateur courses and other – more project-based articles. Aimed at the less-experienced radio enthusiast, the articles are of a general nature, written to remove the fear of technology/techniques and theory.
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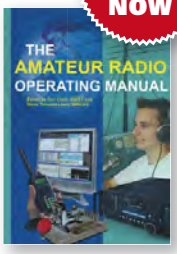

Despite what many believe amateur radio is a fast-moving hobby and the last five or six years in particular have seen numerous changes. The RSGB Amateur Radio Operating Manual provides the best practical guide to the hobby as it is today.

Since the first edition of the RSGB Amateur Radio Operating Manual, it has provided practical information on many different forms of amateur radio operating. This latest edition covers subjects from the basics of setting up a station for maximum efficiency, DX Operating, Radio Sport's many guises, through to D-Star, Satellites and much more. Readers will find information detailing the numerous changes to the amateur bands as more countries have gained frequencies at, or around, 136 and 500kHz, as well as 5, 7.1 - 7.2 and 70MHz. The newer datamodes such Winmor are covered along with the developments in the WSJT suite of software and the whole datamode field. The use of computers in amateur radio is extensively covered, as are basic operating practices and there are even guides to making the most from the various bands available. You will also find subjects as varied as the RSGB IOTA programme, China's first amateur radio satellite, XW-1, Skimmer, ClubLog, on-line DXpedition log checking, and DXpedition operating.

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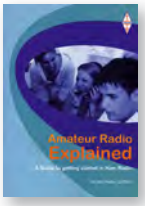

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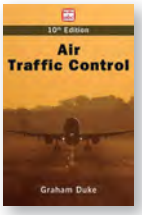

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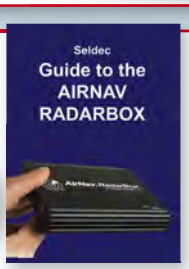

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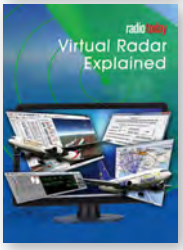

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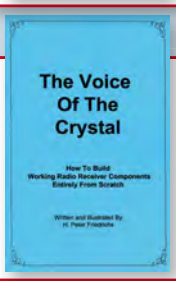

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Rob Mannion's

topical talk

A letter from Tom Read M1EYP features this month, and Rob also discusses an interesting University initiative he saw in Germany recently.

The latest letter from **Tom Read M1EYP** (Letters this month) providing an up-date on his continuing work for Amateur Radio training at his school, and reminds us of what can be achieved by truly dedicated Radio Amateurs. Many readers – I have no doubt – must have been as impressed as we were when we learned of Tom M1EYP's activities via articles in *PW*.

Tom, together with the many others who work to help youngsters into the hobby throughout the world, breath life into the smouldering enthusiasm that seems (so often) to be left untouched in so many young people. Indeed, I think that the youngsters of today are just as keen as my generation was – but nowadays there are so many barriers and layers of bureaucracy that lie between potential tutors-trainers and students?

In my opinion the main problem is caused by the requirement (in England and Wales) to undergo the **Criminal Record Bureau** (CRB) check. Unfortunately though, when the certificate does eventually arrive (most often) carries the vital information 'Nothing known' – it's an entirely unsatisfactory statement begging for a definitive answer!

I think that the well-meant legislation has led to he loss of many potential tutors, 'Elmers' and other helpful types who have encouraged many a youngster (me included) into the hobby. Simply speaking it's because some people feel offended that they've been asked to submit themselves to a CRB check – especially when they've probably been providing the same help and support for many years. Without the certificate the law stops them from volunteering further.

Surely commonsense has to enter into the CRB process soon? For those of us who come into contact with children or vulnerable people – the CRB system certainly seems to leave much to be desired.

Wuppertal's Wonderful Example

In early September I travelled by train to Wuppertal in the North Rhineland of Germany for a long weekend. And no, I'm sorry to say – I didn't get to ride on the famous 100 year-old hanging monorail (the Schwebebahn) as it was closed for maintenance!

Despite the closure of the monorail the Wuppertal Stadtfest (City Festival) was in full swing and there were a great number of attractions to watch and enjoy. For example, the shopping centre close to my hotel was a typical modern building, holding many separate shops and – during the Stadtfest – something quite remarkable was taking place for those interested in Science.

As part of the Stadtfest one of the local Universities – the **Bergische Universität Wuppertal (BUW)** had taken over a section of one of the shopping centre's open plazas and had a large number of open-plan 'hands on' types displays in action. The displays covered everything from basic biology and research to electronics (plenty of soldering iron projects and other technology to play with) to forensic medical investigation demonstrations (complete with anatomically correct model human skulls!). The stands were staffed by very helpful (often multilingual) lecturers and post-graduate students.

It was an incredibly effective display of modern teaching techniques and I was fascinated to see what was on offer. However, there were so many youngsters (of all ages!) watching, asking questions or trying the various 'hands-on' demonstrations, I had to wait my turn to join in what was obviously an extremely successful, future student, staff and recruitment venture. Additionally, I have no doubt that the displays were showing local people just what sort of work the University does – very effectively!

Altogether, the displays were most effective and absolutely fascinating! Everyone showed an interest in what was on offer. As expected, I met several Radio Amateurs who were involved and I suggested that our hobby could do something similar. So, I wonder – has anyone applied a similar idea to promote our hobby? The special promotional exercise certainly seemed to work for the BUW and I'm sure it would work for us!

Rob Mannion G3XFD/EI5IW

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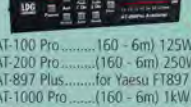

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