www.rsgb.org
0 1 0 0

Journal of The Radio Society of Great Britain
£3.50

RadCom

Volume 76 No 1 ♦ January 2000

The Voice of Amateur Radio

Stand by to receive...

M2000

stations

FIRST In Amateur Radio

Waters & Stanton PLC

22, Main Road, Hockley, Essex. SS5 4QS

Fax 01702 205843
Enquiries 01702 206835
01702 204965

Orders only
FreePhone 0500 73 73 88

ISO 9002 REGISTERED FIRM

For the very latest Bargains & Secondhand Listings,
Visit: Our large Web Site www.waters-and-stanton.co.uk

Secure e-mail order: sales@wsplc.demon.co.uk
General e-mail: Info@wsplc.demon.co.uk

Retail Mon. - Sat.
9.00am - 5.30pm

YAESU FT-90R Micro Commander

SAVE

In Stock Now!

£359

Yaesu's 2m/70cm Mobile
World's Smallest Dual Bander
100 x 30 x 138mm 50/35 Watts

Next Day Delivery £7.00

or pay 10% Deposit and balance in 6 months Interest FREE

SAVE 70cms Handy

£29.95

* PLL 10mW Output
* 69 Channels
* 433.075 - 434.775MHz
* Full CTCSS
* 25kHz Steps
* Battery Save (4 x AA).

Batteries not included
Carriage £5.00 (1 or 2 pcs).

ICOM IC-746 160m - 2m All-mode

£1395

Still going strong, this transceiver offers excellent performance on the HF bands and equally sparkling performance on the VHF bands. The large front display is very easy to read and offers a wealth of information. If ever there was a complete station in one box, this has to be the one. 19.4% APR Available

KENWOOD TS-570DG 160 - 10m All Mode

£849

or pay 10% Deposit and balance in 6 months Interest FREE

19.4% APR Available

New IC-756 Pro

1.8 - 52MHz 100W
Auto ATU 51 Bandwidths
Real-Time Spectrum Scope

New DX Rig
5" Colour Screen
32 Bit DSP
51 Bandwidths
RF Processing
Voice Memory
CW memory

Phone

Part Exchange & Keep The Cost Down!

YAESU FT-1000MP 160 - 10m All Mode

Super Discount Phone!

19.4% APR Available

It has stood the test of time and used by the worlds top DXers and DXepeditions. Its excellent receiver combined with its superior transmitted signal makes this a natural choice for the HF enthusiasts. AC and DC versions in stock.

SAVE

ICOM IC-706IIG 160 - 70cm All Mode

19.4% APR Available

£989

or pay 10% Deposit and balance in 6 months Interest FREE

£1069 with switch mode power supply

Next Day Delivery £7.00

Shown above with PSU

The IC-706II G is the latest model of this classic transceiver. Great for mobile, portable or base use. Its got a great pedigree and offers 100 Watts on all bands up to 50MHz with 50 Watts on 2m and 20 Watts on 70cm. CTCSS encode and a lovely display with removeable front panel.

TUNE CONTROL Plugs into back of your IC-706. Now when you press "tune" you get 10W of RF for tuning up via manual ATU etc. A lovely idea that costs you only **£29.95** post £2.00

ICOM SAVE IC-Q7E

* 2m & 70cm Handheld
* 300mW Output
* CTCSS Encoder
* Rx. 30kHz - 1309MHz FM / AM
* 200 Multifunction Memories
* LCD Backlight & Timer
* Runs from 2 x AA Cells

Dual Bander
Airband Receive!
Only 50pcs Available

W&S Exclusive Deal ~~£169~~

£119

YAESU FT-847 SAVE

160 - 70cm All Mode
or pay 10% Deposit and balance in 6 months Interest FREE

£1379 with switch mode power supply

£1349

Next Day Delivery £7.00

PRICE MATCH

The FT-847 has firmly established itself as a true all-band, all-mode transceiver. Loved by the VHF & UHF operators, and superb for satellite operation, it also offers great HF performance. We have sold more than any other dealer, which says a lot about our reputation and our price. Phone for free leaflet today. And remember, our stock is genuine UK, not modified overseas models!!

Price Increase - *We have had to increase the "847" price slightly. However, there is a further price increase likely - so now is the time to buy!!* ***BE WARNED***

YAESU FT-100 160 - 70cm All Mode

~~£1259~~ Phone

See RadCom Review

This this rig is the smallest all-bander available. We have used it extensively and it is absolutely great. Read Radcom's in-depth review and then come to us for the best deal around.

YAESU					
FT-840	HF 100W	£619.00	YF-114SN	FT-1000 2.0kHz Fil.	£84.00
FM Unit	For FT-840	£56.00	XF-117C	FT-100 500Hz Fil.	£98.00
YF-112C	FT-840 500Hz filter	£84.00	YSK-100	FT-100 Sep. Kit	£56.00
FC-20	Auto ATU	£199.00	**FT-300M**	2m Mobile	£295.00
YF-114CN	FT-1000 250Hz Fil.	£84.00	VR-500	Scanner	£399.00
			FT-920AF	HF 100W	£1149.00

We will BEAT Competitor's Prices By up to £100

On Genuine UK Stock

Wow! Complete Catalogue on The Web! **FREE**
Over 200 pages in colour.
Go to the section you need and Print It Out
GO NOW www.waters-and-stanton.co.uk

ADI AT-600 Dual Bander

£199

Previously £249.00

Airband Rx

* 2m & 70cm Handheld
* 5W Output on 13.8V DC
* Full CTCSS & 12.5/25kHz Steps
* 110 Alphanumeric Memories
* 29 Programmable Functions
* DTMF Keypad & AM Airband
* Ni-cads & AC charger

NEW Earpiece / Boom Mic

WEP-501YS
Fits VX-1R, VX-5R, FT-50

This popular, light-weight earpiece and boom microphone makes for easy operation, and keeps the RF away from the head.

£24.95

Clearance Items:

Alinco DR-130E	2m 50W Mobile	~~£280~~	£159
Yaesu FT-200	2m 50W Mobile	~~£330~~	£169
Yaesu FT-2500	2m 50W Mobile	~~£280~~	£169
Optotrakker	Multimode decoder	~~£290~~	£229
MFJ-422B	Electronic key + paddle	~~£145~~	£95
MFJ-1792	80m - 40m base vertical	~~£150~~	£109
Cushcraft AR-X6	6m Vertical	~~£199~~	£139
Tonna 209022	21 El. TV antenna	~~£69~~	£45

Hoka Decoding Software

We are now the UK distributors. As used by governments, it can decode just about any form of data transmission. Simply connect between PC and Rx audio. Can be loaded on any number of PCs. This is a very advanced programme.

C-150 2m Handy

* 2m Handheld
* 5W Output on 13.8V DC
* 1750Hz Tone Included
* 25 / 12.5kHz Steps
* 20 Memory Channels
* Wideband Receive
* Uses 6 x AA cells (not inc.)

£99.95

YAESU VX-5R

~~£330~~

* 6m / 2m / 70cm Handheld
* 5W Output on 13.8V DC
* CTCSS Encode / Decode
* 25 / 12.5kHz Steps
* Auto Repeater Shift
* AM Airband Receive
* Lithiun Cells & Charger

YAESU FT-50R

~~£220~~

* 2m / 70cm Handheld
* 5W Output on 13.8V DC
* CTCSS Encode / 1750Hz tone
* 25 / 12.5kHz Steps
* 30 Memory Channels
* AM Airband Receive
* Ni-cad Cells & Charger

SAVE

C-408 70cms Handy

Normally £89.95

£69.95

CTCSS
Repeater Shift
Digital Display
12.5 / 25kHz Step
20 Memories
230mW Output
Uses 2 x AA

Offer Extended

ICOM IC-T8E

~~£349~~

* 6m / 2m / 70cm Handheld
* 5W Output on 13.8V DC
* 25 / 12.5kHz Switchable
* 123 Multifunction Memories
* CTCSS & 1750Hz Tone
* Programmable Features
* Ni-cads & AC charger

KENWOOD TH-D7E

~~£299~~

* 2m & 70cm Handheld
* 6W Output on 13.8V DC
* CTCSS & 1750Hz Tone
* Built-in Packet Modem
* 200 Alphanumeric Memories
* DTMF Keypad & AM Airband
* Ni-cads & AC charger

ICOM IC-T81E

~~£399~~ Phone

* 6m / 2m / 70cm / 23cm Handy
* 5W Output on 13.8V DC (1w 23cm)
* CTCSS & 1750Hz Tone
* 12.5 / 25kHz Switched
* 124 Alphanumeric Memories
* Wideband Rx. FM WFM & AM
* Ni-MH Cells & AC charger

ADI AR-147

AM Airband Receive

£199

* 2m 50 Watt Mobile Airband Receive
* Full CTCSS Encode / Decode
* 81 Memories 25 / 12.5kHz Steps
* Keypad microphone & Mounting Kit

KENWOOD TM-V7E

£369

* 2m / 70cm Mobile
* 50W 2m, 35W 70cm
* Cear LCD Readout
* CTCSS & DTMF
* 8 Frequency Steps & 280 Memories
* Includes Microphone & Mounting Bracket

MFJ's New MFJ-269

Now with 70cms

£299

1.8MHz to 70cms Antenna Analyser
Extra Features

Measures VSWR, Impedance, Reactance, Capacitance, Inductance, Coax losses, Velocity factor, Stub lengths, Even calculates length to fault on coax lines plus more!!

A complete antenna and feeder analyser. Runs from AA cells or external 12V. Solve all antenna problems on-site.

ICOM IC-2800H

In Full Colour!

~~£549~~ Phone

* 2m & 70cm Mobile
* Colour TV Screen
* Full CTCSS and 1750Hz Tone
* 50W 2m 35W 70cm

Includes FREE Remote head cable.

ICOM IC-207H

~~£369~~

* 2m / 70cm
* 50W / 35W
* 180 Memories and 7 Tuning Steps
* Detachable Head Unit / Clear Display
* Microphone, Mounting Bracket etc.

KENWOOD TM-G707E

£279

* 2m and 70cm
* 50W and 35W
* Full CTCSS
* 180 Alphanumeric Memories
* Detachable Head with Amber Display

YAESU FT-8100R

Phone

* 2m and 70cm
* 50W and 35W
* Wideband Rx AM & FM 208 Memories
* 7 Tuning Steps DTMF Remote Front panel
* Very compact, supplied with all hardware.

ICOM IC-2100H

~~£269~~ Phone

* 2m Mobile 55 Watts Output
* 50 Alphanumeric Memories
* Switched 12.5kHz and 25kHz Filters
* CTCSS and 1750Hz Tone

Waters & Stanton

FREE MFJ Catalogue - Just Phone!

Beware of grey imports. All MFJ products should have serial numbers and UK Warranty cards issued by us.

MFJ

FREE CATALOGUE

Every Model Stocked

MFJ-969 300W ATU

£139.95

160 - 6m Wire, Coax or Balanced

Includes VSWR / Power Meter, Ant. Selector, PEP feature, Roller Coaster Tuning

MFJ-949E 300W ATU

£115.95

160 - 10m Wire, Coax or Balanced

Includes VSWR / Power Meter, Ant. Selector, PEP feature, Built-in Dummy Load

MFJ-948 300W ATU

£99.95

160 - 10m Wire, Coax or Balanced

Includes VSWR / Power Meter, Ant. Selector, PEP feature, Built-in Balun, 12v Illumination

MFJ-901B 300W ATU

£59.95

160 - 10m Wire, Coax or Balanced

MFJ-962D 1.5kW ATU

£198.95

160 - 10m Wire, Coax or Balanced

Includes VSWR / Power Meter, Ant. Selector, PEP feature, Roller Coaster Tuning, T-Network

MFJ-986 3kW ATU

£239.95

160 - 10m Wire, Coax or Balanced

Includes VSWR / Power Meter, Ant. Selector, PEP feature, Roller Coaster Tuning, Differential Tuning.

MFJ-989C 3kW ATU

£269.95

160 - 10m Wire, Coax or Balanced

Includes VSWR / Power Meter, Ant. Selector, PEP feature, Roller Coaster Tuning, T-Network

MFJ-9406X 6m SSB

£239.95

Get on 6m with this 10W SSB & CW Transceiver. Draws just 2 Amps max current. Includes microphone.

MFJ-9420X 20m SSB

£239.95

A 20m 10W SSB & CWt Transceiver. Draws just 2.2 Amps max. Supplied with microphone. Great value..

MFJ CW QRP Rigs

£189.95

5W CW Transceivers. 750Hz xtal filter and Semi QSK 1 Amp max..

MFJ-9040	40m CW QRP	£189.95
MFJ-9030	30m CW QRP	£189.95
MFJ-9020	20m CW QRP	£189.95
MFJ-9015	15m CW QRP	£189.95
MFJ-9010	10m CW QRP	£189.95

MFJ-914 Auto ATU Extender

£55.95

Extends the range of your internal auto atu. Having trouble with G5RV? Fit it between transceiver and antenna - MFJ-914 does the rest.

MFJ-260C Load

£32.95

"N" model £39.95

300W max 1.5 - 150MHz

MFJ-264 Load

£49.95

"N" model £59.95

1.5 kW max 1.5 - 150MHz

MFJ-912 Ladder Feed Balun

£39.95

Connect between ladder feeder and coax and enjoy very low loss and all-band operation (when used with manual atu).

MFJ-418 CW Tutor

£58.95

The easy way to learn CW. Sends real QSOs or random characters. Clear LCD display

MFJ-1704 4-way Switch.

£49.95

Ideal for HF or VHF. This switch, fitted with SO-239 sockets, is ideal for antenna selection. Has earth centre position

MFJ Compact 3ft Loop Antennas

£299

A magnetic loop could be the answer to your antenna problems. Just 3ft diameter, they will accept 100W with ease. Just connect a single coax cable between antenna and the control box.

MFJ-1788	7 - 22MHz	£379.95
MFJ-1786	10 - 30MHz	£299.95

MFJ-259B Antenna Analyser

£169.95

This battery powered analyser will check the resonance and impedance of your antenna system in seconds. Make adjustments and watch the changes. Saves hours of work.

MFJ-1026 Noise Phaser

£124.95

Reduces local electrical noise by up to 3 S points

Simply insert between antenna and transceiver. Using a small "sniffer" antenna, just phase out the local noise to uncover the signals. Offered on our usual 10-day approval.

AL-811X 600W Amp

£679

The ideal way to get 6dB of improvement. Built-in cool running power supply and very economical 811A tubes make this a really popular model for UK Hams.

MFJ-702 Low Pass Filter

£29.95

Designed to pass frequencies between 1.8 and 30MHz, it handles 200W and offers 50dB of rejection at 54MHz. upwards. The sensible way to reduce out of band radiation

Professional Bandpass Filters

Guaranteed to cure out of band problems, these filters offer up to 50dB rejection, even just outside the band. 70cm model fitted "N" type sockets. 2m: SO-239 or "N"

DCI-145 2m **£89.95** "N" type **£99.95** DCI-430 70cm **£119.95**

Cushcraft

5 Band Compact Beam From Cushcraft

NEW MA5B Mini - Beam

£289.95

NEW

10 - 20m inc WARC bands
1.2kW 50 Ohm Feed
2 Elements on 10,15, 20m
Dipole on 12m & 17m
Max element length 5.2m
Boom Length 2.2m
Turning Radius 2.7m
Weight 12kg

This mini-beam works! 5.2m Long.

***Peter Hart in RadCom November**, says - "The MA5B significantly outperformed my vertical on all bands" - - "MA5B was better than my main antenna on 10m" - - an excellent antenna" - - "one of the few five band beams offering modest gain" - - "should give years of trouble-free service" - - "excellent value for money." For copies of this review give us a call.*

Full Cushcraft range stocked - Check our Web Catalogue

Carolina Windoms

CW-80 Special

Just 66ft long yet covers 80m - 10m. It will out perform a G5RV and give lower angle of radiation because of the 10ft vertical section which is forced to radiate. It will handle 1.5kW

Carolina Windom 80 Special

£89.95

Just 66ft Long!

Other Models (all with low angle radiator stub)

CW-160	160 - 10m 171ft long	£105.95
CW-160S	160 - 10m 133ft long	£99.95
CW-80	80 - 10m 133ft long	£82.95
CW-40	40 - 10m 66ft long	£79.95
CW-20	20 - 10m 34ft long	£77.95

Power Supplies

SEC-1223 13.8V PSU

£89.95

23 Amps - 3.2lbs!

Back In Stock

Lighter than an IC-706 and about the same size! The **SEC-1223** switch mode power supply delivers 23 Amps at 13.8V Thermo fan cooled, it measures just 57 x 177 x 190mm. Will power all 100W rigs and can be changed for 115V AC

£89.95

Watson power supplies guarantee the very best performance and value for money. Tried and tested, they have been submitted for independent laboratory testing for safety and electrical performance.

W-3A	3 Amp fixed supply.	£22.95
W-5A	5 Amp fixed supply	£29.95
W-10AM	10 Amp variale supply	£59.95
W-25AM	25 Amp variable supply	£89.95
W-30AM	30 Amp variable supply	£119.95

Compact 10 Amp Switch Mode PSU

The W-10SM is small enough to fit in a brief case. Measuring just 230 x 100 x 65mm, it's ideal for 50 Watt mobiles etc. Over voltage and current protection.

£49.95

Order Details on inside Front Cover

Number ONE in Amateur Radio — Waters & Stanton

Order Details on inside Front Cover

Replacement Batteries

SAVE

		List	Ours
FT-50R			
NBP-40Y	6V 650mAh	£43.00	£27.95
FNB-42	9.6V 1100mAh	£46.00	£29.95
IC-T8E			
NBP-200	9.6V 680mAh	£40	£25.95
NBP-199	6V 700mAh	£30	£25.95
TH-D7E			
NBP-39K	9.6V 600mAh	£45.95	£29.95
TH-22			
PB-32	6V 600 mAh	£32.00	£21.95

Available around end of January 2000.

RF Metering

Avair AV-600 1.8 - 525MHz 400W

£59.95

VSWR and power meter. Reads RMS and PEP. The ideal all-band VSWR meter. Reads up to 400W (3 ranges)

Watson VSWR / Power Meters.

£49.95

Measure VSWR and RMS or PEP power. Large easy to read meter. 3 ranges: 5W, 20W and 200W.

W-220	1.8 - 200MHz	**£49.95**
W-420	118 - 530MHz	**£49.95**
W-620	1.8 - 525MHz	**£89.95**

GB Beams from Netherlands

Dual Triple & Quad Bands!

GB-2 Dual band Yagi covering 2m & 70cm. Uses 4 elements of 2m and 5 elements on 70cm. £

GB-3 Tri-band design. 2 el 6m, 4 el. 2m, and 5 el. 70cm. Ideal as a compact system for VHF/UHF **129.95**

GB-4 Quad bander. 2 el 6m, 4 el 2m, 5 el. 70cm and 10el 23cms. A complete system on one boom **199.95**

Watson Off-Air Frequency Counters

£59.95

High quality units supplied with antennas, ni-cad packs and AC chargers. They are very sensitive and may be used for near-field checking.

Hunter - 10MHz - 3GHz **£59.95**

FC-130 - 1MHz - 3GHz, switched gates, 16 segments. **£79.95**

Super Hunter - 10Hz to 3GHZ and with signal strength meter. **£149.95**

Antenna Rotators

£49.95

AR-300XL Lightweight

Ideal for VHF and UHF systems of small to medium size. Includes control box, motor and Brackets. Support masts sizes can be up to 50mm

YS-130 Medium Weight VHF

£79.95

Made in Japan, this rotator will support medium sized VHF arrays. The diecast motor housing will fit masts up to 40mm diameter. Includes motor, control box and brackets.

New Create RC5-1 Rotator

NEW £299.95

We are pleased to be able to offer one of the most popular rotators from japan. The RC5-1 will handle 3-4 element HF beams. It has a torque of 6kg (rotation) and 80kg braking. Uses 7-core cable.

Yaesu Rotators for HF Systems

G-450C	Smaller Tri-band Yagis etc.	**£379.00**
G-650C	Larger Tri-banders etc.	**£499.00**
G-1000C	4 element HF Yagis (cw with 25m cable)	**£559.00**
G-2800SDX	Really large HF Yagis	**£1229.00**
G-550	Elevation Rotator	**£309.00**
G-5500	Az/El Rotator	**£569.00**

We have extensive stocks of tower mounts, bearings and rotator cables. Phone if you need advice. Leaflets available.

Cushcraft HF Yagis - In Stock

High quality DX Yagis. More Cushcraft Yagis are used in the UK than any other brand. Buy from W&S and be assured of long-term spares back-up.

Carriage FREE until 31/1/00

A3S	10-15-20m 3 el. 4.27m boom 8.45m el. 2kW	**£389.95**
A3WS	12m, 17m 3 el. 4.27m boom 7.66m el. 2kW	**£299.95**
A4S	10-15-20m 4 el. 5.48m boom 9.75m el 2kW	**£469.95**
X7	10-15-20m 7 el. 5.49m boom 11.33m el 2kW	**£549.95**
X9	10-15-20m 9 el 8.53m boom 11.12m el. 2kW	**£799.95**
TEN-3	10m 3 el. 2.44m boom 5.49m el 2kW	**£139.95**
XM-510	10m 5 el 5.8m boom 5.6m el 2kW	**£249.95**
XM-515	15m 5 el. 7.3m boom 7.3m el 2kW	**£325.95**
XM-520	20m 5 el 9.75m boom 11m el 2kW	**£529.95**
XM240	40m 2 el 6.7m boom 13.3m el 2kW	**£469.95**

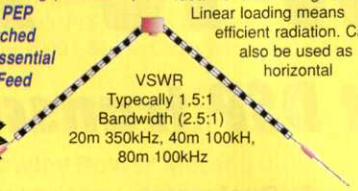
80/40/20m Dipole 50ft Long!

G3OJV 80-Plus-2 **SpaceSaver**

Approx 50ft long (Horizontal)
400 Watts PEP
Balun Matched
ATU not essential
50 Ohms Feed

Ideal lor the small garden. Linear loading means efficient radiation. Can also be used as horizontal

£79.95



No soldering, just assemble the elements, check the dimensions and fine tune per instructions. Unlike the G5RV, it self-resonates with low VSWR on all three bands. A unique design that offers LF operation from your back garden.

Garmin GPS-III Plus

NEW

With street map up-load feature.

All the familiar features of the old GPS-III plus more. Lower battery drain and the ability to up-load street maps into the memeory. Includes serial port data lead.
GPS-III P;us £329. UK street CD £69.95

Telescopic Masts

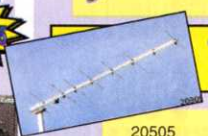
NEW

We are now able to supply a range of telescopic tiltover masts, glavanised to BS729. Heights available from 7.6m to 12m extended. Models for wall mounting or post mounting are included. The post mounted versions tilt-over and are supplied with a socket for mounting in con-crete.. ***Phone or write for information.***

VHF/UHF Antennas

Base Station Fibre Glass		
WVA-100	2m/70cm 2/4.5dB 1.09m	£29.95
W-30	2m/70cm 3/6dB 1.15m	£39.95
W-50	2m/70cm 4.5/7.2dB 1.8m	£49.95
W-300	2m/70m 6.5/9dB 3.1m	£59.95
W-2000	6m/2m/70cm 2.5m	£69.95
Mobile Antennas PL-259 bases		
W-285	2m 5/8th foldover base	£14.95
W-77LS	2m/70cm 0.39m low profile	£18.95
W-770HB	2m/70cm 1.1m 3/5.5dB	£24.95
W-7900	2m/70cm 5/7.6dB 1.5m	£32.95
W-627	6m/2m/70cm 1.62m	£34.95
Mounts		
W-3HM	Hatch / Boot Mount	£14.95
W-3CK	5m low loss cable kit	£18.95
W-ECH	5m RG-58 standard cable	£12.95
WMM&	Magnetic mount	£10.95
WAM-2	BNC window mount	£12.95

Tonna VHF/UHF



20505	6m 5 el 10dBi 3.45,	£82.95
20804	2m 4 el. 8/9dBi 0.93m	£44.95
20809	2m 9 el. 13.1dBi 3.47m	£52.95
20818	2m 9 el xd. 13.1dBi 3.47m	£10.00
20811	2M 11 EL. 14.1DbI 4.62M	£79.95
20822	2m 11 el xd 14.1dBi 4.62m	£117.95
20817	2m 17 el. 15.3dBi 6.57m	£89.95
20909	70cm 9 el 13dBi 1.24m	£45.95
20919	70cm 19 el 16.2dBi 2.82m	£61.95
20623	23cm 23 el 17.9dBi 1.75m £	

Carriage £7.00 an y quantity of above Antenna

Double Your Life

Nexcell NiMH Cells

AA-Size 1350mAh

Twice the capacity of normal ni-cad cells and no memory effect. Ideal for handhelds and digital cameras. As supplied to the police.

4 x AA cell pack	£9.95
4 x AAA cell pack	£9.95
AC charger (4 x cells)	£9.95
Postage £2.00 any quantity.	

Heil Headsets In Stock

Available from your Number ONE dealer

Hear the Difference!

A choice of normal or DX inserts are available when ordering.

Pro Headsets (Dual ear)	£119.95	HM-10 Dual	£109.95
Pro 54 or 55 (Single ear)	£109.95	CC-1 Adaptor cables Y,I,K	£23.95
Pro Micro (Dual ear)	£99.95	FS-1 Foor switch	£29.95
AD-1 Adaptors Y, I, K.	£14.95	TB-1 Table stand	£22.95
HM-10 Hand Mic.	£69.95	HS-1 PTT switch	£26.95

Motorola Talkabout 200

PMR-446 New Low Price

446MHz 500mW Handy
8 Channels
38 CTCSS Tones
3 Kilometres Range
3 x AA Cells Reqd.

£78

Now you can use a 446MHz handheld without a licence. Ideal for a wide range of uses. The package provides every-thing you need for personal communications. Just add 3 x AA cells and you are on the air!

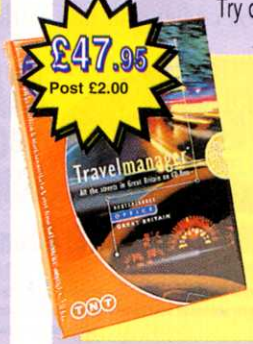
£149 pair NEW

Every Street in GB on CD!

Search on Postcode or address

Try out: www.travelmanager.co.uk

£47.95 Post £2.00



Every street in Great Britain on one CD. Search by Postcode or address. Zoom in to A-Z style road maps, or zoom out to larg-er areas. Route planner shows graphic route plus text route instructions. Measure distances, edit symbols. Really amazing database for your laptop.
Order: Travelmanager

ICOM

The NEW IC-756PRO

HF+50MHz, 32bit DSP transceiver

- ***32-bit, Floating-point, IF DSP*** - *this refined level of processing improves noise reduction and provides auto-notch functions.*
- ***5-inch TFT Colour LCD*** - *a first in a HF transceiver! This LCD provides a wider viewing angle and increased level of information, without cluttering the display area. The following information can be displayed:·*
- *Dual frequency display*
- *Memory frequency & memory name*
- *IF filter bandwidth*
- *RTTY tuning indicator and received characters*
- *Real-time spectrum scope*
- *Voice memory/CW memory keyer contents*
- ***Digital Voice Memory*** - *4 channels are assigned for transmit and 4 for receive, with up to 15 seconds recording in each.*
- ***Digital Twin-Pass Band Tuning*** - *digitally narrows the pass-band width at the DSP to efficiently eliminate interfering signals. Operating the PBT within the DSP allows sharper, superior pass-band width characteristics.*
- ***Real-time Spectrum Scope*** - *selectable sweep ranges, ±12.5kHz, ±25kHz, ±50kHz, ±100kHz.*
- ***Dual-watch*** - *receive two signals on the same frequency band simultaneously. Monitor a DX station while operating on another frequency!*
- ***AGC Loop Operation*** - *IF filter and notch circuits are included in the DSP loop, giving a wider dynamic range.*
- ***Digital IF Filter*** - *with 51 selectable bandwidths. To operate in PSK31 and other digital modes, it is possible to set the bandwidth for the SSB filter to 50Hz.*
- ***Low Distortion, RF-type, Speech Compressor*** - *with selectable transmit bandwidths of 2.0kHz, 2.6kHz, and 2.9kHz.*
- ***Built-in RTTY demodulator/dual-peak APF*** - *an RTTY demodulator and decoder circuit is built-in. Two peak frequencies can be selected by setting the shift width for RTTY operation. Received data is shown on the LCD.*

The IC-756PRO contains new and improved features of great interest to serious HF operators and DX enthusiasts.

NOW AVAILABLE FROM ML&S AT ONLY

£1999 (RRP £2399)

Pay nothing until June then pay balance interest free!
Or after June pay 36 x £84.36 at 24.9%

ML&S is an authorised dealer and has workshops on-site, inspected and certified by Icom U.K.

Call now

MARTIN LYNCH & SONS
140-142 NORTHFIELD AVENUE, EALING, LONDON W13 9SB

0208 -566 1120
or see Web Site for more details

FAX: 0208 - 566 1207 **WEB SITE: MLandS.co.uk** **E-MAIL: sales@MLandS.co.uk**

Martin Lynch can also offer finance terms up to 60 months. Deposits from a minimum of £25. We welcome your part exchange against any new (or used!) product, provided its clean and in good working order. Call the Sales Desk today. APR: 24.9%. Payment protection is also available up to 36 months. All units are brand new and boxed and offered with full manufacturers RTB warranty. All prices quoted for cash/cheque or Switch/Delta card. No additional charges for credit cards. Martin Lynch is a licensed credit broker. Full written details are available on request. Finance is subject to status. E&OE. £10 p&p on all major items.

Front Cover:
Rangers House in Greenwich Park, London, from where M2000A will be active from 31 December 1999.

RadCom
Radio Communication

Publications Manager
Mike Dennison, G3XDV

Editor
Steve White, G3ZVW

News Editor
George Brown, M5ACN

Technical Illustrator
Bob Ryan, 2E1EKS

Designer
Suzanne Dunnett

Secretarial
Pauline Reid

All contributions and correspondence concerning the content of *RadCom* should be posted to:

The Editor
Radio Communication
Lambda House, Cranborne Road
Potters Bar, Herts EN6 3JE

Tel: 01707 659015
Fax: 01707 645105

ADVERTISING
All display and classified advertising enquiries (excepting Members' Ads) should be directed to:

Janice Forde
Advertising Sales, RSGB
Lambda House, Cranborne Road
Potters Bar, Herts EN6 3JE
Tel: 01707 851199 **(advertising ONLY)**
Fax: 01707 851206 **(advertising ONLY)**

RadCom is published by the Radio Society of Great Britain as its official journal on the first day of the relevant month and is sent free and post paid to all members of the Society.

Closing date for contributions, unless otherwise notified, is five weeks prior to publication date.
All material in RadCom is subject to editing for length, clarity, style, punctuation, grammar, legality and taste.
No responsibility can be assumed for the return of unsolicited material (if in doubt, call us first!)

Filmset by JJ Typographics Ltd, Southend, Essex.

Printed by Southernprint (Web Offset) Ltd, Poole, Dorset.

RSGB membership at 30 April 1999: 27,025
ISSN No: 0033-7803

January 2000

Contents

News and Reports

Technical Features

Down To Earth - Amateur Radio From The Ground Up

Regulars

RADIO SOCIETY OF GREAT BRITAIN

THE NATIONAL SOCIETY WHICH REPRESENTS UK RADIO AMATEURS

Founded in 1913 incorporated 1926. Limited by guarantee
Member society of the International Amateur Radio Union

PATRON: HRH PRINCE PHILIP, DUKE OF EDINBURGH, KG, KT

Membership is open to all those with an active interest in radio experimentation and communication as a hobby. Applications for membership should be made to the Subscriptions Department from which full details of Society services may also be obtained.

Headquarters and registered office:
Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JE
Telephone 01707 659015 - Members Hotline and book orders
Fax 01707 645105. **Web Site** http://www.rsgb.org
E-mail addresses subscriptions@rsgb.org.uk; sales@rsgb.org.uk; GB2RS@rsgb.org.uk; RadCom@rsgb.org.uk; AR.Dept@rsgb.org.uk; IOTA.HQ@rsgb.org.uk; GM.Dept@rsgb.org.uk

Annual Subscription Rates

Home Corporate	**£38.50**
Overseas Corporate	**£38.50**
Corporate (Senior Citizens) (Applications should provide proof of age at last renewal date)	**£29.50**
Corporate after 50 years membership	**50% DISCOUNT**
Corporate after 60 years membership	**FREE**
Family member (Must reside with existing member. Does not include *RadCom*)	**£14.50**
Student Members (Applications should include evidence of full-time student status)	**£24.50**
Affiliated Societies (UK or Overseas) (including *RadCom*)	**£22.50**
HamClub (under 18)	**£14.50**

(Subscriptions include VAT where applicable.)
Special arrangements exist for blind and disabled persons. Details are available from RSGB HQ. Membership application forms are available from RSGB HQ.

Telephone 01707 659015
Fax 01707 645105
Website www.rsgb.org

The RadCom Leader

A New Age Dawns

WELCOME TO the 21st Century. With the millennium celebrations behind us we can all look forward to the next one hundred years of technical development. I wonder if the founders of the Society ever gazed into the crystal ball and wondered where radio communications would be in the year 2000? From humble beginnings at the turn of the last century, radio communications has developed, further and faster than they probably would have envisaged. What of the next one hundred years? Certainly amateur radio played a key role in moving communications technology on in the last century and I am sure that we have a vital role to play in the future of communications in this the 21st Century. Are we up for the challenge? I believe we are, certainly the Society is gearing up to play a continuing role in representing amateur radio. Recent discussions in Council have centred on ensuring that the Society is structured in the right way to be a truly representative organisation; an organisation that is in touch with its grass roots membership; an organisation that listens to the voice of its membership; an organisation that is focussed on the continuing growth of amateur radio - not just within the United Kingdom but also globally through the offices of the International Amateur Radio Union.

Over the next few months Council will be reviewing the structure, role and work of the Society from top to bottom. Foremost in its thinking will be to put into place the right organisation to meet the needs of its members today and into the future. We are extremely conscious that at times the Society can be inward looking. We are frequently criticised for not taking into account grass root views and opinions. With an organisation that is as well established and set in its ways as the Society is, this is an easy trap to fall into. Change is always more difficult to accept and encompass in such an organisation.

In view of this, the first and foremost part of the task ahead is to ensure that we have the right level of representation on the ground, ie that our representatives are easily accessible, well briefed, and that the information highway is clear and uncluttered. If we are to be truly representative of the licensed amateur in the UK we need to adopt a more interactive approach to our individual members and affiliated clubs. We must also make ourselves available to the views of those amateurs that through personal choice do not wish to belong to the amateur radio family that is the Society.

Modern technology in the form of interactive web sites and club links must be established. All this and more is on the agenda for the year 2000.

Council will also be looking at the higher level direction of the Society; the role and structure of Council itself and the work and role of our committees and honorary officers. The task is huge, but there is a will and enthusiasm for change which is only befitting the new dawn, which is the 21st Century.

Peter A Kirby, G0TWW
General Manager

RadCom NEWS

PSC Seeks Volunteers

TWO NEW MEMBERS are being sought by the Propagation Studies Committee (PSC) - one who has particular interests in any field from VLF to SHF and is prepared to take a more general interest in work elsewhere in the radio spectrum; another with a general interest in propagation matters who would be prepared to act as Minutes' Secretary. The capability to send and receive e-mail is a distinct advantage, as the committee only meet in person twice a year.

Anyone interested should contact the Chairman, G3USF, QTHR, or by e-mail: Chairman.Psc@rsgb.org.uk

In a celebration of the centenary of the first news story to be sent to a ship by radio, the owner of Woodvale House, Ryde, Rod Burman, G4RSN, taps out a message, watched by Marconi's daughter, Princess Elettra (Photograph by Chris Thwaites, courtesy of *Isle of Wight County Press*).

Maritime Mobile Net Co-ordinates Mid-sea Rendezvous

Amateur Radio Helps Lone Atlantic Rower

DIANA HOFF, a doctor from Scotland, left Tenerife in her 22-foot boat, the *Star Atlantic II*, on 13 September in a bid to row single-handedly across the Atlantic to Barbados.

By 12 November, with another 1000 miles to go, the after-effects of hurricane Lenny had caused disruption of the current flow; Diana was obliged to put out her anchor in rough seas. She relayed her exact position (obtained by GPS) to her husband, Stein, in Norway. He, in turn, passed it to Trudi, 8P6QM, in Barbados, who runs the Trans-Atlantic Maritime Mobile Net. She contacted Geoff, G3ZNV/MM, who was crossing the Atlantic aboard the 617ft *Wind Surf*, also bound for Barbados, and gave him Diana's position. Geoff and the *Wind Surf* were able to make for the tiny *Star Atlantic II* and, after about 10 days, were almost upon her before they made visual contact.

After more than two months alone at sea in the *Star Atlantic II*, Diana looks incredibly fit and well as she waves to greet the *Wind Surf*.

It was no easy matter to bring about the large vessel so that she had the small boat to leeward. Two canisters of supplies were ferried to the stranded doctor. The crew of the *Wind Surf* learned that Diana's broadcast radio had failed, as had her CD player, and they volunteered to furnish her with replacements on the spot.

Realising that Diana would not make port before Christmas, the *Wind Surf* crew happily provided her with a holiday gift package along with a printed radio message from her husband, also a doctor, living in Norway.

This remarkable story has been provided by the participants in the adventure - Geoff, G3ZNV, and Trudi, 8P6QM, with supporting details from Dave, KN4BN.

RA Changes Reservation Procedure

CURRENTLY, ANYONE applying for a new callsign may reserve an unallocated callsign, provided that it is due to be allocated within the next six months. The applicant must then wait until the callsign is automatically generated by the system before the licence can be issued. This can mean a long wait.

The system will now be changed so that callsigns can be generated out of sequence. Once the change is made, applicants will be able to choose any callsign in the current series, provided that it has not already been issued or reserved. It will no longer be necessary to choose callsigns due to be issued within six months, and applications will be accepted up to the suffix 'ZZZ'.

Any applicant should telephone Subscription Services Limited (SSL) on 0117 925 8333, to check that the intended callsign is still available. This will then be allocated once the completed application is received. Callsigns will be issued on a 'first come, first served' basis.

The change is due to be made by 1 April 2000, but it is likely that it will be introduced earlier than this. Until then, SSL will be accepting reservations, *as completed applications only*, for any callsign in the following series:

Full Class A:	M*0xxx;
Full Class A/B:	M*5xxx;
Full Class B:	M*1xxx;
Novice Class A:	2*0xxx;
Novice Class B:	2*1xxx.

All reserved callsigns will be issued as soon as the new system is in place. This only affects new applications; existing licence holders will *not* be permitted to change their callsigns. Enquiries should be made on the following number – 0171 211 0160. Please note that the reservation of a callsign can be made only by completion of the necessary application form, and not verbally.

Council on the March

THROUGHOUT the year, the President and members of Council are available to speak at local clubs about the RSGB and to answer questions about the Society and other amateur-radio-related topics. If you are interested in arranging a visit, please let the President or General Manager know, and they will try to make the necessary arrangements. Where such a visit takes place, we would appreciate it if you could extend an invitation to members of other clubs in your vicinity to join the meeting, as it isn't possible for Council to travel to every club in the UK!

M2000A on Air!

M2000A HITS the airwaves on 31 December from Ranger's House, Blackheath, South East London. The Cray Valley Radio Society (CVRS) is organising the special event station which will be celebrating the new Millennium. There will be five stations active, one of which will be concentrating on making pre-arranged contacts with stations in over 30 DXCC entities as they enter the new Millennium.

It has already been reported that Lord Rix, G2DQU, will make the first QSOs, including one scheduled with ZL6A in New Zealand at 1100 UTC - their midnight. ZL6A will also be representing NZART and will be passing Millennium greetings to the Society as the 1999 and 2000 Presidents (Hilary Claytonsmith, G4JKS, and Don Beattie, G3OZF) will be in the M2000A shack. Finally, ZL6A will pass greetings to Mencap (of which Lord Rix is President) and it is hoped to have representatives from Mencap's sister organisation in New Zealand in the ZL6A shack.

Three operating awards will be available for working or hearing M2000A.

Admission to members of amateur radio societies, and to those who bring their amateur radio licence, will only cost £1.90. Only members of CVRS will be able to operate. So, if you have not joined and you want to come along and operate, you should contact Bernard Harrad, G8LDV, QTHR or via e-mail at berniharrad @tesco.net

The station will be open to the public between Wednesdays and Sundays between 10am and 4pm (except for New Year's Day). Ranger's House is situated on the edge of Greenwich Park at Chesterfield Walk. Parking is available and disabled access is provided. The British Rail stations at Greenwich, Blackheath and Maze Hill - 20 minutes' journey from London Charing Cross - are not far from Ranger's House.

● IN NOVEMBER'S *Last Word*, we attributed an incorrect callsign to Mr J H Clifton, Secretary of the Willenhall and District ARS. He is G0UIU and not as printed. Our apologies to him.

Beacon News

FROM MARTIN Harrison, G3USF, the Region 1 HF Beacon Coordinator, comes the following beacon news.

The latest beacon in the worldwide HF beacon network, RR9O, has been heard in the UK with good signals. This beacon is located at Novosibirsk in Siberia and, like the other beacons in the network, transmits for ten seconds in sequence on 14.10, 18.11, 21.15, 24.93 and 28.20MHz with four levels of power - 100 watts down to 100 milliwatts. The final station to complete the 18-station network, is expected on air from Hong Kong shortly.

Another new 10m beacon, A41RB, is now in operation from Oman. It is run by the Royal Omani Amateur Radio Society, transmits on 28.194MHz with 10 watts to a Cushcraft AR-10 antenna, and is sited at locator LL93FO. The power will subsequently be increased to 100 watts.

Shield Returned to Society

DURING A VISIT to the RSGB Headquarters on Saturday, 30 October, members of the Blackmore Vale ARS returned the Dud Charman shield to the Society. F J H 'Dud' Charman, G6CJ, was President of the RSGB in 1952 and was a popular speaker at many club events, his 'aerial circus' (which demonstrated aerial performance using scale models) becoming internationally recognised. He was the author of many articles in *Radio Communication*, the precursor of *RadCom*, and he presented several papers at conferences both here and abroad. In the photograph, Mrs Nicky Marriott, 2E0ATL, is seen handing over the shield to Peter Kirby, G0TWW, the Society's General Manager. Other members of the Blackmore Vale club were in attendance, including the club secretary, Tony Marriott, G0GFL, second left.

Internet Linking

AT THE Radiocommunications Agency's *Making Connections 99* Roadshow held in London on 29 October, it was announced that the Agency would be allowing interconnection between amateur radio and the Internet by the end of the year. David Hendon, the Agency's Chief Executive, made the announcement in response to requests from the amateur radio community to be permitted to link their radio equipment through the Internet.

The Agency recognises the need to encourage young people into amateur radio, as it provides a valuable training ground for future careers in radio and electronics. Recognising the huge appeal of the Internet to the young, the Agency has taken this decision to open up whole new avenues into amateur radio.

The introduction of this exciting new facility may be underway by the time you read this.

1999 Council Election Result

THE RESULTS OF the 2000 – 2002 RSGB Council Election were as follows:

Ordinary Members
Bob Whelan, G3PJT
Gordon Adams, G3LEQ
Geoff Dover, G4AFJ
were elected unopposed

Zone F – Northern Ireland
Peter Maile, MI0BME ..... 37 votes
Jeff Smith, MI0AEX ..... 57 votes

Jeff Smith, MI0AEX , is elected

Access to Planning Appeals

ON PAGE 10 of the July 1999 issue of *RadCom*, G4GJB mentioned that members would be able to gain access, via the Internet, to a library of planning appeal decisions. The system came on line on 1 November 1999. It is now possible to obtain instant access to the largest source of planning appeals either on the Internet (24-hour access) or by telephone. There is free additional information including Planning Policy Guidance notes, ministerial statements, government documents and planning legislation. To get further information, or to register (free), you should telephone 020 7413 4574.

● THE FAMILY OF silent key Derrick Wright, G0OKT, have arranged with the authorities that his callsign should be re-allocated as a tribute to him. The recipient is Collin Parker, also of the Willenhall and District ARS, who has recently passed his 12WPM Morse test.

Project Millecom

Youth on the Air

PROJECT MILLECOM comprises a group of youth organisations and the RSGB who have come together specifically to enable all young people in the UK to communicate using hobby radio during the Millennium year. The Project is available to all youth organisations, schools and clubs.

With the agreement of the Radiocommunications Agency, special arrangement for the Millennium year (1 January 2000 to 31 December 2000) have been agreed. This will enable young people to communicate under full supervision on specified amateur frequencies, using the special callsign M2000Yfollowed by either the respective amateur or military callsign.

Project Millecom will operate from Youlbury Scout Camp, Oxford, using the callsigns M2000Y and GB4YOU.

The following frequencies are those agreed with the RA, and must be used: 3.650MHz; 7,080MHz; 14.300MHz (all ±10kHz permitted for the eradication of noise, interference or other band users preventing communication).

M2000A will operate from Rangers House for two months; Youlbury will operate most weekends as will other youth organisations. Cadets will be active during the week, especially during School holidays.

You can run your own Millecom station! During 2000, any school, college, youth organisation or Cadet unit with the necessary radio equipment can set up its own station under the Millecom umbrella. Guidelines and Special Event Station Application Forms are now available from RSGB HQ - Cadet users should contact HQ Air Cadets, or ACFA/CCFA to obtain authority.

See the RSGB Web Site at www.rsgb.org.uk for details.

RSGB VHF Awards

WITHIN DAYS of each other, two multi-part claims for the 50MHz band arrived from Guernsey. The first of these was from Colin Fallaize, 2U0ARE, who successfully claimed a certificate and stickers for 25, 50, 75 and 100 squares. Additionally, Colin also claimed '2-way Country' certificates for both multi-mode and CW-only operations. Colin is the first Novice from the Channel Islands to claim an award and it shows what can be achieved using low power. Admittedly, having a 2U0 prefix may help, but it is no substitute for patience and dedicated monitoring of the bands.

Also from Guernsey came successful claims from Mike Johnson, GU6AJE. Sinvce moving to Guernsey, Mike has been active on 6m and has opened his account with certificates and stickers for 20 countries (2-way) and also for 50 squares.

Somewhat further up the ladder, David Jarrett, G4DCJ (PE), successfully claimed an update for 275 squares confirmed on 6m.

On the microwave bands, David Millard, G8NEY (SN), achieved a '50 square' sticker for 1296MHz. In addition, David was also rewarded with a certificate and stickers for 5 and 10 squares on the 2.3GHz band.

On 10GHz, Tim Ballinger, G0RYR (GL), was successful in claiming a certificate and a '5 square' sticker.

Summary of Award Recipients for November

50MHz:

25 squares: 2U0ARE, GU6AJE;

50 squares: 2U0ARE, GU6AJE;

75 squares: 2U0ARE;

100 squares: 2U0ARE;

275 squares: G4DCJ.

10 countries (2-way): 2U0ARE, GU6AJE.

10 countries (CW): 2U0ARE;

20 countries: 2U0ARE, GU6AJE;

20 countries (CW): 2U0ARE;

30 countries: 2U0ARE.

1296MHz:

50 squares: G8NEY.

2300MHz:

5 squares: G8NEY;

10 squares: G8NEY.

10GHz:

5 squares: G0RYR.

Details of all RSGB VHF, UHF and Microwave Awards can be obtained by sending an A4 or A5 SAE to the Awards Manager, Tony Jarvis, G6TTL who is QTHR. Queries may also be sent by e-mail to vhf.awards@ rsgb.org.uk

Y2K Suffix

A REMINDER that the Radiocommunications Agency has agreed that the suffix /2K may be used by UK radio amateurs during January 2000, in celebration of the new millennium. Any station may add the /2K suffix to its own call, its club call or its Special Event call during all operations.

Satellite Launches

AMATEUR RADIO'S newest satellites are on the launch pad awaiting liftoff from the Vandenburg Air Force base in California between 0212 and 0232 UTC on 8 December. Since the launcher is a new type, this date and time might slip. The planned orbit is a sun-synchronous, circular one with a nominal 750km altitude, 98.39° inclination and 99-minute orbital period. There will be several amateur radio payloads, including JAWSat, OPAL, STENSat, Artemis, and ASUSat-1.

The launch teams would greatly appreciate the amateur satellite community helping the team out by listening for the satellites, particularly ASUSat, recording the digital telemetry received and sending it to the team by e-mail. Their first acquisition of the satellites will not be until nine hours after launch, so they would be pleased to learn earlier that their off spring survived the launch.

Frequencies, pre-launch keplerian data and other details can be found on the news page of the Amsat-UK web site http://www.uk.amsat.org/satnews.htm

● The Society held its AGM on December 4th, at which the Council election results were declared (see page 10). After the AGM, an Extraordinary General Meeting was held to alter the Society's rules regarding meetings of Council and other committees. The rule change, which was overwhelmingly accepted, will allow decisions to be made by telephone, fax or e-mail, if the committee agrees in advance to permit this for specific cases.

● STOLEN FROM a vehicle parked in Mayland, Essex, equipment belonging to the Dengie Hundred ARS. Any information should be passed to the Chelmsford police or G0IJN, QTHR.

IC-751A, S/N 2785B and PSU; Daiwa ATU, S/N E07160; FT-290 Mk1, S/N 2N240064 and PSU; FT-290 Mk2, S/N 530056 and PSU; AEA Pakratt TNC, S/N 30734; Amstrad 2086 computer, 100m of RG213, various microphones, patch leads, 6m Tonna beam, MFJ-112 clock, and trap dipoles for 160/80m and 40/20m.

● The Grimsby Amateur Radio Society now has its own web site. It can be found at http://www.gars4.freeserve.co.uk and any comments on its operation will be welcome.

● A correction to last month's news item on page 9 about the IARU's Region 1 Monitoring Service web site. The URL given was incorrect, and should read http://www.iarumsr1.cwc.net

● The caption on page 12 of last months RadCom News, showing G3MYM and G7LNJ at the Yeovil ARC, was not strictly correct. G7LNJ is on the left, and G3MYM is pointing to the board.

Turn to page 89 for more RadCom News

RADIOWORLD

(WEST MIDLANDS)

42 BROOK LANE
GREAT WYRLEY, WALSALL
WEST MIDLANDS WS6 6BQ
WE ARE 5 MINS AWAY FROM J11 M6

TEL SALES & SERVICE: 01922 414796
FAX: 01922 417829
MOBILE TEL: 0850 099244

Main dealers for Alinco, Icom, Yaesu & Kenwood

Manufacturers warranty on all new equipment

TELEPHONE SALES ON: 01 922 41 47 96

Ask for Dave (G1LBE)

Open Mon-Fri 9.30 - 6.00pm. Sat 9.30 - 4.00pm

WEB SITE
http://freespace.virgin.net/radio.world

E-mail
radio.world@virgin.net

VISA · DELTA · MasterCard · SWITCH

There is NO CHARGE for using credit cards

WANTED USED EQUIPMENT

PX WELCOME

BEST PRICES PAID!

ICOM

Most of the Icom range will carry unbelievable discounts. Ring for details

IC-706G
HF 6m, 2m, 70cm
£999

IC-746
HF, 6m, 2m 100W, 100W, 100W with tuner built in.
£1395

PCR 1000
Computer driven receiver.

IC-T8E
Triple bander. 5W output. Military spec.
£299

ICOM IC-R75
Latest Icom receiver. 0-30 + 6m. Outstanding receive with DSP. **£629**

YAESU

FT-920AF
HF & 6m built-in tuner with FM & FREE AM/FM Filter. ~~£1199~~

FT-1000MP AC
Dual Receiver. Digital 100W Competition radio.
~~£2199~~

FT-VX 1R
VHF/UHF Handie. Micro small.
£POA

FT-847
The new mobile-base. DSP HF 2m-70cm 50MHz.
~~£1499~~

FT-100
HF 6m/2m/70cm extra small mobile. Information to follow.

KENWOOD

TS-870
Still the only true DSP radio with TX,EQ N/R.
£1499

TS-570DG
Dedicated HF mobile-base DSP with built-in tuner. **£899**

TH-G71E
Full 5 Watts power. Wide band receive.
£239

TM-G707
The new mobile package with features: High visability display, 5-in-1 programme memory, memory name function, multiscan facility & built-in CTCSS. **£299**

ALINCO

DX-70TH
HF +6M **£599**

DR-M06
6M MOBILE 20W
£215

DR-140
2M mobile 50W
£220

DR-430
Mobile 70cm
£220

DJ-G5
2M/70CM handie
£237

PRICE MATCH
Up to 5% extra discount may be available on selected items.

WE STOCK ALL ACCESSORIES FOR THE MAIN BRANDS DISCOUNTED BY 10%

Microphones - Icom

SM6 ohm, 8 pin, desk mic £59
SM8 1.3/600 ohm selectable, 8 pin desk mic £100
SM20 600ohm, 8 pin, deluxe desk mic £108

Speakers - Icom

SP20 base station loudspeaker with audio filter £125
SP21 base station loudspeaker £65

Microphones - Kenwood

C-60A dual impedance desk mic internal pre-amp £106
MC-80 electret desk mic with pre-amp £65
MC-85 electret desk mic with pre-amp & compressor £125
MC-90 desk mic for DSP transceivers £169

Speakers - Kenwood

SP-23 station loudspeaker for TS-450/690S/570D £62
SP-31 station loudspeaker for TS-850/870S £74.50
SP-950 station loudspeaker for TS-950SDX £96

Yaesu FT-847 options

ATAS-100 active tuning ant system £224
FC-20 automatic ant tuner £197
MD-100 A8X desk top mic £99
YF-115C 455kHz/500Hz Collins Mechanical filter £89
YF-1158 02 2.7kHZ SSB filter Collins Mechanical £89

We also stock all makes of antennas:- Cushcraft, Diamond, Sirio, Watson, Pro-Am, etc.

RADIOWORLD

NEW SHOP NOW OPEN!

42 BROOK LANE
GREAT WYRLEY, WALSALL
WEST MIDLANDS WS6 6BQ

SALES & SERVICE
TEL: 01922 414796
FAX: 01922 417829

WE ARE 5 MINS AWAY FROM J11 M6

FINANCE NOW AVAILABLE. PHONE DAVE FOR DETAILS!

USED EQUIPMENT PRICE LIST

MAKE	MODEL	PRICE
AEA	PK88 TNC	£100.00
ALINCO	DX70 TK	£500.00
ALINCO	DR-150 2M 5W	£180.00
ALINCO	DR-M06 6M FM 25W	£175.00
ALINCO	DJX-10E HANDIE SCANNER	£200.00
AOR	AR-8200 SCANNER (Used)	£299.00
AOR	5000 BASE	£1,099.00
AOR	8200	£280.00
AOR	3030 RECEIVER	£395.00
AOR	8000 HANDIE SCANNER	£200.00
CUSHCRAFT	R7000 ANTENNA 10 - 40M	£240.00
CUSHCRAFT	X9 9 ELEMENT TRI-BANDER	£500.00
FAIRHAVEN	RD500 + KEYBOARD	£699.00
ICOM	IC-275E 25W MULTI/MODE	£550.00
ICOM	IC-471E 70 WATT 70CM	£450.00
ICOM	IC-706 Mk1	£499.00
ICOM	IC-706MK 11 DSP TRANSCEIVER	£599.00
ICOM	IC-725 TRANSCEIVER PLUS FM	£450.00
ICOM	IC-726 HF / 6M/ MULTI MODE	£500.00
ICOM	IC-735 TRANSCEIVER	£450.00
ICOM	IC-737 BASE, INC TUNER 0-30MHz	£600.00
ICOM	IC-765 HF Base Station 0-30MHz	£995.00
ICOM	IC-T8E 2 m 70m & 6m HANDIE	£230.00
ICOM	R-7000 25MHz/ 2GHz	£500.00
ICOM	R-7000 INCLUDING REMOTE	£550.00
ICOM	R75 RECEIVER Inc DPS	£595.00
ICOM	730 HF 100W	£250.00
ICOM	T7 HANDIE 2/70cm	£175.00
ICOM	775DSP 200W DSP	£1,799.00
ICOM	207H 2/70cm	£250.00
ICOM	IC 746	£1,099.00
ICOM	IC575H 1000 6M	£595.00
ICOM	IC-229H 2M FM	£165.00
ICOM	PCR 1000 Inc DSP	£239.00
ICOM	IC-821H	£850.00
ICOM	IC 970H WIDE RECEIVE	£1,495.00
ICOM	IC-781 HF BASE	£1,899.00
JRC	NRD-135 HF-GENERAL DC	£499.00
JRC	NRD-535 RECEIVER	£595.00
KANTRONICS	KPC-3+ TNC	£110.00
KENWOOD	AT-230 ATU 0-30MHz	£140.00
KENWOOD	SP-31 SPEAKER	£50.00
KENWOOD	TH-G71 DUAL BAND HANDIE	£200.00
KENWOOD	TS-140S HF/0-30MHz	£400.00
KENWOOD	TS-430 HF 0-30MHz 100W	£350.00
KENWOOD	TS-440 SAT TRANSCEIVER	£525.00
KENWOOD	TS-850 TRANSCEIVER 0-30MHz	£695.00
KENWOOD	TS-870 DSP TRANSCEIVER	£1,195.00
KENWOOD	G71E HANDIE 2/70cm	£165.00
KENWOOD	TS 930 SAT	£600.00
KENWOOD	TS 180S	£295.00
KENWOOD	TS 950S HF BASE	£1,099.00
KENWOOD	TM-251E 2M FM	£195.00
KENWOOD	PS-50 HEAVY DUTY P.S.U.	£125.00
KENWOOD	R-5000 HF 0-30	£550.00
LINEARAMP	RANGER 811H	£650.00
MFJ	986 A.T.U.	£160.00
PAC COMM	TINY 2 TNC	£99.00
RACAL	RA 1772 RECEIVER	£550.00
REALISTIC	DX-394 AS NEW HF	£90.00
TOKYO	HL-130M 180W 70CM ANP	£200.00
TOKYO	HL-63 70CM AMP 60W	£100.00
TOKYO	HL-60M 70CM AMP 50W	£100.00
TRIDENT	TRX-100XLT AM/FM SCANNER	£200.00
UNIVERSAL	M-8000 TERMINAL	£500.00
YAESU	FT-10 HANDIE 2M	£100.00
YAESU	FT-1000MP AC	£1,599.00
YAESU	FT-11 2M HANDIE	£140.00
YAESU	FT-11 HANDIE 2M	£100.00
YAESU	FT-290R11 2M MULTI MODE	£275.00
YAESU	FT-51R DUAL BAND HANDIE	£249.00
YAESU	FT-690 6M MULTI MODE	£295.00
YAESU	FT-707 100W HF	£250.00
YAESU	FT-747 TRANSCEIVER	£350.00
YAESU	FT-8100R DUAL BANDER	£250.00
YAESU	FT-840 0-30MHz TRANSCEIVER	£495.00
YAESU	FT-847 HF/6M/2M/70CM	£1,099.00
YAESU	FT-920 AF TRANSCEIVER	£999.00
YAESU	FT-2500M 2M FM MOBILE	£195.00
YAESU	FT-730R 70cm/FM	£100.00
YAESU	FP-707 PSU	£95.00
YAESU	FT-8500 2/70cm	£275.00
YAESU	FT-8100 2/70CM	£175.00
YAESU	FT-847	£1,099.00
YAESU	FT-650AC 6M 100W	£595.00
YAESU	FT 767 GX 2M/6M/70CM	£799.00
YAESU	FRG-100 plus PSU	£350.00
YAESU	FT-736R 2M - 70CM BASE UNIT	£700.00
YAESU	FRA-7700 ACTIVE ANTENNA (NEW)	£60.00
YAESU	FT-757 GXMK1 TRANSCEIVER	£400.00
YUPITERU	MVT- 7100 SCANNER	£150.00
YUPITERU	MVT-9000 SCANNER	£225.00

NEVADA®

We've moved! to ou

WAREHOUSE & SHOWROOMS PACKE

LATEST EQUIPMENT READY FOR IM

SHOWROOM STOCK - BRAND NEW OR EX DEMO AS DESCRIBED - FULLY GUARANTEED!

MODEL	DESCRIPTION	WAS	NOW
LATEST RADIOS!			
YAESU FT1000MP/AC	HF 100W TX - 2 ONLY - NEW BOXED	2,499.00	1,799.00
YAESU FT8100	2M/70CM MOBILE TX - 1 ONLY - NEW BOXED	479.00	CALL
YAESU FT847	HF-70CM BASE TX - 1 ONLY - NEW BOXED	1,699.00	CALL
YAESU FT100	MOBILE HF - NEW BOXED	1249.00	CALL
YAESU FT90	DUAL BAND MOBILE - NEW BOXED	399.00	CALL
YAESU VX1R	DUAL BAND HANDHELD - NEW BOXED	229.00	169.00
YAESU VX5R	TRIPLE BAND HANDHELD - NEW BOXED	359.00	CALL
ICOM IC-2800H	2M/70CM MOBILE TX - 1 ONLY - NEW BOXED	499.99	449.00
KENWOOD TM-G707	2M/70CM MOBILE TX- 3 ONLY - NEW BOXED	349.95	299.00
KENWOOD TH-D7E	2M/70CM HANDI + PKT TNC - 2 ONLY - NEW BOXED	319.99	259.00
KENWOOD VC-H1	COLOUR SSTV IMAGING UNIT - 3 ONLY - NEW BOXED	399.95	249.00
NEW OR EX-DEMO SHOWROOM STOCK			
ALINCO C4	70CMS MICRO - BRILLIANT RADIO - EX DEMO	99.00	75.00
ALINCO DJ-G5EY	DUALBAND HANDY + WIDE RX - EX DEMO	289.00	215.00
ALINCO DJ-X10E	WIDEBAND MULTIMODE SCANNER, DISPLAY MODEL	295.00	225.00
ALINCO DJ-191E	2M HANDIE - EX DEMO	169.00	119.00
ALINCO DR-140	POPULAR 50W 2 METRE MOBILE, LOTS OF POWER	229.00	169.00
ALINCO DR-605E	2M/70CM MOBILE - EX DEMO	329.00	269.00
ALINCO DX-77E	100W BASE - 1 ONLY - EX DEMO	599.00	499.00
ALINCO VC-6	GREAT 6M ANTENNA, 'V' DIPOLE - WORKS WELL	75.00	39.00
CABLE - TWIN FEEDER	TOP QUALITY 450 OHM FEEDER (PRICE PER METRE)	0.85	0.80
COMET CA62DB	BIG VERTICAL FOR 6 METRES. HI-GAIN	89.00	75.00
CUSHCRAFT 13B2N	13 EL 2M BOOMER, 15.8 DBD GAIN. IDEAL FOR DX	129.95	115.00
CUSHCRAFT 22XB	70CMS OSCAR - 22 ELE. 14.3FT BOOM. S/STEEL H/WARE	229.95	199.00
CUSHCRAFT 738XB	70CM OSCAR 38 EL 14.3FT BOOM INC POLARITY SWITCHER	209.95	175.00
CUSHCRAFT A14820T	10+10 ELE 2M CROSSED YAGI - 11.1DBD ON 11FT BOOM.	105.95	99.00
CUSHCRAFT AR6	6M RINGO RANGER -OMNI, JUST RIGHT FOR REPEATERS!	59.95	49.95
CUSHCRAFT ARX6	GREAT BIG 24FT -(5.5DBGAIN) 50MHZ VERTICAL	199.95	149.00
CUSHCRAFT XM510	5 ELE 10M YAGI. USED FOR EVALUATION - LATEST DESIGN	269.00	129.00
DIAMOND D707	ACTIVE SCANNER ANT, BUILT-IN AMP (0.5 - 1500MHZ)	129.00	99.00
DIAMOND RN702B	70CMS. HI-GAIN WHIP BNC FITTING - LAST FEW	19.00	12.00
DRAE DLC	POCKET SIZE MORSE TUTOR, LAST FEW - SPECIAL PRICE!	39.00	29.95
DRAE DLT	POCKET SIZE MORSE TUTOR - BUILT-IN OSCILLATOR	59.00	39.95
DRAKE SW2	QUALITY COMMUNICATIONS RX - EX-DEMO	489.00	399.00
EARTALKER CT221	INVISIBLE MIC - FITS YAESU, ICOM ETC - SPECIAL PRICE	29.95	25.00
HIMOUND MORSE KEY	HK705 - GREAT STARTER - JUST PUT ON A NICE BASE!	29.95	25.00
HIMOUND MORSE KEY	HK708 - AS HK705, SLIGHTLY BIGGER KEY	39.95	35.00
ICOM BP7	BATTERY PACKS - 13.2V @ 450MAH - FOR OLDER MODELS	68.00	25.00
INAC	36A/12V VARIABLE PSU + LED DISPLAY - 1 ONLY	139.00	90.00
JPS NTR-1	NOISE REDUCTION UNIT, VERY EFFECTIVE, NEAT COMPACT	199.00	125.00
KENWOOD BT11	BATTERY CASE FOR G71E - LAST ONE	12.95	9.95
KENWOOD DFK4	SEPARATION KIT FOR TM MODELS	39.95	30.00
KENWOOD DRU-2	RECORDING UNIT, SUITS TS850/950	97.95	79.00
KENWOOD DTU-2T	TONE UNIT SUITS TM241/741/702E	21.95	15.00
KENWOOD KSC8	COMPACT CHARGER FOR OLDER HANDIES - ONE ONLY	21.36	5.00
KENWOOD MB430	MOUNTING BRACKET FOR 430/440/450 ONLY	20.95	15.00
KENWOOD MB430	MOUNTING BRACKET FOR TS430/140/680/450/690 ETC	20.00	13.00
KENWOOD MJ86	MIC ADAPTOR - LAST FEW	10.95	7.50
KENWOOD PB18	LONG LIFE BATTERY PACK, SUITS TH28/48/78	63.95	49.95
KENWOOD PG4K	4M BOOT MOUNTING KIT SUITS TM732E	42.95	30.00
KENWOOD PG-5A	DATA CABLES	14.95	10.00
KENWOOD YK88A	5KHZ AM FILTER FOR OLDER MODES - 940S ETC	61.95	50.00
MFJ 914	AUTO TUNER EXTENDER, WORKS WITH ANY AUTO TUNER	59.95	55.00
NEVADA	900MHZ SWR METERS	54.72	19.00
NIE NB50R	2M DOCKING BOOSTER - MORE POWER FROM YOUR HANDIE!	79.00	49.00
OPTO 3000A	10HZ-3GHZ FREQUENCY COUNTER - EX DEMO	299.00	149.00
OPTO CB AR	SERIAL I/F ADAPTOR FOR SCOUT BEFORE V3!!! - CHEAP	39.95	20.00
OPTO CC30	CARRY CASE FOR OPTO RX'S	14.95	9.95
OUTBACKER JUNIOR	80 - 10M	179.95	149.95
OUTBACKER JUNIOR+	COMPACT MULTIBAND MOBILE HF ATNENNA 8-10 2M+6M	175.00	149.00
OUTBACKER OB8	6 FOOT HF MOBILE ANTENNA 780M-10M REDUCED	189.00	159.00
OUTB OBS8	HF 2 SECTION	199.95	169.95
OUTBACKER PERTH	160 - 10M	199.95	169.95
OUTBACKER PERTH+	HF + 6M	199.95	169.95
OUTB OUTREACH	160 - 10M 12FT	199.95	169.95
OUTB OUTRUNNER	160 - 10M 9FT	199.95	169.95
PALSTAR AT300	ANTENNA TUNER - 150W TUNER, GREAT PRICE - LAST FEW	99.95	79.95
PALSTAR AT300CN	ANTENNA TUNER - EX DEMO	139.95	99.00
PALSTAR KH6	6M HANDY - BEST 6M HANDY AROUND - NEW BOXED	149.00	89.00
PRO-AM PHF12	24MHZ MOBILE WHIP, WORK THIS GREAT BAND FOR	19.00	10.00
REVEX EM700	SPEAKER/MIC (EAR/BOOM) WILL FIT MOST RIGS	29.00	19.00
REVEX FM50	HEADSET/SPEAKER MIC WILL FIT MOST RIGS	49.00	29.00
REVEX FM80	MOBILE BOOM MIC, WE'LL WIRE FOR YOUR RIG - (FITTING EXTRA)		25.00
RMS 2200	2.2K OIL CAN TYPE DUMMY LOAD - LAST FEW	59.00	25.00
SCANMASTER GW2	25-1300MHZ IN LINE PREAMP, VARIABLE GAIN MODEL	49.95	39.00
SCANMASTER SP55	SCANNER PRE-AMP, BNC/BNC + BAND SEL - EX DEMO	59.00	49.00
SCANPOLE	WIDEBAND SCANNER ANT, APPROX. 1M LONG	49.95	29.00
SGC SMARTCUBE	500W MOBILE AMP - NEW - BOXED	995.00	799.00
SKYVIEW FAX III	SOFTWARE, COMPLETE, EASY TO USE PROGRAM, LAST FEW	99.95	59.00
SKYVIEW SYNOP-2	WEATHER PLOTTING SOFTWARE & INTERFACE	149.95	79.00
STARTEK ATH30	1MHZ - 2.8GHZ COUNTER - NEW - BOXED	299.00	149.00
TRANSFORMERS	240V IN 12V @ 3AMP, TRANSFORMERS - BRAND NEW		2.95
UHF SWR METERS	ORIGINALLY FOR 934 MHZ BUT GOOD FOR UHF 144/70 CMS	45.00	10.00
VECTRONICS DL2500	2.5KW DUMMY LOAD, FAN COOLED	179.00	99.00
VECTRONICS LP30	1500W LOW PASS FILTER	59.00	39.00
VECTRONICS VC300M	MOBILE ANTENNA TUNER - 150WATTS- LAST FEW AT	121.95	95.00
WISE WP2170DU	HI-POWER DUAL BAND BOOSTER 50W AMP	219.00	149.00
WSE WP272H	2/70CMS DOCKING BOOSTER FOR TH79E, 2W IN 10W OUT	169.00	99.00
YAESU CA10	CHARGER ADAPTORS, FOR FNB31 WITH FT51R HANDHELD	12.00	7.00
YAESU DVS1	DIGITAL VOICE MEMORY UNIT - FT212,712,912 ETC	99.00	59.95
YAESU EDC5B	CIGARETTE LIGHTER LEAD FOR MOST YAESU HANDHELDS	22.00	19.95
YAESU FNB 28	BATTERY BACK - SUITS YAESU HANDIES	49.95	39.95
YAESU FNB35	BATTERY PACK - SUIT FT51R 7.2V 900MAH	56.00	39.95
YAESU NC50	DUAL SLOT RAPID CHARGER - FT10/40/50/51 ETC.	91.00	59.95

USED EQUIPMENT ALL SAFETY TESTED & GUARANTEED FOR 3 MONTHS

ADI AT400	70CM HANDIE TRANSCEIVER	75.00
ALINCO ALM-203E	2M MTR HANDHELD TRANSCEIVER	99.00
ALINCO DJ-180 + EDC46 Q C	2MTR HANDHELD TX	99.00
ALINCO DJ-C1E	2M MINI HANDIE	79.00
ALINCO DJ-C5	2M/70CM MICRO HANDIE	125.00
ALINCO DJ-480E	70CM HANDIE	99.00
ALINCO DJ-G1E	2MTR HANDHELD TX + AIR RX	139.00
ALINCO DR-MO6DX	6M, 20W FM MOBILE	189.00
DENPA MZ22	2M FM MOBILE TRANSCEIVER	125.00
ICOM IC207H	2M FM MOBILE	225.00
ICOM IC229E	2M FM MOBILE	159.00
ICOM IC7BE	6M/2M/70CM HANDIE	225.00
ICOM Z1E	2M/70CM H/H REMOTE DISPLAY	185.00
KENPRO KT-22	2M HANDHELD TRANSCEIVER	59.00
KENWOOD TH78E	2M/70CM HANDIE + ACCS	195.00
KENWOOD TH215E	2MTR HANDHELD TRANSCEIVER	75.00
KENWOOD TH28E	2MTR HANDHELD TX+70CM RX	119.00
KENWOOD TM-201	2M FM MOBILE TRANSCEIVER	159.00
KENWOOD TM732E	2M/70CMS MOBILE TX	295.00
KENWOOD TM733E	2M/70CM MOBILE	295.00
KENWOOD TMG707	2M/70CM MOBILE TX	259.00
STANDARD C78 +AMP	70CM FM MOBILE + 10W PA	135.00
STANDARD C-5200	2MTR/70CMS MOBILE TX	299.00
STANDARD C-8900	2MTR MOBILE TRANSCEIVER	159.00
SYMEK TNC 2H+RF UNIT	9K6 TNC + G3RUH Mod UHF 10W TX	185.00
TRIO TR2200GX	2MTR MOBILE TRANSCEIVER	75.00
TRIO TS700	2M MULTIMODE BASE	250.00
TRIO TR9130	2M MULTIMODE TRANSCEIVER	249.00
YAESU FT208R	2M HANDIE TRANSCEIVER	59.00
YAESU FT41R	70CM HANDIE TRANSCEIVER	129.00
YAESU FT411	2M HANDIE TRANSCEIVER	125.00
YAESU FT212RH	2M FM MOBILE TRANSCEIVER	149.00
YAESU FT290 MK2	2MTR MULTIMODE TX	275.00
YAESU FT2500M	2M 50W FM MOBILE	189.00
YAESU FT5200	2M/70CM MOBILE TX	259.00
YAESU FT8000R	2M/70CM MOBILE TX	289.00
YAESU FT708	70CMS HANDHELD TX	69.00
YAESU FT726R	2M/70CM/HF BASE STATION	599.00
YAESU FT811	70CM HANDIE TRANSCEIVER	80.00
YAESU FTL2014	VHF PMR TRANSCEIVER	75.00
ALINCO DJX10E	HANDHELD SCANNER	179.00
AOR AR2000	HANDHELD SCANNER	125.00
BEARCAT UBC200XLT	HANDHELD SCANNER	99.00
COMMTEL 510	HANDHELD SCANNER	145.00
MAYCOM AR108	H/H SCANNER, CHARGER & NICADS	69.00
NEVADA MS1000	BASE SCANNER	130.00
TRIDENT TR2400	HANDHELD SCANNER	149.00
YUPITERU MVT 7000	HANDHELD SCANNER	125.00
YUPITERU MVT7100	HANDHELD SCANNER	145.00
GRUNDIG YB500	SHORTWAVE RECEIVER	99.00
ICOM ICR-71E	HF RECEIVER	395.00
KENWOOD R5000VHF	HF RECEIVER + UHF + FILTERS	699.00
MATSUI 220	SHORTWAVE RECEIVER	35.00
REALISTIC DX394	SHORTWAVE RECEIVER	85.00
SANGEAN ATS-803A	SHORTWAVE RECEIVER	99.00
YAESU FRG 100	HF RECEIVER	299.00
ICOM IC706 MKII DSP	HF + 6M 100W + 2M 20W TX	799.00
TOKYO HX240	2M - HF TRANSVERTER	145.00
KENWOOD TS-680	HF 100W TX + CTCSS	549.00
TRIO TS-940S	100W HF TRANSCEIVER	795.00
YAESU FT 900AT	HF REMOTE MOUNTABLE TX	699.00
YAESU FT990/DC	HF 100W TRANSCEIVER	899.00
AEA SWR121	HF ANTENNA ANALYSER	199.00
AMDAT ADC-60	FREQUENCY STANDARD CLOCK	99.00
BNOS LPM 10-50-100	6M 100W AMPLIFIER	139.00
COMET CF-416B	2M/70CM DUPLEXER	15.00
COMET CF-706	HF + 6M + 2M DUPLEXER	29.00
COMET CM400N	MINI 70CM SWR METER	15.00
COMET CSW20 'N'	2 WAY 'N' COAXIAL SWITCH	17.00
CREATE CV730V-1	7-28MHZ V-DIPOLE	85.00
CTE 767	AMPLIFIER (30WATT 50 MHZ)	49.00
CTE BS-25E	VHF AMPLIFIER/DOCKING BOOSTER	59.00
GOLDLINE	ANTENNA MATCHER	9.00
HI-MOUND BK100	BUG KEY	49.00
HANSEN FS711V	50-150MHZ SWR METER	29.00
HANSEN FS302M	VHF PWR/SWR METER 50 - 150MHZ	19.00
ICOM PS-15	POWER SUPPLY (20AMP)	95.00
ICS AMT-2	RTTY/CW/AMTOR UNIT	29.00
KENWOOD AT200	ANTENNA TUNER	125.00
KENWOOD AT230	ANTENNA TUNER	99.00
KENWOOD PS430	POWER SUPPLY (12 AMPS)	80.00
LESON TW232	BASE MIC	29.00
MFJ 784B	MFJ DSP FILTER	165.00
MW MODS MM4001KB	MWMODS RTTY RX/TX INC KB	49.00
MW MODULES 432/50	70CM LINEAR AMP	99.00
'N' TYPE SWITCH	ANTENNA SWITCH	15.00
NEC SPEAKER/CLOCK	SPEAKER/CLOCK	35.00
PALSTAR PS-04	2/4 AMP POWER SUPPLY	14.00
PALSTAR WM150	300/3KW PWR/SWR METER	49.00
TIMEWAVE DSP59 +	DSP FILTER	175.00
TRIO VB-2200GX	10W AMP FOR TR2200GX	49.00
TRIO TL-120	AMPLIFIER	129.00
WELTZ DUMMY LOAD	DUMMY LOAD	75.00
YAESU FRV7700	VHF CONVERTER	145.00
YAESU FRT7700	ANTENNA TUNER	35.00
YAESU FTS17	CTCSS UNIT FT411/FT811 ECT	39.00
YAESU MH-26E8	MIC TO SUIT YAESU MOBILES	30.00
YAESU MMB20	MOBILE MOUNT FT757	15.00
YAESU MMB21	MOBILE ADAPTOR	5.00
YAESU NC1828U	WALL CHARGER	6.00
YAESU PA3	MOBILE DC ADAPTOR	12.00

NEW ITEMS ARRIVING DAILY - CALL!

ZX Antennas

Mini 2000 Beam 3 Element 10/15/20 Mini Beam	£193	£12 P&P
G4 MH/3 Beam 3 Element 10/15/20 Mini Beam	£129.95	£12 P&P
G4 MH/2 Beam 2 Element 10/15/20 Mini Beam	£193.95	£12 P&P
GP3 Vertical 10/15/20 Mtr 3.9 mtr tall vertical	£59.95	£12 P&P
GP4 Vertical 12/17 Mtr 4.3 mtr tall vertical	£59.95	£12 P&P
SO/2 2 El 50MHz Beam Boom - 0.60m, Gain - 6 dB, F/B - 18	£48.95	£12 P&P
SO/3 3 El 50MHz Beam Boom - 1.75m, Gain - 9.1 dB, F/B - 25	£81.95	£12 P&P
SO/5 5 El 50MHz Beam Boom - 4.35m, Gain - 12.1 dB, F/B - 28	£81.95	£12 P&P
SO/6 6 El 50MHz Beam Boom - 6.40m, Gain - 12.5 dB, F/B - 35	£147.95	£12 P&P

HF YAGIS Full range of high spec custom designed 3kW rated send for details

Palstar Tuners

AT300 150W Tuner 1.8 - 30MHz W/Balun	£99.95	£8 P&P
AT300LCN 180W Tuner 1.8 - 30MHz X needle mtr w/balun	£139.95	£8 P&P
AT1500 1500W Tuner 1.8 - 30MHz X needle mtr w/balun	£299	£8 P&P

Palstar Meters Accessories

WM150 SWR/PWR Meter 1.8 - 150MHz 3kW X Needle	£89.95	£6 P&P
WM150M SWR/PWR Meter 1.8 - 150MHz 3kW X Needle	£79.95	£6 P&P
VR28 Roller Inductor 28mH 3kW Hi-Spec	£69.95	£6 P&P
VC350 Hi Pwr Variable Capacitor 350pf 6kV for Big Amps/ATU's	£69.95	£6 P&P
VC220 Hi Pwr Variable Capacitor 220pf 4kV for Amps & ATU's	£49.95	£6 P&P
DL1500 Dummy Load 1.5Kw 50Ω Dummy Load	£59.95	£6 P&P

Palstar Power Supplies

PS50 50A 13.8V Supply 13.8V DC 40-50 Amp w/meters	£169.95	£8 P&P
PS30M 30A Variable Voltage 13.8V Variable with meters	£99.00	£8 P&P
PS15 15A 13.8V Supply 13.8V Bench Supply	£59.95	£8 P&P
PS06 6A 13.8V Supply DC cigar socket & short CCT protection	£29.95	£8 P&P
PS04 4A 13.8V Supply 220pf 4kV for Amps & ATU's	£19.95	£8 P&P

A NEW YEAR, A NEW ERA FOR NEVADA! BY THE TIME YOU READ THIS ADVERT, WE WILL BE SETTLED IN OUR MASSIVE NEW 11,500

Hotline **023 9231 3090**

• Unit 1• Fitzherbert Spur • Farlington • Portsmouth • PO6 1TT

USE YOUR CREDIT CARD FOR SAME DAY DESPATCH!

r new 11,500 SQ FT
D FULL OF THE
MEDIATE DESPATCH!

Price match
CALL!
We match prices on the spot!

Alinco DJ-SR1
PMR 446
£238 PAIR!
£6 p&p
NEW!

ALINCO'S NEW RADIO
- fully spec'd & made in Japan!
See our Alinco ad for FULL DETAILS

SPECIAL OFFER
SPECIAL TWIN PACK
• 2 X DJ-SR1 + NiCads
• 1 x Drop in Charger
£238 - pair! £6 p&p

Goodmans Tracker
PMR 446
£99 PAIR!
£6 p&p
NEW!

SPECIAL OFFER
SPECIAL TWIN PACK
• 1 PAIR TRACKERS
• 1 x Drop in Charger
• Drop in Charger
• NiCads
£99 - pair! £6 p&p

- Switchable VOX
- Call function
- External Mic
- Speaker facility
- Excellent audio quality

Price match
CALL!
We match prices on the spot!

RTTY & CW made easy!
PATCOMM PC 16000E
NEW!

A full featured HF Transceiver with a patented built-in keyboard interface. Data may also be sent to a dumb terminal for display via a RS232 built-in serial port.

- Powers 1 - 100 Watts
- DSP filters built-in
- General coverage RX
- Built-in keyer

£1590 £8 P&P

Send SAE for FULL INFO

PATCOMM PC 9000
NEW!
NEW compact HF transceiver with optional RTTY Send \ Decode

- HF + 6 Metres
- 5W QRP or 40W output
- Built-in keyer

£799.95 £8 P&P

Send SAE for FULL INFO

Top Ten

1. **Yaesu FT-847** including FREE 30A PSU value £99 — £1499
2. NEW! **Icom 756 Pro** Icom's LATEST SUPER RIG! — £CALL
3. **Alinco DX-70TH** • 100W HF + 100W 6M • Superb receiver with filters • Separate Antenna sockets — £699
4. **ZX Mini 2000 Beam** A mini beam with just 2 metre boom length, & 3 elements (5 mtr long), that really performs. — £193
5. **Kenwood TM G707** 2M/70cm + great dislplay, wide RX inc AM airband/quick release front panel — SPECIAL £279
6. NEW! **Alinco DJ-V5** Compact dual band handheld plus wideband RX — £219.95
7. NEW! **Yaesu FT-100** NEW Mobile Transceiver covers 160-10M + 6M + 2M + 70cms! — ~~£1249~~ £CALL
8. **Yaesu FT-1000mp** •Still the TOP DX's CHOICE • Latest Model (AC + Collins) • Twin Receivers - Great Performance — ~~£2499~~ £CALL
9. NEW! **Yaesu FT-90** NEW Micro-sized Twinbander wide RX inc AM Airband — ~~£399~~ PRICE MATCH
10. **Icom 706 IIG** LATEST CLASSIC HF MOBILE TRANSCEIVER — ~~£1195~~ £CALL

Low Loss Coax SPECIALS

SIVA R-H100 — Semi airspaced double screened low loss 50 Ω cable

FREQ	LOSS PER 10 METRES
28MHz	0.11dB
50MHz	0.25dB
100MHz	0.35dB
400MHz	0.82dB

PRICE PER METRE £0.95
100 METRE DRUM CLEARANCE PRICE ~~£95~~ £59 £8 p&p

SIVA RG-213U — Popular low loss 50 Ω cable

FREQ	LOSS PER 10 METRES
28MHz	0.21dB
50MHz	0.45dB
100MHz	0.67dB
400MHz	1.47dB

PRICE PER METRE £0.73
100 METRE DRUM CLEARANCE PRICE ~~£75~~ £45 £8 p&p

SIVA RG-58CU — Popular lightweight coax cable

FREQ	LOSS PER 10 METRES
28MHz	0.41dB
50MHz	0.97dB
100MHz	1.4dB
400MHz	3.0dB

PRICE PER METRE £0.38
100 METRE DRUM CLEARANCE PRICE ~~£35~~ £18 £8 p&p

SIVA MINI RG-8 — Low loss small diameter cable

FREQ	LOSS PER 10 METRES
28MHz	0.39dB
50MHz	0.86dB
100MHz	1.28dB
400MHz	2.82dB

PRICE PER METRE £0.45
100 METRE DRUM CLEARANCE PRICE ~~£45~~ £29 £6 p&p

NEW!

Yaesu VX-5R
- 50 - 144 - 430MHz
- Wide Band Receiver
- Ultra Rugged Construction

SPECIAL £299 £8 P&P

Kenwood VC-H1
- For SSTV Pictures
- Send on most rigs
- Built in camera

CLEARANCE PRICE ~~£399.95~~ £245 £8 P&P

SGC 2020

£599 £8 P&P
PORTABLE HF TRANSCEIVER

Yaesu FRG-100

~~£489~~ £399 £8 P&P
- Covers 50kHz - 30MHz
- FM Option plus LOTS MORE!

SGC

PRICE MATCH

- HF SmartTuner SG-230 £8 P&P
- 500W Mobile Power Amp ~~£995~~ £799 £8 P&P
- SG-231 HF - 50MHz SmartTuner £349 £8 P&P
- SG-237 HF - 60MHz SmarTuner £289.95 £8 P&P
- SG-237 PCB Unit £219.95 £8 P&P

for the most up to date info
NEVADA ONLINE
www.nevada.co.uk

SQ FT WAREHOUSE AND SHOWROOMS. BIGGER STOCKS, BETTER SERVICE, FASTER DELIVERIES!

IT'S EASY TO PAY!

- by three post dated cheques
minimum order: £99

- Simply divide the price (including carriage) into 3 equal payments.
- Write 3 cheques dated in consecutive months starting with today's date.
- Write your telephone number, cheque card No & expiry date on the back of each cheque.
- Post them to us, enclosing your name & address & we will (subject to status) send your goods immediately.

Lead Feature

The Crawley Power Meter

*By Derek Atter MIEE, CEng, G3GRO**
*and Dr Stewart Bryant BSc, PhD, DIC, MBA, FIEE, CEng, G3YSX***

RELIABLE AND accurate RF power measurements are an important facility for anyone involved in RF projects. Power meters capable of operating at relatively high power (over 1 watt) are readily available, but little attention has been given to amateur techniques capable of accurate power measurement at lower power levels. The Crawley Power Meter is capable of direct measurement of powers in the range -9dBm to +22dBm (125µW to 150mW) with an accuracy of about of 1dB (~20%). It has a frequency response that is flat to within 1dB up to 280MHz. This design, based on readily available components, needs only a digital multi-meter (DMM) to calibrate it.

Crawley Power Meter with digital readout, shown with its external RF head.

AMATEUR POWER MEASUREMENT

TECHNIQUES FOR the accurate measurement of RF power have been studied in considerable depth in the electronics industry. For a good review of the available techniques and the issues involved in achieving accurate results, take a look on the web at the Hewlett-Packard Test and Measurement Group site [1].

Most of the amateur power meter designs that operate in the power and frequency ranges that we are considering have involved the use of diodes operating at the limit of their IV characteristics into a high impedance [2]. The more sophisticated designs use a matched pair of diodes in a thermally compensated arrangement [3]. Some designs used logarithmic amplifiers (for example the RSSI output of a Philips NE604), although until the recent introduction of the Analogue Devices AD8307 [4], most cost effective instruments had a top end frequency limit of about 50MHz. These diode and log amplifier instruments measure voltage, not true RMS power, and are calibrated by measuring the output of a signal generator which must itself be externally calibrated. By contrast, the instrument described in this article is a true RMS power meter, and can be calibrated with a DMM.

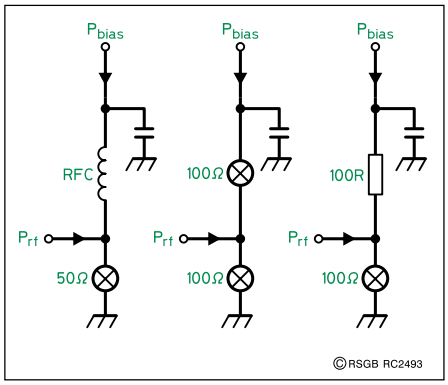


Fig 1: (a) G4COL single bulb RF sense head, (b) the two bulb approach, and (c) the approach used in the Crawley Power Meter.

The basic sensing element in the Crawley Power Meter is a small light bulb held at constant temperature and hence constant resistance, by a biasing circuit. The use of light bulbs in RF power measurement goes back to the early days of radio [5]. The technique typically involved dissipating the RF power in a bulb and then optically comparing the brightness of the bulb to a matched bulb fed by a metered DC supply. When the bulbs were of equal brightness, the DC power was equal to the RF power. Unfortunately, the resistance of a bulb varies significantly with the filament temperature and hence with the RF power applied. This in turn means that the device under test is subject to varying and unspecified loads.

An example of the use of a bulb as the sense element in a power meter is the design published by Ian Braithwaite, G4COL [6]. Ian's design, which was limited by the inductance of the sense element to about 30MHz, used in effect a simple analogue computer to calculate the RF power. He later published a simpler derivative of this design [7]. This later instrument used manual balancing and required the user to measure the voltage across the bulb, both with and without RF

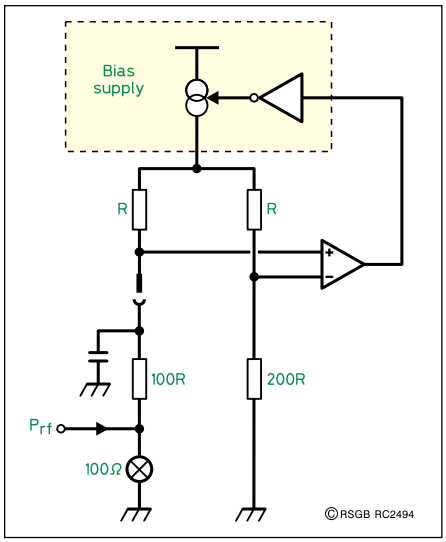


Fig 2: The RF sense head with bridge-controlled DC bias.

** 1 Little Crabtree, West Green Crawley, Surrey RH1 7HW.*
E-mail: DAtter@compuserve.com
*** 3 Redstone Park, Redhill, Surrey RH1 4AS.*
E-mail: SFBryant@iee.org.uk

power. Some calculation was then required to determine the RF power from these measurements. We investigated the latter design in some depth and were impressed by both its dynamic range and high-end frequency response (over 144MHz), both of which had been understated in the reported results. In the G4COL designs, a single bulb was used to measure the RF power level (**Fig 1a**).

The bulb used was a relatively large MES screw-in type torch bulb (nominally 6.0V, 0.1A, 60Ω), and the inductance of the coiled filament, together with its associated wiring, determined the upper frequency limit. In addition, these instruments used a choke to isolate the RF path from the DC bias circuit. The construction of this choke is critical to avoid unwanted losses and resonances, especially over an extended frequency range.

At a Crawley Amateur Radio Club presentation on G4COL's instruments, G0SQF referenced an article [8] using a two-bulb approach, based on a bridge (**Fig 1b**). This arrangement has three advantages.

1. The RF load consists of two bulbs in parallel. This allows the choke, along with its stray reactance, to be eliminated.

2. By using two very small bulbs, each dissipating half the power, it potentially reduces the stray reactance, which in turn tends to increase the useful operating frequency range.

3. Since the two bulbs are operated in series at DC, each bulb can be run at a higher resistance (ie 100Ω each) and hence lower current.

A mathematical analysis of the design (Appendix 1) showed that it was possible to obtain a linear reading of power without the need for a multiplier, either in the form of an analogue computer or a pocket calculator. The final refinement to the design (**Fig 1c**) was the realisation that one of the bulbs could be replaced by a resistor and, contrary to our intuition (but not our mathematics), would not affect the sensitivity of the instrument. This removed the need for a matched pair of bulbs and marginally increased the VHF performance (resistors have lower inductance).

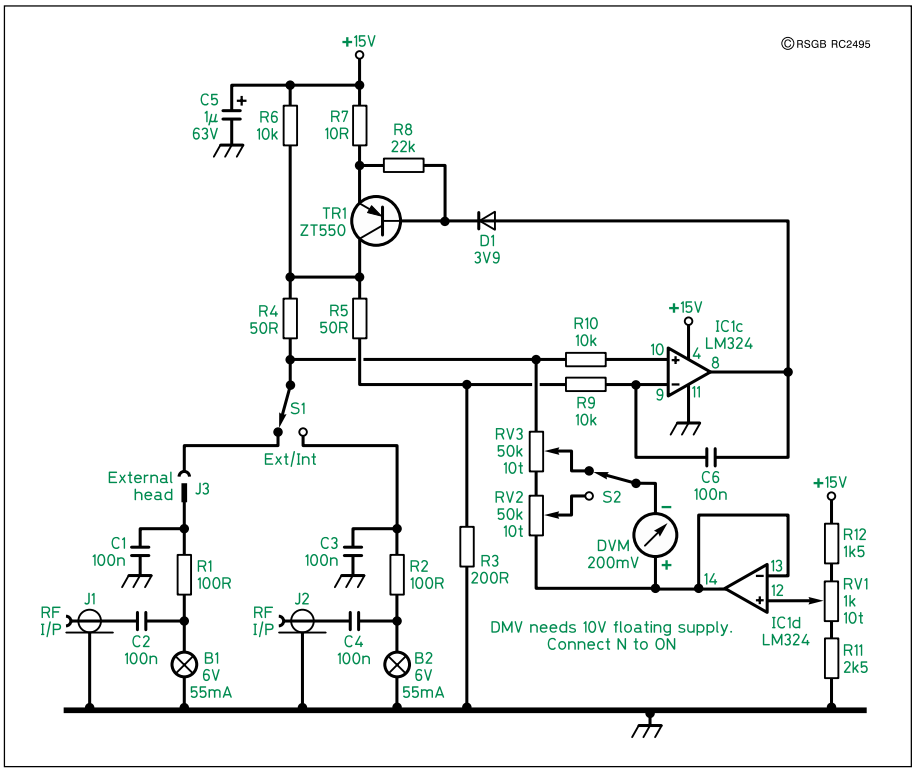


Fig 3: Power measuring circuit for the digital version of the Crawley Power Meter.

COMPONENTS

(Digital version)

Resistors (all fixed resistors, 0.6W 1%)

R1, R2	100R
R3	200R
R4, R5	50R
R6, R9, R10	10k
R7	10R
R8	22k
R11	2k5
R12	1k5
RV1	1k 10-turn panel mounting
RV2, RV3	50k 10-turn pre-set

Capacitors

C1, C2, C3, C4, C6	100nF 50V disc ceramic
C5	1µF 63V electrolytic

Semiconductors

IC1	LM324
TR1	ZT550
D1	3V9 400mW Zener

Miscellaneous

DVM	200mV DVM module with floating inputs (ie PM-128 from Vann Draper)
B1, B2	6V 55mA wire ended bulb (RS part 587-068)
J1, J2	BNC panel socket
S1, S2	SPDT toggle

POWER SUBSTITUTION TECHNIQUE

THE CRAWLEY Power Meter and the instruments described in [5], [6] and [7] all use a power substitution technique. This technique works by measuring the reduction in DC bias power needed to maintain the sense element at constant resistance when the sense element is heated by the dissipation of RF power. With these instruments we can calculate RF power dissipated by the sense element as:

$$P_{rf} = P_{\text{bias with no rf}} - P_{\text{bias with rf applied}}$$

Normally in commercial designs, the sense element is either a resistive thin film element or a thermistor, but these are expensive and difficult to source. In the Crawley Power Meter we used a small wire-ended 6V 55mA bulb in place of the thermistor. This has a nominal resistance of 110Ω. We placed the RF head in a bridge circuit, which then automatically adjusts the applied bias to the level necessary to maintain the resistance of the bulb filament at 100Ω (**Fig 2**). In this circuit, a voltage controlled constant current source biases both the sensor head and a 200Ω reference resistor. When the bias is such that the bulb has a resistance of 100Ω, the total resistance of both legs of the bridge will be 200 + RΩ, equalising the currents in both legs, and hence balancing the bridge. A differential amplifier compares the voltage across both legs of the bridge. Its output voltage controls the current source. Note that the simplest realisation of this instrument requires an inverting current source in which the current is inversely proportional to the control voltage.

OPERATION

THE BRIDGE operates as follows:

As the current flowing through the bulb increases so does its resistance, increasing the voltage across the bulb and its series 100Ω resistor. This increases the voltage applied to the positive input of the differential amplifier, which in turn increases the control voltage applied to the constant current source, reducing its current.

As the current through the bulb reduces, so does its resistance. This reduces the voltage across bulb, which brings the circuit back to balance. Similarly, if the current through the bulb decreases, so does its resistance, which causes the differential

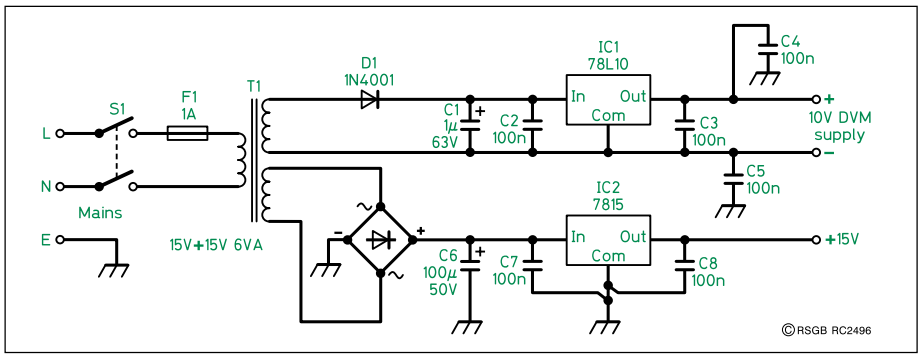


Fig 4: Power supply circuit.

amplifier to increase the applied current to restore balance.

Finally, you should notice that the RF head (the bulb, its 100Ω series resistor, and the de-coupling capacitor) needs only two connections (bias and ground) to the main instrument. This makes it simple to connect a remote sense head via a length of screened cable.

In Appendix 1 you will see that for this design of RF sense head, the change in bias voltage is directly proportional to the input RF power. We show that the relationship is approximately:

$$P_{rf} = 10V\Delta V \text{ mW}$$

where:

- P_{rf} is the RF input power in mW,
- V is the voltage across the sense head (bulb + 100Ω resistor) without RF power, and
- ΔV is the difference between the voltage across the head with and without RF power.

DIGITAL POWER METER

THE CIRCUIT for the digital version of the Crawley Power Meter is shown in **Fig 3**. The internal RF head consists of C3, C4, R2 and B2, and the external head consists of C1, C2, R1 and B1. Because of the small DC voltage changes that need to be measured, and to keep RF out of the bridge balancing circuitry, the external head is connected to the power meter via a length of 50Ω coax, using BNC connectors. S1 selects between the two available heads. R3, R4 and R5 form the remainder of the bridge. R3 sets the series resistance of B2+R2 (or B1+R1) at bridge balance. The choice of value for R4 and R5 is a compromise. The larger they are the more sensitive the bridge will be to the out-of-balance condition. However, increasing the resistance of these components also increases the voltage needed to drive the bridge. R1 and R2 must dissipate 50% of the RF power under measurement and hence must have both good RF characteristics and be capable of dissipating the necessary power. The accuracy of R1 through R5 is critical to the accuracy of the power meter as a whole. They must all dissipate the necessary power and yet remain at their designed values. In the prototypes, we used 0.6W 1% metal film resistors for these components. Power dissipation of the instrument could be improved by proportionally scaling R3 and R5, but care must be taken that they do not have a resistance that is significant compared to the input impedance of the bridge balance circuit. Making the two halves of the bridge identical is the conservative approach.

A controllable constant current source consisting of TR1, R7 and R8 supplies bias power to the bridge. Because TR1 is a PNP transistor, the current is inversely proportional to the control voltage. The bridge balance detector IC1c controls the constant current source. Op-amp IC1c measures the difference between the current flowing in the two halves of the bridge. When the bridge is balanced, the voltage at S1 will equal the voltage at the junction of R3 and R5. R9 and R10 isolate the bridge from the Op-amp. The output voltage of the Op-amp settles at the voltage necessary to drive sufficient current through the bridge. Because the base voltage that TR1 needs to achieve the balance is close to the +15V supply, a Zener diode (D1) is used to provide an offset, moving the required Op-amp output voltage closer to the supply voltage mid-point. R6 bypasses the constant current source and ensures that even when TR1 is turned off a small current always flows through the bridge. This prevents latch-up on power-up, or when switching measurement heads.

The reference voltage (the term V in the analysis) is set by RV1. A second Op-amp connected as a voltage follower sets the impedance of this voltage reference close to zero, providing isolation between the reference voltage and the operation of the bridge and voltage measurement circuitry. RV2 and RV3 are a potential divider that scale the difference between the bridge output and the reference output (ie they scale ΔV). The DVM module measures this scaled voltage. The DVM module needs a floating power supply of approximately 10V. On the DVM module the 'N' pin must be connected to its 'ON' pin to enable the display of the sign of the voltage difference. The voltage scaling was relatively large on the 200mW range and relatively small on the 20mW range. However, it was also quite variable, depending on the exact voltage that was needed to set the bulbs to 100Ω. We opted to use a pair of 10-turn preset potentiometers (RV2 and RV3) rather than the more conventional approach of cheaper pre-sets with series resistors. In analysing the operation of this circuit further, you should note that the input impedance of the DVM module is in excess of 10MΩ. For the purpose of calculating the necessary setting of RV2 and RV3, the presence of the DVM can therefore be ignored.

Fig 4 shows the power supply circuit. Because a 15V supply was needed to provide the necessary headroom in powering the RF heads, operation from the standard 13.8V supply found in most amateur radio stations was not possible. We therefore elected to provide a suitable internal mains power supply. T1 is a 15V 6VA transformer with two separate windings. One winding provides the 15V supply using a standard bridge and integrated voltage regulator arrangement. The isolated 10V supply for the meter is generated using the other winding and a half-wave rectifier. Because the current consumption of the DVM module is extremely low, a battery could have been use instead. In this case, a relay should be used to automatically disconnect the battery when the instrument is not in use.

ANALOGUE POWER METER

SOME CONSTRUCTORS may prefer the use of an analogue meter to display the measured power. **Fig 5** shows the analogue version of the power meter. The bridge, the controllable constant current supply, and the reference voltage supply are identical to the digital power meter design. The DVM

COMPONENTS

(Power Supply)

Capacitors

C1	1µF 63V electrolytic
C2, C3, C4, C5, C7, C8	100nF 50V disc ceramic
C6	100µF 50V electrolytic

Semiconductors

IC1	78L10
IC2	7815
D1	1N4001
D2	50V 1A bridge rectifier

Miscellaneous

T1	15V + 15V 6VA mains transformer
S1	DPST mains switch
F1	1A

COMPONENTS

(Analogue Version)

Resistors (all fixed resistors, 0.6W 1%)

R1, R2	100R
R3	200R
R4, R5	50R
R6, R9, R10, R13, R14, R17	10k
R7	10R
R8	22k
R11	2k5
R12	1k5
R15	1M
R16	100k
R18, R19	See text
VR1	1k 10-turn

Capacitors

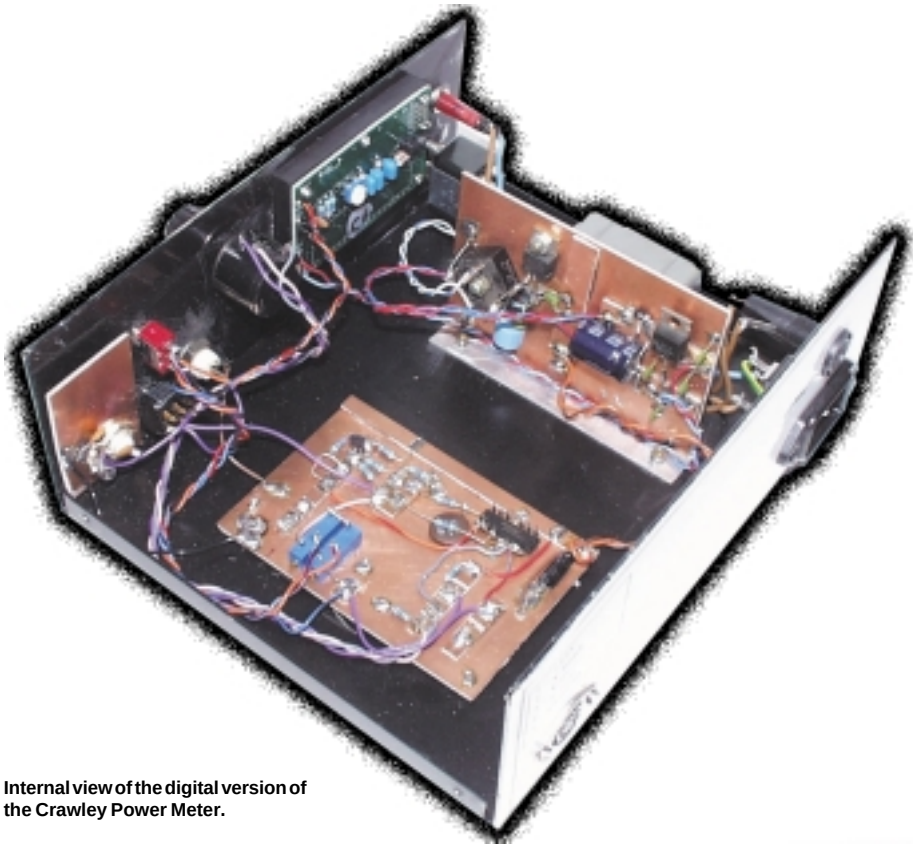
C1, C2, C3, C4, C6	100nF 50V disc ceramic
C5	1µF 63V electrolytic
C7	4.7µF 63V electrolytic

Semiconductors

IC1	LM324
TR1	ZT550
D1	3.9V 400mW Zener
D2, D3	1N914

Miscellaneous

Meter 1	100µA
B1, B2	6V 55mA wire ended bulb (RS part 587-068)
J1, J2	BNC panel socket



Internal view of the digital version of the Crawley Power Meter.

is replaced by an inverting amplifier with pre-settable gain (IC1a), and a voltmeter consisting of a 100µA meter with a series resistor (R18 or R19). The amplifier is operated at a convenient gain that is a multiple of ten. The voltmeter series resistors are set to achieve the correct calibration, compensating for the meter's internal resistance.

On the 300mW and 100mW ranges, a gain of one is needed, so the feedback resistor (R17) is made equal to the inverting input resistor (R13). On the 30mW and 10mW ranges a gain of ten is used so that the same voltage is read by the voltmeter. Similarly, on the 3mW range, a gain of 100 is required. In order to apply some meter damping, C7,

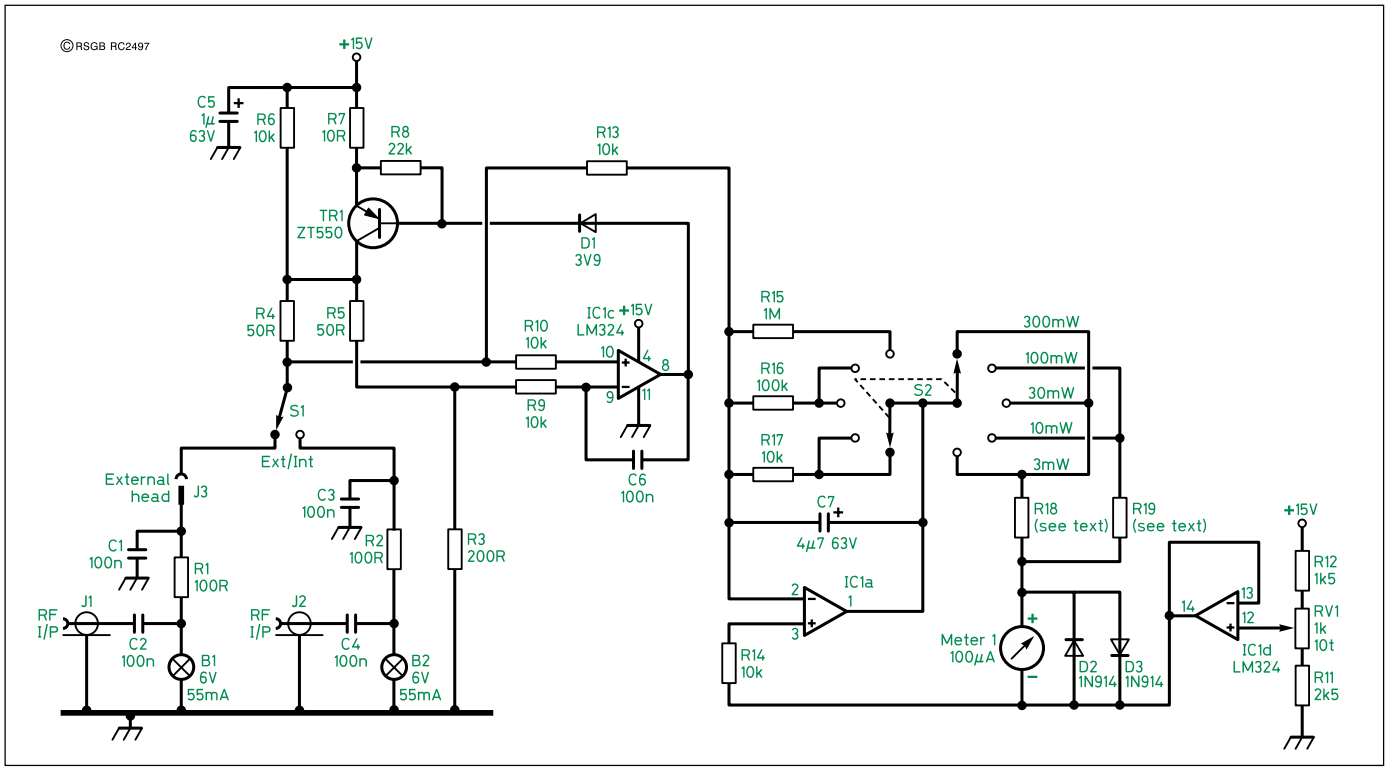
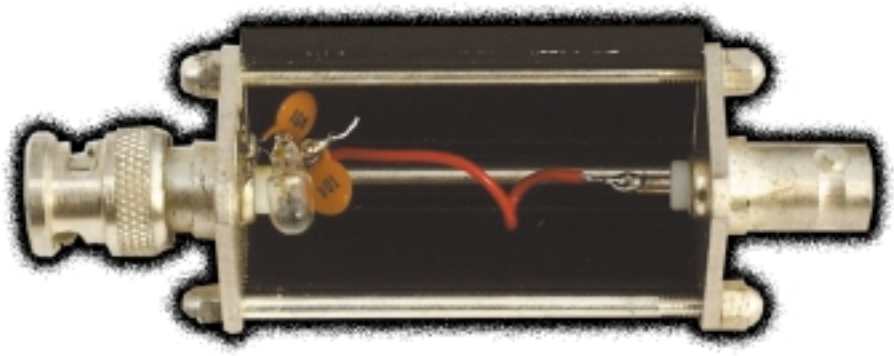


Fig 5: Analogue power meter circuit.



Internal view of the external RF head.

connected in parallel with the feedback resistor, provides an integration function. The amplifier must measure the difference between the voltage on the RF head and the voltage on the reference line (the output of IC1d). The non-inverting input is connected to the reference voltage via a 10k resistor to minimise an effect called 'input offset voltage'.

The process for setting the voltmeter resistors R18 and R19 is first to measure the quiescent voltage across the RF head, and to use this to determine the voltage at the meter for the given measured power. If we assume a head voltage of 9.6V, then we know that with a 300mW input, the change in voltage on the RF head would be 3.125V (using the relationship $P_{rf} = 10V\Delta V$mW - see Appendix 1). Since on this range the amplifier has a gain of one, we need to set R18 such that 100µA flows through the meter when the 3.125V is applied to it. If a 100µA meter is used this means that the total resistance of the meter plus R18 must be 31.25k [9]. The value can either be realised by directly selecting a suitable resistor (using standard values in series/parallel, as needed), or, preferably, by using a lower value resistor in series with a variable resistor. Similarly, on the 100mW range, the differential voltage will be 1.04V and the required value for R19 will be 10.42k. The meter movement, which should be scaled 1-3 and 1-10, is protected by a pair of back-to-back diodes, D2 and D3.

The analogue power meter only needs a single 15V power supply.

CONSTRUCTION

TWO COPIES OF the Crawley Power Meter were constructed, one digital and one analogue. The only critical area of construction is the RF heads. Here, careful choice of components and good RF practice in construction is critical to achieving good high frequency characteristics. In particular, lead lengths should be minimised.

We soldered the input coupling capacitor (C4) directly to the input socket and then soldered the bulb directly to its other lead, soldering the ground lead of the bulb directly to the body of the BNC input socket. Similarly, the lead lengths of R2 and C3 were minimised. The resultant 'birds nest' had the lowest inductance that we could achieve with these components, and correspondingly the best HF response. With one prototype, we placed the RF head on the main board, connecting it to the bulkhead BNC socket with a short length of miniature 50W coax. Unshielded lead lengths at one end were about 5mm at the board, and about 10mm at the socket, limited by the physical size of the components. When we carefully measured the frequency response, we found a 20dB null at about 143MHz. Reconstructing the head directly on the bulkhead connector removed all traces of this problem.

Construction of the bridge, readout and power supply is relatively simple and not critical. Any preferred technique - PCB, stripboard or 'dead bug' may be used. We both chose the dead bug approach. Although this is not as aesthetically pleasing as a PCB or stripboard approach, the solid groundplane, short lead lengths and low parasitic capacitance makes it ideally suitable for one-off RF and very low voltage designs. The number of wires needed is relatively small, so construction is not particularly onerous.

APPEARANCE

TO ACHIEVE A professional appearance for the finished project, a computer package was used to produce the artwork for the front and back panels. A laser print of the artwork was glued to the panel metalwork using a transparent spray-on adhesive. When dry the panel was covered with a transparent plastic film of the type that is sold for covering books. Provided care is taken to avoid stretching or tearing the plastic surface when mounting components on the panel, the result is a durable and attractive finish. A copy of the panel artwork with suitable drilling marks inscribed may be tacked over the panels and used as a template to ensure the correct hole alignment with the final panel artwork.

The calibration of the Crawley Power Meter depends directly on the exact voltage at which the resistance of the bulb is 100Ω. In some cases a number of heads might need to be build for the power meter (eg, you might wish to provide remote monitoring, to include the sense element in an attenuator, or to experiment with a frequency-compensating network to extend the HF response). In this case a simple jig can be constructed to measure the bias voltage when no RF is applied. The RS Components bulbs that we used were supplied in batches of 10. From each batch a couple of pairs that were matched to within 100mV (0.2%) were selected. The construction of this jig is not critical (it operates at DC). The power meter drives the jig using the external head socket.

All the components needed for this project are readily available. The only critical components are the bulbs. These are available from RS Components, which trades on the amateur electronics market as Electromail. If you are unable to source these bulbs, they should be substituted by the smallest wire-ended 6V 55mA bulbs available. If a different type of bulb is used, an accurate calibration run must be undertaken to verify that a satisfactory HF response has been achieved.

CALIBRATION

CALIBRATION OF THE digital power meter is achieved by setting the 10 turn pre-set resistors (RV2 and RV3) such that they satisfy the scaling equation derived in Appendix 1:

(equation 1)

Where V is the voltage across the RF head when no RF power is applied and V_m is the DVM voltage required when power P_{rf} is applied. R1 represents the resistance across the DVM module (which is dominated by the setting of RV2 and RV3), and R_1+R_2 is the total resistance of RV2 plus RV3.

To calibrate the power meter, first measure the voltage across the RF head with no RF power applied using a DMM. Then measure the series resistance of RV2 and RV3, again using a DMM. Using equation (1), calculate the required settings for RV2 and RV3.

As shown in Appendix 1, one of our instruments needed a resistance ratio of 0.0961 on the 200mW range. In this case the resistance of RV2 and RV3 in series was 94k, thus the resistance across the DVM module when S2 was switched to the 200mV range need to be 0.0961 x 94k = 9.03k. A DMM was used to measure the resistance between the positive terminal of the DVM module and the slider of RV2. RV2 was adjusted until a resistance of 9.03k was measured. Similarly, on the 20mW range, a resistance of 90.3k was needed between the slider of RV3 and the positive terminal of the DVM module. ♦

To be continued...

ESSEX AMATEUR RADIO SERVICES

ears97.com

01268 752522

ALAN

CHRISTMAS GIVEAWAY

NEW

(4) FT 1000MP AC	**£1,625**	3 IC 706G	**£875**
(6) FT 100	**£925**	(10) IC PC R1000	**£249**
(8) FT 847	**£1,199**	(3) AOR 8200	**£299**
(1) FT 736R	**£1,100**	(1) AOR SUD 5000	**£499**
(4) ALINCO DX70TH	**£550**	(2) MVT 9000	**£265**
(4) TS 870S	**£1,450**	(4) ICR 72E (AC)	**£399**

PRE USED

TS 950 SDX late model.	**£1,899**	IC W32E	**£195**
TS 950 SDX	**£1,699**	IC 746 HF/6M	**£995**
TS 690 SAT HF + 6M	**£695**	IC R 71E	**£300**
TS 940 SAT HF	**£595**	DX 70	**£399**
TS 505 HF	**£500**	DX 70TH	**£499**
IC 736 HF + 6 PSU	**£695**	FT 736R 2/70 Mint + Boxed.	**£750**
IC 706 I HF + 2M + 6M	**£495**	FT 736R 2/70	**£600**
IC 821H 2/70	**£695**	FT 890 AT HF	**£550**
IC 207 H 2/70	**£250**	FT 900 AT HF	**£595**
IC 820 H 2/70 BASE	**£650**	FT 290 II 2M MODE	**£275**
IC 735 HF	**£395**	FT 690 II 6M/MODE	**£295**
IC 725 HF	**£295**	FT 847 2/70/6/HF	**£895**
IC 726 HF + 6M	**£395**	FT 8100R	**£275**
IC T8E	**£250**	FT 8000R	**£250**
IC T7E	**£165**	FT 3000M	**£200**

PLUS LOTS MORE – CHECK WEB SITE

WE NEED YOUR PRE USED RADIOS & EQUIPMENT – TOP PRICES PAID

01268 752522

email: alan@ears97.com

Transverter Interface for the Icom IC-746

*By Andy Talbot, G4JNT**

HAVING RECENTLY acquired an Icom IC-746 HF/50/144MHz transceiver, I wanted to be able to use it with a range of transverters to allow operation on 137kHz, 70, 432MHz and 10GHz using a choice of different drive frequency bands.

The IC-746 transceiver's output power is adjustable over the range 5W to 100W from a front panel control, and the obvious solution is simply to turn this to minimum and use a 5-watt rated attenuator to reduce the transmit RF to the few milliwatts needed for transverter driving. This, of course, is a recipe for disaster! Remembering to have to set the drive control to minimum each time a transverter is connected, together with the proximity of this knob to the CW pitch control on the IC-746, means that it would be very easy to unintentionally apply 100 watts to the attenuator, almost certainly destroying it and with the potential of damaging the transverter further up the chain. One solution would be to simply rate the attenuator at 100 watts, but that would just be silly.

AUTOMATIC LEVEL CONTROL

EXAMINATION OF THE manual for the IC-746 shows an ALC input on a phono socket on the back of the rig, with the connection to this duplicated on both accessory sockets. The ALC input is intended primarily for use with external linear amplifiers, to allow these to operate at the correct level by varying the RF input to them automatically - equivalent ALC input connections are usually available on other makes of transceiver. This suggests a route to a more failsafe transverter interface.

The handbook specifies a voltage in the range -1 to -4 volts (note that this is negative, in common with most other makes of transceiver) and examination of the circuit diagram showed that in this rig the input is buffered by a PNP emitter follower, an input resistance of 100kΩ with protection against reasonable overvoltage. The buffered voltage actually drives gate 2 of a pair of dual gate MOSFETs in the early stages of the transmit driver chain. Tests with a variable voltage applied to the ALC socket confirmed that the RF output on all bands could be reduced to zero with a voltage that in fact only had to vary over a relatively narrow range around -1.6 volts. In practice the absolute value of this voltage will vary for different transmitters and is likely to shift with temperature, but the relatively narrow range needed – which points to a high ALC loop gain – will be a common feature, ensuring constancy of output level from external linear amplifiers in spite of any gain variations over the operating bands. For interfacing to transverters, a negative voltage derived by rectifying the RF from the antenna connection directly, then feeding back to the ALC input, ought to make it possible to set the wanted RF level. The simple test circuit shown in **Fig 1** confirmed that this was indeed the case; at maximum setting of the variable resistor it was possible to reduce the IC-746 output level to around 40mW (this being the RF level which in a 50Ω load gives a fed back voltage in the region of -1.6 V).

FAIL SAFE OPERATION

IN ITS SIMPLEST case this is all that is needed for the transmit RF part of a transverter interface – a 50Ω load with RF pick off, and diode detector across it. However, we still need to provide transmit receive switching, since most transverters with low level inputs have separate transmit and receive IF ports, and there is still a potential danger here in that the reduction of RF is governed by a physically separate connection. If this connector is forgotten or fails, the full 100 watts could still appear on the transverter input which, if it is now designed to accept just 40mW, could be even more catastrophic.

The method of preventing damage from this failure mode is to add a relay at the interface input, controlled by the rectified voltage, such that if too much RF is applied the relay opens, preventing overdrive and damage. This does mean that the transceiver will now be operating into an open circuit, but its own self-protection circuitry - which is always present in any self-respecting rig - can now come in to play and prevent damage to the PA stage. An audible warning of this situation such as a buzzer helps to identify a problem immediately. Obviously, the relay contacts need to be normally open and the relay pulled in for normal operation, so that if RF is applied without DC power being present on the interface, no RF can pass into the attenuator elements.

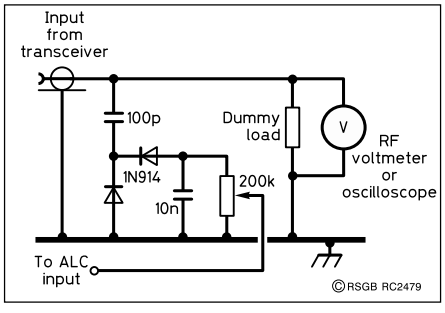


Fig 1: The circuit for ALC operation.

As it is difficult to use a negative voltage to control switching circuitry when a negative supply rail is not present, a second RF detector circuit, this time giving a positive output, can usefully be used here. In any case, having the two separate level detectors for different functions is good engineering practice, as it separates the level control feedback from the overload warning circuitry.

OTHER CIRCUIT ELEMENTS

A COMPLETE transverter interface will provide separate ports for transmit and receive. To do this needs transmit/receive control from the transceiver, to direct the RF to the appropriate interface port; and since this switching function is now available, provision of switched Tx and Rx voltage supplies for transverter hardware might as well be added. All transceivers provide this control output for linear amplifier switching, usually in the form of a switch closure to ground. On the IC-746 the Tx/Rx connection is on a second phono socket adjacent to the ALC input - what a coincidence - but, surprisingly, not duplicated directly in the accessory socket.

COMPLETE INTERFACE

THE CIRCUIT DIAGRAM of the complete transverter interface is shown in **Fig 2** and works as follows.

The negative ALC voltage is derived from D1/D2. These are driven from a capacitive potential divider, to lower the voltage across the diodes should the full 100 watts be applied. RV1 sets the ALC level and therefore the RF power that needs to be dissipated. A 5dB power attenuator, capable of absorbing 3W continuously, follows a normally open relay contact in the RF input path. This attenuator is left in circuit on receive as well, but there should always be sufficient IF gain in a transverter to permit a small amount of attenuation in the return path. The second overload detector sits at the output of this 5dB attenuator and consists of D3/D4, feeding into a level sensing circuit. This keeps RLA1 pulled in, closing the RF path. The threshold voltage is set

*15 Noble Road, Hedge End, Southampton, S030 0PH.

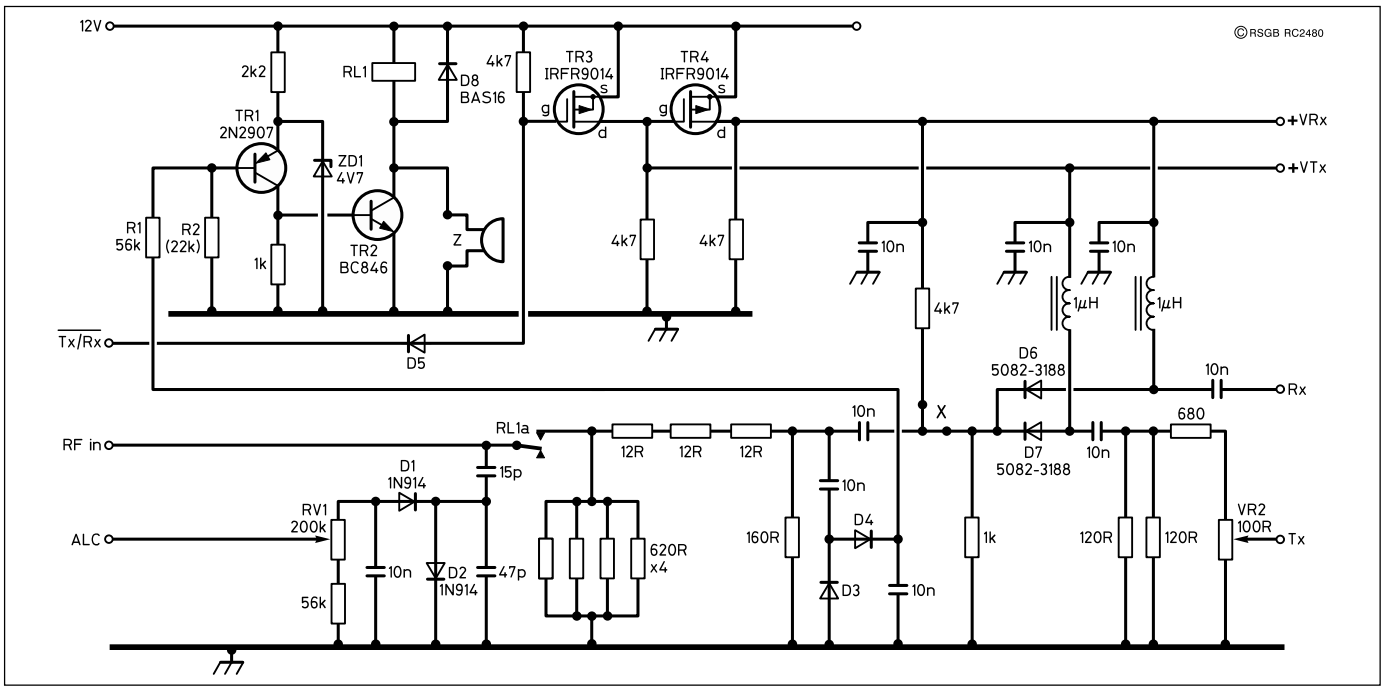


Fig 2: Transverter interface circuit diagram.

by the values of R1, R2 and ZD1; with the values shown the relay will trip at approximately 1.5W at this point, equivalent to 4.5W from the transceiver [1].

The DC supplies for Rx and Tx DC power are switched alternately by two P-channel MOSFETs, controlled by the T/R line. The devices specified can carry 5A continuously, but can be directly replaced by higher (or lower) rated devices if needed. The use of power FETs here actually works out cheaper than using a relay for switching the DC. D5 is included to provide isolation, in case the transceiver outputs a DC level on the T/R connection when on receive.

Some time ago I adopted a UHF/Microwave transverter driving standard with 144MHz IFs of 0.5 to 1W on a single coax lead, with a DC voltage superimposed on this on receive only for T/R control [2]. This standard is compatible with the old Icom IC-202 144MHz SSB transceiver, with its ALC pot wound to maximum. Incidentally, this rig is still a firm favourite with microwave operators. By connecting the DC coupling link and taking the output connection from point 'X', this control standard could be generated from the interface here, ensuring compatibility with all my existing higher frequency equipment when the IC-746 is used for 144MHz [3].

For a standalone transverter interface module such as might be built into the transverter's case, transmit/receive RF switching for separate RF ports is provided by a pair of PIN diodes D6/7 and a 25-30dB attenuator on the transmit side to reduce the RF to a level suitable for directly driving a transmit mixer, ie a few milliwatts.

CONSTRUCTION

ONLY THE RF path is layout-critical, and even at 144MHz most construction methods (except Veroboard!) may be used, but a continuous ground plane is the best way of ensuring the wanted RF performance. An 80mm x 50mm PCB layout, shown in **Fig 3** and employing mostly surface mount components and wire ended resistors for the higher power attenuator elements is given for those who want to build a neat, compact, drop in module. The underside is a continuous ground-plane. This is connected to the top ground tracks by wire links and component leads in the appropriate places. No precise component details or list is shown, as most of the components may be substituted by ones of a broadly similar kind, to make best use of whatever is available in the junk box.

Depending on the drive frequency chosen, the value of the coupling capacitors and DC chokes may need to be altered. The values shown are optimum for the 10 to 50MHz range. For a 144MHz drive frequency, the 10nF capacitors could be reduced to 1000pF and the DC chokes to 220nH. Conversely, for 2 - 5MHz drive (for a 73/137kHz transverter, perhaps) these ought to be increased.

RV1 is adjusted to set a level of no more than 5W carrier from the transceiver, to avoid cooking the 5dB attenuator. If this

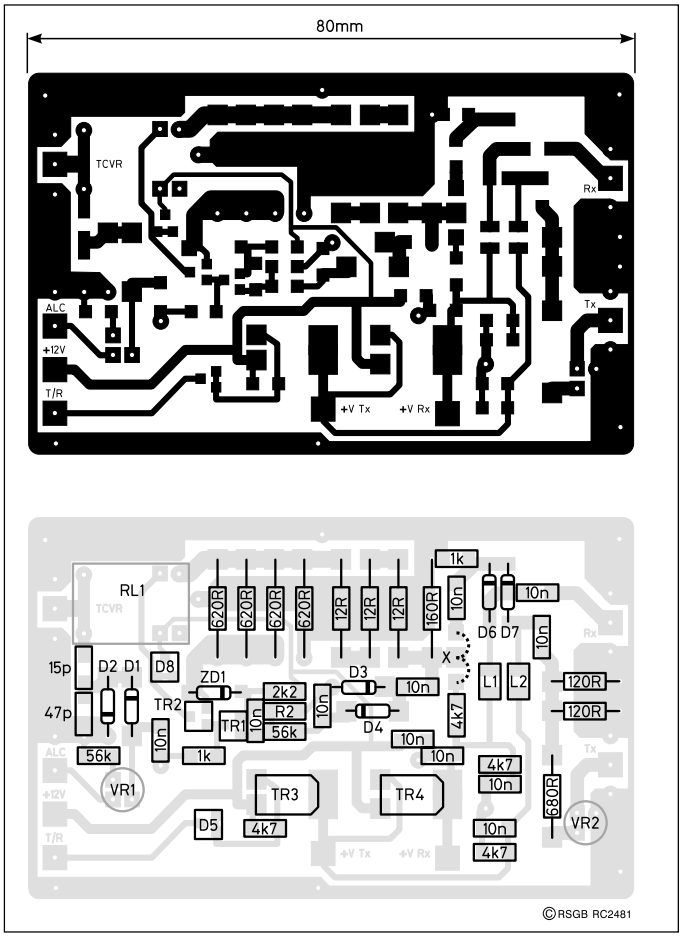
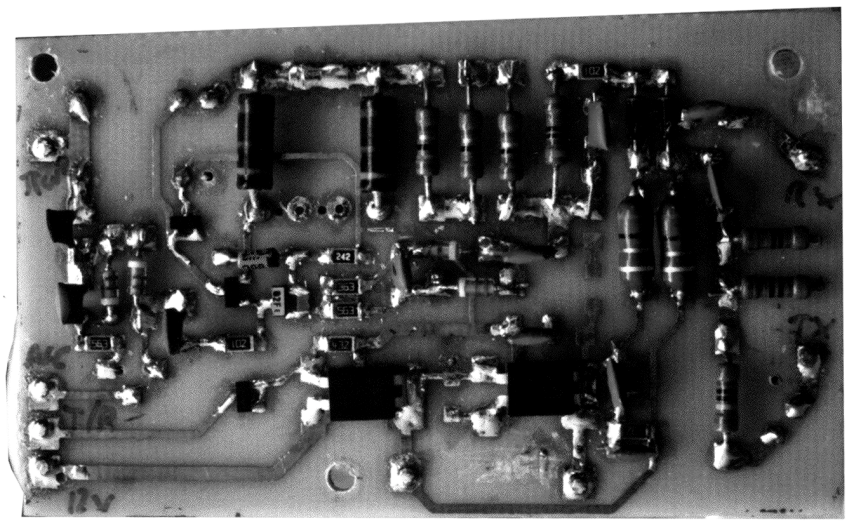


Fig 3: Printed circuit board layout. Most of the circuit is constructed from surface mounted devices, but wire ended resistors are used for the RF attenuator.

level trips the overload circuitry, either reduce the value of R2 slightly or operate at a lower interface level. A suitable point might be to trip at the 7-8 watt region, as modern metal film resistors should be able to survive this sort of abuse for short periods.

One component worthy of note is the relay. This may be asked (very briefly) to carry 100 watts of RF, so the smallest, lowest-rated contact devices should be avoided. Since this 'fault' situation shouldn't occur too often, it is not necessary to go as far as the sort of relay that might be used for 100W Tx/Rx switching.

By connecting a DC operated piezo sounder at point 'Z', audible warning will be given if the interface encounters an overload situation.



Track side of the completed prototype.

SUMMARY

THE TECHNIQUE shown here, using a commercial transceiver's ALC input to control the level supplied to a transverter, backed-up with additional independent overload detection circuitry, provides a safe interface that will prevent damage to transverter equipment if connections are left off or fail [4].

The only residual danger that can still occur is if the transmitter cannot operate safely into an open circuit - but this is only likely with ancient valve PA rigs, and these often have a low level output (with the PA heaters switched off) for driving transverters anyway.

NOTES

1. It is possible to adopt any RF level at the interface input point, down to the 40mW limit determined by the rectified voltage, but there are advantages in using a higher level here. Since the ALC-derived attenuation is applied to the early stages of the transceiver's transmit chain, the following stages will still have plenty of gain and will be operating well backed off. There is the possibility of noise being generated in the PA stages and of spurii leakage, which is normally at an acceptable level at a few watts output power, but with a 40mW carrier level could approach unacceptable levels in relative terms. By using an interface level in the region of 1-5 watts of RF, the PA is only operating 13-20dB below its rated power and added noise should not be noticeable.

2. A transverter interfacing module for Icom IC-202 and Yaesu FT-290 type transceivers, including power attenuator, RF and DC switching was developed some years ago and kits were made available via the Microwave Components Service run by Petra Suckling G4KGC. Reference JNT001. The details of this are given in the August 1992 edition of the *Microwave Newsletter*.

3 Another favourite old rig for microwave operators is the Yaesu FT-290, which uses the opposite polarity on the antenna connection - a positive voltage on transmit on the coax rather than on receive. This standard is not so fail-safe as the IC-202 polarity, as it allows more possibility of transmitting into the transverter's receive mixer if DC power is not on when RF is applied.

4. This usually happens on a windswept hilltop site, in a leaking tent, in pouring rain, a few minutes from the start of a contest. ♦

● Brian, G4TRE, is looking for anyone who has previous knowledge of a **Type 88 receiver** (circa 1958), inside which is hand painted 'El Aden Amateur Radio Club. Seria (sic) No MEL0180. 5A3CR'. G4TRE, QTHR. E-mail: g4tre@iparc.com

● The Duxford Radio Society is looking for someone who is scrapping a pre-WARC **FT101Z**. They need the **ceramic section** of the **band switch**, which lives in the PA compartment. Regrettably, Yaesu can no longer supply. G4HXH, QTHR. Tel: 01279 656149.

● Colin, G7HPI, is looking for a **6-pin Jones socket** and some **Pye type coax plugs**. Tel: 01793 534198.

● Mr D Evans is looking for information on the **Quasar ME240** ship's radio, or the address of the company in Taiwan who made it. D Evans, 6 Awel-y-Mor, Llandudno Road, Rhos on Sea, N Wales LL28 4BD.

● Peter, G4GEW, is looking for a copy of the circuit diagram and service manual for the **Gould Advance OS3000A** oscilloscope. G4GEW, QTHR. Tel: 01737 554388.

RadCom Helplines FOR MEMBERS

● Douglas, G3KPO, is searching for an ex-RAF **R1082**, **T1083** and **T1154** transmitter. G3KPO, QTHR. Tel: 01983 567665.

● Jim, G0PHZ, is looking for a copy of the circuit diagram and service manual for the **KW202** receiver. All costs covered. G0PHZ, QTHR. Tel: 0117 949 5393.

● A **contest group** in the North West (callsigns G8A and G3CSA) is seeking **new members**. G4WSE, QTHR. E-mail: kennedygc@aol .com

● John, G0FRO, is looking for a copy of the circuit diagram of the **Wavetek 3001** signal generator, or the address and phone number of Wavetek (of Indiana, USA). E-mail johnmedcalf@harwell.swinternet .co.uk

● Ray, G3EVT, is looking for a copy of the circuit diagram of the **Sony Handycam CCD-TR55E**. G3EVT, QTHR. Tel: 01789 762041.

● Steve, G3ZVW, would like to borrow a copy of the Service Manual for the **Yaesu FT-225RD**. All costs covered. G3ZVW, QTHR. Tel: 020 8882 5125.

● GW8HZW is looking for technical advice and help on using a set of coils and IF transformers from an **Eddystone 640** in a home built solid-state receiver. Tel: 01656 744892.

● GM0KMG would like to **thank** everyone who responded to his request for information on the **Drake R4-C**.

● Michael, EI6AU/ON9CAU, would like to know where to obtain a **Plessey SL6270 IC**. E-mail: mike.whelan@skynet.be

● Paul, MW5ABA, is looking for information on the three capacitors contained in a **Watson W2000** antenna. The components are marked: '10J 500V', '0.5C 500V', and '8D 500V'. 113 Maes Glas, Caerphilly, Mid Glamorgan CF83 1JW.

● Mike, G2DBA, has a full set of *RadCom's* from 1991 onwards, which he would like to **donate** to a club or educational institute. G2DBA, QTHR. Tel: 01494 525266.

Just Published

UK RADIO COMMUNICATIONS EQUIPMENT GUIDE £2.95

Postage £1.25

272 Pages in Full Colour

Over 2000 Products

"- - an excellent production and fascinating reading" - J Kyle
"This is the best equipment guide I have ever seen. Congratulations" - D Ponsford.
"About three times the size of a magazine and cheaper. Well done". R. Wells.
I have found products I didn't know existed. Thanks for an excellent publication - S. Sumner.

Phone Credit Card Orders
FREEPHONE 0500 73 73 88

The Most Comprehensive Equipment Guide
In the history of Amateur Radio
An Essential Bookshelf Publication

Waters & Stanton PLC 22, Main Road. Hockley, Essex. SS5 4QS
e-mail: sales@wsplc.demon.co.uk Web: www.waters-and-stanton.co.uk

Morse Campaign

*By Bob Whelan, G3PJT**

Students and instructors in RSGB HQ, at the start of the weekend.

THE FOLLOW-UP event to Morse Camp took place at RSGB HQ over the weekend of 20-21 November 1999. A further 16 VHF and Novice licensees passed their 5WPM Morse examination and one also passed his 12WPM examination. This second event had 25 candidates, rather than the 100 who attended the earlier event in September. This makes a total of 38 passes for both events. Taking these two events together and analysing what has been learnt about intensive Morse training gives us confidence to start to formulate a longer programme of Morse weekends, a *Morse Campaign*.

CONCEPT

THE ORIGINAL concept behind Morse Camp was proposed by Martin Lynch. Martin suggested that an intensive weekend of Morse instruction would be an effective way of achieving a sufficient proficiency to meet the requirements of the 5WPM Morse standard and hence gain access to HF with the new M5 licence. Such intensive instruction weekends have not been attempted in the UK before, except in professional and military training. Morse Camp was a first for all those involved. Because of this, a systematic attempt was made to capture results for subsequent analysis and to decide how such an exciting concept could be extended. Space does not permit all of the findings to be presented here, but they are available from me.

The first Morse Camp was widely advertised and heavily over subscribed, with 230 applications for 100 places. The applicants were virtually all VHF licensees. Morse Camp was seen as a route to HF as had been envisaged when the M5 license was conceived.

The format of both events was similar, with candidates being given a series of standardised receiving tests at 5WPM, the same length as the Morse examination itself. Promising candidates were given one-to-one sending instruction and a pre examination test, to see if they were up to 5WPM standard. This was repeated through the weekend. A candidate could have up to 40 receiving tests and one or two sending sessions. In the second event this was stepped up to at least four 30-minute tests. This is a very intensive process. Candidates' errors were monitored and recorded for later analysis. Morse examinations were available on demand to candidates as their standard improved and they felt confident to take one.

The candidates' initial familiarity with Morse code varied widely. A Morse Camp event cannot raise a candidates' standard from next to nothing to 5WPM, but it is evidently very effective in bringing candidates who have some knowledge and who have practiced before the event, up to standard. For the second event, candidates were sent a self-assessment tape and were encouraged to test themselves before the weekend, to make sure they met the minimum requirement. But just how much improvement in copying Morse at 5WPM can be achieved in a single weekend? Comparing receiving errors on the first three tests taken by candidates with the last three they took shows that improvements were significant (**Fig 1**).

By analysing the progress of candidates, test after test, it was clear that the rate of improvement was about the same for candidates who went on to pass the examination in the weekend as those who didn't meet the required standard. This implies that people were at different points on the same learning curve and that such events should be planned ahead in a programme, rather than be occasional. Candidates who just fail to meet the standard at one event will now be offered priority booking for the next. By this means it is hoped to build each event on the previous one.

A further finding from the second event was that more effort needs to be put into sending skills, so a series of sending exercises will be developed.

A good environment helps, that was the reason for using RSGB HQ for the second event. A large number of small rooms permitted 6 parallel sending sessions, as well as the main receiving room.

As we all know, passing the Morse test is partly about knowing the code, but also to a large degree having the self confidence to succeed in what for many is a stressful experience. Morse camps help greatly in both aspects; especially the latter. The mutual support that the candidates can give to each other is very significant as is the relationship formed with expert but sympathetic instructors. All candidates became very familiar with the format of the examination scripts and the way the examination is conducted. For many, Morse Camp provided the 'push' to learn the code, get an M5 call, become active on the HF bands and enjoy the excellent HF conditions.

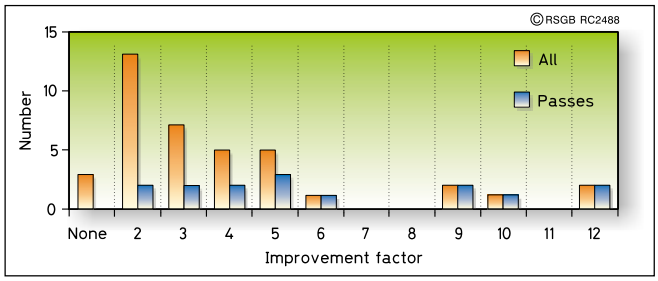


Fig 1: The first bar on the X axis represents candidates who did not improve. The last bars on the X axis represent 2 candidates who made 20 and a factor 54 fold improvement! The data is based on returned Morse cards.

INSTRUCTORS

A GOOD TEAM of instructors is a key factor and we gratefully acknowledge the support from CDXC, the UK DX Foundation, and FOC, the First Class Operators Club. Members of both clubs have been the core of the instructor teams. We are in the process of widening the pool of instructors for future events. All the instructors enjoyed the events greatly and found them personally rewarding.

Instructor G3KTZ (left), giving encouragement.

SPONSORS

MARTIN LYNCH and Sons and Bob Ives at Yaesu have been the principal commercial sponsors with the RSGB. Chris, G3TUX, The QRP Component Company, and specialist CW supplier joined the sponsors for the second event.

PROGRAMME FOR 2000

THE RSGB WISHES to support regional events during 2000. Clubs who feel they could organise such an event are invited to contact RSGB HQ without delay. In the meantime, the preliminary dates of Morse Campaign events for 2000 at RSGB HQ are: 26/27 February, 6/7 May, 8/9 July, September and November.

Bookings for February are now open, but no reservations further ahead can be taken at this time. See the RSGB website, GB2RS transmissions and *RadCom* for future release dates. RSGB HQ events are limited to 30 candidates. ♦

*36 Green End, Comberton, Cambridge CB3 7DY.

Propagation at Solar Maximum

*By Gwyn Williams, G4FKH**

THE MOST RESPECTED propagation prediction scientists are of the opinion that the next solar maximum is still scheduled to happen in the early part of 2000, during the period February to April, when a smoothed sunspot number of 160 is expected. As would be presumed, propagation at this time and for the following few years is expected to be at the best levels for long distance HF communications. This is the part of the sunspot cycle that all HF operators have been waiting for. Even those with modest equipment and aerial systems should be able to work DX. VHF and above will experience varying conditions at this time of the sunspot cycle, not necessarily enhancements, but more about this a little later.

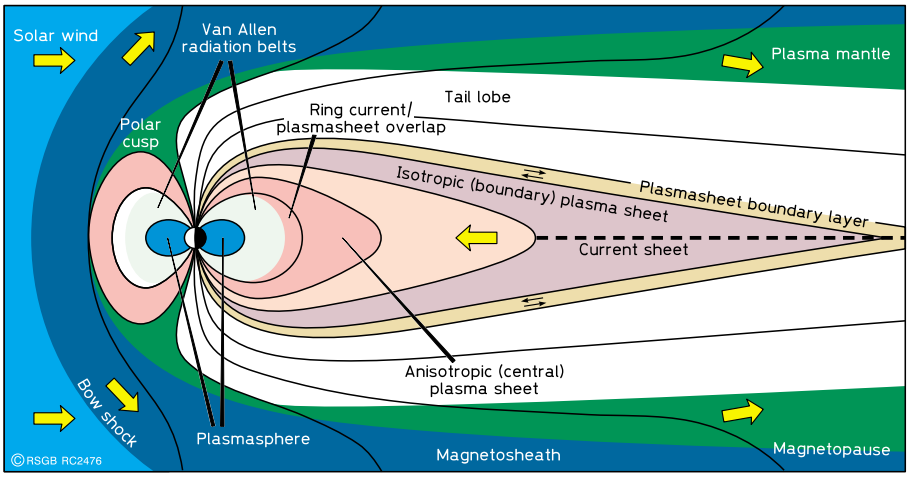


Fig 1: The geospace environment.

SOLAR CYCLES

ONE OF THE MOST striking features of our Sun is its cycle of 'activity'. The numbers of sunspots, solar flares, solar radio bursts and coronal disturbances increase and then decrease again every 9 to 13 years. Only during the last three cycles has it been generally appreciated that the underlying driver of this cycle is the solar magnetic 'dynamo', a convecting layer of electrically conducting material inside the Sun that produces a surface magnetic field of changing character with nearly periodic behaviour. These types of cycle have now been remotely sensed on other solar-type stars in our galaxy.

The solar cycle seems to be linked with a wide range of cyclic changes in the geospace environment (**Fig 1**). For a more complete article, see [1]. For example, changes in the upper atmosphere, the ionosphere and cosmic-ray-related radiation levels, the Earth's surface magnetic field, and Van Allen radiation belts. Geospace is coupled to the Sun and, as inhabitants of Earth and members of a technologically advanced society, we are compelled to understand the causes, modes, extent and consequences of that coupling.

Magnetic fields generated by the solar dynamo can only be directly observed at and above the visible surface of the Sun where sunspots contain the strongest concentrations of field. (NB: The Sun should only be viewed through imaging devices such as cameras with special filters or an arc welding lens of shade 14 or darker; *never* by the naked eye.) The solar activity cycle was first noticed in changes of the number, pattern, and magnetic polarity of the sunspots over the average 11-year cycle. Images of the Sun taken through filters that isolate narrow *ultraviolet* (UV), *extreme ultraviolet* (EUV), soft x-ray and optical wavelength bands show that the fields extend far above the sunspots, producing sometimes complex patterns of loops and arcades. These images also indicate the presence of weaker magnetic fields between the sunspots that underlie larger-scale systems of loops and arcades visible in the corona during solar eclipses.

Most frequently at solar maximum, the interactions between the magnetic fields and the moving, ionised solar atmosphere can twist strong fields above sunspot groups into unstable configurations storing substantial amounts of energy. This energy can suddenly be released as solar flares, which temporarily enhance the solar radiant output at radio and x-ray wavelengths, by several orders of magnitude. The larger-scale magnetic structures also undergo frequent eruptions during solar maximum. The ejecta from these *coronal mass ejections* (CMEs) can travel outward through the background solar wind at speeds of up to 2,000km/s. These fast CMEs cause interplanetary shocks as they move, thereby greatly enhancing the density and fields in the solar wind. The large-scale character of solar magnetic fields over the cycle also determines the large-scale pattern of coronal fields carried by the solar wind.

EARTH'S GEOSPACE RESPONSE

SINCE THE ADVENT of spacecraft capabilities it has become clear that conditions in interplanetary space and geospace can become extreme and highly dynamic (Fig 1). In particular, the Van Allen radiation belts, previously regarded as slowly varying and predictable features, were found to be much more dynamic and transient than any statistical model would imply. The bulk of the major geospace disturbances were a consequence of the CMEs, which on occasion compress the magnetosphere to altitudes well inside the geosynchronous orbit (at 6.6 Earth radii). Those CMEs that travel fast enough with respect to the relatively low-speed, quiet time (~400 km/s) solar wind, produce leading shock waves that are a major cause of solar energetic proton events. These proton events can contribute to the radiation belt for weeks or even months. Moreover, by virtue of their disturbance of the entire magnetosphere, it is the CMEs that cause widespread effects including auroral activity and ionospheric disturbances.

We have witnessed a gradual transition over the last few years from the high-speed solar wind stream activity characteristic of a solar minimum to the less predictable eruptive events that characterise a solar maximum. This change in behaviour manifests itself most spectacularly when CMEs produce enormous magnetic clouds that expand toward Earth. These CMEs can produce interplanetary shocks that hit the magnetosphere and may be followed by high solar wind speeds

*21 Borda Close, Chelmsford, Essex CM1 4JY.
E-mail; Gwyn@g4fkh.demon.co.uk

TERMS

T-INDICES

The T-index is a little known index that describes the strength of the ionosphere. **Fig 2** illustrates the response of the ionosphere to increased solar radiation. Higher values are good. Lower values are bad for radio communications. The last five solar cycles are plotted here, showing the monthly mean T-index values. T-indices over the last two solar cycles have reached similar maximum values, which implies that the strength of the ionosphere and resulting radio communications were of similar high quality.

The T-index can be seen rapidly increasing in 1998 at the right side of the plot. This is good news for radio communicators, as it confirms that we are well on our way toward stronger ionospheric conditions and better radio communications. The T-index fluctuates strongest near the solar maximum, when stronger transient disturbances are most capable of impacting the ionosphere and reducing T-index values. This variation is easily observed in this plot. A similar behaviour is predicted for cycle 23. Short periods of strongly reduced T-indices (and therefore weaker ionospheric strength and poorer radio propagation conditions) are expected to be observed in the years from 1999 to approximately 2003.

FLARES

The number of solar flares observed over the sunspot peak and the years immediately following are expected to increase dramatically as we begin to see a larger number of more complex sunspot groups capable of producing major M-class or larger x-ray solar flares. Flares are classified as shown in **Fig 3**. A double peak may be observed, as has previously happened, the first occurring in 2000 in conjunction with the sunspot maximum. The second peak may occur in the year 2002. Although radio propagation will improve, so will the frequency of solar flares capable of producing absorption on high frequency bands. The numbers of daylight short wave fadeouts (SWFs) are expected to increase to an average of several per day in the years 2000 – 2002/3.

CORONAL MASS EJECTIONS

These are associated with imbedded clouds of magnetic fields. When these magnetic clouds pass around the Earth, they help block high-energy cosmic rays from outside of our solar system from penetrating through the Earth's atmosphere. These CMEs, as has already been stated, cause ionospheric disturbances associated with high A/K indices.

CORONAL HOLES

First directly discovered in 1957 by M Waldmeier using maps of the Sun that were constructed using the green coronal line of Fe XIV (530.3nm) on the limb. Prior to this, unseen regions on the Sun were thought to be responsible for producing geomagnetic disturbances. They were named M-regions, a designation which identified them as unknown sources of turbulence. Just as sunspots follow a characteristic cycle of approximately 11 years, so do coronal holes. Coronal holes are not very prevalent during the early stages of solar cycles. They therefore exhibit the following characteristics:

1. They are most numerous around the time of solar maximum, and particularly during the first few declining years after solar maximum. At this time they appear straddling the solar equator and, in these latitudes, are more likely to interact with Earth's geospace.
2. They begin appearing less frequently at lower solar latitudes in the years immediately around solar minimum and are very seldom seen at low solar latitudes at solar minimum. During the rising phase of the next solar cycle, they begin forming again at lower solar latitudes.
3. The phenomenon also results in increasing A/K indices.

and higher than normal particle densities, resulting in geomagnetic storming, ie high A/K indices [2].

EARTH'S CLIMATE RESPONSE

ACCUMULATED RECORDS of the total solar radiative output are finally yielding accurate measures of the degree to which the 'solar constant' actually varies (by ~0.1%) as the contemporary Sun goes through the extremes of its approximate 11-year activity cycle. An example is the relationship between the Sun and Earth's climate concerns the possible role of the ionisation state of Earth's atmosphere. It is known to affect its chemical makeup, its response to solar wind disturbances of the magnetosphere, and other processes that depend on the presence of free charges. Although this state is mainly controlled by the solar UV and EUV flux responsible for the ionosphere proper, solar x-rays, solar

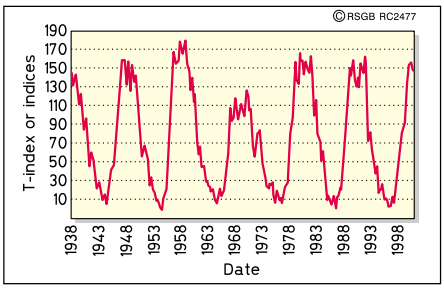


Fig 2: T-indices for the last five sunspot cycles. Note the sharp rise to the expected peak in 2000 (values after June 1999 are predicted).

energetic protons and galactic cosmic rays produce some deeper ionisation. The flux of galactic cosmic rays at Earth and other solar system bodies is known to be reduced during periods of high solar activity. At the same time, the more variable fluxes of generally less energetic particles from solar flares and from CME-driven interplanetary shock acceleration of some solar wind particles increase greatly. The flares also produce impulsive bursts of energetic electromagnetic radiation (UV, x-rays and sometimes gamma rays). These different energetic emissions all increase the amount of ionisation in the atmosphere.

INTERFERENCE

THE SOLAR MAXIMUM will affect radio communications in several ways. Most directly, enhanced radio output from the Sun degrades the effective sensitivity of receiver systems linking to satellites near the Earth-Sun line. Historically, the dominant effect has been on long-range, short wave communication, which depends on radio wave reflection from the bottom of the ionosphere.

Enhanced EUV and soft x-ray emissions change the electron density and gradients in the ionosphere, directly and profoundly affecting this reflection. The resulting increased scattering of satellite-to-ground *Ultra High Frequency* (UHF) transmission, or scintillation, can seriously interfere with direct satellite communication links. Similarly, the variability in propagation conditions degrades the performance of *Global Positioning System* (GPS) receivers, *Very Low Frequency* (VLF) communications systems, and over-the-horizon radars. These effects are of particular concern in the high-latitude regions of auroral activity, but they can also be severe in near-equatorial regions, where the scintillations can be amplified.

ROUND-UP

DURING THE TIME of solar maximum and the years that immediately follow, it will be a relatively simple matter to work DX with a modest communications set-up. That is not to say that the proverbial wet piece of string with

2 watts will not work, rather better results will be experienced with something more substantial.

Even with flares, CMEs and coronal holes causing elevated A/K indices, high solar flux figures associated with the strengthening of the ionosphere will enable DX communications to be established. There will be periods when disturbances will cause SWFs and radio blackouts, but these occurrences will be surpassed by the more positive effects of solar maximum.

REFERENCES

[1] 'Geospace', *Radio Today*, July 1999 - page 38.

[2] 'An Introduction to Solar Indices', *RadCom*, Sept. 1999 – page 44. ♦

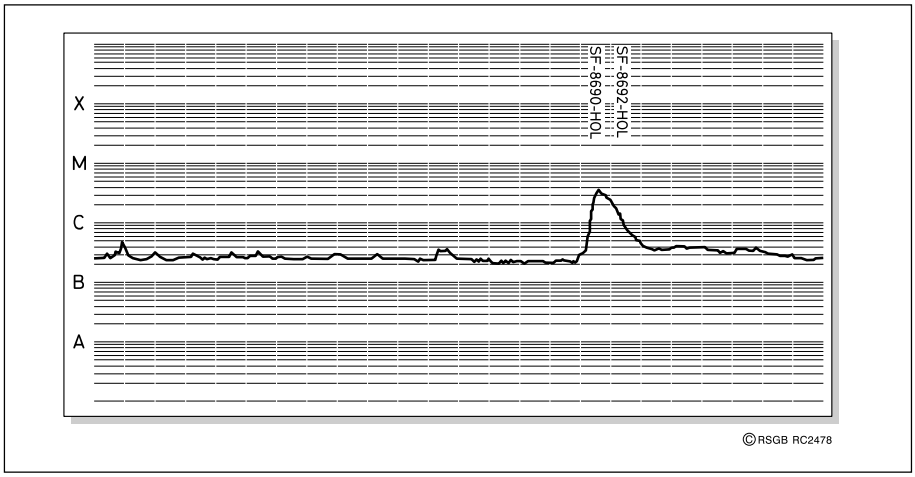


Fig 3: Flare classification. Each class of flare is ten times greater than the preceding one. Note that X-class flares can be - and are - exceeded at solar maximum.

technicalfeedback

'Easi Build' 80m Transceiver

RADCOM NOVEMBER 1999

A TRANSIENT suppressor diode should always be installed across a relay coil (see **Fig 1**). If this diode is omitted, the back EMF pulse produced when the coil circuit is broken can destroy semiconductor components.

Pat Painting,G3OUC

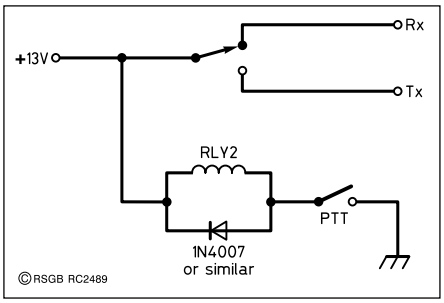


Fig 1: Suggested addition of a diode to prevent back EMF being generated by a relay coil. In this instance, with the relay operated by a switch, it is unlikely that a problem would occur, but it is just possible that the switch contacts could arc over. The placing of a diode across the coil of a DC relay is good practice, even though it is not always possible to do (eg if the circuit relies on current being able to pass through the coil in both directions).

Intro to Speech Processing

RADCOM, NOVEMBER 1999

THERE ARE A number of ways to achieve speech processing, and 'An Introduction to Speech Processing' outlined an effective one. There is another chip that does an excellent job, the AD633JN. This was used by Sabin in 'A Logarithmic Audio Speech Processor', *Communications Quarterly*, Winter '97.

I built this unit and find it quite effective in producing an extra 6dB on my signal (like adding a 400W amplifier to a 100W transmitter). My 1m dia loop antenna noticed the difference - I had to replace the capacitor with a larger one to keep it from breaking down!

Wayne Cooper, AG4R

Introduction to Noise

RADCOM, DECEMBER 1999

SOME EAGLE-EYED readers spotted my *deliberate mistake*. Deliberate it was, so I'm not trying to evade the issue! Strictly speaking, randon noise voltages cannot be added. Noise powers can be added. The equation should therefore read:

Output noise = $\sqrt{((0.5 \times 100)^2 + 15^2)} = 52.2$mV

This gives a better overall S/N ratio than that quoted in the article.

Omitting the RMS calculation was done as the article was intended to present the basic principles only. Had I introduced the RMS calculation, the explanation would have required more space than was available.

George Brown, M5ACN

Short Meander Antennas

RADCOM, AUGUST 1999

THE 3FT meander antenna got my attention as a possible improvement to the 1m diameter loop that I use at my apartment, so I built one up. It did not come out with a 50Ω load in trying to feed it in the manner shown. Also, it was several lines short of 20m resonance.

To salvage the project I removed the connections at the ends of the centre pole and fed the centre connections as a balanced dipole, with a hairpin and a balun (see **Fig 2**) to give a 50Ω match. I had to add four more strands to each side to resonate on 20m.

In operation, I hung it on the 9ft pole that I use to hang my 1 metre loop. The 2:1 SWR bandwidth is 100kHz. The results are about 12dB down from the loop antenna, which compares with K1BQT's results.

Wayne Cooper, AG4R

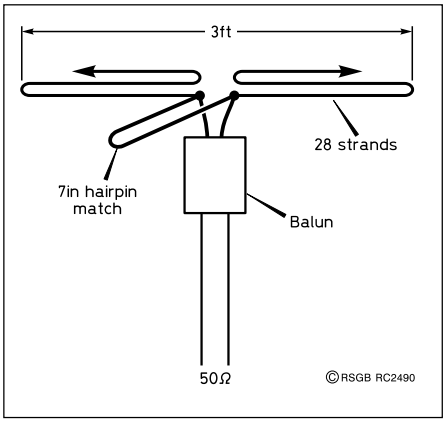


Fig 2: AG4R's short meander antenna.

PSU Load Tester

RADCOM, JULY & AUGUST 1999

I too have used transistors as variable loads for power supplies. As shown in **Fig 3**, I have always incorporated resistors in series with the transistor emitters, to share the power dissipation. More importantly, the resistors have been included to ensure that the total load is shared equally between the transistors. If this is not done, progressive destruction of all the load transistors could occur.

Jim Levinson, G3NFB

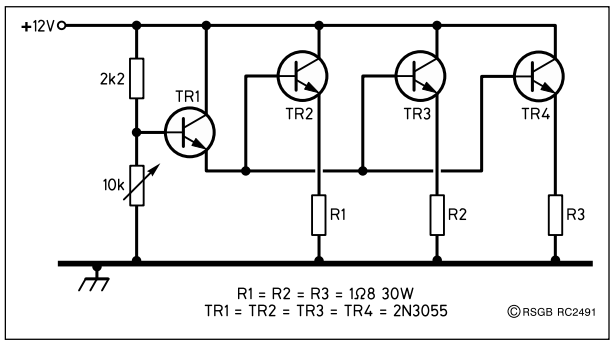


Fig 3: Variable load, suitable for 12V at 10A. The resistors dissipate about half the load and must be rated accordingly. The circuit can easily be adapted for higher currents.

Linearised Varicap Tuning

*By Chas Fletcher, G3DXZ**

VARIABLE FREQUENCY Oscillators for HF application can be constructed by a range of techniques, the simplest being the L/C oscillator and the most 'hi-tech' the Direct Digital Synthesiser (DDS). The latter is a wonderful beast and recent improvements by chip manufacturers has simplified its application [1], but it still costs at least ten times as much as an L/C VFO. Thus, for simple home construction by the non-professional, the L/C circuit can still offer a blend of simplicity, adequate performance and good value. Not only will it work, the average amateur can understand what is going on; a condition becoming rarer in these days of blacker and blacker boxes.

Traditionally, an air-spaced variable capacitor has been used to tune the inductor. This method either demands the use of two tuning controls, coarse and fine (ie bandset and bandspread) or a slow motion drive if a single capacitor is used, in order to have an easily and accurately set VFO. In my experience, a tuning control covering much more than about 10kHz per turn tends to be a bit touchy in use, whereas much less than this figure is unnecessarily slow. Trying to achieve 10kHz per turn using a reduction drive is far from easy and the following text describes the use of Varicap tuning as an alternative approach.

TUNING DIODES

THE 'VARICAP' IS a voltage controlled capacitive diode. The range of application stretches from medium wave broadcast to UHF television, either as primary tuning devices (wide range) or in frequency trimming circuits (narrow range). They exhibit a high Q in operation, together with some temperature dependence. Drift due to temperature change can be a problem, eg if the shack is unheated except when in use, and this problem needs to kept in mind when designing a VFO. The effects can be minimised by arranging for the Varicap to pull the oscillator by the tuning bandwidth only, rather than having it as the primary capacitive element in the L/C circuit. This is the basis of the VFO circuit I have used, but anyone faced with serious drift might adopt the series junction diode technique suggested by Motorola [2].

The ratio of maximum to minimum capacity within the types of diode suitable for HF use, eg MV2108 or the BB909A, is typically 3:1, although with the medium wave 'hyper-abrupt' types it is much greater. Achieving a 3:1 ratio with a component like the MV2108 needs a voltage swing of 28 volts but, luckily, such a wide ratio is not needed for the relatively narrow amateur bands. As a result, it is possible to achieve useful tuning with a control voltage change as small as 5 volts.

The biggest problem with Varicaps is their non-linear capacitance/control-voltage relationship, ie their change in pF per volt. This ratio is highest when the control voltage is lowest and vice versa. Where tuning is not by hand control, this feature is of little importance, because the effect is seldom seen and even when it is, eg some radio tuning scales, a cramped scale on a broadcast receiver is not a problem.

To the amateur, however, non-linearity of tuning is a problem we could well do without, and measures need be taken to overcome it.

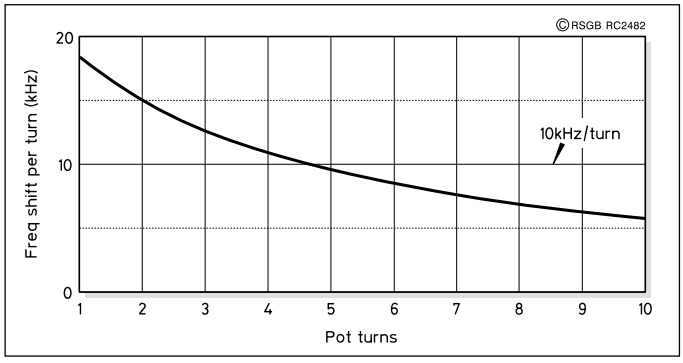


Fig 1: Frequency shift per turn over a 100kHz range using a linear ten-turn-pot.

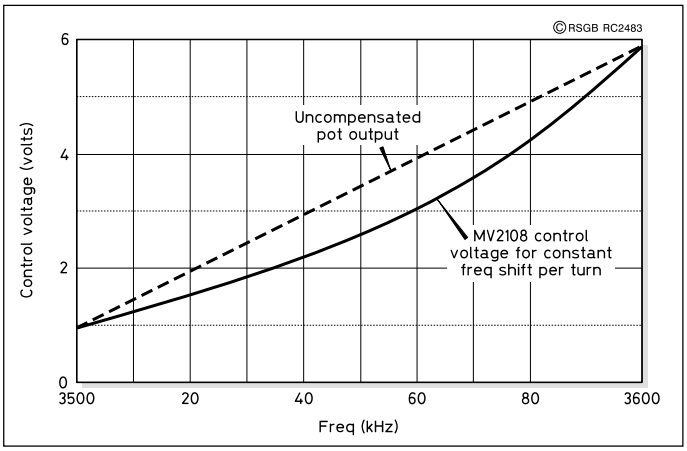


Fig 2: Control voltage needed by an MV2108 to produce a constant 10kHz per turn.

USING VARICAPS

TO USE A Varicap as the main tuning element in a VFO, the control voltage has to be varied by some means which allows an adequate number of turns on the tuning knob. A single-turn potentiometer is out of the question for all but RIT type applications, but the 'ten-turn-pot' is quite useful. Ten turns at 10kHz per turn gives a 100kHz tuning range, which is more than adequate for CW segments. If a wider frequency coverage is needed then some other means needs to be used - more about this later. There is a problem, however. All affordable ten-turn-pots are highly linear, producing exactly the same change in voltage output for every turn of the knob. This does not work well when connected to a non-linear Varicap. The size of the problem can be seen from **Fig 1**, which shows frequency shift plotted against turns of a ten-turn-pot. Note that there is a three to one difference between the first and last turn. Using a good quality wire-wound ten-turn-pot, as the slider passes from one wire to the next, a frequency shift of around 20Hz is produced when working at 10kHz/turn. Although this is audible it is not a serious problem, even when tuning SSB signals, but, as Fig 1 shows, an uncompensated Varicap diode tuning over a 100kHz range will move more than 20kHz per turn at the low voltage end of its range. This is clearly unacceptable and must be remedied if the Varicap is to be useful.

In order to produce a near constant frequency change per turn of the tuning knob,

*12 Park Crescent, Retford, Notts DN22 6UF.

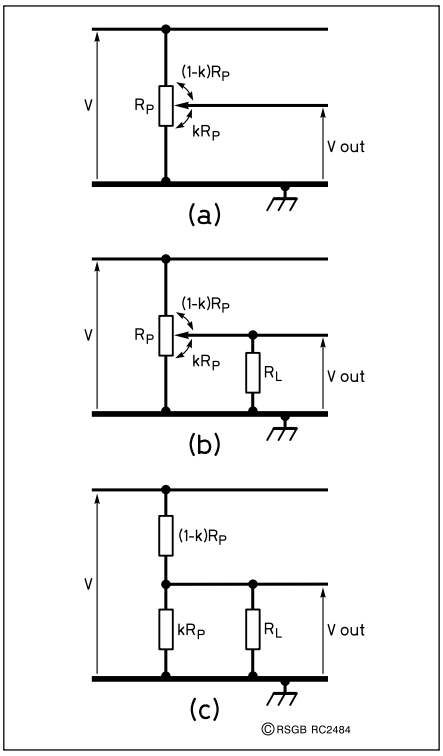


Fig 3: (a) The unloaded potentiometer, (b) the loaded potentiometer, (c) the loaded potentiometer equivalent circuit of Fig 3(b).

the voltage applied to the Varicap needs to be non-linear in the opposite sense to the Varicap itself, thereby cancelling the ill effect. **Fig 2** shows the voltage needed by an MV2108 to produce a straight line tuning characteristic. This can be achieved using an op-amp with a non-linear feedback network, and I have two rigs that use this technique successfully. Even so, it is a bit complicated and a simpler method is to load the potentiometer. There is nothing new in this technique and although it does not approach the ideal as closely as the op-amp solution, it is much simpler to implement and in practice the difference is hard to detect.

ADAPTING THE TEN-TURN-POT

FIRSTLY, CONSIDER a potentiometer as a source of variable voltage. The output at the wiper is determined by the voltage applied across it and the wiper position. Refer to **Fig 3a**. V_{out} = k x V, where V is the voltage applied and k depends upon the wiper position and varies from 0 (when the wiper is at the bottom) to 1 (at the top). However, this is true only when the wiper is connected to a very high resistance load - ideally an open circuit. As soon a current is taken from the wiper connection the circuit looks like **Fig 3b**, R_L representing the effective load of the circuit coupled to the wiper. The actual output voltage is less than that given by the simple relationship above, because it becomes the output of a series/parallel network. The equivalent circuit is shown in **Fig 3c**.

In practice the circuit becomes more complicated, because Varicaps need to be kept in a reverse biased condition (or their tuning characteristic becomes even more bent at the bottom end). This demands that the lowest tuning voltage is higher than the peak oscillatory voltage applied to the diode from the oscillating circuit, -0.6V. It is possible to ensure this minimum voltage by adding a resistor in series with the ten-turn-pot at the lower end (see **Fig 4**). The output voltage function then becomes a second order function of k, the potentiometer position, with its shape governed by the relationships between Rp, Rs and R_L. I pursued the problem of sizing Rp, Rs and R_L for a best approximation to the ideal curve shape, by a combination of experiment and a QBASIC program which I wrote to display the subtle effects of varying the resistors. The software is available from myself (send me a 1.44M-byte floppy disc and an SASE), but is not really necessary if you don't mind a little experimentation. The appendix gives the mathematical base for the calculations.

TYPICAL OSCILLATOR

THE SIMPLE single-band Hartley oscillator, illustrated by **Fig 5**, is the circuit I used for a 3.5 to 3.6MHz VFO. For a wider coverage on 80m, segment switching, eg 3.5-3.6MHz or 3.6-3.7MHz, is easily done by switching into circuit another trimmer capacitor. Switching bands presents greater problems in that it is difficult to maintain the same bandspread when the basic frequency changes substantially. For multiband use I remain an advocate of the mixer style VFO, where the tuning operation remains in a single frequency band.

The circuit of Fig 5 runs nicely on a 6 volt regulated supply, derived from a 78L06 IC. The trimmer C1, in series with the Varicap D1, allows the constructor to vary the tuning range to suit the application and/or the diode used. Including C1 assumes that the diode has too great a tuning range if connected directly to the L1. In my circuit, a 150pF foil trimmer gave enough range to cope with both the diodes tried. VR2 provides degenerative feedback in the oscillator loop so that the output can be set to about 300mV peak-peak (100mV RMS). This is necessary so

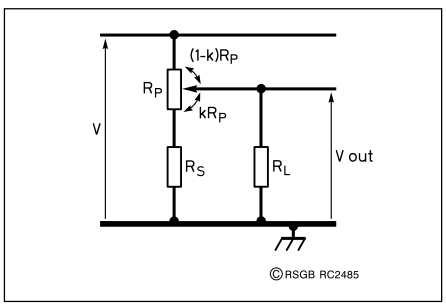


Fig 4: Loaded potentiometer plus series resistor.

D1	R1	R2
MV2108	5k6 + 1k	10k + 1k5
BB909A	4k7 + 1k	22k + 2k2

Table 1: Required values of R1 and R2 for different Varicap diodes.

that the Varicap is not driven into conduction when the control voltage is at its minimum value. Remember, the output is taken from a 30% tap on the coil and the Varicap sees three times the output voltage swing.

The VFO may be set up in the following sequence.

1. Set the ten-turn-pot to minimum voltage.
2. Set C1 to mid capacity.
3. Set VR2 to minimum and adjust C2 for the lowest frequency required.
4. Set VR2 for 300mV p-p output and re-check the frequency.
5. Set the ten-turn-pot to maximum voltage and check the tuning range.
6. Alternately set the ten-turn-pot to maximum and minimum, adjusting C1 and C2 as necessary to achieve the desired bandspread.
7. Now check the tuning linearity.

The compensation resistors, R1 and R2, are primarily dependent upon the value of the ten-turn-pot and the diode used. **Table 1** shows some values that I established for the MV2108 and BB909A diodes. Once up and running the actual frequency change per turn can be established. R1 has most effect at the lowest frequency and R2 at middle and high. **Fig 6** shows my results and presents deviation from the ideal 10kHz per turn against ten-turn-pot posi-

COMPONENTS

Resistors

R1, 2	See Table 1
R3, 4	220k
R5	1k
RV1	10k ten-turn-pot [3]
RV2	2k2 skeleton pot [3]

Capacitors

C1	150pF foil trimmer
C2	47pF foil trimmer
C3	47pF polystyrene
C4	150pF polystyrene
C5	100nF polyester

Inductors

L1	48 turns, tapped at 16 turns, on a T68-6 toroidal core [3]

Semiconductors

TR1, 2	2N3819
D1	MV2108 or BB909A
D2	1N4148

tion. The performance is such that the operator is unaware of any change in tuning rate.

Interestingly, because the compensating resistors cause the ten-turn-pot's output to approximate to the voltage/frequency characteristic of the Varicap, increasing the supply voltage to, say, 8 volts has little effect upon the linearity produced!

The ten-turn-pot itself is relatively expensive, but some excellent parts can be found on the surplus market. See supplier note. The component values listed for R1 and R2 assume a 10k ten-turn-pot. There is no magic in the value 10k, so if a 5k ten-turn-pot comes to hand simply divide the values of R1 and R2 by two.

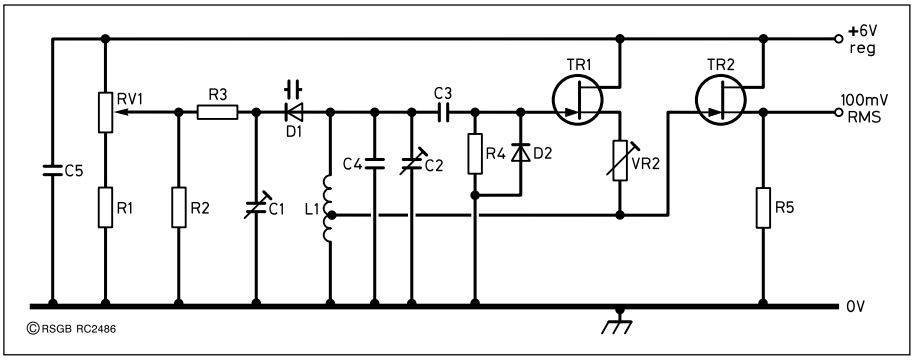


Fig 5: Circuit diagram of the 80m VFO.

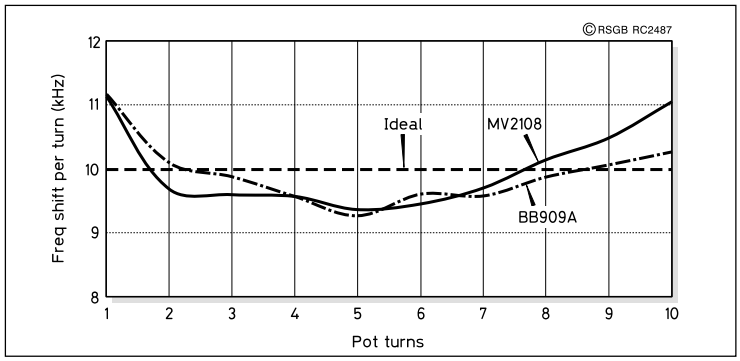


Fig 6: Tuning characteristic of the VFO.

REFERENCES

[1] The G3OPE DDS-3 VFO, *SPRAT*, Winter 1998/99.

[2] Motorola Semiconductor Data, MV2101-MV2115 series.

[3] Can be supplied by J Birkett (tel: 01522 520767) or Maplin (tel: 01702 554000). ♦

APPENDIX

CALCULATION OF OUTPUT VOLTAGE

Apply Ohms Law for series/parallel network and put:

$$p = (1-k) \times Rp \qquad (1)$$

$$q = \frac{((k \times Rp) + Rs) \times R_L}{(k \times Rp) + Rs + R_L} \qquad (2)$$

$$\text{so: } V_{out} = V\left(\frac{q}{p+q}\right) \qquad (3)$$

Expanding gives:

$$V_{out} = V\left(\frac{(k \times Rp \times R_L) + (Rs \times R_L)}{(-k^2 \times Rp^2) + (k \times Rp^2) + ((1-k) \times Rp \times Rs) + (Rp \times R_L) + (Rs \times R_L)}\right)$$

A second order equation in k, which is the potentiometer's position.

The equation is easily verified by setting: k=0 (minimum output voltage)
and k=1 (maximum output voltage)

For computer calculations, use (1), (2) and (3)

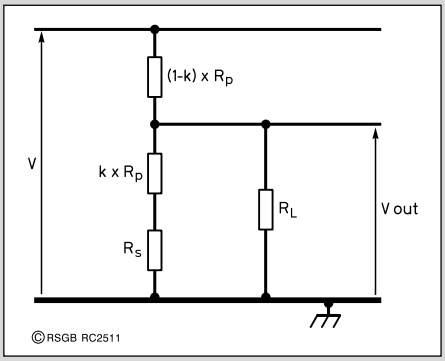


Fig 7: The equivalent circuit to Fig 4.

● Geoff, G4FAS, would like to know where he can obtain a copy of the ***Amateur Radio-Astronomers Handbook***, by John Potter-Shields. G4FAS, QTHR. Tel: 0161 437 7784. E-mail: geoff.royle@lineone.net

● Alan, G3MBL, would like to hear from anyone who has experienced a problem with the notch filter of the **Kenwood TS-440**. G3MBL, QTHR. Tel: 01284 827379.

● Peter, G3BPM, needs a copy of the circuit diagram of the **65B** signal generator made by **Taylor Electrical Instruments Ltd**. All costs covered. G3BPM, QTHR. Tel: 01935 881763.

RadCom Helplines FOR MEMBERS

● G8HLJ is looking for information on the **Microwave Modules** digital frequency meter and a copy of the service manual for the **Racal RA17** receiver. All costs reimbursed. G8HLJ, QTHR. Tel: 0151 632 0614.

● George, G3WMJ/ZS1YZ is looking for the source of a **Pye Westminster W15AM** or similar crystal controlled VHF AM receiver, for reception of meteorological data in the 110-120MHz band. Also, data and the circuit diagram of the **Withers 6DS4** nuvistor converter, originally purchased around 1966. All costs reimbursed. G3WMJ, QTHR. E-mail: jillings@fast.co.za

● G3HZR is looking for a copy of the circuit diagram of the **Tektronics 2215** oscilloscope. G3HZR, QTHR. Tel: 01422 845148.

Helplines is a free service to members. Requests for help are published in the order they are received. We regret it is not possible to provide an undertaking of when any submitted request will be published.

HAYDON COMMUNICATIONS

★ ★ MAIL ORDER: 01708 862524 ★ ★

NEXT DAY DELIVERY TO MOST AREAS, £10.00.

MILLENNIUM SIZZLERS

KENWOOD TS-870

Still seen by most to be the best "IF-DSP" DX transceiver available!

SALE PRICE **£1449.95** *IT'S A BARGAIN*

KENWOOD TS-570DG MkII

Superb HF transceiver with built-in ATU.

+ FREE matching speaker

SALE PRICE **£849.00**

Kenwood MC-60 deluxe microphone & pre-amp. £75.00
Kenwood MC-80 desk microphone £49.95
Kenwood SP-31 extension speaker.....£79.95

ALINCO DX-70TH

HF + 6m transceiver with CTCSS + CW filter. (100W all bands)

ONLY **£599.00**

ICOM IC-746

Looking for one rig to satisfy all your base station needs? Look no further.

OUR PRICE **£1299.00**

ICOM IC-706IIG

The world's best selling HF transceiver.

OUR PRICE **£949.00**

NEW! ICOM IC-756PRO

THE ULTIMATE HF + 6M TRANSCEIVER.

£T.B.A. + FREE matching speaker.

Icom SM-20 desk microphone £99.00
Icom SP-21 extension speaker £54.95

YAESU FT-847

We have 10 pieces only to give away at a stupid price.

OUR PRICE **£1269.95**

Yaesu SP-8 extension speaker £119.95

RANGER 811

Easy to tune HF linear amplifier. (Up to 800 watts).

ONLY **£849.00**

ICOM IC-Q7E

Miniature 2m + 70cm hand-held transceiver with wideband receive (30-1300MHz).

OUR PRICE **£149.95**

KENWOOD TH-D7E

Dual band hand-held with buit-in TNC.

OUR PRICE **£269.95**

KENWOOD TH-G71E

Dual-band transceiver with optional wide-band receive. (110-950MHz with gaps).

SPECIAL OFFER **£199.95**

YAESU VX-5R

6m/2m/70cm hand-held with wideband receive. up to 5W output.

OUR PRICE **£269.95**

Alinco DJ-G5E dual-band hand-held transceiver £249.95

KENWOOD TM-V7E

2m/70cm mobile ttransceiver. 50/35W, CTCSS & DTMF.

Optional extended Rx available. (RX:- 108-950MHz)

ONLY **£349.95**

KENWOOD TM-G707E

Our best selling dual-band mobile with detachable head.

(Optional extra RX available).

OUR PRICE **£269.95**

YAESU FT-90R

The world's smallest twin band mobile.

ONLY **£339.95**

Yaesu FT-8100R Dual-band mobile.....£349.95

MOTOROLA TA-200

Licence free PMR-446. Now you can use a 446MHz hand-held without a licence.

OUR PRICE **£75.00** EACH

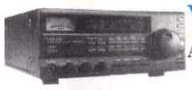
or 2 for £139.00

TA-288 Now in stock £125.00
Motorola Handie Pro only £199.00.....*Buy 3 & get one free*

REALISTIC DX-394

★ Superb performance SW receiver ★ True SSB ★ 0.2 - 30Mhz (AM/SSB) ★ 240 or 12V ★ Attenuator ★ S-meter ★ Timer S.S.P. ~~£249.95~~ SPECIAL OFFER: **£99.95**

Delivery £10 (SEND S.A.E. FOR REVIEW).



YAESU FRG-100

Award winning SW receiver.

OUR PRICE **£395.00**

SANGEAN ATS-909

Sythesized world receiver with RDS and 306 memories. Covers SW/MW/LW & FM stereo incl's free PSU.

ONLY **£129.95**

SW-55 SW portable £239.00
SW-100E Miniature SW portable.....£149.95

ICOM PCR-1000

Computer radio system 100kHz-1300MHz (all mode).

Includes S.S.B

OUR PRICE **£249.00**

UT-106 DSP option for above £79.95

AR108

Palm sized dedicated airband scanning receiver. Covers airband 108-136.975MHz VHF 136-180MHz with 99 memories.

ONLY **£59.95**

Optional batteries + charger £13.99.

ICOM IC-R2

Minature wideband hand-held scanner covers 0.5-1300MHz (AM, FM/WFM).

ONLY **£129.00**

Soft case for IC-R2 .....£14.95

AR8200

The latest all mode innovation in handies. There's too many features to list.

OUR PRICE **£339.00**

AR8000 Our price..... £269.00
Soft case for 8200/8000 (specify) £19.95

MVT-7100

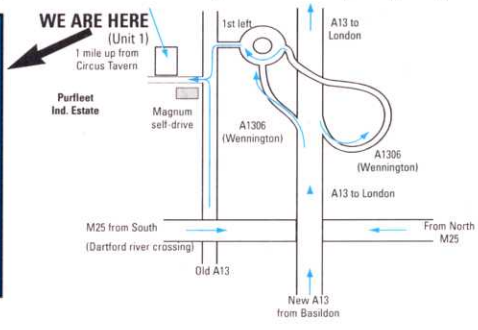
Wide-band hand-held scanner 0.5-1650MHz (all mode).

ONLY **£199.00**

MVT-9000 Our price.....£319.95
Soft case for MVT-9000/7100 (specify).....£19.99

SHOWROOM & MAIL ORDER
Unit 1, Thurrock Commercial Park, Purfleet Industrial Estate, London Road, Aveley, Essex RM15 4YD
TEL: 01708 862524
FAX: 01708 868441
Open Mon - Fri 8am - 4.30pm.
Sat 8am - 1.00pm

NEW OPENING TIMES



W. MIDLANDS SHOWROOM
Unit 1, Canal View Ind. Est., Brettel Lane, Brierley Hill, W. Mids. DY5 3LQ
Open Mon-Fri 9.30-5pm. Sat 9.30-2pm
NO MAIL ORDER TO MIDLANDS BRANCH

HAYDON COMMUNICATIONS

★ ★ MAIL ORDER: 01708 862524 ★ ★

NEXT DAY DELIVERY TO MOST AREAS, £10.00.

Q-TEK PENETRATOR

"We've sold 100s all over Europe"

★ 1.8 - 60MHz HF vertical ★ 15 foot high
★ No ATU or ground radials required
★ (200W PEP). ONLY **£150.00** delivery £10

SEND SAE FOR LEAFLET

Wire version now available 45ft long end fed.
(1.8-60MHz) spec/price as above.

Q-TEK ZL SPECIALS *Delivery £9.00*

2m	5ele (boom 45"/9dBd)	£39.95
2m	7ele (boom 60"/11dBd)	£49.95
2m	12ele (boom 126"/13.8dBd)	£69.95
70cm	7ele (boom 28"/11dBd)	£29.95
70cm	12ele (boom 48"/13.8dBd)	£49.95

Q-TEK YAGIS FOR 2/4/6m + 70cm *Del £9.00*

2m	5ele (boom 63"/9dBd)	£39.95
2m	8ele (boom 125"/11dBd)	£49.95
2m	11ele (boom 156"/12.7dBd)	£69.95
2m	5ele crossed (boom 64"/9dBd)	£69.95
2m	8ele crossed (boom 126"/11dBd)	£89.95
4m	3ele (boom 45"/7dBd)	£44.95
4m	5ele (boom 128"/9dBd)	£59.95
6m	3ele (boom 72"/7dBd)	£54.95
6m	5ele (boom 142"/9dBd)	£69.95
70cm	13ele (boom 76"/12dBd)	£39.95
70cm	13ele crossed (boom 83"/12dBd)	£59.95

Q-TEK HB9-CV *Delivery £9.00*

70cm	HB9CV (boom 12")	£17.95
2mtr	HB9CV (boom 20")	£21.95
4mtr	HB9CV (boom 22.5")	£29.95
6mtr	HB9CV (boom 32.5")	£39.95
10mtr	HB9CV (boom 52")	£69.95

END FED HALF WAVES Ground plane free.

Made from glass fibre - no ground radials or tuning required.

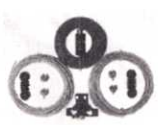
4m	Length 92" (SO239) vertical	£39.95 *Del £9.00*
6m	Length 126" (SO239) vertical	£49.95 *Del £9.00*

NEW HF MOBILE WHIPS (PL-259)

Easy to mount HF mobile whips ready to go with PL-259 fitting.

PL-80	80m whip (approx 1.5m long)	£21.95 *Del £8.00*
PL-40	40m whip (approx 1.5m long)	£19.95 *Del £8.00*
PL-20	20m whip (approx 1.5m long)	£19.95 *Del £8.00*
PL-62	6m/2m whip (approx 1.3m long)	£18.95 *Del £8.00*

DELUXE G5RV Multi-stranded PVC



coated heavy duty flexweave wire. All parts replaceable. Stainless steel and galvanised fittings. Full size - 102ft.

ONLY **£39.95**

Half size 51ft. Only **£34.95**

Carriage £6.00.

Choke Balun Inline balun for G5RV ..... £24.95 P&P £2

STANDARD G5RV

Full size	102ft	£24.00 P&P £6
Half size	51ft	£21.00 P&P £6

NEW Q-TEK INDUCTORS

80mtr inductors + wire to convert ½ size G5RV into full size. (Adds 8ft either end). **£22.95** P&P £2 (a pair).

Q-TEK INTREPID

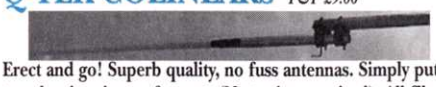
PRE-MATCHED END-FED HALF WAVES. SUPERB SINGLE BAND WIRE HORIZONTAL ANTENNAS. NO A.T.U. REQUIRED.

IPT-80	80m version (40.7m)	£69.95 P&P £7
IPT-40	40m version (20.3m)	£59.95 P&P £7
IPT-20	20m version (10.1m)	£49.95 P&P £7

NEW QT-20 11ele 23cm yagis boom length 1m gain 11.5dBd (n-type) ..... £49.95 + P&P £10

QT-40 19ele 23cm yagis boom length 1.5m gain 16dBd (n-type) ..... £69.95 + P&P £10

Q-TEK COLINEARS *P&P £9.00*



Erect and go! Superb quality, no fuss antennas. Simply put together in minutes & erect. (No tuning required). All fibre glass & stainless fittings.

QT-100 GF 144/70, 3/6dB (1.1m)	£39.95
QT-200 GF 144/70, 4.5/7.2dB (1.7m)	£54.95
QT-300 GF 144/70,6.5/9dB (3m)	£69.95
QT-500 GF 144/70, 8.5/11dB (5.4m)	£125.95
QT-627 GF 50/144/70, 2.15/6.2/8.4dBi gain	£69.95

ACCESSORIES *P&P £3.00 on the following*

TSA-6001N	Duplexer (+Coax) 2/70 (N/N259)	£24.95
TSA-6003	Duplexer (Coax) 2/70 (PL/259's)	£19.95
MX	Triplexer (6/2/70) (Coax)	£56.95

MOBILE ANTENNAS *£6.50 delivery*

TSM-1612	6/2/70 (2.15/6/8.4dB) 2.1M	£54.95
DB-7900	144/70 cms, (5/7.6dB) 1.5m	£29.99
DB-770M	144/70 cms, (3/5.5dB) 1m	£24.95
DB-1304	144/70 cms, (2.15 /3.8dB) .41cms	£19.95
DB-EL2E	144MHz,⅞ths, 4.5dB (1.8m)	£29.95
DB-285	144MHz, ⅝ths, 3.4dB (1.3m)	£15.95
PL-6M	50MHz ¼ wave (1.5m)	£16.95

ACCESSORIES *P&P £3.00 on the following*

MT-1301	H/Duty Mag Mnt + Coax Top Quality	£24.95
MT-3302	H/Duty Hatch/Trunk Mnt Top Quality	£24.95
CF-BPF2	2m band pass filter	£49.95
Q-Tek	6m band pass filter	£42.95

COPPER ANTENNA WIRE (All 50mtr rolls)

Enamelled	£12.95 P&P £5
Hard drawn	£13.95 P&P £5
Multi-Stranded (Grey PVC)	£9.95 P&P £5
Extra H/duty (Clear coated)	£30.00 P&P £5
Flexweave (H/duty 50 mtes)	£30.00 P&P £5
Flexweave H/duty (20 mtrs)	£15.95 P&P £5
Flexweave (PVC coated 20 mtrs)	£18.95 P&P £5
Flexweave (PVC coated 50 mtrs)	£40.00 P&P £5
Earth wire (6mm) 30m roll	£10.00 P&P £5
Copper earth rod (4ft)	£13.00 P&P £6
Copper earth rod (3ft) + 10m wire attatched	£14.99 P&P £6

Q-TEK BALUNS & TRAPS

Baluns are wound on ferrite rod and encapsulated into a dipole centre with an SO239 socket. Brass terminals form the balun output and stainless steel screw eyes offer an anchor point for antenna ends. Maximum power rating is 1kW.

1.1 Balun		£24.95 P&P £2
4.1 Balun		£24.95 P&P £2
6.1 Balun		£24.95 P&P £2
40 mtrs	Traps	(a pair) £25.00 P&P £4
80 mtrs	Traps	(a pair) £25.00 P&P £4
10 mtrs	Traps	(a pair) £25.00 P&P £4
15 mtrs	Traps	(a pair) £25.00 P&P £4
20 mtrs	Traps	(a pair) £25.00 P&P £4

1kw Handling

Q-TEK DL-1000

HF 200W continuous dummy load (0-30MHz).
SSP ~~£89.95~~.

INTRO OFFER **£79.95** P&P £8

Q-TEK DL-60

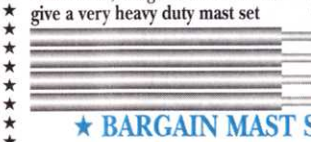
DC-500MHz.
60W max. PL259.

OUR PRICE **£18.99** P&P £1

★ STAR BUY ★

4 x 5' 4" lengths of 2" extruded (16 gauge) heavy duty aluminium, swaged at one end to give a very heavy duty mast set

SSP ~~£60.00~~
LIMITED STOCK
£30.00
DEL £10



★ BARGAIN MAST SET ★

FIBRE GLASS MASTS

1¼" Dia	£8.50 per metre	(Max length 5m)	*Delivery £10*
1¾" Dia	£10.50 per metre		*Delivery £10*
2" Dia	£12.50 per metre		*Delivery £10*

NB. We can only deliver 3m lengths

TELESCOPIC MASTS

6 section telescopic masts. Starting at 2¼ in diameter and finishing with a top section of 1¼" diameter we offer a 8 metre and a 12 metre version. Each mast is supplied with guy rings and stainless steel pins for locking the sections when erected. The closed height of the 8 metre mast is just 5 feet and the 12 metre version at 10 feet. All sections are extruded aluminium tube with a 16 gauge wall thickness.

8 mtrs **£79.95**
12 mtrs **£109.95** *Carriage £10.00.*

FREE STANDING TRIPODS

Superb quality heavy duty "quick erect" tripod for permanent or temporary installation. (Fits in the boot of a car). Available for our 8m or 12m masts.

£84.95 *Carriage £10.00*

GUY WIRE KITS etc.

Standard kits (complete with wire)	£23.95 P&P £6
Heavy duty kits (complete with wire)	£26.95 P&P £6
Ground fixing spikes (3 set)	£15.00 P&P £6
30m pack nylon guy rope	£10.00 P&P £2
30m pack (3mm dia) winch wire	£16.00 P&P £4

MAST HEAD PULLEY

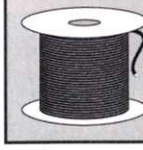
A simple to fit but very handy mast pulley with rope guides to avoid tangling.

£8.95 + P&P £1.50

WALL BRACKETS + MAST BASE PLATES

2"	Mast base plate	£12.95 P&P £5
6"	Stand off	£6.95 P&P £5
9"	Stand off	£8.95 P&P £5
12"	T&K Brackets	£12.00 P&P £8
18"	T&K Brackets	£18.00 P&P £8
24"	T&K Brackets	£20.00 P&P £8
U bolts (1½" or 2")		£1.10 each
8 nut universal clamp (2" - 2")		£5.95
3-way guy ring		£3.95
4-way guy ring		£4.95
2" mast sleeve		£9.95
1½" mast sleeve		£8.95

COAX BARGAINS



100m roll of RG-213 coax
ONLY **£69.95** P&P £10

100m roll of RG-58 coax
ONLY **£35.00** P&P £8.50

SP-350V

Be protected this summer! In-line lightning surge protector. (Gas discharge type). Replaceable fuse.

INTRO PRICE **£19.99** P&P £1

Christmas sale now on!

Late night christmas shopping Thursday 9th, 16th & 23rd December. Open 8am - 8pm.

NISSEI PS-300

Superb 30 amp/12V power supply built to combat most needs. *Features:* ★ Over voltage protection ★ Short circuit current limited ★ Twin illuminated meters ★ Variable voltage (3-15V) latches 13.8V ★ Additional "push clip" DC power sockets at rear ★ Multiple front outlets ★ Detatchable IDC lead (supplied) for mains connection ★ Ultra quiet fan ★ Professional build (black finish). *Dims:* L308 x W268 x H135mm. *Wt:* 9kg. SSP £149.00.

INTRO PRICE **£99.95** Delivery £10

SGC-230

Superb ATU will work with any HF transceiver. ~~£349.00~~.

LIMITED STOCK **£259.00**

SGC-231 HF + 6m Smartuner.....£299.00
SGC-2020 QRP rig.....£549.00

MFJ-259 MkII

HF digital SWR analyser + 1.8-170MHz counter/resistance meter.

ONLY **£169.95** P&P £5

UK VERSIONS

MFJ-949	300W ATU + dummy load	£115.95
MFJ-969	HF + 6m ATU	£139.95
MFJ-962D	1.5kW versa tuna	£239.95
MFJ-784B	DSP filter	£176.95
MFJ-418	CW tutor	£58.95

CUSHCRAFT SALE

R-6000	6-20 meters	£259.00
R-7000	10-40 meters	£319.00
X-7	10, 15, 20 meters 7 ele yagi	£449.00
X-9	10, 15, 20 meters 9 ele yagi	£649.00
A-35	10, 15, 20 meters 3 ele yagi	£329.00

D-308B BLACK DELUXE DESK MIC (with up/down).

Every amateur using this mic (over 2000) has expressed extreme pleasure with it's performance. **£49.95** P&P £5.00

OPTIONAL LEADS (P&P £1.50)

A-08	8 pin "Alinco" round	£9.95
K-08	8 pin "Kenwood" round	£9.95
I-08	8 pin "Icom" round	£9.95
AM-08	Modular phone "Alinco"	£9.95
YM-08	Modular phone "Yaesu"	£9.95
IM-08	Modular phone "Icom"	£9.95

TH-887 headset

A high quality headset that will fit most hand portable and most HF & VHF/UHF tcvrs via optional interface.

£24.95 P&P £3.50

Supplied with two pin molded plug-will fit Alinco/Yaesu/ Standard/ADI/Icom hand-helds. (Optional leads available for TH-887 to use with various mobiles £18.95 P&P £1.50).

TH-887K Headset for Kenwood.....£24.95

YAESU G-450C

Heavy duty rotator for HF beams etc. Supplied with circular display control box and 25m of rotator cable.

ONLY **£319.95**

GC-038 Lower mast clamps.....£25.00
GC-065 2" thrust bearing.....£48.00

NOW ONLY **£49.95**

AR300XLT

New superb quality rotator suitable for VHF/UHF work. Complete with control box (requires 3-core cable).

GS-300 Stay bearing.....£16.95
50mS 3-core cable (50 mtr roll).....£19.95

NISSEI PWR/SWR METERS

Super quality meters made to a professional standard with meter illumination.

RS-502	1.8-525MHz (200W) £99.95...NOW £79.95	P&P £5
RS-102	1.8-150MHz (200W) £59.95	£49.95 P&P £5
RS-402	125-525MHz (200W) £59.95	£49.95 P&P £5
RS-101	1.8-60MHz (3kW) £79.95	£69.95 P&P £5
RS-40	144/430MHz Pocket PWR/SWR Meter (200W) (SO239)	£34.95 P&P £1
RS-40N	As above with N-type	£39.95 P&P £1

COAX SWITCHES (P&P £3.00)

CX-401	4 way (SO-239)	£49.95
CX-401 'N'	4 way (N TYPE)	£54.95
CX-201	2 way (SO-239)	£18.95
CX-201 'N'	2 way (N-type)	£24.95

GARMIN GPS-III PLUS

UpgradableGPS system supplied with data lead and free on-board maps. Shows cities, airports and much, much more.

SALE PRICE **£329.95**

GPS-III UK version with moving map.....£249.95
GPS-12 Navigator.....£129.95
Cigar power lead.....£20.00
Active magmount antenna.....£39.95
"CD map source".....£89.95

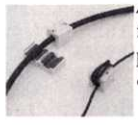
RECHARGEABLE ALKALINE CELLS

Starter kit includes charger & 4 x AA cells. **£13.99** + £2.50 P&P.

Please note that only the special cells can be recharged with this charger.

8 x AA pack £10.99 4 x AA pack £5.99 4 x AAA £6.25 P&P £1

INTERFERENCE – STOP IT!



A superb slide-over ferrite sleave suitable for assisting with eliminating RFI problems with :- radio/TV/telephone/PC & data & many others.

6 for £5 (P&P £2.50)

HAND-HELD ACCESSORIES

Nissei EP-320

Hanging type earphone with boom mic & PTT. Fits Kenwood, Alinco, Yaesu or Icom.

£24.95 P&P1

Nissei EP–300T

Over the ear earpiece with lapel mic & PTT. Fits Kenwood, Alinco, Yaesu or Icom.

(Please specify brand of radio when ordering)

OUR PRICE **£24.95** P&P £1

This Ear/Mic comes with an "over the ear" earpiece as EP-300

FERRITE RINGS

10 for **£5.00** P&P £2.50

Superb quality.

NB–30W 2M FM handheld

amplifier 2-5W input. 30W output (for 5W ip). Turn your handheld into a mobile for under £50

ONLY **£49.95** P&P £4.00

REGULAR-GAINER RH-770

21cm flexible whip that has 2m + 70cm transmit and wideband receive.

ONLY **£14.99** P&P £1

SUPER-GAINER RH-9000

40cm flexible whip that has 2m + 70cm transmit and wideband receive.

ONLY **£19.95** P&P £1

POLICE STYLE HOLSTER HHC-2

Matches all hand helds. Can be worn on the belt or attached to the quick release body holster.

£22.95 + P&P £1

Waterproof case for handheld.....£10.00 P&P £1

QS-300

A fully adjustable desk top stand for use with all handhelds. Fitted coaxial fly (FAI) with BNC & SO239 connectors

ONLY **£14.99** P&P £3

QS-200 Air vent holder for hand-helds with belt clip. ...£9.99

EP-300 Deluxe over the ear earpiece.

100 PIECES ONLY **£9.99** + P&P £1

SHOWROOM & MAIL ORDER

Unit 1, Thurrock Commercial Park, Purfleet Industrial Estate, London Road, Aveley, Essex RM15 4YD

TEL: 01708 862524 FAX: 01708 868441

Open Mon - Fri 8am - 4.30pm. Sat 8am - 1.00pm

NEW OPENING TIMES

W. MIDLANDS SHOWROOM

Unit 1, Canal View Ind. Est., Brettel Lane, Brierley Hill, W. Mids. DY5 3LQ

Open Mon-Fri 9.30-5pm. Sat 9.30-2pm

NO MAIL ORDER TO MIDLANDS BRANCH

SRP TRADING

1686 Bristol Road South, Rednal, Birmingham B45 9TZ

YUPITERU MVT-7100
The ultimate. LSB, USB, AM, FM, WFM. 100kHz-1650MHz.
£199.95 + P&P

ICOM IC-R2
Our smallest wideband scanner. AM, FM, WFM. 0.5-1300MHz. 3.4 x 2.3 x 1.1 inches.
£139.00 + P&P

THIS MONTH'S BEST BUY

COM 307
Compact civil air, marine and 2mtr band.
£55.00 + P&P

BEARCAT UBC-3000XLT
25-550MHz and 760-1300MHz. AM/FM/WFM.
£189.95 + P&P

AOR AR8200
The only radio ready with the new 8.3kHz aircraft frequency channels.
£349.95 + P&P

PMR 446 RADIOS
From £99 a pair
The new 'no licence required' professional radios that can be used by all.

ICOM PCR-1000
Call into the showroom to see this PC controlled radio.

£299.00 + P&P

QS-200
In-car dashbord grill fitting hand-held mount to fit a mobile phone or hand-held scanner into your car.
£4.99 + P&P

YUPITERU MVT-9000
531kHz-2039MHz. WFM, FM, NAM, AM, LSD, USD, CW.
£319.95 + P&P

AIRBANDER ANTENNA
Dedicated (108-137MHz) civil airband, "micro mag" featuring rare earth magnet to ensure it stays in place. Complete with miniature 50ohm coaxial cable and BNC plug.
£19.95 + P&P

SKYSCAN DESKTOP
Desktop discone antenna. Ideal for indoor use or on the car when stationary. Covers 25-1300MHz. Complete with 4m RG58 cable and BNC connector.

£49.00 + P&P

PORTABLE SHORT WAVE ANTENNA
Compact portable short wave longwire antenna on a reel.
£7.99 + P&P

WIDEBAND PRE-AMP
Variable gain and bypass facility. Boosts weak signals adding clarity to let you listen with ease.
~~£49.95~~ **£29.95** + P&P

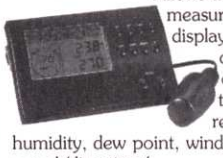
SKYSCAN DX V1300 DISCONE
Vertical and horizontal elements enhance reception from 25-1300MHz. Constructed from best s/steel and aluminium. Complete with mounting pole and pole clamps.

£49.95 + P&P

QS-300
Desk top stand for hand-helds includes BNC to SO239 adaptor.
£13.99 + P&P

COM 215 BASE SCANNER
200 channel AM/FM scanner. Range: 66-88: 108-174: 216-512: 806-950MHz. ~~£299.00~~.
£179.99 + P&P

WM-918 ELECTRONIC WEATHER STATION



Allows the measurement and display of weather data. Indoor/outdoor temperature, relative humidity, dew point, wind speed/direction/gust/chill; barometric pressure and daily and accumulative rainfall, etc.
£179.00 + P&P

SKYSCAN AIRBASE
Civil airband base station antenna with extednded receive capability.
TX 118-137MHz
RX 25-1300MHz
Built using fibreglass s/steel and chromed brass to withstand the weather.
£39.95 + P&P

ANTENNA ROTATOR AR300XL

Max load 60kg (with support bearing) 360deg. rotation in approx 65sec. (Support bearing optional £14.95)
£29.95 + P&P

GUTTER KIT
for 3/8th or SO239 mobile antennas, with 4m RG58 cable and PL259 plug
£9.95 + P&P

TURBO MAG
SO239 or 3/8th.
£12.95 + P&P

SYNCRON SX 144/430
2m/70cm cross needle swr powr meter.
£39.95 + P&P

DC-AC INVERTORS, 12V DC IN 240V AC OUT

150W version	(for notebook computers, etc.) £39.99	**£29.95**	+ £5 P&P
300W version	(for small power tools, etc.) £59.99	**£49.95**	+ £5 P&P
600W version	(for medium power tools, etc.) £129.99	**£99.95**	+ £10 P&P
1000W version	(for large power tools, etc.) £159.99	**£129.95**	+ £10 P&P
2500W version	(for most purposes, etc.) £499.99	**£419.95**	+ £15 P&P

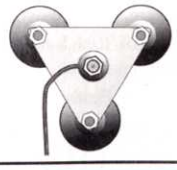
SRP 3BR
Extension speaker. Quality filtered speaker with noise filter.
£12.95 + P&P

TW232 CB BASE MICROPHONE
With speech compression amplifier. Please specify moden of radio when ordering.
£19.95 + P&P

G5RV
Half-size (40-10m)
£12.00 + P&P
G5RV
Full-size (80-10m)
£15.00 + P&P

SELF AMALGAMATING TAPE
Excellent ageing and weathering properties. High resistance to ozone. Tight banding to create waterproof connection.
£5.00 a roll

TRI-MAG
Super strength for all HF antennas.
£29.00 + P&P



EUROCARD MasterCard VISA

SWITCH

PROFESSIONAL POLICE STYLE EARPIECE
£8.99 + P&P

COAX SWITCHES SO239
CX201 2-way **£16.95**
CX203 3-way **£29.95**
CX204 4-way **£39.95**

NI-MH
1500mAh rechargeable batteries.
£2.00 each.
Charger **£6.96** + P&P

Opening times: Mon-Sat 9.30am to 5.15pm. We are Kenwood, Yaesu, Icom, & Alinco dealers.

Call Mary (M0BMH) or Dave on

TEL: 0121-460 1581, 0121-457 7788 FAX: 0121-457 9009

eurotek

edited and translated by **Erwin David,** G4LQI*

THESE OPEN-SLEEVE multiband antennas, sometimes called 'closely-coupled resonator antennas', consist of a base-fed monopole and one or more earthed close-spaced parasitic elements. The diagram shown in **Fig 1** is of a typical three-band arrangement. The coordinate system is shown in **Fig 2**. Most often the longest element is driven, but that is not a requirement of the program. The horizontal and vertical radiation patterns on the frequencies covered are close to those of a λ/4 monopole. In the following HF examples, all elements are made of 16mm OD tubing, rising above a perfectly reflecting earth plane. In practice, this means many radials, or wire mesh, on top of the ground. Other tubing sizes require a slight modification of the program.

WHAT IS COMPUTED?

FOR EACH BAND to be covered, we wish to know the height of the driven element z_0 and the parasitic element(s) z_1, (z_2..z_n) and the spacing between the driven element and each parasitic element (x_1, x_2, y_1, y_2) which gives the best possible SWR on each band.

If s_0, s_1..s_n stand for the SWRs on the specified resonant frequencies, the program computes the *sum*, Σs, of the SWR values obtained on those two (or more) frequencies. In the ideal case for a two-band antenna, with the SWR a perfect 1.0:1 on both bands, Σs would be 2; for three bands, 3. In practice, a somewhat greater value of c = Σs_{max} must be specified. The program runs until this Σs<c is reached, then stops. Following runs may yield additional, slightly different sets of values. This is illustrated in **Table 1** for c = 2.5.

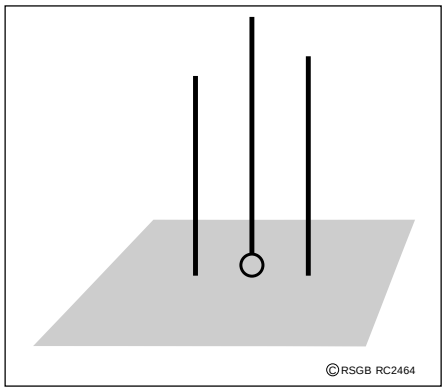


Fig 1: Basic three-band open-sleeve monopole.

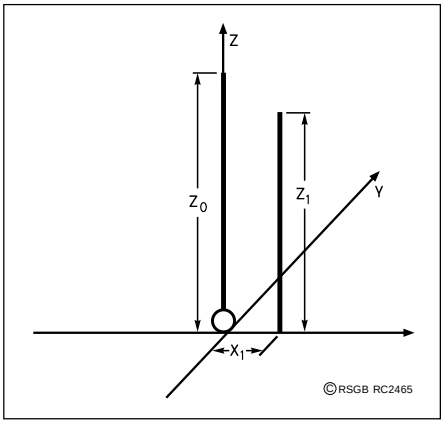


Fig 2: The feedpoint is at the origin of the coordinate system.

***Open-Sleeve vertical antennas** for up to five bands can be designed with an antenna optimization program using a genetic algorithm. **Peter Bertram, DJ2ZS,** described how it works and presented several two and three-band designs in CQ-DL 10/99.*

MHz	z_0	z_1	x_1	Σs_i
18.1, 21.1	4.14	3.26	0.39	2.36
18.1, 21.1	4.13	3.28	0.26	2.39
18.1, 21.1	4.17	3.29	0.31	2.32

Table 1: Three sets of data satisfy c < 2.5. All dimensions are given in metres.

MHz	z_0	z_1	x_1	Σs_i
24.9, 28.1	3.02	2.4	0.15	2.59
21.1, 24.9	3.52	2.82	0.26	2.98
18.1, 21.1	4.01	3.22	0.38	2.46
14.1, 18.1	5.34	3.93	0.23	2.94
10.1, 14.1	7.46	5.08	0.27	2.95

Table 2: Five two-band combinations. All dimensions are given in metres.

Dimensions found for five different two-band combinations are displayed in **Table 2** with c = 3. Adjacent-band pairs are shown, but this is not a condition; it would work for any pair of frequencies.

THREE BANDS

COMPUTED DIMENSIONS for three band combinations with c = 4.5 are shown in **Table 3.** These runs took a lot of computing time.

To validate the algorithm, the SWRs resulting from these dimensions were computed with NEC2. This yielded, for the top, middle and bottom line of Table 3, Σ_{NEC2} = 4.23, 4.80 and 5.14 respectively, ie only insignificantly higher.

LIMITATIONS

WITH REAL EARTH instead of the assumed perfectly reflecting earth plane, the real part (R) of the computed feedpoint impedances will always be higher by the earth resistance. This does affect Σs. For R<50Ω the added earth resistance will reduce Σs; for R>50Ω, Σs will be higher.

Accordingly, the results for real earth are not always worse, as on some bands R<50Ω. One way to improve the accuracy of Σs would be to subtract the estimated earth resistance from the cable impedance to be matched.

The reactive part (X) of the feedpoint impedances hardly changes by the transition to real earth, ie it remains near zero at the specified resonance frequencies. Nearby objects such as buildings do affect X and clearly result in SWRs higher than those computed. On-site adjustment will then be required.

The data given here do not apply to systems with elevated radials, as these affect both R and X. Their geometry would have to be included in the input data.

TRY IT YOURSELF

IF YOU WOULD like to do your own optimization, or try it for other frequencies, you can get the Pascal source code from the author: Peter Bertram, DJ2ZS, Wittlicher Strasse 30, D-54538 Hontheim. Fax: 0049 2674 910 149. E-mail: dj2zs@t-online.de

REFERENCES

[1] Gary A Breed, K9AY in *RF Design*, 11/94.

[2] Pat Hawker, G3VA, 'Closely Coupled Resonators form Multiband Antenna', *RadCom* 6/95 pp67ff.

[3] Pat Hawker, G3VA, 'Background to Coupled-Resonator Antennas', *RadCom* 10/95 p78. ♦

** 22 Island Wall, Whitstable, Kent CT5 1EP.*
E-mail: eurotek.radcom@rsgb.org.uk

MHz	z_0	z_1	z_2	x_1	x_2	Σs_i
18.1, 24.9, 28.1	3.67	2.72	2.52	0.54	-0.24	4.23
14.1, 21.1, 28.1	5.53	3.32	2.54	0.37	-0.36	4.47
10.1, 18.1, 24.9	7.37	3.95	2.91	0.25	-0.28	4.09

Table 3: Three typical three-band combinations. All dimensions are given in metres.

inpractice

by **Ian White,** G3SEK*

http://www.ifwtech.demon.co.uk/g3sek E-mail: g3sek@ifwtech.demon.co.uk

DIY ELEVATION AND AZIMUTH READOUT

WHAT ABOUT elevation readout from the screwjack azimuth rotator you described last month?

ADMITTEDLY, ONE advantage of the packaged elevation rotator is that it comes complete with a readout system - but if you've built a screw-jack system you can easily build an elevation readout that out-performs the commercial equivalent. The readout system on most satellite TV actuators uses a reed switch that outputs typically 3 pulses per millimetre of linear movement, or 48 pulses per inch in some models. This is good, but it requires a controller that can translate the pulse train into angular movement and position. A typical satellite TV dish controller doesn't actually bother about angles; it simply stores the required number of pulses to move from one satellite to another, and counts pulses until it gets there. GM4JJJ uses an old controller which memorises the one-degree intervals of angle as 'TV channels 0 to 90', so if he wants 42° of elevation, he simply selects 'channel 42'. A digital controller would also be a nice little project for learning how to program a PIC, with a few bytes of static memory to store the settings.

More commonly, amateur elevation readouts rely on some kind of voltmeter, driven from a potentiometer that is mechanically coupled to the antenna. The simplest idea is shown in **Fig 1a** - a voltmeter reading 0 to 90V for 0 to 90 degrees motion of the potentiometer RV1 - but we can be a lot cleverer than that. It's nice to have electrical zero and full-scale adjustments, so that you don't have to make mechanical adjustments out at the antenna, and **Fig 1b** meets this requirement. This is a Wheatstone bridge circuit, where RV2 provides the zero adjustment and RV3 adjusts the full-scale span of the readout. This circuit has several advantages over the simple voltmeter in Fig 1a. One is that RV3 takes care of any scaling factors. For example, you can use a 0-100µA meter and adjust RV3 to make 0-90° read 0-90µA on the meter scale. Also, the elevation sensing potentiometer RV1 doesn't need to have a direct drive from the elevation motion - you can use a belt or chain drive of any ratio (so long as it doesn't slip) and RV3 will take care of the scale factors. A simple three-terminal regulator such as a 78L05 can meet power supply requirements.

For a little more money, why not use a digital voltmeter (DVM) module? They are available from all the catalogue distributors, at prices from £15 to £25 according to size and specification. They all read 0 to ±199.9mV, so in order to display elevation angles from 0 to 90°,

*52 Abingdon Road, Drayton, Abingdon, Oxon OX14 4HP.

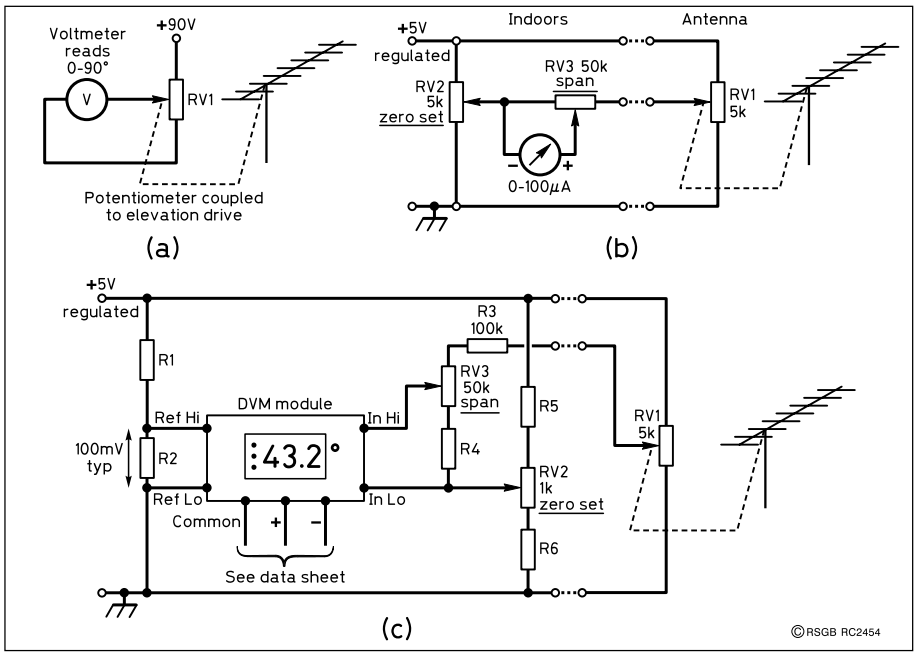


Fig 1: Basic concept of a 0 -90° readout. (b) Bridge circuit allows indoor adjustment of zero and span, eg to make a 0-100mA meter read 0 -100° elevation (max 90°). (c) Outline circuit using a DVM module - details will depend on the exact type used.

we'll have to present the module with 0.0 to 90.0mV at its input terminals (the leading 1 digit is never seen). A DVM module can be used in the circuit of Fig 1b, but we can make it even better. A slight disadvantage of Fig 1b is that it is sensitive to power supply drift - if the voltage drifts by 1%, all your readings will be off by 1% too. Maybe that doesn't matter for this application, but the solution is very easy, so let's do it. In fact, DVM modules don't measure voltage directly - they measure the *ratio* between the terminal voltage and an internal voltage reference. With most modules, you can disconnect this internal reference and apply an external reference voltage instead. This brings us to **Fig 1c**, where the input voltage (from RV1), the zero voltage (RV2) and the reference voltage (from R1 and R2) are all connected to the same power supply. Now if the power supply voltage changes, the reference voltage changes in proportion, so the display doesn't change at all. Additional refinements in Fig 1c are to place the adjustment pots RV2 and RV3 between fixed resistors to make the adjustment less sensitive, and also you can use 10-turn trimpots for RV2 and RV3. Full details of this circuit, such as the power supplies to the DVM module, are not shown because they will depend on the module in question. Some have specific requirements about the allowable voltage differences between various terminals, so you need to check the data sheet that comes with the module.

The potentiometer RV1 is the most important part of a 'voltmeter' position readout, and

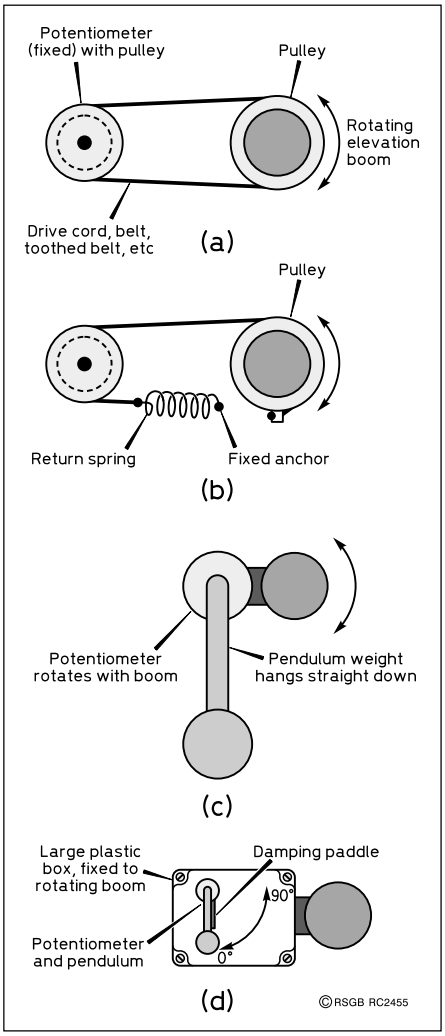


Fig 2: Potentiometer drive system. (a) Typical belt drive system. (b) Belt drivewith return spring. (c) Typical pendulum system. (d) Pendulum in weatherproofbox for wind protection. A large damping paddle helps to reduce oscillation.

probably the largest potential source of errors. Although you obviously need a linear-law potentiometer, not a log-law type, the linearity of resistance change versus angular rotation is unspecified in most ordinary potentiometers. This means you could easily have an elevation error of several degrees due to the potentiometer alone. To improve on this, you have to use some form of precision potentiometer such as a servo pot or a 10-turn pot. These have a specified linearity, often ±2% for a single-turn servo pot, which is quite good enough for this application, or typically ±0.25% for a 10-turn wirewound pot. Although new precision pots are expensive, they can often be obtained surplus at much more reasonable prices. Note that you don't need to use the whole track of any potentiometer - with the circuits of Fig 1b or Fig 1c, you can use RV2 and RV3 to obtain a 0-90° readout from whatever portion of the potentiometer track is convenient to use.

So far I haven't mentioned how to drive the potentiometer RV1 from the moving parts of the antenna. There are various options, divided roughly into direct drive and pendulum systems (**Fig 2**). Note that you never need to use the whole available track of the pot, so this gives you more design flexibility than you might have imagined. In the direct drive systems the potentiometer is fixed to the non-rotating part of the frame, and you drive the potentiometer shaft from the rotating cross-boom. The options can include various kinds of belts and pulleys (**Fig 2a**) but you must be careful to avoid problems with slippage. The other major difficulty is how to fit and replace a continuous drive belt - think about it! One neat way around this is to use an open-ended drive cord, driving the potentiometer shaft through a cord drive drum salvaged from an old domestic receiver, and using a long return spring to keep the cord in tension (**Fig 2b**). In the pendulum system (**Fig 2c**), you attach the potentiometer to the rotating part, and hang a pendulum weight from the shaft. The pendulum always hangs vertically downwards, so when you elevate the antenna the potentiometer shaft rotates. The major problems with the pendulum system are its tendency to stick due to friction in the potentiometer shaft or, if you use a potentiometer that turns more freely, the tendency for the pendulum to oscillate whenever it is disturbed by the wind or by rotating the antenna. It's easy enough to protect the pendulum from the wind by enclosing the whole setup inside a large box, which also waterproofs the potentiometer, but oscillations are more difficult to suppress. I've had some success using a ball-bearing servo pot that has good linearity and turns very freely, with a large paddle on the pendulum arm that nearly touches the sides of the box (**Fig 2d**) but even this can oscillate for several seconds.

LOCATING CABLE BREAKS

IF A BREAK occurs in a multi-core cable, how can I locate where it is without damaging the good parts of the cable?

BREAKS USUALLY OCCUR where the cable is flexed the most, or inside connectors. However, a single broken core inside a multi-core cable can be hard to find, and you don't want to cut open and destroy a moulded-on connector that may in fact be perfectly good. Here are a few ways around the problem.

Check the cable visually. With care, you may be able to spot where it has been pulled out of a connector, or where it has been stretched or pinched. Next, check the continuity of every core with an ohm-meter to see how extensive the damage is - this might affect whether you decide to continue with fault-finding or replace the whole cable. When you have identified the broken core(s), the next problem is to locate the break. One way to do this is with a capacitance meter or bridge, because the insulated cores of a cable have significant capacitance with respect to one another - of the order of 100pF per metre in mains and multi-core cables. With the far end of the cable open-circuited, connect all but one of the known continuous cores together at the near end (**Fig 3**), and measure the capacitance of that single good core to all the rest of the cores in the bundle. Then measure the capacitance of the broken core. Very roughly, the capacitance will be proportional to the distance to the break. Unfortunately, the capacitance readings are not directly proportional to distance, because of the effects of connecting leads, the self-capacitance within the connectors, and often the zero setting of the capacitance meter. To get around this, it may be helpful to re-measure the same broken core from the other end.

At best, you may get a very clear indication, for example that the break must be inside one particular connector, or very close to it. Remember that it's quite common for cores to break inside or very close to connectors, but quite unusual for a break to occur part way along a cable that shows no external sign of damage such as stretching.

Ian Braithwaite, G4COL, has another idea that can locate a break within 5mm or better. He uses an audio signal generator with a pick-up probe connected to an oscilloscope or an audio amplifier (**Fig 4**). The audio generator can be anything that will produce about 1kHz at a level of several volts - in fact a simple 555 square wave oscillator will do fine. The pickup probe is a wire loop, bent to fit round the cable, although even a plain 'scope probe might pick up enough signal. If you are using an audio amplifier, it should have a reasonably high input impedance to avoid reducing the sensitivity. As shown in Fig 4, connect all the intact cores together at the signal generator end, and to the ground points of the signal generator and the 'scope or amplifier. Connect the output of the signal generator to the broken core. Now run the pickup probe along the cable. Where the problem core is still connected to the signal generator, you should be able to see or hear a good signal, capacitively coupled from the core to the probe - but when you reach the break, the signal suddenly drops and then stays low. If the cable is twisted internally, the signal level may vary periodically along its length, but there is still no mistaking the break. If you can provide a suitable ground return, G4COL's technique should also work with single wires where the capacitance method cannot be used. However, only the capacitance method will work with a shielded cable. ♦

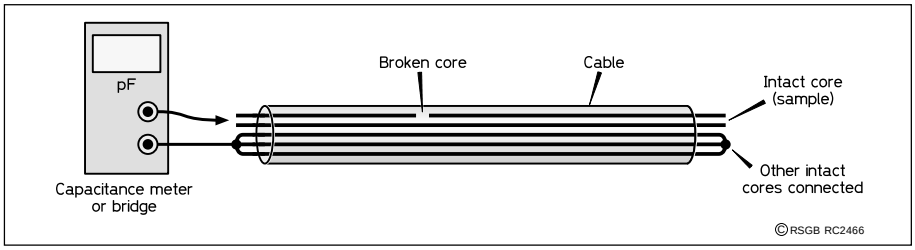


Fig 3: Capacitance method for locating a cable break. The continuous core is measured first, as a sample. Then the broken core is measured from each end.

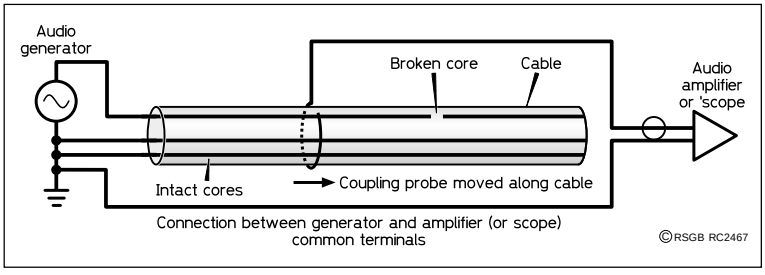


Fig 4: G4COL's method for locating a cable break. Note that the coupling 'loop' is an open-ended probe, wrapped around the wire.

If you have new questions, or any comments to add to this month's column, I'd be very pleased to hear from you by mail or E-mail. But please remember that I can only answer questions through this column, so they need to be on topics of general interest.

Newcomers' News

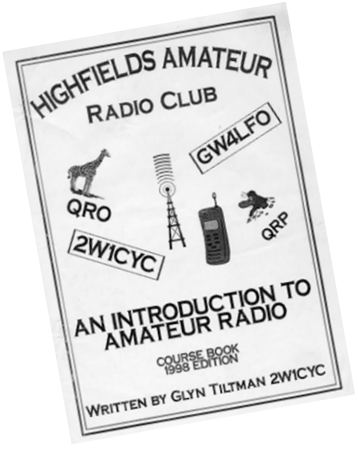
*News and Comment from and for Amateur Radio's Newcomers. Compiled by Steve Hartley, G0FUW**

HELLO! THIS IS my first *Newcomers' News* column and I think I should start by thanking my predecessor, Esde Tyler, G0AEC, for the sterling work she did in covering new developments and achievements over the last four years. I hope that I can carry on that good work, and look forward to hearing about your news, hints, tips and ideas for newcomers to the hobby. Please send any contributions to the address at the foot of the page or via e-mail to newcomers@rsgb.org.uk Photographs, diagrams or special QSL cards are particularly welcome.

By way of introduction, I have been involved in amateur radio since 1983 and was first licensed as G1KVY, a graduate of the 'George Dobbs School of Kitchen Table Technology'. Until fairly recently my station was almost entirely homebrew and QRP. The HF station now features an ICOM IC-706, which can produce 100W or QRP as required. I have been a registered Novice Instructor since the scheme began and have been the Senior Instructor for Avon for the last three years.

A GOOD FOUNDATION?

DURING A RECENT QSO with special event station GB3WUL (West Usk Lighthouse), I was told of the training scheme run by the Highfields Club in Cardiff. Kevin, GW0KIG, the club secretary, sent me details of what they call their 'Amateur Radio Foundation Course', an introduction to the hobby intended to ease newcomers into the world of amateur radio.



The Highfields Club in Cardiff have produced their own course for absolute beginners (see 'A Good Foundation?').

The 14-page handbook, which accompanies the course, was written by one of the club's youngest members, Glyn Tiltman, 2W1CYC, and takes the beginner through how to become a radio amateur, the language of amateur radio, receivers, transmitters, propagation, band plans, and some very basic circuit symbols. Well done, Glyn, a fine piece of work!

I think this is an excellent idea and one that others could use to break the ice. The Highfields Club is fortunate to have a willing instructor in the shape of Clive Trotman, GW4YKL, who runs RAE classes. The club is a registered City & Guilds examination centre, and meets on Thursdays at the Highfields Centre, Allensbank Road, Cardiff. Visitors are always welcome and further details can be obtained from the club secretary Kevin, GW0KIG, QTHR, who can be contacted by e-mail at harc@radio67.freeserve.co.uk

RAE PRACTICE

IN THE SEPTEMBER 1999 *Newcomers' News*, Esde gave details of some software by Murray, G3KZB, software that provides the user with an interactive RAE question bank. Murray was good enough to send me a copy of the programme, which comes in compressed format on two floppy discs. I found installation and operation very straightforward.

Once the software is loaded, any parts of the syllabus can be selected, or a full mock exam can be chosen. Progress is reported after each question and, after an error, the programme automatically provides another on the same topic a few questions later. I think the software is an excellent aid to those studying for the RAE and Murray should be congratulated on his development work. Anyone interested in obtaining a copy of the software should write to Murray Ward, G3KZB, at Hartley, Green Lane, Milford, Godalming, Surrey GU8 5BG.

On a hilltop outside Bath, having just erected a G5RV as part of the Novice training, Steve Hartley, G0FUW; Mark Tyldesley, 2E1HHK; John White; Jack White, 2E1HGN.

TRAINING VENUES

AS I WRITE this, Mike Coombs, G3VTO, and I are about to start our latest NRAE course at a local school. The hire of the classroom is being sponsored by the City of Bristol RSGB Group with some help from the Trowbridge Amateur Radio Club. The cost of classroom hire can be a major obstacle to formal training in any hobby and, without the generous help of the local clubs, I doubt that our courses could go ahead.

Phil Mayer, G0KKL, tells me that he has managed to establish good relations with his local Adult Education Centre. Apparently, the centre manager was astounded to learn that the NRAE training was provided free of charge by RSGB-registered instructors, and agreed to advertise the courses in the centre's annual prospectus. As a result, Phil has had a number of enquiries and should be well into the course by now. Not all Adult Education Centres will be so accommodating, but it may be worth a try.

NRAE BEST EVER

THE RESULTS OF the latest NRAE have been published. I always find the City & Guilds' report useful in giving some hints on what topics are proving tricky for newcomers. In September there were only 65 candidates and 59 of those passed (over 90%), which is the highest percentage ever achieved. Congratulations to all those who passed, and to their instructors; commiseration to the six who missed out. I am sure that they will be able to brush up and pass next time.

Candidates were generally very well prepared for the exam, but a few questions seemed to cause problems. The first was a question about the type of meter to use in the 12V supply to a 6W power amplifier. Over half the candidates were unable to determine that, among the choices given, a 0-1A meter would be the one to use. In a block diagram of a simple CW transmitter, 59% were unable to identify the PA stage; almost a third thought it was an AF amplifier.

A potentially lethal misunderstanding still persists, with almost a quarter of the candidates not knowing how to wire up a 13A mains plug. This shortfall has been highlighted in other reports from the City & Guilds and should be noted by all instructors and future Novices alike.

Copies of the examiners' report can be obtained by sending an SASE marked 'NRAE Report' to RSGB Headquarters. The report can also be found on the City & Guilds web site, www.kippax.demon.co.uk/c-and-g ♦

Spread The Word!

Send your news and colour photos to: Steve Hartley, G0FUW, QTHR

**5 Sydenham Buildings, Lower Bristol Road, Bath, BA2 3BS*

Down To Earth

Königs Wusterhausen: Birthplace of German Broadcasting

*By Gerhard Roleder, DL6AKC * with a foreword by Pat Hawker, G3VA*

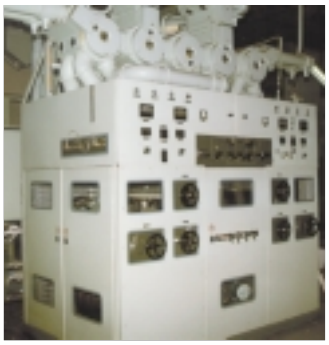
Foreword

One of the major developments of the 20th Century was the birth and growth of broadcasting. This was initiated in the years following the cessation of WW1 (November 1918). The Dutch pioneer Hanso Idzerda was the first to build a radio transmitter specifically for broadcasting regularly at scheduled times. The 'Hague Concerts' from PCGG began in November 1919 on 670 metres. The UK was relatively slow to respond, but in the years before the setting-up of the British Broadcasting Company in 1922, the Marconi Company - together with newly licensed British amateur stations - 'broadcast' speech and gramophone records and even some 'live' concerts; sometimes with, sometimes without, the special-event 'public entertainment' permits issued by the Postmaster General. In 1923 *Wireless World* (then the official journal of the RSGB) wrote: "Regular broadcasting in this country was initiated, not only at the request of, but through the insistence of the experimental amateur."

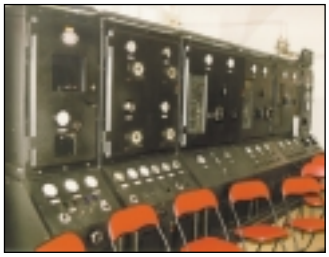
Germany was relatively quick off the mark and played an important role in the development of high-power transmitters at KW and later at the nearby short wave centre at Zeesen. The KW site now forms a Museum dedicated to transmitter and radio technology.

Pat Hawker, G3VA

A SMALL TOWN a few kilometres south-east of Berlin is recognised as the birthplace of German broadcasting. During the period 1911 to 1918 a site on Windmuehlenberg (Windmills Hill) had was used for military radio telegraphy. After WW1 the buildings and equipment were taken over by the Dutsche Reichspost and used for commercial traffic. The hill where the transmitter station was built was renamed 'Funkerberg' (radio operators' hill) and in 1920 telephony tests began using amplitude modulated signals. Successful results led to the first official programme, a Christmas concert presented by the Postal staff, on 22 December 1920. A room in Transmitter House 1 (built in 1916), normally used for technical purposes, was used as the studio. Later, external studios were installed, nevertheless live concerts from the transmitter station continued with a series of Sunday concerts between 1923 and 1926.



Coupling unit for two 50kW transmitters.



Transmitter No.13 is the 'scenery' in the assembly room.

The mid 1920s saw essential extensions. By 1926 two further transmitter buildings, six lattice masts each 210m high, and the 243m 'Middle Tower' were erected. This tower, built on three concrete bases, was soon called 'fatty' by local residents. The site became established as an important transmitter site for broadcasting and telecommunications.

THE TRANSMITTERS

OVER THE YEARS, equipment was renewed to meet changing requirements. A short-wave transmitter built by Lorenz in 1930 was used until 1975 for commercial telecommunications. As Transmitter No.11, it had a maximum output of 20kW between 3.33 and 13.32MHz and it still exists.

A 100kW grid-modulated MW transmitter, built in 1930 by Telefunken, originally installed at Berlin-Tegel, is now listed as a historic monument. The Berlin-Tegel antenna mast in the French Sector was destroyed in 1948, at which time the complete transmitter was moved to Königs Wusterhausen. From 1949 until 1989, as Transmitter No.21, it radiated the *Berliner Rundfunk* (Berlin Broadcasting) programme of the DDR. From 1989 to 1991, after the reunification of Germany, it continued to transmit the same programme, but for only a few hours each week.

Two Russian-built 50kW short-wave transmitters (No.22 and No.23) which could be operated in parallel (100kW) radiated parts of the *Radio Berlin International* programmes from 1960 to 1990, and some *Deutsche Welle* programmes from 1990 to 1995. Designed for changing frequency, they could operate in seven HF broadcast bands and were manually tuned.

Also at the site is the 100kW long-wave transmitter, reconstructed by the staff in 1963-64 as No.37. This transmitter was originally made in 1947 by Lorenz and Telefunken. It was mainly used for the *Deutschlandsender* (Germany Radio) programmes. 'No.36', a 70kW VLF transmitter built in by the staff, was used for commercial telecommunications until 1989.

ANTENNAS

Antennas were similarly modified from time to time. Most of the antennas, from long wave to short wave, were designed as long wires, dipoles or cages. During the 1930s there were 22 self-supporting tow-

**Am Urbach 7, D-99189 Erfurt-Urbich, Germany*

ers and masts on *Funkerberg*.

Of the original six lattice masts plus the Middle Tower only one 210m mast remains, now with a LW cage antenna. The Middle Tower was the victim of a storm in 1972, and the other five original masts were dismantled over a period of time.

CURRENT SITUATION

SO WHAT IS the current situation at *Funkerberg*?

First, the bad news. Regular broadcasting from KW was closed by Deutsche Telekom in 1996. Solely, the No.17 LW transmitter is held in reserve for the programme *Deutschlandradio Berlin* on 177kHz.

The good news is that a museum has been established in Transmitter House 1, illustrating the history of the radio station. It is sponsored by Deutsche Telekom, who provide the building. The exhibition is provided by a project group from the company ABEKOM, and technical support is by a registered promotional club 'Sender Königs Wusterhausen' e.V.

The mast base is insulated from ground. Concrete blocks compensate for changing lateral thrust due to wind on the long wave antenna.

The 210m high lattice mast is the last one of its type.

The core of the exhibition is in the Transmitter House 1, which provides visitors with an authentic environment. Under the heading "Königs Wusterhausen - Cradle of German Broadcasting" a trip through the history of radio communication can be taken by visitors. The exhibition is divided into eight periods. In the first period (1795 to 1910) the technical basis of radio is illustrated. Other sections show for example the importance of KW as a pioneer station in the 1920s and as a propaganda station for the Nazis.

Historic design documents about the nearby Zeesen site give details of this former giant station, which began transmitting in 1927 and was mainly used for HF broadcasting. In its final state there were nine 50kW transmitters and more than 20 antennas, most of them dipole curtains. In 1945, the Zeesen equipment was seized as reparation and taken to the Soviet Union. The buildings and antenna masts were blasted.

The KW Museum displays a wide range of exhibits, ranging from antenna insulators to transmitter valves, from the classic mass-produced 'Volksemp-fänger' broadcast receiver to transmitter modules, radio components and a 1:300 scale model of the antenna farm as it existed at the end of the 1930s. Then, not to be missed, is the machine hall. It contains a 1000 PS Diesel engine connected to a generator.

The opening times of the museum are: Tuesdays and Thursdays from 0900 to 1500; and Saturdays and Sundays from 1300 to 1700. Guided tours can be arranged. The postal address is: Sender- und Funktechnik-museum, Funkerberg, Haus 1, D-15711 Königs Wusterhausen, Germany. Tel: +49 3375 294 755. Visitors from Great Britain are welcome. ♦

A 1:300 scale model shows the former antenna farm.

Today, Transmitter House No.1 is a museum.

Behind a display of power variometers, a 20kW transmitter made by Funkwerk Köpenick of the DDR.

1000 PS diesel generator.

An Introduction to The Superhet

By Ian Poole, G3YWX *

THE SUPERHET radio is by far the most popular form of radio in use today. Even though there are a great number of other forms, the superhet has been the mainstay for radio designers since the early 1930s. During this time valves have given way to discrete transistors. Now integrated circuits are widely used. Other technologies like phase locked loops have been adopted and many new forms of modulation are commonly used; yet, despite all of these changes, the superhet has remained the main principle around which radios are designed, because it still offers levels of performance that cannot be matched by other techniques.

DISCOVERY

THE SUPERHET resulted mainly out of work that was brought about by the First World War. However, prior to this, a number of other discoveries and developments had to be put in place. The first of these was the diode valve, invented by Professor Ambrose Fleming of University College in London and a consultant to Marconi. In this capacity he realised that the weakest link in a wireless system was the detector. To overcome this problem he investigated ideas for more sensitive detectors. In 1904 he invented the basic diode valve. It consisted of an evacuated bulb in which there was a heated element called the cathode and a second element known as the anode. Current would flow in one direction but not in the other. This could be used to detect radio signals, converting them from radio frequency signals to audio frequency.

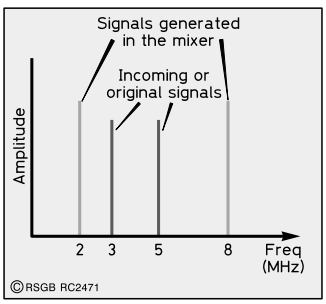


Fig 1: Frequencies generated by mixing two signals together.

In America, another researcher named Lee de Forest developed the idea further (around 1906) by adding a third element into the glass envelope, to produce the triode or 'audion'. This was called a grid, because of its construction, and it was placed between the cathode and anode. Initially this device was only used as a detector. However, after a few years, it was discovered that it could amplify signals and as a result its importance grew tremendously.

In these early days the performance of valves was very poor and they could only be used at low frequencies. When used above frequencies of a hundred kilohertz or so they were very unstable and also lacked gain.

With the outbreak of war in 1914 came a new impetus to develop and improve wireless technology, because the armed forces saw the potential of using it. At this time all radios were what is termed TRF sets, where all the selectivity is provided at the frequency of the incoming signal. As a result it was not easy to provide the required levels of selectivity. If several tuned circuits were used to give increased selectivity they all had to be varied together if the frequency was changed. Also, the frequency of the incoming signal could be relatively high, making obtaining the required degree of selectivity more difficult.

The first stage towards developing the superhet radio was undertaken by a Frenchman named Lucien Levy. He reasoned that interference could be completely eliminated if the incoming signals were converted to a lower frequency and then tuned. He used several sets of variable tuning at the intermediate frequency, and although it gave a great improvement in performance it did not completely remove all the interference as he suggested it might.

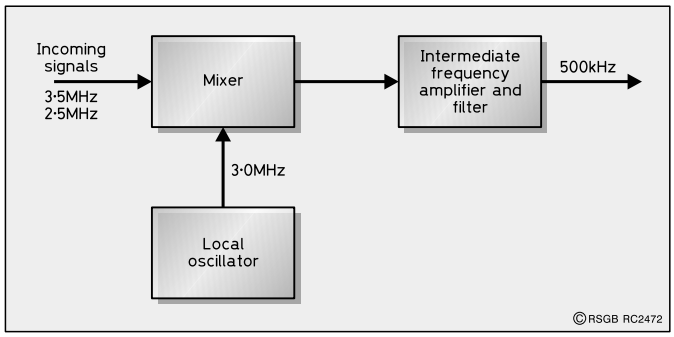


Fig 2: The basic concept of the superhet radio.

It was a brilliant American engineer named Edwin Armstrong who is credited with developing the superhet as we know it today. Like Levy, he converted the signals down to a lower frequency, but he used a variable frequency local oscillator and a fixed intermediate frequency filter of several stages to give the required performance. In this way several tuned circuits could be used quite easily, because their frequency was not changed.

The development of the superhet occurred right at the end of the war and the idea fell into disuse because other types of receiver used fewer valves. Also, its superior performance was not required at this time, because few stations were active and interference levels were comparatively low. Nevertheless, as the number of broadcast stations started to increase in the late 1920s, the superhet came into its own and was soon the most popular form of set.

MIXING

THE BASIC IDEA behind the superhet radio involves mixing or multiplying two signals together. The concept of mixing was described in August 1998

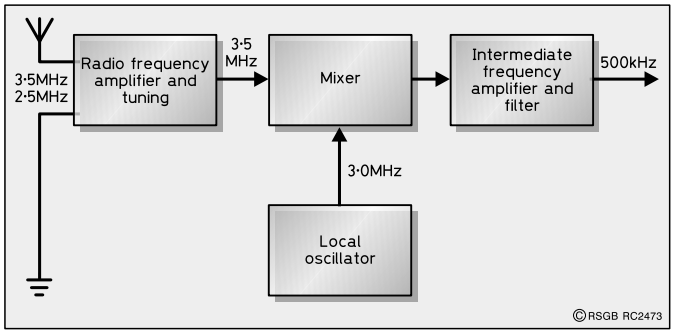


Fig 3: The superhet with RF tuning to remove the image.

* 5 Meadway, Staines, Middlesex TW18 2PW.

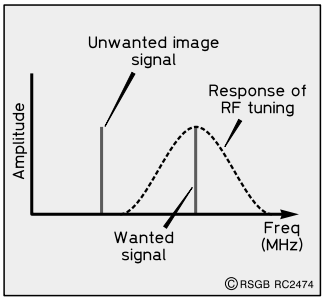


Fig 4: Frequency response of the RF tuning.

RadCom. However, to recap, if two signals of different frequencies are applied to a multiplier or mixer circuit, it is found that new signals are generated. One of these is at a frequency equal to the sum of the frequencies of the two input signals, and the other at the difference. If the two incoming signals are at frequencies of f1 and f2, the new signals will be at frequencies of f1+f2 and f1-f2. To illustrate this, take a look at **Fig 1**, where two incoming signals are at frequencies of 3MHz and 5MHz. The difference frequency component will appear at a frequency of 2MHz and the sum at 8MHz.

SUPERHET CONCEPT

IN THE SUPERHET receiver, the incoming signal enters a mixer along with a locally generated signal to convert the incoming signal down to a fixed intermediate frequency where it can be amplified and filtered (see **Fig 2**). By changing the frequency of the local oscillator, a signal on a different frequency is converted to the intermediate frequency and can pass through the filter.

Again, the idea is best illustrated using example figures (see **Fig 3**). A receiver may have an intermediate frequency of 500kHz. If the local oscillator is set to a frequency of 3MHz, then a signal at a frequency of 3.5MHz will mix with the oscillator to produce a signal that falls within the intermediate frequency filters (3.5 - 3.0MHz = 0.5MHz).

Unfortunately it is possible for a signal on another frequency to mix with the local oscillator and be converted to the intermediate frequency. A signal on 2.5MHz also has a frequency difference of 0.5MHz or 500kHz from the local oscillator and will mix with it to give a signal that will fall at the intermediate frequency. The unwanted signal is called the image signal, and it needs to be removed, otherwise interference can be caused to the wanted signal. To remove the unwanted signal some tuning is placed before the mixer, often in a radio frequency amplifier. Fortunately this does not need to be particularly sharp, because it does not have to select between one channel and the next - the intermediate frequency filter performs this function. Instead, the front-end tuning only needs to be able to reject the image signal that will be twice the intermediate frequency away from the wanted one, as shown in **Fig 4**.

COMPLETE RECEIVER

HAVING LOOKED at the basic idea behind the superhet radio, it is helpful to look at the block diagram of the overall basic receiver. In **Fig 5** it can be seen that signals enter the receiver from the antenna. They pass into the RF stages. Here the signals are tuned to remove the image signal. In addition to this most receivers have some form of RF amplification, but the level of amplification has to be carefully guaged in the design so that the mixer is not overloaded, even when strong signals are present.

The tuned and amplified signals from the antenna enter the mixer and are mixed with the local oscillator to produce signals around the intermediate frequency. These signals enter the IF stages where they are amplified and tuned. As the IF stages provide the main selectivity for the receiver, the performance of the filter is critical and governs the selectivity performance for the whole radio. As a result, high performance (and high cost) crystal filters are often employed in short wave receivers where signal bandwidths may be around 3kHz or less. For narrow band FM applications, common at VHF and UHF, the filter bandwidths are somewhat wider and ceramic filters are often used instead.

Once through the intermediate frequency stages the signals need to be demodulated, ie have the modulation removed from the signal so that it can be amplified for a loudspeaker. Demodulators take a variety of forms and depend upon the type of transmission being received. For AM signals a simple diode detector is often used. Morse and single sideband require the use of a BFO and a mixer or product detector. For FM applications a frequency sensitive demodulator is used to convert the frequency variations into changes in output voltage.

Once demodulated the signals are amplified by an audio amplifier and can be applied to a loudspeaker, headphones, or an adapter in the case of data signals.

SUMMARY

THE SUPERHET radio is in widespread use today. It is found in domestic portable radios, hi-fi tuners, CB rigs, amateur radio equipment, as well as in receivers for professional use. It provides the best performance of any type of receiver, and as a result is likely to remain in use for many years to come. ♦

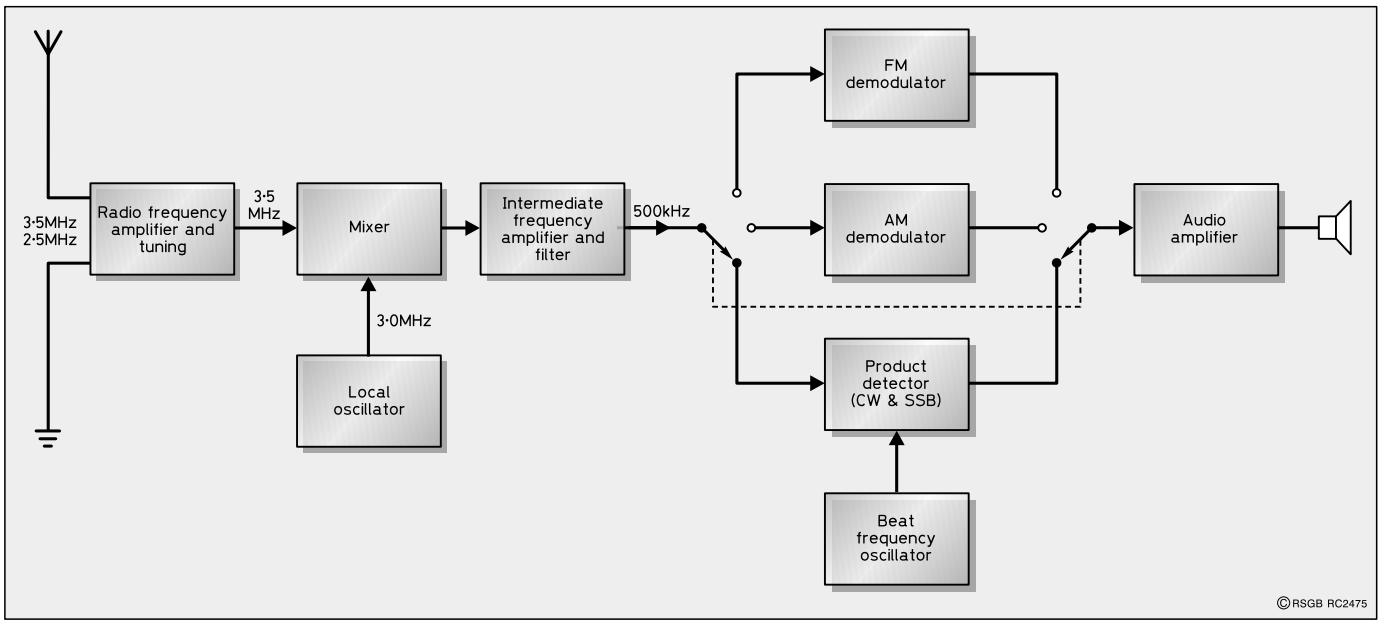


Fig 5: Block diagram of a basic superhet receiver.

Down To Earth

'Easi Build' 80m Transceiver

Final part, by Bruce Edwards, G3WCE *

FINALLY WE reach the concluding part of the project, where everything that has been described over the past months gets put together.

ELECTRICAL CONSTRUCTION

THIS IS BEST done in a logical order, rather than haphazardly. Refer to **Fig 12**, and start by mounting the large components: controls, sockets, switches, relays (the latter can be fixed in place with a spot of Super Glue®). Draw pencil marks on the base, along the line of the receiver (30mm from the side edge) and transmitter (30mm from the back edge). These are used as guides for the smaller components.

The first major job is the VFO. Fit all components and make all connections, taking great care to get the pin connections of the semiconductors right. Check and double-check everything. Mount the VFO board, ensuring that the connections on the underside are clear of the base. Connect the variable capacitor using stiff wire (1.25 or 0.9mm). The lead to the RIT pin can be grounded for now. Connect a 13V supply and check that there is 5 volts at the output of IC1. All being well, the tuning range can now be roughly set. With VC1 at half mesh, connect a short length of wire to the output (C9). Using a test receiver tuned to 3550kHz, adjust TC1 until a signal is heard. This is all that is needed at the moment. Don't be concerned if the VFO is not very stable at this stage.

Now for the receiver. Referring to Fig 4 (September 1999) start by assembling the bandpass filter (see Fig 5) and fixing it in place. Continue with IC3, IC2 and the smaller components. IC3 is mounted in the same manner as IC4 ('dead bug', ie legs upwards), but only pin 3 is grounded. Where grounding is necessary, leads are soldered directly to the base. Carry on until the receiver is complete. The volume control is connected with miniature screened audio cable, and the output from IC4 is connected to the loudspeaker socket.

The receiver can now be tested using a temporary connection from the VFO to IC3, with 13 volts to IC4, TR4 and IC2, and a length of wire as an antenna to the input of the bandpass filter. Sensitivity will be low, but it should be possible to hear something by tuning the VFO up and down its range.

Continue with the auxiliary circuits; the RIT, sidetone, changeover relay RLY2 [1] and the power connector. Permanent power connections can be made to all stages, a length of miniature coax connected to C15, and the wiring tied down neatly as shown. Now carry on and complete the transmitter and make a thorough check of everything.

TESTING

IF AT ANY STAGE a problem appears, turn off the power and investigate it. Connect a loudspeaker and an antenna, and turn on. Advancing the volume control should result in noise from the loudspeaker. Set the RIT control to zero. Tune the VFO and search for a steady signal at the centre of the tuning range. When one is found, using a suitable tool, adjust the cores of T1 and T2 for maximum volume. Now check the function of the RIT control.

Disconnect the antenna and connect a Morse key and a dummy load [2]. Set RV3 to the centre of its travel. Switch to transmit and press the key. The sidetone should be heard in the speaker. Holding the key down, tune the test receiver until the signal is found, somewhere near 3550kHz. If you have a power meter it can be connected between the transceiver and dummy load. It should show an output of at least 1 watt.

SETTING UP

THERE ARE ONLY three adjustments to be made; the VFO, RIT and bandpass filter; and they have already been roughly set.

VFO

Close the vanes of VC1 fully. The tuning knob should be set to exactly 9 o'clock. Now set the test receiver to 3490kHz if VC1 is a 12pF component or 3500kHz if it is 10pF. Adjust TC1 until the signal is heard. Set the tuning control to the 3 o'clock position and check the frequency of the VFO by finding the signal with the test receiver. If using 10pF for VC1 the frequency should be about 3600kHz, if using 12pF it should be about 3610kHz. The VFO enclosure can now be completed, but don't use too much solder on the lid - you might want to remove it at some future time. The VFO must be calibrated, but not yet. Since you have just heated everything up with a soldering iron, now is not a good time, allow several hours to elapse first.

RIT

Set the VFO to the centre of its range, the RIT control to zero (centre), and tune the VFO to give a beat note on the test receiver. Switch to transmit and adjust RV3 for exactly the same note. Switch between transmit and receive and carefully adjust RV3 so that the note doesn't change.

BANDPASS FILTER

With the antenna connected, find a steady signal in the centre of the tuning range and carefully adjust T1 and T2 for maximum signal strength. This time take care and make sure it is right.

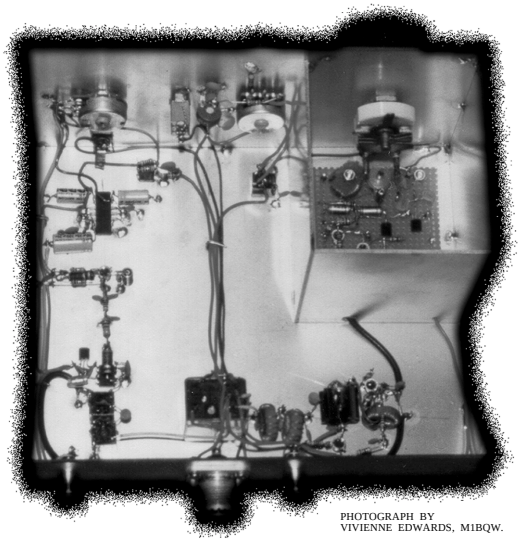
CALIBRATION

It just remains to calibrate the VFO scale and the transceiver will be ready for use.

Before using it in earnest, though, it would be a good idea to get a local amateur to listen to your signal to make sure that all is well.

AND FINALLY...

THE 'EASI BUILD' transceiver is delightfully easy to use. To



PHOTOGRAPH BY VIVIENNE EDWARDS, M1BQW.

A look inside the completed 'Easi Build'.

**232 Earlham Road, Norwich, NR2 3RH.*

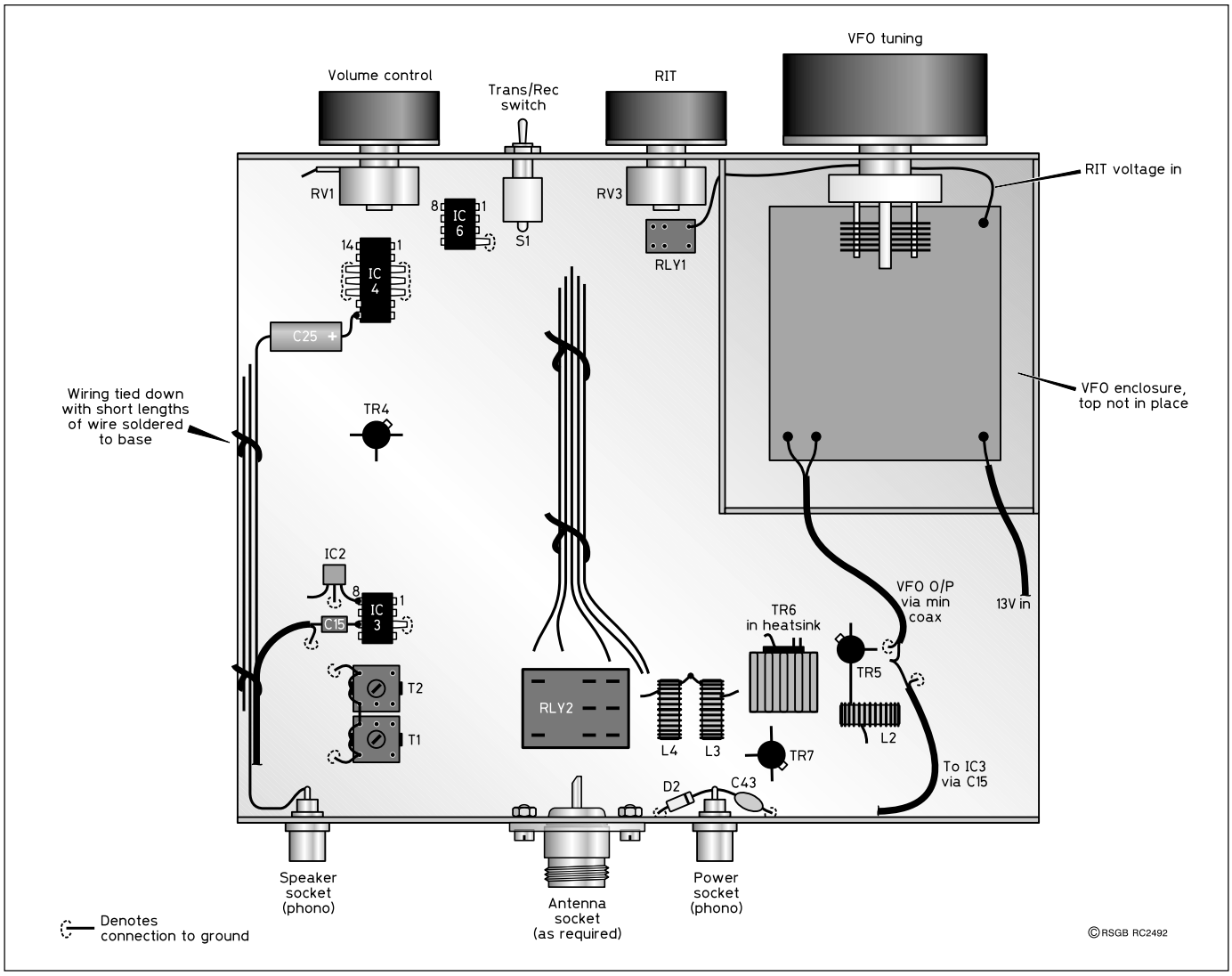


Fig 12: Layout of the major components. Smaller components are soldered between the larger ones.

net onto a station, start with the RIT at its centre position and adjust the main tuning for zero beat. The RIT can now be set to give the desired note.

With a reasonable antenna (eg a G5RV) you shouldn't have any shortage of QSOs. You are unlikely to achieve WAC or DXCC (please prove me wrong); on the other hand, you will almost certainly have no problems with TVI or BCI. Have fun!

NOTES

[1] As a particular relay is not specified for RLY2, you will have to work out the connections for yourself. If no data is available, this can be done visually and confirmed with a test meter on a resistance range.

[2] This can be three 150Ω 0.5W resistors in parallel. ♦

ABBREVIATIONS AND SYMBOLS

A	Ampere (the electrical unit of current)
AF	Audio Frequency
AM	Amplitude Modulation
BCI	Broadcast Interference
BFO	Beat Frequency Oscillator
CB	Citizens' Band
CW	Continuous Wave (Morse)
DDR	Deutsche Democratic Republic (the former East Germany)
DXCC	DX Century Club (an award)
FM	Frequency Modulation
IF	Intermediate Frequency
kHz	kilohertz (one thousand Hertz)
kW	kilowatt (one thousand watts)
LW	Long Wave
m	metre (metric unit of length)
MHz	Megahertz (one million Hertz)
MW	Megawatt (one million watts)
NRAE	Novice Radio Amateurs Exam
Ω	Ohm (the unit of resistance)
PA	Power Amplifier
pF	pico Farad (10^{-12} farad)
QRP	Low power
QSL	Confirmation of a contact
QSO	A contact
QTHR	Location as given in the *RSGB Yearbook*
RAE	Radio Amateurs Exam
RF	Radio Frequency
RIT	Receiver Incremental Tuning
RSGB	Radio Society of Great Britain
SASE	Self-addressed Stamped Envelope
TRF	Tuned Radio Frequency
TVI	Television interference
UHF	Ultra High Frequency
UK	United Kingdom
V	Volt (the electrical unit of potential)
VFO	Variable Frequency Oscillator
VHF	Very High Frequency
VLF	Very Low Frequency
W	Watt (the electrical unit of power)
WAC	Worked All Continents (an award)
WW1	World War 1

bookchoice

THE FOCAL ILLUSTRATED DICTIONARY OF TELECOMMUNICATIONS – Focal Press 1999

Described by RSGB Staff

THIS IS A NEW book and, like all reference books before it, takes great will-power to put it down once it has been picked up! The book gives a good impression resting on a desk, the cover showing the festooned end of a fibre-optic cable, and reminding us that the book has over 6,000 terms, definitions and acronyms, and has 350 illustrations. Not all abbreviations and acronyms are defined, however, other than by giving their titles in full.

Most people reading a reference book for the first time will look for particular entries whose definitions include pitfalls for the unwary. A current favourite is the word 'baud', a unit, rather like the farad, where the partial name of a pioneer has replaced the standard unit. This unit does not appear amongst the 6,000 terms, but is replaced by the term 'baud rate'.

Although not specifically mentioned anywhere in the book, it is heavily biased towards American systems and standards, and the branches of telecommunications implied in the title are those of digital, analogue and cellular telephone networks. It claims to cater for 'relative newcomers' and 'telecommunications engineers who are specialists', a very difficult objective by any standard. The book cannot be used as an exclusive source of definitions without consulting other encyclopaedias or dictionaries, because the definitions are those relating to the branches of telecommunications mentioned previously. For example, a 'station' is defined as 'a collection of communications equipment connected to a network, with a unique address, and capable of sending and/or receiving data'.

Diagrams occasionally leave a little to be desired. Gregorian and Cassegrain reflector arrangements are presented without *any* explanatory wording on the diagrams. They *are* understandable if you know about them in the first place!

There is no doubt that there is a wealth of useful information here, and if your business includes GSM, then you will find this book particularly useful.

Focal Press, paperback, 215 by 135mm, 685 pages, ISBN: 0 240 51544 7

Non-members' price £29.50. Members' price £25.08

RADIO COMMUNICATION HANDBOOK - RSGB 7th edition, 2000

THIS HANDBOOK should require no introduction to any radio amateur in the United Kingdom. Indeed, as the margarine advert used to say, 'Its fame is spreading'. What *might* need expanding upon are the contents, as these have been extensively revised since the previous edition. All chapters have been updated and many have been rewritten. Even the new data mode, PSK31, is described.

There are 23 chapters in this weighty yet durable tome, and the first three covering most of the principles of the subject, including the basic components and their properties. They also give an introduction to propagation. It would be difficult to think of a component in common use whose description and application are not described in these pages. These three chapters form your reference manual for basic devices and their properties.

Chapter 4 is entitled 'Electronic tubes and valves'. Its contents fall into two main categories. The first covers the construction, principles and operation of those valves used in RF power applications in amateur radio. In the second, microwave valves such as klystrons, magnetrons and disc-seal valves are described. The cathode-ray tube, the key component of so much test gear, is included with the other thermionic devices in this chapter.

Following this 'introductory course' are eight chapters covering virtually everything about transmitters, receivers, and the building blocks from which they are made. The frequency range from 73kHz to microwaves is covered, as is the propagation which determines how any RF signal launched from an aerial will be affected by diurnal, weather and solar conditions.

Owners of the book *HF Antennas for all Locations* will recognise the style of Chapter 13 on HF antennas, and the typical thorough approach to the subject. The same pragmatism exists in Chapter 14, which gives designs and performance figures for VHF and UHF antennas.

A short chapter on power supplies follows, giving the principles underlying the subject, after which designs of linear and switched-mode supplies are presented.

So far, this book has provided the information needed to have a good grounding in all aspects of the operation of the equipment in a typical amateur radio station. Next comes some data on the test and measuring equipment that may be required to keep it all going! Information is given on the following: AC, DC and RF current and voltage measurement (analogue and digital); using the cathode-ray oscilloscope; a capacitance meter; an RF impedance bridge; an RF noise bridge; an absorption wavemeter; a FET dip oscillator; an audio oscillator; a two-tone oscillator for testing sideband transmitter linearity; a crystal-based frequency marker; 2m and 70cm signal sources; a receiver calibrator and transmitter monitor; a frequency counter; a spectrum analyser; a power/VSWR meter. The chapter ends with an antenna bridge.

Having chosen something to build, those of us not too well-versed in workshop practice will welcome Chapter 17, which tackles just that. Tools and how to use them, and with what materials and adhesives – everything is here. The mysteries behind the design and etching of printed-circuit boards are revealed, together with those underlying the use of surface-mount devices. Finally, 'boxes' of various sorts are described, and how to give them the professional finish. What else is needed? Nothing, you may think, but you would be wrong. This book does not skimp anything, and goes on in Chapter 18 to discuss the minefield known otherwise as electromagnetic compatibility (EMC), and covers it in some detail, too.

The book finishes with a final flourish, covering satellite and space communications, slow-scan and fast-scan television, packet radio, and gives guidelines on operating technique and good station layout. Some general reference information is included at the end, followed by an appendix containing printed-circuit artwork for some of the projects covered in the book.

All in all, the *Radio Communication Handbook* is a reference book *par excellence*, and one under whose weight all bookshelves should have to strain!

7th Edn, 2000, RSGB, paperback, 272 by 198mm, 820 pages, ISBN: 1-872309-24-0

Non - Members' price £30.00 Members' price £25.50

product news

GPS WRISTWATCH

CASIO HAVE introduced the world's first GPS wristwatch, the **Satellite Pro Trek Navi**. In addition to the normal functions that you would expect of a digital watch, you get a fully featured GPS that can indicate latitude, longitude, distance to destination, waypoints, speed and direction of movement. From the single CR2 cell you should get over 720 GPS measurements or one year of normal operation.

Weighing-in at 138g and priced at €365.3 + VAT, radio amateurs might find the Satellite Pro Trek Navi particularly useful for determining a contest or home station locator, DF hunting, homing-in on a rally, etc.

Orbitics SARL. Immeuble California, BP 693, 31319 Labège Cedex, France. Tel: 00 33 5 62 24 31 76. Web site: www.oreika.com/orbitica/watches/casiogps.htm

CATALOGUE

THE 2000 EDITION of Waters & Stanton's **UK Radio Communications Equipment Guide** is now available.

With 272 colour pages of transceivers, antennas, kits, receivers, power supplies, test and measurement equipment, tuners, etc, it makes a handy reference for a multitude of products that might be of interest to radio amateurs. There's even a section on video, personal audio, and telescopes.

30 pages bigger than the 1999 edition but still the same price, the new W&S catalogue costs £2.95 plus postage.

Waters & Stanton PLC. Spa House, 22 Main Road, Hockley, Essex SS5 4QS. Tel: 01702 206835. Web site: www.waters-and-stanton.co.uk

SSB/CW/RTTY MOBILE

A NEW HF mobile transceiver, the PC-9000, has been introduced by Patcomm of the USA. It is an SSB/CW model that covers all the HF bands plus 50MHz. Power output is 40 watts on HF and 20 watts on 6m. Standard features include a CW keyer and a socket for a PC-type keyboard. Optional extras include an FM module and a RTTY module. With the RTTY module installed, it is possible to send messages direct from the keyboard (not supplied) and receive them on the transceiver's display.

Measuring 203 x 70 x 190mm and weighing 2kg, the PC-9000 is priced at £799.95.

Nevada. 189 London Road, North End, Portsmouth, PO2 9AE. Tel: 023 92 662145. Web site: www.nevada.co.uk

QRP UHF TRANSCEIVER

W&S ARE distributing a new low power **Maxon** UHF FM transceiver, the **SR-214**.

The SR-214 employs a frequency synthesiser and provides 69 25kHz stepped channels from 433.075 to 434.775MHz, 10mW transmit output, full CTCSS encode and decode, and scanning facilities. It can be used for short-range communication (*not* licence-free in the UK) and is ideal for monitoring local repeaters, etc.

Measuring just 45 x 128 x 35mm, and weighing 130g including the supplied antenna, the SR-214 is priced at £29.95. Batteries (you'll need four AA cells) are not included. Extras include a carry case and a NiCad charger.

Waters & Stanton PLC. Spa House, 22 Main Road, Hockley, Essex SS5 4QS. Tel: 01702 206835. Web site: www.waters-and-stanton.co.uk

FM DUAL BANDER

THE NEW **TM-D700E** data communicator from **Kenwood** is a full dual-band 2m/70cm transceiver that offers a wide range of data communication options, enabling the user to operate SSTV, GPS and APRS. The transceiver includes a TNC for 9600bps packet radio operation.

The display, which forms part of a detachable front panel, is large, clear, and incorporates a band scope. DCS and CTCSS are standard, as is a wireless remote control, and an extension cable and holder to mount the front panel remotely. The frequency coverage is dealer-expandable and there are a number of optional extras, including a voice synthesiser.

Priced at £519.95, the transmit power is 50 watts on VHF and 35 watts on UHF..

Kenwood UK Ltd. Kenwood House, Dwight Road, Watford, Herts WD1 8EB. Tel: 01923 655284. Web site: www.kenwood-electronics.co.uk

SIMPLE RECEIVER KITS

LAKE ELECTRONICS have introduced yet another very simple receiver, this time for the Medium Wave. This new kit is along the same lines as their increasingly popular Short Wave receiver kit. It consists of a quality PCB, all the components, plus a crystal earpiece. Ideal for newcomers or the less experienced constructor, it should only take an hour or so to build and fully meets the requirements for one of the practical projects for the Novice RAE.

The kit is priced at £8.00 plus £1.00 potage. Battery not included.

Lake Electronics. 7 Middleton Close, Nuthall, Notts NG16 1BX. Tel: 0115 938 2509.

Note: Product News is compiled from press releases sent in by the manufacturers and distributors concerned. Details are published in good faith, but *RadCom* cannot be held responsible for false or exaggerated claims made in the source material.

HOT NEWS!! SEE THE NEW 'SHOPPING BASKET' ML&S WEB SITE AND SAVE EXTRA POUNDS!! http://www.MLandS.co.uk

BUY NOW - PAY NOTHING UNTIL JUNE - INTEREST FREE!

MARTIN LYNCH & SONS
140-142 NORTHFIELD AVENUE,
EALING, LONDON W13 9SB
OPEN SEVEN DAYS A WEEK. MON - SAT 9.30 - 6.00, SUNDAYS 10.00 - 4.00

Another year flies by and as we enter the first year of the Millennium, who knows what the 'big three' Japanese manufacturers have in store for us. One thing is for sure, despite machines with '2 wheels' appearing in the London store, along side masses of Ham Radio (makes a change from colour TV's and washing machines as found in some of our competitors!) we are determined to stay at he top of the first division with the equipment that counts - Yaesu, Icom and Kenwood. Better still prices that will help that bruised post-Christmas pocket!

SUPER SALE STARTS 27th DECEMBER - COME EARLY

● TEL: 0208 566 1120 ● FAX: 0208 566 1207 ● Web site: MLandS.co.uk ● e-mail: sales@MLandS.co.uk

ICOM

IC-756PRO
The only new HF Base designed for the millennium. HF + 6M 32 Bit DSP
RRP £2399 ● ML&S £1999
Pay nothing until June then pay balance interest free!
Or after June pay 36 x £84.36 at 24.9%

IC-775DSPmk11
Still the only 200W base with DSP available.
RRP £2999 ● ML&S £2295
Pay nothing until June then pay balance interest free!
Or after June pay 36 x £96.85 at 24.9%

IC-707mk11G
Sold more than any other 'mini ham shack'
RRP £1249 ● ML&S £999
Pay nothing until June then pay balance interest free!
Or after June pay 36 x £42.16 at 24.9%

KENWOOD

TS-870S
Use one and you will see why we have so few used examples. 100W HF.
RRP £1999 ● ML&S £1499
Pay nothing until June then pay balance interest free!
Or after June pay 36 x £63.26 at 24.9%

TS-570DGE
Without question the most under priced HF DSP radio there is!
RRP £999 ● ML&S £899
Pay nothing until June then pay balance interest free!
Or after June pay 36 x £37.94 at 24.9%

HF TOP TEN

YAESU

FT-1000MP/AC
Still sells well, despite its advancing years.
RRP £2299 ● ML&S £1999
Pay nothing until June then pay balance interest free!
Or after June pay 36 x £84.36 at 24.9%

FT-920AF
Excellent HF & 6M Base with DSP.
RRP £1499 ● ML&S £1249
Pay nothing until June then pay balance interest free!
Or after June pay 36 x £52.71 at 24.9%

FT-847
The whole lot (160-70cm) in one box.
RRP £1699 ● ML&S £1349
Pay nothing until June then pay balance interest free!
Or after June pay 36 x £56.93 at 24.9%

FT-100
It arrived 3 years late but its very good. 160M-70cm
RRP £1249 ● ML&S £959
Pay nothing until June then pay balance interest free!
Or after June pay 36 x £40.47 at 24.9%

VL-1000
Buy this 1kW solid state amp and never buy another amplifier.
RRP £4690 ● ML&S £3799
Pay nothing until June then pay balance interest free!
Or after June pay 36 x £160.32 at 24.9%

● NO DEPOSIT
● NOTHING TO PAY FOR 6 MONTHS
● INTEREST FREE PERIOD OF 6 MONTHS

YAESU

FT-90
The smallest most powerful mobile in the world. (Honest!)
RRP £419 ● ML&S £369
Pay nothing until June then pay balance interest free!
Or after June pay 36 x £15.57 at 24.9%

VX-5R
The best selling handie since the FT-23. Except its got 2/6/70 & 5 Watts as standard.
RRP £359 ● ML&S £299
Pay nothing until June then pay balance interest free!
Or after June pay 36 x £12.62 at 24.9%

FT-8100
A true Dual Band Mobile offering simultaneous RX on both bands.
RRP £459 ● ML&S £399
Pay nothing until June then pay balance interest free!
Or after June pay 36 x £16.84 at 24.9%

KENWOOD

Kenwood TMD-700E NEW!
Latest Dual Band mobile with some very advanced features. Built in 9k6 modem, KISS compatiable, APRS. See web site.
RRP £520 ● ML&S £469
Pay nothing until June then pay balance interest free!
Or after June pay 36 x £19.79 at 24.9%

TH-D7E
Still the only handie with built in 9k6 modem.
RRP £319.95 ● ML&S £289
Pay nothing until June then pay balance interest free!
Or after June pay 36 x £12.20 at 24.9%

VHF TOP TEN

TM-G707E
Still the easiest to read mobile available, twin band and 50/35W
RRP £329 ● ML&S £299
Pay nothing until June then pay balance interest free!
Or after June pay 36 x £12.62 at 24.9%

TM-V7E
Excellent Dual Band Mobile with remote head
RRP £549 ● ML&S £389
Pay nothing until June then pay balance interest free!
Or after June pay 36 x £16.42 at 24.9%

ICOM

VC-H1
Hand Held picture communicator. Hook up to any Transceiver and send and receive SSTV pictures.
£299.95 ● ML&S £279
Pay nothing until June then pay balance interest free!
Or after June pay 36 x £11.77 at 24.9%

IC-T81E
Superb (and only!) QUAD BAND handie. 6/2/70/23
RRP £399 ● ML&S £369
Pay nothing until June then pay balance interest free!
Or after June pay 36 x £15.57 at 24.9%

IC-2800H
Ultimate Dual Band mobile with built in TFT Colour monitor for camera.
RRP £549 ● ML&S £449
Pay nothing until June then pay balance interest free!
Or after June pay 36 x £18.95 at 24.9%

Heil Sound

ML&S are the sole authorised retailers of this excellent range of TX/RX Audio products from the USA. As used by the 9M0C DXpedition last year, treat yourself to either the HC4 for DX or HC5 'full articulation' inserts.
The Pro Series Headsets are designed to meet the demands of top contesters and DX chasers. The light and comfortable headset combines with a flexible boom which houses either a HC4 DX or HC5 full "BBC quality" microphone insert.

Special package deal.

Proset 4 DX h/set + boom with FREE HC5 insert and lead for your rig.
Total RRP £172, ML&S £129.95.

Heil Proset *Professional Headset & Boom Microphone.*
HC-4 & HC-5 *Inserts.* **Foot Switch.**
Heil Pro Micro *Lightweight Headset & Boom Microphone*

Samlex SEC-1223 PSU

Around the same size as an IC-706, this fantastic new PSU is a must for the shack, IOTA use, or indeed anywhere small compact 13.8 is required. Ideal for use with the FT-100, FT-848, IC-706, IC-736 etc.

- Voltage out: 13.8 DC
- Current: 23-25amps
- Cooling: Internal heatsink & fan
- Input: 240V (or 110 with int. modification)
- Dimentions: 57 x 177 x 190mm
- Weight: 1.45kg

Only £89.95 inc. VAT

Martin Lynch can also offer finance terms up to 60 months. Deposits from a minimum of £25. We welcome your part exchange against any new (or used!) product, provided its clean and in good working order. Call the Sales Desk today. APR: 24.9%. Payment protection is also available up to 36 months. All units are brand new and boxed and offered with full manufacturers RTB warranty. All prices quoted for cash/cheque or Switch/Delta card. No additional charges for credit cards. Martin Lynch is a licensed credit broker. Full written details are available on request. Finance is subject to status. E&OE. £10 p&p on all major items.

FINANCE EXAMPLE
All examples do not include P&P.

Cash Price	Deposit	PAID IN 6 MONTHS	APR
£409	NIL	£409	0%
OR			
Cash Price	**36 Payments Deposit of**	**Total Credit Price (T.A.P.)**	**APR**
£409	£17.26	£621.36	24.9%

Written quotations available on request

CALL: 0208 566 1120 IF YOU SEE A DEAL BETTER ELSWHERE GIVE US A CALL

Don't forget - Morse tests last Saturday of every month!

technical topics

by **Pat Hawker**, G3VA*

RECEIVERS FOR 2000

ALMOST 20 YEARS ago, Dr Ulrich Rohde, DJ2LR, wrote a two-part article under the title 'Communications Receivers for the year 2000' (*Ham Radio,* November, December 1981) in which he discussed some then new approaches to receiver design, including microprocessor applications in receivers, input filters, and input mixers in Part 1; and feedback amplifiers, IF filters, IF detectors and frequency synthesisers in Part 2. Much of this article remains relevant today, although his designs were based on the design practices then coming into professional models, rather than lower cost amateur radio practice. By now many of his design approaches have entered amateur practice, although rather overtaken by the increasing use of digital signal processing in the later stages of receivers. (usually, in amateur practice, in the post detector stages). Increasingly in commercial practice the signal is changed into digital form before demodulation, although still usually at a low IF. The all-digital receiver, with the signal digitised at the very front of the receiver, still remains tantalisingly over the horizon.

Some examples of current professional HF receivers are noted in a 1998 publications of the Radiocommunications Agency, *Current UK Research into HF Systems, HF Propagation, and the Ionosphere*, compiled by the National Radio Propagation Committee and edited by Geoff Gott, G3MUO; Les Barclay, G3HTF; and Paul Cannon, ex-G8EAJ - all eminent professional researchers in this field of expertise. While this publication is primarily concerned with HF propagation and Ionospheric research, it provides a useful summary of the continuing developments in HF radio in the last few years of the 20th Century.

For example, it provides a brief outline of the current Racal Radio series of high performance HF surveillance and communications receivers in the form of the RA3790 series, which include models with front panel control (RA3791 and 92) as well as units intended for remote control use only (93, 94, 96). These use a linear sigma-delta analogue-to-digital converter (ADC) at a second-IF of 32kHz, followed by a digital mix to baseband and decimation within the DSP array. The highly linear ADC gives an improved in-band dynamic range when compared with a conventional analogue receiver. IF filtering, AGC and demodulation functions are all implemented digitally, providing a wide range of user-programmable IF filter bandwidths, together with an adjustable IF notch filter. All the digital IF filters are claimed to have a 100dB stopband, and have linear phase, zero differential group delay characteristics. The AGC is implemented within the DSP array using a feed-forward technique. The gain of the analogue circuits before the ADC is also under the control of the DSP array, resulting in a gain control system with excellent transient response, and effectively no overshoot, which automatically adjusts the relative gains of the digital and analogue sections of the receiver to maximise the in-band dynamic range of the receivers. The AGC hang and decay times may also be programmed by the user. A dual RS-423A (ASCII) remote control interface is also included within the basic receiver, to allow the user to control the receiver from a computer or from any RA3790 series receiver that has a front panel.

Similarly, Marconi have designed and produced a range of high-performance digitally implemented HF communication receivers and transmitter drives (exciters) as the H2550/1550 series along what appear, from the summary given, to follow much the same basic design approach. In this case it is pointed out that all the software is held in flash memory and facilities are provided to allow all the receiver functions, including DSP functions, to be updated by remote control via a serial link. Some performance characteristics are given: In-band third-order intercept point is typically +11dBm. With the preselector module fitted the out-of-band third order intercept point is typically +55dBm and image rejection better than 100dB. The key A-D/D-A conversion and digital signal processing elements were developed at the Marconi Research Centre.

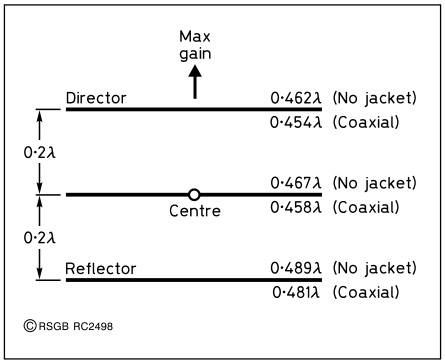


Fig 1: Gain-optimised three-element wire beam. Dimensions are for bare wire elements (no jacket) and for elements made of RG-8/X coax (with jacket). The feedpoint impedance at the centre of the driven element is 13.3Ω (resistive).

Roke Manor Research Ltd have developed a broadband HF surveillance receiver providing 'staring' reception of a full 3.3MHz sub-band of the HF spectrum. This bandwidth is digitised at 10MS/s with 16-bit resolution, after which analysis functions, such as real-time FFT, equalisation and demodulation, are performed.

The above notes refer to current professional receivers and claimed performance figures. Where digital demodulation at IF has been attempted in relatively lower cost receivers, this has tended to result in limited dynamic range and unsatisfactory AGC, but clearly this is the way that designs will tend to go in the 21st Century. For my part, I would like to see receivers and controls increasing in physical size, although this would require a reversal of trends of the past 50 years or so. The drive towards very compact transceivers was originally sparked by the wish to develop models that could function both as fixed stations and yet fit into the average small car for mobile operation - a trend which began with the original Collins KWM-1 and continues with such models as the ICOM IC-706.

I would suggest that miniaturisation of fixed stations has reached the stage where it is not really ergonomically sound. Our fingers have, if anything, grown bigger! It has also largely taken away one of the traditional pleasures of amateur radio, the fun of home servicing by non-professional amateurs with limited facilities and experience. It used to be the proud boast of an amateur that he could keep his rig on-air despite the then high fault rate of valves and components. It is perhaps no wonder that there appears to be a growing nostalgia for the large, valved receivers of the pre-1970s!

Will amateur radio equipment increasingly fall into the category of 'throw away electronics' - ultra-reliable but too costly to repair when eventually a fault (usually mechanical) finally strikes? Domestic equipment has almost reached this state, with many radio and television service engineers on the point of giving up. As long ago as 1966 I recall writing a 'New Thinking' piece for *Electronics Weekly* 'A Throw-away' Era Soon?', in which it was noted that the traditional 'bath tub reliability curves' were becoming outdated and the costs of servicing with transport and complex servicing gear, backed by clerical and stock-keeping assistants, was even then becoming high. Who today would take a faulty, cheap transistor radio to be professionally repaired? It would usually be cheaper to buy a new one. This is not yet the case with most amateur radio gear, but it could come. Home servicing is largely a matter of history. As I wrote in 1966, "The changes have many consequences for the industry and for those whose living depends upon skilled servicing." The throw away approach may yet come to have increasing impact on amateur radio,

OFFSET FEEDING OF WIRE BEAMS

ROBERT ZIMMERMAN, NP4B, in 'Simple Offset Feeding of Wire-Element Beams' (*QST*, October 1999, pp45-46) describes a useful-looking technique for matching a co-axial feedline to a three-element monoband Yagi

*37 Dovercourt Road, London SE22 8SS.

wire array, by using the antenna as an impedance transformer with the driven element fashioned from coaxial cable. The parasitic elements can be made from American gauge No.12 wire; possibly supported by PVC tubing.

NP4B writes: "The Gamma match - a popular matching arrangement that is often used with Yagis made of aluminium tubing - is typically not employed with wire beams, because of the Gamma match's bulkiness, combined with a geometry that is difficult to maintain on an antenna that frequently is swinging in the wind. The Delta match, convenient for use with open-wire transmission lines, does not readily lend itself to use with coaxial cable."

In his article, NP4B shows that a convenient and simple means of feeding a wire beam with coaxial cable is by using the *antenna itself* as an impedance transformer. He shows that typically for a resonant driven element of a three-element Yagi (**Fig 1**) is of the order of 13Ω at the centre, but moving away from centre the impedance will increase and at some point will be exactly 50Ω, which would provide an excellent match to 50Ω coaxial cable [much as is used for the 300Ω Windom off-centre-fed dipoles - *G3VA*]. The basic construction of the driven element is shown in **Fig 2.**

Table 1 and the associated **Fig 3** show the antenna dimensions for the amateur bands from 10 to 50MHz, assuming that (1) the

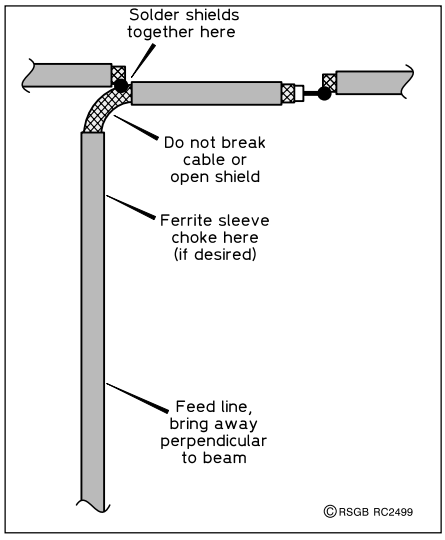


Fig 2: Construction of the driven element made from coaxial cable such as RG-8/X.

Freq. (MHz)	A (m)	B (m)	C (m)	D (m)	E (m)	F (m)
10.125	13.69	6.79	4.44	2.34	14.49	5.93
14.150	9.80	4.86	3.18	1.67	10.37	4.24
18.110	7.65	3.79	2.48	1.31	8.10	3.31
21.200	6.54	3.24	2.12	1.12	6.92	2.83
24.930	5.56	2.76	1.81	0.95	5.88	2.41
28.500	4.86	2.41	1.58	0.83	5.15	2.11
50.200	2.76	1.37	0.90	0.47	2.92	1.20

Table 1: Antenna Dimensions (key see Fig 3).

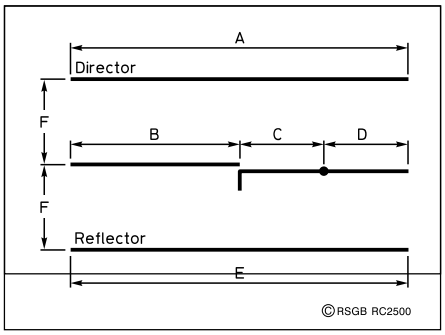


Fig 3: Key to the dimensions shown in Table 1 for 10 to 50MHz.

driven element is made entirely of RG-8X coax, and (2) the director and reflector are made of bare No.12 antenna wire. Note that with this feed system there is *no need for a balun*. In fact, NP4B stresses, in this somewhat unusual application, where the driven element is made of coax, we *want* current to flow on the outside of the coax.

NP4B points out that this type of beam can be used at HF and VHF: "For HF use, it is convenient to hang the elements in free space between any available supports such as trees. For VHF, it is easier to make a support frame of PVC-pipe and tape the elements to the pipe. In this case the elements should be about 3% shorter than shown because of the dielectric loading of the PVC pipe. Optimised gain is of the order of 15dBi, including ground reflection gain [about 6-7dBd, excluding ground gain]. He believes that "Wire beams will be with us for a long time to come. The feeding technique described here is so simple in concept and parts that I hope it will find widespread use."

CRYSTAL SETS - RECRUITING OR EXPERIMENTAL AID?

AN ITEM 'Headphone Adapter' in the December 1998 *TT* noted that the absence of high-impedance headphones has made it more difficult for the novice radio constructor to take the first steps of building his own crystal set. The venerable crystal set has continued to take a useful educational role. This item attracted a surprising amount of correspondence, including several long letters and numerous enclosures from Vic Pierson, G3MXV, dealing not only with the question of headphones but also extolling generally the value of the humble crystal set not only as an educational tool but also as still offering experimental opportunities.

I was reminded of this material by a letter in *QST* (September 1999, p24) from Kerry Michael, KC0EYD, published under the heading 'Attracting new voices'. This pointed out that children as young as five years old are extremely curious as to how things work, but have only a very short attention span: "Unless they are incredibly interested, four minutes is the longest they will listen to Mum or Dad explaining how antennas work. There's a better chance to teach older kids, but it is possible with the younger ones also. These kids are eager to learn anything. It's the perfect time to introduce them to amateur radio!

"But how? In my opinion, there is no better way to introduce kids to electronics than a crystal radio set. They're inexpensive, the components are easy to find and relatively simple to assemble. All the parts can usually be found at a local Radio Shack [Tandy in the UK – Ed] or science store and kits are also available. Curious youngsters will be thrilled when they hear radio stations through a set they built themselves, or even with a little help!

"Controversial as this may seem, Morse code is another powerful attraction for many kids. My eight-year-old brother ran away with learning the code. He loves the idea of knowing a 'secret' alphabet (well, at least semi-secret!). Take it from a 17-year-old, video games are not the be-all and end-all of the 90s kid [or hopefully in the New Millennium - G3VA]. Getting kids interested in radio isn't hard at all! All you have to do is take a little time and show them the way."

I must admit that some 30-odd years ago, I succeeded in getting my son interested in some aspects of radio and electrical construction, but primarily his interest was in model aircraft and I failed lamentably when it came to Morse and lost him to the then already expanding computer industry, linked to airlines. Perhaps I did not start him on radio early enough! To my shame I never even tried with my daughter!

G3MXV confesses that there have been three periods in his life when building crystal sets have taken up most of his spare time; first as a youngster of 6 or 7 years; as a father with two young boys (neither interested); and as a grandfather with one grandson, similarly uninterested. But, despite the failures, crystal sets still intrigue him. He tells the following story:

"As a boy, in Manchester, I was repeatedly told by my elders that in their day at the birth of radio broadcasting, it was possible for all the family to enjoy a wireless programme simply by placing a single earpiece of the crystal-set inside a pudding dish to distribute the sound. This spurred me on in an attempt to achieve greater output from the circuits I built.

"Despite making large basket-weave coils, trying an assortment of crystal detectors (readily available as late as 1936) and pleading at every birthday for more sensitive headphones, I had no success. It was some consolation later to discover my parents had lived only a few miles from the first Manchester transmitter, call-sign 2ZY, and had used fully the permitted outdoor aerial length of 100ft." [I had reasonable success with the pudding basin experiment, being fortunate to live only

a few miles from the high-power BBC twin station at Washford Cross, Somerset - but also found that the old horn-style loudspeaker with in-effect a large earphone-type transducer, was much more sensitive and more efficient than a moving-iron or moving-coil loudspeaker of the 1930s. But my greatest success was picking up Radio Roma and Zeesen on a crystal set, by fitting a short-wave coil and using a good length antenna - G3VA].

G3MXV continues: "I did not give up on the crystal-set, however, and eventually had two sons to be introduced to the miracle of 'simple radio'. There were now germanium signal diodes, a valued stock of genuine litzendraht wire (not the loosely-bunched imitation), ferrites, pot cores, and a nice long-wire amateur radio antenna available. In accordance with the KISS principle, our variable capacitors were made from aluminium kitchen foil wrapped around two thick cards, one having an extra cover of cling-film as dielectric. The usual 1-3nF capacitor shunting the headphones had been rejected in my early days as unaffordable and having no benefit whatsoever - it makes no perceivable difference. All this was good fun for my boys, but with transistor sets readily available and the output from a crystal set so puny, how could one expect it to hold their interest for long?

"When the time came to try again with my grandson, a major short-coming seemed to be the absence of my old pair of 4000-ohm S G Brown headphones (long gone), or even a near-equivalent. The junk box offered only low-Z ex-government headphones, left-overs from the many Morse practice oscillators I had been called upon to make. . . Step-down transformers would at best lose 50% of the output. Against all conventional theory I connected a single low-Z earpiece to the crystal set. The result was astonishing, I called my wife into the shack to listen to music from Radio Leicester on Medium Wave, with the earpiece sitting on the table. At long last I had achieved the ability to listen to a crystal set without wearing headphones, albeit from a local transmitter. Being already aware of the sensitivity of these particular headphones - a single earpiece could fill a hall when driven by my Morse oscillator at its resonant frequency and acoustically loaded, I had to wonder where the secret really lay.

"Is it purely a question of sensitivity? What about the loading effect on the high-Q tuning coils that we have struggled to produce? But, of course, the loading is only during the half-cycle when the diode is conducting [Because of the 0.7V junction barrier, conduction will be significantly less than a half-cycle so that the diode will not load the tuning coil to anything like the extent generally assumed - G3VA]. And one recalls the 1917 book *The Elementary Principles of Wireless Telegraphy* (2nd edition) by R D Bangay, page 136. Under the heading 'High Resistance Telephones', para 502: 'Unfortunately, however, as we reduce the size of the wire (*wound on the magnet to increase the number of turns, space being at a premium*) so do we increase the resistance per turn of that wire, and therefore decrease the amount of current which would pass through it for a given voltage. Therefore, unless the current at our disposal is already limited by some external resistances, we shall not gain anything by increasing the number of turns if at the same time we increase the resistance of the *(headphone)* coil in proportion.' The words in the italics are mine [*G3MXV*'s] otherwise quoted directly from the book. Most significant is the final reference to the resistance of the headphone.

"When I try to interest other radio amateurs in their 70s, I get a sideways look, so I always insist: 'Please try it for yourself, it takes but minutes to clip the parts together.' Sadly, so far, no takers. Yet nothing special is required to prove my point, no high-Q coil, just a bunched winding of plastic-covered wire around a cardboard former. A very high L to C ratio in the resonant circuit is suggested in the Bangay book, something I have not yet tried. Any appropriate diode will do, eg OA5/OA95, an ancient 500pF air-spaced variable capacitor and *specifically* an ex-Army earpiece: Type No DLR No 5S (external marking), other markings ITBA5 (external), YA 5275 (internal). Measured DC resistance: 25-ohm (varies slightly with sample). Measured impedance: approx 450ohms at 1200Hz. Best perceived performance and impedance is when acoustically loaded, eg if earpiece is placed face down on a flat surface with a small air gap.

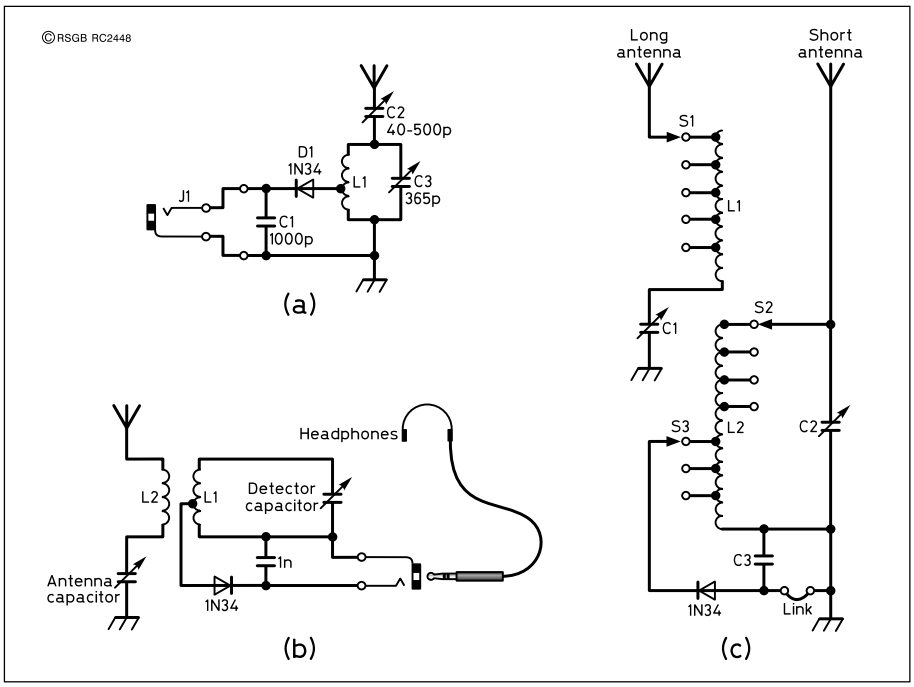


Fig 4: Some typical recently described crystal-set receivers, all of which tap the detector across only part of the coil and connect a fixed capacitor across the headphones - practices deplored by G3MXV. (a) from *QST*, December 1997. (b) From *73 Amateur Radio Today,* September 1998. (c) From *QCWA Journal,* Spring 1999. All intended for use with 2000 ohm headphones, but see text for G3MXV's notes on the surprising results he achieves using ex-Army low-Z headphones.

"These particular headphones were a glut on the surplus market for many years, instantly identified by their wire head-frame and khaki-coloured headband. There must still be a lot around. Surely somebody will spare a few minutes to prove this intriguing anomaly and perhaps offer a reasoned explanation."

In a later letter, G3MXV reported making two further discoveries, again going counter to perceived theory and begging a theoretical explanation. Both are concerned with 'loading' the resonant tuned circuit and its effect on sensitivity/selectivity, though he has long ignored the need for tapping the detector down the tuning coil or connecting a bypass capacitor across the output. He has also found that he can connect all his four DLR5 low-impedance earpieces in parallel and still have acceptable reception. He draws attention to 'The Xtal Set Society' founded 1991, based in the USA and providing News-sheets on Internet (http://www.midnightscience.com/) with a number of publications on crystal set projects, construction and history. He also reports that GWM Radio Ltd (*RadCom* advertisers) have (or had a few months ago) some 20 of the ex-Army DLR5 headsets in stock.

G3MXV writes: "The outcome of this fascinating business will probably be an anticlimax. My growing belief is that the manufacturer of these headphones hit upon a unique design involving the dynamics of the diaphragm, sometimes referred to as 'motional resistance' and perhaps taking into account

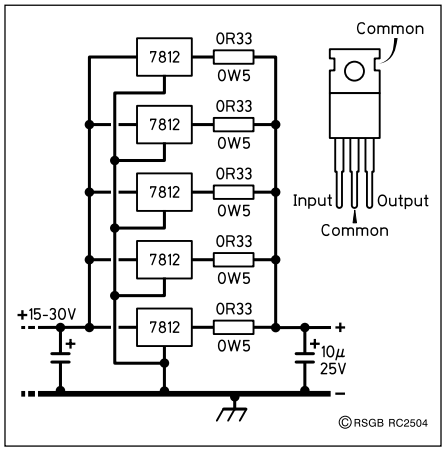


Fig 5: Circuit diagram of the stabilised power unit, providing 12V regulated output at up to 5A.

audio harmonics due to the magnet core. The end paragraph on page 11 of David Owen's 'Alternating Current Measurements' (Methuens's Monogrtaphs on Physical Subjects, 1937) throws some light."

He also draws attention to 'The Crystal Radio' - subtitled 'What's old is new again!' by Dave Evison, W7DE, (*QST*, December 1997, pp56-57) although this presents the conventional circuit diagram (**Fig 4(a)**) with the diode tapped down the coil and a 1000pF capacitor connected across the headphones. W7DE emphasises that building a crystal set is one of the few ways of "reaching today's kids" with the true magic of radio buried under layers and layers of complicated hardware that needs to be stripped away to reveal radio in its purest form.

But G3MXV has surely shown that even the humble crystal set can throw up some interesting experiments that can confound accepted practice as well as (possibly) providing a means of interesting youngsters in radio in their pre-teen years.

STABILISED 12V OR 13.8V AT 5A

KLAAS ROBERS, PA0KLS,in *Electron* (October 1999, pp439-441) provides some useful hints on how low-cost three-terminal voltage regulator chips can be used to stabilise the output of power supplies at 12V at up to 5A, simply by using up to five 7812 chips in parallel: see **Fig 5.** The output voltage can be increased to 13.8V by connecting three 1N4001 diodes, as shown in **Fig 6.** To provide heat sinking, he mounts the 7812 chips on the sides of the metal box enclosing the PSU. A simple enough dodge, although I cannot recall having seen this idea in print. **Fig 7** shows some alternative ways of raising the output to 13.8V: (a) using a pilot bulb to replace the 270Ω 1W resistor. (b) To provide switched 12V or 13.8V output. (c) To set the output voltage to any required value between 12V and 13.8V. Presumably more or less 1A regulator chips could be connected in parallel to meet other current requirements, provided each regulator feeds through a 0.33Ω 0.5W resistor.

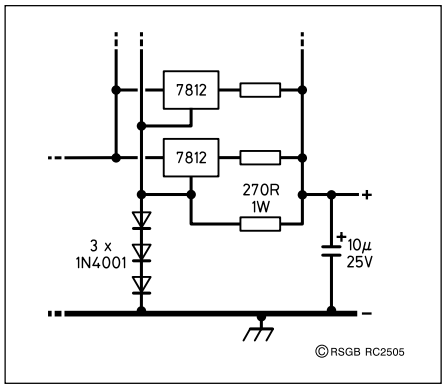


Fig 6: Output voltage can be increased to 13.8V by inserting three 1N4001 diodes in the ground lead.

The technique of raising the 'ground' terminal of a three-terminal regulator IC to increase the output voltage is well established and is featured also in an article by Sam Ulbing, N4UAU 'Getting more voltage out of a regulator IC' (*QST*, January 1999, pp45 & 65). He shows how (**Fig 8**) by properly selecting the values of R1 and R2, the LM7805's output voltage can be made to be any value between 5V and 1.5V less than the voltage applied to the regulator's input, as an alternative to a series string of diodes which will each add about 0.6V to the output. With the values shown, output is 9V when using ¼W 5% tolerance carbon-composition or film resistors. Other output voltages can be obtained from the equation: Vout = 5V + (5V/R1 + Iq) x R2, where Iq is the quiescent current of the regulator, which varies somewhat with input voltage, temperature, and with individual devices. N4UAU suggests it is wise to make the Iq portion of the current through R2 small.

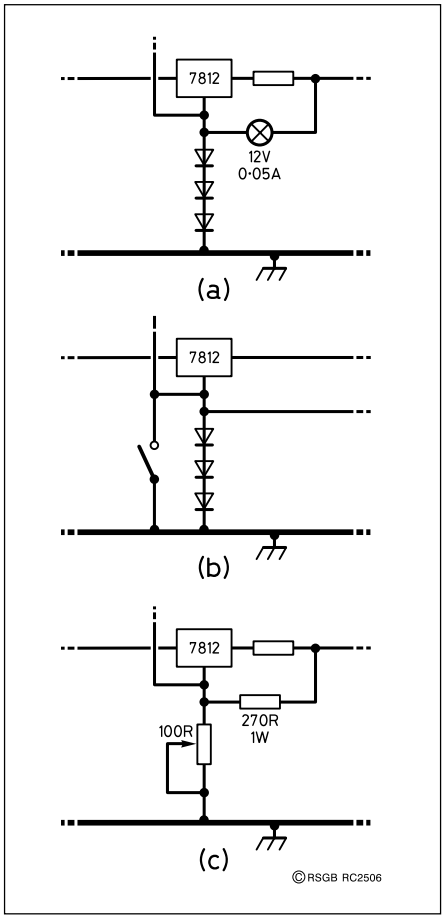


Fig 7: Alternative methods of providing 13.8V output (b) with switch closed for 12V.

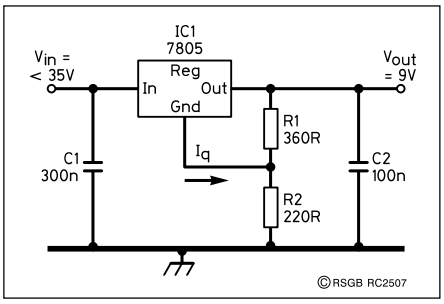


Fig 8: By selecting suitable values of R1 an R2 (see text), the output of the 5V regulator can be made to be any value between 5V and 1.5V less than the voltage applied to the input of the 7805.

Similarly, in an item 'High-power, low-cost supplies' in the 'Circuit Ideas' feature of *Electronics World* (January 1999), A J Bird points out that a Zener diode can be used instead of a string of diodes (**Fig 9(a)**), and that for high-current a bypass transistor can be used (**Fig 9(b)**) with suitable heat-sinking.

THE KOELN E52 FILTER

HORST STEDER, DJ6EV, was especially interested in the item on the elaborate IF filter used in the German wartime Koeln E52 receiver (September *TT*, Fig 1, page 54). He writes: "Because I have been interested for years in the special characteristics of this form of crystal filter based on the work of W Kautter (*Telefunken Zeitung* No.76 & No.77,

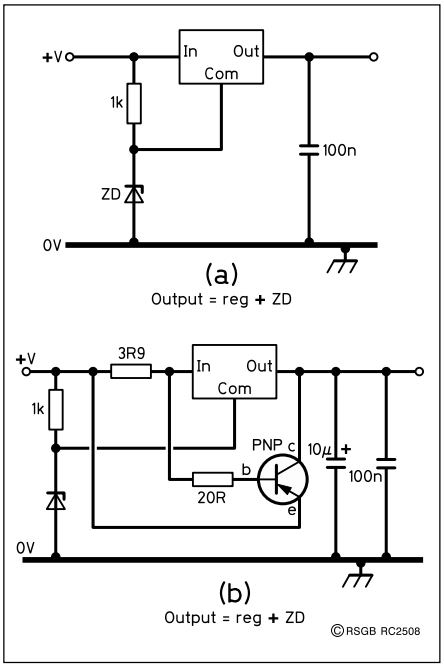


Fig 9: (a) Use of a Zener diode to increase the regulated voltage. (b) For high currents, a suitable series bypass transistor (with heat sinking) may be used.

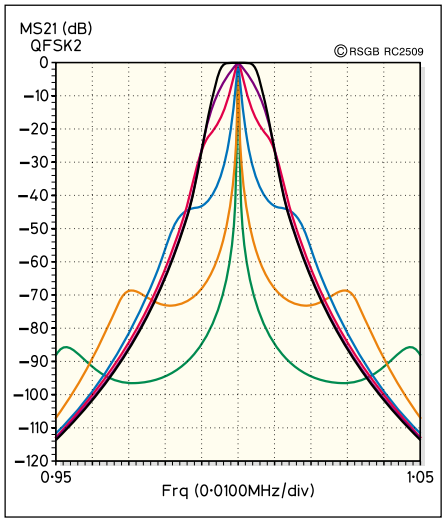


Fig 10: Response curves of the E-52 filter (modelled with the ARRL Radio Designer software) without the 8-pole LC filter at various settings of the continuously-variable bandwidth control.

1937), I can give some additional information about this filter. It was used in several German wartime receivers with IFs ranging from 352kHz to 1MHz.

"Briefly, the 6-pole LC preceding the dual section crystal filter was not an overkill to suppress possible spurious crystal responses (in fact the crystals used in these filters were carefully cut and selected to suppress such responses) but was absolutely necessary to compensate for an undesirable effect of the crystal filter which is nowhere mentioned. Based on the bandwidth control mechanism through symmetrical detuning of the terminating LC circuits, the stopband rejection would otherwise be quite insufficient at the narrower bandwidths.

"A while ago I modelled the filter chain of the E-52 using the ARRL-Radio Designer software, based on the circuit values and the bandwidth specifications (10kHz/3dB to 26kHz/60dB and 0.2kHz/3dB to 4kHz/6)dB) given in the operator's manual of the E-52.

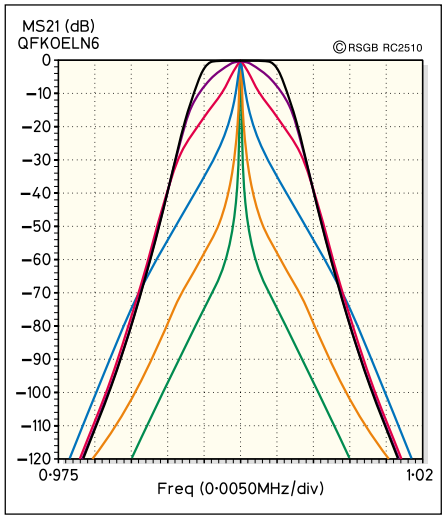


Fig 11: The E-52 filter with the 8-pole LC filter. Note that the curves are plotted with a different frequency axis.

See **Fig 10** and **Fig 11**, which show response curves derived from screenshot illustrations for various bandwidth settings. Fig 10 shows the responses of the dual-section crystal filter alone, while Fig 11 shows the responses with the 8-pole LC filter (note the different frequency scaling on the two illustrations). The roughly symmetrical peaks appearing in the stopband are in fact the resonances of the detuned LC circuits.

"The 8-pole filter (together with the additional 2-pole band filter preceding the demodulator stage) thus assures the exceptional total stopband rejection of over 130dB as given in PA0AOB's paper.

"The computer modelling moreover shows another very undesirable effect, inherent with this method of bandwidth control. In the intermediate settings towards narrower bandwidths, the response curve immediately loses its nice flat-top and deteriorates into a relatively narrow peak response with very shallow slopes. Only in the extreme bandwidth settings do the responses look very good. This effect was mentioned by Kautter in his second paper (*Telefunken Zeitung* Nr.77) but was 'forgotten' or 'overlooked' in all of the subsequent descriptions of this filter. These later articles show the response curves only for the maximum and minimum bandwidth settings, and they look good!"

"I found only one relevant reference in a Telefunken publication, showing the numbers for a 0.7kHz/3dB setting as 11kHz at 40dB, 20kHz at 60dB! Thus, this elegant method for continuously variable bandwidth control has its drawbacks. But one has to consider that at the time these filters were built, QRN was much more of a problem than QRM. Also, the narrowest bandwidth setting of <200Hz still provides very good selectivity, even for today's environment. For this reason the E-52 is still much loved by CW enthusiasts.

"These characteristics probably prompted Telefunken to abandon this form of bandwidth control after the war, in favour of crystal filters with bandwidth control through variable coupling (IF 525kHz). Although this meant abandoning continuously variable control in favour of four switched positions (6kHz, 3kHz, 1kHz and 0.2kHz) with elaborate alignment of the two filter sections (6 trimmers per bandwidth-setting for centre frequency and neutralisation!) the resulting response curves look better, especially at 3 and 1kHz."

MATTERS ARISING

FRED WARD, G2CVV, spotted an error in the text of the item on 'New life for the FT-200/250' (*TT*, November 1999, p62). The text suggests "It may be easier to wire the pins 1, 4 and 5 together before installing the bases" [for the two 6146B valves]. This should have read "pins 1, 4 and 6", as correctly shown in Fig 5. Apologies!

JESPER FOGH BANG draws attention to two errors in Fig 1 of the October, 1999, item on 'Efficient Short Meander Antennas' which illustrated three of the many folded dipole antennas developed by Dr Kraus, W8JK, in the 1940s. While the conventional half wave folded dipole in (a) is correct, in both (b) and (c) the two antennas should be open-circuited in the top wire. An amended diagram is shown in **Fig 12**. This item was concerned primarily with the very short multi-element meander monopole and dipole antennas using a constructional technique resembling the old caged dipole, but with the wires in series rather than parallel. Surprisingly, although the *TT* item reproduced correctly the claims on radiation efficiency and bandwidth made by the authors of the paper in the professional journal *IEEE Transactions on Antennas & Propagation* (for which all papers are refereed by professional engineers), it seems clear that the claimed performance cannot be reproduced. There seems little doubt that the radiation resistance of antennas using the information in the paper must be very low, so that the radiation efficiency will be adversely affected by the appreciable ohmic losses of the thin No.26 American gauge wire used for the folded sections other than the central tubing.

While ohmic losses could be reduced by using larger diameter copper wire, this is still likely to prove an unduly lossy antenna compared with a normal half wave resonant dipole or the relatively simple folding developed by Dr Kraus, or the forms of resonant meander antennas discussed in *TT* February 1992 (see also *Technical Topics Scrapbook, 1990 - 94*, p130). It seems that all attempts to develop physically very small antennas still run into the low efficiency problems ascribed by classical theory to electrically small antennas. ♦

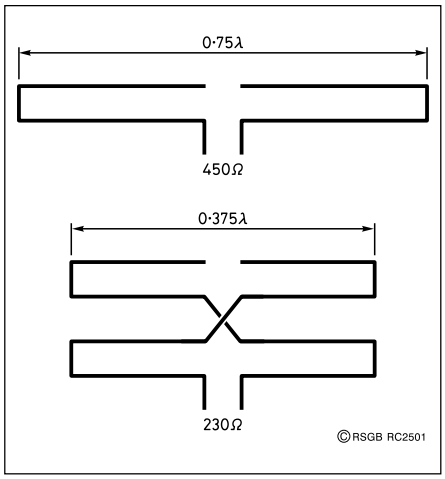


Fig 12: Corrected diagrams for the Kraus 0.75λ and 0.375λ folded dipoles.

HF

DON FIELD, G3XTT
105 Shiplake Bottom, Peppard Common, Henley on Thames, RG9 5HJ
e-mail: hf.radcom@rsgb.org.uk

BAND conditions have finally taken a dramatic turn for the better, most obviously so in the CQWW Phone contest at the end of October. EA8BH, operated by N5TJ (ex-KR0Y), made over 10,000 contacts in the 48 hours of the contest, the first time the 10,000-mark has been exceeded by a single operator. At M6T, where we were operating multi-multi, our 10m station worked all 40 zones and over 150 countries by mid-afternoon of the first day, and had almost 190 countries in the log by the end of the contest. Admittedly, we had the benefit of a four-over-four array at 100ft or so! However, G0TSM, using just a triband antenna at 50ft, but following the spots on the Packet Cluster, worked 172 countries on 10m during the contest weekend. Even as I write this, FO0DEH has been reported with a good signal into the UK on 10m, despite the fact that he is using just 100 watts to a vertical. Not surprisingly, the effects of this excellent propagation are reflected in the table scores, with five entrants now over the 200-country mark and, I'm delighted to say, three of those are M-series calls, so it's not just the old-timers who achieve the big numbers. Please observe the deadline for the March issue to send me your end of year scores. I propose to run both WARC and 28MHz band tables again during 2000, with your first totals to reach me by the deadline for the April issue.

28MHz COUNTRIES TABLE 1999

G4DUW	230
G3TMB	216
M0BZQ	204
M0BIB	203
M0CCQ	203
G0VHI	198
G3JFH	191 (all SSB)
G0TSM	183
G3ZKN	181
G0CAS	171
G3SNN	169
G3XMM	149 (all CW)
G3IFB	144
M0CAL	143 (all SSB)
GW0MOW	140
G0KDS	139
GM3COQ	130 (all CW)
G3SXW	127 (all CW)
G0NXX	122 (all CW)
G3LVP	119
G4OBK	119 (all CW)
G3NKS	115 (all CW)
G3LME	113 (all CW)
GM4CHX	109
G3MDH	105 (all SSB)
G4FUJ	104
G3TEV	100 (all CW)
G4BGW	100
G4IDL	90 (all CW)
G3YVH	89
G3ZBE	87
GI4XSF	77
GM0NTL	74 (all SSB)
G4PDQ	71 (all CW)
G4UCJ	68 (all CW)
G3SZS	51
G4OVB	50 (all SSB)
G0BMS	49 (all CW)
5Z4GS	46 (all SSB)
GX0WAW	46
MM0BQI	46
G3ING	37 (all CW)
2U0ARE	36 (all CW)
G4OTY	35 (all CW)
G3WP	33 (all CW)
MI0BVK	33
GM4OBK	26
GU0SUP	22 (all RTTY)
M0ASJ	21
GI0NQC	9

MORE HINTS AND TIPS

WITH ALL BANDS likely to be buzzing early in the New Year, you might want to focus on some specific goals, such as trying a new mode or chasing islands for the IOTA Millennium award. But you might also want to focus on some of the announced DXpeditions.

As you will see below, there are two major expeditions in the offing, one to Pitcairn Island and one to Juan Fernandez Island. Do you need either or both of these? If so, on which bands and modes? Each month Gwyn, G4FKH, who prepares the propagation tables which accompany this column, runs predictions specifically for one of the forthcoming expeditions in addition to the generic forecasts. This month he is focusing on Pitcairn, so half the job is done for you. But remember that this is a single-operator expedition, so the operator will need to eat, sleep, and spend some time with his hosts. As a result, you may have to be patient, especially as this is a rare country which will be in huge demand. The good news, though, is that he will be there for several weeks. So the best strategy may be to observe his operating patterns, perhaps by checking spots on the Packet Cluster or Internet, and anticipating the most likely opportunities once the pile-ups have started to subside. This is exactly what a member of my local club did during the CDXC operation from Spratly (9M0C) in February 1998. As a QRP enthusiast who is constrained to wire antennas, he needed to use guile rather than brute force. He noted that we were regularly on 30m, and figured that this was a band where propagation was favourable, and where very few callers were likely to be using high-gain antennas. Towards the end of the operation, when the big guns had all got through, he made an easy contact with us.

The modest station of CE0ZIS, the only resident amateur on Juan Fernandez Island (see text).

In contrast to Pitcairn, the Juan Fernandez operation is for just ten days, but with five operators. The ten days span two weekends, the first of which is likely to be very busy, so a better time to try would be during the week or, if you are away at work, the second weekend. With five operators, they should be on the air 24 hours a day, perhaps even on more than one band at a time, so the strategy can be different. Incidentally, one good point to note is that both locations are to the west of us, which can be especially advantageous on the low bands. As dawn sweeps westwards across Europe, those to the east of us lose LF propagation, and UK stations often find that they end up by having a clear shot at the DX before daylight.

DX NEWS

GWYN, G4FKH, our propagation guru, is off to Mauritius from 28 January 2000 to 27 February. He will probably be signing 3B8/G4FKH and will be active on CW only, mainly on 28.024MHz during UK day-time, and around 21.024MHz in the UK evenings. QSL via the bureau to his home call. We can only suppose that propagation will be excellent throughout his operation!

A multi-national group will operate from Thahtay Kyun Island (AS-*new*) Myanmar, during mid-January. The operation will include two or three weekends with the special call sign XZ0A. Operators include N7MB, G3VMW, G3NOM, AF7O, K7WX, OH1RX, N5IA, WA6CDR, NA7DB, KM5EP, K6KRE, EA5XX, W8AEF, OH2BH and K7ZV. Several of these operators have previously participated in the XZ1N DXpeditions. Look for an all-band effort on CW, SSB, RTTY and SSTV. The island is in the Andaman Sea, at 9º 57' North, 98º 32' East and is 1800 acres in area. It is hoped that the island location will be especially advantageous for reception on the low bands.

Estonian operators ES1AKM and ES1AX were planning to be in south-east Asia during December and January. First stop is Saigon, until 4 January, signing 3W6KM. Next they go to Cambodia, where they expect to activate XU7AKM for two weeks. They will be on all bands and modes, including PSK31. QSL via ES1AKM, either

QTH Corner

CE0Z CE6TBN, DL7DF	P.O. Box 1234, Temuco, CHILE. Siegfried Presch, Wilhelmsmuehlenweg123. Berlin D12621,Germany
E44A,JY4NE, OD5/JY4NE, and ZC6A	Dianna R. Killeen, KB6NAN, P.O.Box 911, Pescadero CA 94060-0911
HS0ZBS	Kurt Brauer, Box 75, Phanom-Sarakham, Chachoengsao, 24120, Thailand
I2MQP	Pietro Mario Ambrosi,Via Stradella 13, Milano, MI 20129, Italy
JH7FQK	Ichio One Ujiie, 162 Shionosawa Kohata, Towa, Fukushima, 9640203, Japan
VE3HO	Garth Hamilton, PO Box 1156, Fonthill, ONL0S1E0, Canada
W2NY	Thomas G Georgens, 407B Woodbridge Dr, Ridge, NY 11961, USA
ZL7ZB	Lothar Grotehusmann, Quaekerstrasse 35, D-13403 DJ4ZB, Berlin, Germany

1999 WARC BANDS TABLE

	10MHz	18MHz	24MHz	Total
G0NXX	145	151	127	423 (all CW)
G3YVH	121	142	104	367
G4MUL	75	116	112	303 (all CW)
G4OBK	69	65	145	279 (all CW)
G3SXW	80	83	92	255 (all CW)
G0BMS	77	93	84	254 (all CW)
G4UCJ	71	70	56	197 (all CW)
G3ING	54	63	41	158 (all CW)
G3WP	30	60	48	138 (all CW)
G4KHM	54	68	14	136
G0VLC	33	35	24	92 (all CW)
GM0NTL	0	56	33	89 (all SSB)
MM0BQI	16	45	28	89
GM4OBK	30	31	19	80 (all CW)
M0BIB	14	12	54	80
5Z4GS	0	44	25	69 (all SSB)
2U0ARE	68	0	0	68 (all CW)
M0BUY	9	10	6	25

direct or via the bureau.

Carlo, I4ALU, plans to operate from Dhiggiri Island (AS-013), Maldives from 26 December to 3 January. He will use 8Q7RX on 10 to 40m, CW only. QSL via I4ALU.

Kurt, HB9AMZ, moved to Thailand in September and is now active as HS0ZBS or via HS2CRU.

Takeshi Funaki, JI3DST, is planning another small expedition to the Tokara Archipelago (AS-049) from 29 December to 8 January.

Lothar, DJ4ZB, says he'll be on again from Chatham Island as ZL7ZB from 31 January until 2 March, and plans to operate from the Chatham Hotel.

Jukka Heikinheimo, OH2BR, will operate as VP6BR from Pitcairn Island during January. He has planned this trip as a celebration of his 40-year long amateur radio career. His goal is to give the DX community a maximum number of VP6 contacts on all ten amateur bands from 6 to 160m on CW, SSB and RTTY. Pitcairn Island stands at position 52 on a recent 'most wanted' list, but is undoubtedly even rarer on certain bands and modes. Because Jukka is relying on reaching the island by way of a supply ship, his schedule is imprecise, so it will be a case of keeping an ear to the bands. He will take a Yaesu FT-1000MP, an Icom IC-706MkII for back-up, a FinnFet 1kW solid-state linear amplifier, triband and duoband Yagis for the 10 to 20m bands, and vertical antennas for the low bands. The goal is to leave the antennas for the Pitcairners, for future use. Two 2kW generators and 1000 litres of fuel are planned for maximum reliability of power supply. The island's own diesel generator cannot be used as a power supply for a DXpedition, because it is available only for a few hours in the morning and evening. Jukka will be hosted on Pitcairn by Tom and Betty Christian, VP6TC and VP6YL. The operation will be conducted either from the VP6PAC club site up on the hill, or from the home of the hosts in Adamstown on the north-east slope of the island. IOTA enthusiasts will be interested to hear that side trips to the rare Henderson and Ducie islands may be considered if local conditions permit. A log search and home page will be available in due course.

Alan, VK8AC, will be working on contract with the Australian Antarctic Division as a member of the 2000 Australian National Antarctic Research Expedition on Macquarie Island. His exact departure date is not known at the time of

HF F-Layer Propagation Predictions for January 2000

	10.1MHz	14.0MHz	18.1MHz	21.0MHz	24.9MHz	28.0MHz
Time	000001111122	000001111122	000001111122	000001111122	000001111122	000001111122
(UTC)	024680246802	024680246802	024680246802	024680246802	024680246802	024680246802
*** Europe						
Moscow	....754578..	1...87678...	....887881..	....8888....	.....8881...	.....888....
*** Asia						
Yakutsk	44..3..14434	....44.....	........1....	....	....	....1.....
Tokyo	134144	.........1..	....3.....	....	....	....
Singapore	.1....1.11.	1.....1.1...	....1..12...	.....12...	...1..111...	....
Hyderabad	..1....1.441	......1.24..	.....1.24...	....21144...	....4444....	....4444....
Tel Aviv	....2113666.	....644566..	....66566.1.	....66666...	.....666....	.....666....
*** Oceania						
Perth	2.........2.	.........2..	.......22...	.....22...	.....1.22...	.....1....
Sydney	.........1...	......1.2...	.........2...	.....112....	.....113....	....2231....
Wellington	.....1.....	.....4.45...	.....5566...	.....666.1..	.....666....	.....6.....
Honolulu	..1.1.....	.........1.1	.....1...2..	1..........	.1..........	....
W. Samoa	..1...1....	.....3.142..	.....3444...	.....43....	.....33....	....
VP6BR Dx-Ped	....	1....211....	..1..31.....	.....2.....	.....1..1...	....
*** Africa						
Mauritius	.2........	...1.....22.	....1...43..	....21223...	...11222.4..	....12..4...
Johannesburg	.3........	...1...1.31.	1...111.223.	....2111244.	....2211.4..	.....2.344..
Ibadan	4466...1.444	41124444	....4445544.	....545566..	....66556.1.	....66556...
Nairobi	44.....1.444	.....1.344.	1...432344..	....443344..	....4433....	....
Canary Isles	888.72.36888	....8665788.	1...87778...	....877788..	.....7888..	.....88...
*** S. America						
Buenos Aires	33..2.....3	....3.....	....4...11..	....411122..	.....2233..	.....2.3...
Rio de Janeiro	4...3....1.4	....4.....4.	.1..411234..	.....22334..	.....43.44..	.....444..
Lima	....2.....	...1311.....	111.....1..	.....11..	.....1122..	.....122...
Caracas	4.5.4.....	..1..3.1.3..	.....3244..	.....14345..	.....4455..	.....555...
*** N. America						
Guatemala	444.4.1....	.....11....	.....123..	.....334..	.....44...	.....44...
New Orleans	.44.......	..1...2....	.....132..1	.....434..	.....44...	.....44...
Washington	555....11.35	.....31355.	.....445..	.....455..	.....455..	.....14....
Quebec	555.....255	.....3355..	.....4456..	.....666..	.....66...	.....166...
Anchorage	.4..41..33..	...1.....3..	....1.....1.	1.........1	....1..1...	....
Vancouver	133.....21..	1.....23..	.....1.44..	.....4...	.....1...	....
San Francisco	123..11.11..	....1.132..	.....3...	.....4...	.....4...	.....4...

Key: The numbers in the table represent S-meter reading on the average amateur rig, whilst colours represent availability. When the predictions are expected to be 67-100% certain, the numbers are blue; when 33-66% certain, red; when less than 33% certain, black.

The RSGB Propagation Studies Committee provides propagation predictions on the Internet at www.g4fkh.demon.co.uk The page is updated weekly.
The provisional mean sunspot number for November 1999 issued by the Sunspot Data Centre, Brussels, was 132.7. The maximum daily sunspot number was 206 on 10 November and the minimum was 78 on 29 November. The predicted smoothed sunspot numbers for January, February and March are respectively: (SIDC classical method – Waldmeier's standard) 118, 117, 115 (combined method) 122, 124, 126.

ARRL 10-metre Contest, 1998

Call	Score	Class	Power
G3FNM	15228	A	A
M8U	1008	A	A
G0MTN	221480	A	B
G3MXH	198102	A	B
G8D	170414	A	B[1]
G6QQ	37444	A	B
GW3YDX	1594412	A	C
GW8GT	1073198	A	C[2]
GM3CFS	70870	A	C
G0AEV	243250	B	B
G3PFS	71148	B	B
GM3BCL	61466	B	B
G4IUF	45428	B	B
MM0BYC	40432	B	B
G4NXG	3672	B	B
GI0UJG	621516	B	C
GM8C	381680	B	C
GM4FDM	195344	B	C
M0ACW/P	166116	B	C
GM0JKF	23896	B	C
G0TDX	170240	C	A
G4FDC	9240	C	A
GW3NJW	135880	C	B
G5LP	122880	C	B
G4UZN	104664	C	B
G3TJB	93732	C	B
G3TJE	85560	C	B
G5MY	82236	C	B
G3VQO	59024	C	B
GW3SYL	15136	C	B
G4ZME	9744	C	B
G3ILO	4640	C	B
GM3POI	688940	C	C
G8G	508592	C	C[3]
G4ODV	239856	C	C
G0ORH	179360	C	C
G3UFY	159744	C	C
G3ESF	128516	C	C
G4BJM	65780	C	C
G0IVZ	1010412	D	B[4]
M8T	1131550	D	C[5]

Class: A = Mixed mode, B = Phone only, C = CW only, D = Multi-op

Power: A = QRP, B = Low C = High

[1] ops: G3SJJ, M0BWY
[2] ops: GW3KYA, GW3NWS, GW4JBQ, G4VXE, GW5NF, GW6ZUQ, GW0MAW
[3] op: G0LII
[4] +G4TSH, 8P6CV
[5] ops: G4BAH, G4PIQ

writing, but he should arrive on the island during December or January. This is not a DXpedition, and he will only be on the air in his spare time. Alan's past callsigns have included A4XYF, VP8PT, G4EEL, VS5AC/V85AC, P29AC and VK6CQ. For this operation he has been assigned VK0LD and has set up a web page at http://www.geocities.com/vk0ld/1.html

Dan Bookwalter, N8DCJ, plans to be in Barbados and to be active as 8P9CW from 25 December to 8 January.

A multi-national group from South America have announced its intention to activate Juan Fernandez Island, using the callsign CE0Z, starting 6 January. Operators will include Fil, CE6JOE; Mark, CE6TBN; Gustavo, XQ3SAI; Ed, HC5AI; and Mats, LU9AY. They plan to operate on 10, 12, 15, 17, 20, 40 and 80 metres (30 metres is not normally allowed in Chile), on all modes, until 16 January. A web page has been set up in Spanish at http://www.qsl.net/ce6tbn/ce0z.htm The Juan Fernandez archipelago includes Robinson Crusoe Island and Alexander Selkirk Island, as these were the islands on which Alexander Selkirk based his well-known book. My brother visited the islands recently on a bird-watching trip, dropping in on (and photographing) the station of CE0ZIS, the only resident amateur.

CONTESTS

THE MILLENNIUM PSK31 contest takes place from 1200 on 1 January until 1200 the following day. Scoring is the same as for the CQ WW RTTY contest, because it is supported by many of the logging programs available. The full rules run to two pages, but to take part all you really need to know is the contest exchange which, for non-North Americans is RST plus CQ Zone (UK is in Zone 14). North Americans also send state or province. There are two power categories (up to 30 watts, and 31-100 watts) and entries can be single- or multi-band. Logs go to Andrew O'Brien, KB2EOQ, 9082 Concord Drive, Fredonia, NY 14063, USA, to arrive by 15 February.

This month I am including the UK results for the 1998 ARRL 10-metre contest (see table). High scorers included GW3YDX, who was world 6th in the 'mixed-mode high power' category. GM3POI was world 4th in the 'CW-only high power' category, and GI0UJG world 8th in the 'phone-only high power' category. No doubt there will be some very much higher scores in the recent 1999 event as a result of the improved propagation.

QSL INFORMATION

I RECEIVE SEVERAL requests each month for QSL information, and am very happy to help in this way. An e-mail is fine, but if you use the old-fashioned variety it helps if you include an SAE, as most people do. I'd love to include all the QSL information I receive in QTH Corner but, as it runs to some hundreds of items each month, that is quite impossible. It sometimes makes me wonder how we kept track of all this before the onset of computers and the Internet. I think the main reason was that there were far fewer DXpeditions in days gone by, before the advent of reciprocal licensing, cheap air travel, and so on. Anyway, having said all that, there is enough space this month to include QSL manager information for a number of the expeditions and DX stations which were on during the CQWW contests. If you are sending cards out through the bureau, identify the manager's call clearly on the card and, when you sort the cards, sort them by the manager's country rather than by the DX callsign.

PIRATED CALLS

TWO READERS HAVE been in touch with me recently to report that their calls have been pirated. Robert, G4ACY, is again having his call used by someone on 7MHz (Robert is active only on 14 and 21MHz) and Martyn, G4GMW, is receiving cards for GU4GMW. He has never operated from anywhere other than G itself. It is always unfortunate when these situations occur, both for the legitimate holder of the call and for those who think they have worked a rare one like GU.

DX AND CONTEST MEETING

THE 6th INTERNATIONAL contest and DX meeting of Contest Club Finland (CCF) takes place in Helsinki, on 21-22 January. The agenda includes presentations by CT1BOH (P40E), OH2BH, WX0B, OH1RY, OH0XX, DL6LAU and others, all to be given in English. Last year, the event was attended by contesters and DXers from ten different countries. Further information is available from Pasi Luoma-aho, OH2IW, (e-mail:OH2IW@sral.fi).

THANKS

MY THANKS TO all who have provided information for the column. Special thanks go to the authors of the following for information extracted: *OPDX Bulletin* (KB8NW), *The Daily DX* (W3UR) and *425 DX News* (I1JQJ). Please send items for the **March** issue by **22 January.** ♦

Call Managers

Call	Manager
3XY2D	VE2DPS
3W7TK	OK1HWB
5W0ST	G4EDG
8P1A	W2NY
8P9JG	W2NY
8R1K	OH0XX
9E1C	IV3OWC
9M6NA	JE1JKL
9M8R	W7EJ
A61AJ	W3UR
AH2R	JI3ERV
B1Z	JA4HCK
B4R	BY4RSA
CO9BCC	VE2EH
CP6/LU9AY	NU4N
EA8BH	OH2BH
EA9EA	EA9AZ
EL2RF	K1SE
FK8HC	VK4FW
FM5BH	W3HNK
FO0AOI	F6AOI
FO0SOU	F6AUS
FO0THA	DF2IY
HC8A	WV7Y
IG9A	I2MQP
IH9P	KR7X
J3A	WA1S
J6J	N5VL
J6R	N3NT
J79KS	DL1DA
JW5E	LA5NM
JY9NE	N3FNE
JY9NX	JH7FQK
KH2/N2NL	W2YC
KH4/W4ZYV	W4ZYV
MU0BKA	K4ZLE
P3A	W3HNK
P40B	I2MQP
P40E	W3HNK
P40J	WX4G
P40R	K4UEE
PJ2C	W8KKF
R1MVZ	K6VNX
RW2F	DK4VW
T30CW	DL7DF
T30Y	DL7DF
T320	WC5P
T33CW	DL7DF
T33Y	DL7DF
T88WF	JN1WTK
TG9IGI	I2MQP
TO0DX	LA9VDA
V21A	HB9AQH
V26B	WT3Q
V31JP	KA9WON
V47DA	DL1DA
V47KP	K2SB
V47NS	W9NY
V85HG	JH7FQK
V8A	JH7FQK
VK8CI	VK9NS
VK8ML	VK9NS
VK9LM	W1HEO
VP2E	N5AU
VP2MBT	EA3BT
VP2MCM	DL7NFK
VP2MGS	DL9NDS
VP5DX	NU4Y
VP5R	N0KK
VP6TC	K6RPF
VQ9VK	N1TO
WP3C	W3HNK
XT2HP	JA1OEM
XX9TRR	N6XJ
YJ0ABL	VK3DBL
YJ0DX	VK4JSR
YN2EJG	K5LBU
ZC4ATC	5B4YX
ZD8Z	VE3HO
ZF2DR	K5RQ
ZF2MK	K9MK
ZX0F	PY5EG

VHF/UHF

NORMAN FITCH, G3FPK
40 Eskdale Gardens, Purley, Surrey CR8 1EZ
E-mail: g3fpk@compuserve.com

A VERY HAPPY New Year, New Century and New Millennium to all readers and particularly to regular and occasional contributors. The 50MHz band has produced openings from Oceania and Japan into parts of Europe, with an unconfirmed report of a G-to-VK4 QSO. There were some tropo openings on 144MHz, one being in progress as this is being compiled. All times are UTC. In the 'Band Reports' section, call signs followed by an asterisk (*) indicate a CW contact. Where applicable, British stations' district codes are noted after their calls, eg G4UPS (EX).

REPEATER NEWS

RICHARD JOLLIFFE, G3ZGC, writes that he has not seen any mention in *RadCom* about the Newbury VHF repeater, so let's rectify that omission. GB3NE came on air at 1000 on 20 March 1999, to provide hand-portable coverage in Newbury and mobile coverage from Hungerford to Reading. It is located at the Wash Common water tower (IO91HJ86). It operates on 145.7625MHz (RV61), and runs a 5W transmitter, set to 2.5kHz maximum deviation, to a dipole antenna. Access is by a CTCSS tone of 118.8Hz (tone area J). The keeper is Mr G T Miller, G8JIP, and the group has its own website - see the panel.

Happy 20th birthday to VHF repeater GB3SC (IO90BH). John Fell, G0API, reports that it came on air on Christmas Eve 1979. It has provided exceptional service to users in the Bournemouth area and no electronic components have failed or been replaced since it was commissioned. It is located on top of an eight-storey office block 300m from the cliff top and is on 145.625MHz (RV50).

The group also supports the co-sited UHF repeater GB3SZ on 433.375MHz (RU270), and runs narrowband beacons on several microwave bands. Continued existence relies on voluntary donations and Mr R A Mackney, G4RAM, holds the purse strings. Technical queries are handled by G0API and the addresses of both are in the current *RSGB Yearbook* (QTHR).

Steve Vaughan, G4WXC, is the honorary secretary of the South Oxfordshire Repeater Group. The SORG runs three repeaters, GB3OX in Oxford on 433.300MHz (RU264), GB3DI in Didcot on 433.150MHz (RU252) and GB3WO near Witney, which came on the air at the end of April 1999. No operating channel was mentioned, but I deduce it is 433.250MHz (RU260). For details of the SORG's activities and membership information, contact G4WXC (QTHR).

Brian Davies, GW4KAZ, Chairman of the Arfon Repeater Group, reports that VHF repeater GB3AR resumed operation on 24 October from a new ManWeb site at Waunfawr, three miles east of Caernarfon (it used to operate from the NTL site at Nebo, seven miles south of the city). GB3AR transmits on 145.700MHz (RV56) and now conforms to the 12.5kHz channel spacing system. Tone access is by 1750Hz or CTCSS of 110.9Hz (tone area H).

Initial reports indicate improved coverage, even into the city of Bangor. While coverage to the north of Snowdonia will be good, that to the south previously enjoyed from the NTL site will be lacking. The ARG has secured a second ManWeb site close to the village of Penrefelin near Criccieth. An application has been made to the RSGB Repeater Management Group for GB3DW on 145.6625MHz (RV53). If successful this would extend coverage to Cardigan Bay towards Aberystwyth and further south.

From this new site the ARG intends to establish a new Amateur Television (ATV) repeater, GB3GW, on 1.31GHz with the same specification as the existing GB3TM on Anglesey. Membership details of the ARG can be obtained from Brian Davies, GW4KAZ (QTHR).

BEACON NOTE

A FREQUENCY FOR a 6m beacon in Lithuania has been allocated. In an Internet message on 25 October, Remi Vaicius, LY2MW, says it is hoped to have it operating soon on 50.063MHz with 5-7W to a quarter-wave vertical antenna. No call sign was mentioned. Any comments or suggestions may be e-mailed to him at r.vaicius@omnitel.net

FIRSTS

VARIOUS OPERATORS have compiled lists of first QSOs between pairs of countries on the VHF/UHF bands. Gabriel Sampol Duran, EA6VQ, advises, "I have updated the list of first-ever QSOs on VHF/UHF from EA, EA6, EA8 and EA9 with the latest information I have received". Gabriel's e-mail is ea6vq@qsl.net and the details are on his website - see the panel.

THE ANNUAL TABLE

AS IN 1998, the 1999 Annual Table only attracted 13 entries, but, as it introduces some friendly competition among contributors, I propose to run it with the same rules in 2000. The final placings, including the band-by-band breakdowns, will appear in the March *RadCom* and the first appearance of the 2000 table will be in the May issue. Send me an SASE if you want a hard copy of the rules, or drop me an e-mail.

AMATEUR TV

THE NOVEMBER 1999 issue of *CQ-TV*, the quarterly journal of the British Amateur Television Club, comprises 48 pages of text plus covers in A4 format. This is the 188th edition and, as always, it is packed with high quality articles, news and technical information for ATV enthusiasts.

There are many excellent photographs of equipment and people taken at the BATC's 1999 Shuttleworth meeting on 8 August. For the third year running, the BATC was invited to put on a stand at the prestigious International Broadcast Convention, held in the huge RAI exhibition and conference centre in Amsterdam. There are lots of photos taken at the five-day event, which started on 10 September.

Ian Pawson edits *CQ-TV* and details of BATC membership can be obtained from Dave Lawton, G0ANO (QTHR). His e-mail is memsec@batc.org.uk and there is an excellent website from which recent electronic editions of the journal can be downloaded - see the panel.

PROPAGATION

DAVE EDWARDS, G7RAU, has been carrying out ionoscatter propagation tests on 2m with SM5BSZ for some time. He has now updated the documentation on his website - see the panel. Mark Hattam, G4KGA, has been monitoring Band 2 FM propagation for the past year-and-a-half to see how it corresponds with that on the 6m, 4m and 2m bands. He uses a Sony SA3es tuner on 87.6MHz feeding a PC which records/logs incoming RDS data, and a Mac recording audio. These data are available on his website - see the panel.

It is most gratifying when operators who carry out such experiments take the trouble to make the results available to other interested amateurs. Thanks, Dave and Mark, and to all others who run similar websites. Let me know what you're up to and I'll be only too glad to publicise it.

The September issue of the *Six and Ten Report* includes the usual reports on various propagation modes on 28 and 50MHz. As reported earlier, Sporadic-E (Es) tailed off early in the month, there wasn't much meteor scatter (MS) activity, but there was some degree of auroral propagation on 13 days.

There is a graph of Q-indices for every 15 minutes of the

The EME 2m crossed Yagi of F/G8MBI, with its 15m boom.

month, recorded at Sodankyla (KP37) in Finland, supplied by OH2LX to supplement the page of solar and geomagnetic data. The latter shows that the 2.8GHz solar flux at Ottawa peaked at 163 units on the 1st, the minimum being 107 on the 10th with the monthly average calculated as 136.9.

The *Report* is compiled monthly by Dr Steve Reed, G0AEV, and Prof Martin Harrison, G3USF, and is an activity of the RSGB's Propagation Studies Committee (PSC). Subscription inquiries are handled by G0AEV (QTHR) whose e-mail is g0aev @ explore. force9.co. uk and the PSC has a website - see the panel.

The October issue of *SunMag* begins with a solar cycle update article. David Hathaway, a solar physicist at the Marshall Space Flight Center, and his collaborators, reckon the maximum will occur in the middle of 2000. They suggest the peak sunspot count will be a bit lower than expected, comparable to, but lower than, the peaks of the 1989 and 1978 maxima.

There are two articles about the Leonids meteor shower that will be mentioned in the 'Meteor Scatter section'. There is a short report on the solar blast that occurred on 21 October. The shock front hit the Earth's magnetosphere around 0240 that morning and produced auroral displays over much of the USA from Washington in the west to New York in the east, and as far south as Ohio.

On 12 October, the space-based Solar and Heliospheric Observatory (SOHO) photographed two dramatic coronal mass ejections (CMEs) in an 8-hour period, and a third six hours later on the 13th. Such CMEs can carry up to *10 billion tons* of plasma travelling at velocities up to 2000km per second. Fortunately, these were not directed at Earth. During solar maxima, CMEs can occur on a daily basis.

There are the usual tables of daily solar, particle, geomagnetic and sunspot group data and a solar flare list. *SunMag* is compiled and published by Neil Clarke, G0CAS (QTHR). His e-mail is neil@g0cas.demon.co.uk and you can telephone him on 01302 531925 (Doncaster). His website details are in the panel.

ANNUAL VHF/UHF TABLE - JAN TO DEC 1999

Callsign	50MHz Dist	50MHz Ctr	70MHz Dist	70MHz Ctr	144MHz Dist	144MHz Ctr	430MHz Dist	430MHz Ctr	1.3GHz Dist	1.3GHz Ctr	Total Points
G3FIJ	44	37	44	3	82	13	52	8	18	3	304
G4DEZ	48	59	43	5	50	12	24	11	4	7	263
G4APJ	34	26	-	-	94	12	50	8	-	-	222
GW6VZW	82	65	-	-	-	-	-	-	-	-	147
G3KAC	7	5	31	3	33	8	27	6	14	5	139
G7OOD	29	11	-	-	52	10	16	4	-	-	122
G7NBE	21	13	14	2	38	8	5	1	-	-	102
2U0ARE	10	51	-	-	7	5	8	5	2	1	89
MM0BQI	26	15	-	-	28	9	2	1	-	-	81
G4OUT	-	-	27	4	42	8	-	-	-	-	81
G1UGH	2	16	-	-	32	14	11	5	-	-	80
G4OTY	-	-	8	2	31	6	4	1	-	-	52
M0CNP	-	-	-	-	17	6	8	4	-	-	35

The District Codes are the 124 listed on page 83 in the 2000 *RSGB Yearbook*. Up to 6 different GI stations and up to 3 different GM stations in each Scottish district may be counted. Countries are the current DXCC ones plus IT9. The deadline for the final 1999 scores is 20 January 2000.

MOONBOUNCE

PETER BLAIR, G3LTF (IO91), operated in the first leg of the ARRL EME contest, starting on 13cm on 30 October by working a couple of stations. He switched to 23cm at 0310 and completed with 15 Europeans and six North American stations. Things were slowing down by 1000, so he switched to 70cm, completing with another ten stations, until 1130.

At moonrise, around 2300, he went back to 23cm to work JH5LUZ, JA6CZD and three more Europeans, before changing again to 70cm to catch the Japanese window. This session brought another 22 contacts, including JA6AHB #347, DL1YMK #348 and DJ3FI #349. As the wind was getting high, he closed down but, as it eased later and with only 6 degrees of elevation, he worked W7CS and WA9OUU #150 on 23cm (NB '#' denotes a station worked for the first time, ie an 'initial'). Peter's final scores were; 13cm 2 x 2, 23cm 29 x 20, and 70cm 32 x 16; all but one QSO were on CW.

Roy Reed, G3ZIG (JO02), was also QRV in the contest and reports good conditions in spite of the high winds. In 28 hours of operation on 2m, he completed 79 CW contacts in 24 countries, of which 35 were initials, to bring his total to 176 all-time. Among the initials were 9H1PA, RK9CC, R1MVZ, 7K3LGC and PY2DW, a really creditable performance.

I visited Graham Daubney's, F/G8MBI (JN04), website - see the panel - and downloaded his EME data. From JN04 up to 6 November, he had worked 197 stations on 2m using a single 6.6-wavelength home-designed, crossed Yagi antenna. The boom length of this 16.1dBd gain beast is 15m, and elevation is limited to 55 degrees (see the photograph opposite). The receiver preamp is an MGF1802 with a measured noise figure of <0.3dB, and about 18dB gain. The feeders from the driven elements are FSJ450, half-inch diameter hardline.

For a few years in the past, Graham operated from Hong Kong as VS6YHT and VR2IH, and there are pictures of the shack and the view from his apartment. He made the first ever Es QSOs on 2m from the former colony to Korea and later Japan, best DX (ODX) being close to 3,000km which remains an Asian region record.

METEOR SCATTER

THE OCTOBER ISSUE of *SunMag* included a fascinating article 'Glow Worms in the Sky' concerning a phenomenon which seems unique to the Leonids meteor shower. Dr Jack Drummond of the US Air Force Research Laboratorystates that the Leonid meteors leave behind trails which, unlike ordinary meteors that fade in a matter of seconds, can last up to an hour and are still unexplained.

He calls these trails 'glow-worms', and the winds distort them into weird serpentine shapes. They are self-luminescent and appear to be due to chemiluminescence, the production of light from chemical reactions, similar to the bioluminescence characteristic of fireflies and glow-worms. So, if your sky was clear, did you notice any of these glow-worms in the sky in the 1999 Leonids?

The first major shower in 2000 should be the Quadrantids. The OH5IY program predicts the peak, which is usually sharp, at 0430± 3 hours on 4 January. The zenithal hourly rate (ZHR) is given as 120, but it ranges between 60 and 200. Activity should be above half that at peak for about 10 hours. The radiant is above a mid-UK horizon all day, and the times when refection efficiencies exceed 50% are NE/SW around 0600 and also 1100-1830; E/W 1430-0300; NW/SE 2300-0600 and 1130; N/S 0100-0700 and 1000-1630.

BAND REPORTS

50MHz

Gian Carlo Moda, I7SWX, is now working in the south of France and holds the reciprocal call F5VGU (JN33JK). His QTH is Saint Raphael in department 83, one of 35 in mainland Francewhere 6m operation is not allowed. The map on page 78 in the *SWL* column in the May 1999 *RadCom* shows the situation, and confirms that French amateurs are restricted to 50.200-51.200MHz.

The following notes were compiled from the Internet. Jose Hierro, EH7KW (IM67), reported the MUF up to 55MHz in the evening of 9 November. For an hour from 2215, he received good long path signals from New Zealand TV, and the audio on 50.750 and 50.760MHz peaked to S7. Alain, ON4KST (JO20), had a good opening to 5R8DJ (LH41) and 5N9RGJ (JK31) on 23 October, and on 11 November he heard/worked VK6s, JA5FFJ, VK8GF, TR, ZS and V5 stations.

Between 0810 and 0840 on 31 October, Corneliu, YO4AUL (KN44), reports the first F2 opening from Romania to Australia this year, in which he worked VK4ABW*, VK4JH* and VK4FNQ. Peter Casier, 5X1T (KJ60), reports an excellent opening in the evening of 23 October.

In the course of an hour, he made 150 QSOs up to ON and PA, but no Gs were heard. The opening lasted till 1944. He was due to leave Uganda about a week later and can be QSLed via ON5NT.

Now to direct reports. John Hoban, G0EVT (WF), caught the opening on 12 October reported last month, working some ZS6s, PY5CC and LU2FFD, with many others heard. More ZS6s were contacted on the 16th. Bryn Llewellyn, G4DEZ (SS), worked 9 PYs, 3 LUs and a ZP on the 12th.

Ted Collins, G4UPS (EX), reports that Peter, PY5CC, made his first G contacts from Fernando de Noronha as PY0FM (HI36) on 21 October, and Ted worked him on CW at 1438 and on SSB at 1501. His detailed report reveals Es propagation to Europe on 23, 24, 28 and 31 October, and propagation to southern Africa on 23 October, and on 7 November. At 0927 on the 8th he copied JA4CQS* at RST229 working PA0HIP.

Apologies to John Armstrong, GW3EJR (SA), whose report was mislaid last month. He is still running an IC-706 to a 3-ele home made Yagi at 18ft AGL. Progress was slow in 1999, but he did work into LX, LY, LZ, SM, YU, 4X and 9A in the summer. On 17 July he gave MW1EJR his very first 6m QSO.

USEFUL WORLDWIDE WEB SITES

GB3NE	http://www.wteam.co.uk/gb3ne
EA6VQ	http://www.qsl.net/ea6vq/firsts.html
BATC	http://www.batc.org.uk
PSC	http://www.keele.ac.uk/depts/por/psc.htm
G7RAU	http://www.g7rau.freeserve.co.uk/index.htm
G4KGA	http://www.dxradio.demon.co.uk/dxlatest.html
G0CAS	http://www.g0cas.demon.co.uk/main.htm
G8MBI	http://www.rfham.com/mbi.htm

Paul Baker, GW6VZW (NP), managed to work only PY1VOY* (GG87) in the South American opening on 12 October, due to having to QRT for work. He contacted PY0FM at 1501 on the 21st, ZS6PJS (KG46) at 1145 on the 23rd, and GM6NX* (IO86) at 1807 in an aurora on the 28th.

Jamie Ashford, GW7SMV (NP), also worked PY0FM and ZS6PJS. On 7 November the band was open to South Africa for hours, and at 1228 his ODX was ZR5ADQ (KG50), all the above being new squares. Colin Fallaize, 2U0ARE (GY), was another who worked PY0FM on 21 October. Next day he heard Es to Europe, several LUs at S5, and the CN8LI beacon, but worked nothing. On the 27th he contacted TZ6VV, who was S9 for over half an hour.

144MHz

Ian Cornes, G4OUT (ST), was QRV in the Marconi Memorial 2m contest on 6/7 November, and made 48 CW QSOs. ODX was F5KOJ (JN28) at 702km, and other QSOs over 500km were with DL0KM (JO31), F6DWG/P (JN18), F9LT (JN08), F6CGT (JN18), ON5RY (JO20), PA4VHF (JO32), PA3BAS (JO21) and F5MUX (JN08).

David Dodds, GM4WLL was out portable for the 6-hour RSGB CW event on 7 November, and made 38 QSOs in good activity. In the final half-hour, an aurora provided contacts with SK7MW (JO65), DJ4SO (JO44) and DL8EB/P (JO30). The aurora ceased shortly after the end of the contest, but reappeared by 1440, after which he worked on CW LA8AJA (JP50), SM6CEN (JO57), SM6OPX (JO58), SM4IVE (JO79), LA0BY (JO59) and OZ2TF (JO46).

Matthew Jeffery, G7ORR, was out portable in Wales for a few hours on 31 October. From a site 3 miles SW of Abergavenny, 500m ASL and in flat conditions, GW7ORR/P (IO81LS) made 40 QSOs between 1133 and 1611. ODX were DL1BCT and DJ6YFW, both in JO32 at 693km. Four other QSOs were over 600km. He used an IC-275, 400W PA to two 6-ele Yagis 10m AGL, with a masthead preamp on receive. Thanks also to GW7SMV and Brian Clowes, GW4HBZ (LL), who reported on the mid-October tropo.

DEADLINES

THE MARCH COPY deadline is **20 January** and for **April** it's **17 February**. My telephone answering and fax machine is on 0208 763 9457 and the CompuServe ID is g3fpk. ♦

µWAVE

SIMON LEWIS, GM4PLM
181 Kent Drive, Helensburgh G84 9RX
E-mail: uwave.radcom@rsgb.org.uk

HELLO AND welcome to a New Year and a new millennium. I hope the festive season has been enjoyable for you all.

BEACON NEWS

IN THIS INCREASINGLY commercial world of communications it is sad that amateur radio operations are being squeezed off hilltop sites because of a lack of finances. So it is with sadness that I have to report that the owners of GB3SCX/SCS/SCK/SCF have lost their site and will be off-air by the time you read this. It is especially sad, as I reported their arrival as recently as in the last column. The beacons were all co-located at IO91AP11, and a new home is being sought on the south coast. Chris Towns, G8BKE, would like to hear from anyone who may be able to help re-home them. If *you* can help, please forward your contact details to him, or via the microwave reflector, or to me.

A further plea for beacon help comes from Ted Warne, G3YJX, of the Mid-Cornwall Beacon and Repeater Group. Ted reports that the future of the 1296MHz beacon, GB3MCB (1296.860 MHz) is being evaluated, as the beacon is costing £30 per annum in electricity and the group has not received a single reception report since it started operating. Ted asks for reception reports so that the group can assess the viability of the beacon. Time for action, folks. Will all readers in the area (with 23cm equipment) please send a reception report to the group? Ted can be contacted via e-mail at ted.warne@treryn.freeserve.co.uk orvia packet at G3JYX @ GB7TAS or QTHR. Your action may save a beacon going off-air. It's up to you.

UK MICROWAVE GROUP

THE INAUGURAL Meeting of the UK Microwave Group took place at British Telecom's Adastral Park (the new name for Martlesham Heath) on 14 November. The meeting took place as part of one of the many RSGB Microwave Committee's 'Microwave Roundtables' and was attended by over 80 delegates from both the UK and Europe. A lively dinner on the previous evening had been attended by around 30 people, showing the event to be the principal microwave event in the UK. The group exists to promote microwave activity in the UK by having a dedicated microwave group, such as the one that promoted the initial 10GHz activity in the late 1970s. The group produces a quarterly technical journal entitled *Scatterpoint* and has a dedicated microwave website (www.microwavers.org). Further facilities will be offered as the group develops. Details of the group can be obtained from the secretary, Lehane Kellet, G8KMH. He can be contacted on lehane@mm-wave.demon. co.uk or by sending a SASE to 43 Waverley Way, Finchampstead, Wokingham, Berks, RG40 4YD. Subscriptions have been set at £12 annually.

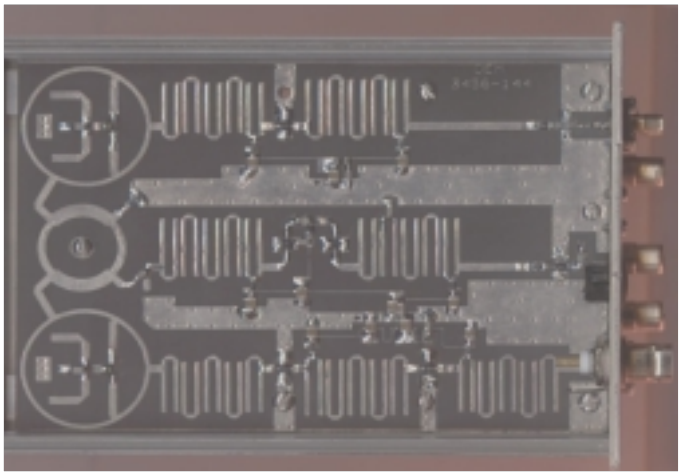
MICROWAVE SOFTWARE

GABRIEL SAMPOL, EA6VQ, sends information on the latest version of his excellent VQLOG PC logging package. Version 2.0g has some useful updates and the whole package is very useful, as it is written with the VHF - microwave operator in mind. Many of the features in this fine program are not found in more general logging software. What is more, the program is very cheap and well worth considering. An evaluation copy can be downloaded at www.qsl.net/ea6vq/vqlog.htm

Paul Wade's Palm logging software has been under extensive use by the author since the last column and I have come to the conclusion that it's a great help! The Palm is a small handheld computer that is a perfect replacement for paper logs and is miniature compared to a full-blown laptop. The software contains a bearing/distance calculator as well! It also supports multiband and cumulative events. I have tried to find a Psion equivalent without success. Does anyone know of such a program? Paul's freeware software can be found at www.tiac.net/users/wade/ The site also holds an excellent online microwave antenna handbook that is worth reading. A CD-ROM of the antenna handbook is available for US $20.

EQUIPMENT NEWS

THE US COMPANY Down East Microwave has recently released the latest version of its 2m - 9cm transverter. American designs generally differ from European designs in that they favour 'no-tune' designs utilising printed PCB filters. These are seen clearly in the photograph below. This latest design is no exception and features a single-board transverter and an external local oscillator. The basic transverter has a receive noise figure of <2dB and a transmit output of 20-30mW. More information on this and other DEM kits can be found on the web at www. downeastmicrowave .com I will be bringing you an exclusive review of their new 10GHz transverter in the near future.



The latest Down East Microwave 3.4GHz transverter (note the u-shaped PCB image filters).

The G3WDG014 10 watt 13cm PA kit is now available from the Microwave Component Service. This kit utilises a single MGF0907 and gives around 8dB gain. An MCS price list, giving details of this, other kits, components and ordering details, can be found on the MCS website at www.g3wdg-free-online.co.uk or by telephoning Charlie on 01933 411 446.

FINDING MICROWAVE INFORMATION

MANY PEOPLE ASK me where the best place to find microwave information is. The web is an excellent source, but some people do not have access to the Internet or, perhaps, like to read a 'real' book occasionally! In this case, the multinational publication 'DUBUS' takes a lot of beating. This quarterly magazine is dedicated to the VHF-and-up operator and carries lots of microwave technical and operating information. The UK representative is Roger Blackwell, G4PMK. He can be contacted via his website at www.marsport.demon.co.uk or at 5 Tollgate Road, Culham, Abingdon, OX14 4NL. Current yearly UK subscriptions are £14.

MICROWAVE COLUMN WEBPAGE

FOR MORE information on microwave operating in the UK, please pay a visit to the Microwave Column homepages at www.pacsat.demon.co.uk/mwcol .htm These pages are not a replacement for the *RadCom* pages, they are intended to complement them. They should be of great use to the curious, or to the newcomer to microwaves. Please note the change of address.

News and items of interest to microwavers should be sent to me. The Microwave Column website can be found at www.emn.org.uk/mwcol.htm

A set of Frequently Asked Questions (FAQs) can be found on the RSGB's website. These offer a newcomer the answers to many of those nagging questions about how to become involved with microwaves. ♦

ALINCO GIVES YOU more FOR LESS!

DJ-G5EY
Dual Band Handheld

- Spectrum channel display
- Optional extended receive including Airband
  108-173.995MHz
  400-511.995MHz
  800-999.990MHz
- Full VHF/UHF Duplex
- Over air cloning
- Cross band repeat
- Up to 5W RF output
- 100 memories

£289.00 £8 P&P

A brilliant twin band handheld that does everything including spectrum display of adjacent channels. The RX has a superb front end that does not suffer with breakthrough like some other handhelds. It has CTCSS/DTMF built in as standard.

DJ-V5
With Wideband RX

A new compact heavy duty dual band transceiver

- Full VHF+UHF amateur bands coverage
- Expandable RX range (76 - 999MHz)
- Wide FM broadcast
- Up to 5W output
  (3 output settings: 0.5W, 1W, 5W)
- 4 scan modes
- 200 memory channels + 2 call channels
- 5 programmable scan bands
- Priority Watch
- Plus many more features!

£229.95 £8 P&P

DJ-195
Low Cost 2mtr Handheld

One of the 'New Breed' Alinco handhelds using state of the art technology

- 5W output (with standard battery)
- 144MHz amateur band coverage
- CTCSS encode/decode fitted
- 40 memories
- DCS, Tone bursts and DTMF
- Many other features!

£159.00 £8 P&P

DX-70TH
100W HF Transceiver plus 100W on 6 mtrs

£699.00 £8 P&P

The DX70 TH packs a hefty 100W punch on all Ham bands 1.8 - 50MHz. It is backed by a superb receiver with narrow filters fitted as standard. Make no mistake - this is a real DX operators transceiver ideal for use at home, in the car, or for that portable DXpedition. General coverage receive is included and wideband transmit facilities for export customers. The detachable front panel allows remote mounting and additional security.

- TX - all HF + 6mtr
- RX - general coverage
  150kHz - 30-MHz
  50MHz - 54MHz
- SSB, CW, AM, FM and digital modes
- 100 memories
- Detachable faceplate and remote mounting kit available
- Speech processor standard
- Narrow filters fitted as standard
- 100W output on HF & 6mtrs
- Selectable 4 stage RF gain
  -20dB to +10dB
- Superb TX audio and RX
- Excellent RX sensitivity
- Full break in on CW
- All mode squelch
- Scan facilities
- CTCSS encoder
- Noise blanker
- Quick offset for DX pile-ups
- IF shift control
- Separate HF & 6M antenna sockets

DR-610E Twin Band Mobile

The DR-610E dual band transceiver equipped with Alinco's Advanced Channel Scope utilises a 'Real Time Monitor' on 11 different frequencies simultaneously giving you quick visual scanning capability and the potential for making numerous contacts.

- **120 memories**
- **VHF 50W/UHF 35W max**
- **Channel Scope**
- **Full duplex**
- **CTCSS encoder**
- **AM Airband RX**
- **Optional extended receive inc airband**
  - VHF 108 - 174MHz
  - UHF 420 - 470MHz

£425.00 £8 P&P

What PETER HART said about the DR-610E . . .

" The Alinco also includes a DTMF decoder which permits full DTMF coded links to be set up."

Channel Scope - "I found this feature a real boon for quiet monitoring of band activity and in no way just a gimmick."

"The audio quality on receive was excellent, the best of all the radios with best overall frequency response."

DX-77(E)

£599.00 £8 P&P

- Covers all HF Amateur Bands
- General coverage receive (150kHz - 30MHz)
- 100 memories
- 100W, SSB, CW & FM, 40W AM
- Built in speech compressor
- Computer control with optional ERW-4
- Full QSK in CW modes
- QRM/QRN reduction with IF shift, RF attenuator and optional CW filter
- Two VFOs + memory operation mode
- Basic model upgradeable to (T) model with
  EJ33U Electronic keyer.....**£29.95**
  EJ34U CTCSS.....**£19.95**
  EJ35U CW filter **£49.95**

Post and Packing £2.75

DR-150E 2 Metre Mobile

£279.95 £8 P&P

- Optional receive to cover Airband, PMR, Marine, UHF, etc 135-950MHz (with gaps)
- 100 memories
- Channel Scope simultaneously displays 7 channels
- 9600 BPS Interface
- CTCSS encoder
- Time Out Timer
- On air cloning

DR-140E
2 Metre Mobile/Base

£219.95 £8 P&P

- Optional receive to cover Airband, PMR & Marine
  118-135.995MHz (AM)
  136-173.995MHz (FM)
- 51 memories
- Time out timer
- Alpha numeric display
- 50W FM output
- Electronic squelch
- c/w DTMF mic

DJ-491
70cms Handheld Transceiver

A new slim line 70 cms transceiver that's easy to use and has an enormous clear display. A unique feature is the ability to display either frequency readout or just a channel number.

£189.95 £8 P&P

- Up to 5W output (with 9.6V NiCad pack)
- 40 memories channels
- RX expandable to 430 - 450MHz
- Programmable steps 5-50kHz
- PLUS MANY MORE FEATURES!

DR-605E Dual Band Mobile

- 50W (2m) - 35W (70cms)
- 100 memories
- Full Duplex
- CTCSS encoder fitted

£329.00 £8 P&P

DR-M06TH
6mtr FM Mobile
50 - 54MHz

£249.95 £8 P&P

With the new 6 metre repeaters now up and running, this is the ideal radio for the Band. With an optimised receive front end, CTCSS encode and easy to use controls you will be amazed at the range achievable.

- 100 Memories
- Programmable Repeater Shift

NEVADA®
DISTRIBUTION DIVISION

UK Distributors for Alinco products

tel: **023 9231 3090** fax: **023 9237 6565**

• ***e-mail:*** info@nevada.co.uk • ***website:*** http://www.nevada.co.uk

COMET

High Quality Japanese Antennas

featuring the Comet Exclusive SLC System

- **Linear Coil for Maximum Gain**
- **Soldered Element Joints**
- **ABS Radome Joints: Weatherproof/Invisible to RF for the Finest Radiation Pattern**

Comet Base Antennas

GP-15N	Triple Band Base 50, 144, 430MHz, length 2.4mtrs 300W PEP	**£89.95** p&p £8
CA-62DB	50MHz Base 5/8λ 2 step 6.5dB 500W PEP (aluminium)	**£84.95** p&p £8
GP-1	144/430MHz 3/6dB 1.25mtrs 200W	**£49.00** p&p £8
GP-3	144/430MHz 4.5/7.2 1.78mtrs 200W	**£57.95** p&p £8
GP-6	144/430MHz 6.5/9.0 3.07mtrs 200W	**£89.95** p&p £8
GP-98	144/430/1.2GHz 6.5/9.0/13.5dBi 2.94mtrs 200W PEP	**£119.95** p&p £8

Comet VHF Mobile Antennas

CHL-285	50/144MHz Mobile 300W, length 1.32 mtrs	**£24.95** p&p £4.75
CHL-350	28/50MHz Mobile 200W, length 2.16 mtrs	**£39.95** p&p £4.75
HR-50	50MHz Centre loaded 2.15dBi 200W PEP, length 2.13 mtrs	**£39.95** p&p £4.75
SBB-2	Dual band Mobile 144/432 100W length 0.46 mtrs	**£19.95** p&p £4.75
SBB-4	Dual band Mobile 144/432 60W length 0.92 mtrs	**£29.95** p&p £4.75
SBB-14	Tri band Mobile 50/144/432 120W length 1.08 mtrs	**£39.95** p&p £4.75
CX-702	50/144/430MHz High gain 120W, length 2.1 mtrs	**£57.50** p&p £4.75

Comet HF Mobile Antenna

CA-HV	HF/VHF, 7, 14, 21, 28, 50, 144MHz 120W 1.9 mtrs	**£89.00** p&p £8.00
L-14	20M Coil for CA-UHV	**£19.95** p&p £3.75

Comet Handie Antennas

SM-A3	SMA connector 144/432/900MHz Ideal for VX1R	**£19.95** p&p £3.75
SH-95	BNC connector 144/432/1200MHz 10W length 0.37 mtrs	**£26.95** p&p £3.75
RX-5	SMA connector 144/430MHz + wide RX 0.45 mtr	**£26.95** p&p £3.75

Comet Mobile Antenna Cables/Mounts

3D-4MB	SO239 Base w/4mtrs 3.5D low loss coax c/w PL259 plug	**£15.50** p&p £4.75
CK-3M4B	SO239 Base w/4mtrs 5D low loss coax c/w PL259 plug	**£24.50** p&p £4.75
MG-4M	Heavy duty mag mount c/w 4mtrs 3.5D low loss coax/PL259	**£19.95** p&p £4.75
RS-700	Gutter Mount fully adjustable	**£17.95** p&p £4.75
RS-730	Hatch/Trunk Mount fully adjustable	**£18.50** p&p £4.75
TBR	Hatch/Trunk Mount standard model	**£14.95** p&p £4.75

Comet Baluns

CBL-2000	0.5 - 60MHz 1kW 1:1	**£27.50** p&p £4.75
CBL-30	1.7 - 30MHz 1kW 1:1	**£21.95** p&p £4.75

Comet Filters

CF-30S	32MHz low pass filter, 150W CW	**£19.95** p&p £4.75
CF-30MR	32MHz Low pass, 1kw PEP	**£37.50** p&p £4.75
CF-50S	50MHz low pass filter, 150W CW	**£21.50** p&p £4.75
CF-50MR	50MHz low pass, 1kw PEP	**£37.50** p&p £4.75

Comet Band Pass Filters

CF-BPF6	50MHz band pass filter, 150W CW	**£42.50** p&p £4.75
CF-BPF2	144MHz band pass filter, 150W CW	**£42.50** p&p £4.75

Comet Duplexers

CF-416A 144/430MHz SO239/PL/PL ..... **£27.50** p&p £4.75
CF-416B 144/430MHz SO239/PL/'N' ..... **£28.50** p&p £4.75
CF-706 For IC706 & CA-HV 1.3-56MHz/75-320MHz ..... **£39.00** p&p £4.75
CF-360A 1.3-30MHz/49-470MHz SO239/PL/PL ..... **£37.95** p&p £4.75
NEW! - *Ideal for IC-706 IIG & CA-UHV*
CF-530 1.3-90MHz/125-470MHz SO239/PL/PL ..... **£39.95** p&p £4.75

Comet Triplexers

Comet CFX-431A
144/430/1200MHz 'N' - 'N' - PL - 'N' socket .. **£46.00** p&p £4.75
Comet CFX-514N
50/144/430MHz PL - PL - N SO239 socket ..... **£47.95** p&p £4.75

Antenna Switch

Comet CSW-40M
4 way 'PL' coaxial switch DC 800MHz 1kW SSB .... **£49.00** p&p £4.75

Comet Antennas are available from selected amateur dealers or direct

NEVADA - UK Distributors for Comet Antennas

We've moved to our new 11,500 sq ft warehouse!

• UNIT 1 • FITZHERBERT SPUR • FARLINGTON
• PORTSMOUTH • HAMPSHIRE • PO6 1TT

SPACE

DENNIS KITCHEN, G0FCL
'Hazelbeech', 13 Lenwood Park, Northam, Bideford, Devon EX39 3PD

ONE GETS THE feeling that things are really beginning to happen in space now. There was that wonderful news about Phase 3D getting a ride on an Ariane 5 rocket sometime early this year. A grand start to the Millennium which most of us have no doubt heard about. Certainly the contract was signed amidst sighs of relief everywhere (and some rather happy celebrations). The spacecraft should have been shipped to Kourou in French Guiana by now for any launch opportunity which is available. However, this doesn't mean that we are out of the woods yet. There is always a chance that a commercial satellite could bounce us off any proposed manifest; it is simply an opportunity which we hope will be realised before too long.

We should have our own Sputnik-type satellite very soon. An announcement on the AMSAT Bulletin Board gave the news that Bristol University are building a small dry-battery-powered satellite. The announcement stated that 'The University of Bristol's Human-Activated Nano-satellite Demonstration (HAND) is a small satellite intended to prove the capabilities of a hand-deployed satellite platform. It is designed to be carried into orbit in the Space Shuttle's cabin and then deployed by an astronaut during an EVA. If successful, the platform can be used on other applications-orientated projects.

'Current thinking envisages the use of a 2m or 70cm downlink which might use a terrestrial packet radio format similar to that used by the DOVE spacecraft. If this is the case, telemetry-decoding software will be made generally available before the flight, which is not expected in less than a year. Powered by dry cells, HAND-1 is expected to have a limited lifetime - probably less than one week.'

Wonderful news that more of our educational establishments are joining in space activities, in addition to the University of Surrey who, with Surrey Satellite Technology Limited (SSTL), are now a very well-established commercial enterprise. The American universities have long been encouraged to participate in small satellite building by AMSAT-NA, and NASA has supported a great deal of educational involvement with the shuttle missions. This policy has resulted in a fruitful co-operation with industry, not to mention a good spin-off for amateur radio in terms of increased membership of some societies and a greater awareness of amateur radio in general.

GO TO A CONFERENCE!

THE EDUCATIONAL theme was much in evidence at the AMSAT-NA 17th Space Symposium at San Diego in early October, 1999. The symposium was held in the Hanalei Hotel Conference Centre and was well supported. These events are great fun, the lectures are usually varied, informative and entertaining. The delegates represent the whole spectrum of satellite technology and amateur radio, from the big names to the 'newbies'. Above all, delegates mix, talk, learn and advise during the socialising when formal lectures are over (often in the bar over a convivial drink, which doesn't have to be alcoholic). San Diego was no exception. Topics included a talk on the Apogee at Constant time-of-day Equatorial (ACE) orbit for amateur radio satellites, by Ken Ernandes, N2WWD, and another on converting surplus Qualcomm Microwave assemblies for use with amateur satellites, by Kerry Banke, N6IZW. The construction of patch antennas was explored by Cliff Buttschardt, K7RR, and we were treated to a dissertation on the 'Anatomy of a SETI (Search for Extra Terrestrial Intelligence) Hoax' by Dr H Paul Shuch, N6TX. Dr Shuch finished his presentation with a song which he had written for the occasion and which he accompanied on the guitar. These are appetisers to give the flavour of this type of event. Why don't you sample it yourself at the AMSAT-UK Space Comms Colloquium at the University of Surrey in July, or go to one in the States? In any case, take the family on holiday!

RUSSIAN DIFFICULTIES

A RECENT CASUALTY among the amateur satellites was Zeya, RS16. Zeya re-entered the earth's atmosphere on 25 October 1999. It was launched from Svobodny in 1997 and has had a troubled life - RIP.

There has been more trouble for Russia due to the loss of a Proton launcher from Baikonur in Kazakhstan. Not only has this resulted in a suspension of firings from the cosmodrome, but it has also set back the International Space Station (ISS) programme. A proton rocket was due to launch their Zvezda module to the ISS in December 1999. The Zvezda module is the initial location for the amateur radio hardware, and carries the bulkhead connector allowing connection to an outside antenna.

NASA has suffered problems with the shuttle electrical systems. Consequently, mission STS-101, carrying the initial amateur radio equipment for the ISS, will launch no earlier than 10 February 2000, instead of December 1999, as originally planned. No external antenna gear will be carried but, apparently, a good commercial antenna already exists on the service module and will be made available so that the crew can start using 2m immediately. Further information can be found on http://garc.gsfc.nasa.gov/~ariss/ariss.html

STS-103 NEWS

IT LOOKS AS IF mission STS-103 will in fact precede STS-101. STS-103 (Discovery) carries a payload to service the Hubble Space Telescope. It will be the focus of media attention, according to NASA. Members of the media will be allowed to view and photograph the payload flight hardware and talk to project representatives. The servicing mission is designed to replace ageing parts on the 9-year-old observatory and to upgrade some of its systems. During the flight, the astronauts will replace all six of Hubble's gyroscopes, a fine guidance sensor, and the spacecraft's main computer, along with other important equipment. In fact, preparations for this mission are fairly well advanced, and the flight may have actually taken place by the time you read this, depending on how long the electrical inspection and modification take to perform.

Ken Ernandes, N2WWD, discussing orbital configurations for amateur satellites at the San Diego Symposium (photo by KB5MU).

APRS DEVELOPMENTS

THERE IS GREAT interest in APRS (Automatic Position Reporting System) being shown in the States. Experiments are under way with Low Earth Orbiting satellites such as AO-16, LU-19 and IO-26, all 1200-baud Pacsats. The ultimate object seems to be a world-wide network using the modern facilities available to radio amateurs. With a satellite communications station, it is always the downlink which requires care and a not-insignificant investment. Consequently, signals in the form of UI packets and lasting a few seconds are transmitted from a simple FM handheld transceiver. The packets contain positional and status information which is digipeated by the satellite. The digipeated signal is received by a few fixed, more expensive, ground stations, some 1000 miles apart. This information is relayed by any suitable means such as telephone line, HF and even the Internet, to mobile tracking stations for anyone who wishes to access the information. With a GPS receiver, any mobile station's position or status can be monitored with ease. The potential seems enormous, especially for expeditions or emergency situations. The mobile or reporting station needs the minimum amount of equipment - everybody has a 2m FM set! Full details are available in a report by Bob Bruninga, WB4APR, on http://web.usna.navy.mil/~bruninga/traknet.txt It will no doubt clarify the above summary. A problem in some countries may be the old one of handling third party traffic. ♦

QRP

REV GEORGE DOBBS, G3RJV
St Aidan's Vicarage, 498 Manchester Road, Rochdale OL11 3HE
E-mail: g3rjv@gqrp.demon.co.uk

IN THE LAST WEEK of September, *SPRAT* number 100 was mailed to G-QRP Club members. *SPRAT* is the quarterly journal of the G QRP Club and I have had the pleasure of editing all 100 issues. That pleasure is largely derived from the content of *SPRAT*. The aim is to have at least 60% technical content - circuits and ideas for practical radio construction. Over the years, the members of the G QRP Club have been prolific in their design and experimentation. *SPRAT* reflects an area of the hobby where self-training, through the building of sometimes modest and sometimes complex equipment, shows that the 'amateur' in amateur radio is still alive and well.

That issue of *SPRAT* also marked 25 years of the G QRP Club, a club which became the amazing result of a letter I wrote to the *Short Wave Magazine* asking if anyone was interested in forming a UK QRP group. 32 people responded to that letter, and the G QRP Club now has a membership in excess of 10,000. If you want to know more about the G QRP Club and receive a sample of *SPRAT*, write to me at the address at the head of this column. An address sticker and stamp would help to speed up the reply.

G3RJV IN JAPAN

LAST AUGUST I was fortunate enough to be invited by a group of JA QRP Club members to attend the 1999 Ham Fair in Japan. Kuninori Nogi, JR4CLN, kindly arranged the visit for me in conjunction with the JA club. Prior to the event I spent some days in Tokyo, including a visit to the headquarters of the JARL and the splendid Akihabara 'electronic town', with all its components, electronics and computer shops and stalls.

The Ham Fair was held in the impressive, modern convention centre in Yokohama and ran over Friday, Saturday and Sunday. The G QRP Club had a small stand adjacent to the JA QRP Club stand. The JA QRP Club could well be the oldest extant QRP organisation, as it has run continuously since 1954. Their stand included a large collection of home-built equipment, including a lot of 6m AM equipment which seems popular in Japan. The main JARL stand also featured a home-built equipment competition with a very impressive exhibition of work.

Apart from the display of some G QRP Club material and public relations, my chief role at the Ham Fair was a presentation on QRP in Europe. The presentation was well attended and, I think, well received. I was somewhat daunted by the prospect of a live translation to accompany the talk, but this ran very smoothly. The range of stands at the Ham Fair was very similar to those I have found elsewhere, and the Flea Market suggested that radio junk is the same the world over! The day after the Ham Fair, I had the opportunity to meet a couple of the long-established characters in Japanese QRP circles.

For some 20 years, I have read copies of the *Fancy Crazy Zippy* magazine. To say 'read', I really mean 'looked at the circuits', as the magazine text is in Japanese. *Fancy Crazy Zippy* is a fascinating little publication, the work of Tadashi Okubo, JH1FCZ. For all those years, JH1FCZ has produced a slim monthly magazine full of little QRP circuits and ideas for the home constructor, most of them backed up with parts and kits from his small company called FCZ Labs. The latest issue I have, for October 1999, is issue number 285. I had the pleasure of meeting Tadashi for the first time at the Dayton Hamvention in May and was invited to visit the FCZ Labs.

The labs proved to be the front portion of a large house, where Tadashi and his wife Ryoko Okubo, JH1MHN, greeted me. It was not a disappointment, as the FCZ Lab was just what I had expected. Crowded workbenches were filled will a jumble of partly- and wholly-built electronic boards, scraps of paper with notes, circuits and calculations, all with that healthy appearance of semi-organised chaos. I enjoyed poking around the workbenches and discussing the projects with JH1FCZ, who spoke excellent English.

The Okubos are a multi-talented family. Mrs Okubo entertained me with samples of authentic Japanese food and varieties of green tea, while we talked about building QRP equipment. Tadashi is a skilled water-colourist, and drew and painted a personal QSL card as a reminder of my visit. It was refreshing to find so much individual talent and flair in the 'land of rice box equipment'.

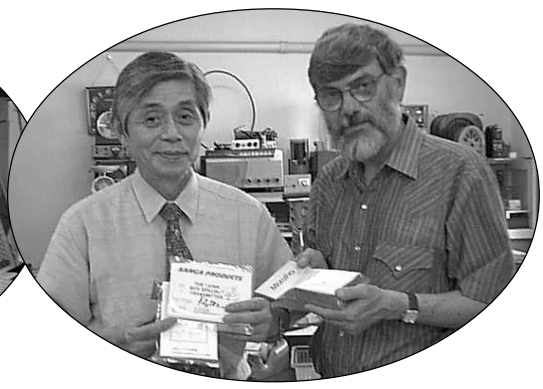
JH1FCZ took me to visit the Mizuho Tsusin Company and its owner and founder T Takada, JA1AMH. UK radio amateurs will know Mizuho from some of their products, which have been retailed here from time to time. Currently, the main products that we know about in the UK are the hand-held QRP SSB transceivers imported by Waters and Stanton PLC. Mizuho produce quite a range of amateur radio items including some kits, many of them unknown to UK radio amateurs.

A 7MHz QRP CW transceiver, with built-in keyer, by JA2ESR.

Members of the G QRP Club may recall the SG-9 board which the club sold in the 1980s. This was a 9MHz SSB processing module, which contained all that was necessary to receive and generate a 9MHz SSB signal. These boards formed the basis of many home constructors' first attempts at building an HF SSB transceiver. I once wrote a series of articles for the old-style *Short Wave Magazine*, with G3ROO, about SSB construction for the HF bands, based on these boards.

JA1AMH showed me around the company's premises, a compact but tightly filled building which contained everything required to produce and sell their products, including his secretary armed with an abacus. After green tea and cake, I was shown the company's small museum, an exhibition of their products and prototypes. The one thing I could not find was an SG-9 board, and JA1AMH explained that they did not have one. I had an unused SG-9 so, on my return home, I posted the board to complete the Mizuho museum's range. ♦

The workshop at the FCZ Labs.



JA1AMH, founder and owner of Mizuho, with G3RJV.

SWL

BOB TREACHER, BRS 32525
93 Elibank Road, Eltham, SE9 1QJ
E-Mail: brs32525@compuserve.com

MILLENNIUM greetings to all short wave listeners! As this issue will be arriving prior to the holiday period, a very Happy Christmas, too.

M2000A

AS THIS IS received, there will only be a few days before the special Millennium station, M2000A, hits the airwaves. I hope that many listeners log the station and apply to me for the DXpedition-style QSL card and that they will also qualify for one of the three special M2000A Operating Awards. Check the M2000A website (www.qsl.net/m2000a) for more details, or send a stamped addressed envelope for a copy of the rules to the Awards Manager, who is my daughter, Clare, RS102891. The certificates will definitely be a collectable item, especially the one for hearing M2000A either side of the new Millennium.

THE 21st CENTURY

SO, WHAT WILL the new Millennium bring? Good band conditions for the first few years, I hope, with some superb DX to be had on 50MHz. Conditions in late October and early November this year provided an appetising foretaste. The SSB leg of CQ Worldwide gave some excellent conditions on 28MHz. I have reports of up to 167 DXCC entities being logged, and Karl Drage, RS174461, managed DXCC on the band in only 3 hours 54 minutes! Did anyone better that?

While 28MHz was in superb shape, 21MHz was disappointing, as almost everyone was on 28MHz bagging all the fine DX! 14MHz was also in good shape, yielding over 130 DXCC entities. Once again, 7MHz gave the vigilant over 100 countries. As was to be expected at this stage of the sunspot cycle, 3.5 and 1.8MHz did not live up to their former glories.

Logs were still being received for the CQWW SWL Challenge at the time of compiling this month's page but, the leading scorers were all British: Single Operator: GW-5218; Multi-Single: RS88568; and Multi-Multi: RS178500.

SWARL Annual Countries Table

Here are the SWARL annual HF countries all-modes scores at 1 November. SSB, CW, RTTY, SSTV, Hellscheiber and PSK31 scores can also be viewed at http://www.swl.net/rs174461/scores.htm

HF BANDS - ALL MODES

Callsign	160m	80m	40m	30m	20m	17m	15m	12m	10m	9 Band	All Bands
BRS25429	63	139	178	0	238	160	217	165	209	1369	277
GW-5218	53	144	181	0	241	160	212	152	195	1338	261
RS174461	64	106	124	67	202	103	186	131	196	1179	251
BRS32525	61	73	103	0	91	96	71	143	74	712	217
F-11556	39	52	102	0	138	89	128	66	140	754	204
DE1UCS	8	24	41	28	55	52	90	37	42	377	169
F-15452	2	29	89	0	89	16	54	12	17	266	141
BRS31976	57	57	23	1	59	24	63	20	32	336	140
OE-20272	6	9	1	0	5	0	2	0	0	23	19

RADIO PORTAL

MY ATTENTION has been drawn to a new selective search engine especially for radio amateurs and shortwave listeners. You can do a 'search in depth' (if you know exactly what phrase to search for) or you can do a 'search in broad' by combining given categories. Categories which may be of special interest are 'Amateur Radio', 'SWLing', 'DXpeditions and Contests', 'Awards and Diplomas' and 'QSL Information'. If you are on the Internet, try http://www.radio-portal.org

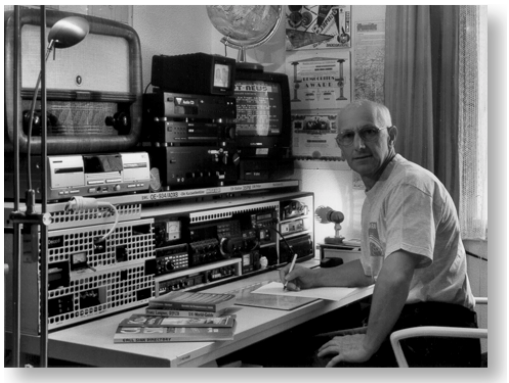
NEW YEAR CONTEST

EVERY YEAR, the SWL Group of VERON (the Dutch Society) organises a New Year's Contest for SWLs. Lambert Wijshake, NL-10175, has sent us the rules in the hope of attracting some British interest.

1. The date of the contest is Sunday 2 January 2000.
2. The idea is to log stations for any three-hour period between 0000 UTC and 2400 UTC on 80 or 40m SSB only.
3. Only three stations from each DXCC country will count for points. The first station heard from each country counts 5 points, the second station 3 points and the third station 1 point. The maximum score for every DXCC country is therefore 9 points.
4. Example of a log sheet:

Time	Band	Station	Working	R/S	Pts.
0600	40	ON6NL	ON6MP	5-9	5
0600	40	ON6MP	ON6NL	5-9	3
0615	40	PA0MPM	DL7LD	5-9	5
0615	40	DL7LD	PA0MPM	5-9	5
0620	80	PA2SWL	LY2BUG	5-9	3

5. The winner of this contest will receive a plaque or a trophy.
6. Logs must be sent before 22 January 2000 to the contest manager: Lambert Wijshake, NL-10175, Kattedoorn 6, 8265 MJ-Kampen, Netherlands. Logs can also be sent by e-mail to lambert.wijshake @wxs.nl in *Word* or *Excel* formats only.



Peter Weissengruber, OE-934/ADXB, in his tidy station.

SMC SWL Contest

HERE IS THE information regarding the International SWL contest organised by South Midlands Communications Ltd - lower frequency bands - year 2000. **Please read the rules very carefully. Times and points-scoring have been changed. It is not expected that there will be any further changes in the next three to four years.**

Rules

1. The contest runs from 1600 UTC on 15 January 2000, to 1000 UTC on 16 January 2000.
2. The contest is open to all SWLs throughout the world. There will be three sections.
   1. Single Operator Phone.
   2. Single Operator CW.
   3. Novice licence holders.

   NB: No mixed-mode entries are allowed.
3. The following bands are to be used - 40, 80 and 160m.
4. The object of the contest is to log a maximum of **10** stations on each band in as many countries as possible. Scores will be compiled as follows. (a) 40 and 80m only: countries outside one's own continent score **5** points for each station heard; a bonus of **10** points is given for each new country heard; all other countries score **1** point for each station heard plus a bonus of **10** points for each new country. (b) 160m only: countries outside one's own continent score **10** points for each station heard, plus a bonus of **20** points for each new country heard; all other countries score **5** points for each station heard, plus a bonus of **20** points for each new country heard. The final score will be the total of all three bands.
5. Each call area of Canada, Japan, Australia and New Zealand will count as a separate country, ie:- VO1, VO2, VY1, VY2, VE1-9, JA1 to JA0, VK1-VK8, ZL1-ZL4. All other countries will be determined by the ARRL Countries List.
6. No CQ, QRZ or similar calls will be allowed to count for points. Aeronautical- and Maritime-Mobile stations are not to be included in the entries.
7. Log sheets must show the following columns:-Date, Time (UTC), Station Heard, Station being Worked, RS(T) at SWL QTH, Bonus Points, Total Points. If both sides of a QSO are heard, each may be claimed as a separate station. The callsign will appear in the 'station heard' column for each band. Logs should be submitted for each band and should be on separate sheets. Another sheet, listing all the countries heard on each band, should also be included. Penalties will be imposed otherwise.
8. Entries should be sent to the Contest Manager Mr David A Whitaker, BRS 25429, c/o 57 Green Lane, HARROGATE, North Yorkshire, HG2 9LP, UK. Entries to be postmarked no later than 14 February 2000.
9. A trophy, suitably engraved with the winner's name, will be presented to the winner of each section, provided there are more than six entries in each section. Certificates of Merit will be awarded at the discretion of SMC, and its decision will be final.
10. For a copy of the results, please send a large SAE. Contest stationery is available, and it includes declaration and station-logging forms. Again, a large SAE is needed. Computer-generated entries will be accepted with the declaration form.

CORRECTION

THE MAILING address for the 28MHz SWL Challenge logs was not quite right in November's *SWL*. Franck Parisot's full address is P O Box 6, 92173 Vanves cedex, France. ♦

LF

DAVE PICK, G3YXM
178 Alcester Road South, Kings Heath, Birmingham B14 6DE.
E-mail: lf.radcom@rsgb.org.uk

THINGS HAVE been pretty busy on LF over the last few months, with many new 'firsts' being added to the tally. Some good conditions and a relative lack of static have helped. Portable stations have been active from GI and GD, and the SM's have made an impressive entrance. There are now at least three SMs on 136kHz, the most active being SM6PXJ, who has worked into G, GM, GW, HB9, I, OH and ON, all in a very short time. Christer's aerial, shown in the photograph, is made of metal ventilation pipe of 160mm and 60mm diameter, with top loading wires.

'LF' CONVENTION

THE HF CONVENTION at Windsor in October was well attended by LF operators. There were representatives from Germany, Holland, USA, etc. The LF forum discussed the subject of bandplans (more later!) and I was very proud to be presented with the Nevada Cup. Thanks to those who nominated me.

A session of special LF interest was given on DDS VFOs by G0MRF, and another by N4ICK chronicled the last few months of LF experimentation in Virginia. An LF station was set up, using the GB4RS call, by David, G0MRF, and Graham, G3XTZ, which had some success on both 136 and 73kHz. On 136kHz they made history by being the first G station to work OK on LF, having a slow-CW QSO with OK1FIG. They couldn't use the GB4RS call on 73kHz, but did manage a couple of QSOs using G0MRF's call. The longest distance (78km) was to Peter, G3LDO, after David did a quick heart-transplant on the transmitter!

BANDPLAN

THE VEXED SUBJECT of a bandplan for 136kHz keeps coming back. There are many local considerations but, in general, this is the consensus.

135.7 to 136.0kHz, unused area; use for tests, beacons etc.

136.0 to 137.4kHz, CW working area; try to keep at least 200Hz away from other QSOs.

137.4 to 137.6kHz, data modes such as PSK31.

137.6 to 137.8kHz, slow-CW.

This is not mandatory, it is just a suggestion. If the only crystal you have falls in the wrong part of the band, don't be afraid to put out a call. I don't want to discourage anyone from coming on!

PSK31 ETC

VARIOUS DATA MODES such as slow-hellschreiber and clover have been suggested for LF use, but the only one used by more than a couple of stations so far is PSK31. In order to encourage use of these interesting modes, perhaps we could connect our PCs to our radios on a Wednesday evening at 2000 UTC and listen around 137.5kHz for others of like mind?

137.0kHz

THE MYSTERY SIGNAL at 137.0kHz has been identified definitely as CFH, a Canadian Navy station near Halifax, Nova-Scotia. This data signal was heard at very good signal strength in the early hours last winter. The station has an ERP of about 5kW and it will be a good indicator of trans-Atlantic conditions.

SM6PXJ's aerial.

WHICH RECEIVER?

I HAVE BEEN collecting comments about the suitability of various transceivers for LF reception. No objective measurements have been made, but some sets are reported as "good" more often than others. The latter-day Kenwoods; TS-50, -450, -850, and -950 all seem to perform well. Next most popular are various Icoms, with a general proviso that they need about 10dB more gain on LF. Unfortunately, the IC-746, which otherwise performs quite well, has a strong birdie in the middle of the 136kHz band. Surprisingly, not many operators are using Yaesu sets, although I did get good reports of the FT-990. I'll have to persuade Peter Hart to check LF performance when he does future reviews!

100 YEARS OF GERMAN MARITIME RADIO

I RECEIVED this information about the Deutscher Wetterdienst (German Weather Service) LW transmitter at Pinneberg near Hamburg. 'The Deutscher Wetterdienst is to transmit - in cooperation with MF-Runde - a special broadcast to the public with its longwave transmitter DDH47 on 147.3kHz in Morse code. Short messages in different languages are transmitted in remembrance of the inventors of wireless radio. Additionally, we want to find out what are the longwave propagation conditions during night-time and with different levels of emitted power. The times are, 2230 UTC on 14 January and 11 February, with powers of 1 to 15kW. Reception reports (RST), with name of the pioneer mentioned in the transmission, your address and IRCs (Europe 2, overseas 3) should be sent to: Deutscher Wetterdienst, Amateurfunkgruppe, Bernhard Nocht Str. 76, D 20359 Hamburg, Germany. We will send a special certificate. The deadline is 31 March 2000.'

Y2K, 73K!

AS WE LOOK forward to a happy and prosperous new year, there is a tinge of sadness. The 73kHz band, the first LF allocation for most of us, will cease to be available in June 2000. I hope to be able to have some more QSOs on the band before then. Let's make it a new year resolution. ♦

G3RCQ t/a RIGS OF DISTINCTION
I BUY, SELL & EXCHANGE

Items for sale:- For a complete list please visit www.g3rcq.co.uk or send s.a.e.

ACCESSORIES

NIR-10 DSP FILTER EXCELLENT	£125
MFJ-781 DSP FILTER	£80
OPTO LYNX RS-232 INTERFACE	£70
SGC POWERCLEAR DSP FILTER (NEW)	£275
TIMEWAVE DSP 5992X THE BEST	£225
6M MODULE FOR YAESU FT767	£150

ANTENNAS

KR-500 ELEVATION ROTATOR	£150

ATU'S

AC-38M ATU BOXED	£65
GLOBAL AT-1000	£65
KW-107 SUPERMATCH	£125
MFJ 962C 1.5KW	£125
OWNER	£225
MFJ-971 200W CROSSED NEEDLE ATU	£65
YAESU FC-700 ANTENNA TUNER	£100
YAESU FC-902	£125
YAESU FR 7700 ACTIVE ANT AS NEW	£60

TRANSCEIVERS

ICOM IC-735 BOXED	£425
ATU	£695
MFJ-9420 20M QRP TRANSCEIVER	£135
MFJ-9406X 6M SSB TRANSCEIVER	£165
PALSTAR KH6 + EXTRAS	£100
TRIO/KENWOOD TS-530S BOXED	£295
TRIO/KENWOOD TS-830S	£350
TRIO/KENWOOD TS440SAT	£395
STATE	£295
YAESU FT-690R MK2 + NI-CADS	£275
YAESU FT-840 HF TANSCEIVER	£495
YAESU FT-890 HF TRANSCEIVER	£550
YAESU FT101EE	£150
YAESU FT77	£250

LINEARS

500WATTS	£475
MICROWAVE MODULES MML 144/30LS	£50
TOKYO HL-60U 70CMS LINEAR	£65
YAESU FT-6020 6M LINEAR	£95

PACKET

KAM TNC WITH UPGRADES	£150
KAM+	£195

RECEIVERS

AOR 3000A HF RECEIVER/SCANNER	£495
ICOM IC-R71E	£295
TRIO/KENWOOD R-5000 THE BEST?	£550
TRIO/KENWOOD R-2000 + VHF	£325
YAESU FRG-100 AS NEW	£295
YAESU FRG-7700	£195
YAESU FRG-8800	£275
YAESU FRG-9600 WITH HF	£195
YAESU FRG7700 PLUS MEMORY UNIT	£250

SCANNERS

AOR AR-2002 BASE SCANNER	£150
ICOM IC-R1	£120
ICOM IC-R10 RECEIVER	£225
UNIDEN UBC-3000XLT BOXED	£150
YUPITERU MVT-7000 SCANNER	£125

TRANSVERTERS

MUTEK TVHF230C 2M IN ALL HF OUT	£175
TOKYO HX-640 6M TO	£150

70 CMS TRANSCEIVERS

ICOM IC-820 2/70 MULTIMODE	£625
ICOM IC-W21E DUAL HAND HANDIE	£160
KENWOOD TS780 2/70 MULTIMODE	£350
TRIO/KENWOOD TH-78E DUAL BAND MULTI	£175
	£200
YAESU FT-2700RH 144/432 FM MOBILE	£225
YAESU FT-470R DUAL BAND HANDIE	£130
MULTIMODE	£395
MULTIMODE	£550
YAESU VX-1R 2/70 FM	£165

144 MHZ TRANSCEIVERS

AKD 2001 25W 2M FM MOBILE	£95
ALINCO DR-112 144MHZ MOBILE	£135
OWNER	£495
TRIO/KENWOOD TH-22E	£125
TRIO/KENWOOD TM-221E	£145
YAESU FT-208R + NC8 BASE CHG	£60
YAESU FT-290R MK1	£150
YAESU FT-290R MK2	£225

D.L. Cole, 9 Troopers Drive, Harold Hill, Romford, Essex RM3 9DE
Tel: 01708 374043 Office: 07956 854947 Email: g3rcq@easynet.co.uk
Callers strictly by appointment. Open daily 9am-8pm

COLOMOR (ELECTRONICS) LIMITED

Unit 5, Huffwood Trading Estate
Brookers Road, Billinghurst, West Sussex RH14 9RZ
Tel: 01 403 786 559 Fax: 01 403 786 560
Email: sales@colomor.demon.co.uk

SEE OUR NEW WEB PAGE AT: **http://www.colomor.demon.co.uk**

VALVES

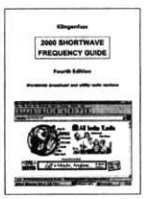
AR8	£7.00	ECLL800	£29.00	UCL82	£2.00
ARP3	£4.60	EF37A	£5.60	UF41	£3.25
ARP4	£5.40	EF39	£2.00	UF42	£2.50
ARP12	£3.55	EF42	£5.25	UL41	£14.10
ARPT2	£7.65	EF80	£2.35	UL84	£4.50
ATP4	£3.55	EF86	£5.10	UM80	£4.70
AZ31	£7.05	EF91	£2.00	UM81	£5.50
CL33	£14.00	EF92	£2.00	UY21	£3.80
DAF91	£2.00	EF183	£2.00	UY42	£4.20
DAF96	£2.00	EL32	£2.00	UY85	£2.00
DF91	£2.00	EL34	£7.10	5R4	£7.20
DF96	£3.50	EL41	£4.75	5U4G	£5.80
DK91	£2.00	EL81	£2.80	5V4G	£3.20
DK96	£3.55	EL84	£2.50	5Y3GT	£3.55
DL91	£2.00	EL86	£3.80	5Z4	£4.20
DL96	£2.70	EL95	£2.00	6AU6	£2.40
EB91	£2.00	EM34	£21.00	6BA6	£2.00
EBF89	£2.00	EM80	£3.40	6BE6	£2.00
EBL1	£5.80	EM81	£4.70	6K7G	£2.05
EBL21	£4.80	EM84	£2.10	6K8G	£2.85
EBL31	£11.75	EM85	£5.25	6L6GTC	£2.95
ECC81	£2.50	EM87	£3.60	6Q7	£3.00
ECC82	£2.90	EZ41	£2.35	6SL7	£2.75
ECC83	£3.90	EZ80	£4.70	6SN7	£4.20
ECC85	£3.50	EZ81	£7.00	6X4	£2.35
ECC88	£2.35	EZ90	£2.00	6X5GT	£2.65
ECC91	£2.00	GZ32	£4.00	12AT7	£2.50
ECC189	£2.00	GZ34	£4.05	12AU7	£2.90
ECF80	£2.50	UAF42	£3.50	12AX7	£3.90
ECF82	£2.00	UBC41	£3.80	12BH7A	£18.35
ECH35	£2.60	UBL21	£5.75	12BY7A	£7.35
ECH42	£2.00	UCC85	£3.00	12E1	£12.00
ECH81	£2.50	UCH21	£5.20	572BMP	£75.00
ECL82	£3.00	UCH42	£4.70	807	£4.80
ECL86	£3.00	UCH81	£2.00	811A	£13.80

Price is per valve and includes VAT. Carriage (UK only)
1-3 Valves £2.00 4-6 Valves £3.00 7-10 Valves £4.55
Many other types not listed in stock. Please telephone for an instant quote.

New books and CDs for worldwide radio!

2000 SUPER FREQUENCY LIST CD-ROM
worldwide broadcast and utility radio stations!

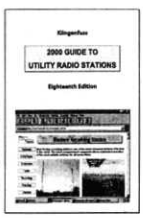
10,500 entries with latest schedules of all clandestine, domestic and international broadcasters on shortwave. 11,000 frequencies from our *2000 Utility Radio Guide*. 17,000 formerly active frequencies. All on one CD-ROM for PCs with Windows™ 3.1 or Windows™ 95/98. You can search for specific frequencies, countries, stations, languages, call signs, and times, and browse through all that data within milliseconds. It can't get faster and easier than this! · EUR 30 = £ 22 (worldwide postage included)



2000 SHORTWAVE FREQUENCY GUIDE

Simply the most up-to-date worldwide radio handbook available today. Really user-friendly and clearly arranged! Contains more than 20,000 entries with all broadcast and utility radio stations worldwide from our *2000 Super Frequency List on CD-ROM*, and a unique alphabetical list of broadcast stations. Two handbooks in one - at a sensational low price! 564 pages · EUR 30 = £ 22 (worldwide postage included)

2000 GUIDE TO UTILITY RADIO STATIONS



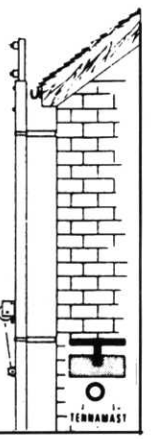
Now includes hundreds of informative new screenshots of modern digital data decoders. Here are the really fascinating radio services on shortwave: aero, diplo, maritime, meteo, military, police, press, and telecom. 11,000 *up-to-date* frequencies from 0 to 30 MHz are listed, plus abbreviations, call signs, codes, explanations, frequency band plans, meteo/NAVTEX/press schedules, modulation types, all Q and Z codes, and much more! 612 pages · EUR 40 = £ 28 (worldwide postage incl.)

Special package price: CD-ROM + Shortwave Frequency Guide = £ 35. More package deals available on request. Plus: Worldwide Weather Services = £ 22. Double CD Recording of Modulation Types = £ 35. Radio Data Code Manual = £ 28. Radiotelex Messages = £ 15. Shortwave Communication Receivers 1942-1997 = £ 35. WAVECOM Digital Data Decoders = the # 1 worldwide: ask for details. Sample pages and colour screenshots can be viewed on our comprehensive Internet site (see below). Payment can be made by cheque or credit card - we accept American Express, Eurocard, Mastercard and Visa. Please ask for our free catalogue with recommendations from all over the world! ☺

Klingenfuss Publications · Hagenloher Str. 14 · D-72070 Tuebingen · Germany
Internet http://ourworld.compuserve.com/homepages/Klingenfuss
Fax 0049 7071 600849 · Phone 0049 7071 62830 · E-Mail klingenfuss@compuserve.com

Best seller ... the bargain priced

Adapt-A-Mast



★ Lifts to 25ft ★ Wall mounting
★ Complete with all brackets, cable and winch
★ Accepts 2in stub mast ★ Adaptable to tilt-over
★ Hot dip galvanised to BS729
★ Simple four bolt installation
Many other mast types available

Call 01505 503824
www.tennamast.com

NQA ISO 9001 REGISTERED COMPANY

TENNAMAST SCOTLAND LTD
81 MAINS ROAD
BEITH, AYRSHIRE KA15 2HT
Email: NBROWN@tennamast.com
For Benelux Countries contact
Doeven Elektronika – Tel: + 31 528 269679

VISA Also Eurocard

G.W.M. RADIO LTD

40/42 PORTLAND ROAD, WORTHING, WEST SUSSEX BN11 1QN
Tel: 01903 234897 / 235913 Fax: 01903 239050
e-mail gwmradio@cheerful.com website http://www.bcity.com/gwmradio/
May we wish all of our customers past and present a Happy New Year

SEW (STANDARD) CLAMP on ammeter model ST 300 6-300 amps in 5 ranges with volts and continuity new and boxed **£20**

EX MoD MORSE KEYS type Key WT 8 amp, similar to the 19set type key but not cased ..... **£7.50** each or 3 units for **£20**

BACK IN STOCK! Military style wrist watches, sweep secondhand, black face, luminous webbing strap **£40**

PHILIPS PR710 high band 12.5khz synthesised hand helds 5w, supplied with charger and ni-cad battery **£25**

BACK IN STOCK! Ex-Bundeswehr Steiner binoculars 8x30 magnification, as new condition **£125**

PYE M296 UHF 1 ch, complete with mic/ls **£30**

PYE MX294 (hi-band) 12v synthesised mobiles, 16/32 channel, supplied with alignment info and eprom supplier **£38**

PYE/PHILIPS MX293 low band am 16 channel, supplied with mic l/s and bracket and prom details **£30**

AIRLITE 62 head/mic sets, good used condition, 600 ohm mic **£20**

Unissued (boxed) microphones no 16 for W/S no 18 complete with the 4 pin plug ..... 2 units for **£18**

5 x PYE/PHILIPS MX294 16/32 ch hi-band fm for 2m etc, complete **£150**

10 x PYE/PHILIPS M293 low-band am 6 ch sets only **£85**

10 x MOTOROLA MC80 hi-band fm 6 ch with mic and l/s **£150**

IOTA

ROGER BALISTER, G3KMA
La Quinta, Mimbridge, Chobham, Surrey, GU24 8AR
E-mail: iota.hq@rsgb.org.uk

WINNERS OF the three new IOTA trophies awarded for DXpedition performance in 1998 were announced at the RSGB HF & IOTA Convention at Windsor in early October. The trophy for the 'Most Courageous IOTA DXpedition of 1998' was awarded jointly to Barry Bettman, KL7/K6ST, and Thomas Attwood, KL7/W6IXP, for their IOTA operations from Sledge Island (NA-210) and Little Diomede Island (NA-150) in western Alaska. This indomitable duo had to contend with appalling weather conditions and other frustrations, but struggled through to activate successfully two very difficult islands.

The trophy for the 'Most Outstanding IOTA DXpedition of the Year in the areas of Africa, Asia and Europe' went to the Chinese Radio Sports Association (CRSA). The citation read: 'In recognition of the strong support, assistance and encouragement given to Chinese radio amateurs in mounting successful first time IOTA operations, using the special BI prefix, from islands in six Chinese Provinces, IOTA groups AS-134 to AS-139, during the year'. The IOTA Committee has also awarded Premier IOTA Award Plaques to Alan Kung, BA1DU, and Yang De Hao, BA7JA, for their efforts in mounting these operations.

The third trophy, that for the 'Most Outstanding IOTA DXpedition of the Year in the area of North America, South America and Oceania', was awarded to Jim Smith, H40AB. Jim, better known to most of us as VK9NS, was not satisfied just to put on the Temotu Islands as a new DXCC counter, but did it from Pigeon Island in the very rare Reef Islands group (OC-065). Operating alone, he notched up a massive 15,800 contacts.

Congratulations to all the winners and our appreciation to all IOTA expeditioners. Without their efforts, IOTA would not be the popular award programme that it is today. Details on how to vote for the 1999 DXpedition winners will be published soon.

IOTA IN CHINA

NEWS OF THE award to the Chinese Radio Sports Association clearly delighted the key IOTA players in China. They tell us how much it will help to promote awareness of IOTA throughout their country and, consequently, to increase IOTA activity. While it is nice to hear this, we must be the first to acknowledge that it is the Chinese amateurs themselves who have given IOTA such a high profile. During the last two years, they have systematically targeted ten IOTA groups for a DXpedition and, one by one, have seen these events through to successful conclusions. The last such DXpedition, BI7Y in September, was to the remote Xisha Archipelago in the South China Sea, shown on most maps as the Paracel Islands, hundreds of miles south of the mainland and half way to Scarborough Reef. The story of this eventful operation will appear in the next IOTA column.

IOTA MILLENNIUM PROGRAMME

NO APOLOGY for mentioning again this exciting programme. A list of the regularly-activated island groups counting for premium points for January/February 2000 is shown top right.

Full details of the programme can be found on the CDXC web site (http://www.cdxc.org.uk). For those who would like details but do not have Internet access, please refer to the *RadCom* IOTA column of September 1999, page 68.

ANNUAL UPDATE

IOTA MEMBERS are reminded that the last date for mailing applications or updates to checkpoints for the 2000 Honour Roll and Annual Listings is 1 February 2000. Updates postmarked after that date will be processed in the normal way, but the scores will be held over to the following year's listing.

IOTA MANAGER'S NEW WEB SITE

FOR THE LATEST official IOTA news, try http://www.eo19.dial.pipex.com /index.htm It is still under construction and will be fully integrated into the IOTA Committee's existing site (http://www.logiciel.co.uk/iota/) when this is further developed.

Finally, I should like to thank Neville, G3NUG, for his work in developing this column over the last three years and for his wider efforts on behalf of the IOTA Programme. It may not be generally known that Neville was greatly involved with the design and development of the IOTA computerised database, on which we have now come to rely so heavily, and on promotional work which has borne much fruit. Thank you, Neville. ♦

http:// www.logiciel.co.uk/iota/
http://www.eo19.dial.pipex.com/index.htm

RSGB IOTA Programme, PO Box 9, Potters Bar, Herts EN6 3RH

IOTA millennium programme regularly activated islands counting for premium points in January and February 2000

JANUARY 2000

OC-004	VK9L	Lord Howe Island
OC-005	VK9N	Norfolk Island
OC-010	V63	Pohnpei Islands
OC-011	V63	Truk Islands
OC-016	3D2	Vanua & Viti Levu Is
OC-028	V73	Ralik Chain
OC-031	C2	Nauru
OC-032	FK	New Caledonia Island
OC-035	YJ	New Hebrides
OC-036	ZL1/2	North Island, NZ
OC-047	H44	Solomon Islands
OC-049	A3	Tongatapu Group
OC-064	A3	Vava'u Group
OC-134	ZL3,4	South Island, NZ

FEBRUARY 2000

AS-007	JA1etc	Honshu Island
AS-017	JA6	Okinawa Arch
AS-018	UA0F	Sakhalin Island
AS-020	BV	Taiwan
AS-031	JD	Ogasawara Arch
AS-076	JA5	Shikoku Island
AS-077	JA6	Kyushu Group
AS-078	JA8	Hokkaido Island
OC-001	VK	Australia
OC-006	VK7	Tasmania
OC-012	V63	Yap Islands
OC-026	KH2	Guam Island
OC-034	YB9,P2	New Guinea
OC-042	DU1-4	Luzon Group
OC-086	KH0	Northern Marianas
OC-130	DU8,9	Mindanao Group
OC-146	YB8	Sulawesi Islands

NEW REFERENCES

AS-143	China: BY7	Xisha Archipelago (Paracel Is)
OC-230	Australia:VK9	Western Australia Outliers, Rowley Shoals

STANDARD

Undoubtedly the best selling
Dual band handheld on the market!

Have you purchased yours yet?

£99 inc VAT

available now!

Standard CPB510

Size 150mm(W) x 31mm(H) x 170mm(D)

50 Watt booster

RRP £299
Now..£100 inc VAT

Standard C510

A full featured, pocket sized handheld that can be transformed into a powerful mobile too! The C510 and accessories provide a top performance mobile with the convenience of a high specification handheld.

- Dual band - 144 & 430MHz
- 1Watt high power 300mW low power
- CTCSS encode/decode
- 1750Hz tone burst
- Wideband receiver with AM
- 200 memories
- Extensive scan functions
- DTMF paging function
- Cross band operation
- Large backlit LCD display
- Powered by 3 AA batteries
- Size 58mm(w) x 104mm(H) x 27mm(D)
- Extensive range of accessories including the CPB510 50Watt mobile booster

Dual -Band!

All accessories and equipment now stocked - Visit our web site http://www.standard-comms.co.uk/c510htm

STANDARD

As a result of huge demand we are excited to a announce the return of the..

C156E

Features include:-
2 meter band transmit
5 watts output
Wide band receive (135-174MHz)
100 memory channels
CTCSS encoder
1750Hz tone burst
Alpha numeric dot-matrix display
Plus too much to list..

We also now stock other models of Standard brand amateur radio equipment. For further details including a list of our extensive range of accessories, please visit our web site.

www.standard-comms.co.uk
or telephone sales on:-
0181 236 0032

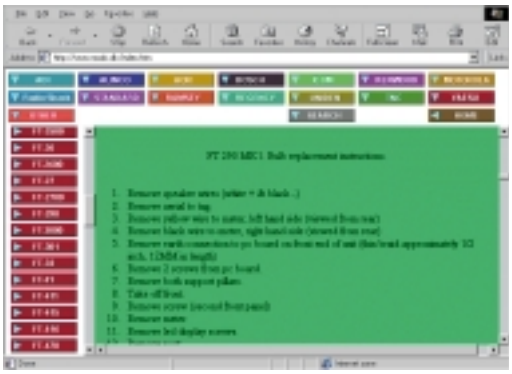
~~RRP £199~~

Now just

..£69 inc VAT

WWW

ANDY GAYNE, G7KPF
119 Lower Lickhill Road, Stourport on Severn, DY13 8UQ. E-mail: www.radcom@rsgb.org.uk



More mods than you can shake a stick at - mods.dk

IPS, an Australian view of HF propagation and space weather

THE INTERNET is frequently accused of being a threat to amateur radio, mainly because of the reliable worldwide communications that it makes possible. It is my belief that this is a misconception, often put forward by people who have never experienced Internet-based communication. In fact, the communication systems available via the Internet can be excellent tools for the amateur radio operator, e-mail being the most recognisable and widely-used. Real-time communications systems are also increasing in popularity, and these, too, can complement amateur radio operations. For example, anyone who enjoys building and using experimental equipment or working difficult long paths could make considerable use of a completely reliable yet low-cost talk back system.

FIRETALK

THERE ARE numerous voice-communications packages available for use across the Internet, but one that I have found to work well is called *Firetalk*, which can be easily downloaded and installed from the *Firetalk* web site [1]. *Firetalk* is a free software package that permits one-to-one conversations using the microphone and speaker facilities of your computer's sound card. The system works by building a contact list of known users, who can then be 'called' whenever they are on-line. Conversations are full-duplex, although there is usually a significant transmission delay so simplex-style exchanges tend to be easier to follow. The sound quality is remarkably good, with the software buffering the incoming data stream to produce continuous speech most of the time. Dropouts seem to occur only when there is severe system congestion. Best results are obtained when a headset-type microphone is used, and hands-free operation is possible thanks to a built in VOX control.

Additional features of *Firetalk* include the ability to join a 'Forum', where like-minded individuals can have group conversations on any subject, and text-messaging that allows you to supplement your conversations with unambiguous information, such as web URLs. The Forums can be free-access, moderated or password-protected, and any type of Forum can be set up by any user, giving full control over who may or may not join. It is easy to see how Forums would be an ideal way for special interest groups to get together on a regular basis to plan and discuss their on-air activities.

Voice over the Internet is still in its infancy, and currently has an 'amateur radio' feel about it. Software such as *Firetalk* is constantly improving though, and whilst it will never replace amateur radio as a hobby it does make cheap, reliable long-distance communication a possibility.

MORE ON MODIFICATIONS

AFTER READING the reviews of modification sites in previous editions of this column, Barry Kirkwood, ZL1DD, sent in a recommendation of what must be the ultimate collection of radio modifications available on the web. The plainly-titled 'www.mods.dk' web site [2] is a comprehensive collection of over 1400 modifications, improvements and maintenance tips for more than 400 models of radio and ancillary equipment. The eclectic nature of the mods.dk site is clearly indicated by the contributors' list, which presents names of almost fifty different amateurs worldwide who have sent in modifications to the page author.

This frame-enabled site presents modifications from all of the familiar equipment manufacturers, as well as some which are not so common. All are presented in a straightforward and easy-to-navigate fashion. Selecting a manufacturer from the main menu bar will list, in a frame down the left-hand side of the screen, all the models covered. Selecting your model of interest will display, in the main frame of your browser window, all the available modifications. The modification information is mostly textual and uncluttered by superfluous graphics, making it very quick to download and easy to print out for future reference. An efficient search facility, based on keywords, is available to find modifications. For example, entering 'bulb replacement' returns a reference to the page which covers the perennial FT-290R problem.

The latest VHF contest information supplied by VHFCC

ACROSS THE SPECTRUM

IN THE PAST I have mentioned that I was not aware of a site concentrating on VHF contests. Andy Cook, G4PIQ, has kindly reminded me of the Blacksheep Contest Group web pages which host the official pages of the RSGB VHF Contest Committee [3]. Here you will find just about everything you need to know about contests at VHF and above, including results, rules, the contest calendar and current holders of all the RSGB trophies. Complementing a page giving a full description of how to submit your contest entry is a page of useful contest stationery, stored in Adobe Acrobat format for producing high-quality printed copies. A nice touch is the use of the browser message bar to give a scrolling display of the current month's contests. It is rare to see this browser feature used in such a useful manner.

For global space weather and HF propagation prediction information, David Whyborn, G4KIK, has recommended the Ionospheric Prediction Service web site [4]. Run by a branch of the Australian government, this colourful site presents a host of data in a relatively informal manner, and much of it is useful to amateur radio operators worldwide. There are pages for general solar and space weather, background information for Australian observatories, together with software and educational material for downloading. It is a refreshing change to see a site of this calibre and style set up by an official government agency; many others could learn a great deal from its example!

Finally, please note that my new RSGB e-mail address printed at the head of the November column was incorrect, and should have read: www.radcom@rsgb.org.uk Apologies for the error. ♦

REFERENCES

[1] http://www.firetalk.com (*Firetalk*)
[2] http://www.mods.dk (Radio Mods)
[3] http://www.blacksheep.org/vhfcc/ (VHF Contests)
[4] http://www.ips.gov.au/ (HF Propagation Predictions)

CONTEST

TIM KIRBY, G4VXE
11a Vansittart Road, Windsor SL4 5BZ
E-mail: contest.radcom@rsgb.org.uk

THIS MONTH, we have the first in what I hope will be an occasional series, where well-known contesters talk to us about a particular branch of contesting that is dear to their hearts. I hope you will find them interesting and thought-provoking. To begin, I asked Richard Marshall, G4ERP, if he would share some of his experiences in microwave contesting.

Contest: Richard, thank you for agreeing to talk to us about microwave contests. What are your favourite events of the microwave calendar and why?

G4ERP: Well, they're all good fun in different ways, but I think the 3cm cumulatives are my favourite because there's enough activity to keep you permanently busy. It's not just a case of calling CQ all day long. You really have to work at it. As the equipment is mostly homebrew, there's double the sense of achievement.

Contest: What sort of equipment do you need? Is it mostly home-made, or is there commercial gear available?

G4ERP: Transverters from 2m to the required microwave band are the norm. Many are built from kits, but completed units are available commercially. 23cm is slightly different as there have been commercial rigs for sale in the past - I'm thinking of the FT-736 in particular. As an example, a typical station on 3cm runs 1W to a 2ft dish with a 1.5dB noise figure on receive.

Contest: Activity seems to have grown dramatically on some of the microwave bands over the last ten years. To what do you attribute that?

G4ERP: Well, firstly, microwave operation is great fun. It's really the last stronghold of the homebrew enthusiast. There are several good, reliable, published designs. G3WDG and DB6NT in particular have done so much to help the cause. The RSGB's *Microwave Handbook* and the German *DUBUS* publications have a wealth of information. As a result, there's much more equipment around these days.

Contest: Do you make contacts directly on the bands, or is talkback on VHF/UHF needed?

G4ERP: Most contacts on the bands above 23cm are set up on 2m (some of the continentals use 70cm) so you need a good 2m station for talkback. It's not unusual for signals to be louder on 3cm than on 2m. After all, microwave power levels may be a lot lower, but the aerial gain is huge in comparison, and the propagation characteristics are different as well - just to add to the fun. 50W to a 2λ aerial is really the minimum talkback station. If you're getting serious, imagine you're entering the restricted section of the VHF NFD. That's the spec for your talkback station.

Most contest activity on the microwave bands is now on either SSB or CW - don't worry the CW is slow enough that even I'm comfortable with it. (My CW prowess is notorious!)

Contest: Can you give us any tips on finding a good site for microwave contests?

G4ERP: A difficult one. They're getting rarer. Trees are a big problem, as they tend to absorb microwave signals rather well. In the good old days, dishes on tripods were the *de facto* standard. Many of us now put our dishes up the mast along with the transverter and feed IF signals plus power up the mast. This allows signals to clear any local walls (we have lots of them in the Cotswolds!) and your own vehicle as well. If you're running high power, it's also better from the safety angle.

Contest: Thank you!

Web pages

AS I MENTIONED last month, the HF Contests Committee are now publishing claimed scores for RSGB HF events on their web pages. You can find the claimed scores for SSB Field Day 1999 on there at the time of writing. Note that when you enter the URL of the site http://www.g4tsh.demon.co.uk/HFCC the 'HFCC' bit *must* be in upper case, otherwise you'll get an error message.

Next month, we'll cover some reaction after the CQWW contests last autumn.

70MHz Cumulatives 1999

WHEN YOU GET a set of results like this, you begin to wonder if the Isle of Man was on the same planet as the rest of the entrants. Robert Ferguson certainly was, and turned in an outstanding set of scores from one of the best locations for 4m in the country. In contrast, third and fourth places in the open section were very closely fought with only 4 points separating John Lemay, G4ZTR, and Martyn Vincent, G3UKV. In the end, careful checking changed the order and widened the gap.

Pretty much everyone agreed that session 2 was the best of the bunch, and it is clear that activity is still good on 4m, and the entry to the event was larger than last year. David Edwards, G8NEO, in Cromer, was also QRV, but only heard signals in the last session and was unable to complete any QSOs.

David Dodds, GM4WLL, and Ross Wilkinson, G0WJR, both went out portable this year. Ross operated from five different sites to add a little variety to the event, while David tried to operate from his usual site each time, but couldn't make it right up the mountain during the fourth session. In fact, it was so windy that he couldn't even get the antenna more than five feet in the air, and that had to be in the lee of the car! Thanks to both of them for making the effort in the middle of winter.

Andy Cook, G4PIQ

70MHz Cumulatives 1999

Single Operator Fixed Section

Pos	Callsign	17-Jan	31-Jan	14-Feb	28-Feb	14-Mar	Norm	QSO	Loc	Pwr	Ant	km
1*	GD4GNH	10632	20615	15697	16208	12269	3000	219	74QD	160	2 x 6Y	543
2*	G3XDY	6697	6734	7192	8063	0	1586	140	02OB	150	6Y	579
3	G3UKV	5200	7293	5459	5668	5884	1323	179	82RR	100	5Y	454
4	G4ZTR	0	0	6010	6132	6072	1257	106	01KW	150	5Y	584
5	GM4AFF	2948	6709	5637	5460	4842	1091	65	86ST	150	7Y	673
6	G1OGY	0	6722	4357	5105	4709	1025	138	01GR	150	6Y	598
7*	G7UYP	2035	6546	4700	3795	3775	925	124	02AT	25	7LPY	473
8	G3NKS	3705	5515	4499	3512	0	903	132	81XU	100	6Y	552
9	G3TCU	3011	3734	3522	4061	0	759	113	91QE	150	6Y	526
10	G3ZJY	1280	3137	3394	2934	3252	663	93	90FR	50	4Y	433
11	G0GCI	1637	3887	2748	3634	2567	622	97	01ED	100	4Y	474
12	G0MJW	2395	3887	2312	2510	0	569	105	91JO	160	4Y	472
13	G4JTJ	0	0	2456	2155	3193	550	62	92SD	30	6Y	428
14	G3FIJ	1797	2674	1836	1674	1974	460	68	01KV	15	4Y	445
15	G4OUT	1371	1658	0	1483	1381	334	49	92AT	10	3CV	245
16	G4SJH	0	0	1621	1481	1259	298	41	91PI	10	3Y	407
17	G3VWH	382	2142	2031	988	0	295	35	82OQ	10	3Y	460
18	G7NBE	529	1102	1052	823	0	172	26	92GS	25	3Y	260
19	G0DVJ	287	771	145	282	578	112	19	01MX	24	Dipole	449
20	GW1SXT	0	617	0	0	0	30	9	81LQ	10	3Y	126

All Others Section

Pos	Callsign	17-Jan	31-Jan	14-Feb	28-Feb	14-Mar	Norm	QSO	Loc	Pwr	Ant	km
1*	G4RFR	4618	7735	8380	7817	7183	3000	216	90AS	100	12Y	672
2*	G4NOK	0	7614	3158	4938	6825	2567	101	93FR	150	6Y	348
3	GM4WLL/P	3616	5470	5634	574	3125	2163	77	85NR	20	4Y	626
4	G0WJR/P	1283	2432	3042	2374	2848	1074	91	81/91 /83	15	2Y/5CV	404

* Certificate winner

The presentation of the David Hill, G4IQM, trophy at the HF Convention, 1999. Shown from left to right are; Peter, G4ENA, John, G4PDQ, Hilary, G4JKS, and Richard, G4ERP.

1st 50MHz Backpacker 1999

EXCELLENT BAND conditions greeted the entrants for this contest. As one remarked 'it makes a nice change to work some good DX on 6m during a contest'. The weather was not kind to some stations, with heavy rain showers and the occasional thunderstorm to make life more difficult.

Thank you to all of the entrants who provided their logs on disk or via e-mail. All logs were re-scored to eliminate any scoring differences between logging programs. This also allowed a very thorough crosscheck of all entrants' logs to be undertaken. As is normal for Backpacker contests, the standard of logging was very high.

The usual crop of problems occurred during this contest. One station had to pack up early when the microphone stopped working. A replacement has been ordered for the next contest!

Congratulations to the winners and runners-up in each section, you will all receive certificates.

Ian Pawson, G0FCT

1st 50MHz Backpacker 1999

Multi Operator 10W

Pos	Group Name	Call	Loc	QSO	Multi	Points	Total	Best DX
1*	One Man & His Dog CG	G8NWM/P	IO92TR	25	23	15195	349485	EH1IB

Multi Operator 3W

Pos	Group Name	Call	Loc	QSO	Multi	Points	Total	Best DX
1*	Wythall CG	G1WAC/P	IO82XJ	43	19	11117	211223	9A1O
2*	Oldham RC	G1ORC/P	IO83XN	28	16	8150	130400	EH9IB

Single Operator 10W

Pos	Call	Loc	QSO	Multi	Points	Total	Best DX	km
1*	M0AFC/P	IO84VG	98	29	27755	804895	EH7KW	2647
2*	G8JAY/P	IO91AW	56	34	21644	735896	LZ2CC	2224
3	M0BAO/P	IO80LV	21	17	8674	147458	IE9/I2ADN	1856
4	M0BHE/P	IO80MU	13	12	7863	94356	IE9/I2ADN	1848
5	G4MPK/P	IO81RC	12	10	3248	32480	EH6SA	1329

Single Operator 3W

Pos	Call	Loc	QSO	Multi	Points	Total	Best DX	km
1*	GW0PZO/P	IO83ID	88	27	22300	602100	9A4U	1712
2*	GI7JYK/P	IO74BQ	32	29	20264	587656	IW0UIQ	2057
3	2C8ZRE/P	IO83JF	29	22	14125	310750	SP8PAI/P	1883
4	G4FAA/P	JO01AG	20	11	1442	15862	2C4BVY/P	228
5	G0FUW/P	IO81PH	12	6	1535	9210	EH3CQQ	1134

* Certificate winner

1st 1.3/2.3GHz Fixed 1999

THERE'S NOT MUCH to comment on, poor conditions, low activity and fewer entries than usual, with a number of 'regulars' missing. On the upside, 2.3GHz activity continues to grow.

Steve Thompson, G8GSQ

1st 1.3/2.3GHz Fixed 1999

1.3GHz Single Operator

Pos	Call	Pts	QSO	Loc	Pwr	Ant	Best DX	km
1	G3MEH	2480	20	91QS	100	2 x 35	PA3DYS	374
2	G8NEY	1977	15	81VK	150	55	DK5WO	580
3	G4THI	1705	14	93HC	100	35	G4GFI	215
4	G4GFI	1675	15	91VH	20	28QLY	G4THI	215
5	G4LDR	439	7	91EC	8	55	G8OHM	145

1.3GHz Multi Operator

Pos	Call	Pts	QSO	Loc	Pwr	Ant	Best DX	km
1	G8OHM	2414	20	92AJ	150	4 x 23	PA5DD	455

2.3GHz Single Operator

Pos	Call	Pts	QSO	Loc	Pwr	Ant	Best DX	km
1	G4THI	502	5	93HC	4	25	G6SPS/P	201
2	G8NEY	439	4	81VK	100	48QLY	G4THI	193
3	G3MEH	168	2	91QS	5	62	G6SPS/P	92

2nd 50MHz Backpacker 1999

ALMOST UNIVERSALLY, entrants commented on the lack of activity during this contest. Peter, GI7JYK, commented "band was flat, very flat! The only DX that was workable were those few stations who could be bothered to swing their beams north-west to GI!"

Some DX was about however. MI1DRU commented "an IK5 came up on our frequency and we nearly fell out of the back of the Land Rover - didn't get him though - there's always next year!" To compensate for the poor band conditions most contestants commented on the nice warm weather during this contest.

Congratulations to the winners and runners-up in each section, you will all receive certificates.

Ian Pawson, G0FCT

2nd 50MHz Backpacker 1999

Multi Operator 10W

Pos	Group Name	Call	Loc	QSO	Multi	Pts	Total	Best DX	km
1*		GW5NF/P	IO81KR	60	46	7090	326140	GI7JYK/P	384
2*	Wythall CG	G1WAC/P	IO82XJ	67	48	6037	289776	G8BCG/P	264
3	One Man & His Dog CG	G8NWM/P	IO92TR	26	29	3664	106256	ON1APG	371

Multi Operator 3W

Pos	Group Name	Call	Loc	QSO	Multi	Pts	Total	Best DX	km
1*	Oldham RC	G1ORC/P	IO83XN	31	27	2639	71253	G8BCG/P	374
2*	Drunken Radio Users	MI1DRU/P	IO74FP	13	20	1229	24580	2C0SIX	293

Single Operator 10W

Pos	Call	Loc	QSO	Multi	Pts	Total	Best DX	km
1*	M0AFC/P	IO84SA	97	70	17528	1226960	IK5ZUL	1567
2*	G8JAY/P	IO91AW	34	39	4651	181389	ON1APG	434

Single Operator 3W

Pos	Call	Loc	QSO	Multi	Pts	Total	Best DX	km
1*	GI7JYK/P	IO74BS	21	25	2565	64125	G3SKR	479
2*	G1WKS/P	JO01ED	14	20	1860	37200	M0AFC/P	373
3	GW0PZO/P	IO83JF	15	21	1480	31080	GI7JYK/P	244
4	G4FAA/P	IO81PG	10	11	439	4829	G1WAC/P	133

* Certificate winner

50MHz Backpacker Championship 1999

THE FIRST 50MHz BACKPACKER contest was held in poor weather conditions but with excellent propagation. The second event was the exact reverse, with poor propagation and warm weather.

For the second year running, Tim Boon, M0AFC/P, has emerged as the overall winner. Peter Lowrie, GI7JYK/P, was a very close second and the Wythall Contest Group, G1WAC/P, was third.

Ian Pawson, G0FCT

50MHz Backpacker Championship 1999

Pos	Name	Call	BP1	BP2	Total
1*	Tim Boon	M0AFC/P	1000	1000	2000
2*	Peter Lowrie	GI7JYK/P	976	1000	1976
3	Wythall CG	G1WAC/P	1000	889	1889
4	Oldham RC	G1ORC/P	617	1000	1617
5		GW0PZO/P	1000	485	1485
6	One Man & His Dog CG	G8NWM/P	1000	326	1326
7		G8JAY/P	914	148	1062
8		GW5NF/P	0	1000	1000
9		G1WKS/P	0	580	580
10		2C8ZRE/P	516	0	516
11	Drunken Radio Users	MI1DRU/P	0	345	345
12		M0BAO/P	183	0	183
13		M0BHE/P	117	0	117
14		G4FAA/P	26	75	101
15		G4MPK/P	40	0	40
16		G0FUW/P	15	0	15

* Certificate winner

Banbury Direction Finding Hunt - 11 July 1999

SOME 16 TEAMS assembled in the National Trust car park at Dovers Hill near to Chipping Campden, in the south west corner of the Stratford upon Avon and District Ordnance Survey map. By 1320 the sun was shining and temperatures rising. Two weak but readable signals were detected by all but two teams and Bill Pechey who found his batteries to be flat. At 1340 the site was returned to National Trust members, DFers having departed towards the hidden stations, half to the easterly station and half to the north west.

Both stations were around 35km from the start and the two

transmitters about 39km apart.Time trials prior to the competition suggested journey times to be around 40min between check points.

The A Station, G3TRY/P, on 1950kHz was operated by Tony, M1CJZ, and Garry, M1CLO, and was located on the banks of the River Cherwell approximately 12km SSE of Banbury. The station was some 200m from the bottom of the map. The transmitter was situated in a 5m wide strip of brambles, nettles and thorns, the aerial being a simple wire around 200m long .

The most obvious route to the transmitter involved a 4km jog south along the Oxford canal tow path. The quickest route would have been from the south (off of the map) with a 1km jog along the tow path. Of course, contestants found other routes including wading the River Cherwell, which is several feet deep and very murky in that area. Ten teams visited this site and three more arrived just too late to be clocked in.

The B Station, G4MDF/P, on 1980kHz was operated by Gordon, G4EBF, and located in a disused railway cutting approx 4km east of Leamington Spa. The transmitter was almost at the top of the embankment, hidden within thorns and nettles. The aerial system consisted of about 300m of wire in a U shape. Contestants coming in from the north east had a gentle 1km stroll along a nice even track bed. Those coming in from the south had a slightly shorter distance to cover but a very steep bank to clamber up before finding the railway line. Six teams found the transmitter and at least two others arrived just too late to be counted. Afterwards, 40 competitors and helpers assembled at Wroxton Village Hall, near Banbury for a superb tea. Geoff Foster received the Banbury Shield and first prize finding his second station at 16.15:39 and Trevor Gage winning second prize finding his second station at 16.27:36

Trevor Gage and Mick Hawkins qualify for the National Final organised by South Manchester DF Club.

Graham Nicholls, G4DLB

Banbury DF Hunt July 1999

Pos	Entrant	Stat ion 1	Station 2
1	Geoff Foster	16.15:39	15.06:52
2	Trevor Gage	16.27:36	14.57:03
3	Colin Merry	16.28:00	14.50:24
4	Alan Simmons	00.00:00	15.03:30
5	Mick Hawkins	15.06:13	00.00:00
6	Steve Stone	00.00:00	15.06:17
7	Graham Phillips	00.00:00	15.14:21
8	Paul Clarke	15.20:36	
9	Andy Mead	15.26:16	
10	Roy Emeny	15.27:47	
11	Chris Plummer	15.28:05	
12	George Whenham	15.30:04	
13	Bill Pechey	15.42:13	
14	Ray Goodearl	n/f	
14	John Manley	n/f	

2nd 144MHz Backpacker 1999

THE WEATHER varied from bright sunshine to heavy rain, depending on your location. Many entrants heard, but only a few managed to use, the Sporadic E to clock up impressive best DX.

Tim, M0AFC, decided to operate from France for this contest. All was well until the local Gendarmes intervened. They apparently thought that Tim was a pirate radio station broadcasting a local 'rave party' to the rest of Brittany! Tim also found that propagation from his chosen site was awful.

The Bristol Contest Group, MW1BCG, managed to work nearly 200 stations. Their comment on this contest was "very fast QSO rate lots of activity with the PW contest running concurrently, reasonable DX, it surprised us what can be worked with 3W!"

Congratulations to the winners and runners-up in each section, you will all receive certificates.

Ian Pawson, G0FCT

2nd 144MHz Backpacker 1999

Multi Operator 10W

Pos	Group Name	Call	Loc	QSO	Multi	Points	Total	Best DX	km
1*		G0KYS/P	IO91GI	89	24	14797	355128	GM0GMD/P	578
2*	One Man & His Dog CG	G8NWM/P	IO92TR	70	20	13434	268680	YO3APJ	2132
3		GW5NF/P	IO81KR	85	22	10659	234498	GM4WLL/P	445
4	Wythall Contest Group	G0WRC/P	IO82QL	79	13	8187	106431	ON4CJQ	535

Multi Operator 3W

Pos	Group Name	Call	Loc	QSO	Multi	Points	Total	Best DX	km
1*	Bristol Contest Group	MW1BCG/P	IO81KW	199	41	34814	1427374	PA0PLA	682*
2*	Oldham RC	G1ORC/P	IO93BJ	132	22	13237	291214	EI3ENB/P	413
3		G0GRI/P	IO91AI	64	20	6339	126780	GI7JYK/P	458
4		G0HDV/P	IO93GD	71	15	6418	96270	G4IGS/P	312
5	Wythall Contest Group	G1WAC/P	IO82XJ	79	13	6809	88517	GM4IGS/P	353
6	Barpackers CG	M1BAR/P	IO83XH	56	17	4988	84796	GI0SFX/P	326
7	Charlie & Sue Jordan	GW0PZO/P	IO83JF	73	10	4765	4750	G8CBU	238
8	Stockport Radio Society	G8SRS/P	IO93CM	22	9	1516	13644	GM4WLL/P	255
9	Ayr ARG	GM0AYR/P	IO75PJ	14	10	1102	11020	G0TOO/P	210

Single Operator 10W

Pos	Call	Loc	QSO	Multi	Points	Total	Best DX	km
1*	G4ERP/P	IO81XW	131	28	17776	497728	ON4CJQ	484
#*	F/M0AFC/P	IN88RK	35	19	11144	211736	G4ZMB	593
2*	G3WZR/P	IO91BJ	59	15	4908	73620	EI3GE	344
3	G4EDR/P	IO94RD	16	8	2055	16,440	G0KYS/P	315

Single Operator 3W

Pos	Call	Loc	QSO	Multi	Points	Total	Best DX	km
1*	2C8ZRE/P	IO83JF	118	24	14728	353472	G7SPT/P	379
2*	2C7LQD/P	IO82KW	111	21	13783	289443	GM4JJJ	348
3	GI7JYK/P	IO74CS	53	21	12199	256179	G3XFD/P	492
4	G0ROC/P	IO83WR	90	21	11439	240219	GM0HTT	601
5	G8JAY/P	IO91AW	71	18	10411	187398	YO9AZD	2184
6	G4FAA/P	JO01AG	35	14	6836	95704	F/M0AFC/P	365
7	GM4IGS/P	IO75MB	23	15	6119	91785	G1WKS/P	561
8	G1WKS/P	JO01ED	44	16	5271	84336	GM4IGS/P	562
9	G1JDM/P	IO90SV	31	18	4319	77742	EI9GJ/P	449
10	2C0GZI/P	IO73UI	32	18	3520	63360	G8NWM/P	271
11	GW1ATZ/P	IO83LC	50	10	3425	34250	G1JDP/P	214
12	G7NBE/P	IO92AR	29	11	2509	27599	GI7JYK/P	340
13	G0OKD/P	IO93EC	41	7	2687	18809	G0AFH	238
14	M0BAO/P	IO80LV	34	6	3007	18042	G8NWM/P	273
15	G7VHW/P	JO01HO	21	8	2254	18032	GW0NWR/P	305
16	G1GYM/P	IO85WL	23	5	1384	6920	G0KVJ	92
17	G0NFO/P	IO82RJ	7	5	226	1130	G3CKR/P	92

* Certificate winner

F/M0AFC/P wins the overseas section of this contest.

3rd 144MHz Backpacker 1999

THIS CONTEST coincided with VHF NFD. This meant that several of the regular entrants were missing due to NFD 'duties'. Even so, 21 stations managed to put in an entry.

M1BAR/P commented "An excellent day for a contest, both weather wise and radio conditions. Being NFD, it was nice to work some stations outside the UK". These sentiments were echoed by many entrants. However, several stations commented that although the band appeared to be very busy, it was difficult to maintain a high QSO rate due to the QRM from the NFD stations.

Congratulations to the winners and runners-up in each section, you will all receive certificates.

Ian Pawson, G0FCT

3rd 144MHz Backpacker 1999

Multi Operator 10W

Pos	Group Name	Call	Loc	QSO	Multi	Pts	Total	Best DX	km
1*	Single Yagi & Tcvr Gp	G1SYT/P	JO02QB	69	39	19135	746265	I0WBX/6	1346
2*	One Man & His Dog CG	G8NWM/P	IO92TR	73	34	14240	484160	DF8WS	577
3		G0KYS/P	IO91FN	83	31	14492	449252	PI4GN	607
4	Barpackers CG	M1BAR/P	IO83XH	63	28	9735	272580	DL0GL/P	631

Multi Operator 3W

Pos	Group Name	Call	Loc	QSO	Multi	Pts	Total	Best DX	km
1*		GW5NF/P	IO81KR	64	25	9157	228925	2S4ZUK/P	580
2*		G0HDV/P	IO93GD	57	20	7182	143640	F6IFR	428
3	Oldham RC	G1ORC/P	IO83XN	48	15	4173	62595	2S4ZUK/P	377
4	Stockport RS	G8SRS/P	IO93CM	18	14	2899	40586	2S4ZUK/P	383

Single Operator 10W

Pos	Call	Loc	QSO	Multi	Pts	Total	Best DX	km
1*	2C8ZRE/P	IO83JF	109	29	17771	515359	ON4AMX	610
2*	M0BAO/P	IO80LV	55	27	10452	282204	2S4ZUK/P	672
3	G4EDR/P	IO94RD	32	19	7665	145635	ON4AMX	515
4	G8ORG/P	IO83VC	45	20	5920	118400	ON4AMX	543

Single Operator 3W

Pos	Call	Loc	QSO	Multi	Points	Total	Best DX	km
1*	GI7JYK/P	IO74BS	88	26	27046	703196	F6IFR	750
2*	M0AFC/P	IO84SA	77	29	18098	524842	DL1ECG	715
3	G1WKS/P	JO01ED	65	31	13037	404147	GI7JYK/P	581
4	GW0PZO/P	IO83ID	90	25	12106	302650	ON6ZT	542
5	G1JDM/P	IO90SV	47	19	6418	121942	PI4RCK	387
6	GM4IGS/P	IO75MB	30	18	6773	121914	M0BAA/P	532
7	G7NBE/P	IO92GS	22	11	2242	24662	G4LIP/P	266
8	G0NFO/P	IO82QJ	28	10	2126	21260	M0BAA/P	289
9	G1ATZ/P	IO83ND	17	6	804	4824	G8OQV/P	158

* Certificate winner

4th 144MHz Backpacker 1999

RADIO CONDITIONS were excellent at the start of this contest, with plenty of stations to work. Towards the end of the contest, many entrants reported the build-up of thunderclouds. A few unlucky stations were caught directly in the path of the storms! Several stations packed up early, when they saw the storm approaching.

The standard of logging was not as good as in previous Backpacker contests. Entrants lost an average of 12% of their score through logging errors.

Congratulations to the winners and runners-up in each section, you will all receive certificates.

Ian Pawson, G0FCT

4th 144MHz Backpacker 1999

Multi Operator 10W

Pos	Group Name	Call	Loc	QSO	Multi	Pts	Total	Best DX	km
1*	One Man & His Dog CG	G8NWM/P	IO92TR	53	59	9695	572005	EI6FE/P	533
2*	Barpackers CG	M1BAR/P	IO83XH	58	48	6421	308208	EI6FE/P	423
3	Wythall CG	G1WAC/P	IO82XJ	33	33	2995	98835	G1JKX/P	315

Multi Operator 3W

Pos	Group Name	Call	Loc	QSO	Multi	Pts	Total	Best DX	km
1*		GW5NF/P	IO81KR	54	47	7897	371159	PE1EWR	461
2*		G0HDV/P	IO93GD	48	54	6649	359046	DC1EI	582
3	Oldham Radio Club	G1ORC/P	IO83XN	53	41	4573	187493	EI6FE/P	427
4	Stockport RS	G8SRS/P	IO93AK	25	21	1628	34188	EI6FE/P	430

Single Operator 10W

Pos	Call	Loc	QSO	Multi	Pts	Total	Best DX	km
1*	M0AFC/P	IO84SA	92	78	18975	1480050	DC6IA	711
2*	GW8ZRE/P	IO83JF	99	78	16359	1276002	F6CBH	572
3	G0GRI/P	IO81WG	65	60	9638	578280	EI6FE/P	452
4	G0PQF/P	JO01AX	26	44	5350	235400	EI6FE/P	572
5	EI6FE/P	IO52UR	22	30	7634	229020	G4SWX	654
6	GM8ORG/P	IO74TQ	27	32	6091	194912	G0PQF/P	420

Single Operator 3W

Pos	Call	Loc	QSO	Multi	Pts	Total	Best DX	km
1*	GW0PZO/P	IO83ID	71	57	9224	525768	PE1EWR	500
2*	GM4IGS/P	IO75MB	28	37	5914	218818	G0KPW	519
3	G4APJ/P	IO83TP	42	44	4619	203236	G7RAU	333
4	GW1ATZ/P	IO81GV	37	36	5233	188388	F6CBH	487
5	G1WKS/P	JO01ED	32	36	3566	128376	M0AFC/P	373
6	G3OLY/P	IO91VX	21	34	3720	126480	GM4IGS/P	465
7	G1JDM/P	IO90SV	26	36	3325	119700	M0AFC/P	373
8	G0NFO/P	IO82RJ	17	20	1339	26780	M0AFC/P	181
9	G1GYM/P	IO85WL	24	14	1786	25004	MM1BUO	152

* Certificate winner

Check log from PE1EWR running 25W, 14 QSOs, 22 multipliers, total of 4750 points

70MHz CW 1999

THIS YEAR'S event saw a sharp increase in both the number of entries and the number of stations worked. Despite this, entrants complained bitterly about the conditions and general lack of activity! Indeed, one entrant claimed that there was greater activity on 23cm SSB. In all, 37 different stations appeared in the logs and 16 contacts were made in excess of 400km.

A number of logging errors were made which appear to be due to the poor conditions. The logs were re-scored using one programme, due to surprising discrepancies in distances.

Congratulations go to Martin, G3UKV, for an overwhelming victory and to Stewart, GM4AFF, for his achievements from his remote location. Ian, G4OUT, wins a certificate as the leading entry running less than 25W and the Cockenzie and Port Seton ARS gain a certificate for their win in the Open section.

Roger Dixon, G4BVY

70MHz CW Contest 1999

Section SF

Pos	Call	Loc	QSOs	Mults	Power	Ant	Best DX	km	Pts
1	* G3UKV	IO82RR	26	23	100	5ele	GM4AFF	454	95036
2	*GM4AFF	IO86ST	15	15	150	8ele	G3NKS	552	72300
3	G3NKS	IO81XU	21	20	100	6ele	GM3WOJ	671	70340
4	G3TCU	IO91QE	20	20	150	6ele	G3NEO	245	47460
5	*G4OUT	IO92AT	10	13	10	3ele	GM4AFF	446	21333
6	GW4HBK	IO81KP	16	13	40	3ele	G3FIJ	278	21021
7	G3MEH	IO91QS	15	16	8	6ele	GW4HBK	173	20688
8	G3UUT	JO02BD	10	10	25	4ele	GW4HBK	230	13190
9	G3TUX	IO91PC	11	11	15	4ele	M0BPQ	246	12408
10	G3BPM	IO80OW	9	8	50	Dple	G3TCU	154	6776
11	M0BPQ	IO93GG	11	5	15	5ele	GM4AFF	399	4985
12	G4OTY	IO81UI	4	6	10	4ele	G4RFR	68	1506
13	GM4UYZ	IO85MX	3	4	10	yagi	GM3WOJ	211	132014
14	G8NEO	JO02PV	0	0					0

Section O

Pos	Call	Loc	QSOs	Mults	Power	Ant	Best DX	Km	Pts
1	*2A0CCC/P	IO85RU	11	12	20	8lpy	G4RFR	567	28740

* Certificate winner
* Unfortunately, the G4RFR log went missing in the post. Their open section entry had a claimed score of 96,200 points.

432MHz Backpacker Championship 1999

THIS IS THE second year of the 432MHz Backpacker contests. Most contestants bemoaned the lack of activity during these contests.

Three stations from three different sections have emerged as joint winners of the second 432MHz Backpackers Championship. Congratulations to G8NWM/P, 2W1GMA/P and M0AFC/P for this achievement. Also, congratulations to 2W1GMA/P for being the highest placed Novice station in the championship.

Ian Pawson, G0FCT

432MHz Backpacker Championship 1999

Pos	Name	Call	BP1	BP2	Total
1= *	One Man & His Dog CG	G8NWM/P	1000	1000	2000
1= *	Charlie & Sue Jordan	2W1GMA/P	1000	1000	2000
1= *	Tim Boon	M0AFC/P	1000	1000	2000
4		G8JAY/P	1000	0	1000
5		GI7JYK/P	0	946	946
6	Wythall CG	GW7WAC/P	438	0	438
7		M0BZE/P	283	0	283
8		GM1GYM/P	111	0	111

* Certificate Winner

2nd 432MHz Backpacker 1999

WITH ONLY four entrants to this contest, adjudication was very straightforward. All competitors found this contest very hard going, with little activity.

The winner and runner-up of each section will each receive a certificate.

Ian Pawson, G0FCT

2nd 432MHz Backpacker 1999

10W Multi Operator

Pos	Name	Call	Loc	QSO	Multi	Pts	Total	Best DX	km
1*	One Man & His Dog CG	G8NWM/P	IO92TR	25	15	3597	53955	ON1ABH	395

3W Multi Operator

Pos	Name	Call	Loc	QSO	Multi	Pts	Total	Best DX	km
1*	Charlie & Sue Jordan	2W1GMA/P	IO83JF	25	15	3026	45390	G8VLL	308

3W Single Operator

Pos	Name	Call	Loc	QSO	Multi	Pts	Total	Best DX	km
1*	Tim Boon	M0AFC/P	IO84SA	26	14	5335	74690	PE0MAR/P	495
2*	Peter Lowrie	GI7JYK/P	IO74BS	22	14	5045	70630	G4BRA/P	496

* Certificate Winner

CONTEST CALENDAR

HF Contests

Date	Time	Mode	Contest
1 Jan	0800-1100	RTTY	SARTG New Year Contest
1 Jan	0900-1200	CW	AGCW Happy New Year Contest
1 Jan	1000-1200	CW	RSGB LF Cumulative 7MHz
1 Jan	1800-2400	RTTY	ARRL RTTY Roundup
2 Jan	1600-1800	CW	RSGB LF Cumulative 3.5MHz
7-9 Jan	2200-2200	CW	Japan Int DX Contest 160-40m
8 Jan	1600-1800	CW	RSGB LF Cumulative 3.5MHz
9 Jan	1400-1800	CW	RSGB Affiliated Societies Contest
11 Jan	2000-2200	CW	RSGB LF Cumulative 1.8MHz
15 Jan	1200-2000	CW	LZ Open Championship
15 Jan	1400-1800	SSB	RSGB Affiliated Societies Contest
16 Jan	0000-2400	CW	HA DX Contest
16 Jan	1000-1200	CW	RSGB LF Cumulative 7MHz
19 Jan	2000-2200	CW	RSGB LF Cumulative 1.8MHz
27 Jan	2000-2200	CW	RSGB LF Cumulative 1.8MHz
28-30 Jan	2200-1600	CW	CQ 160 Metre Contest
29-30 Jan	0600-1800	CW	REF Contest
29 Jan	1000-1200	CW	RSGB LF Cumulative 7MHz
29-30 Jan	1300-1300	SSB	UBA DX Contest
30 Jan	1600-1800	CW	RSGB LF Cumulative 3.5MHz

VHF Contests

2 Jan	1000-1600	CW	RSGB 144MHz CW
16 Jan	1000-1230	CW/SSB	RSGB 70MHz Cumulative #1
30 Jan	1000-1230	CW/SSB	RSGB 70MHz Cumulative #2

Apologies for the limited number of overseas VHF contests included this month. Unfortunately, at the time of writing, the sources used to compile this information have not been updated with the contest calendar for 2000.

The full rules of RSGB HF and VHF/UHF contests were published in the RSGB Contesting Guide in October 1999 *RadCom*. Brief rules for non-RSGB contests, can often be found in the *HF* and *VHF/UHF* columns.

Exclusive Credit Card for Radio Enthusiasts

Whether you apply for a Card for the first time or choose another Card to replace an existing one, you need to make sure it offers the right benefits for you.

The **Radio Society MasterCard® Card** is designed specially for radio enthusiasts and is available exclusively to RSGB members. It comes with great benefits and every time you use the Card you are helping to support the Society at no extra cost to you.

Transfer balances from other credit or store cards and for the first six months you will only pay **6.9% APR** on these balances and there is **no annual Card fee**. Once the six months are up, the transferred amounts will revert to the same competitive APR as the rest of your spending, so borrowing on the Card is convenient and effective.

The Card is issued by Bank of Scotland®, which is the oldest retail Bank in the UK and which has a strong reputation for providing excellent and reliable service. There are thousands of UK credit cards currently available - but however hard you search, you would not find another one which gives you the benefits you need and also demonstrates your link to the Radio Society.

Over 1000 Members already carry the Card and they have helped to raise over £51,000 for the Society, so holding one really counts. This extra income is used to help maintain and develop the services we are able to offer the membership as a whole. To start enjoying the low introductory APR and no annual fee offer, simply telephone free:

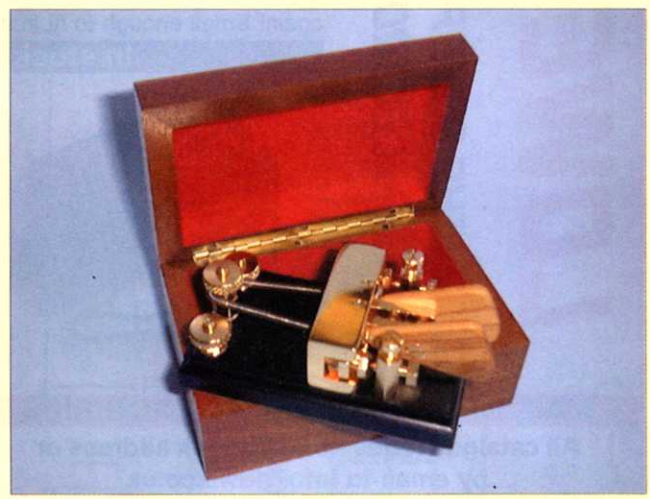
0800 716097 quoting ref 10YH.

1. The **APR** of **6.9%** applies to balance transfers for the first six months after the account is opened. The **APRs** for purchases and Cash Advances during the same period are **19.9%** and **21.8%** respectively. Thereafter, the **APR** will revert to **19.9% APR** for all transactions except Cash Advances, for which the **APR** will be **21.8%**. All details and a written consumer credit quotation are available from Bank of Scotland, Card Services, Pitreavie Business Park, Dunfermline, Fife, KY99 4BS. All lending is subject to appraisal by the Bank of the applicant's financial status. Interest rates variable. You must pay £5 or 3% of the outstanding balance each month, whichever is the greater. Balances may not be transferred from other Credit Cards issued by Bank of Scotland. You must be aged 18 or over and resident in the UK to apply for credit. Telephone calls may be recorded for security purposes and monitored under the Bank's quality control procedures. "Bank of Scotland" is a registered Trade Mark of The Governor and Company of the Bank of Scotland. "MasterCard" is a registered Trade Mark of MasterCard International Inc. Bank of Scotland subscribes to The Banking Code. All details and interest rates are correct at time of going to print (December 1999) but are subject to variation.

ANOTHER BRIGHT SPARK FOR THE MILLENNIUM

Here's another chance to purchase a much prized, limited edition collectable. This time we are proud to present the **RSGB Millennium Paddle Key**. Restricted to only 150 pieces, each carries an inscribed gold-plated plaque, is issued with a certificate of authenticity signed by the RSGB President and is individually numbered. This fully functioning paddle key mechanism is something to treasure, both as a memento of the Morse era and as a shrewd investment for the future.

- Fully functional gold-plated brass iambic paddle key
- Ebony wood base
- Olive wood paddles
- Cork faced bottom with rubber feet
- Commemorative gold-plated plaque bearing the inscription "Radio Society of Great Britain - The Millennium Paddle"
- Each key is numbered and carries a certificate of authenticity
- Limited to 150 pieces
- Supplied in a Sapele wood presentation case lined in red felt
- Base size: 50 x 90 mm
- Case size: 117 x 77 x 53 mm
- Weight: 225g



Members' only price: £89.95 + £3.65 postage, packing and insurance

To purchase your **RSGB Millennium Paddle Key**, telephone the RSGB 24-hour Sales Hotline on 01707 660888.

Night Vision Systems From Lowe Electronics

LOWE

LOWE ELECTRONICS LTD

THE BEST PLACE IN THE WORLD FOR STATE OF THE ART ELECTRONICS, EXCELLENT SERVICE, GREAT VALUE

Moonlight MPN40Ki

Our lowest price Night Vision Binocular offers true binocular vision in moonlight or in total darkness using the built in infra red illuminator. The 70mm f1.5 lenses give a magnification of 4.0 times and a range on infra red of 80 feet (24m)

IN STOCK - £499.00

Moonlight Goggles

Moonlight Nightvision Goggles have improved tremendously over the past couple of years. Several new models are due to be released in the new year and our initial impressions of the samples we have seen are very favourable. They are smaller than before and offer much improved image quality.

Prices from £799.00

Moonlight Expedition 600

The unit is probably the most best value night vision scope on the market. The 85mm f1.6 lens gives a magnification of 3.6x and the built in infra red illuminator allows you to see in total darkness. The lens is high quality glass rather than plastic as found on some of the cheaper units and is a standard M42 screw fitting type.

In stock at £249.00

Moonlight Safari

The ideal solution for use in areas where replacement batteries may not be available. The Moonlight Safari is powered by Piezo Electric Crystals and requires no external power source. Simply squeeze the top of the unit and you will get about one minute of Night Vision. When it fades, just squeeze again! Small enough to fit in any suitcase or flight bag.

In stock at £189.00

Moonlight Wanderer

The same features as the Safari with one important difference, the Piezo Electric power supply has been replaced by 2 AA batteries to allow extended operation and the unit now features built in infra red illuminator.

In stock at £219.00

MAIL ORDER - GENERAL ENQUIRIES

All catalgue requests to Matlock address or
by email to info@lowe.co.uk
Orders by fax or phone to Matlock or
by email to orders@lowe.co.uk
NB Carriage extra on most items

www.lowe.co.uk

MATLOCK

Chesterfield road
Matlock
Derbyshire
DE4 5LE
Fax 01629 580020

Tel 01629 580800

BRISTOL

79 Gloucester Road
Patchway
Bristol
BS12 5QJ
Fax 0117 931 5270

Tel 0117 931 5263

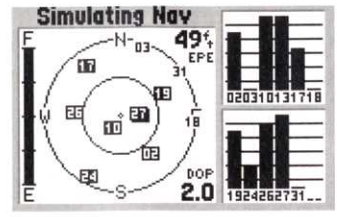
NEW FROM GARMIN - GPSIIIPLUS

At long last the GPSIIIPlus has arrived! It has been well worth the wait though as the UK/European basemap is now very much better than its predecessor and what's more, you can upload even more detailed maps from a new series of CD-ROM maps for even better navigation! On its own, the GPSIIIPLUS promises to be an excellent GPS but linked to your PC it is going to be a powerful navigation tool, ideal for the busy motorist. The GPSIIIPLUS, is also Garmin's first GPS receiver designed specifically for in-car use but it is still small and compact enough for handheld use.

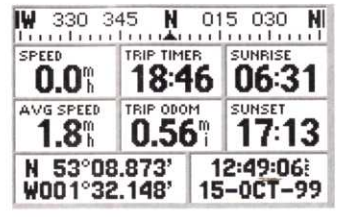
Don't forget, we are a major Garmin stockist and carry large stocks, ready for immediate delivery!

GPSIIIPLUS £349.00

GARMIN



These are actual screen grabs from our demo GPS3 Plus and show just how much detail is available on the dot matrix LCD display.



NEW - GARMIN STREET PILOT

After an even longer wait the superb Street Pilot has finally arrived. It is the first Garmin GPS to be designed primarily for in-car use. It contains a similar built in base map to the GPS3 Plus but when used in conjunction with the optional Mapsource UK Metro Guide CD and the 8 or 16 MB data card, you will get detailed street level mapping which you can alter as required. Route planning facilities are included and the huge backlit display is easy to read while you are driving. The hot news is that there is now a version of the Street Pilot with a full colour display!!

Mono Street Pilot £499.00

Colour Street Pilot £699.00

Garmin emap

What a cute little unit!! The wonderful Garmin emap is the perfect companion when you are out and about. Full mapping for Europe and North Africa is built in and the main design criteria was ease of use and elimination of unnecessary features. The emap just "feels" right!!

Comes complete with an 8MB data cartridge and PC interface cable

emap £249.00

Don't forget we also stock cables, connectors, batteries, rotators, receivers, scanners, antennas, dummy loads, co-ax switches, books, wavemeters, SWR meters and many other things you need for the shack! Just ask!

PS. Radios also available☺

SECOND_HAND LIST

Seen our second-hand list lately? We always have a super range of rigs, receivers scanners and accessories in stock. Why not request a copy today? Club Secretaries, register your Radio Club for regular mailings for your members!

SEND SAE FOR COPY

LOWE ELECTRONICS CATALOGUE

Our catalogue is still availabe for those who can get to our stores. Packed full of the latest in communications gear, it also includes many other items you'll find interesting. Just send four first-class stamps for your free copy today

SEND FOUR FIRST CLASS STAMPS

MASSIVE CLEARANCE SALE

At Chandlers Ford — **29th / 30th December**

HUNDREDS OF BARGAINS

AR303 rotators, fantastic bargain, £30 including FREE support bearing,	**Package worth over £70!**
SMC582L 5/8 + 5/8 433MHz mobile antenna, was £29,	**now only £5 each**
SP2 Mobile loudspeakers, were £12,	**now £6**
938V/144 145MHz 1 channel handies with nicads/chgr.	**only £25 each**
OSPH2/S Polarphasers for 144MHz, list price £116,	**only £35 each**

Yaesu Spare Clearance.

We have over £100,000 worth of spares
for FT767, FT757, FT102, FT901/2, FT101, FRG8800, FRG9600, FT736R, etc, **call spares on 01703 246229**

Misc Items.

CX201N 2 way "N" coax switches ½ price	**only £12.50**
Palstar 30 amp PSU's	**now £89**
CD45 Rotators, 1 only	**to clear £249**

Amplifiers

Amp UK Challenger II 2 3CX800's HF 1500w	**£1849**
Explorer 1200 2 3-500 HF 1200w	**£1399**
Discovery 50MHz 3CX800	**£1229**

Filters

Comet CF30H 2kw low pass filter	**only £25**
Comet CF30MR 1kw low pass filter	**£35**
Comet BPF6 150w 50MHz Bandpass	**£25**
Comet BPF2 150w 144MHz Bandpass	**£29**
XF455C FT102	**£10**
XF8.9GA FT107/FT901 AM	**£10**
XF8.2HC FT102 CW	**£10**
XF455CN FT102 CWN	**£10**
YF100 FT890, 500z,	**£39**
YF101 FT890, SSB, 2.6kcs	**£45**

ICOM Specials

IC756PRO HF/50 projected price	**£2000 to £2300**
IC746 HF/VHF FREE 2 Mtr Handy	**£1349**
IC706MK2G HF/VHF/UHF FREE 2 Mtr Handy	**£975**
ICR2 Handy Receiver, FREE case	**reduced to £119**
IC75E HF Receiver £699,	**cash price £599**
ICPCR100 was £199, bulk buy,	**now only £169**
AT180 (706 ATU) was £349,	**now only £299**

SMC - SAVING MORE CASH

FT-100 — £999

HF/6m/2m/70cms Mobile or Base

FT-1000MP — £1799

The Ultimate HF Transceiver

FT-847 — £1299

The Ultimate VHF/UHF Transceiver

FT-2600M NEW MOBILE — £229

New Compact
Military Standard
2m mobile
60Watts

£329

FT-90 NEW YAESU BABY

The smallest
Dual Band
VHF/UHF mobile
in the world

SMC

Reg Ward Opening: Tuesday - Saturday 9:30am - 5:30pm
Reg Ward & Co . 1 Westminster House . West Street . Axminster . Devon . EX13 5NX

HQ Opening: Monday - Friday 9am - 5pm and 9am - 1pm Saturday
HQ. SM House . School Close . Chandlers Ford Ind Est . Eastleigh . Hants . SO53 4BY

South Midlands Communications Ltd

Some day All Radios will be built this way

but you don't have to wait till then ....You can buy

The most advanced receiver out of this world — NOW

FAIRHAVEN

£799

Includes **FREE**

DATONG ACTIVE ANTENNA AD-270

and **FREE**

DELIVERY (UK MAINLAND)

- Frequency 0-1700MHz
- Switchable Pre-Amp
- Remote Control
- 26 VFO's
- 54,000 Data text Entries
- PC data Editing
- Built in Decoder SSTV,FAX
- Digital Recorder
- Stereo Output
- Video Output for TV
- World Clock

THE SMC - BEST VALUE- AWARD - ATS 818ACS

Other Receivers from Sangean.

Sangean ATS818ACS with Cassette Recorder	just £119
Sangean ATS 818 receiver, was £119,	cash £99
Sangean ATS 909 receiver, retail £169,	now £139
Sangean ATS 202 receiver, £79,	now £49

ATS-818ACS
Just £119

£119

NOW WITH BUILT IN CASSETTE RECORDER

THE SMC - HF150 goes on from strength to strength

Rugged and Dependaple
30KHz - 30MHz
60 Memories
LSB, USB, AM,AM Sync
12v DC input option + £20
Full range of accessories available including
Preselector
Audio Processor
Computer interface
Keypad

£389

Southampton
023 8024 6222
email: us at amateur@smc-comms.com

Axminster
01297 34918
email: us at regward@dialin.co.uk

Website: http://www.smc-comms.com

Members' Advertisements

RSGB Members wishing to place an advertisement in this section must use the official form incorporated on the label carrier of Radio Communication. This will prove membership and must be for the current month. No acknowledgment will be sent. Ads not clearly worded, or which do not comply with these conditions will be returned. If an ad is cancelled no refund will be due. An advertisement longer than 60 words will be charged pro rata. Trade or business ads, even from members, will not be accepted. Traders who wish to use this facility must send a signed declaration that the items for sale are part of, or intended for, their own personal amateur station. The RSGB reserves the right to refuse ads, and accepts no responsibility for errors or omissions, or for the quality of goods for sale or exchange. Each advertisement must be accompanied by the correct remittance, as a credit card payment, cheque or postal order made payable to the Radio Society of Great Britain. Please note that because this is a subsidised service to members, no correspondence can be entered into. Licensed members are asked to use their callsign and QTHR, provided their address in the current edition of the RSGB Yearbook is correct. RS members will have to provide their name and address or telephone number. Please include your town and phone number in the free boxes provided to assist readers. Advertisements will be placed in the first available edition of *RadCom.*

The closing date for copy is the first day of the month prior to publication, eg the deadline for the March issue is 1 February.

Warning: *Members are advised to ensure that the equipment they intend to purchase is not subject to a current hire purchase agreement. The 'purchase' of goods legally owned by a finance company could result in the 'purchaser' losing both the goods and the cash paid.*

FOR SALE

£475 the lot! Yaesu FT-757GX with CAT system, plus Yaesu FT-757HD, KW Ten-Tec ATU, Alinco VHF/UHF dual band FM tcvr with duplex, Standard C-500E VHF/UHF h/held, CT-1600 VHF h/held, Cobwebb multiband 20/17/15/12/10m ant, Tri-Star vertical 10/15/20m ant, Oscar GP-144W 2-step colinear base ant, 20ft scaffold pole, telescopic pole, 2 lots of mounting bracket and lots of other quality cable and bits. 01904 331169 (York). E-mail: michael@cpas.org.uk

BNOS 6m linear LPM-50.10.100, 10W in 100W out, with pre-amp, vgc, £120. Microwave Modules 4m linear with preamp, 10W in 100W out, vgc, £120. 01204 594235 (Bolton). E-mail: neil@g1hsg.freeserve.co.uk

ICOM IC-756 HF + 6m tcvr, vgc, man, accessories, boxed, £950. Icom IC-PS30 25A PSU, fair cond, £50. 01984 798524 (Woodbridge). E-mail: steve@sboldvic.demon.co.uk

2m h/held DJ-F1E inc spare dry battery pack, charger, extended ant, £140. Portable A&AA variable freq antenna, £35. Kenwood R-5000 rcvr, man, plus global ATU, mint, £400. Neil, G0LNV. 0114 255 3103 pm (Sheffield). E-mail: neiltapple@aol.com

AKD 4m radio, 18 month warranty, with 3-ele beam, mint, with all boxes, £150. 0114 245 4579 (Sheffield). E-mail: dave@g7wgx.freeserve.co.uk

ALINCO ALM-203 h/held plus accessories, £70. Icom IC-728 tcvr, as new, £445. Gould TC-314Time Counter, £30. Toyo Meter 20-120W, 144-435MHz, £35. Silent Key sale - all reasonable offers considered. 01708 551158 (Essex).

ALINCO DJ-5EY dual band handie, £200. ADI-146 2m mobile, £150. Both boxed as new. With extended receive. Antennas available. 01752 511387 (Plymouth).

ALPHA 87A fully automatic HF linear power amplifier, 10 hours use from new, £2500. Emoto 1200FXX heavy duty rotator, variable speed, £200. Altron 30ft tower with heavy duty ballrace head and self braking winch with ground post, £200. Cushcraft A35 HF beam, £200. Other than tower, all approx one year's use. 01634 682943 (Chatham). E-mail: bill@g4ljt.freeserve.com

AMPLIFIER Yaesu FL-2100 HF 1200W, with spare valves, only £100. Buyer collects or pays carriage. Call Paul or Annie on 01931 713359 eves (Penrith). E-mail: g4xta@lineone.net

ANTENNA tuner Yaesu FC-902, £99. Buyer collects or pays postage. 01708 373366 (Hornchurch).

BUTTERNUT HF-5B butterfly beam antenna 10/12/15/17/20m, £100, possible deliver depends distance. ERA BP-34 audio filter, £40. Datong auto notch filter, £20. Exchange filters for Diamond SX-200 VSWR meter or WHY? G0GPO, QTHR. 01227 711261 (Canterbury).

CLEAROUT. Tagra vertical antenna, 80m-10m, c/w radials, boxed, vgc, £65. Yaesu YM-49 spkr/mic, unused, £12. Uniden Force 2m tcvr, 3 crystals for packet operation, 12V DC, 35W output, £55. KAM TNC, version 5.0, plus pactor, original packaging , all mans, exc cond, inc original disk software, £120. G0JYL (not QTHR). 01249 892284 (Chippenham).

COLLECTORS' items. Hallicrafters S-27 rcvr, £50. Hallicrafters SX-24 rcvr, £25. BC-906D VHF wavemeter, circa 1944, £25. BC-221 freq meter, circa 1943, £10. All above working. TS-184A UHF cavity wavemeter, circa 1945, £25 (cavity OK but parts missing from front panel). 01635 868640 (Newbury).

COLLINS 30LI linear, vgc, £500. Collins 35C low pass filter for 32V series, £40. Drake TR-4C with RV-4C separate VFO, £475. Drake R-4C rcvr, vgc, £300. T4-XC, £225. Watkins-Johnson signal monitor, £100. 01379 783657 (nr Diss)

FAIRHAVEN RD-500 rcvr in exc cond, purchased Feb 1999, manufacturer's guarantee until mid Feb 2001, £500. View Motherwell or Gloucester. 07050 611076 eves (Gloucester).

FOR sale Kenwood 940SAT tcvr, gc and working order, late serial number, £650. Workshop man included. 01698 862212 (Motherwell).

FT-290 portable 2m tcvr, tired nicads, case, charger, needs CTCSS, £150. MFJ 2m SWR aerial tuner, £30. 6m aerial, offers? 01455 844389 (Hinckley).

FT-990AC 100W tcvr with gen cov and quality desk mic, rarely used, new 1998, automatic ATU not fitted, £750. Palstar high power roller coaster, £180. Ask for Mike 01252 615831 (Fleet) daytime.

GRAND clearance after 40 years! Navy 62H rcvr 100-150MHz, 16 valves, £35. Huge collection of 10GHz microwave gear, waveguide, klystrons, etc. Offers? Completed Hands kit tcvr 20m and 15m bands SSB, solid state (kit cost over £200), £75. HP 15-21GHz signal generator, £15, Kay sonograph, 26 valves, £40. Much more. SAE for complete list. G3MFW, QTHR. 01726 73608 (St Austell).

HAM IV rotator, TB3 Yagi, PSUs 25/30/5 amp, Daiwa DK-210 keyer, Kenwood SP-230 with filters, Daiwa 2-way coax switch, Daiwa SWR/PWR meter, dummy load, MC-60 mic, desk world clock, Kenwood low pass filter, Alinco DR-150E as new, Bencher chrome key, 2m colinear ant, 4/1-2/1 baluns, alloy poles 50p/ft etc, SAE for list, home brew 50ft mast, etc, winches. Offers considered. 01446 413379 (Cardiff). E-mail: gw3cba@tesco.net

HF station FT-747, £300. Star master keyer, £20. Yagi, £70. Mast, £70. Z-match ATU, £20. SWR, £15. 01621 868347 (Colchester).

HIGHLANDER mobile antenna, has had minimal use (estimated 2hrs), cost new, £175 + £5 p&p, will sell for £110. G4LUF, QTHR. 01548 821442 (nr Totnes).

ICμ2E(A) perfect, new battery, spare battery, US/Aus coverage, £60 ono. G3LBA, QTHR. 01865 821503 (Abingdon). E-mail: rgreenwood@compuserve.com

IC-275E 25W multi mode 2m tcvr. 240V/12V, in exc cond, boxed with man, one owner from new, £295. GW8JLY, QTHR. 01222 576225 (Cardiff).

IC-575A 28/50MHz dual band all mode tcvr, vgc, £495. IC-725 all mode HF tcvr, vgc, £395. MS memory keyer, £25. 01953 456101 (Attleborough). E-mail: roger.greengrass@virgin.net

ICOM IC-706 MkII boxed, perfect, £600. Yaesu FT7-B, gwo, unmodified, £190. MFJ-969 Versatuner, 6-160m, 300W, as new, £100. Psion series 5 palmtop computer, 8MB, mint, £200 ono. Military VRQ-301HP 30-76MHz, complete, near mint. Offers or exchange solid state military HF gear. Wanted: PRC-316/A-16 and accessories in any cond. Racal TA-944 HF linear and Redifon HF-125A or similar. John, G3GTJ, QTHR. 01963 240319 (Castle Cary).

ICOM IC-706 MkII DSP, boxed, with mans, hardly used, £500. Diamond V2000 6/2/70 base antenna, £35. Kent Morse key - straight, £25. 6m quarter-wave mobile, £10. Datong Morse tutor, £20. MFJ-418 pocket Morse tutor, £35. 6m cross polar 6-ele Yagi, £35. 18in T+K brackets, £5. All exc cond. 0956 208003 or 020 8308 0051 (Sidcup).

ICOM IC-706Mk1 with narrow SSB filter, £450. Trio TS-780 VHF/UHF multimode tcvr, £330. Trio TS-530S HF tcvr, £220. Yaesu FRG-7700 comms rcvr, £140. Tiny 2 TNC, £50. Datong FL-2 audio filter, £30. DRAE VHF wavemeter, £5. Carriage extra. G0GCI, QTHR. 01892 723703 (Tunbridge Wells).

ICOM IC-729 HF/50MHz tcvr, £600. AT-150 automatic ATU, £75. PSU PS-15, £75. Daiwa PS-304, 12V-2A PSU, £75. G4HHZ, QTHR. 01703 270785 (Chandlers Ford).

ICOM IC-736, built in ASMU, PSU, 160-6m, 28V PA, as new, boxed, mans, late model, inspection welcome, £635. G3GYE, QTHR. (Penzance)

ICOM IC-738 HF tcvr, c/w man, cables, HM36 h/mic, original packing, internal auto ATU, £550 ono. 01206 861240 (Colchester).

ICOM R-72 HF comms rcvr, mint cond, boxed, £260. G4GUV. 01300 341516 (nr Dorchester).

ICOM VHF/UHF satellite base station with SM6 mic, man, boxed, £600. Jaybeam 5-ele Yagi 5Y/2m, £20. Bantex 5/8 mobile whip with magmount, £25. Icom R-71E rcvr with user and service mans, all equip boxed, £400. Prefer collection, or carriage at cost. G3ACB, QTHR. 01279 731070 (Harlow).

JAYBEAM 'minimax' tribander MM3, 10/15/20m bands. Compact size, good cond, £160. Emotator 105TS rotator, medium duty, would suit above, £80. 0191 487 0129 (Gateshead). E-mail: graham.cash@ukonline.co.uk

KANTRONICS all mode TNC. PKT/PBBS/KA-NODE/WEFAX/RTTY/ASCII/AMTOR/CW, 3 mans, cables, as new, £175. Icom IC-251 2m FM/SSB/CW, digital readout, mains/batt, ideal base/mobile, mic, man, £210. Kenwood 4100E FM 2m/70cm, 25W base/mobile, digital readout, auto freq voice module, £200. Carr extra. 020 8505 7207 (Essex). E-mail: p-perera@compuserve.com

KENWOOD 241E FM tcvr, £100. Alinco DR-430 UHF FM, £100. MFJ super high-Q super loop, £50. DL-1000 dummy load, £25. PPS-1210 HQ PSU 10/14A, £25. Yaesu 480R 2m m/mode, £155. 0181 780 5339 (Bath)

KENWOOD TL-922 amplifier, gwo, boxed, man, £800. Heathkit SB-200 amplifier plus spare 572B valves, £250 gwo. 017363 60255 daytime (Penzance). E-mail: daveg0aix@lineone.net

KENWOOD TS-430S, filters, plus FM, used just a few times as standby, plus mobile bracket, unused, PS50, all exc cond, boxed, £440. 01743 245896 (Shrewsbury).

KENWOOD TS-680S HF + 6m, exc cond, boxed, £525. 01582 661800 (Dunstable). E-mail: g1gpl@tesco.net

KENWOOD TS-690 6m/HF, complete with automatic ATU (built-in) and 500Hz filter, exc cond, £800. Will demonstrate. G3WAG, QTHR. 01992 768495 (Waltham Abbey). E-mail: derekg@freeuk.com

MARCONI 2022C signal generator. 10kHz to 1GHz, -127dBm to +13dBm, £300. Yaesu FT-747, unmarked cond, £275. 01933 356768 (Northants).

MUTEK TVVF-144A 2m transverter (10m drive). Worked Rome in sporadic-E with TS-930 drive! £95 plus postage. G0APZ, QTHR. 01273 844951 (nr Brighton). E-mail: lenkillip@argonet.co.uk

NAVICO AMR-1000S 2m FM with additional SWR, ATU, both mint cond, bargain at £120, no offers. Tiny-2 packet radio plus cables, £50. BNOS 13.8V 12A PSU, £40. Could deliver 50 mile radius. Alan, G7CDK. 01763 262443 (Royston).

PK-232MBX data controller, as new, boxed, with man and leads, £125. 01494 583469 (Chesham). E-mail: g3vry@aol.com

RACAL RA-17 HF rcvr with man, schematics and some spare valves, vgc, £100 ono. 01525 221503 (Luton).

RACAL RA-1792 rcvr, late 1988, backlit, pristine, all filters, £775 plus carr. RA-1795 VHF/UHF rcvr, 20MHz to 1GHz, tuneable 10Hz steps, all options, £800 plus carr. Probably the best two specimens in UK. Racal MA-1105, bargraph, 455kHz, £75 plus carr. Eddystone EA-12 rcvr, gwo, mint, £110 plus carr. Collins 302CI Wattmeter, £15 plus carr. Drake TR-4310 with PS-7, offers? 01743 884858 (Shrewsbury).

RADCOM 1981-1997, *Elector* 1975-1977, *Practical Electronics* 1964-1972. All bound, £25. AVO universal measuring bridge (LCR) Type 1. Offers? 01277 823146 (Brentwood).

SILENT key sale, G2ALZ. Yaesu FT-221R, man, £80. FT-102, mic, man, Morse keyboard Datong MK, £150. Yaesu FT-101ZD, man, Katsumi EK-9X electronic keyer, £100. TR-2200GX, FM, man, £20. Heathkit HW-7, man, £10. Mustang SWR meter, 3-33MHz, £5. Hanson SWR3 SWR meter, £8. Pac-Comm Tiny2 Mk2, £50. All items sold as seen, history unknown, buyer collects. 01270 560034 (Crewe).

SILENT key sale, G4BAL. Yaesu FT-480 2m SSB/FM tcvr, man, mobile mount, £175. Yaesu FT-780 70cm SSB/FM tcvr, mobile mount, £200. Icom IC-290D 144MHz 25W FM/SSB tcvr, SM8 mic, man, £160. KW-101 SWR meter, £30. Yaesu PA-3 mobile power adaptor for FT-208, £10. Yaesu NC-15 PSU/charger, £20. Postage extra for heavier items. Richard Perzyna, G8ITB. 01689 602948 (Bromley). E-mail: richard.perzyna@cwcom.net

SILENT key sale, G4LFD. Kenwood TS-530S, AT-230, £300. Kenwood TS-9000, PS-20, £150. Hustler 5-BTV vertical, £80. All with mans. G3FIJ, QTHR. 01206 851189 (Colchester).

SILENT key sale. KW-107 supermatch, man, £100 (sensitivity meter). KW-77 rcvr, man, £100. Trio TS-520 tcvr, man, £250. Trio TS-700G tcvr, man, £250. Swan 350-C tcvr, man, £125. *Trio TR-2300 tcvr, man, £60. *Icom IC-240 VHF, man, £50. *Icom IC-3PA PSU, man, £25. (the 3 * items function as mobile rig). Stolle multimatic aerial (inc desk top controller & rotator), 2m crossed Yagi, £50. M-PU1 tcvr, £100. Frequency tester, £50. AEC SWR-40, £20. All items exc cond & most in original boxes. 01625 525890 / 0771 343 9881 (Cheshire).

SPY rcvr MCR1, four coils, PSU. *RSGB Bulletins* from the first 1925 onwards. Offers? G3OJE, QTHR. 020 8660 5717 (Croydon).

STRUMECH telescope 4 sections tilt-over mast 70ft + new cables available, £450. Linear Yaesu FL2100Z with spare valves, £450. Lighting mast trailer 3 section mast extendable outriggers 20ft + extended, £350. Day-01267 237078 eve-01267 222445. GW0ALR. We can arrange delivery.

TEKTRONIX 453 portable oscilloscope, dual timebase with delay/expansion, high quality instrument in exc cond, complete with original thick workshop and operation manual, £140. Buyer inspects, collects. G3OGK, QTHR. 01885 482929 (Bromyard). E-mail: gerry@g3ogk.freeserve.co.uk

TRIO TS-515 HF tcvr, 80/40/20/15/10m, 100W+, inc PS-515 PSU/LS, mans, £100. FDK multi-2700 2m multimode inc mic, OK on SSB/FM, AM needs attention, £150. Timewave DSP-9, £90. Eddystone 840A rcvr, c/w mains filter and feet, £120. BC221-J frequency meter with integral PSU and original charts, £15. Offers considered, buyer collects. G3LRQ, QTHR. 0118 934 5823 (Twyford). E-mail: michaelhumphries1@compuserve.com

TRIO TS-520 HF tcvr, vgc, c/w mic, CW

filter, inst & svce mans, spares, £170 ono. 01789 267430 (Stratford-upon-Avon).

TS-830S with CW filter, £300. FT-200, vgc, new PA valves, £110. Marconi TF-2008 signal generator with Racal 9903 counter, £195. Pye 1955 radio, reconditioned, in vgc, offers? FT-102, CW filter, good cond, with SP-102 speaker, £325. 01502 715419 (Beccles).

TS-830S, ATU-230, SP-230, immac, mans, box, prefer buyer inspect/collect, or carr extra, £500. TS-450SAT, immac, mans, box, prefer buyer inspect/collect, or carr extra, £500. George. 01226 286200 (Barnsley).

TS-930SAT good cond, boxed, £400 ono. Icom IC-761, good cond, boxed, £500 ono. Icom IC-701, good cond, £90 ono. All with mans. Eric. 01744 608750 (St Helens).

UNIVERSAL Avometer models 7 and 8 MkIII, £25 and £30. Roy, G4RLR, QTHR. 01480 880032 (Huntingdon).

UT7CT Morse devices: www.qsl.net/ut7ct

YAESU FRG-7700 HF rcvr with Yaesu FRT-7700 matching tuner, gwo, exc cond, £250 with man. 1963 RSGB Callbook, £3. 01202 665284 (Poole). E-mail: colin.redwood@psilink.co.uk

YAESU FT-101Z WARC, fan, mic, 150Hz filter, £150. Aiwa dip meter, £20. Sinclair Spectrum 48K computer, power pack, keyboard, recorder, Morse tapes, games, £20. Barlow Wadley XCR-30 comms rcvr, £30. Hy-Gain 18AVT, needs attention, £20. Buyer collects. 0116 287 3723 (Leicester).

YAESU FT-101ZD Mk3, mint cond, spare valves, £275. Hygain DX77 HF vertical antenna, 40-10m, 3 months old, £150. Heathkit SB-200 linear, mint, £240. Super Hustler mobile antennas, 80-10m, 1.5kW, wide band versions, £90, MFJ mobile ATU, £75. MX-29S, full 2m conversion, frequency readout, CTCSS tone, £80. Tonna 9-ele port beam, never used, £35, plus many other items. 01257 249185 (Chorley). E-mail: karl.brookes@genie.co.uk

YAESU FT-102 HF tcvr with FM, user and workshop mans, £200 ono. Gary, G0EGT. 01293 414959 (Crawley). E-mail: garyp@eurobell.co.uk

YAESU FT-102 HF tcvr, AM/FM board, narrow CW filter, FC-102 antenna tuning unit, FV-102DM digital VFO, all in very good condition, a bargain at £500. 01527 874207 (Bromsgrove).

YAESU FT-102, £150. Yaesu FRG-7700 with tuner and VHF converter, £120. Buyer collects. G3NPJ, QTHR. 0151 342 7295 (Wirral).

YAESU FT-2500M, coverage 140MHz - 180MHz, 50W output, with Manson 30A PSU, Chelcom aerial, all mint, best offer secures. John, G4YDM. 0191 416 2606 (Washington).

YAESU FT-726R, 2m and 70cm satellite unit, workshop mans. A gift for Xmas, £385. 01952 251478 (Telford).

YAESU FT-736R 2/70 m/mode, unmarked, boxed, mans, £500. Trio 520S + remote VFO, HF, SSB, mans, gwo, £140. 70cm m/mode linear amp, 432-10-100, £75. All plus carr at cost. Dave, G1IOO, QTHR. 01204 524104 eves, 07977 271515 days (Bolton).

YAESU FT-747 HF tcvr, 160-10m, 100W, mic, power cable, h/book, in good clean cond, £235. G3MKU, QTHR. 01509 502611 (Loughborough). E-mail: g3mku@cs.com

YAESU FT-900AT HF tcvr, Collins filters, mint, £525. Watson W-10SM, 10A switched mode PSU, as new, £30. G4ILO. 01900 821192 (Cumbria). E-mail: julian@tech-pro.co.uk

YAESU FT-920AF HF + 6m, 10hrs use only, Cushcraft R-6000, £1100 the pair, will split reluctantly. 30A PSU, £75. Old 20A PSU, £40. MFJ artificial ground £50. SEM transmatch, £20. AEA SWR-121 HF analyser, £150. Lots of accessories, inc 'scope. 01395 265723 (Exmouth).

YAESU FT-990 HF tcvr, c/w narrow SSB and CW filters and MC-60 desk mic. The tcvr has had very little use and is in as new cond. £750 + carr by courier (about £12). 01736 757721 (Hayle).

WANTED

ALL early wireless equipment wanted. Rcvrs, crystal sets, early transmitters, horn speakers, valves, Morse keys, spy sets, pre-war television. Any cond considered. Jim Taylor, G4ERU, 5 Luther Road, Winton, Bournemouth, BH9 1LH. Tel/fax 01202 510400 (Bournemouth)

BRAUN 1000TG portable radio (made in Germany), Zenith 7000, Sony CRF-320, 330, Sony B-21. Sale: Eddystone 1650, first class cond, £750. 020 8813 9193 (Southall).

EDDYSTONE model 670C cabin rcvr, must be perfect externally but need not work. Graeme, G3GGL, QTHR. 01299 403372 (Bewdley).

KENWOOD TS-50S accessories wanted. SWC1 coupler 1.8-150MHz and SWC2 140-450MHz for SW2000 SWR power meter. PS-52, SP41, SP50B. SG2000 accessories. SG-500 smart power cube. Smart lock for SG-230. Windshield suction cup mount. 25ft Tennamast. South coast if possible. Call Dave, GU0HRY, QTHR. 01481 63489 (Guernsey).

COTTAGE or bungalow required, rural or semi rural location with good size grounds for early retirement, all areas considered up to around £100k. All enquiries answered, genuine advertisement, telephone or write. G0WAY, QTHR. 01902 737330 (Wolverhampton)

DAIWA NS660P SWR/PWR meter, must be in ex cond. G3VLQ, QTHR. 01935 422973 (Yeovil). E-mail: al@g3vlq.freeserve.co.uk

DISABLED enthusiast of 'Real Radio' offers good home to QSL cards, log books, magazines now unwanted. Mike, 8 Windsor Road, Reydon, Southwold, Suffolk IP18 6PQ.

EDDYSTONE 880 wanted. 01484 654650 (Huddersfield).

EDDYSTONE. Now seeking Eddystone loudspeakers, round, square, rectangular, or plinth, any condition acceptable. Also wanted models 670A and 770U Mk.2. 01789 293375 (Stratford-on-Avon). E-mail: g0ogn@aol.com

HAM IV or similar heavy duty rotator required. One needing service or restoration may be acceptable. Coaxial relays VHF/UHF. WHY? 01285 821571 (Cirencester).

INTERNAL switch mode PSU for Icom IC-751. G3KLY, QTHR. 01323 896296 (E Sussex).

KENWOOD accessory. SP-31 speaker in gwo. Tony, M0AAJ. 01223 232905 (Cambridge).

KEYPAD plus interface for Lowe HF-125, or circuitry. S-meter for RCA AR-77. Cabinet and S-meter for Hallicrafters SX-24. G4HHZ, QTHR. 01703 270785 (Chandlers Ford).

KR1B/603 keyer paddle for Corsair II tcvr. 2E0ARF. 0161 3208553 (Manchester).

MARCONI frequency extender 2373 also h/book for 2370 to buy/copy. Ray, G8EZT, QTHR. 020 7602 1171 (Notting Hill). E-mail: elgygrouprentals@yahoo.com

PAXOLIN tube, teflon rod or other material suitable as coil former. 1in diameter, minimum 5in long. G3WCE, QTHR. 01603 250910 (Norwich).

RURAL retreat / second home within commuting distance of Norwich. Ideally cottage or bungalow with large radio-friendly garden. Price to £100k. G3WCE, QTHR. 01603 250910 (Norwich).

TEN-TEC Corsair II external VFO model 263G, complete. G0HZE. 01733 342439 (Peterborough).

THE UK scanning directory, 6th edition preferred. Alan, M0AST. 01922 645678 (Walsall).

TRIO/Kenwood TR-2300 144MHz FM tcvr, non-working or tatty ok. Must have accessories. Also any Trio extras for TR-2300, such as flexy aerials, power leads, ext power amp, mobile mounts, etc. For motorcycle mobile project. All spares needed for this tcvr & Icom IC-290D 2m tcvr, especially mic & mobile mount. HM-10 mic also. Richard Perzyna, G8ITB. 01689 602948 (Bromley).E-mail:richard.perzyna@cwcom.net

TS-930S, 100% working order, late model, fitted ATU, WARC bands, preferably with CW filters. G8FF, QTHR. 01263 713210 (Norfolk).

WANTED 4-pin mic, MC-50 or MC-355. G3BPE, 37 Danvers Way, Westbury, Wilts BA13 3UF. 01373 826939 (Westbury).

YAESU FT-736R 1.2GHz module, FEX-736-1.2. G3DVV, QTHR. 01608 644371 Chipping Norton). E-mail: johnbrown@g3dvv.demon.co.uk

YAESU YO-901 multi scope, with or without band scope. Yaesu YR-901 CW/RTTY reader. Yaesu YO-148 desk mic, workshop man FT-101ZD. Please can anybody help? 01829 760072 (Tarporley).

CLUB NEWS

DEADLINE - Items for club news should be sent to the *RadCom* Office at HQ to arrive by the 26th of the month, ie approximately a month before publication. For example, 26 January for the March issue. News items should be sent in writing (fax or letter) and be signed by the club secretary or the person responsible for publicity. Post cards for this purpose are available from RSGB HQ.

Note: This is a service for clubs affiliated to the RSGB. The announcements are intended to notify non-members and potential members of your club of specific events. Therefore, 'committee meeting', 'natter night' and 'ragchew evening' etc will not be included. Basic, unchanged details about RSGB affiliated clubs are published annually in the *RSGB Yearbook*.

AYLESBURY VALE RS – 12, OTA. Roger, G3MEH, 01442 826651.

BANGOR & DARS – 5, Q. Mike, GI4XSF, 028 42772383.

BLACKMORE VALE ARS – 11,T '/MM' by Walter Reed, G0WAL. Tony, G0GFL, 01258 860741.

BRACKNELL ARC – 12, AGM. Baugh @compuserve.com

BRAINTREE & DARS – 3, OTA; 17, Soldering Evening, G0DEC. Keith, M0CLO, 01376 347736.

BROMLEY & DARS – 18, AGM. Alan, G0TLK, 020 8777 0420.

BROMSGROVE ARS – 11, OTA & competition; 25, T 'Weather Satellites' by Eric, G8BKL, Derek, G3KFD & Dave, G1DYC. B Taylor, G0TPG, 01527 542266.

CAMBRIDGE & DARC – 7, T 'Noise figure measurements theory & practice' & demo by Mike, M0BLP; 14, T 'Aligning & testing your Pixie tx' & demo by Mike M0BLP; 21, T 'TCP/IP packet transfer' & CON 'How to build your own' by Steve, G4WSZ; 28, T 'QRP Pixie on air test', did you build it right?!! By Mike, M0BLP. Bob, G0GVZ, 01223 413401.

CHELMSFORD ARS – 4, JS. Charles, G0GJS, 01245 256654.

CHELTENHAM ARA – 7, T 'Ugly and more ugly' by G4RFU. Patricia, G1NKS, 01242 241099.

CHESHAM & DARS – 12, OTA; 19, AGM; 26, OTA, CON. P Blakeney, G8BLB, 01494 784811.

CHESHUNT & DARC – 12, T 'Development of the CRT', by Bernard Eastwood; 19, OTA; 26, MP. Jim, G0JXN, 01992 468204.

CHICHESTER DARC – 4, Open evening. Graham, G0WSD; 18, Packet radio. 01243 788292.

COLCHESTER RA – 6, T 'How I got Started on 10GHz' by Ken, G0WZV; 20, T 'A History of Space Exploration 1958-1991', by John Bayley. Frank, G3FIJ, 01206 851189.

CRAY VALLEY RS – 20, Meeting at Ranger's House, an evening for CVRS members only. Tony, G4WIF, 020 7739 5057 (OH).

CRYSTAL PALACE & DRC – 15, Transverter Project, MP. Vic, G1PKS, 020 8653 2946.

DERBY & DARS – 5, JS. Martin, G3SZJ, 01332 556875.

DORKING & DRS – 25, AGM. John, G3AEZ, 01306 631236.

ECHELFORD ARS – 13, Bring & Show Evening - maximum 5 minutes chat on each item brought - contact G0LAM; 27, T 'Fix it, Test it, Align it', by Paul Elliott, G0TXL. Robin, G3TDR, 01784 456513.

EDGWARE & DRS – 13, AGM. David, G5HY, 01923 655284.

EXETER ARS – 10, AD. D I Smith, G0WHJ, 01392 434078.

EXMOUTH ARC – 12, T 'Sunspots', by David, G0NRR; 26, Connections Evening by Mike, G7TRF. G0NRR, 01395 271880.

FARNBOROUGH & DARS – 12, Chairman's Evening; 26, JS. Norman, G0VYR, 01483 835320.

FELIXSTOWE & DARS – 13, Novice course commences. Paul, G4YQC, 01394 273507.

GLOUCESTER AR & ES – 10, Heathkit evening - bring & show; 17, OTA; 24, MP; 31, OTA. Tony, 01452 618930, OH.

GREAT LUMLEY AR & ES – 12, Novice course starts. Mike, G0NEE, 01661 832020.

GRIMSBY ARS – 6, AFS organisation; 20, Q. Brian, G4DXB.

HALIFAX & DARS – 18, T 'Reflections', by Esde Tyler, G0AEC Ray, 01274 600297.

HAMBLETON ARS – 6, OTA; 20, AGM. John, G0VXH, 01845 537547.

HARWELL ARS – 2, New Year DF Hunt; 18, Rally preparation. John, G6LNU, 01235 223250.

HARWICH ARIG – 12, T 'Time and the Cosmos', by Tony, G8LTY. Eugene, G4FTP, 01206 826633.

HASTINGS ELECTRONICS & RC – 19, Radio Help Clinic with Terry, G4FET & Peter, G3UFI; 23, Christmas lunch - Leeford Place, Whatlington Rd, Battle; 26, ES. Doug, G4ERA, 01424 812350.

HORNDEAN & DARC – 25, T 'A little bit of Japan', by Walter Vandome. Stuart, G0FYX, 01705 472846.

HORSHAM ARC – 6, T 'Antenna Analysis', by G3JKF. David, G4JHI, 01403 252101.

HULL & DARS – 7, T 'I Hate Decibels', by G0TPS; 21, T 'WWW', by G7DBL. John, G0TPS, 01964 562258.

ITCHEN VALLEY ARC – 14, H M Coast-

SILENT KEYS

WE REGRET to record the passing of the following radio amateurs:

G1FZQ	Mr T Brooker	30/10/99
G3BG	Mr N Button	29/10/99
G5BR	Mr G F Mason	
GM3GBY	Mr J Bryce	13/10/99
G2FTB	Mr F T Baker	12/10/99
G3KWE	Mr M B Aburrow	25/09/99
RS17874	Mr G F Clarke	24/08/99
G8VWP	Mr J B A Jones	11/09/99
G4HZU	Mr D Hayter	08/11/99
G3CCC	Mr H Barnes	18/06/99
GU4XGG	Mr R G Grove	
G3FVV	Mr R C Fagg	29/09/99
G0OEL	Mr T G Benton	02/11/99
G4UNC	Mr J Quash	14/10/99
GW2DUR	Mr M N Lapper	
G3IED	Mr G H Yule	22/09/99
ON6JI	Mr J Crombez	13/08/99
G2FHK	Mr D A Smith	20/10/99
G3MTK	Mr J F Knight	28/09/99
RS52439	Mr A L Johnston	22/10/99
G3RRD	Mr D W Marmont	04/08/99
G4HCQ	Mr J W Westwood	16/11/98
GD7HSX	Mr J Ireland	30/10/99
M0BMS	Mr M P Black	
G4FRG	Mr B L Goddard	07/11/99
G0DFZ	Mr J Wardale	05/11/99
G7MZF	Mr R Chappell	05/11/99
G4IVR	Mr T C Clarke	16/10/99
G0UTJ	Mr F B Bolton	29/07/99
G4TEY	Rev. J Morris	30/10/99
G0AGY	Mr S R Talbot	22/11/99
G3AVO	Grp. Cpt. G K K McKay	29/10/99
G4HKU	Mr D H Leonard	
RS16277	Mr J D Hall	12/02/99
G3SMR	Mr R J Tinkler	16/06/99
G3LSW	Mr K L Willis	
RS38221	Mr C A A Marriott	09/10/99
G3EEW	Mr F J Heasman	18/11/99
PA0ANI	Mr H A de Reiger	
G3NOW	Mr R W Tomkys	18/11/99
G3AOP	Mr G A Bastow-Coultiss	
G3AZT	Mr C H Walker	21/10/99

guard; 28, Chris Lorek, G4HCL, Secret Agent Radio and Mecca. D C Symonds, G0PRZ, 01703 261877.
KEIGHLEY ARS - T by Ian Dewhirst MBE. Ian, M1BGY, 01274 723951.
KIDDERMINSTER & DARS – 4, Talk by Wyre Forest Repeater Group. Geoff, G0RJP, 01299 888826.
LINCOLN SHORT WAVE CLUB – 5, G5FZ OTA; 12, AGM. John, G1TSL, 01522 793751.
MAIDSTONE YMCA ARS – 7, Transmitter Interference; 14, Measurements; 21, 28, EMC. John, G0RHO, 01622 832259.
MAXPAK – 3, T 'Does your PC welcome the new millennium?' Edward, G4ZXS, 07971 570428.
MID-WARWICKSHIRE ARS – 11, Mini talks by Club Members; 25, PC Construction by Dave, G8UIO. Bernard, M1AUK, 01926 420913.
MILTON KEYNES ARS – 10, Club photo night; 17, OTA; 24, Film Night; 31, CON. Dave, M0BZK, 01908 647662.
NEWBURY & DARS – 26, JS. Ian, G3RVM, 01635 826019.
NORFOLK ARC – 5, Vid; 19, T 'British Built Linears are the Best', by Peter Rodmell. John, G0VZD, 01953 604769.
NORTH KENT RS – 4, DX Ladder; 18, OTA. Pete, G0GIR, e-mail: Silversands@aol.com
POOLE ARS – 14, Members' Antenna Forum. Colin Redwood, G6MXL.
PRESTON ARS – 27, AGM. Eric, G1WCQ, 01772 686708.
RS OF HARROW – 7, Shack Evening, 21, G2UV Talk Challenge. Your chance to talk on radio-electronic subject for 15 mins. Prizes for best talk. Jim Ballard, 01895 476933 / 020 7278 6421.
SALOP ARS – 13, Chairman's Discussion night; 20, T 'Aerial Matching and Other Magics', by Richard, G4AZV. Fred, G3NSY, 01743 790457.
SILVERTHORN RC – 14, AGM; 21, Robot Wars - Future of the project. David, G0KHC, 020 8505 1871.
SOUTH BRISTOL ARC – 5, Plans for club events in 2000; 12, B&B, ES; 19, Display of club archives; 26, Master Class - high speed Morse. Len, G4RZY, 01275 834282.
SOUTH MANCHESTER RC – 7, Mini lecture contest; 14, Safe house wiring, by Ged; 21, OTA, 80m; 28, Technical Topics. G E Spark, G7FQY, 0161 9691964.
SOUTH NOTTS ARC – 1, OTA; 5, OTA, 12, AGM; 19, OTA, 26, T 'Kits for Novice and the Experienced alike', by Alan, G4DVW. 01509 672846.
SOUTHDOWN ARS – 10, AGM. Brian, G4LYU, 01323 840530.
SOUTHGATE ARC – 14, T 'Packet part II', by Malcolm Salmon; 28, PC & Hard Disk Setup Clinic/Demo, by Keith, G8RPA. Nick Earl, 01992 463453.
SPEN VALLEY ARS – 6, AGM. Russell, G0FOI, 01274 875038.
STOCKPORT RS – 12, PSK31 demonstrated, by John, M0BEX & Brenard, G3SHF; 26, What's new in the SRS library & OTA. David, M1ANT, 0161 285 0017.
SURREY RADIO CONTACT CLUB – 3, Sid Morley Memorial Lecture. 'D-Day Radio Navigation' by Walter, G3JKV. Ray, G4FFY, 020 8644 7589.
SUTTON & CHEAM RS - T 'Cassini Mission to Saturn' by Dr Dave Linder of the Mullard Space Science Lab.
TELFORD & DARS – 5, OTA. Mike, G3JKX, 01952 299677.
THORNTON CLEVELEYS ARS – 10, T 'A DXpedition to South Sandwich Is', by Ken, G3RFH; 17, Video Evening; 20, T 'Computer', by Jack, G4BFH; 31, ES Jack, G4BFH.
WAKEFIELD & DRS – 4, Millennium Party; 11, Invitation to all Novices; 18, Northern Cross Rally Meeting; 25, Q. John, G7JTH, 01924 251822.
WIMBLEDON & DARS – 14, T 'Near Vertical Incidence Radio Propagation', by George, G3DWW; 28, Members' Evening. 01737 356745.
WORTHING & DARC – 5, Discussion Evening; 12, Short History of Time Keeping; 19, Club Project – Discussion; 26, Videos. Roy, G4GPX, 01903 753893.
YEOVIL ARC – 6, T 'Alan Turing Part 2', by Joe, G3KSK; 13, Video 'Early Radar', by Brian, G4PDG; 20, T 'Inductive Coupling', by Rob, G3MYM; 27, OTA. Malcolm, M0BHE, 01460 54657.
YORK RC (AMATEUR) – 6, T 'Fibre Optic Transmission' by M1CXM; 13, Vid; 20, MP with G4XIV & G0WUY; 27, Fix it evening with G4FUO. Gareth, G1DRG, 01904 421392.

RALLIES AND EVENTS

This is a list of all rallies, hamfests, exhibitions and conventions notified to HQ (as at press date). Items are given in detail for the next three months inclusive and in brief thereafter. Please send detailed information, including contact callsign and telephone numbers direct to HQ and marked 'Rally News - DIARY'.

16 JANUARY
OLDHAM ARC Rally - Queen Elizabeth, Oldham. Details, Mike, M1CVL, on 01706 367454 (eve) or m1cvl@netcomuk.co.uk

23 JANUARY
LANCASTRIAN Rally - Lancaster University. Routes from southbound M6 jcn 33. Northbound M6 jcn 34. OT 10.30am/11am, B&B, MT, C. 01772 621 954.

30 JANUARY
FENLAND REPEATER GROUP Amateur Radio Rally, Electronics and Computer Fair – Horncastle Youth Centre, The Old School, Cagthorpe, Horncastle, Lincs. OT 10.30am £0.50, small children free. TS, MT, C, SIG. John Storry, G4OID, QTHR, 01205 354 644.

6 FEBRUARY
HARWELL ARS Radio and Computing Rally - Ann, G8NVI, 01235 816 379.
SOUTH ESSEX ARS Radio & Computer Rally - the Paddocks, Long Road, Canvey Island, Essex. OT 10.30am, CP, TS, B&B, MT. Brian, G7IIO, 01268 756 331.

13 FEBRUARY
CAMBRIDGE & DARC Radio Rally and Car Boot Sale - Ambulance Station, Addenbrook Hospital, Cambridge. OT 9.30am/10am, £1.50, B&B, CP, CBS. 01954 200 072 or 01223 413 401.
NORTHERN CROSS Rally - Thornes Park Athletics Stadium, Wakefield. Easy access - M1 Jcn 39 & 40. Well signposted, TI 2m and 70cm. OT 10.30am/11am, B&B. 01924 893 321.

11 / 12 MARCH
LONDON Amateur Radio and Computer Show - Lee Valley Leisure Centre, Picketts Lock Lane, Edmonton, London N9. CP, TS, B&B, OT 10.00, TI 2m/70cm, C, LB, DF, SIG, MT, LEC, FAM, CS. 01923 893 929.

12 MARCH
WYTHALL RC Millennium Radio & Computer Rally – Wythall Park Silver Street, Wythall. OT 10am, £1.50, TS, B&B, TI S22, LB, C, park & ride. Chris, G0EYO, 0121 246 7267 or chris@g0eyo.freeserve.co.uk

18 MARCH
ABERYSTWYTH & DARC West Wales Amateur Radio and Computer Rally – Penparcau School, Aberystwyth. OT 10am, £1.00, TS, B&B, TI S22, SIG, C. Ray, GW7AGG, 01686 628 778.

19 MARCH
BOURNEMOUTH RS Annual Sale – Kinson Community Centre, Pelhams Park, Millhams Road, Kinson, Bournemouth. OT 10.30am, £1, TI S22, TS, SIG, C. 01202 887 721.

19 MARCH
TIVERTON SW ARC Radio & Computer Rally – Pannier Market. OT 9.45am/10am, CP,B&B, C. Dave, G4DUT, 01884 253 077.
NORBRECK Amateur Radio, Electronics and Computing Exhibition - 0151 630 5790.

26 MARCH
BARRY ARS Welsh Amateur Radio Exhibition – Memorial Hall, Barry. OT 10am/10.30am. Official opening by special guest at 11.30am. Brian, 01222 832 253.
VINTAGE Technology 2000 – de Vere Hotel, Leisure Centre & Golf Course, East Park Drive, Blackpool. OT 9.00am £4, CP, SIG. Brian, 01253 508 232.

16 APRIL
BREDHURST RECEIVING & TRANSMITTING SOCIETY Rainham Radio Rally, Martin, 01634 365 980.
SWANSEA ARS Amateur Radio and Computer Show, Roger, GW4HSH, 01792 404 422.
YEOVIL QRP Convention, Peter, 01935 813 054.

30 APRIL

1 MAY
DARTMOOR Radio Club Rally, Ron, G7LLG, 01822 852 586.
MID CHESHIRE ARS – Rally, David, G4XUV, 01606 77787.

7 MAY
DRAYTON MANOR Radio and Computer Rally, Peter, 0121 422 9787 or 0121 443 1189.

21 MAY
RIPON & DISTRICT ARS Northern Mobile Rally, Harrogate. Gerald, G0UFI, 01765 640 229, or gerald@bronco.co.uk.
THREE COUNTIES Radio and Computer Rally, Eddie, 01905 773 181.

11 JUNE
ELVASTON CASTLE National Radio Rally, Les, G4CWD 01332 559 965 or les@g4cwd.demon.co.uk

22 / 24 JUNE
HAMRADIO 2000 – Friedrichshafen, Germany

25 JUNE
LONGLEAT RALLY – Longleat House, Warminster, Wilts.

8 JULY
CORNISH RADIO Rally and Computer Fair, Robin, 01209 820 118.

9 JULY
SUSSEX Amateur Radio and Computer Fair, Ron, G8VEH, 01903 763 978 or 01273 417 756.
YORK RC (Amateur) Radio Rally, Pat Trask, G0DRF, 01904 628 036.

23 JULY
COLCHESTER Radio Rally & Computer Fair – Frank, G3FIJ, 01206 851 189.

30 JULY
RSGB Radio Hobby Day – Hatfield House, Hatfield, Herts. RSGB, 01707 659 015.

13 AUGUST
KING'S LYNN ARC 11th Great Eastern Rally, Derek, G0MQL, 01553 841 189, or Fred, 01760 440 570.

10 SEPTEMBER
VINTAGE Technology 2000 – Blackpool. Brian 01253 508 232.

22 / 23 SEPTEMBER
LEICESTER Amateur Radio Show, Geoff, 01455 823 344, fax 01455 828 273, or e-mail g4afj@argonet.co.uk

12 NOVEMBER
MIDLAND ARS 12th Radio and Computer Rally – Peter, 0121 443 1189.

25 / 26 NOVEMBER
LONDON Amateur Radio and Computer Show - 01923 893 929.

GB CALLS

These callsigns are valid for use from the date given but the period of operation may vary from 1-28 days before or after the event date. Operating details are provided in an abbreviated form as follows: T = 160m; L = 80 or 40m; H = HF bands (30 - 10m); V = 6 and / or 4m; 2 = 2m; 70 = 70cm; S = Satellite and P = Packet. Please send operational details of your special event station to the *RadCom* office at least five weeks before publication.

1 Jan	GB0DVN: Devon Morse Test Team Stn. Plymouth, Devon. TLH2 (G3VNG)
	GB2NY: New Year. Lancashire. LHV2 (G0TOO)
2 Jan	GB2VGG: Club Call Sign. Bromsgrove. TL27 (M0CKJ)
5 Jan	GB0WPS: Wraxall Primary School. Wraxall, North Somerset. LH2 (G0LHD)
	GB2MM: 2000 in Roman Numerals. Loughborough, Leics. LHV2 (G4KGG)
8 Jan	GB2MHZ: MHz Unit of Frequency. Netherton, Dudley. LHV2 (G0TMF)
28 Jan	M2000A: Millennium. Blackheath, London. TLHV27P (G3RCV)

CONGRATULATIONS

To the following whom our records show as having reached fifty years continuous RSGB membership this month:

Mr R T Palmer, G3YJJ
Mr W E Waring, G3GGS
Mr G A S Lander, HB9AJU
Mr L M Airey, G3GEJ
Mr J G Houghton, G1KEP
Mr A J Gibbs, VK6PG
Mr A J Shepherd, G3RKK

KEY

Club News
AD - Annual Dinner; **AGM** - Annual General Meeting; **ARDF** - Amateur Radio Direction Finding; **B&B -** Bring and Buy; **CON** - CONstruction; **CC** - Construction Competition; **D -** Details; **ES** - Equipment Sale; **EW -** Evenings/Weekends; **JS** - Junk Sale; **MP -** Morse Practice; **OH** - Office Hours; **OTA** - On The Air; **Q** - Quiz; **RP** - Rally Preparations; **T** - Talk; **VID** - VIDeo;

Rallies & Events
TI - Talk-In; **CP** - Car Park; **£** - admission; **OT** - Opening Time - time for disabled visitors appears first, eg (10.30/11am); **TS** - Trade Stands; **FM** - Flea Market; **CBS** - Car Boot Sale; **B&B** - Bring and Buy; **A** - Auction; **SIG** - Special Interest Groups; **MT** - Morse Tests; **LB** - Licensed Bar; **C** - Catering; **DF** - Disabled Facilities; **WIN** - prize draw, raffle; **LEC** - LECtures / seminars; **FAM** - FAMily attractions; **CS** - Camp Site.

RadCom NEWS

CONTINUED FROM P11

Olympic Award

THE VKDX ASSOCIATION has created a short-term award known as 'Sydney Gold – the Gathering of the Nations Award'. It marks the Sydney Olympic Games and aims to encourage contacts with amateurs in the Sydney area, and is available to all licensed amateurs and SWLs around the world. The rules are as follows:

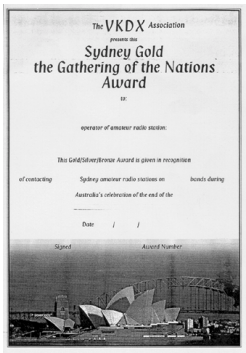
(a) Contacts must be made between 1 July 2000 and 31 December 2000.

(b) Contacts must be made with amateur stations in the Sydney area. The region can be identified by the following postcodes – 2000 to 2249, 2560 to 2570 and 2745 to 2770.

(c) All contacts must be two-way and on the same band and mode. No cross-band contacts are allowed. Repeat contacts are not allowed on the same band with the same station using the same mode within any 24-hour period.

(d) All bands (including the WARC bands) and all types of emission can be used. Maritime and aeronautical contacts are not allowed.

(e) All amateurs working the Sydney region amateur stations must ask for (and log) the Sydney region residential postcode as identification.


The VKDX Association
Sydney Gold
the Gathering of the Nations
Award

(f) Overseas stations (except ZL) must contact a total of 15 Sydney region stations on one band, or a total of 15 on any number of bands.

(g) VK and ZL stations must contact 30 Sydney region stations.

There are three award levels: **gold** – all contacts on three or more bands; **silver** – all contacts on two bands; **bronze** – all contacts on one band.

General Certification Rules

THE APPLICATION should be a simple letter, in English, showing the applicant's full name, callsign and postal address, together with the level of award being requested.

A certified copy (by two licensed amateurs not related to the applicant) of the log extract should be attached, showing each VK2 callsign, the date and time (UTC), band, mode, signal reports sent and received, and the postcode of the VK2 station.

SWLs are bound by the rules above, but must show in each case the QSO partner of the VK2 station.

Applications will not be accepted after 31 December 2000, and the awards will be issued after 1 January 2001. Air mail is preferred , and early application is encouraged. The award is a two-colour A4 sheet specially designed, printed and issued by the VKDX Association. It costs US $10, which includes airmail return and secure packaging. Cheques and money orders should be in Australian currency only. IRCs are not acceptable.

Completed applications should be sent to: VKDX Association, PO Box 299, RYDE, NSW 1680, Australia.

HF Committee Vacancies

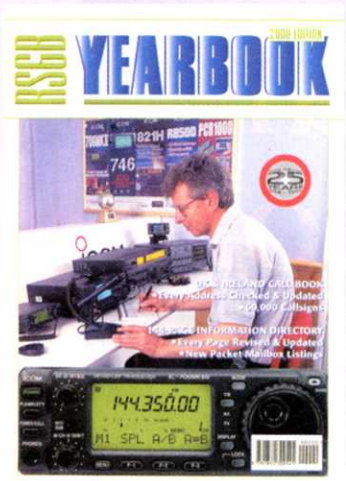
VACANCIES HAVE arisen on the RSGB HF Committee. Volunteers who possess the following qualities are being sought.

A thorough knowledge of the amateur HF spectrum and the modes currently in use; a willingness to help formulate future HF conventions, especially the forthcoming HFC2000, which promises to be one of the best ever; the ability to give one hundred and ten percent commitment to the HF Committee and to any relevant sub-group; a familiarity with the use of e-facilities, because much of the work of the Committee is carried out by e-mail; and lastly, a good sense of humour is essential!

There are no rewards for being a committee member, apart from the satisfaction of knowing that you are doing the job to the best of your abilities. Out-of-pocket expenses are refundable.

Expressions of interest, including a CV and contact details, should be sent initially by e-mail to HF.Manager@rsgb.org.uk or to Colin Thomas, G3PSM, whose address is correct in the current *RSGB Yearbook.*

RSGB Yearbook 2000 Edition



Complete UK and Eire callsigns listing, plus a 144-page information directory - Every page updated. A must for all radio amateurs and SWLs.

Members' Price £12.33 plus P&P

Amateur Radio ~ the first 100 years

To commemorate the first 100 years of amateur radio the Society has commissioned a pictorial history book. This 256 page book, lavishly illustrated with only the best of selected photographs from the Society's extensive photo-library, plots a memorable visual history of amateur radio over the last 100 years.

Each copy of this limited edition is individually numbered, beautifully bound and gold blocked. A collectable item to serve as a particularly apt memento for the end of the Millennium.

Members Price £39.53 plus P&P

Payment: Payment may be made by cheque or postal order. These should be crossed and made payable to 'Radio Society of Great Britain'. If sending cash please use registered post. We accept Visa/Access/Amex cards and our telephone number for credit-card orders is **01707 660888**. Our Giro account number is 533 5256.

RSGB

Description		Retail Price	Members Price
ANTENNA			
Antenna Compendium Volume 1	(ARRL)	£12.50	£10.63
Antenna Compendium Volume 2	(ARRL)	£12.50	£10.63
Antenna Compendium Volume 3	(ARRL)	£13.50	£11.48
Antenna Compendium Volume 4	(ARRL)	£19.50	£16.58
Antenna Compendium Volume 5	(ARRL)	£19.50	£16.58
Antenna Compendium Volume 6 - *New*	(ARRL)	£17.00	£14.45
Antenna Compendium Set - Volume 1, 2, 3, 4 & 5	(ARRL)	£70.00	£59.50
Antenna Impedance Matching	(ARRL)	£18.50	£15.73
ARRL Antenna Book - 18th Ed	(ARRL)	£27.50	£23.38
HF Antenna Collection - 2nd Ed	(RSGB)	£11.00	£9.35
HF Antennas for all Locations - 2nd Ed	(RSGB)	£7.50	£6.38
Physical Design of Yagi Antennas	(ARRL)	£19.00	£16.15
Practical Antennas for Novices - 1st Ed	(RSGB)	£6.00	£5.10
Practical Antenna Handbook - 3rd Ed - *New*	(McGraw-Hill)	£39.50	£33.58
Practical Wire Antennas - 4th Ed	(RSGB)	£10.50	£8.93
Simple Low-Cost Wire Antennas	(ARRL)	£10.50	£8.93
The Antenna Experimenters Guide - 2nd Ed	(RSGB)	£16.00	£13.60
Vertical Antenna Classics	(ARRL)	£11.50	£9.78
Wire Antenna Classics - *New Edition*	(ARRL)	£16.00	£13.60
BACK ISSUES & BINDERS			
RadCom 1991-95 CD-ROMs - *New*	(RSGB)	£34.95	£29.70
RadCom 1996 CD-ROM	(RSGB)	£16.00	£13.60
RadCom 1997 Bound Volume	(RSGB)	£35.50	£30.18
RadCom 1997 CD-ROM	(RSGB)	£26.50	£22.53
RadCom 1998 CD-ROM	(RSGB)	£21.00	£17.85
RadCom Back Issue	(RSGB)	£3.50	£2.98
RadCom Easibinder	(RSGB)		£7.23
CALL BOOKS			
CallSeeker 2000 CD-ROM - *New*	(RSGB)	£14.50	£12.33
RSGB Yearbook 2000 - *New Edition*	(RSGB)	£14.50	£12.33
RSGB Yearbook 2000 & Callseeker 2000 Set	(RSGB)		£19.50
World Callbook CD-ROM 2000	(WG)	£41.00	£34.85
CENTENARY & MILLENNIUM (LIMITED EDITION)			
Amateur Radio ~ the first 100 years - *Coming Soon*	(RSGB)	£46.50	£39.53
Centenery Mug	(RSGB)	£21.50	£18.28
Marconi Centenary Tankard	(RSGB)	£14.50	£12.33
Millennium Morse Key - Add £3.65 p&p + insurance	(RSGB)		£89.95
EMC			
Radio Frequency Interference Book	(ARRL)	£19.00	£16.15
RSGB Guide to EMC	(RSGB)	£21.50	£18.28
Filters - See Components Corner, November Radcom			
GENERAL TECHNICAL			
ARRL Handbook 2000 - New	(ARRL)	£32.00	£27.20
ARRL Handbook 2000 CD-Rom - Coming soon	(ARRL)	TBA	TBA
Introduction to RF Design	(ARRL)	£37.00	£31.45
LF Experimenter's Source Book - 2nd Ed	(RSGB)	£8.00	£6.80
Low Power Communications	(ARRL)	£13.00	£11.05
PMR Conversion Handbook - 1st Ed	(RSGB)	£17.00	£14.45
Practical Receivers for Beginners - 1st Ed	(RSGB)	£14.50	£12.33
Practical Transmitters for Novices - 1st Ed	(RSGB)	£12.50	£10.63
Radio Communication Handbook - 7th Ed - *New*	(RSGB)	£30.00	£25.50
Radio Data Reference Book - 6th Ed	(RSGB)	£15.00	£12.75
Solid State Design	(ARRL)	£13.50	£11.48
Technical Topics Scrapbook 1985-89	(RSGB)	£8.50	£7.23
Technical Topics Scrapbook 1990-94	(RSGB)	£14.00	£11.90
The Focal Illustrated Dictionary of Telecoms - *New*	(Focal Press)	£29.50	£25.08
Test Equipment for the Radio Amateur - 3rd Ed	(RSGB)	£13.00	£11.05
The RSGB Rig Guide	(RSGB)	£5.00	£4.25
W1FB's Design Notebook	(ARRL)	£9.00	£7.65
HISTORY			
CQ-GTZM Diary of a Maritime Radio Officer	(RB)	£12.95	£12.95
RAF Beam Benders No.80 (Signals) Wing 1940-45	(MPL)	£14.95	£14.95
Reflections in a Rosebowl	(RW)	£16.50	£14.03
World at their Fingertips - 1st Ed	(RSGB)	£5.50	£4.68
LOG BOOKS & LOG SHEETS			
HF Log Sheets	(RSGB)	£4.50	£3.83
Log Book Cover	(RSGB)	£6.50	£5.53
Log Book Receiving	(RSGB)	£4.00	£3.40
Log Book Transmitting	(RSGB)	£4.00	£3.40
VHF Log Sheets	(RSGB)	£4.50	£3.83
MAPS			
Great Circle DX Map (A4 card for desk)	(RSGB)	£1.50	£1.28
Great Circle DX Map - Wall (folded)	(RSGB)	£4.50	£3.83
Grid Locator Atlas	(ARRL)	£7.50	£6.38
Locator Map of Europe - Wall (folded)	(RSGB)	£1.50	£1.28
Locator of Europe (A4 card for desk)	(RSGB)	£2.50	£2.13
Radio Amateurs World Atlas	(DARC)	£10.50	£8.93
World Map of Islands - Wall (folded)	(HM)	£30.00	£25.50
World Prefix Map (A3 colour)	(GR PUB)	£3.00	£2.55
World Prefix Map - Wall (folded)	(TRAN)	£6.50	£5.53
MICROWAVES, VHF & UHF			
Microwave Handbook Set - Volume 1, 2 & 3	(RSGB)	£36.00	£30.60
Microwave Handbook Volume 1 - 3rd Ed	(RSGB)	£12.00	£10.20

Online book catalogue

SHOP

Description		Retail Price	Members Price
Microwave Handbook Volume 2 - 2nd Ed	(RSGB)	£18.50	£15.73
Microwave Handbook Volume 3 - 2nd Ed	(RSGB)	£18.50	£15.73
Microwave Lectures & Other Papers	(RSGB)	£6.00	£5.10
Microwave Newsletter - inc postage	(RSGB)	£11.15	£9.50
Radio Auroras	(RSGB)	£4.00	3.40
UHF/Microwave Experimenter's Manual	(ARRL)	£20.00	£17.00
UHF/Microwave Project Manual Volume 1	(ARRL)	£20.00	£17.00
UHF/Microwave Project Manual Volume 2	(ARRL)	£15.00	£12.75
VHF Contesting Handbook	(RSGB)		£4.25
VHF/UHF DX Book (Reprint) - 1st Ed	(DIR)	£18.00	£15.30
VHF/UHF Handbook - 1st Ed	(RSGB)	£22.00	£18.70
MORSE CODE			
Instant Morse CD-ROM	(RSGB)	£9.95	£9.95
Morse Code for Radio Amateurs - 8th Ed	(RSGB)	£4.50	£3.83
Morse Code The Essential Language	(ARRL)	£8.00	£6.80
Morse Instruction Tapes 5-10 wpm (2 tapes)	(ARRL)	£11.00	£9.35
Morse Instruction Tapes 10-15 wpm (2 tapes)	(ARRL)	£11.00	£9.35
Morse Instruction Tapes 15-22 wpm (2 tapes)	(ARRL)	£11.00	£9.35
Your Introduction to Morse Code (2 tapes)	(ARRL)	£11.00	£9.35
OPERATING AIDS			
ARRL DXCC Countries List	(ARRL)	£3.50	£2.98
Conversation Guide CD-ROM	(DARC)	£27.50	£23.38
DXing on the Edge	(ARRL)	£28.00	£23.80
Hints & Kinks for the Radio Amateur	(ARRL)	£11.00	£9.35
ON4UN's Low Band Dx-ing ~ New Edition	(ARRL)	£19.50	£16.58
Personal Computers in the Ham Shack	(ARRL)	£14.00	£11.90
RSGB Prefix Guide - New	(RSGB)	£6.00	£5.10
Super Frequency CD-ROM 2000 - *Coming Soon*	(Klingenfuss)	TBA	TBA
Your First Amateur Station - 1st Ed	(RSGB)	£7.00	£5.95
Your Guide to Propagation - 1st Ed	(RSGB)	£7.00	£5.95
QRP (LOW POWER)			
G-QRP Club Antenna Handbook	(GQRPC)	£7.50	£6.38
G-QRP Club Circuit Handbook - 1st Ed	(RSGB)	£10.50	£8.93
QRP Power	(ARRL)	£13.50	£11.48
W1FB's QRP Notebook - 2nd Edition	(ARRL)	£9.50	£8.08
QST MAGAZINE (ARRL)			
QST 1 Year Sub - Airmail	(ARRL)	£88.50	£75.23
QST 1 Year Sub - Surface Mail	(ARRL)	£35.00	£29.75
QST 2 Years Sub - Surface Mail	(ARRL)	£66.50	£56.53
QST 3 Years Sub - Surface Mail	(ARRL)	£94.50	£80.33
SATELLITE			
Satellite Anthology - 5th Edn - *New*	(ARRL)	£13.00	£11.05
Satellite Handbook	(ARRL)	£18.50	£15.73
The Weather Satellite Handbook	(ARRL)	£18.50	£15.73
SHORT WAVE LISTENER			
Passport to World Band Radio 2000	(IBS)	£18.00	15.30
Shortwave Listeners Guide - *New*	(Newnes)	£19.00	£16.15
The New Shortwave Propagation Handbook	(CQ)	£19.00	16.15
World Radio TV Handbook 2000 - *Coming Soon*	(Billboard)	TBA	TBA
SPECIAL MODES			
Nosintro-TCP/IP over Packet Radio	(Dowermain)	£16.50	£14.03
Packet Radio Primer - 2nd Ed	(RSGB)	£10.50	£8.93
Packet, Speed & More Speed - 2nd Ed	(ARRL)	£12.50	£10.63
Space Radio Handbook	(RSGB)	£5.50	£4.68
Spread Spectrum Source Book	(ARRL)	£20.00	£17.00
Your First Packet Station - 1st Ed	(RSGB)	£7.00	£5.95
SUNDRIES			
Callsign Lapel Badge - Deluxe	(RSGB)		£4.50
Callsign Lapel Badge - Standard	(RSGB)		£4.00
Car Sticker - I Love Amateur Radio	(RSGB)	£1.50	£1.28
Car Sticker - I'm on the Air with Amateur Radio	(RSGB)	£1.50	£1.28
Car Sticker - RSGB Emblem	(RSGB)		£1.00
IOTA Rubber Stamp	(RSGB)	£7.50	£6.38
RSGB Lapel Badge - Mini	(RSGB)		£1.25
RSGB Lapel Badge - Standard	(RSGB)		£2.00
RSGB Tie - Blue	(RSGB)		£11.00
RSGB Tie - Red	(RSGB)		£11.00
RSGB Amateur Radio & SWL 2000 Diary	(RSGB)	£3.00	£3.00
TRAINING			
Amateur Radio for Beginners	(RSGB)	£1.50	£1.28
Basic Radio & Electronics Calculations	(RP)	£14.00	£11.90
First Steps in Radio	(ARRL)	£5.00	£4.25
Novice Licence Student's Notebook - 2nd Ed	(RSGB)	£6.00	£5.10
Novice RAE - Additional Worksheets	(RS)	£6.00	£5.10
Radio Amateurs' Examination Manual - 16th Ed	(RSGB)	£15.00	£12.75
Radio Amateurs' Question & Answers Reference Manual - 5th Ed	(RP)	£14.00	£11.90
RAE End of Course Test Papers	(RP)	£14.00	£11.90
RAE Revision Notes - 2nd Ed	(RSGB)	£5.00	£4.25
Revision Questions for the Novice RAE - 1st Ed	(RSGB)	£6.00	£5.10
Training for the Novice Licence Instructor's Manual - 2nd Ed	(RSGB)	£7.00	£5.95

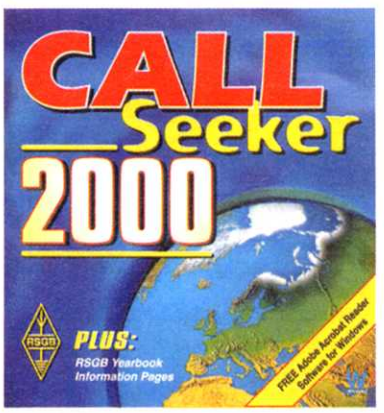
http://www.rsgb.org

Radio Communication Handbook, 7th Edition

The *Radio Communication Handbook* is one of the world's largest and most comprehensive guides to the theory and practice of radio communication. This new edition incorporates the latest technical innovations and techniques of practical radio, from LF to the GHz bands, for professionals and students alike. An invaluable reference for RF engineers and enthusiasts.

Members' Price £25.50 plus P&P

RSGB Callseeker 2000 CD-ROM



Every page of the RSGB Yearbook 2000 in CD-ROM format with searchable callsign listings (Windows 95, 98 or later) and searchable information directory (Adobe Acrobat software supplied free).

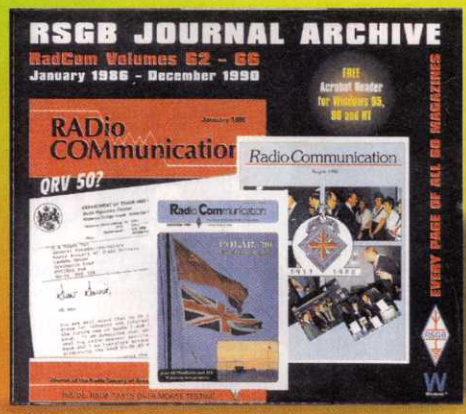
Members' Price £12.33 plus P&P

Next Day Service (UK Mainland Only) £5.25

All prices include VAT (where applicable) and are subject to change without notice

Post & Packing: Please add **£1.25** (overseas £2.00) for one item and **£2.50** (overseas £4.00) for two items or more. Overseas rates for more than two items carries an extra 50p per item. Overseas deliveries are by surface mail (up to 12 weeks delivery) - Air Mail rates on request.

Order From
RSGB SALES (CWO) Lambda House,
Cranborne Road, Potters Bar, Herts EN6 3JE
24-hour Sales hotline: 01707 660888 - Or fax: 01707 645105
E-mail: sales@rsgb.org.uk Web Site: http://www.rsgb.org



RSGB Journal Archive CD-ROMs Jan 86 - 90
&
RSGB Journal Archive CD-ROMs Jan 91 - 95

Each set consists of 3 CDs containing every page of all 60 issues.

- VIEW every page of every edition
- SEARCH a single index file listing every article
- PRINT out any page
- STORE many magazines in a compact box
- FREE Acrobat Reader 4.0 for Win95, 98 and NT

Members' Price
£29.70 each
plus P&P

RSGB

COMPONENTS CORNER

Order Code	Description	Retail Price	Member Price
Adapters			
NBS	N plug to BNC socket adapter	£5.80	£5.00
NC-1465	N plug to SO239 socket	£4.50	£3.90
NC-1520	SO-239 socket to BNC plug	£3.20	£2.80
NC-1521	PL-259 plug to BNC socket	£3.20	£2.80
PL-5/8	PL-259 to 3/8 thread adapter	£5.00	£4.40
UG-349	BNC plug to N socket	£5.80	£5.00
WCN-3	SMA plug to BNC socket	£5.00	£4.40
259NS	Adapter from PL259 to N socket	£5.00	£4.40
Co-ax Plugs			
BNC-15	Small entry BNC plug	£2.00	£1.70
LBNC	Large entry BNC plug	£5.80	£5.00
LEN	Large entry N plug	£3.80	£3.30
NC-556	Reducer for PL-259 for UR43 coax	£0.40	£0.30
PL-259	PL259 plug large entry	£1.30	£1.20
Jacks			
MJP-14	1/4" mono jack plug	£1.20	£1.00
MJP-25	2.5mm mono jack plug	£1.20	£1.00
MJP-35	3.5mm mono jack plug	£1.20	£1.00
MJS-14	1/4" mono line jack socket	£1.20	£1.00
MJS-25	2.5mm mono line jack socket	£1.20	£1.00
SJP-14	1/4" stereo jack plug	£1.20	£1.00
SJP-25	2.5mm stereo jack plug	£1.20	£1.00
SJP-35	3.5mm stereo jack plug	£1.20	£1.00
SJS-35	3.5mm mono line jack socket	£1.20	£1.00

Order Code	Description	Retail Price	Member Price
Mic Plugs			
2PM	2-pin mic plug	£1.90	£1.70
3PM	3-pin mic plug	£2.00	£1.80
4PM	4-pin mic plug	£2.10	£1.90
6PM	6-pin mic plug	£2.30	£2.00
7PM	7-pin mic plug	£2.40	£2.10
8PM	8-pin mic plug	£2.50	£2.20
Misc			
BPP	Phono plug	£0.80	£0.70
FH-2	In line fuse holder	£0.80	£0.70
HJ-15	Cigar lighter plug	£1.40	£1.30
8PDP	8-pin DIN plug	£1.60	£1.40
Filters (AKD)			
Filter 1	Braid Breaker	£10.00	£8.50
Filter 2	HPF for FM Band 2	£10.00	£8.50
Filter 3	HPF & Braid Breaker	£10.00	£8.50
Filter 4	Notch at 145MHz	£10.00	£8.50
Filter 5	Notch at 435MHz	£10.00	£8.50
Filter 6	Notch at 50MHz	£10.00	£8.50
Filter 7	Notch at 70MHz	£10.00	£8.50
Filter 8	High Pass 6 Sect	£31.00	£26.35
Filter 10	Notch at 28MHz	£10.00	£8.50
Filter 15	Notch at 21MHz	£10.00	£8.50
Filter 20	Notch at 14MHz	£10.00	£8.50
Ferrite	2 Ferrite Rings, FAIR-RITE 43 material	£4.50	£3.83

Post and packing: Filters £1.25 for one item (overseas £2.00) and £2.50 (£4.00 overseas) for two items or more. Overseas rates for more than two items carries an extra 50p per item. All other items 40p per item and £2.00 for 5 items or more.

COMPONENTS CORNER

01707 660888 Fax: 01707 645105
E-mail: sales@rsgb.org.uk **Web:** www.rsgb.org

the last Word

Closer Channels

I really can't see what possible objection there can be to 12.5kHz channel spacing on 2m FM. Even our friends on 27MHz are more spectrum efficient than us, with 10kHz channelisation. One obvious benefit would be the availability of pairs of frequencies in the repeater section for emergency talk-through operations without having to work cross-band.

Mike Thorogood, GM0JKF

Too Many Restrictions

I am not normally moved to reply to letter is 'The Last Word', but I felt M0CMG's comments harsh to say the least. A large number of amateurs (myself included) are facing an uphill struggle to put up *any* form of aerial, due to opposition from local councils and neighbours.

As I see it, it will not be our fault that bands are taken from us, but increasing legislation restricting the erection of aerials - a fundamental requirement for operation on *any* band. We should all be supporting the RSGB in promoting the hobby in a positive manner, and resisting the amateur radio hobby being labelled in the same category as mobile phones.

The RSGB planning booklet and assistance offered by committee members continues to give an excellent service to its members and long may it continue.

Peter Scutt, G3IBI

Closed Shops

Due to circumstances beyond my control I am attempting to work HF 'phone from a terraced house in a conservation area with sneaky bits of wire. Looking at the logbook, apart from my weekly sked with D-land and a highly prized fluke with Campbell Island, there is not much to show this year (1999), even compared with my own log ten years ago. It's rather depressing, especially as at the next peak I'll probably be in sheltered housing or something – at best!

Mostly, what I hear is either calling 'outside Europe' or is some closed group's net. I do hear DX at times (when there is not too much noise) quite strongly enough to indicate that a contact should be possible; only when I receive, say, S5 or 7, the DX is giving out S9+20 to all and sundry who obviously have decent sites and aerials and are stomping on me. Calling CQ mostly gets nothing, even with the amplifier; just sometimes South or East Europe, for which I must be grateful. A bit of variety would be welcome, though.

Alex Dick, GM0IRZ

[It's quite possible that a number of *RadCom* readers would benefit from a solution to this problem; so, if you know how to help someone put out a respectable signal from a restricted location, please send it to me - *Ed*]

Morse Camp

I feel I must write again about the Morse Camp. I have already written about the unsatisfactory arrangements.

The handout said that individual attention would be available, but when I arrived to find 100 people I could not see 100 keys and 100 instructors being available. I also remarked that at 12WPM slowed to 5WPM by longer pauses is not Morse at 5WPM but Morse at 12WPM - with longer pauses. So many people were at the 'rabbits' end of the marquee it was unbelievable. It is useless giving three tests to assess abilities, then 14 more at the same speed. If you're in trouble with the first three, the other 14 are wasted time.

After representation we managed to get slower Morse put out, but the gentleman sending "had never sent slow Morse in his life" and was not at all happy. It was obvious that I was going nowhere, so I packed it in on the first morning.

I note you have a headline of "27 new M5 licences issued" but no mention of the 78 people who attended who got nowhere. Do you only note your successes and not your failures? I note in your letters you have printed a letter of praise from someone who passed. My letter has not received either acknowledgement or reply - but I criticised, not praised.

Geoffrey Purrier

[I'm afraid your letter arrived just after the cut-off date for the December 1999 *RadCom*, whereas the other arrived just in time - *Ed*]

G3PJT DE M1ADO
GD BOB = HVE U RECOVERED FROM CW W/E ? = MNI MNI TNX TO U ES TEAM AT RSGB HQ FER HELP ES ENCOURAGEMENT IN GAINING 5 WPM CW TEST = TNX ALSO TO MARTIN LYNCH ES YAESU = HPE MNI MORE HAMS WL BENEFIT FROM FUTURE CW CAMPAIGNS = MUST QRT NW TO PUT UP NEW ANT SO WL SAY 73 BOB = MNI TNX AGN FROM JIM FRY = G3PJT ES TEAM DE M1ADO / M5 IN PIPELINE.

Jim Fry, M1ADO

Not-so-slow Morse

It has been my pleasure to work two M5 calls recently using Morse. They both sent very competently and at not less than 12WPM.

The other night I was listening to a Morse QSO on 40m between a new M5 and a so-called very experienced station. The M5 was sending very good, readable Morse. At one point, the M5 said, "sorry old man, you are a little too fast for me, please QRS." The more experienced station totally ignored the request and sent at a speed which would have caused problems to a lot of people.

I am not sure whether this was a deliberate attempt to belittle a newcomer, or just plain ignorance. It is possible of course that the station in question sends very fast but can't read it, hence the reason for not complying with the request to slow down. Whatever the reason, this station and any others who do such a thing, should be ashamed of themselves. The new M5 call has been criticised by many, but credit should be given to those who attempt the Morse, and we should all encourage anyone who is prepared to give it a try. I just hope this man was not put off by this and doesn't think we are all ignorant. Most operators are excellent and will slow down if requested. My favourite saying is that no one was born knowing Morse, we all had to start somewhere.

One final point. I would much rather hear good slow Morse than some of the rubbish that passes for Morse. Although most are very good and have probably forgotten more than I will ever know, some of the older calls can't send Morse to save their lives. Please don't suggest that I am just not used to their idiosyncrasies, bad Morse is just that.

Alan Clay, M0AXJ

Uninteresting Column

The HF section of *RadCom* is to say the least uninteresting. Reading through it I find the emphasis is on islands. There are facets of HF other than this. We are not all island chasers! Many of us on HF enjoy normal QSOs within our sphere. My log does not record many island QSOs for the reason I - and I expect many other operators - enjoy QSOs with the world other than islands and DXxpeditions. Let us read of normal QSOs on HF for greater interest in the HF section, please.

L Ham, M0ATN

Millennium Collectables

First there was the limited edition Straight Key. Now we are to be tempted by the Millennium Paddle. Where is the society's sense of humour? The only appropriate collector's item to immortalise this time of technological uncertainly is a semi automatic mechanical key. Maybe only Vibroplex can legally use the name 'bug'. Please put me down for number one.

Frank Connor, G3WMR

Buying From Abroad

Last August I ordered some parts from America, to a total value of $US81.02 including post and packaging. The goods were despatched with a United States Postal Service Customs Declaration and Dispatch Note filled in as follows:

Insured Amount: $US200.00
Value: $US200.00
Postage: $US14.60
Gross & nett weight: 1lb

Normally in the EC a postal package of true value $81.02 would probably be allowed in Duty & Tax Free, however, due to the fraudulent Customs & Insurance Declaration, the package arrived with a demand by the Belgian EC Customs for a total of Bef 2.233 (about £37) - very close to the true value of the goods. Needing the parts, I paid, and in fact was able to claim a part of this back from the Customs.

I e-mailed the company about this and received neither acknowledgement nor reply. I subsequently wrote to the the President & Vice President of the company, and again received neither acknowledgement or reply.

I am shocked at the lack of concern for customers, as well as the apparent attempt in the event of loss of the package to fraudulently claim more than twice the value of the goods.

Bill Abrahams, ON9CGB/G0MEU

Please note that the views expressed in *The Last Word* are not necessarily those of the RSGB. All letters received by the Editor are considered for *The Last Word*, unless marked 'not for publication'. Letters may be passed to the relevant person, department or committee.

Classified advertisements

Classified advertisements 58p per word (VAT inc.) minimum 14 words £8.70.
All classified advertisements MUST be prepaid.
Please write clearly. No responsibility accepted for errors. Latest date for acceptance is 1st of issue month.

Cheques should be made payable to RSGB.

Copy and payment to
Jan Forde, Lambda House,
Cranborne Road, Potters Bar,
Herts EN6 3JE.
Telephone: 01 707 851199
Fax: 01 707 851206

FOR SALE

THE RF KIT CATALOGUE. Send 2x 2nd class stamps or browse www.rf-kits.demon.co.uk., Hands Electronics, Tegryn, Llanfyrnach, Dyfed SA35 0BL Tel: 01239 698427.

QSL CARDS. Gloss or Tinted cards. SAE for Samples to Twrog Press, Penybont, Gellilydan, Blaenau Ffestiniog, Gwynedd LL41 4EP.

TECHNICAL MANUALS for WWII radio and radar. Hundreds in stock. RAF, Army, Navy, Luftwaffe, Wehrmacht. US forces. Tel 0151 722 1178 or sae with requirements to VINTAGE TECHNICAL SERVICES, 28 Welbourne Road, Liverpool L16 6AJ.

"RAYNET" YELLOW REFLECTIVE TABARDS with "RAYNET". Medium £11.00, Large £11.50, XLarge £12.00. "RAYNET CONTROLLER" 50p extra. EPSON PX4+ lap top computer, built-in printer, charger Eprom for packet £46.50 inc. pp. Non reversible battery connectors line/panel mounting (10 pairs/pack) £7.00. Mike Watson G8CPH, Ipswich (01473) 738000.

ALUMINIUM TUBE. Heavy-duty (scaffold) tube approx. dimensions 20' long, 2" dia. 1/8" (4.5mm) wall thickness, 20' and 10' lengths available @ £1.80 + VAT per ft. C.W.O. Rusper Hire (Crawley) 01293 871621 office hours only.

QSL CARDS – low cost, quick delivery, superior designs, quality guaranteed, personal designs our speciality, L.S.A.E. for samples: The Standfast Press, 5 South Drive, Inskip, Preston PR4 0UT.

FULL COLOUR QSL CARDS now available from the Standfast Press, see details above.

G4TJB QSL CARDS printed to your specification, send large SAE for samples and full product list. Unit 6, Worle Industrial Centre, Coker Road, Worle, Weston-super-Mare BS22 0BX. Tel/Fax: (01934) 512757.

LANDWEHR VHF/UHF MASTHEAD PREAMPLIFIERS, 2 metre 145MAS £150 and 70cm 435MA £155 plus £4.50 p&p. Write, phone, fax or email for leaflet. Qualitas Radio, 23 Dark Lane, Hollywood, Birmingham B47 5BS. Note new telephone numbers, 0121 246 7267. Fax 0121 246 7268. Email: chris@gøeyo.freeserve.co.uk

E-TYPE TRAP DIPOLE 10-160m fits 28ft garden. Full sized anti-TVI models, traps, baluns, info SAE. Aerial Guide £2.0. R. Holman G2 DYM, Uplowman, Devon EX16 7PH. 01398 361215 anytime.

QSL CARDS – High Quality but low prices. Personal designs including SWL. Fast service. SAE for samples: Adur Village Press (G4BUE), Highcroft Farmhouse, Gay Street, Pulborough, West Sussex RH20 2HJ. Telephone: 01798 815711.

QUALITY PRE-USED EQUIPMENT. The UK's largest stock. Special service and consideration for purchase of deceased amateur equipment. Essex Amateur Radio Services. Telephone 01268 752522.

LIMITED SPACE ANTENNA 160-10 metres 84' overall with 76' of balanced feedline £59.95 plus £5.00 P&P. Choke Baluns Std model £36.85, Yagi model £37.45 (state boom size) G5RV £28.50 all inc P&P. Amidon Cores, limited stocks available. Send SAE for full details of all the above. Ferromagnetics, P.O. Box 577, Mold, Flintshire, CH7 1AH.

PROGRAMMED PROMS FOR PMR EQUIPMENT. Details, SAE Atlanta Communications (RC), PO Box 5, Chatteris, Cambridgeshire PE16 6JT.

QSL CARDS. Gloss or Tinted cards. SAE for Samples to Twrog Press, Penybont, Gellilydan, Blaenau Ffestiniog. Gwynedd LL41 4EP.

G 3 LLL REPAIRS & STOCK CLEARANCE. SAE or e-mail list/details herry@g3111, freeserve.co.uk 3A Wilson Grove, Heysham, Morecambe LA3 2PQ. 07901 932763 afternoons.

YAESU FT101ZD AND ALLWELD SM30 MAST. Offers invited. Telephone evenings 01789 840665 or cden@btinternet.com

MISCELLANEOUS

CALL IN ON THE 'GOOD NEWS' CHRISTIAN NETS! Every Sunday at 8am and 2pm around 3747 KHz and 144.205 Mhz at 2pm sharing Christian fellowship over the air. Info from WACRAL, 51 Alma Road, Brixham, South Devon TQ5 8QR – Tel: 01803 854504.

WANTED

I BUY, SELL EXCHANGE AMATEUR RADIOS OLD OR NEW. Cash waiting 9am-8pm daily. Phone Dave G3RCQ 01708 374043 or E-mail g3rcq@easynet.co.uk. Please visit my web site www.g3rcq.co.uk for further information, or write G3RCQ, 9 Troopers Drive, Harold Hill, Romford Essex RM3 9DE.

VALVES WANTED OLD AND BOXED. KT66 GEC £35. KT88 GEC £60. EL34 Mullard £20. EL84 Mullard £4. EL37 Mullard £18. DA30, DO30, PX25 all at £110 each. PX4 Globe Shape £50. DA100 GEC £150. ECC83 Mullard £4. GZ32 and GZ34 Mullard £8. ECC32 and ECC33 Mullard £8, B65 Metal Base £8. 53KU Bulhous £8. Other types wanted. Please send a stamped S.A.E. for free list. Old valved radio and test equipment also wanted. COLOMOR (ELECTRONICS) LIMITED, Unit 5, Huffwood Trading Estate, Brookers Road, Billingshurst, West Sussex RH14 9RZ. Tel: +44(0) 1403 786 559 Fax: +44(0) 1403 786 560.

RSGB AMATEUR RADIO INSURANCE SCHEME

"ALL RISKS" INSURANCE for portable/mobile/base station amateur radio and ancillary equipment. A service for RSGB members only. Also public liability and equipment for affiliated clubs and societies. Details and leaflets from Amateur Radio Insurance Services Ltd, Freepost, 10 Philpot Lane, London EC3B 3PA. Telephone: 0171 335 1647. Fax: 0171 338 0031.
Email aris@stuartalexander.co.uk

To Advertise
in this
Classified Section
please contact
JAN FORDE on
01707 851199
or
Fax: 01707 851206

COMPUTER SOFTWARE & HARDWARE

SD - EI5DI's CONTEST LOGGERS. HF £25.00, VHF £25.00, both £39.00. Paul O'Kane, 36 Coolkill, Dublin 18. (00 353 1295 3668). www.ei5di.com

SHACKLOG 5.1 – Probably the most popular UK written and UK supported logging software. £32.00. With IOTA add-ons £42.50. SASE+disk for demo copy. Alan Jubb, G3PMR, 30 West St., Gt. Gransden, Sandy, SG19 3AU.01767 677913. www.shacklog.co.uk

PC-AMIGA SSTV-PACKET. Tx/Rx interfaces from £28.50. SAE leaflets, Demodisk £1. Peter Lockwood G8SLB, 36 Davington Road, Dagenham, RM8 2LR. Tel. 0208 595 0823 http://www.angelfire.com/ok/g8slb.

PC SOFTWARE BY G4BMK FOR RTTY AMTOR PACTOR CW with callsign database and on-screen tuning aid, plus built modem £165. State callsign. BMK Communication Ltd, 2 Beacon Close, SEAFORD BN25 2J7. (01323) 893378.

HOLIDAY ACCOMMODATION

NORTH WALES. CARAVAN, BUNK HOUSE, CAMPING. Elevated site. Use of shack and beam antenna. Open all year. Rural setting. "Tynrhos", Mynytho, Pwllheli, LL53 7PS (01758 740712).

BED & BREAKFAST/FOOD. Scotland, north coast GM0EXN, Cliff Top HF & Internet. Tel: 01847 851774.Email: accommodation@btinternet.com. Web address: http://www.btinternet.com/~bandb.farnorth/index.html

Notice to readers

Although the staff of Radio Communication take reasonable precautions to protect the interests of readers by ensuring as far as practicable that advertisements in our pages are bona fide, the magazine and its publisher, The Radio Society of Great Britain, cannot accept any undertaking in respect of claims made by advertisers whether these advertisements are printed as part of the magazine, or are in the form of inserts.

The publishers make no representation, express or implied, that equipment advertised conforms with any legal requirements of the Electro Magnetic Compatibility Regulations 1992.

Readers should note that prices advertised may not be accurate due to currency exchange rate fluctuations.

While the publishers will give whatever assistance they can to readers having complaints, under no circumstances will the magazine accept liability for non-receipt of goods ordered, late delivery, or faults in manufacture, receipt of goods ordered, or for late delivery, or for faults in manufacture. Legal remedies are available in respect of some of these circumstances, and readers who have complaints should address them to the advertiser or should consult a local Trading Standards Office, or a Citizens Advice Bureau, or their own solicitor.

Readers are also reminded that the use of radio transmission and reception equipment (including scanning) is subject to licencing and the erection of external aerials may be subject to local authority planning regulations.

Advertisement Index

Next Advertisment copy date:

Display advertisment copy date for March 2000 is 27th January

ICOM

NEW! 756PRO WATCH THE SCREEN

You've heard the Rumours, now read the Facts...

Icom (UK) Ltd is proud to present the NEW IC-756PRO, HF+50MHz, 32bit DSP transceiver. The IC-756PRO contains new and improved features of great interest to serious HF operators and DX enthusiasts. Lets see exactly what this new rig has to offer...

32-bit, Floating-point, IF DSP - this refined level of processing improves noise reduction and provides auto-notch functions.

5-inch TFT Colour LCD - a first in a HF transceiver! This LCD provides a wider viewing angle and increased level of information, without cluttering the display area. The following information can be displayed:-

- Dual frequency display
- Memory frequency & memory name
- IF filter bandwidth
- RTTY tuning indicator and received characters
- Real-time spectrum scope
- Voice memory/CW memory keyer contents

Digital Voice Memory - 4 channels are assigned for transmit and 4 for receive, with up to 15 seconds recording in each.

Digital Twin-Pass Band Tuning - digitally narrows the pass-band width at the DSP to efficiently eliminate interfering signals. Operating the PBT within the DSP allows sharper, superior pass-band width characteristics.

Real-time Spectrum Scope - selectable sweep ranges, ±12.5kHz, ±25kHz, ±50kHz, ±100kHz.

Dual-watch - receive two signals on the same frequency band simultaneously. Monitor a DX station while operating on another frequency!

AGC Loop Operation - IF filter and notch circuits are included in the DSP loop, giving a wider dynamic range.

Digital IF Filter - with 51 selectable bandwidths. To operate in PSK31 and other digital modes, it is possible to set the bandwidth for the SSB filter to 50Hz.

Low Distortion, RF-type, Speech Compressor - with selectable transmit bandwidths of 2.0kHz, 2.6kHz, and 2.9kHz.

Built-in RTTY demodulator/dual-peak APF - an RTTY demodulator and decoder circuit is built-in. Two peak frequencies can be selected by setting the shift width for RTTY operation. Received data is shown on the LCD.

What are you waiting for! Hurry to your local Icom dealer and see for yourself how great the IC-756PRO is!

Icom (UK) Ltd

Sea Street, Herne Bay, Kent CT6 8LD. Telephone: 01227 741741. Fax: 01227 741742. Internet: www.icomuk.co.uk e-mail: info@icomuk.co.uk

Count on us!

HF ENTHUSIASM

Yaesu, Choice of the World's top DX'ers

FIELD COMMANDER

Over 40 years of experience in HF transceiver design has firmly established Yaesu as the choice of the world's top DX'ers. The knowledge that produced unequaled RF technology and design that is found in the State of the Art FT-1000MP can also be found in the miniature FT-100. The FT-100 while small in size 6.3" × 2.1" × 8.1"(160 W × 54 H × 205 D mm :w/o knob) is large in features and performance. This is accomplished by using the most advanced manufacturing techniques and component mounting technology. High Dynamic range RF front-end technology and Advanced Digital technology such as DSP sets a new standard of receiver performance for miniature HF transceivers. The single piece die cast frame, dual cooling fan system and revolutionary RF high power design technique keeps the FT-100 running cool and smooth in the most adverse operating environments. (TX Power output=100W HF, 50W VHF/20W UHF) The TX Equalizer offers crisp, clear and clean TX audio reproduction that until now was only found in top of the line HF base stations. The optional ATAS-100 (active tuning antenna system) ushers in a new age of mobile and field day operation (from HF to UHF frequencies). Add the optional ATBK-100 base kit (Good for limited space, simple setup.) and you've got a base station that ranks among the best in the world.

Features

- Frequency coverage:
  RX : 100 kHz-970 MHz
  TX : 160-6 m/144-146 MHz/430-440 MHz
- Power output : 100 W (160-6 m), 50 W (144 MHz), 20 W (430 MHz)
- DSP Bandpass Filter, Notch Filter, Noise Reduction, and Equalizer
- IF Noise Blanker
- IF Shift
- SSB, CW, AM, FM, AFSK, Packet (1200/9600 bps) operation
- Detachable Front Panel
- Two Antenna Jacks (HF/50 and 144/430)
- VOX
- Dual VFOs
- Available IF bandwidths of 6 kHz, 2.4 kHz, 500 Hz, and 300 Hz (6 kHz, 500 Hz, 300 Hz filters optional)
- Built-in Electronic Memory Keyer
- Speech Processor
- Built-in CTCSS and DCS for FM operation
- Automatic Repeater Shift and Auto-Range Transponder System
- Smart Search™ Automatic Memory Channel Loading System
- 300 memory Channels
- Quick Memory Bank (QMB)
- Bright LCD with multi-function display
- Optional FC-20 External Antenna Tuner
- Compatible with ATAS-100 Active-Tuning Antenna System. Add the optional ATBK-100 base kit

FIELD COMMANDER

FT-100

Ultra-Compact HF/VHF/UHF Transceiver

YAESU

Choice of the World's top DX'ers

For the latest news, hottest products:
Visit us on the Internet! http://www.yaesu.co.uk

Specifications subject to change without notice. Specifications guaranteed only within Amateur bands.Some accessories and/or options are standard in certain areas. Check with your local Yaesu dealer for specific details.

YAESU UK LTD. Unit 12, Sun Valley Business Park, Winnall Trading Estate Winchester, Hampshire, SO23 0LB, U.K. 01962-866667