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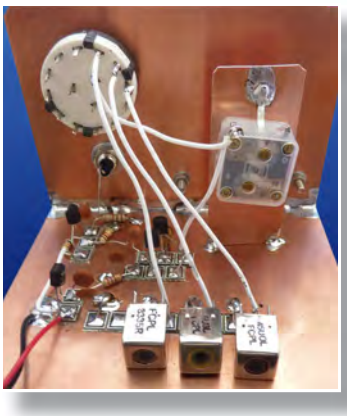
NOW IN ITS 78th YEAR!

Practical WIRELESS

Britain's Best Selling Amateur Radio Magazine

Flex-1500
Software Defined Radio



Build
An RF Test Oscillator

2010 QRP Contest Results

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WATERS & STANTON

SCOTTISH STORE • W&S @ JAYCEE, 20 WOODSIDE WAY, GLENROTHES, FIFE, KY7 5DF - CLOSED MONDAYS
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AOR — W&S Are Sole 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 mems, Rotary tuning VFO.
£599.95 D

AR-5001D NEW

40kHz-3.15GHz Base Receiver. All mode reception, monitors 3 ch at once!
INTRO PRICE £2999.95 D

AR-MINI *New Low Price!*
Scanner 100kHz - 1300MHz.

Offers lots more than you think. From LW to GHz it has great sensitivity, CTCSS decoding & DCS. Built-in 100kHz-5MHz bar antenna & offers AM FM & WFM. Great for monitoring, airband listening or broadcast. FREE software available for programming.
£149.95 D

DV-Dongle 2 Models!


DV-DONGLE USB to your PC or Mac and work D-Star by accessing internet open D-Star repeaters worldwide. £179.95 C

NEW DV-ACCESS Access Point, similar to above but able to TX/Rx over short distance so that with 2m D-Star radio you can work through your PC. £219.95 C

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

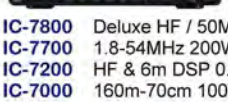
IC-E92D

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

NEW The HF AlexLoop


Easy thumb tuning

* 7-Band Loop Antenna
* 40/30/20/17/15/12/10m
* Manual tune in seconds
* 1m diameter loop
* Packs in case 40x27cm
* 20W QRP design
* Includes loop mast
* Easy handheld

£299.95 D

RFSPACE SDR-IQ Receiver
NEW

The SDR-IQ is a high performance receiver covering 500Hz to 30MHz. It is powered directly from PC USB socket and 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

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. You get superb audio quality, amazing razor sharp selectivity, & complete programming options. The live spectrum & waterfall display plus overall graphic interface combines with a transceiver that fits in a brief case yet punches well above its weight.

This Month Only Save £100!

Flex-1500 5W 160m-10m
Was ~~£1399.95~~ Now £1299.95 D

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.

£549.95 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

NEW VX-8DE

* Triple Band - 6m/2m/70cm
* Upgraded APRS features
* Rugged & Submersible
* Powerful Li-Ion battery
* Built-in altimeter
* Increased Memory
* CW Trianer!

£389.95 D

NEW VX-8GE Dualband 2m/70cm 5W + GPS Antenna
£379.95 D

HF Transceivers

FT-2000 £2299 D

FT-2000 classic HF & 6m 100W transceiver with PEP (performance upgrade) ready installed. Dual receive & fantastic filtering make this an impressive performer. We still have the largest, most up-to-date stock of Yaesu in the UK!

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-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

New Mobiles In Stock Now!

FT-1900E £129.95 D

55W 2m Mobile. 3 Watts of pristine audio, large LCD & 200 memories.

FT-2900E

75W 2m Mobile. No cooling fan needed! Large easy-to-read LCD.
£139.95 D

FT-7900E £229.95 D

50/45W 2m/70cm Mobile. 1000 Memories supplied with DTMF Mic.

VX-3E


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

TEN-TEC

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

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

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

TG-UV2 — QUANSHENG

2m/70cm Dual Bander

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

YAESU — NEW FT-DX5000 Series!

W&S First! We were the first to receive official CE stock from Yaesu UK. No grey imports or non-Europe spec stock here!
The new series comprises 3 options : FT-DX5000, FT-DX5000D & FT-DX5000MP. All offer 200W from 160m to 6m.

PW Readers Get £100 FREE Heil Goods!

FT-DX5000	Basic Transceiver 200W HF-6m	£4999 D
FT-DX5000D	With Station Monitor SM-5000	£5349 D
FT-DX5000MP	With Station Monitor & Roofing Filters	£5799 D

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

WiNRADiO Excalibur Receiver NEW

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

The WR-G31DDC "Excalibur" receiver heralds a new standard of performance at a very affordable price. The robust front end handles today's busy bands with ease. You will love the live spectrum display (up to 50MHz wide) and absence of significant spurious signals.

£649.95 D

Stock is very limited on this model due to component supplies.

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

KENWOOD

NEW TS-590S

W&S Exclusive! We are pleased to announce the new HF radio from Kenwood. Prices to be announced.

bhi DSPKR

NES10-2-MK3 NEW
New DSP speaker for any receiver or transceiver.
£109.95 C

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

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

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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www.wsplc.com

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)

Create
Rotators

RC5-1 Medium Duty Rotator

*Rotating torque: 6kg/m *Braking torque: 80kg/m *Mast size: 48-63mm *Vertical load 400kg *Horizontal load 800kg *Rotation speed: 60-150sec/50Hz *Power requirement: 230V AC 80VA *Weight: 5kg *Cable: 7-core cable (not supplied) *Requires MC-2 lower mast clamp if mounting on pole **£579.95 D**

RC5-3 As above + preset control **£699.95 D**
RC5A-3 As above but heavy duty **£999.95 D**

Palm Portable Key
German Engineering

Beautifully Enginnered Ultra smooth movement and balance. **£74.95 C**

This tiny straight key is manufactured in Germany & represents typical German design & brilliance. Ideal for portable or QRP & very popular for the users of FT-817 transceivers.

SGC
Auto ATU

SG-211

SG-211 "Stowaway" auto ATU. HF + 6m Up to60W. Powered by internal battery. Not weatherproofed.

Was ~~£249.95~~ **£199.95 C**

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*

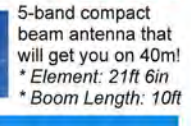
MQ-26SR as above + 17m & 12m **£599.95 D**

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*

Watson
Coax Switches

Premium grade Watson RF coax switches.



4-Way Switches

CX-SW4N **£69.95 C**
DC - 1.5GHz 1.5kW 5x N-Type Connectors.

CX-SW4PL **£59.95 C**
DC - 800MHz 1.5kW 5x SO-239 Connectors.

3-Way Switches

CX-SW3N **£49.95 C**
DC - 1.5GHz 1.5kW 3x N-Type Connectors.

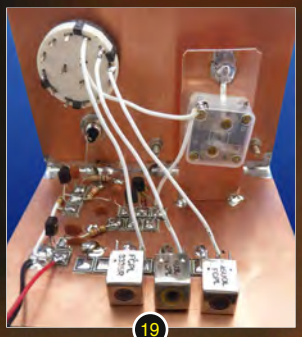
CX-SW3PL **£42.95 C**
DC - 800MHz 1.5kW 3x SO-239 Connectors.

2-Way Switches

CX-SW2N **£32.95 C**
DC - 3GHz 2kW 3x N-Type Connectors.

CX-SW2PL **£26.95 C**
DC - 1GHz 2kW 3x SO-239 Connectors.

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



Practical Wireless November 2010

Volume 86. Number 11. Issue 1242. On sale 14 October 2010

Front Cover
Operating G0AOZ/P in the field for the *PW* 144MHz Contest, and the FlexRadio 1500 transceiver, with a rear view of the test oscillator featured in COTPW.

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Rob Mannion's

keylines

Rob has second thoughts about the British legal system!

Sometimes an item of Amateur Radio news or a letter published in *PW* or elsewhere, attracts much feed-back from our readers – and the 'Amateur Radio Prosecuted' item regarding the case of Dorset-based **Carl Johnson M3VWP**, certainly attracted attention! Indeed, since *PW* featured Carl's letter there's been a constant stream of comment, suggestions and criticisms, much of it in the 'not for publication' category.

Some correspondents criticised UK legislation – and some were questioning the actions of an Amateur who was using a hand-held microphone while in charge of a vehicle. However, whatever the opinions, including those that are published our *Letters* pages – I think we can be sure that the topic will be in focus for some while yet!

The legal problems facing Radio Amateurs who attract the attention of the Police are not – of course – limited to the UK. Similar situations to those of Carl M3VWP have occurred in the USA and Canada and (thank you everyone!) a number of readers have kept me up-to-date with news from around the world involving Amateurs facing similar problems.

The legal situation is complicated enough in the UK. However, when compared to the USA which is, of course, a collection of separate States linked within a Federally (centrally controlled) political system.* So, just imagine how complicated it could be if an Amateur (unfamiliar perhaps with the law in a neighbouring State) makes a mistake – perhaps operating a hand-held microphone.

With the politically linked States (such as the United States of America) it's possible that the separate States can have laws that vary from the State next door! In fact, I was surprised to learn that if someone is wanted for a legal problem in one State, but is in another State (perhaps 'next door') they have to be 'extradited' from one jurisdiction to another. And for someone like myself living in the UK, the concept of extradition from one part of a country – within its own boundaries – to another part of the same country seems strange indeed!

Please be aware though – I'm not criticising the USA's Federal and separate State system – nor any other Federal system for that matter. Instead, I'm just using it as an example of just how complicated legal systems can become. Perhaps on reflection – the system in the UK isn't as complicated as I thought it was! Despite this, my personal advice to anyone operating mobile here in the UK is not to use a hand-held microphone unless you are 'parked up' safely, off the road – with your vehicle keys removed from the steering column/ignition lock.

***Note:** Please forgive my abbreviated and perhaps inadequate description of the Federal system with separates States – but for the purposes of *Keylines* it must suffice. My Editorial isn't Wikipedia!

Low Profile Amateur Radio?

Every so often the public profile – or lack of it – of Amateur Radio is questioned and 'we' (The Editorial team, *PW* readers, clubs and Amateurs who wish to publicise the hobby more efficiently) become quite concerned. It's always followed by a little flurry of activity, ideas and positive action plans to publicise our worthwhile hobby. Unfortunately, (and I think this is entirely natural) the flurry of concern fades away and our worthwhile activities slip from the public gaze.

However, the 'lack of awareness' of Amateur Radio by otherwise well informed people – is to me – quite surprising. I say this because very recently I was discussing Amateur Radio with an off-duty full time member of a West Country Fire Service. This man – a delightfully friendly and helpful type – has served in several County Fire Services during the last 20 years or so and was visiting the Bournemouth area when we met, after he spotted my callsigns displayed in my car's rear window, as he passed my driveway.

My visitor showed great interest and I explained their significance. This intelligent man knew all about CB radio – but hadn't heard of Amateur Radio! But after a visit to my shack and a long chat – I'm sure he then knew much about our hobby. So, just how can we make people more aware of our hobby? I'd be interested in your suggestions!

Rob Mannion G3XFD/EI5IW

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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*.

Not Being In Proper Control Of The Vehicle

Dear Rob,

I read with interest the readers letter on the subject of **Carl Johnson M3VWP**'s traffic offence conviction in the September *PW*. It had to happen sometime with the catch-all of "Not being in proper control of the vehicle". Users of two-way radios whatever they may be – other than hand-held mobile telephones – were exempt from the offence of using a mobile communication device whilst driving when this became law in December 2003. I have carried a copy of the regulations in my vehicle since that date. They are:

Statutory Instrument 2003 No 2695 The Road Vehicles (Construction and Use) (Amendment) (No.4) Regulations 2003

However, even with this in place I would never normally use a hand-held microphone as it attracts zealous Police personnel wishing to score 'Brownie points' as obviously happened in Carl's case. I have several 'hands free' devices to overcome this barrier. Anything extra you do whilst driving can always put you in jeopardy due to a lack of concentration at a critical moment. As you get older it gets worse so I reduce the risk as much as possible! Regards,

Bob Wilkinson G3VVT
Kendal
Lake District

The Jet Stream & Radio Effects

Dear Rob,

Thank you for publishing the letter from **John Cormack G4VZR** – it's highlighted what I think is an overlooked topic. Can you publish an article on the subject?

The vagaries of propagation have always interested me. Many years before I became involved in hobby radio – I was most intrigued at the 'fluttering' effect we used to get on our TV set at my late parents' home near Lydd in Kent. My parents' home had Lydd Airfield quite close-by and the Dover BBC transmitter v.h.f. signals would dramatically reflect from the aircraft that used to ferry cars over to Le Touquet in France. One of the airlines – Silver City – used Bristol Freighters, which were very slow. About half way across the English Channel they were still able to cause quite a flutter on the picture on our ancient 405 line v.h.f. Marconi TV set.

When I joined the RAF – after enjoying several years in the Air Training Corps – my fascination for radio led me to train in maintaining aircraft communications and – you might have guessed it – radar technology. Even after 30 years working on the equipment, before I

Star Letter

Carl Johnson – A Serving Police Officer & Radio Amateur Replies

Dear Rob,

I have been a front line Police Officer in the Midlands for over 20 years and a licensed Amateur for considerably longer than that. In his letter printed in the September issue of *PW* Carl Johnson M3VWP mentioned that the Officer who stopped him did not know the intricacies of the Law relating the use of mobile 'phones whilst driving a Motor Vehicle. I would like to say in defence of that Officer that due to the complexity and constantly changing nature of British Law it is impossible to know the intricacies of each and every piece of Legislation and indeed the defence offered to each piece of that legislation.

I indeed I read somewhere that the previous Government brought in on average 13 new laws every day that they were in Office. Try staying on top of that!

Regarding use of mobile 'phones in vehicles, the Law is quite specific in defining what is actually a Mobile 'Phone from a technical point of view i.e. operating frequencies, etc. Indeed I to advised a Colleague not so long ago when they stopped somebody using a 446MHz 'licence free' 'Walkie talkie' whilst driving. (No further action was taken and suitable advice given to the Driver)

As far as being dealt with for "Not being in proper control of his vehicle" – ultimately that's for a Court of Law to decide if, as often occurs, the individual driver's commonsense does not prevail beforehand – and they use some form of a hands free kit in the first place.

The real issue here is I believe Carl's methodology. Solicitors have an old saying that goes along the lines of, "A Solicitor who represents himself has a fool for a Client."

Why did he not, if he felt so strongly, use one of the Solicitors available at Court free of charge?

From previous personal experience with Defendants representing themselves at Court I would strongly suspect Carl wasted the Court's time, made a complete hash of his defence and probably – unfortunately – did himself few favours doing so. Regards, keep up the good work.

Mark (Licenced Amateur & Serving Police Officer)
Full name and address supplied

Editor's comment: *Thank you Mark. From the correspondence received so far, it seems that there are two main opinions. Most letter writers who criticise Mark M3VWP consider that he did not help his case by not taking legal advice or obtaining the services of a Solicitor. The other letter writers mostly consider that Road Traffic Law is over complicated and unnecessary in many cases. However, I have no doubt that this topic will continue to be aired. Please see* Keylines *for further comment from me.*

retired from the RAF, I still ended up servicing radar at small airfields. I like to think my interest was triggered by the interference on our old TV. I look forward to seeing more information on unusual propagation in *PW.* Thanks for an interesting read each month.
Steve Holme
The Bourne
Hastings
East Sussex

Amateur Radio Propagation Studies

Dear Rob,
I have been most interested to read the letters published in *PW,* regarding propagation studies and, in my opinion, it's a feature of our hobby that's frequently overlooked. But, in defence of *PW* I'm pleased that our new *World Of VHF* author **Tim Kirby G4VXWE** is very much aware of propagation observations and mentions them in his column.

I decided many years ago that the path for me in the radio hobby was listening on the Amateur bands and this has now developed into monitoring both the h.f. and v.h.f bands. Like many others I've always had a suspicion that the h.f. bands (particularly the higher bands from 18 to 28MHz) are actually affected by the day-to-day tropospheric weather conditions. Of course, my studies are only casual – although I do keep notes, I'm sure that 'official' researchers would regard my observation over the last 25 years or so to be anecdotal.

Living near the sea here in Southend I'm able to monitor the 2m band and the Maritime Ducting can be absolutely fascinating. But, I have also recorded some most interesting DX conditions on 18MHz – particularly – when we've had consistently high barometric pressures. For my observations on the Amateur bands I mainly use the International Beacon Project (IBP) beacons, particularly the beacon **CS3B** on the Portuguese Island of Madeira in the Atlantic – although it's presently off-air, as it was recently been damaged by lightning! The CS3B beacon is normally a consistently good signal here on 18MHz – but I always notice it's even stronger during times when the barometer is reading high for a a day or so.

It's thanks to *PW* I learned about the IBP beacons – they're extremely useful. Even though they transmit their idents at 22w.p.m., if you have a timer or *PW* Beacon Clock, there's no need to read the high speed Morse. Fortunately, although I was a Chef-in-training when I was called up for my National Service – the RAF trained me as a Radio Telegraphist and the Morse has always been useful. So, I can cook, read Morse and observe propagation conditions!
John Harrison
Thorpe Bay
Southend-on-Sea

Editor's comment: *Thanks John. Please join me on the* Topical Talk *page for further comment.*

Send your letters to:

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New Zealand South Island – Shaken & Stirred!

Dear Rob,
We appreciate your E-mail and concern thank you! We've had some 250 aftershocks so far and some say another big one is on its way – perhaps Intensity 6 next time. We are fine in the main – the big issue is getting back to work. No work, no money, no food for a lot of people just now. This has brought priorities to the fore I can tell you! Candles, water, battery radio, heat and a little food and a roof that doesn't leak are all you really really need. Our Amateur Radio Emergency Corps has largely, not been needed. Power, phones and cell phones have continued as normal. We've taken everything off the walls of the home and set up one room in the house as the 'survival room' with extra blankets, supplies and water etc.

Chopped some wood, dug up the lawn to build a fire to heat water and also a latrine. Sewer system is cross contaminating the water supply. Overall about half a million Canterbury folk are affected. 100,000 homes damaged. As you can imagine recovery is going to take a long time and lots of money. The mental impact may last a lifetime. There are bright sides too. Clean up will create a lot of work; not what you will be used to but it will be there. Some folk may not get over this quake and it will colour the way we treat each other and see the world for a long time to come I guess.

What's happened will help us better sort out what's important, that's for sure. Well I'd better get back to doing things or catching up on sleep during the day. Here's some sites to monitor what's happening: For number of aftershocks and intensity visit here: **http://www.geonet.org.nz/earthquake/quakes/recent_quakes.html** For the official information that the citizens are being told visit: **http://www.civildefence.govt.nz/memwebsite.nsf** For general news and photographs visit: **www.stuff.co.nz** I'm delighted to be able to write to you. The odd prayer occasionally will be well received by all concerned. All the best to you, Tex and *PW* readers.
David (+ **Mary and Family**) **Searle ZL3DWS**
Christchurch
New Zealand
davidsearle@contactplus.co.nz

Editor: *I E-mailed David immediately after seeing the news of the earthquake on TV. His (fairly!) re-assuring reply set my mind at rest and I thought our readers would like to also hear the news. Our thoughts are with you and your neighbours David!*

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.

New Alinco Receiver

Mike Deveruex G3SED, Managing Director of Nevada, contacted *Newsdesk* with some interesting information from Alinco: "Please find attached a photograph of the new Alinco DX-R8e h.f. communications receiver we will release during December for the UK market.

The DX-R8 will sell for around £500 and feature an IQ output (In-phase Quadrature) that will also allow it to be used with free downloadable software as a software defined radio (SDR).

Covering 150kHz to 35MHz with intermediate frequency (i.f.) shift, narrow/wide filters, memory scan and all mode reception, we feel it will be a great success. The radio will be available direct from us or our dealers throughout the UK." Mike G3SED.

Specifications:

Frequency range:	150kHz – 35MHz
Modes:	a.m., c.w., s.s.b. and f.m.
Freq. stability:	±1p.p.m.
Sensitivity:	a.m. 150kHz – 1.8MHz: 10μV, 1.8–30MHz: 2μV f.m. 28 – 30MHz: 0.25μV s.s.b. 150kHz –1.8MHz: 1μV c.w. 1.8-30MHz: 0.25μV
Selectivity:	AM Narrow 2.4 kHz (-6 dB), 4.5 kHz (-60 dB) AM/FM 6 kHz (-6 dB), 18 kHz (-60 dB) SSB/CW 2.4 kHz (-6 dB), 4.5 kHz (-60 dB)
Intermediate frequencies:	1st: 71.75MHz, 2nd: 455kHz
Image rejection:	70dB
Audio output:	<2.0 W into 8Ω 10% THD
Memories:	600 channels in three banks
Power requirements:	11.7 – 15.8V d.c.
Current drain:	1A maximum
Dimensions:	(w×h×d): 240 × 100 × 293 mm (9.45 × 3.94 × 11.54 in)
Weight:	4.1 kg (9 lbs)

Further information from **Nevada Retail Sales**, Tel: (**02392**) **313090**
Unit 1 Fitzherbert Spur
Farlington
Portsmouth
Hampshire PO6 1TT
E-mail **sales@nevada.co.uk**
Website **www.nevada.co.uk**

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The Dover Radio Rally – First Of The 2011 Season?

Nigel Evans M0NDE contacted *Newsdesk*: "The Dover Rally is to be held on January 16th 2011 at Whitfield Village Hall, Sandwich Road, Whitfield on the A2 just outside of Dover – post code **CT16 3LY** –for visitors with SatNav. There will be talk-in provided on GB3KS. The event was revived last year and was such as success that we have hired extra space for the rally this year. We had a packed hall of small traders, and being a radio rally the focus will be on ra dio related items not other electronic bits and bobs. The rally ends with an auction and items are either sold with a commission or traders often donate stuff they do not want to haul back to their garages and sheds. We have a web site set up specifically for the rally and this is **w ww.doverradiorally.com** The site has all the usual information required such as booking form and details of talk-in and lo cation. The web site is only just up and w ill be improved shortly.

"The food last year was cooked by some of our ladies and proved very popular. We had to send out for extra ra lls half way through! Our plans are to provide the same level if not better at th e next rally. We are looking forward to seeing old and new friends again."
Nigel Evans M0NDE
Further rally details from Peter G 0KOK **events@darc.org.uk**

Morse Enthusiasts Group Scotland Change Frequency

The frequency for the **Morse Enthusiasts Group (Scotland)** is changing from 3.550MHz± to 3.555MHz±. The day and time will be every Monday at 1800 UTC. The changes w ill take place on Monday December 6th, although up to that date you can call on 3.550MHz and then QSY to 3.555MHz. The changes have been made to comply w ith the band plan and with time constraints.

F urther information from **Dave Francis M M0DYX** (Club Secretary) via **mm0dyx@supanet.com**

The Chiltern DX Club (CDXC) 2010/11 Committee

Chris Duckling G3SVL contacted *Newsdesk* with the latest news from the Chiltern DX Club. "At its recent AGM, the Treasurer for the past seven and a half years, **Nigel Cawthorne G3TXF** stood down. The President, **Neville Cheadle G3NUG**, presented him with a commemorative plaque to honour of his services to CDXC. Nigel is staying on the committee to assist with some transition tasks.

"Tony Bettley G4LDL who has been acting as secretary, was duly confirmed as secretary and **Gordon Rolland G3USR** as Treasurer. All other members were re-elected to their current positions".
The new committee for 2010/11 is as follows:

CDXC
CHILTERN DX CLUB
The UK DX Foundation

President:
Neville Cheadle G3NUG

Chairman:
Chris Duckling G3SVL

Secretary:
Tony Bettley G4LDL

Treasurer:
Gordon Rolland G3USR

Digest Editor:
Martyn Phillips G3RFX

Awards Manager:
Jim Steel M0ZAK

Reflector Moderator:
Mark Marsden G4AXX

Member:
Michael Wells G7VJR

Member:
Nigel Cawthorne G3TXF

"Following the AGM, a barbecue was held in glorious sunshine and attended by 103 members and their partners. The CDXC is the UK's largest group of h.f. DX and contest-oriented Radio Amateurs with a membership of 750. It promotes good operating both in DXing and Contesting and offers financial support to major DX-peditions as well as publishing a bi-monthly magazine *The CDXC Digest."* More information can be found on our website at: **www.cdxc.org.uk**
Further information from **Chris@G3SVL.com**

Peter Hart G3SJX Collects Yaesu FT-DX5000MP

Martin Lynch G4HKS writes, "Twelve years after buying a Yaesu FT-1000MP, **Peter Hart G3SJX** finally replaces his shack base station with the new, top of the range FT-DX5000MP.

"After subjecting the new Yaesu h.f. and 50MHz base station to stringent tests, Peter decided the improvements made to the FT-DX5000 warranted the change. Peter commented that, "This is only the fourth base rig I have ever bought commercially, starting with another Yaesu, the original FT-101 in the 1970s". The photograph shows Peter Hart G3SJX left, Martin Lynch G4HKS centre and **Dean Croome,** Yaesu UK General Manager on the right. Further information from:

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United Kingdom KT16 9AS
Tel: (01932) 567333
FAX (01932) 567222
E-mail: **Martin@MLandS.co.uk**
Website: **www.MLandS.co.uk**

Lothians Radio Society Is Keeping Busy!

New LRS President Dr. John Cooke GM8OTI, presented his President's address 'Home Brew Portable', on Wednesday September 8th, at the Braid Hills Hotel. John will soon presenting an article in* Practical Wireless *featuring his microwave construction experiences from first steps to getting on the air.

Do you fancy buying some 'junk' (we know it's really a 'surplus equipment' sale!), or want to know what those famous GPO vans got up to? If so, the Lothians Amateur Radio Society meetings will interest you! **Andy Sinclair GM7HUD** invite you to their meetings.

Andy GM7HUD writes: "We've got a full programme taking us through the Winter into 2011. Our Surplus Equipment Auction takes place in **St. Fillan's Church Hall, Buckstone Drive, Edinburgh** on October 20th. Come along – you're bound to find something to bid for!

Another – which promises to be fascinating – is a talk about those famous little GPO vans. Entitled "GPO Vans In The Queerest of Places, the talk, provided by **John MacDonald GM4XZN**, will bring back many memories!

And on November 24th, **Gavin Taylor GM0GAV** is providing a talk about a DXpedition to Antarctica. Bring your woolly jumpers – it's bound to a a really 'cool' talk!

January 26th 2011 brings something for the Valve & Vintage fans when Ian Ropper GM0UHC will give a talk about restoring the famous R1155 and T1154 RAF receiver and transmitter combination.

If you want to know anything else about the society please feel free to E-mail me for further details.
Andy Sinclair GM7HUD
Secretary Lothians Radio Society
secretary@lothiansradiosociety.com
Meetings take place in the Braid Room, Braid Hills Hotel, 134 Braid Road, Edinburgh EH10 6JD, 7.30pm for an 8pm start.
Website **http://www.lothiansradiosociety.com/**

Inventor Tim Hunkin To Open Norfolk Amateur Radio Club's New Shack

As *PW* went to press, Inventor **Tim Hunkin**, presenter of the TV series *The Secret Life of Machines* was on course to open the Norfolk Amateur Radio Club's (NARC) new radio shack at 7.30pm on Wednesday October 6th 2010.

Steve Nicholls G0YKA writes: "The club has been meeting at the Eaton City of Norwich School, Eaton Road, Norwich NR4 6PP, for several years, but has now put together a large dedicated, lockable cabinet in one of the classrooms, which will hold the club's h.f. and v.h.f./u.h.f. equipment. New permanently-installed antennas have also been added giving members the chance to operate at the club's regular meetings, held every Wednesday throughout the year.

Tim Hunkin, who is a talented Engineer and skilled cartoonist, will be guest of honour at the club's grand opening night during Amateur week, unveiling the new shack and giving a talk about his life and work.

Some of Tim's inventions can be seen in the *Secret Life of the Hom*e gallery at London's Science Museum and in the *Science in the Dock* object theatre at Glasgow Science centre. Other imaginative creations made by Tim can also be found on Southwold Pier in Suffolk.

But Tim is probably best known as a presenter on *The Secret Life Of Machines,* a TV series made for Channel 4 in the late 1980s and subsequently shown on the Discovery Channel.

David Palmer G7URP, NARC's honorary chairman, said: "We will be very pleased to welcome Tim to our club and are confident he will inspire a new generation of Radio Amateurs and engineers. We have been planning the shack for a long time and all radio enthusiasts, whether they are NARC members or not, will be very welcome to visit us in the future".

Photo credit:Tim Hunkin

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radio@dcpmicro.com
Tel: **(01953) 458844** Mobile: **07768 724485**
Website:
http://www.norfolkamateurradio.org/index.php

Second World War Memories (And Visitor!) At MKARS

The **Milton Keynes ARS members** were pleased to welcom**e Roland Lefebre ON7LDR** to the club house recently. Roland was on a short visit to the UK and a trip to Bletchley Park was included on his 'must do' list!.

Roland brought with him his excellent home-brew replica Mk7 Paraset to show to the club and continuing the wartime theme he was dressed in an original khaki uniform of the Free French Forces. The club members thoroughly enjoyed Roland's visit and the meeting closed in the time honoured manner with a hearty round applause!

Further details about the club from
roywoollard@btinternet.com
Website **http://www.mkars.org.uk/**


Photo credit: Peter Davies M0PJD

Cha[illegible]n's Morse Evenin[illegible]s

Rob Luscombe MJ0RZD sent a burst of (good) Morse to *Newsdesk* announcing that: "Just a quick line to let anyone who is interested know that the club are hoping to run an informal Friday evening session at the **Jersey Amateur Radio Society**, to learn some of the basics and to get underway with the essentials of morse code.

"**Mathieu Roche** – who is a club member – has kindly offered his time and passion for c.w. operation to help others but with no cost to the individuals wishing to take part or to the club. Mathieu phoned me this evening about this and we hope to make start soon. It is not initially essential to have any equipment or prior knowledge of Morse code and all club members are welcome. Please – could anyone who is genuinely interested in taking part, let me know so I can gauge response. We look forward to hearing from you!"

Rob MJ0RZD
Tel: 07797 923916
E-mail: **mj0rzd@robluscombe.com**
Website: **www.robluscombe.com**
The Jersey Amateur Radio Society at **http://www.radioclubs.net/gj3dvc/**
The Jersey Amateur Radio Repeater Group at **http://www.radioclubs.net/gb3gj/**

Chris Taylor G0WTZ – To Pastures New!

Martin Lynch G4HKS writes: "My trusty old employee Chris G0WTZ has finally thrown in the towel and found himself a new job just a walking distance away from his home in Watford.

The travelling, working six days a week and pressure finally caught up with him and in his words "I've worked 6 days a week for 30 years and I just want to slow down and get more time back in my life". Can't say I blame him either. Chris has found himself a job very local to his home, working in the aviation market which, as Chris's interests changed over the years, (supporters of the excellent SBS system will know), suits him down to a tee.

Chris joined me in the early nineties (with hair then I might add, in fact so did I), in my first little corner store in Northfield Avenue, London. The only way we could do rallies in those days was to pack the morning of the rally itself – the pair of us were often in the shop at 4:30am! Those were the days. Chris was with ML&S through 4 moves in location including the current superstore in Chertsey, even involved in assisting with the ML&S Bikesmart motorcycle and scooter store in Ealing.

Chris will be missed by all at ML&S and the many customers he met over the years. He has promised to still drop in and help out at our Open Days and may even make a guest appearance (armed with calculator for deals) at the forth coming Newark show at the end of the month. Come and wish "CT" all the best for his new job.

Thank you Chris for all the hard work, dedication and enthusiasm you put in – it's been fun and I'm glad you have more time to chill out – now who's up next to join the Lynchy team? **Martin Lynch G4HKS.**
ML&S Martin Lynch & Sons Ltd.
Outline House
73 Guildford Street
Chertsey Surrey KT16 9AS
Tel: **(01932) 567333**
E-mail: **Martin@MLandS.co.uk**

Stop Press News!

Ofcom has published a consultation setting out its proposal to reserve the 2.6GHz band for wireless camera use during the London 2012 Games. The consultation can be found at: **http://stakeholders.ofcom.org.uk/consultations/band-2500-2690-london-2012-games/**

The 2010 *Practical Wireless* 144MHz QRP Contest Results

How well did you do this year?

The Editor writes: Once again – on behalf of all the contest entrants and everyone who listen or supports the event – I thank Colin G6MXL for his hard work. I wasn't able to take part this year as I was away on holiday – but I've heard from many contesters who really enjoyed their special 'day out'. I also thank everyone who entered, or gave points away, for their support.

The 93 entrants to the 27th *Practical Wireless* 144MHz QRP contest on Sunday June 13th 2010 made a total of 4559 valid contacts with stations in 47 different squares. All three figures are up on 2009, which is particularly encouraging as this year the weather was the worst for several years! In addition there were distractions such as World Cup football matches and the Canadian Grand Prix on TV.

Radio conditions were variable. Some entrants worked some good distances – yet reported significant variations during the course of the contest; others reported heavy QSB on some paths.

The Overall Winner

The Overall Winner, Winning Team and Leading English station are the **Salisbury and District Grand International Transmitting Society** (SADGITS) **G4RLF/P**, operating from IO80WX.

In second place overall, is the **Burton on Trent Amateur Radio Club G3NFC/P**, operating from IO92BA.

The leading Fixed Station is **Linda Leavold G0AJJ**, operating from JO02QT. The leading Single operator station is **Mike Isherwood G4VSS/P**, who operated single-handed as **Warrington Amateur Radio Club B** from IO83RD. The leading **Welsh** station is **Rhys Thomas GW4RWR/P**, operating from IO82HV.

The leading **Overseas** station is again the **UBA TRA-OSB Contest Team F/OT3T**, operating from JO00UV. The team also came Third overall, which is particularly commendable, as they started late due to voting in the Belgian General Election!

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. No checklogs were received this year.

That Weather!

This year 'that' weather certainly played its part! Those in the south enjoyed a sunny day throughout the contest but further north – heavy rain and fog caused difficulties for many stations. There were numerous reports of stations being inundated with water, soaked log sheets, and closing down before the end of the contest, or staying at home instead of going portable.

Mike Isherwood G4VSS/P says, "I spent hours drying out paper log sheets to decipher the required info. What a day, great for setting up in the morning and driving rain in the afternoon. Winter Hill has a 1000ft tall TV mast which disappeared from view during the contest!"

Gareth Woods GW4JPC submitted the **St Tybie ARS GC0VPR/P** entry. "The morning was quite pleasant, but the wind and rain swept in from the west making our hilltop feel quite cold and exposed!"

Jane Dorman GD1LVY commented, "We got the antenna up and only dropped it once, then the fog descended, so we were unable to tell which way the thing was pointing, even the compass we brought with us swung around over about 200°. Radio conditions weren't bad, but we didn't work many stations in the Midlands, despite working JO02, 01 and 00. Perhaps more stations should point their beams to the west?"

Ian M3XNM/P wrote, "It was such bad weather, getting out of the car to turn the antenna was a wet job!"

The weather didn't stop people enjoying the contest and working some DX. For example,

Workin~ ~ ~he statio~ ~f G0AOZ/P.*

A mast hoisted the antenna clear of the ground and car at The Mid-Sussex ARS G5RV/P site.

Assembling the antenn~ ~t The Mid-Sussex ARS G5RV/P site – it's just like Meccano, isn't it?

The *PW* Contest Adjudicator and Organiser – Colin Redwood G6MXL – presents the results of our annual 'fun' contest.

David Martin M0EMM submitted the log for the Chippenham and District Amateur Radio Club G3ZME/P. David reported, "We really enjoyed the contest despite heavy rain in the afternoon. Conditions seemed okay – with some good DX being worked – with DL2ECL being the best at a distance of 699km."

Good Location

Members of the **Cray Valley Radio Society G1RCV/P**, found what many would consider an ideal location! They operated from Cudham Recreation Ground, where they could watch a local cricket match and pop into The Blacksmiths pub in between operating sessions!

Last Minute

Roger Thawley G0SBU/P wrote, "Having recently returned to active operations following a short (25 years!) absence and having last entered the *PW* QRP Contest in 1985, I decided it was time to have another shot! Lacking a spare 2m antenna, I decided to build my own using one of the 'Loop Fed Array' designs published by G0KSA.

"Unfortunately, I left it a little late ordering materials so the Friday, Saturday and the Sunday morning of the contest were spent frantically measuring and sawing. By contest start time the antenna was complete with the exception of the driven element, which took another hour and a half to construct.

"It was 1240 before the finished item had been transported to site, erected and we were on the air. As such, we seem to have missed a big chunk of activity created by the 144MHz Backpackers' Contest, nevertheless, 80 contacts were made spread over 19 locators...a fair outcome for half a contest!"

Track Deteriorated

As many readers will know, **Dave Hewitt GW8ZRE/P** is a regular participant, operating from Cyrn-y-Brian in North Wales where the track condition up the hill had deteriorated in the winter weather. I'll let Dave explain.

"It certainly was a really difficult journey up to IO83JA Cyrn-yBrian. Once you start going up you have to reach the top to turn round. Any attempt at reversing is extremely difficult due to rutting in the track but it's all right driving forward. I keep the car wheels on the high points but reversing you would end up stuck. I nearly had to have my new Ford Focus airlifted off the mountain and I would not know how to explain this to my insurance company! I finished early and it looks like I will have to find another location for the *PW* 2011 Contest."

Jim Nicol MM0SMD said in his report, "It was looking real wet at 6am and the Met office forecast looked dismal. So climbing Ben Rinnes was out of the question this year. Not to be outdone, I removed my trusty J-beam from its brackets on the side of the garage and 'bungeed' it to the roof of the car along with a scaffold pole and off I set to a high spot near Aultmore Distillery.

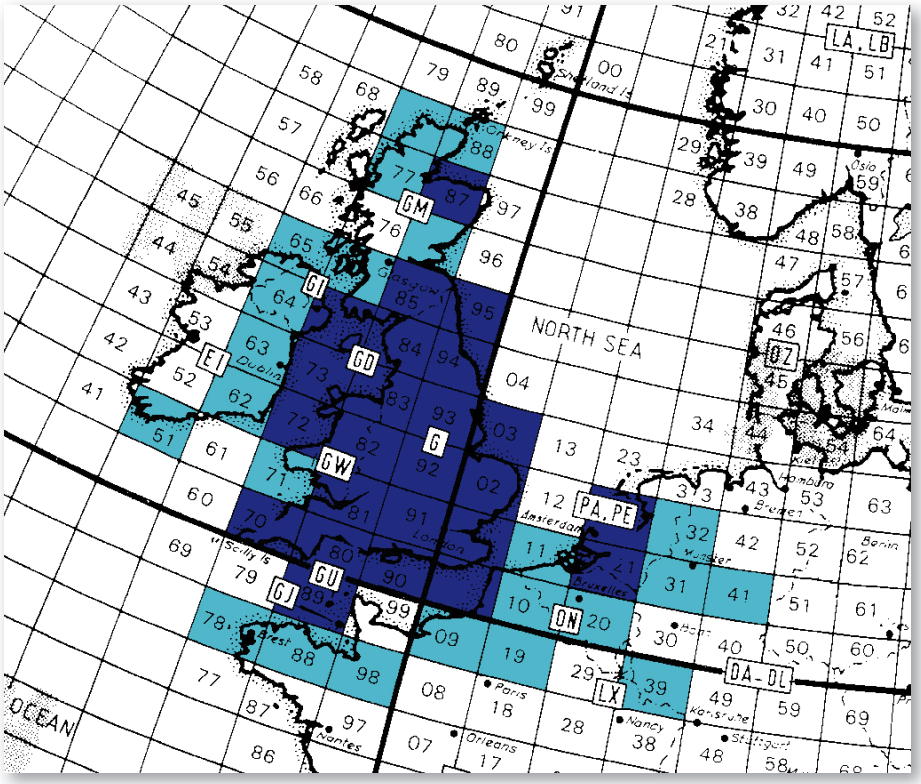


Fig. 1: Map showing locator squares of stations that entered (in dark blue) and other stations worked (light blue).

A high-mounted antenn- -n -lac- -t the location of G8DD/P.

"It poured down while I set up and rained on and off most of the morning. Not too much doing this time. Nothing on f.m. and only a couple of 'lifts'. I heard a number of G stations just below the noise, conditions lifted just enough to work G8PNN/P and I heard him on and off a few times in the day. I was very disappointed I didn't get back to G3NFC/P who lifted right out of the noise only to plunge back again just as fast. I also heard MM6DDX/P, who was heard in QSO and G0WRS/P answered my call only to be wiped out by QSB.

"Altogether a disappointing cold wet 'dreich' day with little in the way of contacts. Will I do it again next year?..... oh aye – I will!"

First Timers

As usual the *PW* 144MHz QRP Contest continues to provide many with their first experience of contesting. **Steve Rhodes M6ZOT** wrote that, "We just went for something simple as this was our first contest and paid more attention to the logging process, but rest assured we know what we must do next year to be more effective!"

Another first timer was **Simon Faulkner M6SCF** who only received his licence 36 hours before the contest! Construction of the antenna finished an hour and half after the contest started, and he still had to get to the portable site! Nevertheless Simon and **Mark Buxton M3MTB**, submitted a very creditable log with 42 contacts.

Peter Gardner G0IPE commented, "I was by myself for the contest, having never done one previously and it was a real learning curve, not least because I mis-judged the wind at that height! It was good fun though!"

Youngster On Air

The club station of the **Chippenham and District Amateur Radio Club G3ZME/P**, was being operated by 11-year old **Isobel Wiltshire M6ISO**, who was doing a super job of handling the pile up. (Congratulations from everyone at *PW* Isobell. **Editor**).

Outlying Squares

As usual, requests have come in for stations to point their beams to the outlying squares. Typical was a plea from **Andy Cox M0HLT/P** who was operating at 122m (400ft) ASL in IO70TQ. "I thought conditions were rubbish, or my equipment was not so good? As you will see I only worked stations in IO70 square. I pointed in all directions, and called and called. Maybe nobody was pointing down our way? There was a fair bit of activity from our square."
(Adjudicator comment: 40 different stations in IO70 square appeared in the logs).

Chris Hore G6GWX writing on behalf of the **Cousinjack Contest Group M0VRL/P** in IO70PP

reported. "A super day but conditions were very strange, at times quite good and at others on the same path hard to hear. Despite starting late due to last minute repairs to the antenna system, we had a good time again. We will be back next year!"

Dave Hewitt GW8ZRE/P working from IO83 square certainly tried. "I pointed to the south west, not my best direction with PMR QRM, but heard no Cornwall stations."

The E-Mailed Logs

This year over 85% of the logs were sent in by E-mail. The contest spreadsheet introduced for the first time in 2009 was again used by many participants. Other entrants used a variety of contest logging software, with the REG1 format being popular.

The submission of logs by E-mail was generally very smooth. Only one station reported a problem, which was quickly resolved.

Despite several E-mails having to be sent to chase one particular station – who had submitted a cover sheet before the start of the contest, no log was forthcoming. Otherwise, every entrant that had entered their cover sheet details on the contest web site at **www.pwcontest.org.uk** also sent in a log.

Cover Sheets

Two stations entered the wrong locator on their cover sheets. In one case it took several E-mails to get this vital piece of information established beyond doubt! Another station missed off half of the information needed from their postal entry. Yet another managed to mix cover sheets and logs between the 144MHz and 70MHz contests.

There were far fewer problems with cover sheets this year in comparison with previous years, with entrants describing not only how they reduced their power to 3W or below but also how they measured it.

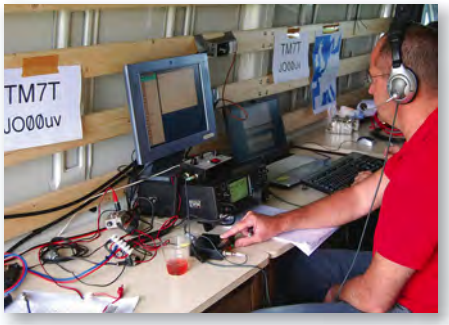
Problem Logs

Where an entry has a systematic error affecting most or all contacts, such as incorrect formatting of data, I usually try to correct this. Examples this year included logs which consistently had spaces between the call prefix and suffix (e.g. G6 MXL), and a dot, stroke or x or colon between the readability and signal strength (e.g. 5.9 or 5/9 or 5x9 or 5:9).

Where I cannot correct systematic errors, such as the station that submitted a log with most times missing or another with what appeared to be numerous transcription errors of the locators of stations worked (the station had the locator of EVERY contact starting J), then I contact the station concerned and ask for a replacement log. Provided that this is submitted before adjudication starts in earnest, then no points are lost.

One station had a different locator on the paper log sheet to the locator on the web-entered cover sheet, whilst another team had different callsigns on the top of two of their five log sheets.

Where errors affect an individual contact, then the extent of the loss of points varies. Incorrect callsigns (including missing /P) or incorrect locators result in the contact not getting any credit at all. The latter can also impact the multipliers if this is the only contact in a particular square.



Inside the mobile shack of TM7T/P operating in JO00UV square.

Stroke P

Missing or inconsistent /P on the end of callsigns continues to be one of the most enduring problems with logs. One station lost nearly a third of their points due to inconsistencies due, I suspect, to not using /P with every contact throughout the contest. Another station had /P on his cover sheet and no /P on his log sheets.

Not Worked!

I noted a number of instances where entrants **thought** that they had made a contact with another station, but in reality the other station **was working someone else**. The entrant's details simply weren't in the other stations log. The serial numbers were in respect of a completely different contact. One way to avoid this is to always use both callsigns in every over (e.g. "M6ABC/P from G6MXL/P you are 59001 in IO80XR").

The Time

One leading station lost nine contacts – which were logged throughout the hour **after the end of the contest**. It didn't result in a change of place, but this error certainly reduced the margin between the station and the nearest station.

One CW Contact

For a low power contest, it's surprising how little use is made of c.w. Only one contact used Morse to make a contact this year.

Working SOTA Station

One non-participant was giving **Summit On The Air** (SOTA) references in their exchanges. Most entrants queried the station to obtain their locator.

Transcription Errors 2010

Several stations lost points and multipliers as a result of mis-keyed locators. For example, one station had mis-keyed IO90 as 1090, etc. Soggy paper log sheets didn't help this year! Others mis-keyed JO00 as JOOO and others as J000. Some stations were perhaps not confident with the phonetic alphabet and logged X (X-ray) as E (Echo).

Other stations slipped up with an occasional contact, one even claiming to have worked UK stations half-way across the Atlantic Ocean in IO01 and IO18 squares!

Further examples of apparent errors in transcribing from the original log to the finally submitted log (in whichever format). Some would appear to be a result of misreading, such as the letters U and V, D and O (very common), A and H, I and J, N and M, T and C, W and N, V and W, M and V.

One entrant lost points due to some locators and reports on a paper log being illegible. I checked these with two independent people and neither of them could decipher what had been written into anything that resembled what might be valid information.

No Errors

This year, nine stations submitted logs which cross-checking showed that they had no errors. They were **G0OIW/P**, **G0KYA**, **M6UVF**, **M3XNM/P**, **G7TAT**, **G0NWT/P**, **G3WDS**, **M3AFF**, and **G7TJB/P**. Congratulations to all nine for their careful logging – it just goes to show that with care it is possible to submit a completely accurate log!

Poor Signals

Following complaints of at least one instance of a station producing poor (wide) signals in 2009, the cover sheets were amended in 2010 to enable such reports to be recorded together with actions taken to resolve. It's pleasing to report that in the handful of instances where a poor signal was reported, this was promptly addressed by the station receiving the report. Causes included flat batteries and a faulty lead. A further instance was put down to inter-modulation in the receiver of a station located close to a PMR site.

Date For Your Diary

The *PW* 144MHz QRP Contest for **2011** will take place on **Sunday June 12th**. As usual this is arranged to run alongside the RSGB's 144MHz Backpackers contest for the benefit of entrants to both contests.

Thanks For Your Help

As usual, many entrants expressed thanks to the other stations taking part or giving points away, particularly this year with the wet weather in many areas. Finally, I must take this opportunity to thank all the entrants in 2010 and **Neill Taylor G4HLX**, for devising what is without doubt one of the most widely supported single-band contests in the v.h.f. calendar. ●

Table 1: Leading stations

Description	Name/Team	Callsign
Overall Winner	SADGITS	G4RLF/P
Runner Up	Burton on Trent ARC	G3NFC/P
Leading Fixed Station	Linda Leavold	G0AJJ
Leading Single Operator	Warrington ARC B (Mike Isherwood)	G4VSS/P
Leading Multi-Operator	SADGITS	G4RLF/P
Leading English Station	SADGITS	G4RLF/P
Leading Welsh Station	Rhys Thomas	GW4RWR/P
Leading Scottish Station	Robin Farrer	MM0VTV/P
Leading Station in Eire and N. Ireland	Paul Knocker	MI0AYR/P
Leading Overseas	UBA TRA-OSB Contest Team	F/OT3T

Table 5: Square Winners.

Square	Name	Call	No. entries
IN89	Rob Luscombe	MJ0RZD	1
IO70	Cousinjacks Contest Group	M0VRL/P	4
IO72	St.Tybie Amateur Radio Society	GC0VPR/P	3
IO73	Ynys Mon - Anglesey LFBG	MW0GMZ/P	1
IO74	Paul Knocker	MI0AYR/P	2
IO80	SADGITS	G4RLF/P	4
IO81	Malvern Hills Radio Club B	GW0RMX/P	4
IO82	Rhys Thomas	GW4RWR/P	4
IO83	Warrington ARC	G0WRS/P	11
IO84	Dene Hunsdale	G4ZOI/P	2
IO85	Robin Farrer	MM0VTV/P	2
IO87	Barry Horning	GM4TOE/P	2
IO90	Worthing and districts	G1WOR/P	6
IO91	Roger D Powell	G0AOZ/P	12
IO92	Burton on Trent ARC	G3NFC/P	8
IO93	Scarborough Amateur Radio Society	G2CP/P	3
IO94	Hambleton ARS	G3MAE/P	4
IO95	Gordon Emmerson	G8PNN/P	2
JO00	U.B.A. TRA-OSB Contest Group	TM7T	4
JO01	Mr John Duddridge	G4NVM/P	6
JO02	Angles Radio Club	MX0GUA/P	5
JO03	Paul Dumpleton	M0XDX	1
JO21	PI4RTD	PI4RTD	1
JO22	Contestclub Alkmaar	PI4ALK/P	1

Table 2: Overall placings in Practical Wireless 144MHz QRP Contest 2010.

Pos	Call	Name	QSOs	Score
1	G4RLF/P	SADGITS	134	4422
2	G3NFC/P	Burton on Trent ARC	137	3973
3	TM7T	U.B.A. TRA-OSB Contest Group	130	3380
4	G0WRS/P	Warrington ARC	138	3174
5	G4VSS/P	Mike G4VSS Warrington ARC B	146	3066
6	GW4RWR/P	Rhys Thomas	129	2967
7	G1ONE/P	Bolton Wireless Club	136	2856
8	GW8ZRE/P	Dave Hewitt	129	2838
9	G4ARI/P	Tim Raven	122	2806
10	G3ZME/P	TDARS	121	2541
11	GC4WXM/P	Wrexham ARS	124	2108
12	G0AOZ/P	Roger D Powell	97	2037
13	GW0RMX/P	Malvern Hills Radio Club B	91	1729
14	MI0AYR/P	Paul Knocker	76	1596
15	M0VRL/P	Cousinjacks Contest Group	68	1564
16	G0OVA/P	Tony Crake	72	1512
17	G1POS/P	Jon Page	86	1462
18	G0BSU/P	Roger Thawley & Roger Bell	75	1425
19	M0YJT/P	Colin Jarvis	67	1407
20	G8HXE/P	Keith Haywood	85	1360
21	G7HFS/P	Ian Harling	73	1314
22	G8PNN/P	Gordon Emmerson	69	1311
23	GD1LVY/P	Manx Dormans	57	1140
24	G1WOR/P	Worthing and districts	71	1065
25	G4ZOI/P	Dene Hunsdale	61	1037
26	G5RV/P	MSARS	66	990
27	G4RUL/P	Al Turner	62	930
28	2E0TGL/P	Andy Wallace	56	896
29	G0XAZ/P	Bill And Malcolm	63	882
30	MX0GUA/P	Angles Radio Club	43	817
31	G2XV/P	Cambridge & District Amateur Radio Club	57	798
32	MW0GMZ/P	Ynys Mon - Anglesey LFBG	46	782
33	M0REG/P	Worthing Radio Events Group	54	756
34	M0UFC/P	Mark Bryant	57	741
35	G4FAA/P	Laurie A And George A	61	732
36	G0BWC/P	Bolton Wireless Club Backpackers	48	720
37	G8MKC/P	Milton Keynes Amateur Radio Society	42	714
38	G8AWO/P	M Gray	44	704
39	G4VRS/P	Aylesbury Vale RS	53	689
40	M0WDZ/P	Simon & Colin	45	675
41	G4NVM/P	Mr John Duddridge	45	675
42	G0AJJ	Linda Leavold	36	612
43	G4VRC/P	Bob Doran	47	611
44	MX0ECR/P	East Cheshire Radio Group	54	594
45	G2CP/P	Scarborough Amateur Radio Society	45	585
46	G0FUW/P	Steve Hartley	39	546
47	G0FCA/P	Iain Groom	45	540
48	G1IOK/P	Shaun Coles	40	520
49	G3MAE/P	Hambleton ARS	37	481
50	M0MMI/P	Mick Moffat	42	462
51	M3MTB/P	Elkstones Hill	37	444
52	MW0PRP/P	Peter Ryan Pugh	31	434
53	G8DDY/P	Peter Thompson	36	432
54	G4TJE/P	Keith Lewis	35	420
55	G7SOQ/P	Eastern Angles	32	384
56	G7TBJ/P	Jeremy Kewn	39	351
57	G6SKU/P	Bromsgrove Bunch	38	342
58	G3VRE/P	G3VRE	34	340
59	G4PRS/P	Poole Radio Society	29	319
60	G0NWT/P	North Norfolk Amateur Radio Group (NNARG)	24	312
61	M0XDX	Paul Dumpleton	19	304
62	MM0VTV/P	Robin Farrer	27	297
63	GM4YEQ/P	Galashiels And District ARS	22	264
64	G4RYV	David Rumbold	22	264
65	G0OIW/P	Mark Palmer	29	261
66	MJ0RZD	Rob Luscombe	23	253
67	M6ICY/P	Matt Wallis	26	234
68	G8DD/P	South Notts ARC	29	232
69	GX0TSN	Hoddesdon Radio Club	23	230
70	2E0VEK/P	Kevin Lowcock	25	200
71	G0LJD/P	Brian Howard	22	198
72	G1RCV/P	Cray Valley Radio Society	23	184
73	GC0VPR/P	St.Tybie Amateur Radio Society	16	160
74	PI4ALK/P	Contestclub Alkmaar	14	140
75	M0HMS/P	Eugene Purvis	19	133
76	M5AEO/P	Jonathan Kempster	23	115
77	GW4YCT/P	Carmarthen Amateur Radio Society	11	99
78	G0IPE/P	Peter Gardner	10	90
79	G4YBS/P	Morecambe Bay Amateur Radio Society	15	90
80	M3XNM-P	Ian Stevenson	8	48
81	M6SIN	Simon Newlands M6SIN/Steve Rhodes M6ZOT	12	48
82	M6UVF	Eddie Goodwin	16	48
83	PI4RTD	PI4RTD	6	36
84	MW3DLA	Aled Lewis	9	36
85	GM4TOE/P	Barry Horning	9	36
86	MM0SMD	Jim Nicol	8	32
87	G0KYA	Steve Nichols	7	28
88	M0GQB	Martin Cox	5	20
89	M3AFF	Alan Brewer	10	20
90	G7IXP	Philip Hammersley	5	15
91	M0HLT/P	Andy Cox	6	6
92	G3WDS	Denis Spooner	2	4
93	G7TAT	Jeff Moye	2	2

Table 3: Leading multi-operators.

Pos	Call	Name	QSOs	Squares	Score	Locator	Transceiver	Antenna	Ht. asl
1	G4RLF/P	SADGITS	134	33	4422	IO80WX	TS770 with LNA RX Amp and Daytong proces	17-ele Tonna	270
2	G3NFC/P	Burton on Trent ARC	137	29	3973	IO92BA	Yaesu FT897D	14-ele jaybeam	360
3	TM7T	U.B.A. TRA-OSB Contest Group	130	26	3380	JO00UV	IC-746PRO + Masthead preamp	4 x 5-ele DK7ZB stacked + Tonna 17-ele	160
4	G0WRS/P	Warrington ARC	138	23	3174	IO83PC	"Icom IC-7400	50cm RS-213 patch lead	Ni"
7	G1ONE/P	Bolton Wireless Club	136	21	2856	IO83RO	TR 9130	homebrew 12-ele ZL special	300
10	G3ZME/P	TDARS	121	21	2541	IO82NN	Icom 7400	17-ele Tonna	508
11	GC4WXM/P	Wrexham ARS	124	17	2108	IO82KW	TS700 & Datong processor.	19-ele Cushcraft	400
13	GW0RMX/P	Malvern Hills Radio Club B	91	19	1729	IO81NV	Icom IC202	13-ele yagi	423
14	MI0AYR/P	Paul Knocker	76	21	1596	IO74AI	Yaesu FT290R mk 2	9-ele F9FT	243
15	M0VRL/P	Cousinjacks Contest Group	68	23	1564	IO70PP	Icom IC-910	4x10-ele home made yagi's at 60ft	308

Table 4: Leading single operators.

Pos	Call	Name	QSOs	Squares	Score	Locator	Transceiver	Antenna	Ht. asl
5	G4VSS/P	Mike G4VSS Warrington ARC B	146	21	3066	IO83RD	"Icom 910x		
6	GW4RWR/P	Rhys Thomas	129	23	2967	IO82HV	IC-202e with BF-981 front end.	9-ele Tonna	827
8	GW8ZRE/P	Dave Hewitt	129	22	2838	IO83JA	Kenwood TR751E	7-ele ZL special	561
9	G4ARI/P	Tim Raven	122	23	2806	IO92IQ	Yaesu FT817	MET 14-ele yagi up at 9 metres	237
12	G0AOZ/P	Roger D Powell	97	21	2037	IO91FN	"Kenwood TS-711E	9 element Tonna	
16	G0OVA/P	Tony Crake	72	21	1512	IO91QI	"Icom IC 706 Welz 45 2m SWR and Power meter	13 el somewhat modified Tonna	
17	G1POS/P	Jon Page	86	17	1462	IO91AW	Yaesu FT817	"6 ele Delta Beam Home-brewed	
19	M0YJT/P	Colin Jarvis	67	21	1407	IO92CM	Norcol Yaesu FT817X 2.5watts Mutek 144SLNA pr	Jaybeam 5XY c1984 model	105
20	G8HXE/P	Keith Haywood	85	16	1360	IO83RP	Yaesu FT817 2.5 watts. SOTA 5 element beam	SOTA 5-ele beam	380
21	G7HFS/P	Ian Harling	73	18	1314	JO00DS	Yaesu FT817	9-ele Tonna	168

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MOONRAKER Yagi Antennas

All Yagis have high quality gamma match fittings with stainless steel fixings! (excluding YG4-2C)

YG27-4 Dual band 2/70 4 Element (Boom 42") (Gain 6.0dBd) **£49.95**
YG4-2C 2 metre 4 Element (Boom 48") (Gain 7dBd) **£29.95**
YG5-2 2 metre 5 Element (Boom 63") (Gain 10dBd) **£49.95**
YG8-2 2 metre 8 Element (Boom 125") (Gain 12dBd) **£69.95**
YG11-2 2 metre 11 Element (Boom 185") (Gain 13dBd) **£99.95**
YG3-4 4 metre 3 Element (Boom 45") (Gain 8dBd) **£59.95**
YG5-4 4 metre 5 Element (Boom 104") (Gain 10dBd) **£69.95**
YG3-6 6 metre 3 Element (Boom 72") (Gain 7.5dBd) **£64.95**
YG5-6 6 metre 5 Element (Boom 142") (Gain 9.5dBd) **£84.95**
YG13-70 70 cm 13 Element (Boom 76") (Gain 12.5dBd) **£49.95**

MOONRAKER ZL Special Yagi Antennas

The ZL special gives you a massive gain for the smallest boom length ... no wonder they are our best selling yagi's!

ZL5-2 2 Metre 5 Ele, Boom 95cm, Gain 9.5dBd **£49.95**
ZL7-2 2 Metre 7 Ele, Boom 150cm, Gain 12dBd **£59.95**
ZL12-2 2 Metre 12 Ele, Boom 315cm, Gain 9.5dBd **£99.95**
ZL7-70 70cm 7 Ele, Boom 70cm, Gain 11.5dBd **£39.95**
ZL12-70 70cm 12 Ele, Boom 120cm, Gain 14dBd **£49.95**

MOONRAKER HB9CV

Brilliant 2 element beams ... ideal for portable use

HB9-70 70cm (Boom 12") **£24.95**
HB9-2 2 metre (Boom 20") **£29.95**
HB9-4 4 metre (Boom 23") **£39.95**
HB9-6 6 metre (Boom 33") **£49.95**
HB9-10 10 metre (Boom 52") **£69.95**
HB9-627 6/2/70 Triband (Boom 45") **£69.95**

MOONRAKER Halo Loops

Our most popular compact antennas, great base, mobile, portable, or wherever!

HLP-2 2 metre (size approx 300mm square) **£19.95**
HLP-4 4 metre (size approx 600mm square) **£29.95**
HLP-6 6 metre (size approx 800mm square) **£39.95**

MOONRAKER G5RV Wire Antennas

The most popular wire antenna available in different grades to suit every amateur .... All from just £19.95!

G5RV-HSS Standard Half Size Enamelled Version, 51ft Long, 10-40 Metres **£19.95**
G5RV-FSS Standard Full Size Enamelled Version, 102ft Long, 10-80 Metres **£24.95**
G5RV-DSS Standard Double Size Enamelled Version, 204ft Long, 10-160 Metres..... **£49.95**
G5RV-HSH Half Size Hard Drawn Version, pre-stretched, 51ft Long, 10-40 Metres **£24.95**
G5RV-FSH Full Size Hard Drawn Version, pre-stretched, 102ft Long, 10-80 Metres **£29.95**
G5RV-HSF Half Size Original High Quality Flexweave Version, 51ft Long, 10-40 Metres **£29.95**
G5RV-FSF Fu l Size Original High Quality Flexweave Version, 102ft Long, 10-80 Metres **£34.95**
G5RV-HSP Half Size Original PVC Coated Flexweave Version, 51ft Long, 10-40 Metres **£ 34.95**
G5RV-FSP Full Size Original PVC Coated Flexweave Version, 102ft Long, 10-80 Metres..... **£39.95**
G5RV-HSX Half Size Deluxe Version with 450 Ohm ladder, 51ft Long, 10-40 Metres. **£44.95**
G5RV-FSX Full Size Deluxe Version with 450 Ohm ladder, 102ft Long, 10-80 Metres **£49.95**

Accessories

G5RV-IND Convert any ha f size G5RV to full with these great inductors, adds 8ft on each leg **£24.95**
MB-9 Choke Balun for G5RV to reduce RF Feedback..... ..... **£39.95**
TSS-1 Pair of stainless steel springs to take the tension out of a G5RV or similar..... ..... **£19.95**

MOONRAKER Trapped Wire Dipole Antennas

Commercial quality trapped wire dipoles that resonate, so require no ATU!

MDT-6 FREQ:40 & 160m LENGTH: 28m POWER: 1000 Watts **£79.95**
MTD-1 (3 BAND) FREQ:10-15-20 Mtrs LENGTH:7.40 Mtrs POWER:1000 Watts **£69.95**
MTD-2 (2 BAND) FREQ:40-80 Mtrs LENGTH: 20Mtrs POWER:1000 Watts **£79.95**
MTD-3 (3 BAND) FREQ:40-80-160 Mtrs LENGTH: 32.5m POWER: 1000 Watts **£129.95**
MTD-4 (3 BAND) FREQ: 12-17-30 Mtrs LENGTH: 10.5m POWER: 1000 Watts **£69.95**
MTD-5 (5 BAND) FREQ: 10-15-20-40-80 Mtrs LENGTH: 20m POWER:1000 Watts **£119.95**

(MTD-5 is a crossed di-pole with 4 legs)

MOONRAKER Multiband Mobile

Why buy loads of different antennas when Moonraker has one to cover all! SPX series has a unique fly lead and socket for quick band changing

SPX-100 9 Band plug n' go portable, 6/10/12/15/17/20/30/40/80m, Length 165cm retracted just 0.5m, Power 50W complete with 38 h PL259 or BNC fitting to suit all applications, mobile portable or base ... brilliant! **£44.95**
SPX-200 6 Band plug n' go mobile, 6/10/15/20/40/80m, Length 130cm, Power 120W, 3/8th fitting **£39.95**
SPX-200S 6 Band plug n' go mobile, 6/10/15/20/40/80m, Length 130cm, Power 120W, PL259 fitting **£44.95**
SPX-300 9 Band plug n' go mobile, 6/10/12/15/17/20/30/40/80m, Length 165cm, High Power 200W, 3/8th fitting **£54.95**
SPX-300S 9 Band plug n' go mobile, 6/10/12/15/17/20/30/40/80m, Length 165cm, High Power 200W,PL259 fitting **£59.95**
AMPRO-MB6 6 Band mobile 6/10/15/20/40/80m, length 220cm, 200W, 3/8th fitting, (great for static use or even home base – can tune on four bands at once) **£69.95**
ATOM-AT4 10/6/2/70cm Gain 2m 2.8dBd 70cm 5.5dBd, Length 132cm, PL259 fitting (perfect for FT-8900R). **£59.95**
ATOM-AT5 5 Band mobile 40/15/6/2/70cm, Length just 130cm, 200W (2/70) 120W (40-6M) PL259 fitting, (great antenna, great price and no band changing, one antenna, five bands) **£69.95**
ATOM-AT7 7 Band mobile 40/20/15/10/6/2/70cm, Length just 200cm, 200W (2/70) 120W (40-6M) PL259 fitting, (Brilliant antenna HF to UHF with changeable coils) **£79.95**

DIAMOND ANTENNA Yagi Antennas

Diamond performance from the superb Diamond factory

A502HBR 6m 2 Elements, Power 400W, Gain 6.3dBi, Radial Length 3m **£89.95**
A144S10R 2m 10 Elements, Power 50W, Gain 11.6dBi, Boom Length 2.13m **£84.95**
A144S5RR 2m 5 Elements, Power 50W, Gain 9.1dBi, Boom Length 95cm **£45.95**
A430S15R 70cm 15 Elements, Power 50W, Gain 14.8dBi, Boom Length 224cm **£65.95**
A430S10R 70cm 10 Elements, Power 50W, Gain 13.1dBi, Boom length 119cm. **£49.95**

MOONRAKER HF Mobiles

Get great results with the Moonraker range of HF mobiles ! ... from as little as £17.95!

AMPRO-10 28MHz, Length 220cm, 38 h fitting (slimline design) **£17.95**
AMPRO-12 24MHz, Length 220cm, 38 h fitting (slimline design) **£17.95**
AMPRO-15 21MHz, Length 220cm, 38 h fitting (slimline design) **£17.95**
AMPRO-17 18MHz, Length 220cm, 38 h fitting (slimline design) **£17.95**
AMPRO-20 14MHz, Length 220cm, 38 h fitting (slimline design) **£17.95**
AMPRO-30 10MHz, Length 220cm, 38 h fitting (slimline design) **£17.95**
AMPRO-40 7.0MHz, Length 220cm, 38th fitting (slimline design) **£17.95**
AMPRO-80 3.5MHz, Length 220cm, 38th fitting (slimline design) **£19.95**
AMPRO-160 1.8MHz, Length 220cm, 38th fitting (heavy duty design) ... **£49.95**
ATOM-20S 14MHz, Length 130cm, PL259 fitting (compact design) **£24.95**
ATOM-40S 7.0MHz, Length 165cm, PL259 fitting (compact design) ... **£26.95**
ATOM-80S 14MHz, Length 165cm, PL259 fitting (compact design) **£29.95**

MOONRAKER New Ground Plane Free Collinear Verticals

We have always wanted antennas without radials without the compromise of performance – well now you can.

SQBM110P 2/70cm, Gain 3/6dBd, RX:25-2000MHz, Length 100cm, SO239 fitting **£54.95**
SQBM1010P 6/2/70cm, Gain 1.5/2.0/5.0dBd, RX25-2000MHz, Length 140cm, SO239 fitting **£79.95**
SQBM1010N 6/2/70cm, Gain 1.5/2.0/5.0dBd, RX25-2000MHz, Length 140cm, N-Type fitting **£84.95**
SQBM225P 2/70/23cm, Gain 2.5/5.0/8.5dBd, RX25-2000MHz, Length 130cm, SO239 fitting **£74.95**
SQBM225N 2/70/23cm, Gain 2.5/5.0/8.5dBd, RX25-2000MHz, Length 130cm, N-Type fitting **£79.95**

TA Tarheel Motorised Mobile

The best USA motorised antennas available here from Moonraker the European distributor – All models in stock now!

Little Tarheel II 3.5-54MHz 200W max length 48" **£349.95**

MOONRAKER GP2500

All Band HF Vertical

This is the perfect answer for anyone with limited space and requires no radials. Covering 80 through to 6M with a VSWR below 1.5:1!

Frequency 3.5-57MHz without tuner, Power 250 Watts, Length 7.13M

All at an amazing £199.95!

NEW GP2500F fibreglass version now in stock **£249.95**

MOONRAKER VHF/UHF Mobiles

GF151 Glass Mount 2/70cm, Gain 2.9/4.3dBd, Length 78cm complete with 4m cable and PL259 ..... **£29.95**
MRM-100 MICRO MAG 2/70cm, Gain 0.5/3.0dBd, Length 55cm, 1" magnetic base with 4m coax and BNC **£19.95**
MR700 2/70cm, Gain 0/3.0dBd, Length 50cm, 3/8 fitting **£9.95**
MR777 2/70cm, Gain 2.8/4.8dBd, Length 150cm, 3/8 fitting **£17.95**
MRQ525 2/70cm, Gain 0.5/3.2dBd, Length 43cm, PL259 fitting (high quality) **£19.95**
MRQ500 2/70cm, Gain 3.2/5.8dBd, Length 95cm, PL259 fitting (high quality) **£24.95**
MRQ750 2/70cm, Gain 5.5/8.0dBd, Length 150cm, PL259 fitting (high quality) **£34.95**
MR2 POWER ROD 2/70cm, Gain 3.5/6.5dBd, Length 50cm, PL259 fitting (fibreglass collinear) **£24.95**
MR3 POWER ROD 2/70cm, Gain 2.0/3.5dBd, Length 50cm, PL259 fitting (fibreglass collinear) **£29.95**
MRQ800 6/2/70cm Gain 3.0dBi/5.0/7.5dBdBd, Length 150cm, PL259 fitting (high quality) **£39.95**
MRQ273 2/70/23cm Gain 3.5/5.5/7.5dBdBd, Length 85cm, PL259 fitting (high quality) **£49.95**

MOONRAKER Dual and Triband Collinear Verticals

Diamond quality – Moonraker prices ! These high gain antennas have been pre-tuned for your convenience, easy to use, easy to install, and a choice of connection ... look no further

SQBM200P 2/70cm, Gain 4.5/7.5dBd, RX 25-2000MHz, Length 155cm, SO239 ..... **£54.95**
SQBM200N 2/70cm, Gain 4.5/7.5dBd, RX 25-2000MHz, Length 155cm, N-Type **£59.95**
SQBM500P 2/70cm, Gain 6.8/9.2dBd, RX 25-2000MHz, Length 250cm, SO239 ..... **£64.95**
SQBM500N 2/70cm, Gain 6.8/9.2dBd, RX 25-2000MHz, Length 250cm, N-Type **£69.95**
SQBM800N 2/70cm, Gain 8.5/12.5dBd, RX 25-2000MHz, Length 520cm, N-Type **£129.95**
SQBM1000P 6/2/70cm, Gain 3.0/6.2/8.4dBd, RX 25-2000MHz, Length 250cm, SO239 ..... **£79.95**
SQBM1000N 6/2/70cm, Gain 3.0/6.2/8.4dBd, RX 25-2000MHz, Length 250cm, N-Type **£84.95**
SQBM223N 2/70/23cm, Gain 4.5/7.5/12.5dBd, RX 25-2000MHz, Length 155cm, N-Type **£69.95**

MFJ LOOP ANTENNAS

MFJ-1788X **£469.95**
Frequency 40-15m, Size 1m, Power 150W, Auto band selection, Built-in cross needle VSWR/Wattmeter

MFJ-1786X **£429.95**
Frequency 30-10m, Size 1m, Power 150W, Auto band selection, Built-in cross needle VSWR/Wattmeter

MFJ-1782X **£375.95**
Frequency 40-15m, Size 1m, Power 150W, No auto band selection, no VSWR/Wattmet

The MFJ-1786 and MFJ-1788 Super Hi-Q Loop Antenna is ideal for restricted space locations. Rugged all welded aluminium construction, it is fully weatherproof and does not require a separate control cable, the coax carries the signal and the DC control signals for tuning. You can remotely tune to the amateur bands in seconds. It has very narrow bandwidth which reduces harmonic interference and provides super front-end receiver selectivity

Miracle Antenna

MIRACLE-WHIP TX:3.5-460MHz, RX:0.6-500MHz, Power 25W, Length 1.44m **£119.95**

DUCKER-IL ATU for rubber duck, long wire or coax, Power 25W, Connection BNC Plug, Antenna socket BNC **£109.95**

DUCKER-PL ATU for rubber duck, long wire or coax, Power 25W, Connection PL259, Antenna socket BNC **£109.95**

MIRACLE-ADAPTOR Free-Style Adaptor Magnetic Mount kit for Miracle Whip Free-style adaptor magnetic mount, cable & PL259 Plug with 10m ground radial **£14.95**

Moonraker Head Office & Mail Order
Cranfield Road, Woburn Sands
Bucks MK17 8UR
Tel: 01908 281705

Moonraker Satellite Shop @ M5 Communications
Moto Services Area, Junction 30 M5 South
Exeter EX2 7HF
Tel: 01392 427269

Cable

RG58 Standard, 5mm, 50 ohm, per metre £0.35
RG58-DRUM Standard, 5mm, 50 ohm, 100m reel £24.95
RG58M Mil spec, 5mm, 50 ohm, per metre (best seller) £0.60
RG58M-DRUM Mil spec, 5mm, 50 ohm, 100m reel £39.95
RGMINI8 Mil spec, 7mm, 50 ohm, in grey per metre (amateur favourite) £0.75
RGMINI8-DRUM Mil spec, 7mm, 50 ohm, in grey 100m reel £64.95
RG213 Mil spec, 9mm, 50 ohm, per metre £1.20
RG213-DRUM Mil spec, 9mm, 50 ohm, 100m reel £99.95
H100 Mil spec, 10mm, 50 ohm, per metre £1.40
H100-DRUM Mil spec, 10mm, 50 ohm, 100m reel £129.95
WESTFLEX103 Mil spec, 10mm, 50 ohm, per metre £1.50
WESTFLEX103-DRUM Mil spec, 10mm, 50 ohm, 100m reel £139.95
TV100U Mil spec, 6.7mm, 75 ohm, per metre £0.60
TV100U-DRUM Mil spec, 6.7mm, 75 ohm, 100m reel £49.95
300-M Ladder Ribbon, best USA quality, 300 ohm, per metre £0.85
300-20M Ladder Ribbon, best USA quality, 300 ohm, 20m pack £14.95
300-DRUM Ladder Ribbon, best USA quality, 300 ohm, 100m reel £59.95
450-M Ladder Ribbon, best USA quality, 450 ohm, per metre £1.00
450-20M Ladder Ribbon, best USA quality, 450 ohm, 20m pack £17.95
450-DRUM Ladder Ribbon, best USA quality, 450 ohm, 100m reel £69.95
FW-M Original high quality flexweave antenna wire, 2mm, per metre £0.75
FW-100 Original high quality flexweave antenna wire, 100m reel £49.95
FWPVC-M Original PVC coated flexweave antenna wire, 4mm, per metre £1.00
FWPVC-100 Original PVC coated flexweave antenna wire, 4mm, 100m reel £69.95

Antenna Wire (50m)

Perfect for making your own antennas, traps, long wire aerials etc.

SEW-50 Multi stranded PVC covered wire, 1.2mm £14.95
SCW-50 Enamelled copper wire, 1.5mm £19.95
HCW-50 Hard Drawn bare copper wire, 1.5mm £24.95
CCS-50 Genuine Copperweld copper clad steel, 1.6mm £24.95
FW-50 Original Flexweave bare copper wire, 2mm £29.95
FWPVC-50 Original clear PVC covered copper wire, 4mm £39.95

Rigging Accessories

Get rigged up, for full list of all options visit our website!

PULLEY-2 Adjustable pulley wheel for wire antennas, suits all types of rope £19.95
GUYKIT-HD10 Complete heavy duty adjustable guying kit to suit upto 40ft masts £49.95
GUYKIT-P10 Complete light duty/portable guying kit to suit upto 40ft masts £29.95
SPIDER-3 Fixed 3 point mast collar for guy ropes £4.95
PTP-20 Pole to pole clamp to clamp up to 2" to 2" £5.95
DPC-W Wire dipole centre to suit either 300 or 450ohm ladder line £4.95
DPC-S Wire dipole centre with SO239 to suit cable feed connections £5.95
DPC-A Dipole centre to suit ½ inch aluminium tube with terminal connections £6.95
DPC-38 Dipole centre with SO239 socket with two 3/8th sockets to make mobile dipole £5.95
DOGBONE-S Small ribbed wire insulator £1.00
DOGBONE-L Large ribbed wire insulator £1.50
DOGBONE-C Small ceramic wire insulator £1.00
EARTHROD-C 4ft copper earth rod and clamp £19.95
EARTHROD-CP 4ft copper plated earth rod and clamp £14.95
G5RV-ES In-line SO239 replacement socket for 300 or 450 ohm ladder line £4.95
AMA-10 Self amalgamating tape for connection joints, 10m length £7.50

Mounting Hardware & Clamps

We have all the mounting brackets you could possible want – for all options see our website

TRIPOD-HDA Free standing, heavy duty, fold away tripod, which adjusts from 50-65mm £149.95
TRIPOD-25L Free standing heavy duty tripod to suit masts 65mm or less £69.95
TRIPOD-20L Free standing heavy duty tripod to suit masts 2 inch or less £59.95
TRIPOD-15L Free standing heavy duty tripod to suit masts 1.5 inch or less £54.95
TK-36 Heavy duty galvanised pair of T & K brackets, 36 inches total length £49.95
TK-24 Heavy duty galvanised pair of T & K brackets, 24 inches total length £24.95
TK-18 Heavy duty galvanised pair of T & K brackets, 18 inches total length £19.95
TK-12 Heavy duty galvanised pair of T & K brackets, 12 inches total length £17.95
SO-9 Heavy duty galvanised single stand off bracket, 9 inches total length £9.00
SO-6 Heavy duty galvanised single stand off bracket, 9 inches total length £6.00
CHIM-D Heavy duty galvanised chimney lashing kit with all fixings, suitable for upto 2 inch £19.95
CAR-PLATE Drive on bracket with vertical up stand to suit 1.5 or 2" mounting pole £19.95
CROSS-2 Heavy duty cross over plate to suit 1.5 to 2" vertical to horizontal pole £14.95
JOIN-200 Heavy duty 8 nut joining sleeve to connect 2 X 2" poles together £16.95
PTM-S Pole mounting bracket with SO239 for mobile whips, suits upto 2" pole £19.95

Antenna Rotators *See website for full details*

We stock all the most popular rotators to suit all requirements

AR-300XL Great entry level rotator, but strong enough for all VHF/UHF yagi antennas £79.95
Yaesu G-450 Medium duty rotator complete with 25m of control cable £319.95
Yaesu G-1000DXC Heavy duty rotator – massive maximum verticla load 200kg £449.95

bhi

NES10-2 Mk3 noise eliminating speaker £109.95

The NES10-2MKII Noise Eliminating Speaker removes unwanted background noise, hiss, hash computer hash, plasma TV interference, white noise etc from speech so that you can hear the speech much more clearly.

DESKTOP "noise away" robust base station speaker £154.95
The Desk Top "Noise Away" is a stylish robust base station speaker for use in radio communications, especially amateur radio

Telescopic Masts (aluminium/fibre-glass opt)

TMA-1 Aluminium mast ★ 4 sections 170cm each ★ 45mm to 30mm ★ Approx 20ft erect 6ft collapsed £119.95
TMA-2 Aluminium mast ★ 8 sections 170cm each ★ 65mm to 30mm ★ Approx 40ft erect 6ft collapsed £199.95
TMF-1 Fibreglass mast ★ 4 sections 160cm each ★ 50mm to 30mm ★ Approx 20ft erect 6ft collapsed £129.95
TMF-1.5 Fibreglass mast ★ 5 sections 200cm each ★ 60mm to 30mm ★ Approx 30ft erect 8ft collapsed £179.95
TMF-2 Fibreglass mast ★ 5 sections 240cm each ★ 60mm to 30mm ★ Approx 40ft erect 9ft collapsed £199.95
TMF-3 Fiberglass mast * 6 sections 240cm each * 65-23mm * Approx 50ft erect 8ft collapsed £249.95

20ft Mast Sets

(5ft Sections)

These heavy duty masts sets have a lovely push fit swaged sections to give a strong mast set. Ideal for portable or permanent installations . . . also available singly

MSP-125 4 section 1.25inch OD mast set £29.95
MSP-150 4 section 1.50inch OD mast set £39.95
MSP-175 4 section 1.75inch OD mast set £49.95
MSP-200 4 section 2.00inch OD mast set £59.95
MSPX-150 4 section 1.50 inch 5mm scaffold gauge (very heavy duty) £69.95

Portable Telescopic Masts

LMA-S Length 17.6ft open 4ft closed 2-1" diameter £79.95
LMA-M Length 26ft open 5.5ft closed 2-1" diameter £89.95
LMA-L Length 33ft open 7.2ft closed 2-1" diameter £99.95
TRIPOD-P Lightweight aluminium tripod for all above £44.95

Patch Leads

PL58-0.5 ½m Standard RG58 PL259 to PL259 lead £2.95
PL58-10 10m Standard RG58 PL259 to PL259 lead £7.95
PL58-30 30m Standard RG58 PL259 to PL259 lead £14.95
PL58M-0.5 ½m Mil Spec RG58 PL259 to PL259 lead £3.95
PL58M-10 10m Mil Spec RG58 PL259 to PL259 lead £10.95
PL58M-30 30m Mil Spec RG58 PL259 to PL259 lead £24.95
PL213-10 10m Mil Spec RG213 PL259 to PL259 lead £14.95
PL213-30 30m Mil Spec RG213 PL259 to PL259 lead £34.95
PL103-10 10m Mil Spec Westflex 103 PL259 to PL259 lead £29.95
PL103-30 30m Mil Spec Westflex 103 PL259 to PL259 lead £59.95
(All other leads and lengths available, ie. BNC to N-type, etc. Please phone for details)

Connectors

PL259/6mm Standard plug for RG58 ..... £0.75p
PL259/9mm Standard plug for RG213 ..... £0.75p
PL259/7mm Standard plug for Mini8 ..... £1.00p
PL259/6C Compression type for RG58 ..... £2.50p
PL259/9C Compression type for RG213 ..... £2.50p
PL259/103C Compression type for Westflex 103 ..... £5.00
NTYPE/6 Compression type plug for RG58 ..... £3.50
NTYPE/9 Compression type plug for RG213 ..... £3.50
NTYPE/103 Compression type plug for westflex 103 ..... £6.00
BNC/6 Compression type for RG58 ..... £1.50
BNC/9 Compression type for RG213 ..... £3.50
SO239/N Adapter to convert PL259 to N-Type male £3.50
NTYPE/PL Adapter to convert N-Type to PL259 ..... £3.50
BNC/PL Adapter to convert BNC to PL259 ..... £2.00
BNC/N Adapter to convert BNC to N-Type male £3.50
BNC/SMA Adapter to convert modern SMA radio to suit BNC £3.95
SO239/SMA Adapter to convert modern SMA radio to suit SO239 ..... £3.95
PL259/38 Adapter to convert SO239 fitting to 38th thread £3.95

New lower prices!

MFJ Antenna Tuners

See our website for full details.

AUTOMATIC TUNERS
MFJ-925 Super compact 1.8-30MHz 200W £169.95
MFJ-926 remote Mobile ATU 1.6-30MHz 200W £419.95
MFJ-927 Compact with Power Injector 1.8-30MHz 200W £249.95
MFJ-928 Compact with Power Injector 1.8 30MHz 200W £199.95
MFJ-929 Compact with Random Wire Option 1.8-30MHz 200W £209.95
MFJ-991B 1.8-30MHz 150W SSB/100W CW ATU £209.95
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The Rev. George Dobbs'

carrying on the practical way

This month, the Rev. George Dobbs G3RJV describes a useful test oscillator.

"It matters little how much equipment we use; it matters much that we be masters of all we do use."
Sam Abell – American Photographer

Test equipment is important to the home constructor of radio equipment. Buying new test equipment can be expensive – so over the years I've built up a useful selection of test equipment by making some of it myself and looking for bargains at Amateur Radio events. Bring & Buy stalls are often a fruitful place to find test gear – as are small adverts in radio magazines. Having said all that, it's surprising how many projects can be built and tested using a minimum of simple test items.

A lot of equipment checking and setting up can be done with a multi-range meter, a basic radio frequency (r.f.) probe and an existing station receiver. And some modern digital multi-meters have an extra range of test facilities. In addition to the usual voltage, current and resistance ranges, they may also offer limited inductance and capacitance measurement and perhaps bipolar transistor testing. Usually, the transistor measuring facility is for checking the small signal forward current gain (Hfe) of a bipolar junction transistor.

Modern multi-meters have come a long way since the first ones I used in my early days of radio construction. A digital multi-meter is a useful item on the workbench – but for many measurements an analogue meter (one with a needle indicator) is required. We may want to measure changes in a circuit or find a peak or null reading and this is difficult with dancing numbers on a digital meter!

More Accurate – But!

Although a digital meter will give more accurate readings I rarely want to know that a voltage is 4.489V – knowing that it's 'about 4.5V' is often enough. So it's useful to have an analogue multimeter in addition to a digital meter and decent ones can often be found for cheap prices at radio rallies.

When building receivers a very useful item is an r.f. signal source, usually in the form of an r.f. signal generator. Sometimes, even this can be improvised. I remember many years ago using my old HRO receiver local oscillator as a make-do signal generator. As I recall it involved subtracting the intermediate frequency of the receiver from the frequency reading on the dial.

Since I had to work out the receiver frequency from a graph on the plug-in coil pack, it was not a recommended method! In more recent years I've used a Marconi TF144 signal generator – a very fine and reliable signal source. Its reliability and accuracy was matched only by its size and weight!

Sadly, on my retirement I had to give up the TF144 in favour of a much smaller Tech TE-20D with worse stability and a very difficult to read frequency scale. However, in practice it does most of the things I want to do.

Very often I just require a wide ranging r.f. oscillator that I can hear on a simple receiver I've built. Musing on this minimal requirement, I remembered a circuit in the **G QRP Club** magazine *Sprat* by **Stefan Petrov LZ1OV**. Incidentally, I've featured it in an edition of this column several years ago. Stefan commended the use of a cascode oscillator circuit using a *pnp* bipolar transistor with a field effect transistor (f.e.t.).

Ideal Test Oscillator

The oscillator is wide ranging in frequency – so it's ideal for an r.f. test oscillator, so I wondered about using the circuit with some of the new 10mm coils sold by **Spectrum Communications**. This coil range covers all the Amateur Radio short wave bands and the coils have an internal core for frequency adjustment.

Stefan LZ1OV's version was built using surface mount devices (SMD) and surface mount techniques – but the circuit does lend itself to conventional (leaded) parts and a whole variety of construction methods. The basic oscillator configuration is shown in **Fig. 1**.

The oscillator is simplicity itself. The frequency relies solely on the values of the two components in the tuned circuit; an inductor and a capacitor (L and C). Stefan LZ1OV successfully tested the oscillator over

the range 10 kHz to 400MHz at good stability. In short it appears to be just the sort of wide sweeping oscillator that would make a good test signal source for the workbench.

A wide range of devices will work in the circuit. The f.e.t. could be a 2N3819, 2N4416, BF245 or MPF102. The *p.n.p* bipolar transistor could be a 2N3906, BC177 or the complimentary *pnp* transistor to most common small signal *npn* devices.

The more adventurous, and keen of eye, constructor might like to try Petrov's original SMD devices;

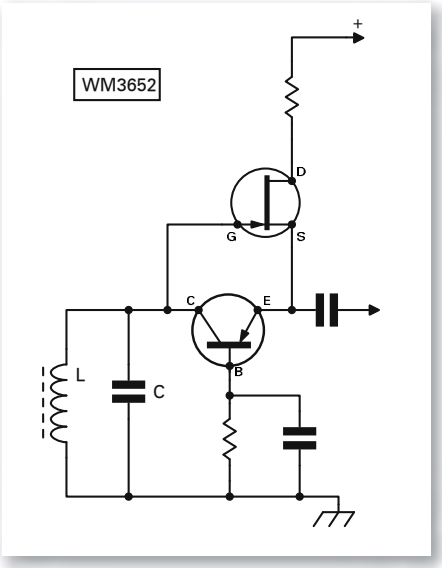

Fig. 1: The basic oscillator configuration is shown here.

a BFR30 f.e.t. and a BFT92 *pnp* transistor. As both devices have a slightly unusual configuration, care must be taken to get the correct orientation of leads (but more of that later).

Buffer Amplifier

Readers could try just building the basic oscillator circuit – but in practice this oscillator does require a following buffer amplifier. The output is quite low and the oscillator really requires a constant load on the output.

Originally, I thought of using my favourite r.f. buffer amplifier using shunt feedback as suggested by **Wes Hayward W7ZOI**, for several designs in *Solid State Design for the Radio Amateur*. Sadly, the book is long out of print but I still turn to it frequently for ideas. But, as usual, I opted for the simple solution and used the very simple circuit suggested by LZ1OV. The final circuit I built is shown in **Fig. 2**.

The circuit in Fig. 2 also includes voltage stabilisation for the oscillator section. A zener diode could have been used – but the popular three pin regulator integrated circuit (i.c.) 'chips' are inexpensive. The 78L06 device is ideal for this application although the oscillator would still work with the 78L05 5V regulator.

The regulator is de-coupled at the input and output with 100nF capacitors. Since the output is taken from the emitter of the *pnp* transistor, the 270Ω drain load resistor on the f.e.t. is also bypassed with another 100nF capacitor. As usual with by-pass capacitors, try to place the capacitors as close as possible to the individual components.

Recent editions of *COTPW* have featured the 'Manhattan' style of construction. In this method a blank printed circuit board (p.c.b.) forms a ground-plane onto which are glued pads for the interconnections of components, with all grounded leads being soldered directly to the printed circuit material ground-plane.

The photograph shows my prototype using Manhattan style construction. However, I did have the advantage of some commercially produced solder pads sold by **W1REX** of **qrpme.com** These are very smart and easy to use – but similar pads are very simple to make.

Begin with an off-cut of blank p.c.b. material. Clean the copper surfaces until they are shining and fit for soldering. It is easier to clean the original board than tiny individual squares. Cut some strips from the board about 5 to 6mm wide. Practical tip: It's better to use the epoxy glass material board rather than the cheaper paper bonded board (SRPB), as this is easier to cut into small pieces.

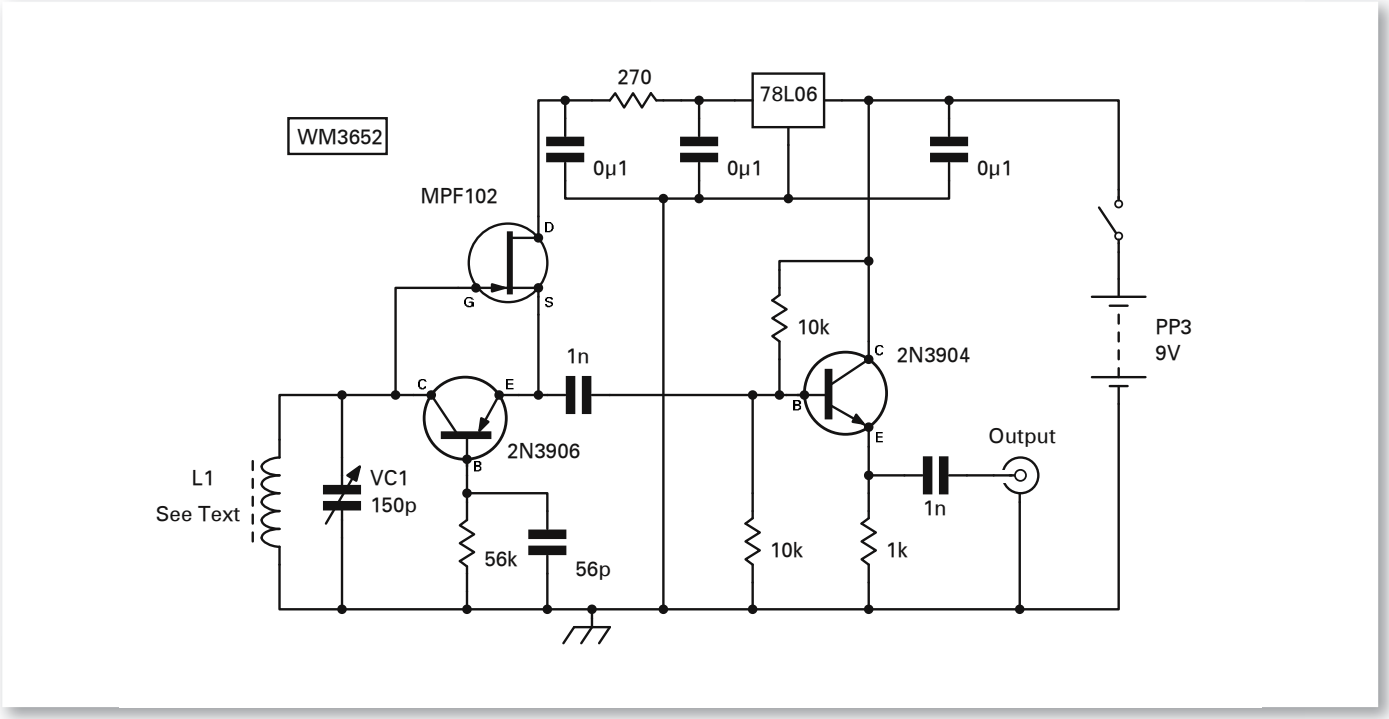

Fig. 2: The final circuit that George created and built.

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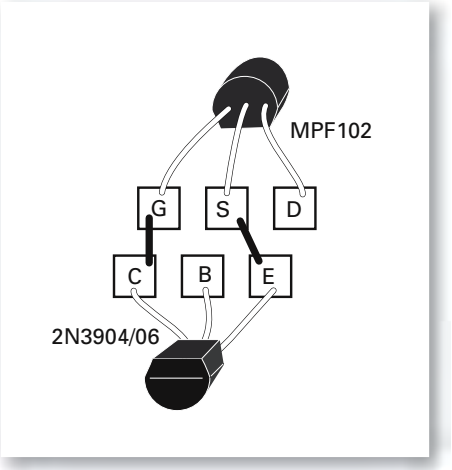


Fig. 3: The connections for the 2N3906 and MPF102 and how this translates into pad placement.

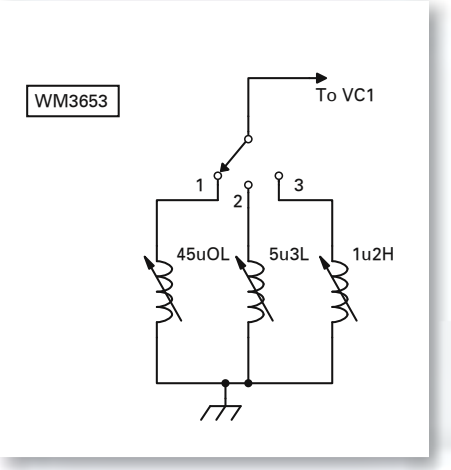


Fig. 4: Using three of the Spectrum Communications 'Toko 10k' style inductors, it's possible to cover most of the 1.5-30MHz range (see text).

Careful cutting – using a hacksaw with a sharp blade – should produce strips with parallel sides. Then a sharp pair of tin snips can be used to cut off square sections from the strip. I find it's a good idea to hold one of the handles of the tin snips in a vice then use the free handle as a lever to cut the board. The pads are fixed to the board in their required places using one of rapid setting cyanoacrylate glues (often just called 'superglue'). When the glue is set the pads should be tinned with a generous layer of solder.

Placement Of Pads

The placement of the pads can follow the layout of the circuit diagram. I sometimes take a copy of the circuit diagram and draw squares to map where the pads can be placed. Take care with the placement of the two active devices (the *pnp* and f.e.t. transistors). Small bipolar transistors often follow the lead configuration of emitter-base-collector *(but not always – so check first. Ed.*) but there is some variation in lead placement for f.e.t. devices.

I chose to use the MPF102 f.e.t. because it has a lead placement that fits exactly to what's required in this circuit. The diagram, **Fig. 3**., shows the connections for the 2N3906 and MPF102 and how this translates into pad placement.

Three pads are used for each device. Lining them up as shown in Fig. 3 and joining the collector (C) of the 2N3906 to the gate (G) of the MPF102 and the emitter (E) to the source (S) gives the required configuration.

The inductor, L1, in the circuit has three switched ranges as shown in **Fig. 4**. My plan was to produce a signal that would cover all the short wave Amateur bands and this is possible using three Spectrum 10mm coils. They are as follows: range 1 uses spectrum 45u0L coil and covers around 1.6 to 4.4MHz, Range 2 uses a 5u3L coil and covers 6.9 to 17MHz, Range 3 uses a 1u2H coil and covers 13.5 to 30MHz.

Notice that the frequency range 4.4 to 6.9MHz is missing – this is because there are no **main** Amateur bands in that range. If a constructor wishes to include those frequencies, a 23uH coil would do the job.

The coils are mounted sideways on pads; the tuned winding being the outer two pins of the side with three pins. I snipped off the centre pin to avoid it making contact, but take care as the thin wire from the coil winding is soldered to this pin. A three-way switch is used to select the required range.

The tuning capacitor, VC1, is a polyvaricon capacitor of a type that is available from several component suppliers. These capacitors have two-ganged sections with nominal values of 60pF and 140pF. The terminals are designated as 'O' for oscillator, 'G' for ground and 'A' for antenna. In this application, the centre tab 'G' is connected to ground with the 'O' to the top of the tuned circuit.

The variable capacitor VC1 covers a wide frequency range and really does require some form of reduction drive for ease of tuning. My prototype has an 8:1 vernier type slow motion drive – but individual constructors could fit an epicyclic in-line drive or improvise a drive themselves.

Calibrating The Oscillator

Calibrating the oscillator is easy if a frequency counter is available – just simply read it from the output. However, going back to the simple testing mentioned at the beginning of this article, a short-wave receiver could be used.

Using the receiver method, connect a few feet of wire to the output and listen for the signal on the receiver. The cores in the individual coils are then adjusted to obtain the desired frequency range.

Remember that the cores are fragile and use a proper trimming tool for the adjustment. Failing this, a plastic knitting needle filed at the end to form a flat blade is a good substitute. In the past, lacking a trimming tool, I've sharpened the end of a match stick to fit the slot of a coil core.

Some types of reduction drive lend themselves for direct marking of frequency. A reduction drive like the one used here could be calibrated using a graph of frequency against dial reading.

The oscillator covers all the short wave Amateur bands with some overlap but does have one setback. As the frequency goes up, the output level goes down. Individual constructors might like to take the project further by improving the buffer amplification, perhaps adding some form of gain adjustment.

As it stands the circuit is ideal for checking the frequency of other projects – but the variable output over the full range precludes it from being useful for quantitative measurements.

The completed project is a useful test oscillator that covers the whole h.f. Amateur band spectrum. I'm sure the ingenuity of *PW* readers will doubtless be applied to the oscillator circuit. For example, the output from Range 1 is high enough to drive a simple passive diode mixer – perhaps for a 1.8 and 3.5MHz direct conversion (DC) receiver? I look forward to hearing from readers who try the idea out! ●

Review

The Flex-1500 QRP Transceiver

Flex Radio Systems are now well established manufacturers and suppliers of Software Defined Radios (s.d.r.) for the Amateur market. These transceivers have gained a reputation as high performance radios, driven completely from a PC so that the software, and therefore the 'radio' can be updated easily and quickly.

To add to their range, Flex Radio have recently introduced the Flex-1500, a dedicated 5W QRP transceiver. It functions as a multi-mode high frequency (h.f.) and 50MHz Amateur transceiver and general coverage receiver from 10kHz) to 60MHz). The ability to drive transverters for very high frequencies (v.h.f.) and ultra high frequency (u.h.f.) is also incorporated.

Physically Small

The Flex-1500 is a physically small unit measuring approximately 114(w) by 60(h)mm (including feet), and 180mm deep including connectors. The electronics are housed in a satin finished aluminium case with black coloured front and rear panels and white lettering. All of the radio frequency (r.f.) connectors are of the BNC type.

System Requirements

Supplied with the Flex-1500 are the following: Power supply cable, USB cable, a BNC to S0-239 adaptor, a *quick start guide* and the CDROM containing the *Power SDR 2.0* software.

To operate the radio you will need: A personal computer (PC) which will need to run Windows XP, Vista or Windows 7, a stabilised 13.8V/2A power supply unit (p.s.u.), plus either stereo headphones or computer type powered speakers, a microphone with an RJ45 connector and a Morse key with 3.5m/m stereo jack plug and c.w. paddles can also be used.

Getting Started

For the review I used my laptop which has a 1.6GHz processor and 1GB of random access memory (RAM). It also has three USB ports for external devices. By following the *quick start guide* the software for the transceiver was quickly loaded. After a few moments the virtual 'front panel' appeared on the screen.

There are a few minor changes to the layout of the Flex-1500 screen when compared to the Flex-3000 which I reviewed last year. This review is to be found in the November 2009 issue of *PW* pages 18-21.

Using the Transceiver

By clicking the mouse button on the **Start** area of the screen, the receiver starts working. A few minutes elapsed as I checked all the Amateur bands for activity. I found there was an abundance of signals on the lower frequencies with the level of activity dropping off on the higher ones. This was confirmed by checking with my own rig and obtaining similar results. Satisfied that the receiver was operating correctly I delved deeper into the numerous controls available.

To get the best results using the receiver, I found that careful adjustment of the AGC-T (radio frequency - r.f. - gain) and audio volume controls were needed. Various bandwidth filters were tried along with different automatic gain control (a.g.c.) settings for the band in use.

One big advantage of the Software Defined Radio (SDR) is that all the filters are created in the software – so there are no expensive additional ones to buy. To change bandwidth the operator just put the mouse pointer on the one of their choice and click to change it.

I came across a c.w (Morse) contest during one weekend. This was an ideal opportunity to try the filters for this mode. Selecting **CWU** and 1kHz bandwidth I found two signals close together. Reducing the filter bandwidth to 500Hz improved things but going to 100Hz I was left with just one signal. I could still see the second signal on the panadaptor but could hear no trace of it in my headphones. This was repeated several times on different bands with equally impressive results!

The 'radio' is controlled and driven from the control and monitor screen. So, the radio can be upgraded, merely by changing the software.

Having reviewed the high-powered Flex Transceiver, Phil Ciotti G3XBZ now takes at look at the low power version.

Changing To SSB

Next, I changed over to single sideband (s.s.b.) operation. Connecting a power meter and dummy load to the transceiver, showed that full output could be obtained on all Amateur bands. Transmissions outside of Amateur allocations are inhibited.

Selecting 7MHz (40m) I found **Merv Wylie MI0TMW/P** near Belfast, calling "CQ". He responded to my second call and gave me a 5+6 report with QSB. He reported my audio from the Flex-1500 as being crisp and clear.

Roland Rauch DF7IB, close to the French border, gave 5+7 with very good modulation. He was interested to know that I was only using 5W p.e.p. as he was running 400W! Next came **DL60DARC**, a special event station in Hanover, operated by **Ben**, who reported 5+8, again with QSB.

Finally, I worked **LA1J** from West Norway (it's one of the club callsigns of the Norwegian radio regulator, and was being aired in the Lighthouse On The Air weekend, and I received a 5+5 report. This proved to be the most difficult contact as he was very popular with a number of other stations calling at the same time.

All of these contacts were made using 5W peak envelope power (p.e.p.) and a modified G5RV antenna erected at eight metres above ground level.

Transverting On VHF

The Flex-1500 can be adjusted to drive transverters for v.h.f. and u.h.f. use. Two BNC connectors are used one for converter input, the other a fixed low power output to drive the transmit side.

My own S**pectrum Communications** transverter was connected to the main transmitting/receiving antenna socket for some 70MHz tests. I could hear the beacons that I normally receive with the added advantage that I could also see them on the Flex-1500's panadaptor screen. When I transmitted the change over was clean, without any tendency of hesitation or oscillation.

Operating With QRP

A high percentage of amateurs often take the view that using 5W or less is a waste of time and that nobody will hear you. However, I'm not of this opinion, as whilst reading *Sprat*, the journal of the G-QRP club, I'm often amazed at what dedicated people can work using modest equipment.

But I do agree that our low power signals will be buried by high power stations at times, despite this the satisfaction gained when contacts are made is really immense. For the best results, I recommend you erect the best antenna you can and add lots of patience!

Closing Comments

On removing the transceiver from the transit packaging I immediately liked the appearance of the rig. The overall finish of the case is very good and the labelling of the connectors functional.

It's small size will appeal to those who like to own a compact station. The power requirement of just 2A maximum compliments the QRP aspect. Plus of course the power requirements of the PC that you're using.

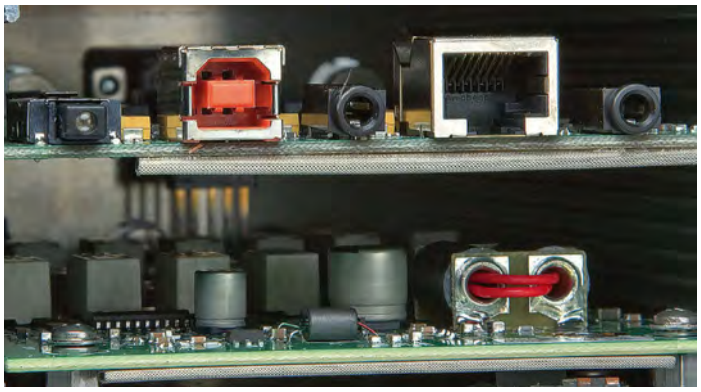
The initial setup, including loading the software, took about half-an-hour without any hitches or glitches occurring. The receiver I found to give an excellent performance without the need to use any of the three stages of r.f. amplification available.

The transmitted audio was of a good standard using a Kenwood MC42S dynamic microphone. There's also a built-in three-band and ten-band transmit audio equaliser, but I used the default setting for the review.

During the time I had the Flex-1500, it performed very well, was reliable and only got warm to the touch after a somewhat lengthy QSO. And, because a fan isn't fitted, the rig was very quiet in operation.

I liked this transceiver, it combines a good receiver with a low power transmitter that stretches the operator's skills. A journey to the sales showroom for a demonstration is highly recommended! My thanks to **Waters & Stanton** for the loan of the Flex-1500 QRP transceiver.

My thanks for the loan of the review transceiver go to **Waters & Stanton PLC**, ***Spa House***, **22 Main Road, Hockley, Essex SS5 4QS**. Tel: (01702) 206835, FAX (01702) 205843. E-mail **sales@wspl.co...** Website **www.wspl.com** ●



A peek inside the Flex-1500. As there's no fan the unit isn't noisy!

The neat and practical rear panel.

Product: The Flex-1500 QRP Transceiver.	**Pros** Compact design, easily transported. Low power requirements. Excellent performance.	**Cons** To be honest, I didn't find any!
Company: Waters & Stanton PLC (Importers).		**Price** £549.95 plus £10 p&p

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Superb quality
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TRUE 'LINEAR' PSU

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NISSEI HAVE BECOME RENOWNED FOR PUTTING QUALITY FIRST, YET MAINTAINING A GOOD PRICING STRUCTURE. A TRULY SUPERB POWER SUPPLY UNIT

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1.8-170MHz

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Fully automatic (1.8-30MHz). 300W SSB.

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

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500kg brake winch. BARGAIN PRICE **£79.99** Del £10.00
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CW-80S	(80-10m) 20m long.....	£149.99 P&P £10.00
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True military spec real UK coax

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

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Q-TEK COLLINEARS (VHF/UHF)

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Over ear earpiece + boom mic. Available in Kenwood version or Yaesu/Alinco/Icom.
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Flexweave (PVC coated 18 mtrs) ..... £24.99 P&P £7.50
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Special 200mtr roll PVC coated flexweave ..... £180.00 P&P £10.00
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All bracket measurements are from wall to end of bracket

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RH-9000 BNC

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

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

QS-300

A fully adjustable deluxe desktop stand for hand-helds. Includes BNC to SO-239 lead. **£19.99** P&P £4

QS-200

A superb, no mess, quick fit in-car holder (fits airvent) for hand-helds. **£6.99** P&P £3

Tim Kirby G4VXE's

the world of vhf

Incorporating VHF DXer

Tim Kirby G4VXE presents his round-up of your news about Amateur Radio activities above 30MHz and a letter from Steve VK5AIM.

Welcome to the *World of VHF* (*WoVHF*) where I start this month by mentioning that I was delighted to receive a letter from **Steve Mahony VK5AIM** from Elizabeth, South Australia, introducing himself and his activity. I was interested to read that back in 1955, he had a station on the 288MHz ('one metre' band). Doing a quick 'Google' to learn more about the 288MHz band I found there isn't an awful lot of information, but it must have been an interesting band to operate on.

The '1m' band was high enough in frequency to make tropospheric propagation quite interesting and presumably more common (the ducts don't need to be as big as on 144MHz) but of course, Sporadic E (Sp-E) would be very much less frequent. As far as I can see, the band was withdrawn in Australia in 1965, when the 432MHz (70cm) band was released.

Whilst on the subject of 'heritage' v.h.f. matters, I recently read an interesting post on **Roger Lapthorn G3XBM**'s 'blog'. Roger had remembered that the late **Jack Hum G5UM** had a recording (a gramophone recording no less) of the last night of 56MHz activity in the London area, which as far as I can see would have been just prior to the Second World War.

Roger wonders whether anyone has access to the recording or whether there's another copy. It struck me that it was the sort of thing that *Practical Wireless* readers might be able to help with! If you have a copy, or know where one might be, we'd love to hear from you. Potentially, we could create an audio 'MP3' file and make it available on the Internet and preserve it for posterity.

The GB7ML D-STAR Node

Next, we go from 'heritage' to 'bang-up-to-date' as the new GB7ML D-STAR node is now active from Tring in Hertfordshire, with the output on 145.6375MHz.As I've been driving around Oxfordshire, I've found that coverage is excellent for a mobile and I have even accessed it on a hand portable from about 64km (40 miles) away from the repeater site.

Rob Loss G4XUT who lives in Swindon has made a number of contacts through the node and found the signal 'very solid 'using his beam and 'adequate' on a collinear antenna. This is exciting news for D-STAR enthusiasts to the south-west of the Chilterns who have up to now struggled to have good node coverage. If you want to look at the excellent coverage provided by this node, go to **http://www.ukrepeater.net** – search for GB7ML and take a look at the map.

Some of the GB7ML coverage reaches as far as Peterborough in the North, Chelmsford in the East, Guildford in the South and to the Cotswolds in the West. So, it's sure to provide a welcome boost to D-STAR activity in the southern part of the UK.

The D-STAR topic seems to polarise opinion amongst Radio Amateurs as to whether it's a 'good thing' or not. However, my own experience is that it is an interesting mode to operate and understand. I've also made some fascinating QSOs all over the world. I'll cover the mode in little more depth in future columns – but I'll be interested to hear from other *Practical Wireless* readers who are using D-STAR.

Humberside VHF Activity

It was great to hear from **Ian Bellhouse, 2E1ICB** who wrote on behalf of the **Humber Fortress DX ARC**. As a club they promote activity on all bands, but are particularly pleased with their Automated Packet Reporting System (APRS) digipeater, **MB7UHU**, operational from the *Fort Paull* on Humberside (the last remaining Napoleonic fortification in Yorkshire).

Contacts have been made as far away as Norfolk, over a path over 144km (appropriately enough!) which is around 90 miles. The digipeater comprises of a Simocco PRM 80 ex-PMR radio and a Diamond X 200 antenna erected at about 15m high on the banks of the River Humber.

The club currently has 23 members and is going to be working most bands including v.h.f. and u.h.f. – listen out for their club call **M0HFC**.

The 50MHz Band

Denny Teasdale M3HSJ wrote to me for the first time and reported that he was very excited on August 29th to hear a EA5 (Spain) station calling "CQ DX" on 50MHz. Denny uses an Icom IC-706 Mark II with a loft mounted halo for 50MHz. Incidentally, this was the first time that Denny had heard anything at all on the band!

It's now quite late in the season for Sporadic E, although we should be aware that there's usually a secondary peak in Sp-Es activity around December, so it will be well worth while keeping an ear on the band then. Keep listening and calling! It's always worth a "CQ" call even if the band seems dead.

With increasing sunspot activity (we hope!) the Autumn and Spring seasons can be good for Trans-Equatorial Propagation (TEP) when you may (from the UK) hear stations from either South America or Africa in the early evening.

The 70MHz Band

Readers may remember that I mentioned the special beacon from the USA – **WE9XFT** –that's operating on 70.005MHz from locator square FM07 beaming towards Europe. Reading the September 2010 edition

Tim Kirby G4VXE
Willowside
Bow Bank
Longworth
Oxfordshire OX13 5ER
E-mail: tim@g4vxe.com
Twitter id: G4VXE

Ken Eastty G3LVP in Cheltenham worked Mark Marment CT1FJC, shown here in his shack.

of the **American Amateur Radio League** (ARRL) *QST* magazine, there are reports that the beacon was heard by EA8/DL3GCS on June 10th and June 14th. It's also been heard in mainland Europe too – by CT1HZE on June 26th.

Ken Eastty G3LVP from Cheltenham reports that he worked **Mark Marment CT1FJC** (Portugal) in late season Sp-Es using single sideband (s.s.b.) on August 26th. **Keith Stevenson, G6LLX** was keen to work CT1FJC from his mobile but didn't have s.s.b., only frequency modulation (f.m.). However, Ken was able to ask CT1FJC to change modes to f.m. on 70.260MHz where Keith was delighted to make the QSO!

More prosaically here at G4VXE, I'm still looking for my first contact on 70MHz f.m. using my Wouxun hand-held transceiver. Having said that, I have only just replaced the helical antenna with one of the **Garex Flexwhips**.

It wasn't until I read the *Practical Wireless* review of the set (by **Phil Ciotti G3XBZ** in the September 2010 issue) that I realised just how much of a compromise the supplied helical antenna is. I suspect that a well timed trip to a local hill top should result in some contacts now I have the improved antenna.

The 144MHz Band

Graham Boor G8NWC reports that nothing very interesting has happened on v.h.f./u.h.f. for him in the last month. Despite this he has just got an old Icom IC-202S out of storage, which hasn't been used for 10 or more years. He says, "Apart from a noisy volume control and slightly 'off' calibration it works perfectly okay".

"Technology has moved on since the introduction of the IC-202S, but in its time it was the favoured driver for many contesters. Performance is down somewhat when compared to today's rigs but they are still an ideal route onto the v.h.f. bands – often appearing on the second hand market at realistic prices".

"With a little work the front end the '202S can be improved on, modifications being easily available on the web. With the prices of some new rigs starting to climb it could be just the rig for a quick appraisal of this part of the Amateur spectrum".

Thanks for that Graham! I couldn't agree more – the original IC-202 and its successor the IC-202S were really great portable rigs, running around 3W on c.w. and s.s.b. I remember taking one along with a home-brewed 144MHz wire cubical quad antenna out to the Cotswolds working portable and, being delighted to work into France with such simple gear. Funnily enough, I also have an IC-202 in store – and it has a noisy volume pot too! As well as the '202 there were variants for 50 and 432MHz, which occasionally appear on the second-hand market.

I mentioned that I was planning to operate from the Isle of Wight during our family holiday this year. I took a variety of low-profile rigs, but in the end, the most used set was the Icom-E92ED dual-band hand-held. The apartment where we stayed had "far-reaching views across the sea" (always a key phrase for Radio Amateurs when we spot them in brochures) towards Sussex to the East and across Portsmouth to the North.

I was surprised just what I could hear on the hand-held on both 145 and 433MHz. I was particularly pleased, when on August 19th and 20th, there was a temperature inversion across the sea and I was able to hear repeaters in France and Belgium. The French repeater F5ZCR, to the north west of Paris, on 145.6625MHz was a great signal for many hours.

I had a really nice QSO through the F5ZFS repeater (output on 145.675MHz) located near St Gobain in JN19, with **Guy Carlier F5CDF/M** who was returning from his holiday – the repeater being nearly 350km from my location in Shanklin – not bad for 5W of f.m. eh? I was also able to hear the ON0WV repeater from Brugge on 145.650MHz over a distance of around 320km.

Slightly closer, the F1ZFM repeater to the west of Lille was a good signal on 145.6875MHz. I made a careful note of these repeater frequencies, thinking that it might be feasible to use them as propagation indicators from home.

Until the v.h.f. opening, I'd been thinking that in these days of voice keyers and digital audio, it's nice for repeaters to announce their callsigns in speech rather than the traditional keyed Morse identification. Whilst this is generally true, I did find it harder to identify the French repeaters that had voice-idents than the ones using Morse! Perhaps a timely reminder of the 'power of Morse' in overcoming different languages and accents!

Our Australian correspondent Steve Mahony VK5AIM has been promoting 144 and 432MHz s.s.b. operation to Foundation Licencees in his area. He noticed that many new licencees didn't realise that v.h.f./u.h.f. s.s.b. existed, but once they had tried it out, were amazed that easy contacts were made with minimal signal levels. Steve says that most evenings they get around 10 check-ins to the nets over a range of 25km or so.

Steve also kindly included a copy of *INFO,* the newsletter of the **Elizabeth Amateur Radio Club**, which makes a great read. The club's repeater VK5RLZ is available on *Echolink*, so if you have *Echolink*, dial it up and give them a call!

Mark Marment CT1FJC uses this 4m antenna from his location in Portugal.

The 432MHz Band

Picking up on my recent comments about holiday operating on v.h.f., **Eddie Marshall G4PPB** wrote to tell me about his experiences operating on v.h.f./u.h.f. whilst in Denmark. Eddie discovered that very few Danish Amateurs operate on 145MHz f.m., with the majority of repeater activity being centred on 433MHz.

Eddie even called "CQ" on 145.500MHz from the Himmelbjerget – which is Denmark's second highest summit (at **147m!**) but without any luck. Eddie's planning another visit to Denmark soon, visiting family and says that he's looking forward to concentrating on 433MHz and making more contacts.

The 1296MHz Band

On to the 1296MHz band now – and I'm pleased to say there's been a really excellent response from readers to my question about operating on 1297MHz f.m. **Mike Hall M0MGH** wrote from Worksop. He uses a Kenwood TS-2000X which has both c.w./s.s.b. as well as f.m. capability. He has a vertical beam which he has pointed towards Rotherham and Sheffield.

When Mike M0MGH first wrote to me, he hadn't made a single QSO on 23cm, but I was delighted to hear shortly after his first E-mail that he had broken his 'duck'! Mike points out that one of the challenges of the higher v.h.f. frequencies is that, when using a beam, the bandwidths are so much smaller, so it's very easy to miss people unless you are both beaming at each other.

Mike also has one of the Alinco DJG-7 hand-helds. I gather that some of the **Summits on The Air** (SOTA) contingent have been using these hand-helds to make 23cm f.m. contacts from summits, particularly in the north of England.

Des Kiely G0RBD from Chippenham in Wiltshire writes, "We've had some interesting contacts on 1296MHz on both f.m. and s.s.b. One evening, **Chris Clarke G0AQL** was working **Charles Riley G4JQX** more than 24km (15 miles) away. I called Chris, who heard me easily, being local, but I was pleased that Charles heard me! I was only using 1W from my DJG-7 with the rubber duck. Charles was using a small beam."

Thanks for that Des! It's very interesting to see what can be done on 1W. Des says the best places to listen are 1296.200MHz (s.s.b.) and 1297.500MHz (f.m.). He also lists a good number of calls active on 1296MHz local to him including G0AQL, G0IUE, G4JQX, 2E0NEY, M0GHZ, M0WYB, G0XAY, G3WZR and G8TTI.

John Wheeler G0IUE from Melksham also reports a QSO with Des G0RBD who was using his handheld at the time. John comments that the signals from Des' hand-held, "Were great". So perhaps an external antenna wouldn't have helped with signal strength in this case, once the connectors and feeder loss have been taken into consideration.

Many Thanks

Many thanks to all of you who've written in with such an interesting and varied postbag. Please keep your news coming. If it's happening on v.h.f., we'd love to include it. ●

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!

Colin Redwood's

what next?

Colin Redwood G6MXL presents his promised article on rotators. So, if they've ever left you in a spin – read on!

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Having looked at several techniques for mounting antennas last month, this time I'm turning my attention to electrical rotators, which enable antennas to be remotely positioned for each contact to maximise the benefit of the antenna's capabilities. I'm also going to cover some of the feed-back I've received from readers in respect of the June 2010 and August 2010 columns.

Using Rotators

Rotators enable antennas to be remotely pointed in the desired direction. The usual arrangement is to mount the rotator outside on top of a pole or mast with the control box in the shack next to the transceiver. The rotator and control box are connected by a separate multi-core cable. The voltages and signals in the cable are usually in the order of 12 to 24V.

Broadly speaking there are two main types of rotators, namely azimuth and elevation. Azimuth rotators move the antennas round horizontally to point to a different direction (for example from North to East). The main consideration is how they handle the movement of the antenna pole above them.

Without additional support, the size of the antenna and the height of the antenna (stub) mast above the rotator will be quite limited. This is because the rotator itself has to support all the forces acting on the antenna and stub mast. Imagine trying to hold up a pole yourself – with an antenna on the top, just by holding the bottom of the pole. You would find the strain on your wrist quite intolerable in all but the least windiest day.

To make this a lot easier, it's usual to provide an additional bearing, so that the rotator does not have to deal with all the forces acting on it. So, I'm going to start by strongly recommending buying a support (thrust) bearing in addition to the rotator. Personally I wouldn't contemplate buying a rotator without one!

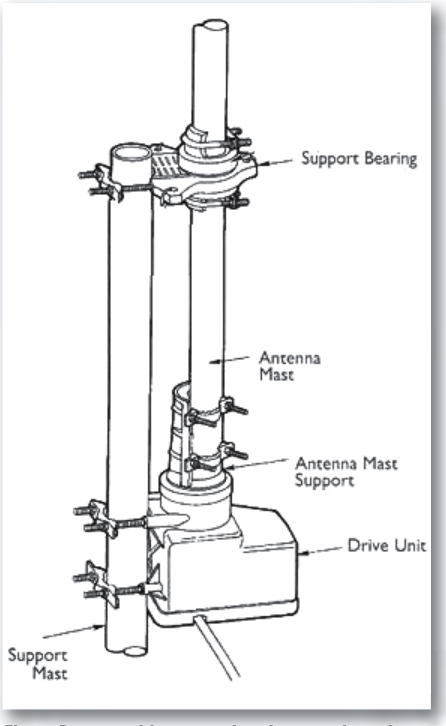

Fig. 1: Rotator with support bearing to reduce the strain on the rotator itself.

Lightweight Azimuth Rotators

Lightweight azimuth rotators are generally designed to rotate domestic broadcast TV antennas. This means that they are quite suitable for small Amateur Radio antennas, such as 144MHz (2m) or 432MHz (70cm) yagis.

Even in the situations I've just described, I must reiterate the point that I consider a support bearing **essential**. The photograph, **Fig. 1**, shows a typical installation with the support bearing about 500mm or so above the rotator drive unit.

Heavy Duty Rotators

Heavy duty azimuth rotators are generally available in two options. One type is for mounting in a similar manner to the light-weight variety on top of a pole. The other is for mounting at the top of proper antenna mast.

In the case of a mast mounting unit, the top section is usually termed a rotator cage, and the rotator is mounted on a flat plate at the bottom of the cage (**Fig. 2**). The top of the cage will have a hole or bearing arrangement to provide a thrust bearing. Heavy duty types are designed to rotate larger antennas, the bigger ones being capable of rotating large high frequency (h.f.) beams.

Installing Azimuth Rotators

Let's now look at installing azimuth rotators and to start – sufficient antenna feeder will be required to go round the rotator. The feeder must also be sufficiently flexible and long enough to allow frequent rotation of at least 360° (some rotators allow 450° of rotation).

An additional cable is also needed to go from the control box in the shack to the rotator drive unit outside. While the cable does not need to be screened, it must have sufficient wires (cores) and be thick enough to carry the current without a significant voltage drop. Lightweight rotators may use as few as three cores, in which case

Fig. 2: Rotator Cage with the rotator mounted on the flat surface at the bottom of the cage, and the top of the cage acting as a support bearing.

5A mains lead is suitable. Heavy duty rotators typically use between six and eight separate cores. Many suppliers of antenna feeder also stock rotator cable.

Connecting The Control Cable

Connections to the rotator vary greatly and many light-weight rotators have a simple cover through which the rotator cable passes. Under the cover, there's usually screw panel into which the wires are inserted and the relevant screws tightened. Finally a cable grip is tightened and the cover replaced.

With heavy-duty rotators, usually some form of multi-way plug and socket arrangement is used. Whichever is used, it's important to document which colour wire you have connected to which terminal and to fully waterproof the connection.

Connections at the control box also vary and these **do not necessarily** use the same connection as the rotator. Care needs to be taken to make sure that the wires are connected to the correct terminal.

I found that using the resistor colour code (e.g. brown is pin 1, red is pin 2 etc.), for numbering the different coloured wires worked for me. I suggest writing down the arrangement you use somewhere on the instructions that come with the rotator so that you can refer to it in the future if necessary.

Mounting The Antennas

The pole above the rotator to which the antennas are mounted is called the antenna or stub mast. In theory the antennas should be mounted a long way apart (as per the antenna data sheet). In reality few amateurs have the luxury of doing this!

For a multi-band installation, try to maximise the separation of antennas with the longest wave length. To minimise the forces acting on the rotator and the support bearing – I think it makes sense to mount the antennas at their point of physical balance by weight – with the heaviest (generally the lowest frequency) antennas lower than smaller higher frequency antennas.

From experience, I recommend mounting antennas for different bands so that they all point in the same direction **(Fig. 3)**. This way you will know that if you are lined up on a station on one band, then you are already lined up if you want to try a contact on another band with the same station.

Fig. 3: The antennas are all pointing the same direction. In this installation the support bearing has been mounted below the rotator as the rotator has the antenna (stub) mast passing through it.

The rotator instructions will often suggest lining the antenna up with the control box indication. This is so that when the control box indicates that it is pointing west for example, then the antenna is actually pointing west. However, I think that for Amateur Radio use, this **may not** necessarily be the best advice.

I suggest making the point where the rotator stops the approximate direction where you expect to get fewest contacts and marking the control box accordingly. The reason I suggest this, is that if you are on the south coast of England (for example) many contacts are going to come from a northerly direction.

If the rotator is pointing north west and you want to work a station in the north East, you have to wait while the rotator turns almost 360°. So, for those of us in the South of England, I think setting the end-stops south west (pointing into the Atlantic) makes sense. I suggest that readers elsewhere set the end-stop based on experience over time.

However, many of the more expensive heavy-duty rotators turn 450° (**Fig. 4**). This makes the selection of the end-stop far less critical.

Elevation Rotators

Elevation rotators are normally only used by Radio Amateurs interested in satellite operation or bouncing signals off the moon using Earth-Moon-Earth (EME) techniques.

There are two main types of elevation rotators. The first of these are the lower duty ones suitable for relatively small antenna systems. These look a bit like azimuth rotators on their sides. It's important with these to arrange for the antennas to be physically balanced (by weight) so that the rotator has the least possible strain placed on its bearings.

The second type of elevation rotators are based on satellite actuator technology. These can be used to control large arrays of Yagis or a large dish. With a large array, it's important that the elevator allows the antennas to be controlled to within 1° of elevation. For both types, it's important that the elevation angle is accurately shown on the control box.

Fig. 4: Control box for a Kenpro KR-1000SDX 450° azimuth rotator. Here the overlap has been set between west and north. Note: The Kenpro range is now sold under the Yaesu brand.

Fig. 5: A basic satellite set-up with separate azimuth and elevation rotators.

Combined Elevation & Azimuth Rotators

The combined elevation and azimuth rotators are the ideal for satellite and EME operators. Again, the accurate alignment of both the azimuth and elevation is important if highly directional antennas are to point at the appropriate part of the sky. Alternatively separate azimuth and elevation rotators can be used **(Fig. 5).**

Advanced Rotators

The most advanced rotators can be interfaced to computers so that when a DX Spot is seen on the DX Cluster, the rotator turns to the appropriate direction and the transceiver tunes to the correct frequency and mode ready for you to make your contact.

Feed-back From Readers

I'm always pleased to receive feedback from readers and **Nick Hockenhull MW0NAB** rightly queried **Table 4** in the **June** issue. Somehow, the 'meaning' column of the table got inverted relative to the rest of the table. The correct table, **Table 1**, correctly shows a bad (Q1) data signal is one with splatter over much of the spectrum. So a RSQ 599 data mode report is fine. Thanks Nick!

Mike Dickenson M0DIV wrote in connection with the feeder losses in **Table 4** in the **August** issue. Unfortunately the headings of the columns of the table were mis-placed because computer tabulation problems. I've included a corrected version of the table here (**Table 2**). Mike's query was that he has found different feeder losses quoted elsewhere, and he wanted to know why they were different! Thanks for your feed-back Mike!

The figures I used in the table came from numerous sources. They were based on the assumption that new feeder was being used and that the connectors had negligible losses. Some feeder manufacturers only quote feeder losses for, let's say 100MHz, and not 144MHz. As a result, some sources may estimate the feeder loss for 144MHz based on the loss at other frequencies, others may do this by measurement. It's unlikely that these two methods will arrive at identical figures. Additionally, I suspect there may be some small variation in losses between batches of feeder made by different manufactures.

Imagine trying to read a radio frequency power meter really carefully when trying to evaluate a coaxial cable accurately! Even if you can read it to a fraction of a Watt (highly unlikely I would suggest), most power meters are simply not that accurate.

At the end of the day, published feeder losses are generally 'best cases', and in practice, feeder losses are likely to be greater due to losses in connectors, moisture ingress, etc. I think it best to use published feeder losses as approximations rather than rely on absolute values. Don't forget also – that feeder loss increases with both frequency and length. Cheerio for now and I look forward to chatting to you next month and to your feed-back. Keep writing! ●

Table 1: Quality for data modes is based on the number of sidebars visible. This is the correct version of Table 4 in the June 2010 What Next?

Q	Quality
Q1	Splatter over much of the spectrum
Q3	Multiple visible pairs
Q5	One easily visible pair
Q7	One barely visible pair
Q9	Clean signal, no visible sidebar pairs

Table 2: Feeder losses in dB of a 20m length of some popular feeders on various v.h.f./u.h.f./super high frequency (s.h.f.) bands, assuming brand-new feeder with no losses associated with connectors. In some cases the data has been estimated for Amateur bands based on published data for other frequencies. This is the correct version of Table 4 in the August 2010 What Next?

	50MHz	70MHz	144MHz	432MHz	1296MHz
UR76	2.4dB	2.8dB	3.8dB	6.4dB	
RG58			4dB	8dB	18dB
UR67	0.9dB	1.1dB	1.7dB	3.1dB	
RG213U			1.64dB	3dB	5.2dB
H100	0.64dB	0.76dB	0.98dB	2dB	
W103	0.4dB	0.5dB	0.9dB	1.5dB	3dB
Ecoflex 15	0.4dB		0.68dB	1.22dB	2.28dB
Ecoflex 10	0.56dB		0.98dB	1.78dB	3.3dB
Aircell 7	0.9dB		1.52dB	2.72dB	4.97dB

Ben Nock's

valve & vintage

Ben Nock G4BXD says the Kidderminster Kollection has experienced a 'bit of a Russian invasion' with the arrival of new items!

Fig. 1: The 13P backpack set in its wooden case.

Fig. 2: The A7b set, notice the similar (to the 13P set) wooden case used on this unit.

A very warm welcome once again as it's my turn to man the *Valve & Vintage* (*V&V)* shop this month. Here in Worcestershire it's been a fine, if sometimes wet, summer – but fortunately several new additions to the collection have arrived. They've maintained my interest levels and one or two events attended with some nice meetings and pleasant comments on the column received, thank you very much indeed. So, on with the show as they say!

Russian Invasion

It seems that its been something of a Russian invasion into the *Kidderminster Kollection* (*KK*) just recently. I offered up the RBM1 and 10RT sets in recent editions – but the latest arrival is yet another Russian designed set, the A7b Russian Army man-pack. I have mentioned this set before, though back in February 2008 after I bought a basic unit back from the 2007 Friedrichshafen rally.

The new arrival is compete in its wooden carrying case and once it got here I realised that it was very similar to an earlier set, the Russian 13P – which I'd also mentioned back in May 2004. So, as an up-date I'll outline the development of these two sets.

At the start of the Second World War, or as the Russians refer to it 'The Great Patriotic War', the Russian military needed to increase their radio production to help their troops in battle. The production of radio sets had been moved deep into eastern Russia during 1941 under the control of the Peoples' Commissariat of Defence (PCD). By the middle of 1942 production of the 13P, **Fig. 1**, was well in hand and around a 1,000 sets a month were leaving the factories.

The 13P, sometimes written as 13R as the Russian letter for R is similar to our P, is a high frequency (h.f.) receiver transmitter backpack, tuning 1.7 to 4.25MHz, running Morse code or telephony and giving just 500mW output into a whip or wire antenna. The set uses six valves in the receiver, a standard single conversion superhet design, and a single valve – would you believe it – as a self oscillating power output stage for the transmitter. Modulation is achieved with a carbon microphone in the heater/cathode line of the transmitter valve.

During 1942 the RB and RBM sets (the RMB1 was developed later) were being produced and proved very successful. However, it became clear that another set was needed to meet the needs of the Russian troops – so work was started on a new design, the A7 backpack. This new set was something of a marvel at the time because it used frequency modulation (f.m.) instead of amplitude modulation (a.m.).

Working up to 18 hours a day the Russian engineers and production plants developed working models in just a few weeks and by the end of 1943 they were apparently producing around 2,000 sets a month. This would have been quite a feat given the extreme hardships in materials and men these plants must have been under at the time.

The A7 worked from 27 to 32MHz and produced about 1W of r.f. output using f.m. It was powered by batteries, using eight valves in the receiver and three valves in the transmitter. An A7A model followed in early 1944 with a similar tuning range, and a further A7b model followed in late 1944, this version tuning 24 to 28MHz.

The A7b, **Fig. 2**, like many other models of Russian designed sets from the Second World War (and later) were manufactured in many other Communist bloc countries. The model of A7b that arrived for the *KK* is a Czech made version, probably made around 1950 or so.

The set arrived in very good condition, there was a slight bend in one of the internal mounting brackets inside the wooden case due to poor packaging by the sender. Thankfully that was the only minor problem. A quick tap with the 'Black Country Screwdriver' as it's called (a hammer

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Fig. 3: The RSI-4T miniature receiver, with C cell by the side.

Fig. 4: Inside the RSI-4T, with six valves squeezed in easily.

to those not from the West Midlands) remedied the fault!

The two cases, made from plywood, are very similar. The 13P case arrived with its straps and the A7b arrived complete with its back pad to protect the wearer. The sectional whip antenna of the A7b is carried in the front pull-down cover along with a folding ground stake. The handset is a Bakelite telephone type with a large push to transmit bar in the centre. This bar simply switches the low tension battery between the receiver or transmitter heaters.

I had previously fitted a mains power supply into the battery space of the 13P and have indeed used it on the air – even in QRP mode it can make contacts! The A7b box also has the battery space at the bottom of the box where two 1.2V re-chargeable batteries were carried to provide a 2.4V heater supply. and a further two 90V dry batteries, wired in series to give 180V, were used as the high tension (h.t.) supply.

The A7b also had the facility to be used as a standard 2 wire telephone, there are two terminals on the left of the front panel which can be connected to a standard military two wire field phone system, the radio is switched off and just the handset used.

больше из этих же

Translation of the cross-heading: 'More Of The Same! And so it was that yet another Russian set arrived on the doorstep. This time it was a very cute looking and tiny receiver called the RSI-4A. This receiver unit, **Fig. 3**, was used as an airborne high frequency receiver, part of the radio equipment along with the RSI-3M1 transmitter and was used in Russian fighter aircraft of the period. The receiver tunes 3.7 to 5MHz, 'phone only reception and was manufactured from around 1940 onwards.

The receiver is very compact, **Fig. 4**, and the designers have squeezed a six valve single conversion superhet into a box of only 130mm square. The receiver needs 12V for the heaters in the original layout, although it's possible any restorer might find this may have been modified to 6.3V by later users, and around 200V of h.t.

It also appears that – when used with the 9RT transmitter – the units could be used in tanks as their main communication set, later replaced with the 10RT station which covered the February 2010 *V&V*. I also found a nice photograph on **Louis Meulstee's** web site, *Wireless for the Warrior*, showing the receiver section fitted to a second chassis on which is a transmitter and rotary generator. Labelled the 9-RS this unit, **Fig. 5**, was apparently used in various Armoured Fighting Vehicles (AFVs). My thanks to Louis for permission to use the photo.

The receiver uses the Russian made versions of the American metal-cased octal valves with the exception of the audio output valve, which had been fitted with a Russian glass type 6F6. Unfortunately, this had suffered at the hands of the shippers and arrived broken. I replaced it with a 6V6 and after applying power to the set was pleased to find it working.

I had to slightly re-align the receiver to cover 3.5MHz upwards but after that and a quick tweak on the intermediate frequency (i.f.) transformers and front end tuning the set works very well indeed. The controls are simple in the extreme, just tuning and volume – but even so

Fig. 5: The 9RS unit with receiver fitted.

reception of amplitude modulated (a.m.) stations on the 3.5MHz (80m) band proved quite easy.

Once again I have gone and started a new thread in the 'Kollection'. Having found the receiver unit I now need to find either the 3M1 transmitter to match it or the base unit to make up the 9RS AFV station. Hopefully, if any reader happens to have either unit laying around somewhere and wants to part with it – they'll give me a call and put me out of my misery!

And Finally

Well 'Comrades', that's about it for this Russian-themed stint at the *V&V* shop. I hope you have enjoyed the selection I have bought you and there are more pictures at **www.qsl.net/g4bxd** As it's my last outing before the festive season I wish you all the very best and a cracking New Year. As always I can be contacted at my E-mail address **military1944@aol.com** Cheerio until next time. ●

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Feature

The Evolution of Amateur Radio Callsigns

The Wireless Telegraphy Act of 1904 led to the issue, in 1905, of Amateur Radio licences for the first time in the UK and no doubt earlier than anywhere else in the world. Our wireless enthusiasts received callsigns that used three letters of the alphabet one of which, either the second or third letter being an 'X'. The 'X' signified that the licence was for experimental work only.

Surprisingly, the first Amateur Licences did not appear in the USA until 1912 when the holders were given unlimited access to wavelengths of "200 metres and down."

After the First World War Amateur Radio in Britain didn't get started again until late 1920, when the first twelve transmitting licences were issued by the General Post Office (GPO). There were new callsigns, which began with the number two followed by two letters.

United States Amateurs were back on the air in October 1919, their callsigns having a number followed by two or three letters. The USA was divided into zones which had callsign numbers pertinent to particular zones and the present day USA call areas are closely related to those early zones.

Many Other Countries

Amateurs in many other countries were issued with licences and callsigns, which were like those used in the USA and Britain – although certain numerals were adopted in a number of European countries. French stations had calls beginning with eight, Danish stations used seven, Swiss calls started with a nine, while the Italians used the number one.

Some countries, the Netherlands being a notable example, refused to allow Amateur Radio operation. This led to a widespread 'Piracy' with Dutch stations inventing their own callsigns. Significantly, they often used 0, because no doubt they were not official many Dutch stations incorporated the number zero in their call. The use of zero in Holland persisted up to the end and after the official granting of licences in the Netherlands.

In 1920, few Amateur operators could make long distance inter-country or inter-continent contacts. Some stations were still using Spark transmitters and long wavelengths were still being used. However, by 1923 spark transmission was outlawed and valves were being used for transmission and reception. The shorter wavelengths imposed upon Amateur operators and communications over longer distances became more common worldwide.

The longer distance communications (DX) meant that a British station, say 2SH (Fred Hogg) might hear 2NB, 2BL or 2BY but not know from the callsigns if they were British or overseas stations until contacts took place. They might have been in Finland, Chile or the USA respectively!

The callsign confusion situation was largely resolved at the first

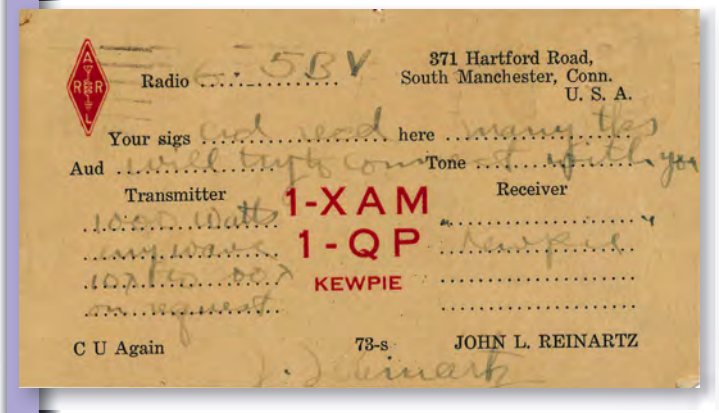


Fig. 1: A May 1924 QSL card from and signed by John L Reinartz. His station was used to make the first Amateur Radio contact with North America on November 27th 1923.

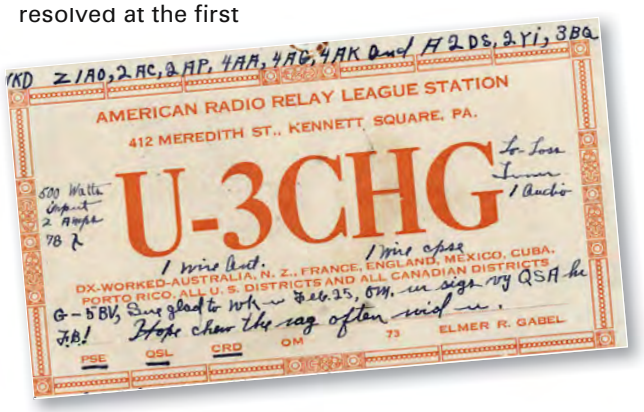


Fig. 2: Card to G5BV in 1925 showing the use of 'U' to indicate a United States callsign.

John Heyes G3BDQ is well known for Antenna Workshop. However, this time John is using his QSL collection to explore callsign history.

Fig. 3: A 1927 photo QSL card from NU3BNU showing an example of the short lived 'NU' prefix.

Fig. 4: A 1927 card to G6CJ from Argentina which has the callsign H.D.4 and also the letters 'SA' showing that it was from South America.

meeting in Paris of the International Amateur Radio Union IARU) in April 1925. One specific topic on the agenda was the use of the particular numbers or letters in callsigns that would indicate the country of origin.

Despite the IARU's decision, there remained some very unusual call letters in use throughout the 1920s and early 1930s. But, by the end of that decade, The International Prefix list closely resembled today's listing.

Historical QSL Cards

By using my extensive historical collection of QSL cards, I'll try to show how some callsigns have evolved from after the 1925 Conference up to the early 1930s. I will also describe them in roughly alphabetical country order, starting with the countries having 'A' as their initial letter.

Argentina didn't formulate its callsigns during the mid-1920s and amongst my cards for that country that were used in 1925 and 1926, there are found the callsigns DC3, AA8, DH4, HD4 and DE3. There may be actually some correlation between the prefixes and the Argentinean districts.

The 1927-28 callsigns used in Austria do have a logical makeup, for the use of a letter 'A' preceded by an 'E' denotes that it is a European callsign. At that time no numerals were used, with typical callsigns being EA-WK in 1927 and EAFK in 1928.

The callsigns in use in Australia between 1926-28 often show no country prefix, just a number which indicates the State. The same numbers are used today with three denoting Victoria, five South Australia, and seven for Tasmania. In 1926 and 1927 some Australian amateurs had the letter 'A' in front of their State number.

The prefix FM8 was used by Algerian Amateurs in 1928, the 'F' indicating that Algeria was located in Africa. Various other African States used the letter 'F' as a first prefix letter, with the numeral eight showing a link with France.

Brazilian callsigns used between 1925-26 generally had no common prefix. Indeed, I have six QSLs that show calls with the numbers one and two and just one other from 1926 which shows the call BZ-1IA. It's most unlikely that 'BZ' was official.

Belgium, the close neighbour of Holland was very reluctant to licence its Amateur Radio enthusiasts and from 1925 to 1929 various 'Pirate' callsigns were in use. Many of these spurious callsigns used the letter 'B'

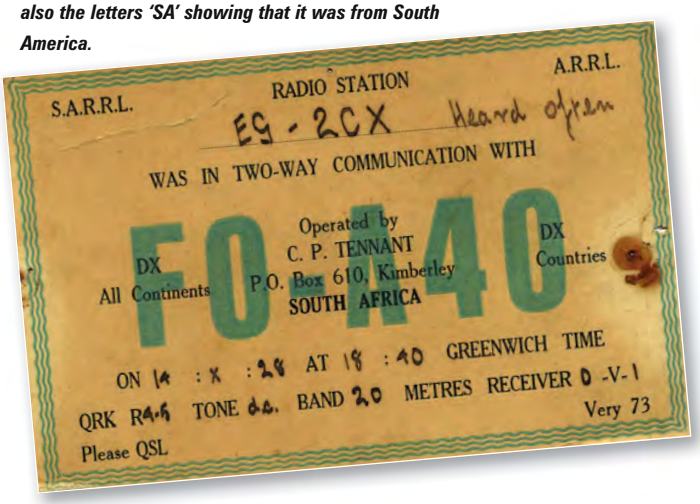


Fig. 7: The letters 'FO' were used in 1928 to show that the station A40 was in Africa.

followed by a number and further letters. But there were also some very unusual examples, including, ALS, P2 (1924), H6 (1926) U3 (1927) E9 (1928) B7 (1926) 4CK (1927) and the odd B-ZG (1926). Most of the Belgian callsigns during the 'free for all' period had the letter 'B' in front of a number and two letters. The 'B' was normally separated from the remainder of the call by a dash.

In 1928 the Canary Islands were using the then normal Spanish prefix 'EAR' – but this prefix was followed by the letters 'FR'. Again, the letter 'F' denoted a location in Africa.

Chilean amateurs had no proper callsign prefix in 1927 – and 2BL was an example from that year. In 1928 SC3AC was used, the initial 'S' showing that the station was in South America with the 'C' indicating the country of Chile.

Canada & European Contacts

Amateur Radio contacts between Canada and Europe must have been tricky to initiate in the early to mid-1920s, for Canada used no regular prefix up to 1927-28. The station 2BN operated in 1924, while in 1925 3AD, 3OH, 1AM, C-3NF and CEB were some of the callsigns in use. In 1928 there was a 2BR and also NC5CP, which has an 'N' to say that the station was in North America. The letter 'C, of course, stood for Canada.

Danish Amateurs used the number seven in their callsigns, something, which lasted up to and for sometime after the Second World War. In 1925 and 1926

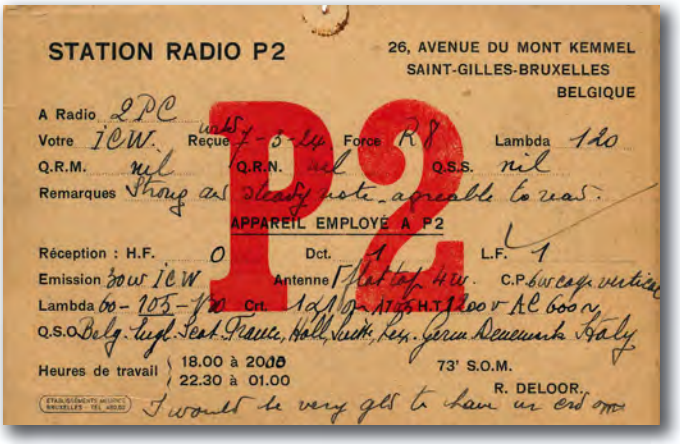


Fig. 5: The letters 'P2' formed the unusual callsign adopted by a Belgian Amateur Station in 1924.

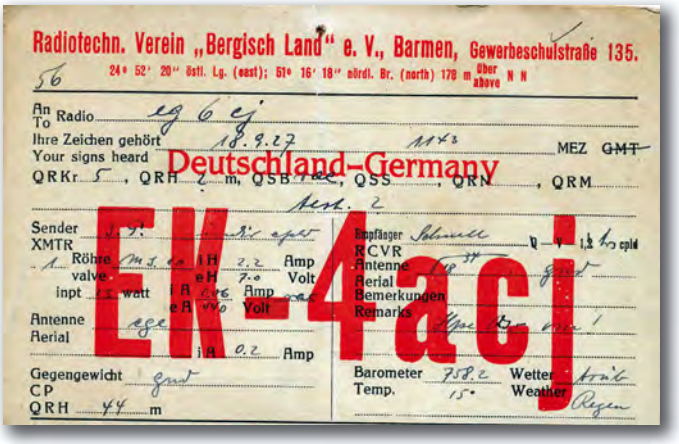


Fig. 6: This 1927 card has the prefix 'EK'. The letter 'K' was used by German stations and the letter 'E' locates the Continent as Europe.

Fig. 8: In 1926 and for several years later the 'EAR' prefix was used in Spain. The three letters were followed by a number that was allotted to each Amateur station.

some amateurs used a 'D', but most stations just used the number seven followed by two letters.

Our nearest neighbour – France – adopted the number eight for its callsigns by 1925. In 1924 a very early French QSL card had the call 8BN. Other European stations noting the number eight in its callsign could rightly assume that the station was French. The ubiquitous eight has in more recent times lost its singularity and other numbers are being used together with prefix letters other than 'F'. In former years, Moroccan stations had callsigns without the 'F' and used an eight followed by two letters. This pattern remained the same until 1931.

German QSL Cards

I've never found any German QSL cards that were dated earlier than 1926. There were, no doubt, restrictions imposed upon those living in Germany before that date, which prohibited Amateur Radio activity, such restrictions being imposed by the Occupying Forces. Some callsigns for 1926 include KV8, KI4, K-4XY and K2DC. In 1927 the callsigns included K4FN, K4XW, EK-4ACJ and EK4ABR. The letter 'E' showing that the station was European.

Irish Free State

The Irish Free State (which became Eire) was founded early in the 1920s and for a few years up to 1928 used an unusual series of callsigns. The prefix was 'GW' (now a prefix for Wales) which suggested that there was still a British connection. This prefix was followed by a two digit number and a final letter. Examples from 1926 and 1927 included GW18B, GW11B, GW15C, GW11D and GW13D. (I don't know the significance of the two digit numbers).

Italy's One

Italy adopted the numeral 'one' for its callsigns – but only after a period when no numbers were used. In 1924 the call ACD was held by **Adriano Ducati**, a member of the famous motor manufacturing company. In 1925 Italian callsigns included 1NO, 1LP, 1GS, and 1RG.

Some time in 1927 the letter 'E' for Europe with the letter 'I' to indicate the country appeared. These included EI1MG and EI1FO. EI eventually became the prefix for Ireland.

New Zealand Callsigns

New Zealand Radio Amateurs used calls made up from the number four, which was followed by two letters. This callsign structure dated from before 1924. Even before the first ever QSO between Europe and New Zealand on October 22nd 1924, between G2SZ and 4AA, the New Zealand station was using the letter 'Z' followed by a dash linking it to the rest of the callsign. After 1924 very few New Zealand stations (2GO in 1926 and 1FE in 1927) omitted the unofficial letter Z.

The Netherlands Very Late

The Netherlands was very late in granting transmitting licences to its Radio Amateurs and this curb on amateur activity continued up to 1930. The ban gave rise to widespread piracy in Holland with Amateurs operating 'under cover' and making up their own callsigns. Many of these 'bootleg' stations however included the letter 'N' and a zero in their callsigns.

An official QSL Bureau was obviously not possible – so an illegal 'Buro' was set-up. This was run by **Mr. R. V. W Tappenbeck**, who in 1923 used the callsign PCTT. Very many Dutch QSL cards (which were handled by the RSGB) asked the recipients to send back a card via Mr. Tappenbeck's address at Hoogduin, Noordwijk-an-Zee, Holland.

Some of the individual callsigns used in the

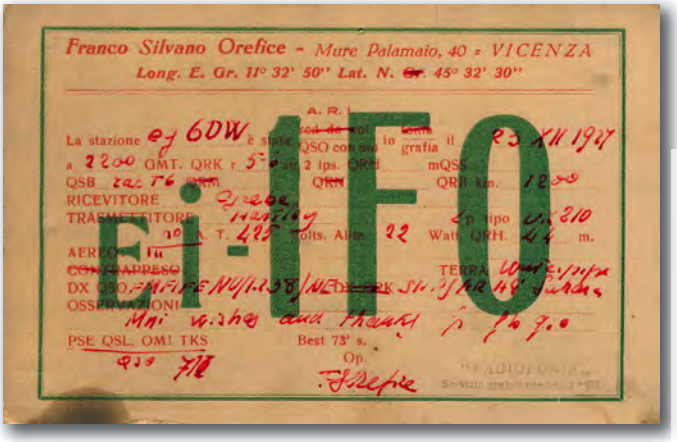


Fig. 9: This is not a card from Ireland! In 1927 the letters 'EI' denoted that it was from Italy, which was within Europe.

Netherlands include ØCX (1928), PB2 (1926), EN- ØXT (1929, via Tappembeck), N- ØPX (1925), and ØNM (1927).

Numberless Swedish Callsigns

For many years Swedish callsigns didn't include a number. Some QSL cards sent for contacts made in 1926 and 1927, include SMUV, SMZV, SMUA and SMYG, which are typical examples. The letters, 'SM' at those early dates are significant for they're e still used today.

From 1925 – and certainly as late as 1932 – Spanish Amateur Radio stations used the prefix EAR ('E' and 'A' are the first and last letters of 'España') followed by a two digit number.

Examples are EAR21 (1925), EAR96 (1929) and EAR98 (1930). A 1932 Spanish QSL in my collection carries the callsign EAR-LAR. Spanish possessions also used the prefix EAR, with the letters 'FR' in front. The 'F' denoted Africa for then as now the Canaries are considered as a part of Africa.

United States Single Number

The United States initially employed a single numeral followed by either two or three letters for its callsigns. The numerals indicated an approximate geographical location and became the basis for later numbering systems. These remain much the same today.

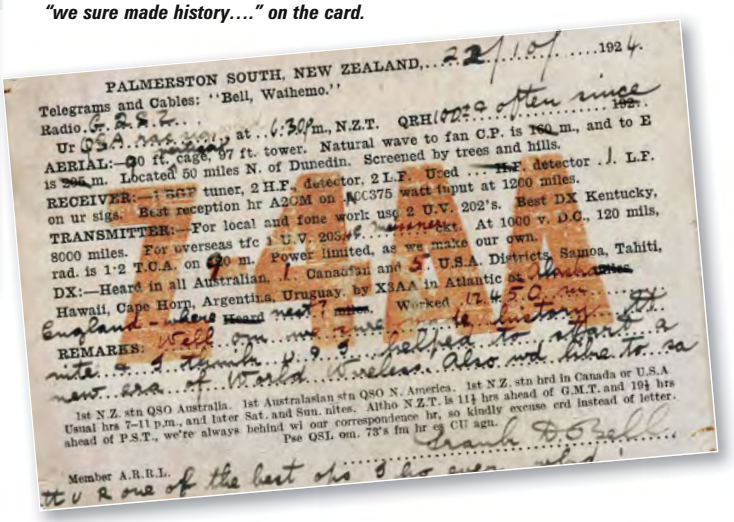
The IARU 1927 Suggestion

In January 1927, the Executive Committee of the IARU suggested a two letter call letter system with the initial letter denoting the Continent ('E' for Europe, 'A' for Asia, 'N' for North America, 'F' for Africa, etc.) but this scheme did not survive for long and even the USA dropped the Continental indicator after a short time. For that short period the United States used the prefix 'NU'. Any QSL cards bearing this prefix are quite rare and in less than two years the prefix letters 'W' or 'K' replaced them.

A 1926 card from Finland in my collection, carries the callsign 3NB and a card from India in that year has the unusual Y2PM. Two years later some Indian stations used the prefix 'AI'; the letters denoting an 'A' for Asia and the 'I' for India. Jamaican Amateurs were using the North American indicator 'N' followed by a 'J'. A card travelling via the RSGB in 1927 bore the callsign NJ-2PZ.

In 1928 the Latvian callsign prefix was 'TLA' and in 1926 Mexico had a resident Amateur station using the

Fig. 10: A very rare 1924 QSL card, which confirms the first New Zealand contact with Europe. The G2SZ callsign was the British operator who was using the Mill Hill School station. The New Zealand operator was correct to write , "we sure made history...." on the card.



call M-9A. Puerto Rican callsigns in 1925 bore the number four followed by two letters and in 1927 Poland used the prefix 'TP' – but used no numbers at all. Palestine was a Protectorate of Great Britain in 1926 and the few active Amateurs there used the number six followed by two letters.

The prefix 'PI' was adopted by the Philippines in 1927 and in that year and in 1928 Portugal's prefix was 'EP'. However, before 1927 no prefix letter was used there – just the letter 'P'.

Between 1925 and 1927 South African callsigns used the letter 'A' followed by a four or a six. However, during 1927 South Africa adopted the prefix 'FO'. A single QSL card I have from Uruguay and dated 1927 – bore the callsign 1CX.

After 1930

After 1930, most countries adopted callsigns similar or identical to those found in present day prefix lists. The greatest upheaval in callsigns followed the so called 'Winds of Change', particularly in the British Colonial regions after 1950. At a glance at a prefix list published as late as 1961 shows that 'VK' was used in eleven territories.

In 1961 there were still 22 territories using 'VP' as a prefix, 11 using 'VQ' seven using 'VR' and eight using 'VS'. The British Commonwealth also used ZB, ZC, ZD, ZE, ZK, ZL, ZM, and ZS in a further 21 territories or countries. Sadly, today few of these have survived. A useful guide to the earlier prefixes are copies of *The Radio Amateur Operators Handbook,* which appeared with revisions each year from 1952 to 1961. This useful little book was edited by the late **Arthur Gee G2UK** and in 1961 sold for the princely sum of 3s/6d .

Here in the UK we've had an explosion of callsign prefixes over the past 20 years or so. This is also happening in other countries and it can be difficult to keep up with the changes and additions. Often I hear or work an overseas station and have to refer to the latest 'handbook' or Magazine prefix list! I'm still learning! ●

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ID-E880E	NEW D-Star Mobile. D-Star as standard	£439.95
IC-E90	6/2/70 FM handie	£299.95
IC-E90/4m	6/4/2/70 version of this popular handie	£339.94
IC-E92ED	As above c/w D-Star fitted & splash–proof	£379.95
IC-E880	NEW! Latest D-Star Dual-Bander. Now in stock	£439.95
IC-E2820	Proper dual band, dual display, remote etc	£425.95
IC-E2820+D	Supplied with UT-123 D-Star board	£589.95
IC-910H	Multimode 2/70 Base Station	£1269.95
IC-910X	As above but with optional 23cm UX-910	£1469.95

Icom PC Controlled Receivers

Icom IC-R1500 & IC-PCR2500

All Windows XP, Vista or Windows 7 Controlled via USB

IC-R1500

10kHz-3300MHz All Mode with remote head £459.95

IC-R2500

Identical to the above but with twin independent speakers .. £589.95

NEW Icom IC-9100 All-Rounder HF through to 23cms Base Transceiver

V/UHF Satellite + HF/50MHz bands + D-STAR DV mode

- HF/50MHz 144/430(440)MHz & 1200MHz coverage
- SSB, CW, RTTY, AM, FM & DV modes
- 100W on HF/50/144MHz, 75W on 430(440)MHz. 10W on 1200MHz
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- Double superheterodyne with image rejection mixer
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- Optional D-STAR DV mode operation

Icom IC-7600

This new Mid-range HF base station from Icom has arguably the best screen for user interface in the business. Successor to the IC-756Pro3.

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This really is a total shack in a box.

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TS-2000E	100Watt all mode HF/2/6M with auto-ATU etc	£1499.95
TS-2000X	As above but fitted with 10Watts on 23cm (all mode) ... SPECIAL	£1679.95

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TM-V71E	First Class 2/70 FM Mobile with remote head	£289.95
TM-D710E	The only 2/70 FM Mobile/Base with APRS/TNC etc	£429.95
TM-D710E+AvMap	Bundle. Personal Navigator for GPS located APRS	£Call!!

GB7ML NOW ON 2m! GB7ML Now on 2m! We thought our NEW D-STAR Repeater would give better coverage on 2m so thanks to G0RDI, G7LWT, G4MDC & others who put many hours of time and effort into the project. For more info including coverage map see: http://www.ukrepeater.net/repeaters/gb7ml.htm

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Compact metal body Cross Needle Meters. Fantastic value all PEP & Average reading.

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Nissei	RX-203	1.8-200MHz, 2/20/200W	£49.95
Nissei	RX-403	125-525MHz, 2/20/200W	£49.95
Nissei	RX-503	1.8-525MHz, 2/20/200W	£69.95

New Range to ML&S, HUGE DISPLAY, PEP & Average reading.

Nissei	TX-102	1.6-200MHz, 2/20/200W	£59.95
Nissei	TX-402	125-525MHz, 2/20/200W	£59.95
Nissei	TX-101A	1.6-60MHz, 20/200/2kW	£84.95
Nissei	TX-502	1.6-525MHz, 2/20/200W	£89.95

See www.hamradio.co.uk for more details on all of these items ... and much, much more! E&OE

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Miracle Antenna is back! **With some important Hot New products.** Introducing the New MMD Mixed Mode dipole. The first and only electrically centre-fed mechanically end-fed dipole ever offered to the Ham Radio market, the MMD provides a host of benefits never available in an end-fed dipole.

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Miracle Ducker iL HF-70cm Mini ATU with BNC..... **£109.95**
Miracle DuckerHF-70cm with PL-259 ..... **£109.95**
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PERSEUS is a VLF-LF-HF receiver based on an outstanding direct sampling digital architecture.

only **£599.95** as reviewed in Radcom May Issue

Unlike lower class direct sampling receivers, the PERSEUS RF analog front-end has been carefully designed for the most demanding users. PERSEUS can also be operated in a wide band mode as a 10KHz - 40MHz spectrum analyzer with more than 100dB dynamic range in a 10KHz resolution bandwidth. PERSEUS is a Software Defined Radio and relies on PC software applications to carry out the demodulation process.

RFspace

SDR-IQ™ Software Defined Radio, Spectrum Analyzer and Pano am... d pt...
Now in stock together with the IF-2000 IF Interface board for the FT2k & FT-950. Both on DEMO at Chertsey.
See http://www.hamradio.co.uk/acatalog/RF_Space.html **£469.95**

The World's Biggest Selling Virtual Radar System

Now includes built-in Airband & FM!

British Designed & British Built!

SBS-1eR Pocket Radar **£479.99**

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2m/70cm/23cm Handie Transceiver. Simultaneous full duplex operation between any two bands. £299.95

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TWO NEW SUPER MODELS FROM LDG

NEW! YT-450	Auto Tuner for the FT-450 & FT-950	£214.95
NEW! YT-847	Want a really good Auto ATU for your FT-847? Here it is!	£214.95
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AT-100proII NEW	Desktop tuner covering all frequencies from 1.8-54 MHz	£199.95
AT-200pro	Designed for new generation of rigs	£214.95
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AT-897Plus	Bolt-on Alternative Auto Tuner for the FT-897. Wider tuning range and cheaper too!	£183.95
IT-100	New version of the AT-7000	£159.95
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Z-817	Ultimate autotuner for QRP radios, including the Yaesu FT-817D	£122.95
Z-100Plus	Ultimate autotuner for Yaesu FT-817D	£143.95
Z-11ProII NEW	Portable compact & tunes 100mW to 125W	£159.95
RCA-14	4-way DC Breakout Box	£49.95
KT-100	Dedicated tuner for Kenwood radios	£173.95
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ULTIMATE in professional weather stations, offering the usual feature set of the WX-831 but uses a Anemometer with solar cells, Satellite Meteotime forecast over the next 4 days and a massive split screen. **Only £199.95**

VENTUS WX-831. New much improved wireless Weather Station. ML&S Price: £119.95.

MyDEL

AS REVIEWED IN PW December Issue 2009

CG SB-2000 USB Radio Interface

Only £99.95

- This small self contained beautifully styled box weighing only 400 grams really is a one stop solution to your data and radio control. It employs a CAT/CIV interface as standard and supports CAT with RS232 protocol.
- The MyDEL CG SB-2000 Interface connects to your PC via USB and Sound Card and connects to your radio via Custom leads.
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HF-2500	1.5kW HF linear Amp, 2 x 3CPX800A7 Triodes	£3395.95
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AT-1500DT	1500W Differential Antenna Tuner	£449.95
AT-2KP	(2000W) Antenna Tuner	Special Price £399.95
NEW AT-2KD	The AT-1500DT and the AT-1KP have been combined into a new 2Kw Tuner	£429.95
AT-4K	(2.5kW) Antenna Tuner	£769.95
AT-5K	(3.5kW) Antenna Tuner	£999.95
BT-1500A	Balanced Antenna Tuner	£599.95
PM-2000AM	Power/SWR Meter	£159.95
Palstar Dummy Loads		
DL-1500	(1.5KW)	£119.95
DL-2K	(2kW)	£229.95
DL-5K	(5kW)	£349.95
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Palstar R30A, fitted Collins filters for SSB & AM		£649.95
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SP30	Matching Desk Speaker	£69.95
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Want to dabble in D-Star without the expense of a radio?

DV-AP-Dongle

NEW

The DV Access Point Dongle, (DVAP for short) by Internet Labs, provides a way to connect to the international D-Star network. The DVAP is used with a PC/Mac and an Internet connection. Unlike the DV Dongle, the new product allows amateur radio operators to walk away from the computer and transmit/receive D-Star voice and data using a two meter D-Star radio. Note that a D-Star radio is required to communicate with the DVAP and an Internet connection is required to communicate with the D-Star network

See web for more details. NOW IN STOCK! £219.95.

DV-Dongle

The DV Dongle connects to your PC or Apple Mac via a USB port and provides encoding and decoding of compressed audio using the DVSI AMBE2000 full duplex vocoder DSP chip. AMBE technology is used in all D-Star radios to provide efficient voice transmissions. It is also used in some HF digital protocols by vendors like AOR. The DVTool application used with the DV Dongle may be installed and run on Microsoft Windows XP/Vista, Mac OS X Leopard, or many flavors of Linux.

In stock, works with MAC or PC. £199.95

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MP-9600 60A switch mode power supply. £179.95

PS-30SW11	Latest high performance switch mode PSU. 25amp	£84.95
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MP-8230	13.8V DC, 25A power supply	£69.95
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NEW Mini VNAPro Now with Bluetooth!

The new miniVNA PRO, the big brother of the well-known miniVNA, is an extraordinary and unique handheld vector network analyzer that makes available a multitude of new features and capabilities which are perfect for checking antennas and RF circuits for hams and commercial users. Together with your PC/Laptop, you can add to your laboratory the further advantages of having this first-class VNA instrument. This is the first world's wireless analyzer able of scanning and sending the data using an integrated Bluetooth module to a remote PC/Notebook up to 100 meters from the miniVNA PRO's location. This makes real-time antenna setup easy!

ML&S: £349.95

MiniVNA original still available (without Bluetooth)

See www.hamradio.co.uk for more details on all of these items ... and much, much more! E&OE

Feature

Buying Second-hand

The summer Amateur Radio rally and boot sale season has been in 'full steam' and I hope that, if you've been able to visit one, you've managed to pick up a bargain or two. Maybe helped by recent *Buying Secondhand* articles in this series.

This time, as promised, I'll be detailing a couple of 'get you going' high frequency (h.f.) transceivers, ideally suited for a first 'all round' rig and at a price which hopefully won't break the bank. The Icom IC-706 and Alinco DX-70 transceivers both offer the ability of fixed, mobile, and portable operation, and have broadly similar capabilities.

The first models of each were launched back in 1995, and over the years each transceiver model has had three different variants, generally an increase in power at v.h.f., etc. (Please see the description later on the individual transceivers for more details).

What's The Cost?

I know one of the first questions readers will ask will be, "What will one cost me?" This is of course often hard to say, as in the past when a second-hand 'buy' is prominently featured in a magazine such as *PW*, this increases the desirability of the rig. However, it can also often 'wake up' people who already have one that's lying dormant and unused under the shack desk or in the house loft and prompt them into selling it!

So, the resultant price – at least for a short while after such a feature – can either go up or down from what it was before! But as a guide I believe you should be able to pick up first, i.e. early, model variants of the DX-70 for under £200 and a first model variant of the IC-706 for under £250. Later models, with more features and of course being newer and thus less-used, will of course usually attract higher prices.

I've been fortunate in using various models of both the DX-70 and the IC-706 myself in the past, each of them at home and out and about in my car. This as well as being able to fully and stringently test them at the time for technical performance in my measurement lab. So, I've no hesitation in recommending either to readers as a second-hand radio, providing of course you follow my advice regarding each one!

I know the DX-70 has been, and probably still is, a 'favourite' of the *PW* Editor **Rob Mannion G3XFD**. I must admit to having a personal preference for the IC-706GMkII (albeit available at a higher price), but that again is personal preference and each radio would be ideal as starter or all-rounder transceiver.

Having said that, the DX-70 has stood the test of time and after 15 years from its launch, the latest model in the DX-70 series, unlike other radios that have faded in the past, is still here on the market and selling well!

Now for couple of points to watch out for when you're buying second-hand. The first is the inclusion, or not, of CTCSS (sub-tone) in the IC-706, or whether you need to add an optional module for this. It will be important if you're interested in 50, 144 and 430MHz repeater operation rather than single sideband (s.s.b./c.w. (Morse).

Secondly, you should check whether either rig has extended 7MHz (40m) band transceive coverage. Additionally, you need to check for 5MHz band coverage transmit if you're licensed for this or hope to be in the future. If not then don't worry too much, because for each transceiver model featured I've given details on how to add this to a second-hand radio.

Fig. 1: The original Alinco DX-70 with its matching antenna 'tuning' unit.

The Alinco DX-70

The first DX-70, **Fig. 1**, first appeared in early 1995, and offers h.f. and 50MHz transceiver coverage on amplitude modulation (a.m.), c.w., narrow band frequency modulation (n.b.f.m.) and s.s.b. The rig has 100W output on h.f. (switchable to 10W for low lower operation) plus 10W on 50MHz, switchable to 1W low power. A little later came the DX-70T, which was virtually the same as the DX-70 but with narrow filters fitted as standard.

Chris Lorek G4HCL takes a look at several h.f. transceivers which you can hopefully pick up at a bargain price.

Finally, in 1999 the DX-70TH, **Fig. 2**, was launched, and this model is in fact still available and on current sale – it's similar to the DX-70T but the 'H' signifies it has a higher power of 100W on 6m. The operation and appearance of each is identical apart from the model number on the front and rear panels.

Each model has a transmit frequency range within the normal Amateur bands, and a receive coverage of 150kHz – 30MHz and 50 – 54MHz. A built-in continuous tone coded squelch system (CTCSS) tone encoder is included – invaluable for 28 and 50MHz n.b.f.m. (usually referred to as f.m.) repeater use.

Narrow (1kHz) and wide (2.4kHz) intermediate frequency (i.f.) filters are available for c.w./s.s.b. and 'narrow a.m.' receive. These being switchable from the front panel, together with a further wider filter for normal a.m. and f.m. use. A 500Hz filter is automatically switched in when c.w. mode is selected.

An **IF shift** control helps in fighting adjacent frequency interference on a crowded band, and switchable 10dB and 20dB receive attenuators help guard against overload, a 10dB preamplifier also being fitted. This is for use when needed on a 'quiet' band or for example whilst mobile with a small antenna. Two antenna sockets are fitted to the rear panel, one for h.f. and the other for 50MHz. The set's dimensions are 178 W x 58 H x 228mm D.

The front panel can be detached and an optional cable used to link this to the main transceiver 'body', which you can then mount elsewhere, maybe next to the feed-point of your mobile h.f. antenna. However, the microphone and speaker connections stay at the main transceiver end, so although you'll need extension leads here, but you can detach the front panel without any further connections and take it with you when you leave the car.

For on-air use, there's an internal speech processor and for c.w. operators, full and semi-break in. When I used the set on-air I found the smooth **VFO** knob control easy to use although I quickly learned how to use the set by touch alone for mobile use. I also quickly learned that I – invariably – had to use the **Dial Lock** button to keep me on frequency during a contact on the move as I found that I could easy accidentally knock the VFO control knob.

For normal mobile use, the set's 100 memory channels were useful. These, combined with a single button-push '**memory to VFO**' operation enables this to act as a band switch for Amateur and broadcast bands.

Fig. 2: The current version of the DX-70, the 'TH' version has been improved and adds more output power of 100W at 50MHz.

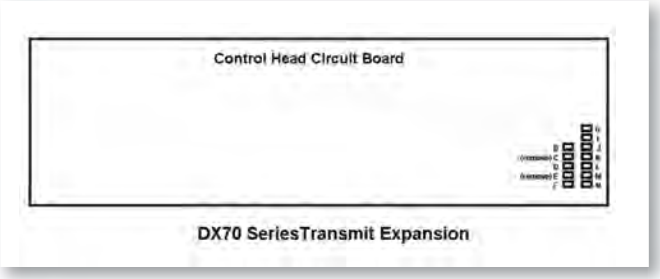

Fig. 3: See the text for expanding the transmit receive capabilities of the Alinco DX-70 series. There is no pad labelled 'A' on the left-hand column.

At home I must confess, I found the set's receiver often suffered on busy bands if I connected my full-size dipole on the l.f. bands, or my tower-mounted 3-element quad-bander Yagi beam on the higher bands and pointed at a busy Europe.

But then, the DX-70TH is a small set, and the attenuator function was useful here. However, in fairness – many users of a transceiver such as this may not be using 'monster' antennas, using more compact types. My conclusions after I'd used the rig those years ago were that Alinco had surprised the Amateur Radio world with a radical departure from their previous v.h.f./u.h.f. f.m. only offerings. But that they'd managed to do a very good job, as I found no real limitations with the set considering it's size and features.

Things To Watch For

Now, let's look at the things to watch for on the DX-70 series of rigs. As well as the usual 'bewares' which I gave details of in the first column in this *Buying Second-hand* series, such as buying and ownership warnings, look out for severe scratching to the case if the previous owner or owners have repeatedly taken it in and out of a car. If just the front panel has been removed this won't usually be an issue, but here check the connections aren't corroded nor the front panel display fascia scratched.

See my recent article on the TM-G707E and IC-207 in the July 2010 issue of *PW* for information on how to remove any scratches if your seller hasn't been too careful in the past.

Electrical problems with the PIN diodes, which are used to switch the antenna path between the transmitter power amplifier and receiver front end circuits, have to my knowledge been reported causes of failure. So it would be a good idea to check a second hand transceiver on-air for r.f. power output (e.g. with an in-line power meter) and receiver sensitivity – here you should hear an increase in background noise on the lower h.f. bands when you connect an antenna.

Extended Transmit Frequency

For the extended 7MHz (40m) band and for the 5MHz band – if you'd like to use these on transmit, check your seller has had extended transmit range enabled. But if not, here's how to go about it.

Remove the control head, remove the four screws from the back of this, then remove the rear panel of the control head – it's a 'snap fit' so you may need to

prise it off. Looking at the printed circuit board, with the display fascia away from you and the tuning knob on the left hand side, you'll see on the bottom right hand side of the board two columns of solder pads for surface-mount resistors, five on the left hand row and seven on the right hand row, **Fig. 3**.

Note that not all resistors may be fitted and that they're not labelled. Above each row is a distinct solder pad. To extend the transmit range, refer to Fig. 3 and remove diodes labelled C and E on the diagram (second and fourth down in the left hand column). Following this, reassemble the control head and perform a reset of the transceiver by keeping the **F** button pressed at the same time as you switch the radio on. Your memory channels, etc., will be re-set but the radio will now operate with extended transmit range.

Fig. 4: As with the Alinco DX-70, the IC-706 series can have a remote location for the control head, making it easier to remove the unit, when not in use.

The Icom IC-706 & IC706G

Now let's turn to the IC-706 which, was launched in the latter half of 1995 and was an obvious competitor to the Alinco DX-70. At the time of its launch it was the most talked-about radio for many years and when the first batch arrived in the UK they were very quickly sold. In fact, I know there were several hundred UK Amateurs on the 'waiting list', with the USA 'waiting list' of around 4000 Amateurs.

As with the Alinco DX-70 it also offers an h.f. and 50MHz multi-mode transceiver, with a detachable front panel, in a similar sized case. It also came with optional narrow filters and the same frequency range – but with added 144MHz transceiver coverage and wide-band f.m. reception.

The transceiver measures 167(W) x 58 (H) x 200mm (D), and like the DX-70 it has a removable front panel to allow you to take this with you when you leave the vehicle. An optional remote cable kit is again also available to allow you to remotely mount the radio body away from the car dashboard, **Fig 4**.

A very comprehensive range of operating features are built-in (too many to mention in detail here) and you'll need a good read of the manual to learn how to operate them all! Note however, that CTCSS isn't fitted as standard in the IC-706 and IC-706G – so you'll need an optional internal add-on board for this.

The transceiver offered up to 100W output on both h.f. and 50MHz, plus the added 'bonus' of the 144MHz transceiver coverage with 10W transmit output – as well as a general coverage receiver tuning from 30kHz to 200MHz. As such it had the edge over the DX-70 in terms of features but came along at a higher price, which second-hand models hold, typically £50-90 more than the DX-70 at the time I write this article.

Just a few years later, the IC-706MkII, **Fig. 5**, came along, this had better technical performance than the original IC-706 along with a doubling of the 144MHz transmit output power of 20W. Still later on, the IC-706MkIIG came on sale, which increased the 2m transmit power output further to 50W (adjustable down to 5W) and, significantly, added 430MHz (70cm) multi-mode transceive coverage with a transmitter power output of 20W maximum, adjustable down to 2W for low power operation.

This later model was, I'm sure, intended to appeal to users who'd like a combined h.f. mobile rig, together with a 2m/70cm dual band rig for mobile repeater operation and the advantage of a multi-mode all-band rig for hilltop DX operation.

When I used the set, coupled to my h.f. antenna system at home (a combination of wires, dipoles and beams), it operated reasonably well, although I usually needed to have the r.f. pre-amplifier switched in on 'quiet' bands such as the upper h.f. bands and v.h.f. While on 3.5MHz (80m) and 40m, at night, the set suffered a little from strong signals and I typically needed to have the attenuator switched in.

When operating mobile, I tended to use the memory channels almost continuously, every channel acted virtually as a 'separate v.f.o.' – I could simply tune away from each as I wanted with a turn of the tuning knob. This knob usefully had a small tension adjustment lever, either stiff for mobile use, or free-wheeling for shack use – which I appreciated.

Fig. 5: The IC-706MkIIG offered operation on the major Amateur bands from h.f. to u.h.f.

The IC-706MkII

The IC-706MkIIG was provided with a higher power – 50W on 144MHz, together with 430MHz coverage and Icom included the CTCSS sub-tone encode and decode as standard. This could previously be added as an optional plug-in unit, but with

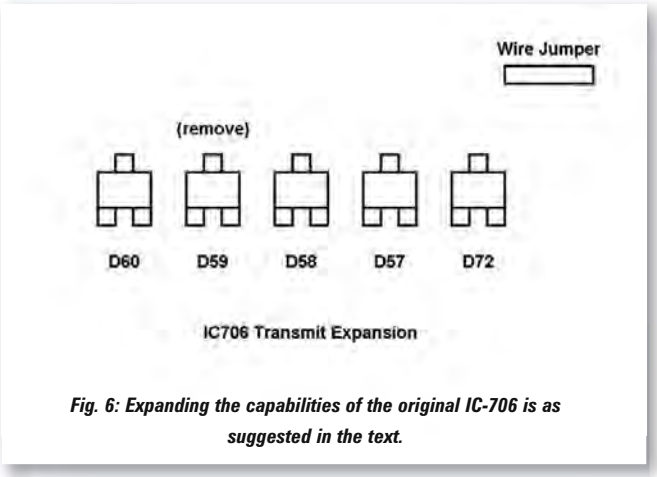

Fig. 6: Expanding the capabilities of the original IC-706 is as suggested in the text.

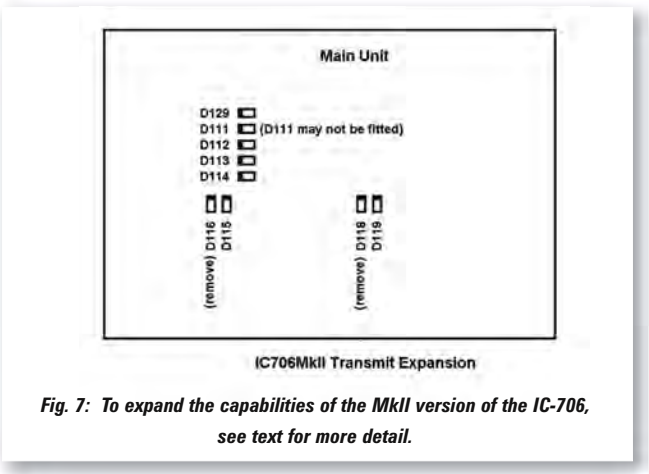

Fig. 7: To expand the capabilities of the MkII version of the IC-706, see text for more detail.

this version it was built in as part of the main p.c.b. circuitry.

The 'G Mark II also has a useful standing wave ratio (s.w.r.) measurement facility on h.f. and 50MHz.The facility is not just on the tuned (working) frequency but either side of this, with a simple **SWR** bargraph display, which appears along the bottom section of the liquid crystal display(l.c.d.) panel.

Mobile whips can have a rather narrow bandwidth on h.f., and you can only shift frequency so far before the s.w.r. becomes too high, so this could be rather useful for mobile operators. On air I found the performance on receive had the edge over the original IC-706, this being reflected in the lab measurements I'd made. The IC-706MkII would also have a similar receive performance improvement.

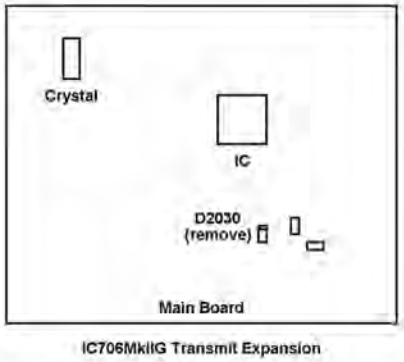

Fig. 8: And the IC-706MkIIG has another version of expanding its capabilities. See text for the differences of the various models of the IC-706.

Things To Watch For

With the IC-706 and IC-706MkIIG an important thing to bear in mind – if you intend to operate the set on 144MHz and, with the IC-706MkIIG, on 430MHz, is to make sure there's a CTCSS option board internally fitted to the set you're intending to buy. As these transceivers aren't current models you may well have difficulty finding a CTCSS board. So check first if one is available if this is important to you before agreeing to buy a set without CTCSS. The IC-706MkIIG has CTCSS fitted as standard.

Again if you want to operate on the whole of the 7MHz band, check it has extended transmit coverage. But if it hasn't, I've detailed the modification for each variant of the set below.

The microphone connector on each model plugs into the lower front of the set, with the microphone lead going vertically downwards. This could have imposed strain on the lead where it enters the plastic plug, causing intermittent operation, especially if the rig was used as a mobile by the previous owner(s).

If you can inspect and test the radio first, wiggle the lead about while you're transmitting, and check for any breaks in your transmitted audio and intermittent transmission. It's not too serious as you can slightly shorten the lead a little, but you'll need a new plug and a special plug 'crimping tool' to fit this.

Extended Transmit Frequency

Extending the transmit frequency range for the IC-706 series isn't difficult. For operation on the extended 40m (7MHz) band you'll need to ensure your radio is enabled for this, also for 5MHz, here are the details for each variant;.

The IC-706: On the main printed circuit board (p.c.b.) by the filter option location, you'll see a row of five surface mounted dual diodes, **Fig. 6**, next to a jumper wire. Using a small (but hot) soldering iron, lift up the lead(s) on one end of D59 to disconnect it (or if you wish) also then heat up the lead(s) on other side and remove it completely.

The IC-706MkII: On the main p.c.b., you'll see an oblong metal can, and near to this are a few rows of surface mount diodes. Take a look at the accompanying diagram, **Fig. 7**, and, using a small (but hot) soldering iron, remove D116 and D118 by applying heat to one of the legs and lifting the diode away from the board.

The IC-706MkIIG; On the main p.c.b., under the speaker near to the crystal, you'll see two rows of solder pads for surface mount components, **Fig. 8**. On position 10 along this row from the left you'll see a diode, D2030, soldered in. Simply remove this diode using a small (but hot) soldering iron on the leads. After you re-connect your d.c. supply the radio will be automatically reset and the transmit range expanded on h.f. and v.h.f.

Next Time

That's it for this month and I shall be back soon with a further *Buying Second-hand* column. If you'd like any particular types of radios covered in this series then please do get in touch. I've already a nice pile of ideas and information in the pipeline – but I'd welcome being guided further by readers' interests.

I can be contacted by E-mail to **g4hcl@rsgb.org.uk** or by post to **PO Box 400, Eastleigh, Hampshire SO53 4ZF, UK**. 'Bye for now, see you next time!

●

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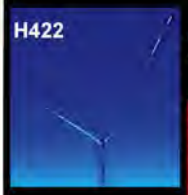

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Tony Nailer's

doing it by design

This time around, Tony Nailer G4CFY details how he's developing broadband transformers suitable for r.f. amplifiers.

Having taken several steps along the route of high frequency (h.f.) receivers and a couple of mono-band transmitters it's now time to consider multi-band h.f. transmitters and the development of broadband amplifiers, with initially up to 25W of output.

When developing broadband h.f. amplifiers, it's relatively easy to produce transmit signals up to a level of about 250mW, but there is little interest in transmitters at that power level. There's a bit more interest in power levels of 5W and even more interest at 25W or more levels of output.

Suitable designs for amplifier stages, in the form of Motorola *Application Notes*, have been in existence since the mid 1970s. There are designs for broadband r.f. amplifiers up to 100W and even higher powers by paralleling several 100W stages. In the 1990s Mainline Electronics stocked kits for many of these designs but discontinued them presumably due to a lack of interest.

As I now have a regular following of readers who are interested in h.f. receivers and transceivers, so my next logical step is to develop transmit amplifiers from 250mW to let's say 5W, and say 2.5W to 25W. Unfortunately this really means delving into the mysterious world of toroidal transformers and baluns. I hope you won't lose interest now, as I hope you will find my trials and tribulations both educational and interesting.

Single Stage Amplifier

Let me first assume that I'm able to produce a transmit signal, of up to 250mW output anywhere from 1.8 to 30MHz with harmonic suppression better than 40dB below the main signal. To lift the output to 5W, I need a stage to amplify this without generating a lot of harmonics.

The obvious choice of a power amplifier is a push-pull stage, which only generates odd-order harmonics, at three, five, seven, etc. times the carrier frequency. These harmonics are sufficiently far away from and, at such levels, as to be easily filtered to the required level. A skeleton of such an amplifier is shown in **Fig. 1.**

It's not easy to define or determine the input impedance of such an amplifier but the majority of designs I've found use a 2:1 turns ratio input transformer with a centre-tapped secondary. This means that the 50Ω of the input is transformed down to 12.5Ω overall and therefore is 6.25Ω to each device with respect to the centre point.

The collector load required by each transistor can be calculated using the formula RL = $Vcc^2/(2*Po)$, where Vcc is the peak amplitude of the half cycle of r.f. and power output per device Po is 2.5W. If we estimate that at a collector emitter voltage of 1.5V the device runs out of gain, then the swing from a 13.5V supply will be 12V.

Then for a single device RL = 144/5 = 28.8Ω and between the two devices the load is 57.6Ω. This then requires a 1:1 turns ratio transformer to match to the nominal 50Ω at the output.

Input Transformer

Literature on the design of toroidal transformers suggest that the inductance of a winding should be about four times the impedance it connects to, at the lowest operating frequency.

So, the primary needs to be 200Ω at 1.8MHz.

Now XL = $2*\pi*F*L$, then L = $XL/(2*\pi*F)$.

L = $200/(2*\pi*1.8*10^6)$ = 17.68μH.

The secondary then needs to be 50Ω which at 1.8MHz will be 4.4μH.

At the low level of input drive a small toroid should be adequate and I chose the Amidon FT37-43 (Fair-Rite 5943-000-201) with an outside diameter of 0.37in (9.5mm) and an inductance factor AL of 420mH/1000 turns.

Any required inductance which can be physically accommodated can be found using the formula N = 1000√(L/AL), where L is in mH and AL is in mH/1000t. In the case of the primary winding 17.68μH = 0.01768mH, then N = 1000√(0.01768/420) = 6.4 turns. Similarly for 4.4μH secondary winding, N = 1000√0.0044/420) = 3.2 turns.

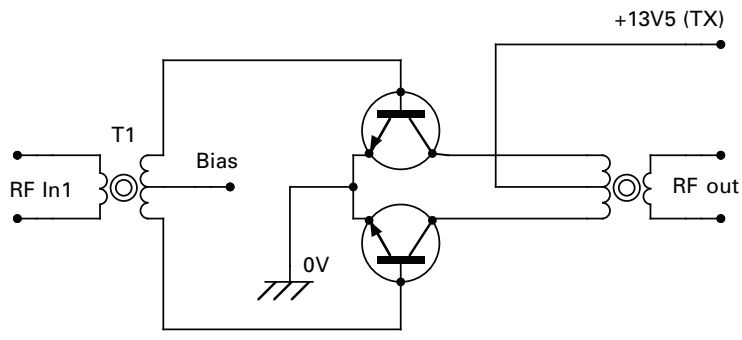

Fig. 1: The skeleton circuit of a push-pull r.f. amplifier, power levels will decide the parameters of the devices and transformers.

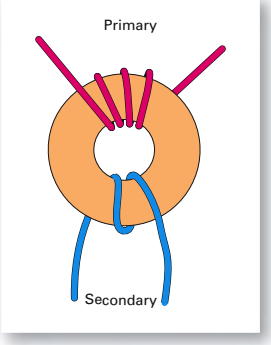

Fig. 2: A 'traditional' r.f. transformer doesn't perform well as a wide-band device.

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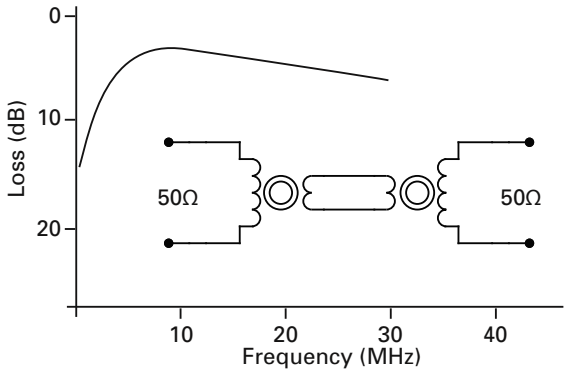

Fig. 3: The losses against frequency for a pair of 'back-to-back' plain-wound transformers, such as those shown in Fig. 2. Each 'primary' has four turns, each 'secondary' has two turns on a pair of FT37-43 cores.

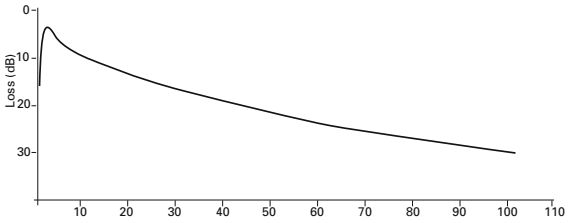

Fig. 4: The transformer pair's, 'back-to-back' losses, this time the primaries have eight turns, to the secondaries' four turns on a pair of FT37-43 cores shows greater loss at higher frequencies.

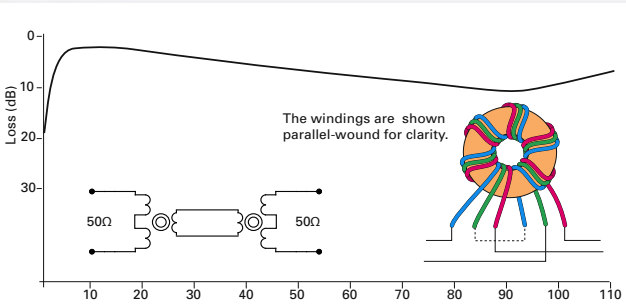

Fig. 5: Changing to trifilar windings on the FT37-43 cores. The 'primary' has four + four turns, and the 'secondary' with four turns, and this gives improved broadband characteristics,

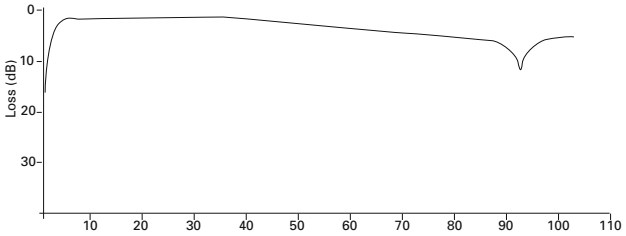

Fig. 6: With a similar set-up to Fig. 5, but now using six trifilar turns to create the windings, shows that this method is on the right track.

It's not practical to produce a centre-tapped secondary using an odd numbers of turns on a single core, so I decided to use two cores glued together to double the inductance and then to halve the turns. The primary then has four turns of 28s.w.g. enamelled wire and the secondary has two turns centre tapped. The winding arrangement is shown in **Fig. 2.**

Measuring Core Performance

The method I've adopted for testing h.f. transformers and baluns, is to make two identical units and connect them 'back-to-back', so giving the same input and output impedance. In this case 50Ω in and out. Then, using a tracking generator and spectrum analyser, I observe the frequency and amplitude characteristic. Obviously whatever losses are observed will be for two transformers, so for one core it will be half that loss.

First, I directly connected the tracking generator to the spectrum analyser to adjust the 0dB line to be two divisions down from the top of the display. Then I substituted two back-to-back transformers and plotted my results on graph paper. The result measured over the range from l.f. to 30MHz is shown in **Fig. 3.**

Minimum loss occurs at 10MHz where it is just under 4dB. And it's also just over 4dB from 6MHz to 15MHz but I consider this unacceptably high. The windings were stripped from the cores then a new pair of transformers wound with eight turn primaries and four turn secondaries.

The result for the new back-to-back transformers is shown in **Fig. 4**. Whilst the loss at 2MHz is dramatically reduced, the loss above that is greatly increased. This is explained by the increased coupling with more turns at low frequency but increased core losses at high frequency. This proves that the conventional method of winding transformers is quite unsuitable for wide-band operation, so I decided to try the balun arrangement.

Toroid Balun Test One

The FT37-43 cores were stripped of windings again and the cores were separated. Next, I measured three 100mm lengths of (0.28mm) 32s.w.g. wire which were then tightly twisted together by hand. The resultant 'wire' was then wound on the core so, that the trifilar winding passed through the core four times.

The wire ends were separated and identified as individual windings. The tails of one winding were set apart as the secondary, the finish of the second was cross-connected to the start of the third winding. This was duplicated to produce another back-to-back combination.

The result of the test is shown in **Fig. 5** and reveals a loss of 2dB over the range 6 to 14MHz, and –3dB points at 4 and 30MHz. This was a dramatic improvement in broadband performance compared with conventional winding but the loss is still not good and performance at 1.8 and 30MHz needs improvement.

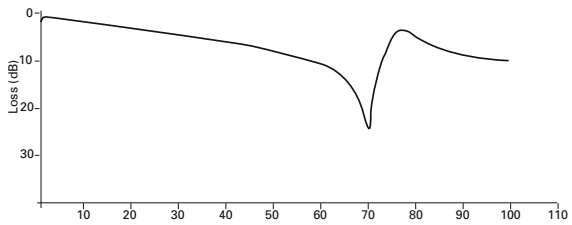

Fig. 7: Changing the cores to FT50A-43 causes a very noticeable 'dip' in output around 70MHz.

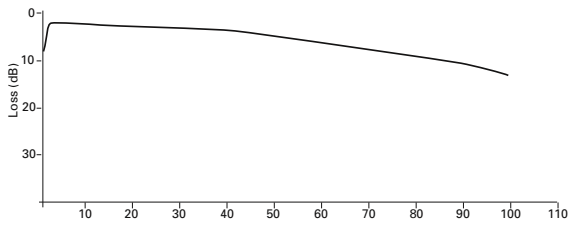

Fig. 8: Reducing the trifilar turns on the FT50A-43 to two, and wiring up as before, gives a much more gentle roll-off, with no noticeable 'dip' in output.

Toroid Test Two

The cores were again stripped and re-wound, this time with six turns of trifilar (0.28mm) 32s.w.g. wire. The result is shown in **Fig. 6** and reveals it to be essentially flat at –2dB from 4MHz to 40MHz. The loss is 4dB at both 2 and 60MHz. So this development is really on the right track!

I intend to undertake further experiments using pairs of FT37-43 cores with four turns trifilar to see if it further improves the v.h.f. performance. Wouldn't it be nice, to have an input transformer useable from 1.8MHz ('Top Band') to 70MHz?

Toroid Test Three

I then selected an Amidon toroid of half-inch (12.7mm) diameter and 3/8in long, type FT50A-43. Two cores were individually wound with six trifilar turns of (0.28mm) 32 s.w.g. wire. As before, one winding was used as the secondary and the other two windings were connected in series as the primary.

The result shown in **Fig. 7** reveals much better low frequency performance, with a loss of 2dB at 200kHz, way below the lowest frequency I require for this project but maybe useful for very low frequency (v.l.f.) work. From a peak of –0.5dB at 1MHz it rolls off very rapidly, being 2dB down at 14MHz and 4dB down at 30MHz. Clearly there are too many turns.

Toroid Tests Four & Five

The cores were again stripped and rewound, this time with four trifilar turns of 32 s.w.g wire, which gave a slightly worse low frequency performance but slightly better at high frequency. Whereas the dip on the previous design was at 70MHz, this time it had moved up to 83MHz.

Again the cores were stripped and re-wound, but this time I wound them with just two trifilar turns, but using (0.46mm) 26 s.w.g. The result is shown in **Fig. 8**. Losses were –2dB at 1.6 and 10MHz and –3dB at 1MHz and 30MHz and the dip was now beyond 100MHz. Unfortunately it's not practical to make a winding of less than two turns, so I need to try using a core with a lower μ, and thus its AL factor, then to try more turns.

Toroid Tests Six & Seven

For tests six and seven, I changed the core to an FT50A-61, which is the same size as in tests four and five, but with the '61' material type. Two cores were each wound with four trifilar turns of (0.35mm) 29s.w.g. wire and connected as before.

This time the losses were –2dB at 3MHz and 36MHz, so the high frequency response was better but the low frequency not good enough to include 'Top Band'.

The new test cores were once more stripped and re-wound with three trifilar turns of (0.35mm) 29s.w.g. Then I found that the low frequency response was even worse, with –2dB at 4.5MHz. The losses in the 1.8-2.0MHz region were around 7.5dB – this core size and material has not helped solve the problem.

Dual-Aperture Balun

I decided to try the dual-aperture core type, which **Tex Swann G1TEX** at *PW*, refers to as a 'pig-nosed' cores. They're intended for baluns and r.f. filtering use and are not normally specified with inductance factor AL in the same way as toroidal cores are.

A small quantity of Fair-Rite, type 2843-000-302, dual-aperture cores were obtained and two cores were each initially wound with four trifilar turns of (0.35mm) 29s.w.g wire. In the case of a dual-aperture core, a turn is counted when the winding passes through both holes.

The results of this new dual-aperture core test are shown in **Fig. 9** and the low frequency performance was so good I didn't measure it! The high frequency response was also quite good with a loss of only 2dB at 30MHz.

More Dual-Aperture Tests

Again I stripped the cores and first tried three trifilar turns with improved results. Then I tried with two turns with still better results. Finally, using just one turn, achieved by making the trifilar winding into a 'U' shape and sliding the ends into each of the holes of the core. To hold the wires in place while I tinned them, I bent the windings outwards.

Setting aside one winding as before and connecting the end of the second winding to the start of the third now 'trapped' the windings to the core. The resulting test was really good and is shown in **Fig. 10.** The losses were flat at –0.6dB from 1MHz to 40MHz. The –2dB points are at 0.8MHz and 52MHz. It's again timely to remind you that the losses for one transformer are half that measured for two baluns mounted back-to-back.

Input Bias Transformer

Unfortunately the balun transformers that have been optimised for input matching, have a centre-tapped primary, whereas we need a centre-tapped secondary, for feeding bias to the transistors. A separate balun

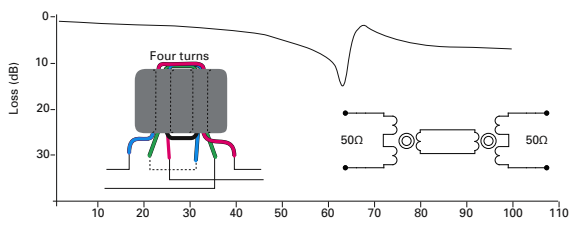

Fig. 9: Using dual-aperture, type 43 core and winding using four trifilar turns gives 2dB loss at 20kHz and 30MHz.

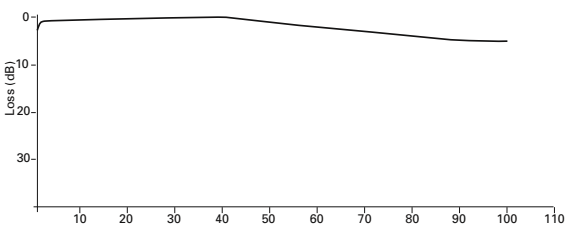

Fig. 10: Changing to one trifilar wound turn on the binocular type 43 core, gives 0.6dB of loss, essentially flat from 1-40MHz. It shows 2dB of loss at 0.8 and 52MHz and a gradual loss above that.

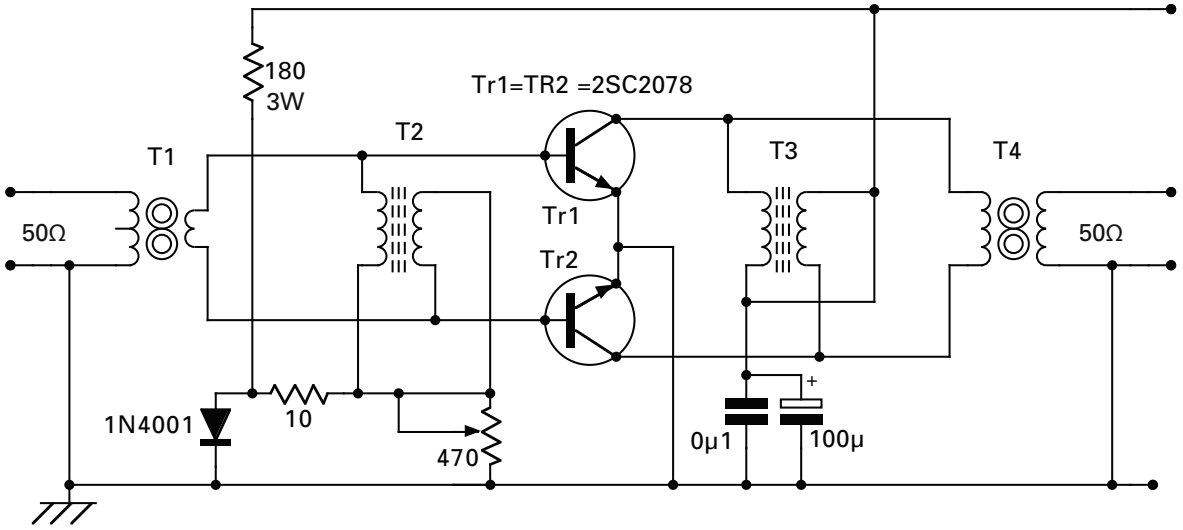

Fig. 11: The theoretical circuit of a bipolar balanced wide-band push-pull amplifier. T1 & T3 are formed with one trifilar-wound turn with 29s.w.g. enamelled wire on type 43 dual-aperture core. Transformer T2 is four bifilar turns of 29s.w.g. enamelled wire on FT37-43 toroidal core.

transformer is then required to provide the bias point.

The input transformer has to provide a low resistance centre-tapped feed for the transistors whilst presenting a suitably high impedance across the whole band. Quite high inductance can be used and core losses are no longer a problem. Previously, I determined that '3.2' turns on an FT37-43 core would give 4.4μH inductance, so I will try four bifilar turns on one of these cores.

Connecting the finish of one winding to the start of the other actually doubles the inductive coupling but halves the capacitive coupling. Nevertheless I am hopeful that it will look sufficiently high impedance across the whole band 1.8-30MHz and cause little attenuation of the drive signal.

Output Transformer

The output-matching transformer needs to be wide-band and to have a 2:1 turns ratio. It also requires a centre-tapped primary, which is what it will have with two windings connected in series. This means that the dual-aperture balun transformer that I've already developed will probably be suitable, even carrying 5W of r.f. power. The proposed circuit for the amplifier is now shown in **Fig. 11.** However, you'll have to wait until next time to see how the design progresses though!

Unfortunately it has no centre tap on my nominal primary winding, so it will be necessary to wind a separate balun for the positive supply feed. In this case I intend to try the larger FT50A-43 core wound with say four turns (quadrifilar) and connect the windings in series as I proposed for the input bias transformer.

Between now and the next *DIBD* I'll build and test a prototype of the amplifier and let you know how successful the scheme is. If you wish to contact me about this or previous articles you can E-mail **tony@pwpublishing.ltd.uk** Cheerio for now! ●

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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.**

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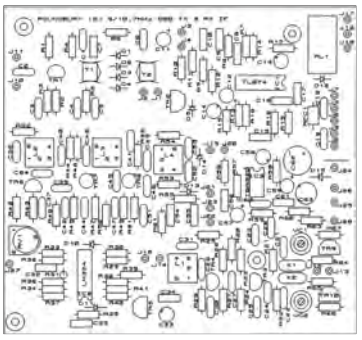
TRANSMIT AMPLIFIER & RECEIVE PREAMP, for 2 or 4 or 6 metres. Receive gain adjustable 0-20dB. Switching for either part or straight through. RF switched on transmit. Diecast box with suitable heatsink and SO239 connectors. RF input and output as detailed in paragraph above. **TARP6SA, TRRP4SA, or TARP2SA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



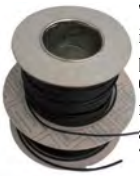
POUNDBURY (ver2) 9MHz SSB TX GENERATOR & RX IF. Speech processor and diode ring modulator with carrier suppression greater than 50dB. IN/OUT termination impedance 560Ω to match external SSB filter. Receive section FET and MOSFET IF amplifiers and a singly balanced diode product detector, discrete audio 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.

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

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Web site: http://spectrumcomms.eu5.org

Carl Mason's

hf highlights

Carl Mason GW0VSW presents his roundup of your h.f. activities. Reports and photos to Carl by the 15th of the month please!

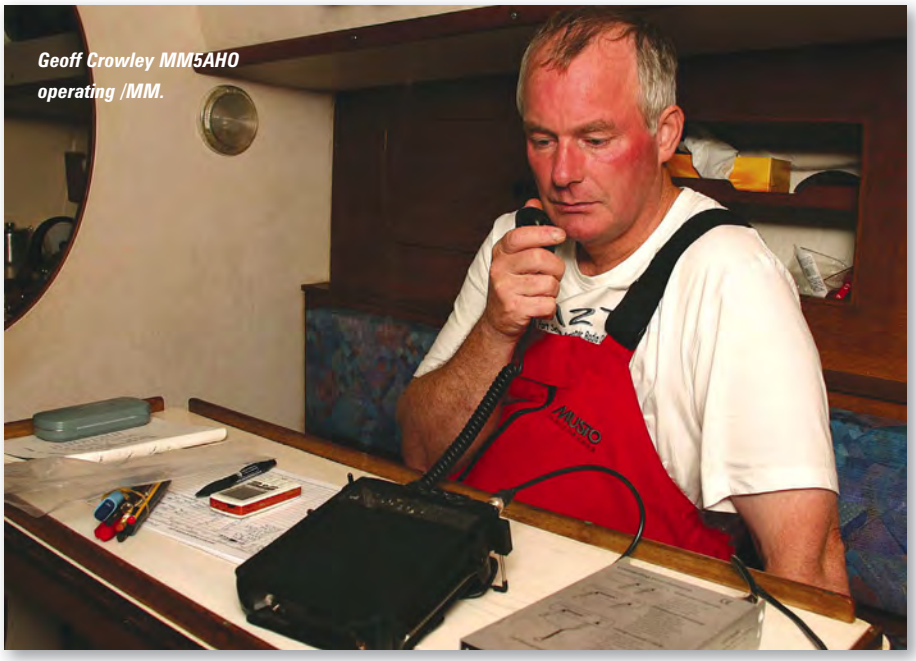
The former Radio Corporation of America (RCA) coastal radio station **KPH** is located on the West Coast of the United States, within the Point Reyes National Park in Marin County, California. For most of the 20th century it provided ship-to-shore communications including telegrams using Morse code and marine telex using radio teletype. Ship-to-shore telephone calls were handled by other stations such as the nearby AT&T high seas station KMI.

The KPH station would broadcast regular news and weather bulletins with other general information to shipping and then relay business and personal messages to and from individual ships. Like most coastal stations the operators also monitored the international distress frequencies for calls from vessels in trouble.

With the decline of Morse code the station, like many others around the world closed down. Nowadays, volunteers have preserved it in operating condition and it can still be heard at weekends and on special occasions including the use of an alternative callsign KSM and the amateur radio club callsign **K6KPH**. The receiving station and control point occupy a classic white 1920s Art Deco building on Sir Francis Drake Boulevard, while the transmitter site is about 20 miles south, near the town of Bolinas.

The reason for siting the transmitters so far away from the receivers is that their powerful outgoing signals would make it very difficult for operators to copy weak incoming signals on the same frequencies or channels. The operators at the receiving site could remotely control and key the transmitters by means of landlines which connected the two together.

The **Maritime Radio Historical Society** or **MRHS**, which restored the station, aims to document, preserve and restore all kinds of artifacts of maritime radio history though their area of specialisation is coastal stations, ships and communications companies of the West coast. The KSM station is their largest project to date and they have a great website at **http://radiomarine.org/** Here you can find information and photos relating to the restoration and other projects.



Geoff Crowley MM5AHO operating /MM.

The various projects that MRHS have underway – keep the members very busy and is done in memory of all the men and women, who through their skill and dedication, helped set the standards of radio operators. The members operate using original equipment so that new generations of listeners may still hear what a real marine coast or ship station sounds like.

Through the website you can also listen to recordings of well known marine radio stations including recordings made by Radio Officer **Aurthur Goodnow** in 1967 of Royal Mail Ship (RMS) *Queen Mary* GBTT. The recordings were of contacts with ships and coastal radio stations on the MF band as she departed New York for an east-bound passage across the Atlantic. Stations heard include Portishead Radio GKB, Rogaland Radio LGW/LGB/LGJ/LGX in Norway and of course KPF San Francisco.

Yacht 'Contender' nearing Lismore Lighthouse.

The K6KPH operating frequencies are 3.550, 7.050, 14.050 and 21.050MHz. The transmitters used are normally Henry HF-5000s – but on special occasions the 1950s vintage RCA commercial units known as 'K' and 'L' sets are used while the transmitting antennas are double

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Gerry St. Amund VE3GER.

extended Zepps fed with open wire line. Check out **QRZ.com** for details and if you would like to know when the latest activities are send an E-mail to **radiomarine-subscribe@yahoogroups.com**

New Entities?

Circumstances are about to change for the inhabitants of the Netherlands Antilles and this is because on October 10th the Netherlands Antilles will cease to exist as a country within the Kingdom of the Netherlands. The islands will emerge with several new statuses: St. Maarten and Curaçao will become an independent country within the Kingdom and will be granted the same status that Aruba attained in 1986. Bonaire, Saba and Sint Eustatius also called the BES islands will be given the status of a 'public body', which is like a special municipality in the Netherlands and will therefore fall directly under Dutch rule.

So, what does all the changes mean for us as Radio Amateurs? Well, the answer is that the two current DXCC entities of PJ2/PJ4 (Leeward Islands) and PJ5/PJ6/PJ7 (Windward Islands) are expected to be deleted. However, several new entities are likely to have emerge by October10th as both St. Maarten (PJ7) and Curacao (PJ2) will become a new entity, Bonaire (PJ4) will become a new DXCC entity and Saba (PJ6) and St. Eustatius (PJ5) will become a new single DXCC entity as they lie so close to each other.

We all know what an activation of a new DXCC country means! And

Gerry VE3GER's shack

to fulfil our expectations a group of Amateurs from Bonaire, Germany, the Netherlands and the United States have already joined forces to activate from Bonaire. The group plan to operate from six locations around the island until October 24th with operation on all the h.f. bands including WARC using s.s.b., c.w. and a variety of digital modes.

The premiere location will be that of the short-wave transmitter site of Radio Netherlands (RN) 'world service', a large relay station with an impressive set of antennas. The Radio Amateurs have been granted use of the antennas during RN's 'dead hours' – so listen between 1230 and 1830UTC for the main site, which will use the 10, 14, 17 and 21MHz bands.

As I was writing the column the callsigns had not yet been announced – but it's likely the prefix PJ4 will continue to be used even after October 10th. Further information about callsigns and the operation with an online log can be found at **www.bonaire2010.com** With six locations around the island and activity on all bands – there should be plenty of opportunity for you to get a QSO in your logs!

Your Reports

On to your reports now and this year's **International Lighthouse & Lightship Weekend** was by all accounts, a fantastic two days with a record number of 447 registrations, which was four up on last year with Germany having the most activities. I was able to copy activity on most of the HF bands up to 21MHz over the two days and was also able to work a few of them.

On 7MHz I heard and managed to work **Geoff Crowley** operating as **M5AHO/MM** onboard his 9.75 (32ft) Rival class yacht *Contender* with his crew, son **Matt MM1EUI** and **Alastair McLeod MM0HAI**. Everyone on board had an enjoyable week sailing around **Ardnamurchan Point**, the most westerly point of mainland Britain and the Islands of Coll, Tiree, Iona and Mull to activate several 'rock' mounted lighthouses. Alongside his Marine Band v.h.f. transceiver Geoff carries a Yaesu FT-857 with a.t.u. and uses the backstay of his mast, about 8m long, as the antenna.

The radio system's earth was a copper braid dropped into the sea with counterpoises along the hull. It was working well when I first hear Geoff on 7MHz with a booming 100W signal into South Wales at 5/9+ but quickly faded as our contact took place to 5/7 while I received 5/4 from my set-up running just 5W from a Yaesu FT-817, LDG Z-817 tuner and modified SRC X80 vertical.

Geoff's log from **Rubha nan Gall Lighthouse** (north west of Tobermory and built in 1857 by the grandfather of Robert Louis Stevenson) also included entries from SK6NP (Sweden) Herrljunga Radio Club at 1107 and PA1AT (Netherlands) 1110.

The 14MHz & Higher Bands

On the 14MHz band, Geoff's contacts from **Hyskeir Lighthouse**, which lies at the southern entrance to 'The Minch' on a low-lying rocky islet part of the Inner Hebrides included JR2KDN (Japan), OZ3FS (Denmark), EA1VT

The OZ9CD/MM QSL – he was worked by Geoff MM5AHQ.

Eric operating GX3WIM.

The JA5AOA QSL for a QSO with Pete ZL5TE on 14MHz PSK31.

(Spain), UY6IM (Ukraine), PA7MF (Netherlands) and IZ1PPO (Italy) around 1300UTC. While from **Lismore Lighthouse** situated on Eilean Musdile in the Firth of Lorne at the entrance to Loch Linnhe, their contacts included Jesper Noble OZ9CD also /MM (Denmark) at 1013 16km (10 miles) south of Copenhagen. Jesper's radio onboard is an Icom IC-706 and also uses the backstay as an antenna tuned with a MyDEL CG3000 random wire autotuner. Next came SQ3LVW (Poland) 1014, PA0INA (Netherlands) 1016 and AA2DR (USA) in Hampton, New York at 1017UTC.

Also in Scotland is **Colin Topping GM6HGW** who said, "It had been my intention to go sailing during the Open Golf Championship in St Andrews, but as any golf enthusiast will know from watching the 'Open', the weather consisted of Force 8 gales and rain which put paid to my holiday plans to sail along Scotland's east coast in my yacht *Boyztoyz* and operating afloat. Specifically for the purpose of operating Maritime Mobile I'd bought a mobile h.f. whip, the Watson Multi Ranger 9, to go with my SGC SG-2020 20W transceiver.

"However, due to the weather I was forced to park up my car on local hilltops and operating portable. Although the bands are still to show any significant improvement I was able to work several stations and in most cases received good reports."

Colin's s.s.b. log included K1RM (USA) in Plainville, Connecticut at 1040, then came F4GFE (France) 1150, DL4YAR (Germany) 1155 and F/ON6MG/P at 1210UTC.

Members of the **Wimbledon and District ARS** (website **www.gx3wim.org.uk**/) including **Eric Masters G0KRT,** operated from a tent in field on the North Downs near Reigate, in Surrey, using an Icom IC-735 and Drake linear and 400W into a 3-element beam.

Using the call **GX3WIM** their s.s.b. contacts included **Gerry St. Amund VE8GER** (Canada) at 0149 operating 11km (7 miles) North West of Inuvik. Gerry's log cabin – above the Arctic Circle – was originally owned by a legendary trapper **Lawrence 'Slim' Semmler** (see **www.capekrusenstern.org/semmler.html**) who travelled all around the North West Territories. Gerry operates an Icom IC-746PRO, which is connected to a Hy-Gain TH-3jr, 3-element tri-bander antenna about 10m (30ft) high.

Later QSOs were with 9A3GX (Croatia) 0854, SM5CCQ (Sweden) 0916, FM5WE (Martinique) NA-007 at 2149, YV5HNJ (Venezuela) 2208, 9Y4IQZ (Trinidad & Tobago) SA-011 at 2228 and V31UB (Belize) 2232UTC (QSL direct via K5UB).

Using an Icom IC-7400 and 25 watts into a Diamond CP-6 vertical antenna **Bill Ward 2E0BWX** used PSK31 to log PD1BV (Netherlands) 0925, DG1HUZ (Germany) 1000 and F5LPL/P (France) 2007UTC.

In East Finchley, North London, **Martin Addison 2E0MCA** provided a large log of voice contacts during the recent IOTA contest. He worked IE9/IK5BCM (Italy) Ustica Island EU-051 at 0727, IS0B (Sardinia) EU-024 1310, F5TJP/P (France) Groix Island EU-048 1310, VC9A (Canada) Whitehead Island NA-014 1316.

Then came AN1C (Spain) Cies Islands EU-080 1335, TF7X (Iceland) Westmann Island EU-071 1511. The up popped **Peter Rodmell TK/G3ZRS/P** (ex Linear Amp UK) EU-014 1859. Then Martin worked CU7/CU3EJ (Azores) Faial Island EU-175 at 2130UTC, while running a Yaesu FT-2000 with a Heil Proset Plus and 50W to a G5RV antenna.

Now we go on to **George Davis G3ICO** who lives in Mudford, Yeovil who uses a Elecraft K2 at up to 10W and 40m long doublet antenna to work c.w. George lists OY1CT (Faroe Islands) EU-018 at 1343 on14MHz before a change up to the 18MHz band found 9M2TO (West Malaysia) 1406 (QSL via JA0DMV).

Next into the log was W9YYG (USA) in Joliet, Illinois at 1421, C31CT (Andorra) 1429 (QSL via EA3QS. The came special call HF200CHOPIN (Poland) celebrating the 200th Anniversary of composer Frédéric François Chopin at 1454 (QSL via SQ1DWR). Finally he worked CO8LY (Cuba) NA-015 at 1930UTC (QSL via EA7ADH).

In Cambridge (New Zealand) **Peter Leng ZL4TE** favoured PSK31 again and logged UN7QE (Kazakhstan) 0152, XE1UYS (Mexico) 0252, HC6EP (Ecuador) 0303, VK5ZIE (Australia) in Wynn Vale at 0334. Next came RA0GCY (Asiatic Russia) 0856 and later JA5AOA (Japan) AS-076 at 2119UTC. Peter was running a Yaesu FT-100MP Mk5 and 100W into a Cushcraft AV-3 vertical antenna.

Signing Off

Well that's it again for another month and there was a great deal to squeeze in. 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 month I wish you all good DX. **73, Carl GW0VSW**

Mike Richards'

data modes

Mike Richards G4WNC continues his look at typed-in data modes and takes us from RTTY to PSK31.

Welcome to the world of *Data Modes* (*DM*)! This month I'm continuing to look at hand-typed data modes and will take you from RTTY to PSK-31 with a few stops along the way.

The fact that radio teletype (RTTY) is still being used, both commercially and by Amateurs, proves that it is a very successful data mode. However, continued technical development has spawned a number of would-be successors to RTTY.

Amateur Teleprinter Over Radio

One of my favourite modes back in the 1980s, **AM**ateur **T**eleprinter **O**ver **R**adio (AMTOR) was developed by data modes pioneer **Peter Martinez G3PLX**. The basis for AMTOR was the commercial Simplex Teleprinter Over Radio (SITOR) system that was used extensively by the maritime community for ship to shore communications. In use, both SITOR and AMTOR operate using one of two available modes known as Automatic Repeat Request (ARQ) or Forward Error Correction (FEC) both of which included error correction.

For the sake of completeness, let's take a look at the workings of AMTOR. The data alphabet employed is very different to RTTY but retains some similarities, such as letter and figure shifts plus capitals only. In order for AMTOR to be able to correct errors there needs to be an aspect of the received signal that the decoder can use to establish whether or not the signal contains errors. In the case of AMTOR, error detection relies on the use of a specific bit pattern in each transmitted character.

The digital alphabet that produces this is ITU 476-5 which is a 7-bit code where every valid character uses a combination of four 0s and three 1s. I've shown a few example characters in **Table 1**. At the decoder, each received character is checked for the 4:3 combination and any that don't match are rejected as errors. In ARQ mode the transmitted message is split into groups of three characters after which the transmitter reverts to receive mode to wait for an acknowledgement.

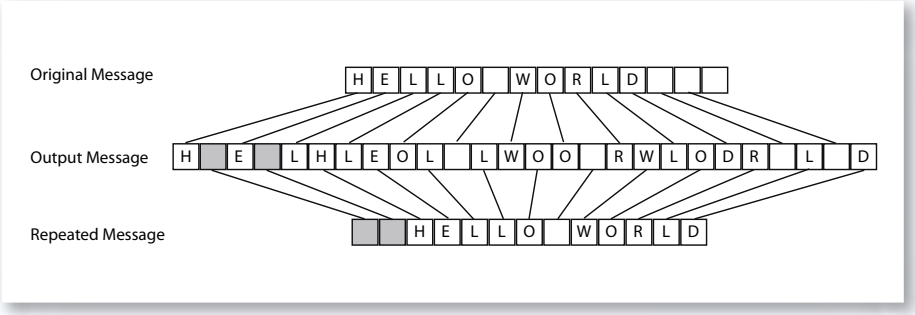

Fig. 1: This drawing shows how the original and repeated messages are interleaved.

At the receiving end the three characters are checked for the 4:3 match and – if all is well – an acknowledgement is returned and the transmitter sends the next three characters. In cases where an error has been detected a repeat request will be sent back to the originator and the three characters will be re-sent.

The process continues until the entire message has been sent. For this mode to work, the sending and receiving stations have to be locked together so only one-to-one communications are possible. If you tune-in to an ARQ signal you will hear the characteristic chirp-chirp as messages are sent three characters at a time.

Back in the 1980s when the AMTOR mode was first used by Amateurs, there were all manner of problems with rigs not switching from transmit to receive quickly enough. It could also get quite noisy in the shack with relays clattering away as the rig cycled from transmit to receive! Despite these shortcomings, AMTOR ARQ mode was extremely effective and great for QRP operation.

I regularly used to work into South America with just a couple of watts and a simple G5RV antenna. The AMTOR system would hang in there and keep the link going when communications were marginal to say the least!

Being based on a commercial system, AMTOR provided a message 'throughput' that was roughly equivalent to a 50baud teleprinter link. However, to allow for the handshaking between transmitter and receiver, the data rate over the air had to be increased to 100baud. Whilst commercial systems employed a shift of 200Hz, AMTOR used the amateur RTTY standard of 170Hz shift.

The FEC Version

The FEC version of AMTOR was a rather different beast as it was designed to be a broadcast mode as opposed to the 1:1 nature of the ARQ mode. The provision of a broadcast mode was essential to enable amateurs to call CQ or broadcast news bulletins. Whilst FEC uses the same alphabet and data rate as ARQ, the message construction is totally different.

When broadcasting (in the Amateur Radio sense, this means to anyone we might wish to communicate with) , it's impractical to have any form of repeat request, so the solution is to repeat every character in the message. Sending the repeated characters right next to each other was unlikely to work. as both characters would probably be affected by the same interference. The solution was to delay the repeat by three characters.

At the receive end the decoder performs the 4:3 ratio check for errors and if an error is detected it will wait for the repeated character and check that for errors. If the repeat is okay then that will be used

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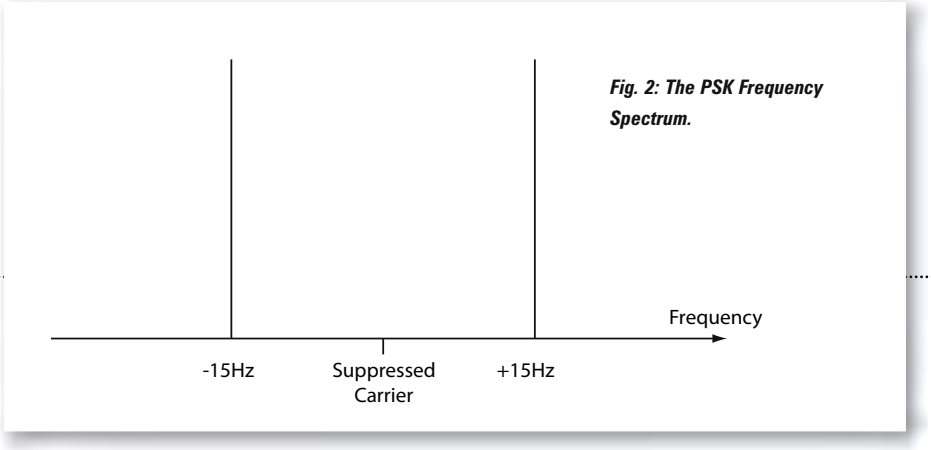

Fig. 2: The PSK Frequency Spectrum.

in the message. However, should both copies be corrupt, there's nothing the decoder can do and the character will be dropped.

I've shown a diagram of FEC interleaving in **Fig. 1**. Incidentally, the FEC mode has enjoyed great success and is still in regular commercial use for Maritime NAVTEX safety broadcasts. From an Amateur Radio perspective, nowadays there's not very much AMTOR activity around although you could change that and start a revival – and if you do – I'll join you!

With fast switching modern rigs, AMTOR is very much easier to implement that it was back in the 1980s. So, if you want to give it a try, here are a few software packages that include AMTOR, they are: *MixW*, *MultiPSK* and *trueTTY*.

Packet/Pactor

Next, it's on to Packet/Pactor. I'm planning to cover both these modes in more detail in a later column – but for a brief period Packet was seen as an alternative mode for typed communications. Amateur Radio packet was developed in the late 1970s but became a mainstream mode in the mid 1980s with the release of the TNC-1 and TNC-2 boards by the Tucson Amateur Packet Radio group (TAPR).

The packet mode was primarily developed as a reliable way to carry computer data over radio and worked by splitting the data into smaller packets – hence the name. These data packets had address and error checking information added so that the distant decoder could reassemble the data packets in the correct order and call for repeats of any corrupt packets.

The data rates range upwards of 300baud with much higher speeds available on v.h.f. While the system works very well at much higher frequencies, when used on the high frequency (h.f.) bands – packet radio often struggles with lots of repeats, which slow the data flow considerably. Packet radio includes controls to allow operators to make one-to-one QSOs and these were used in the early days.

However, slow typed QSOs are not Packet's forté and the one-to-one QSOs tended to just stutter along. Fortunately, an alternative solution to h.f. communication arrived in the form of Pactor which as you might guess from the name is a combination of Packet and AMTOR. One of the problems with Packet was corruption of a small part of the data packet caused the entire packet to be repeated. When conditions were poor different parts of the same packet would get corrupted during re-sending – thus setting-up an extended cycle of repeats.

Pactor combines the addressing and error checking of Packet with the shorter data bursts of AMTOR to produce a much more reliable mode for h.f. work. The mode has proven to be extremely successful and the latest incarnations have become the backbone of modern h.f. E-mail systems.

The PSK31 Mode

The introduction of the PSK31 mode has transformed hand-typed QSOs on h.f. and it has quickly become the dominant mode. I don't think there's a single hour in the day when you can't find a PSK-31 call on 20m! The success of PSK-31 is down to the simple fact that **it was specifically designed** for the job rather than being an adaptation of another system.

The seeds for the new mode were sewn by Polish Radio Amateur and software engineer **Pawel Jalocha SP9VRC**. He devised a new communications system (SLOWBPSK) that used Phase Shift Keying (PSK) with a very slow speed of 31baud. This mode proved successful and inspired Peter G3PLX to build on Pawel's good work to create a new mode – specifically designed for hand typed QSOs on the h.f. bands.

The use of phase shift modulation was an important step forward for h.f. use, as the phase of a signal is less susceptible to distortion, which gives PSK-31 an edge over RTTY. It's also possible to operate slow speed PSK in a very narrow bandwidth, which gives another significant boost to the mode. So, let's now delve a bit deeper into the workings of PSK-31.

Phase Shift Keying involves changing the phase of the transmitted signal in response to the 1s and 0s of the message. With PSK-31 there are only two states – so the phase is either the same as the previous bit or reversed. This simple type of phase modulation can be likened to reversing your antenna leads to reverse the phase.

However, in practical systems the reversing effect is achieved back in the computer. Whilst creating a PSK signal is relatively straightforward, in its raw form, a PSK signal creates excessive key clicks as swapping the phase is rather like abruptly switching one transmitter off and starting another in the opposite phase.

The basic PSK signal needs to be filtered to remove these key clicks and leave us with a well controlled narrow-band signal. The technique employed is to smoothly reduce the carrier to zero, swap the phase and then smoothly bring it back up to the original level. What we are effectively doing here is amplitude modulating the PSK signal at the bit rate.

As a result of this filtering the signal takes on a different look. If you examine a spectrum analysis of a PSK31 signal sending phase reversals – the result looks like a double

sideband suppressed carrier with two tones at ±15Hz from the suppressed centre carrier (See **Fig. 2**.).

The amplitude modulation of the PSK signal is used at the receiver to derive a timing signal that is used as part of the decoding process. Despite the signal looking like a narrow band frequency shifted signal, the information is carried in **the phase not the frequency shift**. This PSK signal is easily transmitted using a standard s.s.b. rig – but you have to take great care to ensure the power amplifier operates in its linear mode.

If you overdrive the power amplifier you'll create intermodulation products that will spread all over the PSK-31 section of the band. Overdriving the transmitter is a common problem and is easily spotted using a waterfall display (see **Fig. 3**). Note: I'll give some guidance on the correct set-up in the operating techniques section.

Incidentally, the 31.25baud rate used for PSK-31 was chosen because it's a good rate for hand typed QSOs and the 31.25Hz clock is easily derived from the 8kHz sampling rate in the soundcard, i.e. 31.25 = 8000/256 or 2^8.

The reception of PSK31 starts with a very narrow bandpass filter, just 31Hz wide and with around 64dB attenuation at ±31Hz. The filter is quite complex and operates by shaping four bits at a time. The signal is then demodulated to extract the timing signal which is then used to extract the phase information that can be converted back into 1s and 0s.

PSK31 Varicode Alphabet

One very important aspect in the development of PSK31 has been the use of a dedicated telegraph alphabet – Varicode. This was developed by Peter Martinez and takes a different approach to many other telegraph alphabets.

Rather than working with a fixed number of bits per character, Peter examined a vast amount of English text to establish how frequently different characters were used. He then devised a code where the most common letters had very short codes and the least used had longer codes. To help – I've shown an example of some of the Varicode characters in **Table 2**.

One operational point to note is that messages typed in lower case are much shorter than those typed in capitals – so they're transmitted much faster. The logic levels chosen for translating Varicode into PSK31 are set with 0 = phase reversal and 1= no phase reversal. This may seem backwards – but the use of phase reversals for 0 results in a constant stream of reversals when the system is idling. These constant reversals provide the decoder with a strong synchronising signal so that decoder is ready for action as soon as the next characters are sent.

In practical systems each transmission starts with a few idles to help the receiver lock and there are at least two reversals between each character and the transmission ends with a string of reversals. The forced use of reversals is used by the decoder as a form of squelch to stop garbage being displayed if the signal fades into the noise.

Time's Up

That's about as much as we have time for this month, so in the next column I will delve into the variations of PSK31 and take a look at a few operating techniques. Cheerio for now! ●

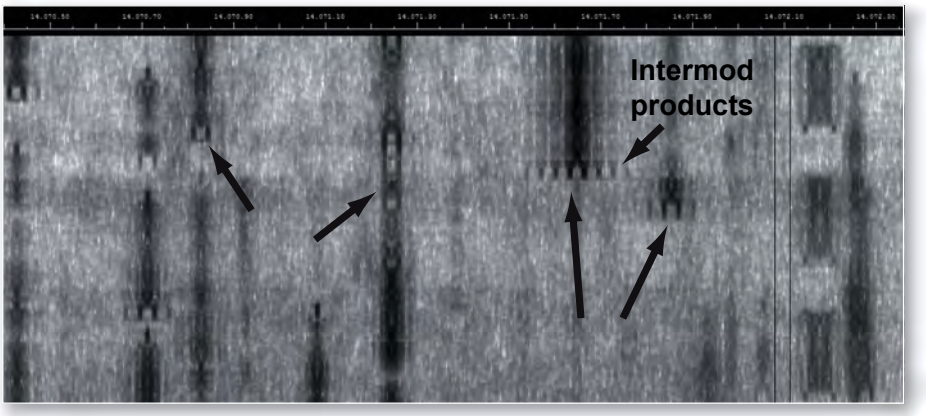

Fig. 3: An example of overdriven PSK31 signals on 14.070MHz.

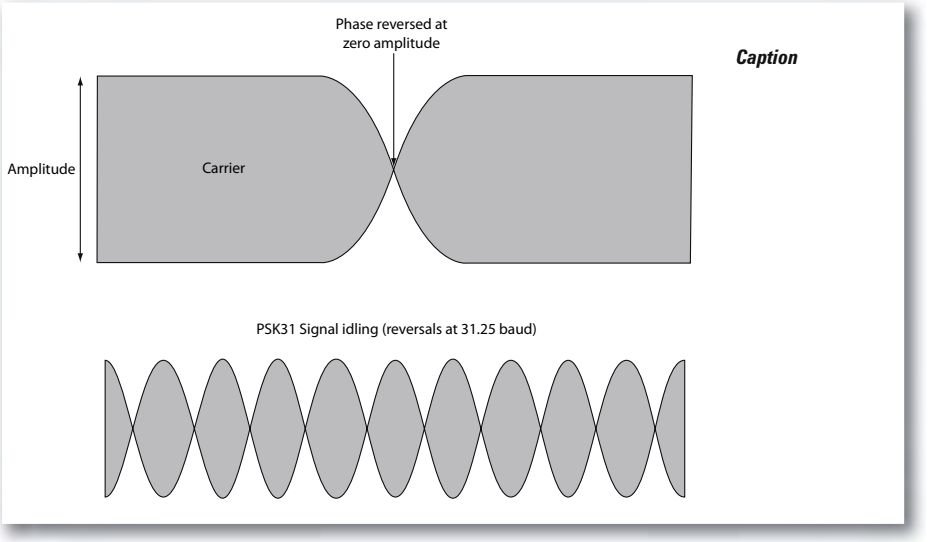

Table 1 – AMTOR Alphabet (ITU476-5)

Letter	ITU 476-5 Code
A	0001110
B	1011000
C	0100011
D	0011010
E	1001010
F	0010011
G	0101001
H	0110100
I	0100110
J	0001011
K	1000011
L	0101100
M	0110001
N	0110010
O	0111000

Table 2 – Varicode Alphabet

Letter	Varicode
A	1111101
a	1011
B	11101011
b	1011111
C	10101101
c	101111
D	10110101
d	101101
E	1110111
e	11
F	11011011
f	111101
G	11111101
g	1011011
H	101010101
h	101011
I	1111111
i	1101

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

rallies

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October

October 17th
The Blackwood Rally
The Blackwood and District Amateur Radio Society Rally will be held at the Coleg Gwent Crosskeys Campus, Risca Road, Crosskeys, Gwent NP11 7ZA. The doors will open at 10.30am (10.00am for the disabled) and admission will be £2.00. There will be talk-in on S22, car parking, trade stands, special interest groups, a Bring & Buy and catering.
Dave GW4HBK
Tel: 01495 228516
E-mail: **gw4hbk@talktalk.net**
www.gw6gw.co.uk

October 17th
The Galashiels Rally
The Galashiels and District Amateur Radio Society Rally will be held in the Volunteer Hall, St Johns Street, Galashiels, Scottish Borders TD1 3JX. The doors will open at 11.00am (10.45am for the disabled), admission will be £2.50 and there will be trade stands, a Bring & Buy and catering.
Jim GM7LUN
Tel: 01896 850245
E-mail: mail@gm7lun.co.uk

October 17th
The Hornsea Rally
The Hornsea Amateur Radio Club Rally will take place in the Floral Hall, 7 The Esplanade, Hornsea, East Yorkshire HU18 1NQ. The doors will open at 10.30am and there will be car parking, trade stands, special interest groups, a Bring & Buy, catering with a licensed bar, a raffle and facilities for the disabled.
Rick M0CZR
E-mail: R106221@aol.com
Duncan G3TLI
E-mail: g3tli@hotmail.co.uk
www.hornseaarc.co.uk

October 30/31st
The North Wales Rally*
The 24th North Wales Radio Society Rally will be held at the John Bright High School, Maesdu Road, Llandudno LL30 1LF. There will be trade stands and car parking.
Liz Cabban GW0ETU
Tel: 01690 710257
E-mail: rally@nwrs.org.uk
Ron Roberts GW6ZDH
Tel: 01492 592884
www.nwrs.org.uk/rally/info.html

November

November 7th
The Foyle & District Rally
The Foyle & District Amateur Radio Club Annual Rally will be held at the Best Western White Horse Hotel, 68 Clooney Road, Derry BT47 3PA. The doors will open at noon and there will be trade stands, the RSGB QSL Bureau and special interest groups.
www.mn0aku.co.uk

November 7th
The West London Radio & Electronics Show*
The West London Radio & Electronics Show will take place at Kempton Park Racecourse, Sunbury-on-Thames, Surrey. The will be free car parking, the doors will open at 10.00am and there will be talk-in on S22 & V44, trade stands, a Bring & Buy, a flea market, catering, special interest groups and facilities for the disabled.

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 *.

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

www.rsgb.org/defencefund

You can also donate by post by sending a cheque payable to 'The Spectrum Defence Fund' and sending it to; Spectrum Defence, RSGB, 3 Abbey Court, Fraser Road, Priory Business Park, Bedford, MK443WH. The 'Spectrum Defence Fund' is a secure and independently audited fund, the proceeds of which will only be used in defence of the radio spectrum.

Spectrum Defence Fund

Advertising space kindly donated to the Spectrum Defence Fund by PW Publishing

Harry Leeming's

in the shop

Harry Leeming G3LLL looks back to his days running an Amateur Radio shop with troublesome diodes and crystals.

Welcome to *In The Shop* (*ITS*) where I'm remembering my days running a busy Amateur Radio Shop. Last month I was sharing the story of a Yaesu FT-757 which kept blowing the small low-level switching diodes, on the input side of the band-pass filters. I had replaced them with higher rated IN4148 switching diodes, but one of these, in the transmit-receive switching circuit, would only last for a few months.

The importer's service department, had no suggestions and so I wondered what to do. I had some BY127, 1A 1200V mains rectifier diodes and doubted that any voltage present in the FT-757 was likely to blow these. But would they work at high frequencies (h.f.)?

Determined to (at least) have a try – I hooked one up as half wave rectifier as per **Fig. 1**. and as a silicon diode needs at least 0.6V to turn it on, I injected a few volts from a signal generator into the circuit. Surprise - surprise, it worked, and produced a d.c. output well beyond 30MHz.

Encouraged by the results I fitted a BY127, and while, I can't say that I was happy – as I hadn't found the real reason as to why the original diode was blowing – the rig worked perfectly and (as far as I know) has never given any more trouble.

Later I read in *Radio Communications* magazine that IN4007 1000V 1A diodes work well at r.f. Indeed, the types made by Motorola, and marketed by RS Components were specially recommended. So, since the 'diode incident' in cases where a normal replacement had failed without any apparent reason, I've used these several times to replace troublesome switching diodes.

Note: Some readers may find difficulty in physically identifying the diodes that need replacing. As an FT-757 has recently been to me for repair, I've therefore taken the photo' which is shown as **Fig. 2**. It's best to replace all the diodes A to J but please note that sometimes one of the diodes (or an extra one) might be mounted under the printed circuit board (p.c.b.), so be sure to swap any you find there – being very careful to note and make a diagram of the connections.

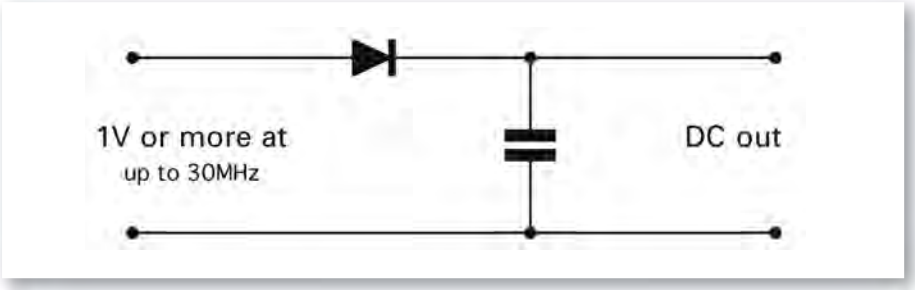

Fig. 1: Some high-voltage rectifier diodes, such as the BY127 and the 1N4007 types can work surprisingly well at over 30MHz. Here's how you check one out.

Tight Tuning Controls

Changing topic now, to tight tuning controls. This was the concern for '**Jim**' who E-mailed me to ask about the possibility of obtaining a replacement rotary encoder, for the tuning on his external FT-902 digital display variable frequency oscillator (v.f.o.), as his had locked up solid. I told him that all he needed was a can of the smelly, messy, but 'cure-all' wonder liquid WD40!

Several Yaesu external digital display v.f.o.s for rigs such as the FT-902, and the FT-101ZD, incorporate the same photo interrupter/encoder as the tuning control and it's also used as the main tuning on the FT-757. For some odd reason, as they get older the bearings tend to dry out and – if nothing is done – they eventually seize up solid. However, curing the problem is a lot simpler than it seems and doesn't even involve removing the case.

First, and this is possibly the most difficult part of the operation, you'll have to remove the tuning knob. Some are fitted with a rubber 'tyre' for better grip, and if you're really lucky, after you've removed this you'll find a hole with an Allen screw in it – loosen this and remove the knob.

On some equipment however, the knob is a push-fit, and it's extremely difficult to pull them off. (I'm told that Yaesu were rumoured to have employed two Japanese Sumo wrestlers, one holds the equipment while the other pulls at the knob!).

When eventually you've removed the knob – and have given yourself time to recover – mount the equipment with the v.f.o. spindle pointing upwards. If, as is shown in the photo of a FT-757, a white plastic friction sleeve, **Fig. 3**, is fitted remove this, and then put a spot of WD40 on the bearing. Next, grip the spindle with a pair of pliers, push and pull at it until it moves a fraction. Then add a little extra WD40,and try to rotate it backwards and forwards.

Eventually it will start to move easier and at this point you should then grip it with the chuck of a hand drill. (Not an electric drill!!) Add more WD40 and gradually you'll then be able to restore it to normal operation. It only then remains to remove the mess, refit the knob, and the job is done.

A Faulty Crystal?

On to faulty crystals now. '**Ted**' rang me to say that his FT-101 would sometimes not operate on LSB and he wondered if the crystal could be faulty?

Tracking down intermittent faults can be extremely time consuming, and often the best way is to substitute a suspect component, but where do you get a substitute crystal from? In the case of sideband crystals, there 's a very simple answer – swap the upper sideband (u.s.b.) and lower sideband (l.s.b.) crystals over!

The sideband selection on your rig will then be reversed; if the crystal is faulty the fault will follow the

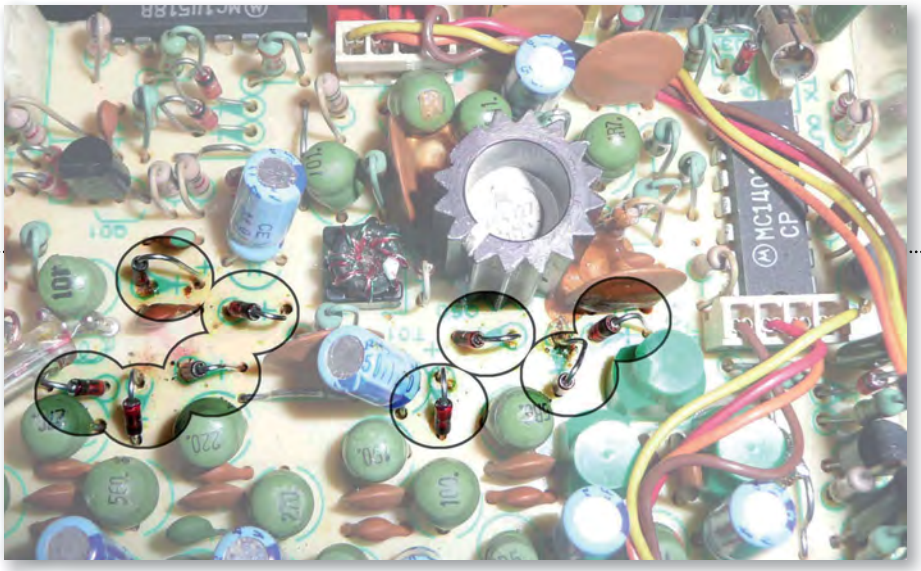

*Fig. ?: *ll the highlighted diode- -hould be change-.*

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crystal and you'll have to replace this. However, if the fault does not follow the crystal you'll have to investigate the u.s.b./l.s.b. switching.

Fortunately, in Ted's case it was the crystal that was faulty and I managed to find him one from a scrap rig. Otherwise he would have had to have one made.

Another Faulty Crystal

I was recently asked to look at an FT-757 which the owner complained jumped in frequency intermittently. I left it running for a few hours, but the digital display remained as steady as a rock.

As a further test I set the rig working in the u.s.b. mode, and tuned it about 1kHz h.f. of a local BBC station, to generate a steady beat note. After some time the note suddenly changed and started to waver but the digital display did not move.

Digital displays can't always be trusted to read correctly if, as in the FT-757, they take their timing pulses from the same master oscillator as the rest of the synthesiser. In these cases any error in the master oscillator cancels out (as far as the display is concerned) and makes it appear that the equipment is still on frequency. It's as well to be aware of this when operating near to the band edge, and to make sure that you have some external way of verifying the frequency such as at least a crystal calibrator and a separate receiver.

A digital display isn't a frequency meter. It doesn't **guarantee** that your rig is transmitting on the displayed frequency!

As the fault was very intermittent, I was afraid of it clearing up if I disturbed it by trying to connect test equipment. So, I dragged out my AOR 8000 hand held multimode scanner, tuned this to the master oscillator's frequency of 15MHz in the s.s.b. mode, held the scanner's antenna close to the crystal and set it to get a beat note.

When the FT-757 shifted frequency or wavered, the beat note on the scanner changed, and so I knew that the fault was in this stage. I then applied a hot iron and then some freezing fluid to the crystal. These could normally be expected to promote a steady change of frequency, but in this case they made the frequency jump about, and clearly indicated that the crystal was faulty.

I ordered a new crystal from Yaesu, but was told that they were no longer available. I considered having a crystal made but decided to try something else first – and I'll give more details next month.

Chargers & Power Supplies

Almost everything electronic now comes with some kind of mains adaptor. These adaptors come in varying voltages and polarities. Many use the same d.c. plug and they can spell expensive trouble if you accidently plug them into the wrong unit – as I found out the hard way!

Whilst it's not 100% fail safe, a very good idea is to slick a large label on each adaptor, clearly indicating as to what piece of equipment it belongs to, and so minimise the chance of an accident. If you haven't already done this, **now is the time!**

All Screwed Up

Around 40 years ago, when I was in the audio and Hi-Fi trade, we had quite a good Christmas selling a particular model of music centre. But, as so often happens when you think you are doing well, some started to bounce back for free repairs 'under guarantee'. And all of them had the same fault – a resistor had completely burnt out.

There seemed no logical reason as to why the resistor should be damaged, as replacements hardly got warm and it was only when we started to reassemble the units that we discovered the cause. Among the dozen or so similar screws that held the bottom covers in place – two were much shorter than the rest.

The two shorter screws had to be fitted in certain holes, if any of the longer screws were inserted in these holes, then a voltage supply line was shorted out, and the resistor disappeared in a puff of smoke. When challenged the customers in question admitted that out of curiosity, they had been looking inside and had not noticed the difference in length of the screws. Hardly a fault that could be covered under guarantee.

I was reminded of the 'wrong screw' problem when a few days ago, when a rig was brought to me for repair. I sorted out the problem and then reassembled it for a final test – but it wouldn't transmit. As soon as I removed the cabinet it worked perfectly – and it was only then that I noticed that it had a rather odd assortment of cabinet fixing screws, certainly not Yaesu originals.

As you'll have guessed by now, one screw was a little on the long side and had caused a short. Luckily, no damage had occurred, but screws that are too long are quite a hazard with electronic equipment. Learn from my mistake and check the length of screws when dismantling equipment.

An Apprentice Learns

In the 1950s I was an apprentice learning the job in a television repair department. Our workshop was in a

cellar with a stone floor, there were no isolation transformers, or automatic cut-outs and at the tender age of 15 I had to learn the rules of electrical safety the hard way.

At that time all television receivers had a metal chassis that was directly connected to the mains supply and so – if the mains plug was wired the wrong way round – the metalwork was connected to the live side of the mains. The sets were supposed to be adequately insulated but there were many weak spots in the safety. Television receivers of that era were really 'accidents waiting to happen'.

Even if the TV mains plug was correctly wired the mains plug – many wall sockets were wired in reverse and a lot were still of the two pin reversible variety. Several serious accidents occurred when owners tried to do their own repairs and some TV 'Engineers' were little more than van drivers who had mastered the skill of plugging new valves in!

One 'Engineer' (who was supposed to be training me) told customers that the picture came down the centre core of the coaxial cable and the sound down the braid – and he believed it!

Everyone of us carried a neon screwdriver, which was used to check that the TV chassis was not live before touching it. But such a safety aid couldn't save everyone.

A tragic accident summed up the risks when one major manufacturer's assembly line, ran out of speaker fixing screws. So, some helpful soul nipped down to a local hardware shop, and purchased a few, just to keep things moving.

Unfortunately, the screws were a fraction longer than the originals and when they were tightened penetrated the wooden speaker baffle they made contact with the metal speaker grill. This was then accidentally connected to the live chassis and unfortunately killed a child who touched it before anyone spotted the error.

The State Of The Nation's Electrics

Mains sockets came in not quite '57 varieties' in the 1950s but it was impossible to sell equipment fitted with the correct plug – as many people didn't even know what type of socket they had. Anyone could fit mains sockets and wire up electrical equipment.

One large retailer regularly sold equipment, such as tape recorders and film projectors, fitted with a two pin bayonet plug wired to the three core mains lead. They did this so that customers could plug them into a reading lamp –as this was about the only 'standard' socket that all households possessed.

The shop where I worked was fitted with 3-pin sockets, half of which had no earth wire. My future Father-in-Law, whose business it was, had no idea that this was dangerous. Later I had to condemn these practices, when years later I started working for him and took responsibility for electrical safety.

Perhaps we go overboard now regarding health and safety, but in the early 1950s, safety was very low priority, no one seemed to take responsibility for it. Indeed, much of the new equipment sold then would give today's health and safety inspectors real cause for anxiety

Taking Responsibility

Finally, here's a little story about taking responsibility: A vicar was surprised to find a dead donkey on his lawn, as no one knew where it had come from, he 'phoned the local Council's Refuse Department and asked if they could arrange for someone to remove it.

Next day, the Vicar received a formal letter stating that it was not the Council's responsibility. However, some wag at the Council had also added in pen, "I thought that seeing to the burial of the dead was the job of the Clergy?"

The Vicar sent the letter back with the additional added comment, "I am fully aware of my duties and in the case of a death one of my first responsibilities is to ensure that all the relatives have been advised." The donkey was removed without further comment! ●

Fig. 3: Removing the knob of the FT-757 and the plastic sleeve, on the tuning control allows you to apply a little WD40 liquid to ease a sticky main shaft bearing.

Problems

I like to hear about problems with older equipment, particularly pre 1990 Yaesu rigs. Please email 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).

Roger Cooke's

morse mode

Roger Cooke G3LDI is in a mood for training – but don't worry – all the exercise is done with the Morse key!

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Welcome to the world of Morse and *Morse Mode* (*MM*)! Autumn is coming – and it's the time when we all start thinking of log fires, long evenings and some studying or practice. Of course, I'm referring to Morse practice! The **Norfolk ARC** starts its series of workshops dedicated to training for Morse, Data and contest operating, plus other things, naturally. However, GB2CW usually gets more attendees during the winter due to the darker evenings and no grass to cut!

For the budding contesters, a few hours a week on *Morse Runner* will prove very beneficial; improve your Q-rate, not to mention your copy at higher speeds. The RSGB Club Cumulatives start again in January so, do try to get as much practice as possible.

The GB2CW schedule is on the RSGB's website and in the yearbook, so signing into your local broadcast will also help and be a lot of fun. More volunteers are always needed too, so if you do have that skill, please consider passing it on to others by taking part. E-mail me for full details of how to become a GB2CW volunteer.

Morse Traffic

If you are interested in old recordings, this web page will be fascinating. It's mostly traffic from sea-going vessels, such as the **last Eastbound Trans-Atlantic Voyage of *Queen Mary*/GBTT - 1967 - R/O Arthur Goodnow, (W1DM)** Whilst not Amateur Radio, they still make for good listening. The Morse is good, to be expected from a Radio Officer on board a ship and the traffic handling is also interesting to listen to.

Vibroplex Changes Owner

It has just come to my notice, old news (but some may not know) that Vibroplex has had a new owner since December 21st, 2009. This is because **Scott Robbins W4PA**, of Knoxville, Tennessee in the USA, purchased Amateur Radio's oldest manufacturer from the previous owner **Mitch Mitchell** of Mobile, Alabama who recently decided to retire.

In a report detailed at **arrl.org**, Scott Robbins says he will leave his post as Amateur Radio Product Manager at **TenTec** in Mid-December to take over and relocate Vibroplex.

Fig. 1: Jonathan Mitchener G0DVJ operating and Eugene Kraft G4FTP relaxing at G1FCW/P, the Essex CW Amateur Radio Club's NFD station for 2010.

Got That Swing?

As a musician I can say that 'It don't mean a thing if it ain't got that swing!' Of course, Morse has long been associated with music and rhythm and this YouTube video is well worth watching if you want a laugh at the way the military used this association. It is quite dated as you will see and I couldn't help thinking of Sergeant Bilko (the late **Phil Silvers** made the character truly memorable) when watching it!

It is perfectly true of course that Morse does have a rhythm and if you are musical it does help with the learning. See **http://www.youtube.com/watch?v=DQj74Y2H8xQ**

The Candler System

As mentioned in a previous *MM*, the Candler System was an approved method of learning in the 1950s and this site was brought to my attention by **Rob Mannion G3XFD** himself! It is well worth reading and even now these techniques still apply to a large extent. **Alex Blyth GM4TAL** wrote and told me that the advert appeared in the *Wireless Servicing Manual*, 1944.

Alex has volumes 1 to 5 and they are dated 1931 (even before I was born!) so it had been going for some years. The originator's full name was William H. Candler, although it doesn't say if he was an Amateur or not. See **http://www.zerobeat.net/tasrt/c30.htm**

Interesting Program

Here's an interesting program – *Morse Keyer* is a software keyer that can be keyed via the mouse or a key/paddle connected to a serial port. It supports straight keying, semi-automatic (bug) keying, and lambic A or B mode automatic keying. The Morse code can be played as c.w. radio tones or telegraph sounder click/clack sounds.

Optionally, the keyer can key an external telegraph sounder or loop, or Amateur transceiver (while still playing the sound). Since it supports semi-auto keying, it can be used to send American Morse code (a single-lever paddle is best for this).

The RSS Morse feature periodically reads an RSS feed (commonly a news feed) and translates it into precisely timed International or American Morse code. The Morse code can be played as c.w. radio tones, old-fashioned c.w. spark-gap sounds, telegraph sounder click/clack sounds, or to a physical telegraph sounder connected to a serial port. Split speeds are supported for Farnsworth effects. American code generation includes timing nuances that make it sound natural.

They both come in the same package and can be downloaded at **http://morse-rss-news.sourceforge.net/** For further information contact **Bob Denny**, the author, at **rdenny@dc3.com** if you have any queries. (These two programs do look very interesting).

National Field Day 2010

A National Field Day (NFD) photo next! The picture, **Fig 1**, was sent to me by **Steve Cocks G4ZUL** and shows **Jonathan Mitchener G0DVJ** operating and **Eugene Kraft G4FTP** relaxing at **G1FCW/P**, the **Essex CW Amateur Radio Club's** NFD station for 2010. Just about every NFD station looks like this now, computer driven, no loggers required, etc. Compare this with an NFD station from the 1950s or 1960s. Anybody care to send me one for publication in this column? Go on, you know you want to!

73 and May the Morse be with you!

Roger G3LDI.

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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).

ICOM IC-E7 2/70 hand-held with cloning cable. My back-up copy programing software CD, carrying case, charger and is boxed. Hardly used, in 100% mint condition. E-mails welcome for information, first £100. Tel: 01709 769845 (Rotherham). E-mail: paul-marshall1@sky.com

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).

NATIONAL HRO-MX receiver, many domestic wirelesses and transistor portables, some in working order most for restoration. Also, KEF-104 speakers and Armstrong A-20 stereo amplifier. Used components. Tel: 07570 911979 evenings (Hampshire).

NRD-535 LOWE TEST CERTIFICATE and manual. In excellent condition, £450. Will part exchange for Icom IC-R8500 with cash adjustment. Moonraker Super Scan Stick MkII, HF/VHF/UHF wide-band. 0.05-2000MHz, unwanted gift, £35.
Tel: 01935 829442 (Somerset).

ON DEATH OF FATHER oscilloscope, valve tester, voltmeter, band filter, transistor checker, electro meter, sweep function generator, signal generator, valves, diodes and resistors. Offer for the lot. Will E-mail photos.
Tel: Nick Lovell 0797 197 4270 (Ingleston, North Yorkshire).

YAESU FT-290 MkII unmarked with case, mic and handbook. New batteries with FL-2025 clip-on linear portable use only. With new unused telescopic yagi in packing aluminum carry case and heavy tripod extra free, £325.
Tel: G0ANX 01235 868498 (Wantage).

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

ELEKTOR ELECTRONICS MAGAZINE copies of the following articles: 1 'Figuring it out' – part 18, July/August 1994 by Owen Bishop. 2, 3,4 'The Digital Solution' – part 4, March 1995, part 6, May 1995 and part 8, July/August 1995. Tel: Brian 0161 740 4559 (Manchester).

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

PANASONIC RF-3100L DR-31 SW/LW/MW/FM receiver in good condition. With box and instuctions if possible but not essential. Please call if you have one to sell. Tel: 07595 332101 (Kent).
E-mail: lawrence007@ntworld.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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B.B. Nov '10

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

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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.

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ALINCO DJC7 HANDHELD TX £99
ALINCO DJV17 VHF/FM H/HELD £99
ALINCO DR635 D/BAND MOBILE £179
KENWOOD TS570D TRANSCEIVER £570
YAESU FT1802 2M MOBILE TRANS £119
YAESU FT60 5W TWINBAND H/H £149
YAESU FT8800M D/BAND TRANSCEIVER £219
YAESU HX280E MARINE HANDHELD £79

HANDHELD SCANNERS

ALINCO DJX2 AM/FM/WFM RADIO £79
BEARCAT 72XLT H/HELD £80
ICOM R5 HANDHELD SCANNER £145
RADIOSHACK PRO 82 HANDHELD £39

RECEIVERS

ETON MINI 300 PORTABLE £13
YAESU VR5000 WITH DSP £399

PMR/LPD RADIOS

INTEK MT5050 PMR446/LPD H/HELD £59

ACCESSORIES

ALINCO EJ47U DIGITAL BOARD £46
JIM M75 SCANNER PREAMPLIFIER £54
KENWOOD MC85 MICROPHONE £79
MFJ 969 ATU £119
SADELTA BRAVO PLUS BASE MIC £45
TOYO SA450 ANTENNA SWITCH £17
UNIROSS CHARGER & BATTERIES £12
YAESU MH35A2B SPEAKER MIC £19

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GRE PSR214 DESKTOP SCANNER £59
ICOM R5 HANDHELD SCANNER £179
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ETON G3 PORTABLE SHORTWAVE RADIO £69
ETON S350 RED PORTABLE RADIO £59
ETON G8 PORTABLE SHORTWAVE RADIO £39
ETON E100 PORTABLE SHORTWAVE RADIO £35
MIDLAND 38 MOBILE CB RADIO £49
TEAM ROADCOMM MOBILE CB RADIO £89
YAESU VX8 HANDHELD TRIBAND TX £279

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TRANCEIVERS

YAESU FRG-9600 ..... £225
YAESU VX-3E £95
YAESU FT-108M/E £95
RCI – 2950 10mtrs Multimode £125
ICOM IC-756 HF/50 ..... £695
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

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YUPITERU MVT 7100 ..... £135
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

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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
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
KENWOOD MC-80 ..... £70
MFJ 986 3k TUNER £185
WELZ SP-220 SWR/PWR METER £65
PM-2000 2Kw Pwr Meter £70
WATSON Tri 2/6/70cm Vertical £35
Various CB PSU's ..... From £10
LOWE FX-1 GDO Complete £125
SCAM 40 Pump Up Mast £350

WATERS & STANTON
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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
Eton	E1100	Compact Portable AM, FM stereo & 10 Shortwave Bands Receiver + Clock	£25
Alinco	DJ-X7E	100kHz-1300MHz AM, FM, WFM Hand Held Receiver 1000Ch + 8.33kHz step	£115
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
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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
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Microset	RU-45	70cm 3-15W in,45W out Linear + GaAsFET Preamp	£149
Microset	PT-105A	12V 5A (max) Protected Stabilized PSU	£29
Microset	PR-145A	2M 100Watt Version 16db Gain -0.9db NF	£79
Microset	PT-107	12V Stabilized 7A PSU	£39
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Roberts	R-861	Portable 150kHz-30MHz SSB , FM stereo RDS	£139
MFJ	MFJ-1786	10-30MHz Super-Loop Antenna with Controller + psu	£279
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
Global	AT-2000	150kHz-30MHz SWL ATU with Q selector	£69
	Moorse Prac	Home Made Morse practice oscillator	£10
Uniden	BR-330T	0.1-1300MHz (+ gaps) AM, FM, WFM Hand Held Receiver 2500Ch. Alpha-tag + Close Call & TrunkTracker III	£119
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MFJ	MFJ-940A	28-30MHz 10m Mobile ATU + meter 150W	£39
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Hi Mound	HK-706	Standard Straight Morse Key + Cover	£39
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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
Sony	ICF-SW40	Portable FM Stereo, MW, LW & SW Radio + Digital Display 20ch	£49
Realistic	Pro-2022	66-960MHz (with gaps) AM,FM Base Mobile Scanner 200Ch.	£59
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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
Nikkai	RP80	1MHz-3GHz Frequency Counter + Ni-CD 9-12V DC	£49
Garmin	eTrex H	Hand held 12Ch.High-sensitivity GPS + 500 Waypoints 2 x AA cell (not supplied)	£59
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Uniden	UBC-60XLT	66-512MHz (with gaps) FM Hand Held Receiver 80Ch. 4 x AA cells	£59
Yaesu	FT-990 AC	HF All Mode Base Transceiver + Auto ATU, 100W & Gen.Cov. 240V AC	£599
Kenwood	TS-570D G	HF All Mode Base Transceiver with Gen. Cov. + ATU & DSP filter 100W 12V	£599
SGC	SG-230	1.8-30MHz Microprocessor controled ATU 150W	£319
Yaesu	FP-1030A	13.8V 25A Protected PSU with meters	£119

RADIOWORLD
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Icom IC-2KL All-mode HF linear amplifier	£999
IC-7400 HF, 6m & 2m transceiver	£999
Kenwood TS-790E Dual-Band Base/Mobile Transceiver	£999
Icom IC-910H 2m/70cms base 100w	£999
Yaesu FT-950	£929
Yaesu FT-736R 6m, 2m & 70cm Base	£799
Kenwood TS-850S /AT	£699
Icom IC-706MkIIG with DSP	£635
Ameritron ALS-500 Solid State Amplifier	£599
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AOR SDU-5000 Spectrum Display Unit	£349
Yaesu FRG-100 HF Receiver	£349
AOR AR-8200Mk3 Scanner	£349
Yaesu FT-77 HF transceiver	£299
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Yaesu FT-77 HF inc FM	£275
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Yaesu FT-8100R 2m / 70cms Mobile Transceiver	£220
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MFJ-962D Versa Tuner	£219
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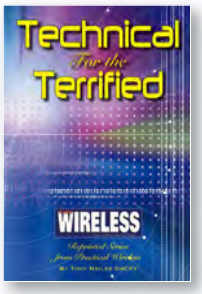

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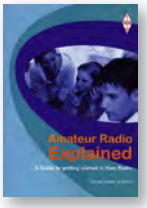

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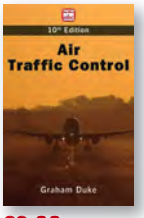

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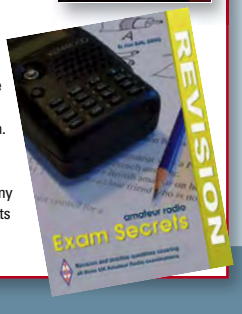

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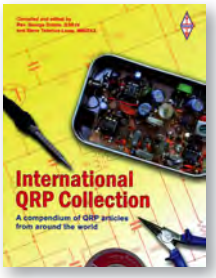

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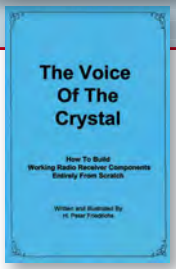

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Rob Mannion's

topical talk

The Editor reflects on topics and suggestions aired in this month's letters pages.

The letters published this month from **Steve Holme** and **John Harrison** indicate to me that there's an abiding interest among our readers regarding propagation studies. And, although – over the past few – years I've received a number of E-mails and letters from transmitting Radio Amateurs, the majority seem to originate from our friends who quietly enjoy the many facets of their radio hobby without feeling the need to have an Amateur Radio Licence.

John Harrison is a remarkable man – I first met him at the former Picketts Lock Amateur Radio show venue, where we were both chatting about satellite radio. John had one of the first World Space Radio receivers and helped to get me interested. We were both very sorry when the service ceased– although my receiver had actually failed before the service stopped.

I consider that John and Steve Holme have much to contribute – despite the fact that neither of them regard themselves as being anything other than 'casual' observers. In my correspondence with both gentleman, I've discovered that they are really keen to share their interests in propagation studies. Of course, I have an article on the topic in mind for *PW* – but Steve and John think of themselves as contributors, rather than as potential authors.

During our continuing correspondence with Steve and John (plus others who've written to me in the past) I've come to the conclusion that Amateur Radio research into propagation studies could benefit very much from the input from keen 'amateur' researchers. There's only one problem – how should we go about it?

As Editor of *PW* it's my job to research and bring article ideas into fruition – something for you to read on the page. Despite this, I also feel it's an important part of my vocation to encourage ideas that may not necessarily bring an article to our favourite magazine – but which will benefit the hobby in another way. So, with this in mind, I'm sure that someone could start a special 'Chat Group' where we could all 'virtually' meet to discuss our research, casual observations, etc. Incidentally, don't think that I'm the right person to run such a group – neither do I have sufficient time to spare – but I would willingly contribute my own observations.

Perhaps I'm being rather mercenary here (I'm always on the look-out for a good article for *PW*!) because I think there's bound to be some material that begs to be published! However, despite my interest in the topic I think that an Internet chat group, website or forum – similar in approach to the many groups operating under the Yahoo.com domain name, etc., could be of great help for everyone.

I'm sure there's a great latent, though hidden at present, interest waiting to be exploited in Amateur Radio propagation. I suggest this because recently, I was chatting to another Amateur about the 'old days' on 7MHz when we often suffered from 'phase distortion' (differential sideband propagational conditions/pathways) on our amplitude modulation transmission. The topic obviously intrigued other Amateurs because they joined in and we soon had a 'net' discussing 'phase distortion'! So, let's hope we can get the Internet based forum under way soon!

New Zealand & Other Calamities

To say that I was relieved to hear from **David Searle ZL3DWS** – after the Earthquake in New Zealand's South Island – would be an understatement! Fortunately, David and his family escaped relatively unscathed. However, this event, along with the continuing flooding tragedy on the Indian Sub-Continent, has brought Amateur Radio emergency communications to the fore once again.

Amateur Radio has much to offer during times of emergencies and the Haitian disaster is just one example. Many of us have been helping with the long term funding to help in Haiti, and of course the flooding in the Indian Sub-Continent are also bound to require very long term help.

However, although we – as Radio Amateurs – are ready and willing to offer support via training in Amateur Radio and donation of equipment (there are a number of initiatives under way here) it seems to me that bureaucracy often interferes with Amateur Radio operations in affected countries. Am I alone in thinking this? I'll certainly be interested in hearing other opinions!

Rob Mannion G3XFD/EI5IW

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Review!
More Chinese Hand-held Amateur Radio equipment!
Richard Newton G0RSN tries out an interesting Chinese made dual band 144/430Mz f.m. transceiver, imported by Nevada Radio in Portsmouth.

Review!
Keen kit and project builder **Phil Ciotti G3XBZ** has been thoroughly enjoying himself building the Tone receiver – an entry level superhet receiver produced by **Tim Walford G3PCJ**. Phil's been so impressed that he's already building one of G3PCJ's transmitters to accompany the Tone! So, make sure you don't miss Phil's interesting appraisal of Tim's kits.

The PW 70MHz Contest Results
Contest Adjudicator and organiser **Colin Redwood G6MXL** presents the results of our relatively news 'Fun on Four' contest. How did you do this year? To find out – make sure you read the results – and prepare for the 2011 event!

Constructional project – Build a Data Interface
It's some time since *PW* author **Len Paget GM0ONX** has had enough time to contribute to the magazine (he's a very busy chap!) but this time he's managed to come up with a very versatile Data Interface you can try for yourself!

Plus *The World of VHF*, *Technical for the Terrified*, *Carrying on the Practical Way* and much, much more!

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