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RadCom

Journal of The Radio Society of Great Britain
£3.50

Volume 76 No 3 ♦ March 2000

The Voice of Amateur Radio

See and hear meteor reflections

Reported: The IOTA Contest 1999

Reviewed: The Icom IC-756PRO

And lots, lots more

LONDON AMATEUR RADIO & COMPUTER SHOW

20-page pull-out guide

FIRST IN Amateur Radio

Waters & Stanton PLC

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

ICOM 1.8 - 52MHz 100W Auto ATU/51 Bandwidths

Phone **IC-756PRO**

Real-Time Spectrum Scope 19.4% APR Available

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

The new IC-756PRO has arrived at Icom's top UK dealer. And of course you get best value from Waters & Stanton, whether it be part exchange, pre-sale or after-sale advice and technical assistance. This feature packed radio sets a new standard in HF operation and convenience and for the first time you can send and receive RTTY on the LCD screen. A new mode with no external boxes. Make no mistake, this is a very advanced transceiver, one that needs top dealer support that only comes from W & S. So give us a call and we'll send you the latest information.

KENWOOD TS-570DG
160 - 10m All Mode

£849

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

19.4% APR Available

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

£1349 SAVE

The IC-746 offers 100 Watts of RF out on all bands from 160m to 2m. We rate it as one of the best value-for-money packages around.

YAESU FT-840
160 - 10m All Mode

£589

The FT-840 offers 100 Watts of well engineered RF together with a receiver that can more than hold its own.

FT-90R Can you believe the size?

The tiny dimensions of the FT-90R from Yaesu, are hard to believe. Yet it produces 50W on 2m and 35W on 70cm. Auto repeater shift on UK channels and switched 12.5 / 25kHz deviation, make this a number one choice.

SAVE

£325

YAESU FT-1000MP
160 - 10m All Mode

Super Discount Phone!

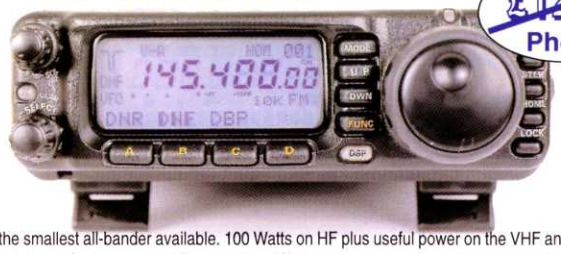
19.4% APR Available

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.

YAESU FT-100
160 - 70cm All Mode

Crazy Price

~~£1259~~ Phone



This rig is the smallest all-bander available. 100 Watts on HF plus useful power on the VHF and UHF bands makes this rig ideal for base or mobile operation. 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.

SAVE FT- 920
HF 160m-6m-100w

£1499

Still one of the best buys today. Includes full DSP and internal ATU. High tech receiver with dual tuning controls. Uses many of the FT1000 MP features but at a more attractive price. Full break-in on CW and includes a data port for TNC.

SAVE ICOM IC-706IIG
160 - 70cm All Mode

19.4% APR Available

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

£989

£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 removable front panel.

TUNE CONTROL Plugs into the 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

YAESU FT-847
160m - 70cm All Mode

SAVE

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!!

We Will Beat Competitor's Prices

By up to £100

On genuine UK Stock

wsplc.com is coming

CHECK IT OUT!

ADI AT-600 Dual Bander Airband Rx

£199

* 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

Kenwood TM-700DE

NEW

£459

2m / 70cm Data Mobile

SAVE

Just arriving, this new model has built-in TNC, port for GPS, Data connector for SSTV, RTTY etc., CTCSS/DCS, Switchable TX/RX deviation, Dual receive, Wide receive option, Detachable head unit, 50 Watts on 2m, 35 Watts on 70cm, 200 memories, Alpha tag memo capability and a lot more. And who has the best price? - look no further!

Hoka Decoding Software

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

£349.95

C-150 2m Handy

£99.95

* 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.)

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
* Lithium 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

NEW

Offer Extended

CD-100 MULTICOUNTER

Reads Frequency & Codes

Range: 10MHz -1GHz
Memory: 100 Channels
Decode: CTCSS, DCS, DTMF, LTR.
Power: Internal ni-cad battery
Charger included

£379.95

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

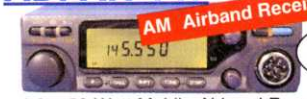
ICOM IC-T81E

£309 Phone

* 6m / 2m / 70cm / 23cm Handy
* 5W Output on 13.8V DC (1w23cm)
* 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

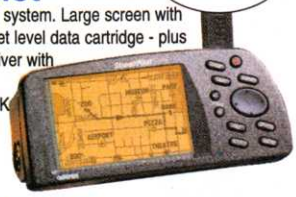
KENWOOD TM-V7E

£369

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

GARMIN In-Car GPS Street Pilot

£419



The complete car navigational system. Large screen with UK mapping and optional street level data cartridge - plus lots more! Designed for the driver with easy routing and special data screen for car use. Optional UK CD **£69.95,** memory storage card 8Mb **£64.95.**

GARMIN In-Car GPS-III Plus

£349

Detailed maps of UK and Europe plus street data upload feature via PC. Great value. Sits easily on the dash board and gives extremely comprehensive data including GB national Grid. Powered by AA cells or external 13.8V.

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

With Switched 12.5kHz & 25kHz Filters

£299 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

£243.95
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-914 Auto ATU Extender

£59.95
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

£64.95
"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).

FB1 - 9 Skin Coloured Earpiece
£9.95
The FBI-9 is a brand new design that is skin coloured to make it far less obvious when worn. Its curly lead means it is much easier to wear neatly. And it is very tough indeed. The cable exits will take a strain of 12kg so it won't break in commercial applications. And finally, it is exactly the same unit as supplied to the FBI, hence its code!

Diamond - SMA Antennas For Portables
From the tiny SRH - 805 upwards, there's an antenna to enhance the performance of your handheld radio.

SRH-805	SMA 2m/70cm dualband mini handheld antenna 4.5cm long	£19.95
SRH-815	SMA 2m/70cm dualband handheld antenna 15cm long	£24.95
SRH-835	SMA 2m/70cm dualband handheld antenna 35cm long	£29.95
SRH-999	SMA 6m/2m/70cm/23cm 4 band handheld antenna 50cm long	£34.95

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	£389.95
MFJ-1786	10 - 30MHz	£299.95

MFJ-259B Antenna Analyzer
£199.95

This battery powered analyzer 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
£129.95

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.

LINEAR AMP UK

Ranger 811H £895
* 1.8 - 30 MHz. 800 watts output
* Drive: - 10-100W * Built in Power Supply

UK Discovery - Two Amplifier £1395
*144 - 146MHz *400 - 1KW Output
*Drive:-10-25W *Built-in Power Supply

UK Explorer 1200 Amplifier £1595
*1.8-30MHz x 100W-1300W Output
*Drive:-10-120W *Built-in Power Supply

GREAT VALUE

British made Amplifiers with a Pedigree

Cushcraft

5 Band Compact Beam From Cushcraft

NEW MA5B Mini - Beam
£289.95
NEW


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 Windows

CW-80 Special
£84.95
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

Other Models (all with low angle radiator stub)

CW-160	160 - 10m 171ft long	£109.95
CW-160S	160 - 10m 133ft long	£99.95
CW-80	80 - 10m 133ft long	£84.95
CW-40	40 - 10m 66ft long	£79.95
CW-20	20 - 10m 34ft long	£77.95

Power Supplies

SEC-1223 13.8V PSU
£99.95
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 variable 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
£49.95

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 mobile's etc. Over voltage and current protection.

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
RFNB-42	9.6V 1100mAh	£46.00	£29.95
IC-T8E			
NBP-200	9.6V 680mAh	£40.00	£25.95
NBP-199	6V 700mAh	£30.00	£25.95
TH-D7E			
NBP-39K	9.6V 600mAh	£45.95	£29.95
TH-22			
RPB-32	6V 600 mAh	£31.95	£21.95

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.

£59.94

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**

144/ 430MHz Dual Band Yagi.

NEW

.142-146,428-442MHz
.Single feed
.SO-239, 50 Ohms
.100W max power
.VSWR 1.1 -1.5:1
.Gain 10 dBi 2m
.Gain 13 dBi 70cm
.Boom length 114cm
.5 elements 2m
.9 elements 70cm
.Gamma match
.Weight 2.3kg

£79.95

Extremely well engineered 2m/70cm dual band Yagi. Can be mounted either vertically or horizontally. Each band has separate gamma match but single coaxial feed.

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 mast 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.

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!

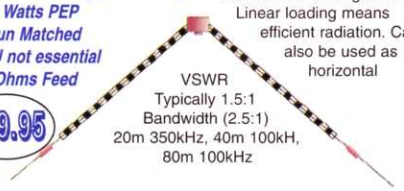
G3OJV 80-Plus-2

SpaceSaver

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

Ideal for 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 as 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.

SGC SG-230 Smartuner 1.8 - 30MHz Wire ATU

~~£329~~ £269

The SGC - 230 is a remote auto ATU that tunes any length of wire in the range 1.8 - 30MHz. Requires a 12V feed of 1 Amp. It is totally weatherproof. Just connect a coax cable back to the transceiver and the SGC-230 will tune instantly RF is applied. The ideal long wire system. Rated at 200Watts.

Telescopic Masts

NEW

We are now able to supply a range of telescopic tiltover masts, galvanised 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 concrete. *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	£14.95
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-7	Magnetic mount	£11.95
WAM-2	BNC window mount	£12.95

IR- 270 MONO PHONES

~~£34.95~~ £19.95

IR - 270

INFRARED HEADPHONES

Connects to your Receiver without need for long Cable.

Includes: 2 x AA cells, AC Adaptor Connecting lead with 3.5mm Stereo plug and 1'4 Mono adaptor.

NEW from Cushcraft

R8 8-Band Antenna
40m to 6m 1500 Watts

£399

The R8 is a robust vertical designed to take full US power limits. It has a very broad bandwidth, effectively working to the edges at 2:1 VSWR. Only two traps are used, so reducing the losses. At around 30ft tall, it is designed to give high performance, even on the lowest bands. A true DX-ers antenna in a very small space. Uses very short rigid base radials similar to R-6000.

Cushcraft

5 Band Compact Beam From Cushcraft

NEW MA5B Mini - Beam

£289

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.

SEC - 1223 13.8V PSU

23 AMPS - 3.2lbs!

Amazing Value

£99.95

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. It will power all 100W rigs effortlessly and can be changed for 115V AC.

Motorola Talkabout 200

PMR-446 New Low Price

£78

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

Now you can use a 446MHz handheld without a license. Ideal for a wide range of uses. The package provides everything 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 larger areas. Route planner shows graphic route plus text route instructions. Measure distances, edit symbols. Really amazing database for your laptop.

Order: Travelmanager

YAESU

NO DEPOSIT

NOTHING TO PAY FOR 6 MONTHS

INTEREST FREE PERIOD OF 6 MONTHS

FT-1000MP/AC

Still sells well, despite its advancing years.
RRP £2299

● ML&S £1999
Pay nothing until August then pay balance interest free!
Or after August pay 36 x £86.79 at 26.9%

FT-920AF

Excellent HF & 6M Base with DSP.
RRP £1499

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OR

Cash Price	36 Payments of	Total Credit Price (T.A.P.)	APR
£299	£12.98	£467.28	26.9%

Written quotations available on request

Front Cover:
Justin Snow, G4TSH, operating GU8D from the island of Sark in the IOTA Contest 1999.

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Check out the new RSGB books on page xix of the Show Guide

March 2000

Contents

News and Reports

Technical Features

Down To Earth - Amateur Radio From The Ground Up

London Amateur Radio & Computer Show - pull-out Show Guide

Regulars

RADIO SOCIETY OF GREAT BRITAIN

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Founded in 1913 incorporated 1926. Limited by guarantee
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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.

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The RadCom Leader

Out and About

ONE OF THE most rewarding aspects of my job is meeting the members, be it at a club talk, a rally, or just talking to someone on the telephone. For an organisation that is supposed to be in decline we have a large and enthusiastic membership who are in the main willing to put forward ideas and suggestions for the future.

In last month's *RadCom*, there was a new feature called 'Speakers' Corner', and the first article was entitled 'The Future of Amateur Radio Examinations'. During my time with the Society we have never had such a large response to an article in the magazine. It certainly got you thinking and gave us all something to think about!

Likewise, the response to the 'Council on the March' item featured in the January *RadCom* has taken us by surprise. Many clubs have written in, asking for a Council member to visit. I think that by the end of the year, members of Council will probably have visited the largest number of clubs in one year than in the whole of the Society's history.

Further changes are afoot. I have already informed you of Council's intention to review the structure of the Society this year. I am pleased to report that these discussions are underway. Numerous ideas have already been floated and I hope soon to be able to report a significant change in the way that the Society is represented at a local level. Further, Council have agreed that it is time to once again take the Annual General Meeting away from London. This years AGM is 'up for grabs', as they say. If you would like to host it in your area, please let me know. There are several criteria to be considered, not least of which are good transport links. But you out there in Bristol, Manchester, Birmingham, Newcastle, Edinburgh and Glasgow, now is your chance. These are just a few of the cities that have been suggested to me in recent years; I could add a whole lot more.

MORSE TEST SPEED DROPS AROUND THE WORLD

THE MORSE TEST speed continues to be a major issue worldwide. Last month saw the US administration announce a simplified licensing structure in the United States, based on a test speed of 5WPM. This month sees the Wireless Institute of Australia, the oldest amateur radio society, putting the issue to the vote. As five out of the seven divisions in Australia have already said yes to lowering the speed - and four is the majority needed - it is almost a foregone conclusion that the new speed will be introduced.

Two years ago when the RSGB made the announcement that we were considering such a move, we were criticised for being out of step with the rest of the amateur community world-wide. Perhaps those that were critical should acknowledge that we showed foresight and vision. And despite the doom-mongers that said a lowering of the speed would sound the death-knell of the code, nothing could be farther from the truth. My ears tell me that the use of the code is on the increase across the bands, not in decline as was predicted. I will resist the temptation of saying 'I told you so'.

Peter A Kirby, G0TWW, General Manager

Council Vacancy

DUE TO THE recent sad and untimely death of Fred Stewart, G0CSF, Council are seeking to appoint a representative for Zone C which covers south-east England, including London and the majority of East Anglia. As the Zonal Council member, you would be the Society's key representative, responsible for the day-to-day management of the zone and the supervision of the Society's Regional Liaison Officers in Zone C. You must reside in the zone and, if appointed, will serve as a co-opted member of Council up to 31 December 2000.

Applicants should be active radio amateurs, in good health, have their own transport and be prepared to travel throughout the zone. They should also have the time to commit to a busy volunteer position, and be happy with being contacted at home, mostly out of working hours.

This is a volunteer position and you will receive subsistence and travelling expenses only.

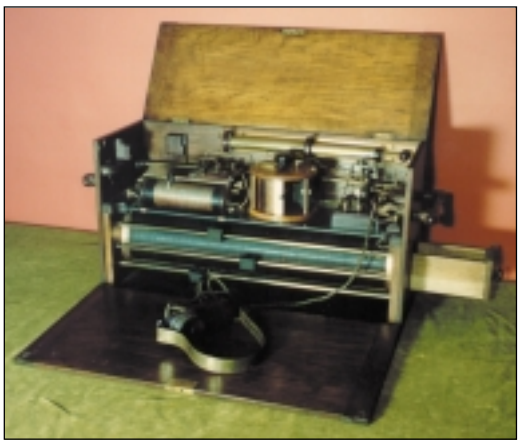
If you have the time to commit and you are interested, please write in strictest confidence to Peter Kirby, G0TWW, Company Secretary, Radio Society of Great Britain, Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JE. The closing date is 28 February 2000.

Edwardian Crystal Set with a unique history

'Titanic Wireless Receiver' Discovered

THIS UNIQUE and valuable Edwardian crystal set was made in England in 1910 and has recently been unearthed by a Midlands antique dealer. It has been acquired for a major private wireless collection in this country.

Early radios of this period are rare enough, but what makes this particular set unique is that its maker, George Leadbetter (a machine turner and clock repairer from Ledbury, Worcestershire), while listening on the set's earphone on the morning of Monday 15 April 1912, heard the Titanic's CQD/SOS Morse distress signals. Unfortunately, his attempts to convince the local Police of what he had heard were unsuccessful.

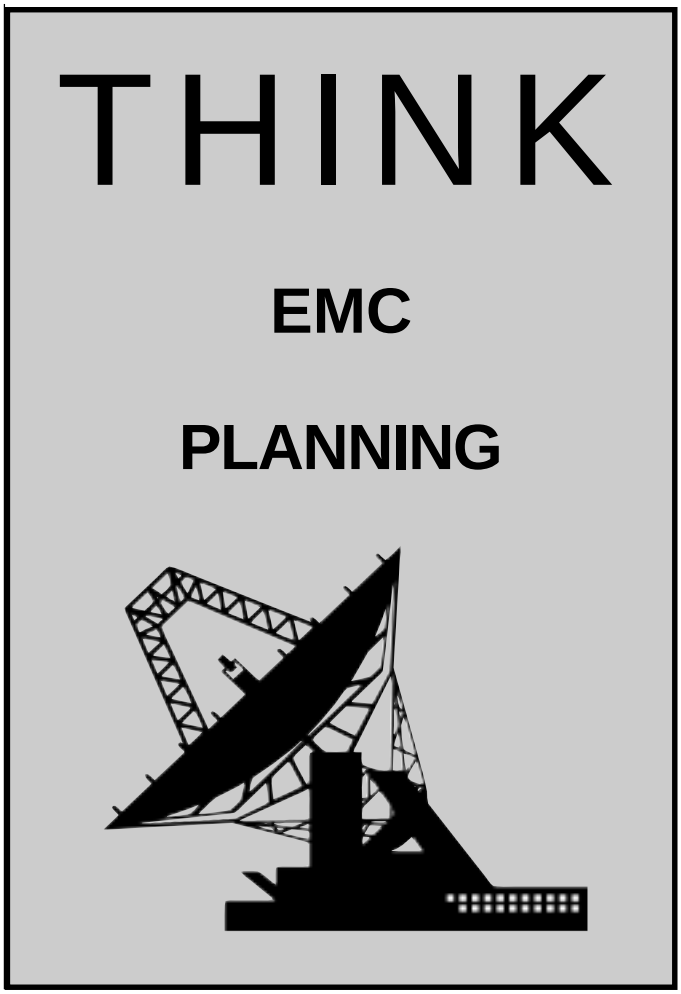


The 'Titanic Crystal Set', made in 1910.

This beautiful engineer-made radio, which measures some 2ft x 14in x 9in, weighing 42lb (18kg), is the only surviving type which is documented to have heard the Titanic transmissions. It is unique indeed, and will be on show at the National Vintage Communications Fair at the NEC, Birmingham, on Sunday 30 April 2000. Other displays will include a collection of WWII spy radio transmitters and receivers, a Horophone time-signal receiver (another unique Edwardian radio) and a display depicting the history of recorded sound.

Streamlined Checking

The ARRL DXCC Desk has announced an enhanced DXCC card-checking programme by which card-checkers will be able to check all awards except 160m DXCC, and all QSLs from any current DXCC entity. This will apply to new awards and endorsements. QSLs up to 10 years old will be eligible for checking in the field, while older cards and deleted entries may still be sent to ARRL HQ. The new programme begins on 1 April 2000, and re-appointment of DXCC card-checkers under the new criteria will be necessary.



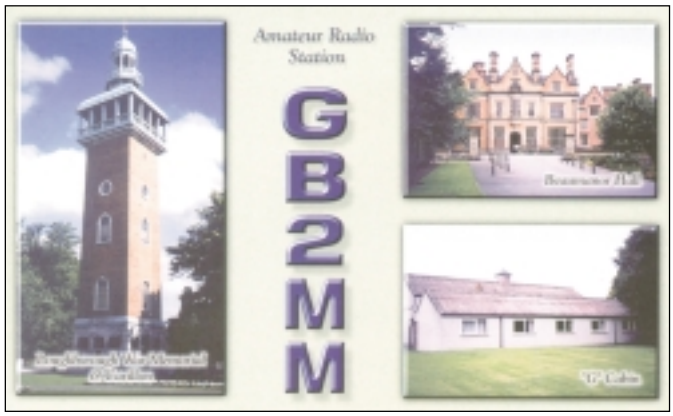
Get Lit Up!

THE INTERNATIONAL Lighthouse/Lightship Weekend takes place this year from 0001UTC on Saturday 19 August until 2359 the following day. Organising an event like this takes careful planning, hence this early warning – it will give you time to decide how *you* will participate! It is not a contest; each station can decide how it will operate regarding modes and bands, and there is no commitment to be on air for the whole period. If the lighthouse of your choice has no available space inside the tower, field-day-type operation adjacent to the tower is acceptable, although permission must be obtained in *all* cases. Invite the local press and the public in order to obtain the maximum exposure for our hobby. Please contact Mike, GM4SUC, if you plan to participate. His e-mail address is gm4suc@compuserve.com

Beaumanor Hall Revived

TREMENDOUS INTEREST has been shown in the Special Event station, GB2MM, which was run from Beaumanor Hall, near Loughborough in Leicestershire in early January. Its contacts included the sister towns of Loughborough, one in Belgium and one in Southern Germany. Also on frequency was GB2BP at Bletchley Park, operated by members of the Milton Keynes Radio Club.

During WWII, Beaumanor was one of a number of satellite stations feeding radio intercepts to Bletchley Park for decoding. It also housed a direction-finding (DF) station which, together with other stations in the UK, used radio-triangulation methods to locate unknown stations.



The QSL card for the GB2MM Special Event station at Beaumanor Hall.

Beaumanor also specialised in identifying Morse code operators by their sending patterns, or by the 'fingerprint' of the equipment they were using. This method was used to identify the Bismarck transmissions and, together with some rapid DFing, was responsible for the sinking of the ship.

This year's Special Event included the first-ever radio contact between 'Station X' at Bletchley Park and Beaumanor on New Year's Eve and New Year's Day. The New Year's Day contact employed a wartime 'spy set' similar to those used by our agents in occupied Europe.

ARRL Buys *Communications Quarterly*

THE ARRL HAS purchased the amateur radio technical journal *Communications Quarterly* from CQ Communications and will merge the publication with the League's own technical journal *QEX*.

The change will become effective for subscribers with the March/April issue of *QEX*. The new combined publication will bear the legend '*QEX*, incorporating *Communications Quarterly*'.

ARRL Executive Vice President Dave Sumner, K1ZZ, said the League was pleased to have the opportunity to demonstrate its ongoing commitment to technical excellence in amateur radio through the combined publication. "Merging *Communications Quarterly* into *QEX* provides a rare synergistic opportunity to turn two good publications into one that's even better," he said.

It's Windmill Time!

THE NATIONAL Mills Weekend is coming round again, and the Denby Dale Amateur Radio Society has been asked by the Society for the Protection of Ancient Buildings to run amateur radio stations from as many windmills and watermills as possible. This year's weekend activity will run on Saturday and Sunday 12/13 May 2000.

Each club or individual is responsible for approaching the mill's owner and applying to the RSGB for a GB call. Many stations are already preparing, so if you are interested, there's not a moment to lose! To register your interest, send an SAE to Tony, G4LLZ, who is QTHR, or send him an e-mail to tony@g4llz.freeserve.co.uk

Skidby windmill in the East Riding of Yorkshire was used for the event last year by York Radio Club (Amateur). They hope to use it again this year.

Can You Help?

THE WIMBLEDON Squadron ATC urgently requires a replacement Radio Officer to instruct cadets in basic radio and the procedures used by the Corps. The syllabus is similar to that of the Novice Licence exam, and the emphasis is on 'hands-on' instruction, as radio now forms part of the main syllabus for their First Class certificate. If you can help, please contact the squadron on Monday or Wednesday evening on 0181 542 3616.

Beam Winner

The winner of the Cushcraft MA5B HF beam in our Purchasing Survey free draw is Mr K S Greenough, G0WBM, from Derbyshire.

An Award for Everyone

TO QUALIFY for the *DXCC 2000 Millennium Award*, you need to work 100 or more DXCC entities during the calendar year 2000. Any combination of bands and modes is allowed. No submission of QSL cards is necessary, but any log extracts submitted must be certified in the usual way. The award period began at 0000 UTC on 1 January 2000, and lasts until 2359 UTC on 31 December 2000.

Normal DXCC rules apply, but qualifying for this award does not give automatic credit for traditional DXCC awards. Official application forms may be downloaded at www.arrl.org/awards/dxcc Otherwise, send a self-addressed envelope plus one IRC to: DXCC 2000 Millennium Application, ARRL, 225 Main Street, Newington, CT 06111.

Completed applications for the award must be received at ARRL HQ within one year of the close of the award period.

International Marconi Day

THIS YEAR, IMD is on 29 April, and a special web site has been set up in support [www.users.globalnet.co.uk/~straff]. Comments would be appreciated by the author, Richard, G3MRT. He is also looking for station histories, with photographs and text. If you would like to contribute, please do, but spare a thought for the users and keep your jpeg and gif files at resolutions less than 100 dots per inch.

- The two Buxton beacons, GB3BUX, on 50.000 and 70.000MHz have been shut down due to severe storm damage to the aerials. They are likely to be off-air for some time.

- The Arfon Repeater Group has announced that the ATV repeater, GB3GW, at Pentrefelin near Criccieth, is now in service. Its transmitter frequency is 1310MHz.

- POCM (formerly SSL) has secured a further contract for the distribution of Amateur and Citizens' Band Radio Licences. The new contract is effective from 1 April 2000 until 31 March 2003, with an option to extend for a further two years. From 1 April, Ship Radio Licences will also be issued under the contract.

No More Kelso Rallies

The organisers of the Anglo-Scottish Rally, Gavin and Margaret Chalmers (GM0ALW and GM0ALX) would like to inform their loyal supporters, both traders and visitors, that there will be no further Anglo-Scottish Rally events in Kelso.

Spread-Spectum Inventor Dies

HEDY LAMARR, the Hollywoood leading lady of the 30s and 40s, held the original patent for the technique which we now know as spread-spectrum. She died recently.

A better example of lateral thinking is hard to find. She was a friend of the composer George Antheil, and used to spend time playing piano duets with him. They played a game in which one of them would suddenly change key and the other would have to follow as quickly as possible. In the period when both were in different keys, the music would be unintelligible, making sense only when the keys were the same. Hedy had the breadth of knowledge (and the undisputed intelligence) to realise that changing key on the piano was a form of frequency-hopping, and when the two players were in different keys, nothing made sense. Suppose a form of communication was devised whereby the transmitter and the receiver kept 'changing key' – changing frequency *synchronously*, so that they always kept in step with each other. Such a system would be very secure, both from the aspects of being intercepted and being jammed. She was granted a patent for the technique in 1942, and was also awarded the Electronic Frontier Foundation Prize for secure, high-bandwidth communications.

Photo: Culver Pictures Inc.

Who ca imagine what she was dreaming up as she plotted against Victor Mature in Cecil B de Mille's film *Samson and Delilah*!

GM Activity Weekend

The GM DX Group, Scotland's DX Association, would like to remind all amateurs that the GM Activity Weekend 2000 takes place on 15/16 April. A large number of GMs will take part, many being from the Scottish islands.

At a recent Committee Meeting, donations to some DXpeditions were also agreed: Clipperton (ON4WW), £150; Tromelin (F5NOD), £150; Agalega (G3KHZ), £100. These are awarded on a basis similar to that used by The Chiltern DX Club.

The GM DX Convention will take place at The King Robert Hotel, Bannockburn on 16 September. Last year's guest speakers includedVK9NS, EI6FR and G3SXW. Information is available from TomWylie,GM4FDM(QTHR),whose e-mail address is twylie@net.ntl.com

A Case for Celebration

FOR MANY YEARS the Highfields Amateur Radio Club in Cardiff has been lucky enough to have had regular monthly lectures from John Case, GW4HWR, one of the RSGB's past Presidents. John always managed to find a new electronic- or radio-related subject to talk about, keeping his audience entranced with anecdotes, drawing on his vast knowledge of electrical and electronic engineering.

On 20 January, in recognition of John's services to the Club, the chairman Ken Dancer, MW0CCK, presented John with a copy of the new RSGB book *Amateur Radio – the First 100 Years*.

The club is fortunate to have the services of two RSGB past Presidents – John Case and Clive Trotman, GW4YKL, who currently runs the RAE class. John and his wife, Joan, will continue to attend the Club as guests.

The presentation: (l to r) Sid, GW0NQQ (Club President), Ken, MW0CCK (Chairman), John and Joan Case, Clive, GW4YKL (RAE tutor).

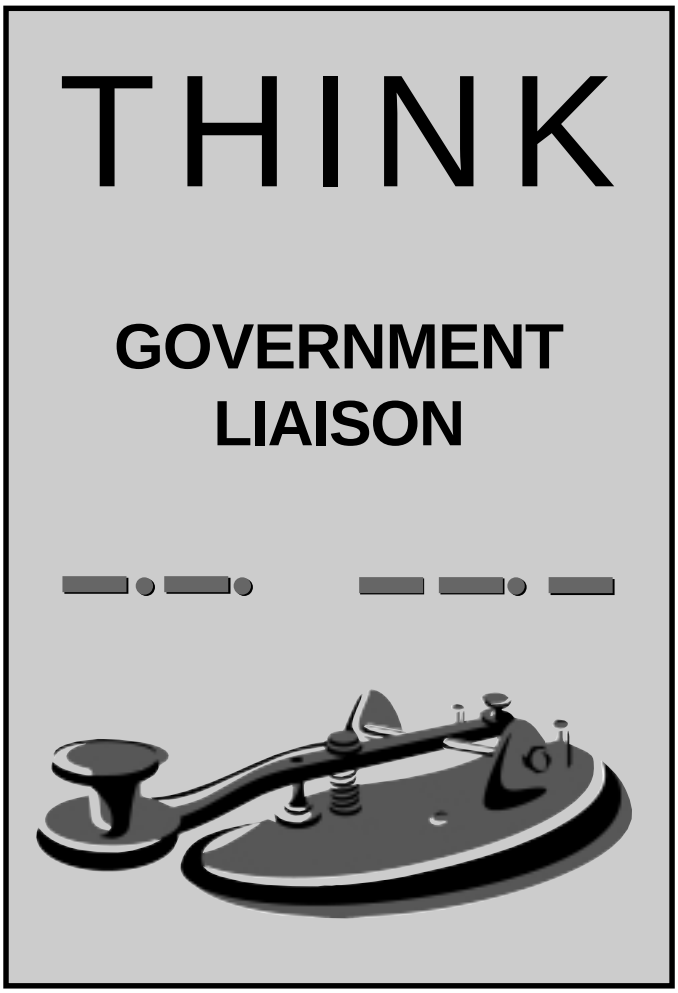
AROS Vacancy

THE SOCIETY'S Amateur Radio Observation Service Coordinator is standing down on 31 May 2000. Have you at least three years' amateur radio operating experience? Are you a a team player wishing to contribute to good operating practice? If so, please write in strictest confidence to Peter Kirby, G0TWW, Company Secretary, RSGB, Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JE.

SMC Closes its Retail Division

South Midlands Communications (SMC) has been increasing its involvement in commercial radio communication markets and now supplies antennas, masts and radio systems to major companies worldwide. As a result of this growth, SMC in-house manufacturing now represents the major part of the company's turnover.

In order to concentrate their resources on these growing markets, SMC has announced the closure of their retail division. There will be closing-down sales at both shops in Southampton and at Axminster. All remaining stocks will be sold at near cost price. SMC will continue to support and guarantee the equipment it has supplied and will continue to manufacture the Fairhaven and Lowe range of receivers, which will still be available from local dealers.



RADIO SOCIETY OF GREAT BRITAIN

Unaudited Income & Expenditure Account
For the six months ended 31 December 1999

	Six months ended 31/12/99		Six months ended 31/12/98	
	£	£	£	£
Gross Income				
Subscriptions	431,714		*419,882*	
Radcom Advertising	92,346		*110,304*	
Basic Membership Income		**524,060**		**530,186**
Books and Products Sales Income	156,819		*163,518*	
Other Publications including Radio Today	48,499		*57,885*	
Other Activities	45,451		*38,329*	
Total Gross Income		**774,829**		***789,918***
Contribution from Activities (ie Basic Membership Income less Direct Expenses)				
Expenses Charged direct against Basic membership Income				
Radcom Production	(225,570)		*(252,036)*	
Amateur Radio Costs	(32,466)		*(31,808)*	
Council & Committee Expenses	(19,128)		*(31,028)*	
QSL Bureau Running Costs	(13,749)		(8,758)	
IARU Payments	(7,960)	(298,873)	*(7,762)*	*(331,392)*
Surplus from Basic Membership Income		**225,187**		**198,794**
Contribution from Products and Books		38,322		*47,298*
Other Publications including Radio Today		(17,726)		*(27,051)*
Other Activities		6,311		*4,626*
Total Contribution before Overheads		**252,094**		***223,667***
Less Overheads (ie Cost of General Administration and HQ Operating Costs)				
Finance, Legal & Administration	(135,686)		*(120,224)*	
Office Stationery, Telephone etc	(77,319)		*(80,442)*	
Despatch Costs	(26,922)		*(28,086)*	
HQ property Costs, rates, power etc	(23,628)	(263,555)	*(23,413)*	*(252,165)*
Net Contribution		**(11,461)**		***(28,498)***
Financial and Other Items		13,332		*20,167*
Non-recurring Items				*(15,705)*
Net Income/(Expenditure) for the half Year		**1,871**		***(24,036)***

Commentary on the Income and Expenditure Account for the 6 months ended 31 December 1999

The Society reports a surplus in the in the un-audited Income and Expenditure Account for the 6 months to 31 December 1999, presented above, of £1,871. This compares with a deficit of £24,036 (after exceptional costs of £15,705) in the corresponding prior half year. The half year has been affected by some personnel changes, which has particularly affected Commercial costs.

Subscription income grew due to the increase in Subscription rates, partly offset by a small decline in membership. The decline in advertising income reflected in part some changes in longer-term advertising contracts.

Radio Today, which is considered a strategic activity for the Society, is still running at a negative contribution although less than the equivalent period last year. The half year saw many actions to improve circulation and contribution with mixed results especially in the distribution of the magazine.

Book sales did not achieve the momentum hoped for, due to the late arrival of a number of new titles. This is not untypical in the publishing world, and steps are being taken to improve delivery of new titles. The second half should see the benefits of a number of new books which, it is hoped, will improve sales in this area.

The high sun spot activity is generating substantial volumes of traffic in the QSL bureau and steps have been taken to adjust staff levels, at a corresponding cost increase. Council and Committee expenses reflect the Society's desire to minimise excessive meeting costs where possible.

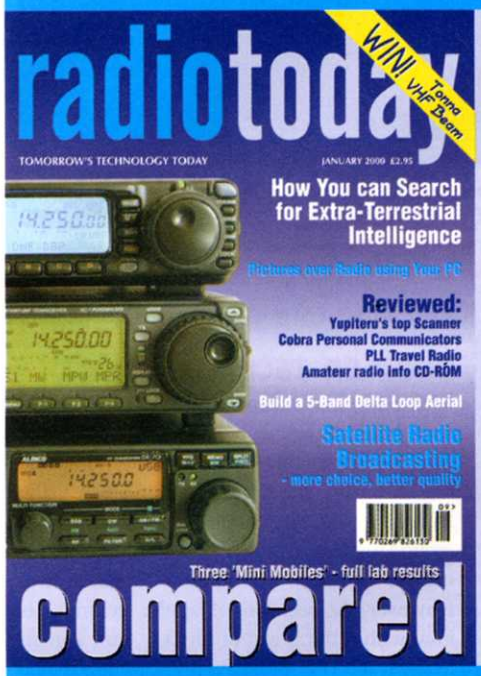
Overall, overheads have increased slightly due to the personnel changes mentioned above. In addition the Society has increased its investment in IT this half to ensure that its systems are efficient and secure. However, some costs, such as general office costs and property costs, are actually lower or have been maintained at the same level as the prior period. This is indicative of the Society's policy of constantly reviewing costs whilst maintaining an efficient service to its members.

The Balance Sheet continues to be strong. The second half should again be close to break even though there will be a full staff complement.

P A Kirby ***General Manager***
K Ashcroft ***Treasurer***

3 February 2000

MEMBERS NOW GET 29% OFF WITH A SUBSCRIPTION TO RADIO TODAY!



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Lead Feature

Echoes from the Leonids

*By Trevor Sanderson, PA3BOH/G4OEY **

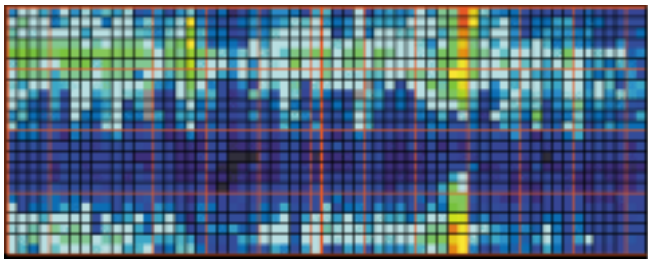


Fig 2: Number of meteors per hour recorded during November and December 1999 by the University of Ghent Automated Meteor Observation Station, taken from their web site.

USING A RADIO to listen to meteor echoes is nothing new. Many amateurs and professionals alike have used the reflections from meteor trails either to detect the presence of the meteor, or as a means of communicating over great distances (see **Fig 1**). Now a new technique is available. Pioneered by Peter Martinez, G3PLX, the technique uses modern DSP software to look for the Doppler shift of the frequency of the received signal, which is due to the motion of the meteor trail in the upper atmosphere winds. Using these DSP techniques it is possible to translate these signals into visible spectrograms, or into audible tones, and so look and listen to the sound of the echo from the meteor trail. There is now a wide range of PC-based Digital Signal Processing software that allows one to measure the effect of the upper atmosphere winds on the meteor trail. Now it is possible for anyone with a good receiver and a PC to look and listen to the echoes.

INTRODUCTION

LAST YEAR, in November, the Leonids returned again. This time it was expected that the display would be particularly spectacular, the main reason being that the earth would sweep through the dust cloud left behind by Comet P55/Tempel-Tuttle when it passed close to the earth's orbit back in 1966. Not only that, but when the earth would pass through the cloud, Europe would be on the dawn side of the earth, and therefore moving into the cloud (had Europe been on the dusk side of the earth at the time of maximum, as was the case in 1998, then the earth, acting as a shield, would have prevented us from seeing most of the meteors).

Already in 1998 it was expected that the high numbers of meteors might pose a threat to the multitude of satellites which encircle our globe. Measures were taken within the major space agencies to try to predict, and if possible, minimise the risk to their satellites. In 1998 the progress of the dust particles could be followed almost in real time, as several professional and amateur groups were using the forward meteor scatter techniques to observe and count the number of meteors observed and were posting their results in almost real time on the Internet. At the times when Europe was shadowed by the earth, groups in the Far East were making measurements, and vice-versa.

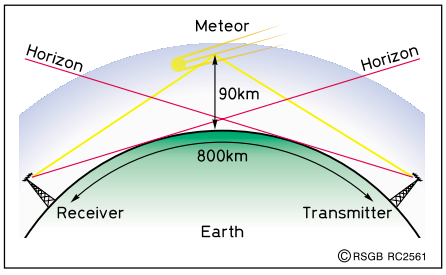


Fig 1: Typical set-up for detecting meteor echoes. The receiver is tuned in to a VHF station beyond the horizon. Echoes are received each time a meteor leaves behind a trail of ionisation that scatters the radio signal.

A well-known way of doing this is to tune to an FM broadcast station about 1000km away. Not quite so easy as it sounds, as usually several much closer station are transmitting on the same frequency. However, East European stations such as the Polish broadcast stations located in Krakow (66.89MHz) and Wroclaw (72.11MHz) are popular for this sort of study, since they are outside of the band of Western European FM stations. For a description of this method, see the web site at http://www.dmsweb.org/radio/radio.html, or the web site of the radio section of the International Meteor Organisation at http://www.imo.net/radio/.

As was said earlier, there is nothing new in the principle of these techniques. What is new however is the availability of the results to everyone via the Internet, and the beautiful presentation software that they use.

A good example of the sort of results obtained is shown in **Fig 2**. This shows data for November and December 1999 taken from the Internet site of the University of Ghent Automated Meteor Observation Station in Belgium (http://allserv.rug.ac.be/~hdejongh/astro/meteor/meteor.html). Here the days are plotted from left to right, each box being one day wide, whilst the hour of day is plotted from top to bottom, each box being one hour wide. The colour code shows the number of meteors per hour. Two peaks can be seen, the Leonids on 17 November, and the Geminids on 12 and 13 December. Notice also how the maximum every day is always around 5 or 6am.

These observations are all part of a Global network of meteor observations called Global Meteor-Scatter Network which is coordinated by NASA's Research in Planetary Astronomy and Planetary Atmospheres program. For more information, see http://www-space.arc.nasa.gov/~leonid/GlobalMSNet.html

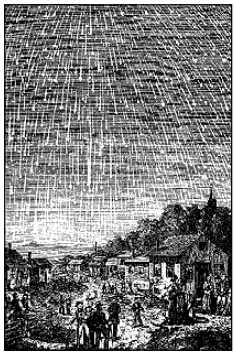
* *Space Science Dept of ESA, 2200 AG Noordwijk, The Netherlands*

DOPPLER TECHNIQUE

THE DOPPLER technique differs considerably from the technique mentioned above. The method enables us to get far more information about the meteor itself. Again, there is nothing new in the Doppler technique. Doppler radar has been around for decades, and Doppler direction finding has also been around for a decade or two. However, the use of the Doppler technique is now within the grasp of anyone with a good receiver and a PC. This has only become possible within the last year or two, thanks to the availability of DSP hardware and software.

My interest in this technique was first aroused by the feature in *RadCom* by Peter Martinez, G3PLX, 'Using Doppler DSP to Study HF Propagation', in May 1998. As usual with such an article, I did not really understand it all. I was able to get hold of the DSP module needed. G3PLX kindly sent me by e-mail a copy of his software. In his feature he showed how this software could be used to detect meteor trails, but at the time this had not registered within me. I had actually intended to use the software to study some aspects of propagation on 80m, but that's another story.

It's very simple really, but the G3PLX software does requires a separate DSP evaluation module (later on in the feature I'll tell you about other software which is available that does not require such a module, and which can work on any PC with a sound card). With the G3PLX software, a dedicated DSP chip and a microcomputer on the evaluation board are used to sample the signal and then perform a Fast Fourier Transform, before sending the data stream via the COM port to the PC for display. The additional hard-



The great Leonids shower storm of 1833. Reproduction of a wood-cut engraving by Adolf Vollmy, based upon an original painting by the Swiss artist Karl Jauslin.

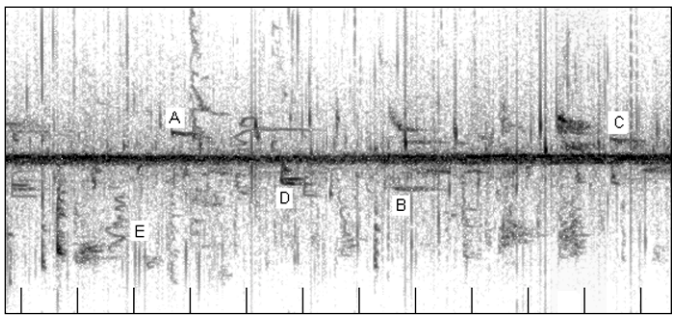


Fig 3: Spectrogram of meteor echoes obtained by G3PLX.

ware, an Analog Devices DSP56002 evaluation module, is clearly out of the reach of anyone wanting just to try out this software.

The technique requires some experimentation to get it right. First, find a short-wave AM broadcast station in the skip zone, ie high enough in frequency and close enough to you that the signal goes off overhead and is not reflected back to you. I used the BBC World service around 17MHz, which I think is sent out from a transmitter about 500km away from me. Using the SSB mode, tune what little of the signal you can hear (due to scatter, etc) so that the carrier is heard at around 1kHz. Then feed the signal to the DSP module and with luck, you will get a trace like the one in **Fig 3**, reproduced from the G3PLX article.

This is a spectrogram with time going from left to right, and positive Doppler shifts above the carrier and negative below. The range of Doppler shifts is 100Hz full scale. This shows several meteor trails, labelled A to E. G3PLX calls this picture a Dopplergram. The traces show the meteor trail (called a 'train' in meteor circles). The trail of ionisation reflects the signal. As the trail passes through different layers of the upper atmosphere, it is blown around by the upper atmosphere winds. Different layers move in different directions and with different speeds. The part of the signal scattered by each of these different layers experiences different Doppler shifts, hence the squiggly nature of the traces in the spectrogram.

THE PC VERSION

ON MOST MODERN PCs there is now enough DSP hardware in the sound card to make it possible to perform these tasks without resorting to a dedicated DSP module, and suitable software using just the PC hardware can now be found on various sites on the Internet. One of the best is the 'r_meteor' software. This software was specifically developed for meteor analysis by Bev Ewen-Smith, CT1EGC/G3URZ/VK5AES, who runs the Centro de Observação Astronómica no Algarve (COAA), an observatory in the Algarve, Portugal. Check it out on http://www.ip.pt/coaa/index.htm

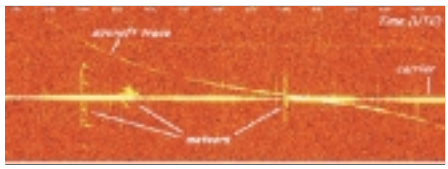


Fig 4: Typical spectrogram obtained with the 'r_meteor' software. This spectrogram clearly shows the reflections from meteor trails. Also seen is the signature of an aeroplane as it slowly crosses the sky.

This software was inspired by G3PLX's *RadCom* feature. A free trial version of this software can be downloaded from http://sapp.telepac.pt/coaa/r_meteor.htm.

Fig 4 shows a typical spectrogram obtained with this software. Again, time is plotted along the x-axis, and frequency (which corresponds to the drift velocity of the meteor trail) is plotted along the y-axis. The straight line shows the signal from the carrier, which in this case was a short-wave broadcast station in Lisbon. This spectrogram shows the reflections from meteor trails. Also seen is the signature of an aeroplane as it slowly crosses the sky.

With the r_meteor software, the output of the receiver is connected to the input of the sound card (if the PC has a microphone, it can also be used to pick up the audio signal directly from the receiver's loudspeaker, but with a small loss in quality). The software then uses the analogue-to-digital converter of the PC's sound card to digitise the incoming signal. Then the PC itself performs a Fast Fourier Transform, which is then plotted on the screen. Using the PC this way means that a dedicated DSP module is not needed and everything can be done on the PC. Other programs equally suitable are the audio analysis packages that are now available from a multitude of commercial companies. Much audio software can be found on sites such as http://www.hitsquad.com/smm/ One which I found very useful is Spectrogram, available from http://www.monumental.com/rshorne.gram.html.

LOOKING AT THE ECHO

AS PART OF ITS 1999 Leonid activities, the European Space Agency (ESA) established a web site pointing to a range of activities which included satellite operations, Meteosat observations, meteor observations in Spain, and a joint ESA/NASA aircraft campaign (http://www.estec.esa.nl/spdwww/leonids/index.html). It also included a chat line with scientists and engineers on line. One activity included as part of ESA's Science Directorate Outreach activities was to try out G3PLX's ideas and listen to the sound of the reflection. At the time we proposed this we were uncertain about the results. A web site describing the method was posted and members of the public were invited to try out the method for themselves (http://www.estec.esa.nl/spdwww/leonids/leolisten.html). Included in these activities were Udo (PA3EZI) and myself (G4OEY) from ESA's Space Science Department in Noordwijk in the Netherlands. Also in touch with us was Bev, (CT1EGC/G3URZ/VK5AES) in Portugal in the Centro de Observação Astronómica no Algarve (COAA), who had written some of the software described above.

Already early on during the meteor shower, good results were being obtained by Bev in Portugal, as shown in top if **Fig 5**. The top part shows a spectrogram taken in Portugal on the night of 15/16 November, and shows a fireball exploding. This fireball was seen visually as well, and lit up the whole of the countryside around. As before, time is plotted from left to right and frequency from top to bottom. The range of frequencies is only ±50Hz. The line across the middle is the carrier. When the fireball in the top part exploded a cloud of ionisation was released which expanded and drifted off in all directions, hence the bright patch which shows both positive and negative Doppler shifts. The patch of ionisation lasts for several seconds.

The bottom part of Fig 5, also taken in the Algarve by COAA on the night of 16/17 November, shows the signatures of two more fireballs disintegrating over the sky in Portugal. These fireballs show more structure. The three yellow patches on the left are probably due to patches of ionisation in different layers of the atmosphere which drift off in different directions, and therefore impart three different Doppler shifts to the reflected signal. The fireball on the right is much more complicated and shows evidence of some stratified motion prior to the final disintegration.

LISTENING TO THE ECHO

AS WELL AS being able to display this data in a spectrogram, it is possible to listen to the signal reflected by the meteor. As mentioned earlier, the receiver has to be operated in the SSB mode so that the carrier is audible. Then, if the received signal is fed to a loudspeaker, a more or less constant tone, corresponding to the carrier, is heard. Each time a meteor enters the

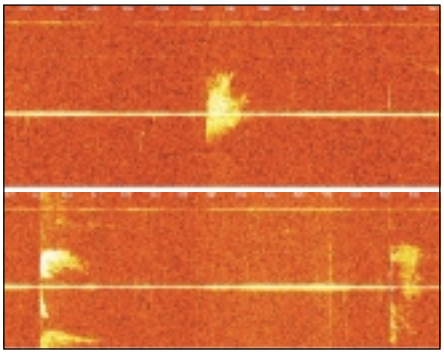


Fig 5: Spectrograms obtained in November 1999. The top part, taken on the night of 15/16 November, shows a fireball exploding; the lower part, taken on the night of 17/18 November, shows two fireballs exploding.

WHAT ARE THE LEONIDS?

EACH YEAR THE night sky is illuminated by dozens of meteor showers. During these showers, fragments of cosmic debris leave glowing trails as they are incinerated during entry to the Earth's upper atmosphere. We see them as short-lived trails of light streaking across the sky. Most meteors are caused by cosmic dust burning up as it enters the Earth's upper atmosphere. The dust comes from giant dirty snowballs called comets. For most of their elliptical (egg-shaped) orbits, comets remain in deep freeze, far from the Sun. When they approach the Sun their icy surfaces are warmed and start to vapourise, generating powerful jets of gas and dust which spurt into space. The ejected dust lingers around the comet for a while, but eventually spreads out around its orbit.

One of the most famous meteor showers is known as the Leonids, so-called because their light trails all seem to originate from the constellation of Leo. The Leonids meteors are associated with dust particles ejected from Comet P/55 Tempel-Tuttle, which pays periodic visits to the inner solar system once every 33.25 years. The meteors appear every year between November 15-20, when the Earth passes very close to the comet's orbit. However, the numbers on view vary tremendously. In most years, observers may see a peak of perhaps 5-10 meteors per hour around 17 November, but roughly once every 33 years the Leonids generate a magnificent storm when thousands of them illuminate the night sky. The most memorable of these storms in recent times occurred in 1833, when tens of thousands lit up the heavens over North America. Unfortunately, not all the comet's appearances are marked by such wondrous sights. While meteors appeared in large numbers during the last perihelion passage of Tempel-Tuttle in 1966, the previous viewing opportunity of 1933 proved to be a damp squib. The reason for this spasmodic and unpredictable behaviour is that, although the main stream of debris trails for millions of kilometres behind the comet, it is not very wide, perhaps 35,000km across. Within this narrow stream, the dust ejected during each of the comet's close approaches to the Sun forms a series of separate ribbons. Their characteristics vary considerably. Generally, the most recent dust streamers are thin and dense, while the older material, which has had time to spread out, forms wider, less densely populated bands. The location of the stream also changes with time, as the gravity of the planets - especially Jupiter - exert an influence. Sometimes the Earth ploughs right into a dense stream of debris, causing a storm of bright meteors. Sometimes it misses almost all of the tightly confined dust trail, so very few meteors are seen.

The train of a Leonid fireball seen over Spain during the 1996 shower.
Photograph: Volker Gerhardt.

The Leonids are renowned for producing bright fireballs which outshine every star and planet. Their long trails are often tinged with blue and green, while their vapour trains may linger in the sky like enormous smoke rings for 5 minutes or more.

Although the incoming particles are small, ranging from specks of dust to the size of small pebbles, the Leonids glow brightly because they are the fastest of all the meteors. A typical Leonids meteor, arriving at a speed of 71km/s (more than 200 times faster than a rifle bullet), will start to glow at an altitude of about 155km and leave a long trail before it is extinguished. The reason for this high speed encounter is that, like their parent comet, the particles travel around the Sun in a direction which is almost directly opposite to the orbital motion of the Earth. The result is a head on collision between the planet and the dust.

Source Detlef Koschny, ESA Space Science Dept./ESA Science Communications: http://sci.esa.int/leonids99/

Udo, PA3EZI, using the club station PI9ESA to listen to the Leonids.
Photograph: J.-P. Lebreton.

atmosphere it releases a trail of ionisation between transmitter and receiver, and the signal strength increases due to the presence of the additional scattering material. The amplitude of the tone will increase for as long as the meteor trail persists. The signal consists of the steady tone due to the carrier, and the additional signal due the meteor trail. On an expensive receiver, most of the carrier can be removed by using a notch filter, leaving only the sound of the reflection of the meteor. The remaining signal is more or less centred at the frequency of the tone corresponding to the carrier, and drifts around in frequency a few hertz.

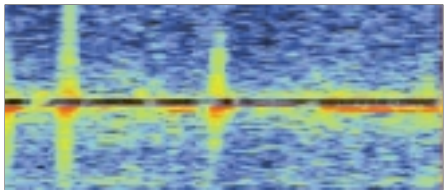


Fig 6: Spectrogram of a 1.25-minute period of data taken around the time of maximum of the Leonids shower on the morning of 18 November.

Fig 6 shows a spectrogram of a short 1.25 minute period of data taken around the time of maximum of the Leonids shower on the morning of 18 November. The carrier has been notched out, so all that is left is the sound of the Leonids. These are the sounds of the reflection from meteors. This sound is available online as a 2Mb .wav file on http://helio.estec.esa.nl/wave5c.wav

At first we expected the sound would be a short 'ping', corresponding to the meteor entering the atmosphere. However, most trails persist for a few seconds and so the echoes should also persist for a few seconds. In fact the sound of the echo is more like a short whistle that lasts for a second or two. The pitch of the tone is actually decided by the operator of the radio. Tuning up or down in frequency changes the pitch of the carrier, so any pitch can be chosen. Modulating this tone are the very small changes in frequency due to the different drifts experienced by the meteor trail. We had hoped to be able to hear these small variations, but so far we have not really succeeded as these variations are only of a few hertz. All we need to do now is expand the frequency range of the signal.

CONCLUSIONS

THE RADIO TECHNIQUE of listening to meteors is now within the reach of everyone with a good receiver and a PC. Much software is available on the Internet, and it is now just a matter of downloading and trying it. As well as the Leonids, there are many other meteor showers all year round. Look at the IMO web site at their calendar for the year 2000 for a list of forthcoming showers (http://www.imo.net/calendar/cal00.html) and look at the web site of the Ghent group (http://allserv.rug.ac.be/~pdegroot/meteor/mc1_99.html) to see at what time of day to expect them.

Try it! ♦

ACKNOWLEGEMENTS

I WOULD LIKE to thank Peter Martinez, G3PLX, for permission to use his software, Herwig DeJonghe for permission to use Fig 2, and Bev Ewen Smith, CT1EGC, for permission to use his software and Figs 4 and 5. Also, his colleagues from the European Space Agency who participated in this exercise - in particular, Peter Faulkner; Detlev Koschny; Jean-Pierre LeBreton; Udo Telljohan, PA3EZI; and Andrea Toni.

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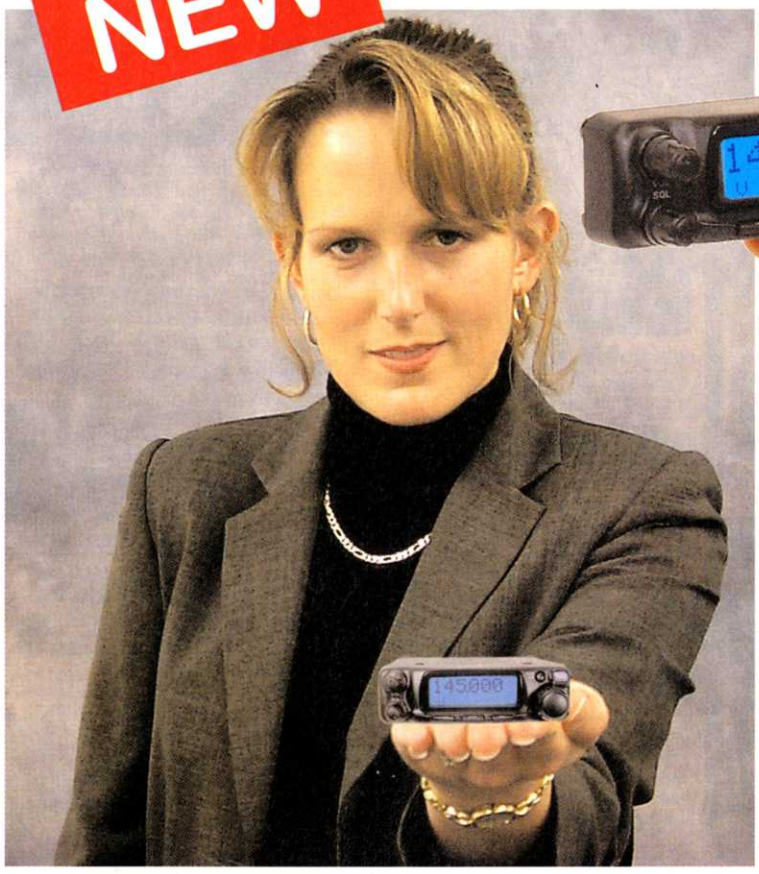

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IOTA Contest 1999

*Reported by Chris Burbanks, G3SJJ**

IT REALLY DOESN'T seem adequate to say that this was another successful contest. Many islands around the world were active, with prefixes appearing that many of us would class as rare DX at any other time; KH2 and KH6 from Oceania, KL7 from North America, BA and BI from China, 6W1 from Africa and R1 from Antarctica. Of course, many more 'local' islands close to the American and European coasts were also represented. K6OHM sent in this 'picture' from his area: "The 1999 IOTA Contest was a well-participated event with many new IOTA references appearing for the first time. From the DX Packet Cluster in southern California, USA, 103 islands were posted. Listed by area they were: 38 European, 30 North American, 14 Asian, 12 in Oceania, 6 South American, 2 African and one in Antarctica". Interestingly, entries received followed this pattern closely - with the exception of Asia, which was 50% up, and Europe, which provided some 66 IOTA references. The event is also popular with Non-Island contestants and entries were received from all parts of the World. Europe and Russia figure strongly in its support, also mainland America and a strong contingent from Brazil.

THE REAL STORY

HERE ARE SOME brief stories, as told by those involved in the contest.

"The IOTA Contest continues to be a summertime delight, featuring a plethora of otherwise largely unavailable islands. Activity appeared to be high, with 20m handling the bulk of contacts as usual during this time of year. There was a brief 15m opening to Europe on the west coast of British Columbia, however the low bands were somewhat disappointing, especially into JA on 40m. Best wishes to the contest committee for organising, evaluating and publishing the results, as well as to all the island stations that were active during the weekend." (CF7ZO)

"Terrible conditions during the contest, but we do have fun on this island. There are always big pile-ups to handle when we make expeditions to any of the islands around Taiwan. Making everybody happy from our islands is our year routine activity. Training and enhancing our skills on each operation is a good opportunity for the members of our society. Thanks for offering the chance and fun from the IOTA program. See you next year." (BO0M. Ops: BV2KI, BV2KS, BV2NT, BV2PU, BV2UJ, BM2BIS, BV4ME)

"This was our first entry in the IOTA Contest and for two operators their first ever HF Contest. Our activity was intended to gain experience for next year, when we will have a big antenna farm with more radios and operators." (GD6IA)

"We are becoming IOTA addicted. It seems the contest is becoming more and more interesting, according to the number of stations active. Again we learned a lot, had great fun and definitely decided to start preparations for IOTA 2000 so that mistakes made this year don't happen again." (9A1RKV/P)

"I just had to include this; what a picture it paints! Decrepit boat, heaving seas and hams, a human chain up the cliff plus a rope and pulley tram up the bluff - too much gear, 1914 lifesaving station, breathtaking views, rising wind, driving rain, water from the ceiling pouring into the power supply, get more poly sheeting - hope there are enough staples, disappointing propagation, where's the duct tape? The boat's got a hole in it, if a trip over another ***** radial!, gorgeous moonrises, a wire brush?, a great expedition!" (CY9CWI)

"This is the second time our group has entered the IOTA Contest. Once more a fantastic weekend, with better weather and the now customary hospitality of the locals making it even more enjoyable. At least half of the island's population must have been at the Friday night ceilidh and I'm not sure if many more could have fitted into the hall even if they had tried. We had a few problems with rotators whilst setting up for the contest and almost didn't have a 15m beam. A guy rope broke during the mast erection, but we still managed to get everything sorted in time for the start. Conditions were good and everyone had a great weekend. Keep up the good work and don't change the formula for what is one of the best contests of the year." (2A0CCC/P)

"It took seven hours by boat to get to the island and we operated from 'very rustic' clam shacks (used by the Tsimshian Indians when they dig clams in the spring). The bugs were terrible and the howling from the wolves kept us awake all night. VE7QCR was afraid to fuel the generators in the dark, because the first morning when he went down the trail two big wolves stared him down. During the contest, band conditions were not spectacular. 20m shut down in the afternoon and 15m never opened up to Asia at all. The biggest surprise was a 1-hour opening to Europe on 15m at around 1000UTC. That was probably the biggest pile-up (of our own) we heard during the contest. It was an exhausting effort and all we seem to remember was packing/unpacking gear and loading/unloading the boat. Dundas Island is a beautiful spot (no facilities), but we were all too busy to wander more than 100 yards from our clam shack. See you next year from a different island!" (VD7D).

Off the coast of Senegal, 6W1QV was active portable from Goree Island (AF-045).

LOGGING

THE CONTEST IS now well supported with logging software. Paul O'Kane has done a marvellous job with Super Duper, which is an excellent program for single operator entries. We are indebted to Paul for supplying some 300 copies of SDI, which were sent out to selected entrants last year. No doubt this contributed to the massive increase in e-mailed entries. For multi-operator stations requiring networked computers and DX Cluster access, NA CT and TR all now fully support the event, although there were reports of problems with CT. One aspect that may need attention is allocation of serial numbers between the run and multiplier station. Currently, the only way is to 'reserve' a number. We have had a suggestion that each station should be able to use its own series.

RULES ISSUES

WE ARE STILL receiving entries from Non-Island multi-operator groups. This category was taken out some years ago, so unfortunately the entries have been counted as checklogs. We received a number of complaints of high scoring stations not including their Island reference with *each* exchange. This is contrary to the rules. Specific callsigns were not named, so we have been unable to take any actions this time. It is also good operating practice to give your own callsign after every contact. The issue of allowing single operators to access the DX Cluster needs addressing, but this may require restructuring of the various categories. A possible solution would be to take the multi-mode category and then split single operator into Assisted and Unassisted. Your comments would be appreciated. Multi-operator entrants are also reminded that the rules permit two radios only. Several groups declared three radios, although their logs did not show any transgression of the rules.

Perhaps the most contentious issue is that of non-Island to non-Island contacts. With the contest now well established, the time may have come to change the rules and disallow this. Again, comments would be most welcome.

Thank You to Catherine at RSGB HQ for handling the receipt of posted logs; Richard, G4ZFE, for receiving the e-mailed entries; and John, G3LZQ, and Tom, GM4FDM, for their adjudication assistance. ♦

*16 Cotgrave Road, Plumtree, Nottingham NG12 5NX

RSGB Islands on the Air 1999 Contest Results

Island Multi Op

Pos	Callsign	QSOs	Mults	Score	Section	Island	Ref
1	MW7Z	2,999	445	7,961,042	DXpedition	Anglesey	EU124
2	OH0MDR/1	2,835	386	6,815,385	DXpedition	Sandstrom Reef	EU096
3	GX6YB	2,719	375	6,268,530	DXpedition	Wight	EU120
4	GU8D	2,565	315	5,824,320	Permanent	Sark	EU114
5	2S5VG/P	2,254	248	5,253,550	DXpedition	Gigha	EU008
6	WP2Z	2,768	290	5,005,110	Permanent	St Croix	NA106
7	TM5K	2,212	338	4,765,800	DXpedition	Ouessant	EU065
8	DL0HRO/P	2,063	316	4,355,112	DXpedition	Usedom	EU129
9	SN6F/1	1,993	309	4,199,310	DXpedition	Wolin	EU132
10	G3N	2,145	257	3,318,384	DXpedition	Wight	EU120
11	9A/S55A/P	1,806	257	2,999,190	DXpedition	Krk	EU136
12	DH1DX/P	1,639	239	2,738,223	DXpedition	Usedom	EU129
13	9A1RKV/P	1,478	262	2,736,066	DXpedition	Dugi otok	EU136
14	G9Q	1,886	260	2,725,320	DXpedition	UK Mainland	EU005
15	9A0DX	1,938	218	2,714,754	100w DX	Korcula	EU016
16	G8A	1,703	256	2,469,120	Permanent	UK Mainland	EU005
17	9A0A	1,914	215	2,465,190	DXpedition	Kornat	EU136
18	ED1PDG	1,596	155	1,807,920	100w DX	Sisarga Grande	EU077
19	ED1MC	2,062	170	1,763,580	DXpedition	Ons	EU080
20	ES01	1,839	164	1,721,016	DXpedition	Baltic Coast	EU034
21	SNØWI	1,288	193	1,630,464	DXpedition	Wolin	EU132
22	CY9CWI	1,505	177	1,614,771	DXpedition	St Paul	NA094
23	W7W	1,382	182	1,461,642	DXpedition	Waadah	NA169
24	DL3KZA	1,350	146	1,424,230	Permanent	Ruegen	EU057
25	2A0CCC/P	1,499	172	1,406,616	100w DX	Tiree	EU008
26	AA1IZ	1,128	188	1,405,488	DXpedition	George's	NA148
27	SW8L	361	165	1,401,593	DXpedition	Nisiopi	EU049
28	W4T	1,382	168	1,330,056	DXpedition	Treasure	NA076
29	TM5J	1,473	151	1,259,793	DXpedition	Noiremoutiers	EU064
30	GM3USL/P	1,233	174	1,203,210	DXpedition	Gt Cumbrae	EU123
31	OZ/AA0ZL/P	1,408	154	1,184,568	DXpedition	Raippaluoto	EU125
32	EJ4GK/P	1,464	150	1,177,200	DXpedition	Inishmore	EU006
33	NH0M	1,252	113	1,119,717	DXpedition	Northern Mariana	OC086
34	VD7D	1,136	149	1,101,408	DXpedition	Dundas	NA118
35	TF7RX	1,858	112	1,081,248	DXpedition	Westman	EU071
36	GD6IA	1,733	133	1,053,759	Permanent	Man	EU116
37	EJ2HY	1,480	176	1,047,552	100w DX	Ireland	EU115
38	RF1P	1,504	118	975,624	Permanent	Dolgy	EU102
39	PA6TEX	908	163	868,464	100w DX	North Sea Coast	EU038
40	TM5G	1,334	131	852,810	DXpedition	Glenan	EU094
41	G0CRW/P	655	188	847,692	DXpedition	UK Mainland	EU005
42	DL6YFB/P	1,091	127	831,723	DXpedition	Fehmarn	EU128
43	IL3/OE8Q/P	1,208	121	823,768	DXpedition	Grado	EU130
44	N3OC/P	1,177	120	816,840	DXpedition	Assateague	NA139
45	M4R	712	167	807,612	100w DX	UK Mainland	EU005
46	IK7XNF/7	1,265	119	798,609	100w DX	Grande	EU091
47	BI4Q	1,025	86	786,642	DXpedition	Ping	AS135
48	MM8Y	1,093	132	759,132	DXpedition	UK Mainland	EU005
49	TM2F	1,460	105	750,960	DXpedition	St Marcouf	EU081
50	G5M	1,469	144	750,384	DXpedition	Scilly	EU011
51	G6I	679	175	710,325	DXpedition	UK Mainland	EU005
52	BO0M	871	81	583,929	DXpedition	Matsu	AS113
53	GN0ADX/P	1,090	100	558,600	DXpedition	Rathlin	EU122
54	KI6T/P	695	123	547,227	DXpedition	Santa Catalina	NA066
55	M0ACW/P	729	132	532,620	100w DX	UK Mainland	EU005
56	HS2AC	602	92	492,384	DXpedition	Koh SiChang	AS107
57	G3SAD	426	143	467,610	Permanent	UK Mainland	EU005
58	IL3/IK2XYG	843	96	457,056	DXpedition	Grado	EU130
59	IK7DXP/P	825	105	455,175	100w DX	S Andrea	EU091
60	EI9GJ	688	92	438,196	Permanent	Ireland	EU115
61	DL0KWH	829	94	431,178	100w DX	Ruden	EU057
62	EJ7MRE	891	96	415,584	DXpedition	Clare	EU121
63	G3FEC	632	103	411,588	100w DX	UK Mainland	EU005
64	NH0L	920	62	386,694	DXpedition	Northern Mariana	OC086
65	P39P	1,132	73	377,556	Permanent	Cyprus	AS004
66	SK7DX	596	82	292,248	100w DX	Hano	EU138
67	VO1SDX	844	88	255,552	Permanent	Newfoundland	NA027
68	LS7D	689	67	248,168	100w DX	Martin Garcia	SA055
69	6K0IS/2	612	37	229,215	100w DX	Kanghwa	AS105
70	DX1E	304	69	182,988	Permanent	Luzon Gp	OC042
71	DX1DX	280	62	167,028	Permanent	Luzon Gp	OC042
72	IS0JMA	550	77	155,001	Permanent	Sardinia	EU024
73	G4JFS	106	75	94,950	Permanent	UK Mainland	EU005
74	RZ1AWD	491	27	80,109	DXpedition	Gogland	EU133
75	LU8XW	112	42	35,280	Permanent	Tierra Del Fuego	SA008
76	K7PAR/7	34	18	2,574	DXpedition	Whidbey	NA065

24-hr SSB

1	M6T	2,176	304	4,139,568	Permanent	UK Mainland	EU005
2	GI0KOW	2,489	267	4,124,082	Permanent	Ireland	EU115
3	P43E	1,696	201	1,872,164	Permanent	Aruba	SA036
4	2S0F	1,545	170	1,659,610	Permanent	UK Mainland	EU005
5	PJ9I	1,631	168	1,598,184	Permanent	Curacao	SA006
6	F/EA3NY	1,360	184	1,430,784	DXpedition	Noirmoutiers	EU064
7	GM3PPG/P	1,395	151	1,218,570	DXpedition	South Uist	EU010
8	VP5JM	1,306	135	914,490	Permanent	Providenciales	NA002
9	CU8I	1,140	133	863,436	Permanent	Flores	EU089
10	3E1AA	1,440	117	848,016	Permanent	Contadora	NA072
11	BA7JA/7	1,103	100	790,500	DXpedition	Gui Shan	AS131
12	CT3HF	868	142	778,727	Permanent	Madeira	AF014
13	OH1LEG	768	114	736,554	100w DX	Kemio	EU096
14	EI8GS	1,149	127	736,473	Permanent	Ireland	EU115
15	EI8IR	902	139	683,046	Permanent	Ireland	EU115
16	VE1JS	741	119	572,985	DXpedition	Brier	NA127
17	M0BRK	439	157	570,381	Permanent	UK Mainland	EU005
18	OZ7HAM	777	109	513,063	Permanent	Sjaelland	EU029
19	G0VSN	396	140	506,100	Permanent	UK Mainland	EU005
20	KP4AH	890	108	504,792	Permanent	Puerto Rico	NA099
21	SK0HS/5	535	119	488,019	DXpedition	Vassaro	EU084
22	6Y5DA	408	91	441,896	Permanent	Jamaica	NA097
23	G4ELZ	638	112	394,464	Permanent	UK Mainland	EU005
24	EI3IS	396	102	360,468	Permanent	Ireland	EU115
25	GW0ANA/P	86	86	304,268	Permanent	UK Mainland	EU005
26	DL5NON	687	67	273,561	DXpedition	Poel	EU089
27	G0WRE	387	105	269,325	Permanent	UK Mainland	EU005
28	IC8JAH	550	64	218,496	Permanent	Capri	EU031
29	KW1DX	362	76	176,472	100w DX	Long Island	NA137
30	G0VBD	212	86	160,992	Permanent	UK Mainland	EU005
31	JA9SCB/1	285	67	141,705	100w DX	Honshu	AS007
32	JA5EO	376	41	114,636	Permanent	Shikoku	AS076
33	YC9YKI	591	42	111,762	Permanent	Yapen	OC147
34	WB2KHO	130	74	103,452	Permanent	Long Island	NA026
35	DK7OM/P	206	63	100,737	100w DX	Poel	EU098
36	JH1UUT	153	68	98,124	Permanent	Honshu	AS007
37	VK4EJ	179	50	70,650	Permanent	Australia	OC001
38	G0PBV	135	42	42,630	Permanent	UK Mainland	EU005
39	GM4EMX	60	46	34,776	Permanent	UK Mainland	EU005
40	G0NWY	82	33	23,562	Permanent	UK Mainland	EU005
41	EA8/EA2CNG	85	24	18,312	DXpedition	Canary	AF004
42	VO1RE	84	25	13,050	Permanent	Fogo	NA198
43	KL7/NO7F	174	15	12,870	Permanent	Unalaska	NA059
44	CE7AOY	158	17	11,934	Permanent	Las Huichas Aisen	SA064
45	CU3FT	18	16	3,936	Permanent	Terceira	EU003

24-hr Multi Mode

1	CF7ZO	1,359	173	1,787,955	Permanent	Vancouver	NA036
2	EI5DI	1,052	190	1,243,718	Permanent	Ireland	EU115
3	RA0FF	695	173	1,067,022	Permanent	Sakhalin	AS018
4	TK/F6AUS	1,004	166	1,064,724	DXpedition	Corsica	EU014
5	IS0IGV	838	73	743,543	Permanent	Sardinia	EU024
6	2A0BQI/P	647	134	690,502	DXpedition	Benbecula	EU010
7	TM1OTA	975	113	626,133	DXpedition	Oleron	EU032
8	JF1SEK	524	139	504,570	Permanent	Honshu	AS007
9	EA8/DL3HQN	596	104	400,608	DXpedition	Canary	AF004
10	EI4BZ	463	125	397,125	Permanent	Ireland	EU115
11	9A2V	567	89	366,235	DXpedition	Pasman	EU136
12	DJ7RJ/P	630	88	361,416	100w DX	Poel	EU098
13	K1VSJ	680	91	330,876	Permanent	Martha's Vineyard	NA046
14	HS0AC/2	442	77	316,470	DXpedition	Koh SiChang	AS107
15	JQ6NAW	623	76	268,812	Permanent	Kyushu	AS077
16	JM6CIP/6	826	63	263,466	100w DX	Amakusa	AS012
17	JH6TYD	525	59	256,473	Permanent	Goto	AS040
18	JA7IC	363	94	219,678	Permanent	Honshu	AS007
19	G4BGW	144	82	123,000	Permanent	UK Mainland	EU005
20	JA1XUY	110	62	76,260	Permanent	Honshu	AS007
21	JJ3TBB	123	61	69,357	Permanent	Honshu	AS007
22	OZ/DL2HEB/P	271	42	68,922	DXpedition	Laes	EU088
23	WP4LNY	250	36	59,256	Permanent	Puerto Rico	NA099
24	YC8TXW	152	23	41,676	Permanent	Sangihe	OC210
25	SO3CE/1/P	133	29	25,143	100w DX	Wolin	EU132
26	R1AND	128	128	12,600	Permanent	Antarctica	AN016
27	JA9XBW	11	11	1,815	Permanent	Honshu	AS007

24-hr CW

1	OH0Z	2,335	139	1,662,328	Permanent	Aland	EU002
2	9H1ZA	1,583	134	1,122,786	Permanent	Malta	EU023
3	DL8OBC/P	1,271	132	926,244	DXpedition	Helgoland	EU127
4	DL1EFD/P	919	144	808,272	100w DX	Langeoog	EU047
5	J49WI	1,317	108	737,748	100w DX	Crete	EU015
6	RZ1OA/A	1,343	103	702,975	DXpedition	Lyasomin	EU153
7	OZ1AA	1,034	112	674,016	Permanent	Sjaelland	EU029
8	M7W	1,131	96	474,336	Permanent	UK Mainland	EU005
9	GD3IZD/P	1,097	79	428,733	100w DX	Man	EU116
10	JG6URG/6	911	69	340,929	DXpedition	Tsushima	AS036
11	OZ8SW	503	92	334,420	Permanent	Sjaelland	EU029
12	GM4SID	550	91	276,822	Permanent	UK Mainland	EU005
13	OZ3CF	318	100	253,800	DXpedition	Sjaelland	EU029
14	G4OGB	510	83	211,650	Permanent	UK Mainland	EU005
15	KE8M/4	588	65	205,920	DXpedition	Key West	NA062
16	G0DEZ	559	70	192,990	Permanent	UK Mainland	EU005
17	GW3KDB	102	101	149,682	Permanent	UK Mainland	EU005
18	DL3NSM/P	249	66	124,542	DXpedition	Ruegen	EU057
19	OZ/SM7GCZ	136	68	115,872	100w DX	Sjaelland	EU029
20	VK8AV	482	55	91,245	Permanent	Australia	OC001
21	EA8DP	403	30	62,550	Permanent	Gran Canaria	AF004
22	JA1NLX	367	35	59,955	Permanent	Honshu	AS007
23	SV8/DL7VSN/P	350	31	55,986	DXpedition	Mykonos	EU067
24	IS0SDX	303	24	41,328	Permanent	Sardinia	EU024
25	DK4CU/P	132	33	30,888	100w DX	Borkum	EU047
26	IS0UWX	209	26	29,040	Permanent	Sardinia	EU024
27	DL0BRF	75	26	13,962	DXpedition	Borkum	EU047
28	UA0FEN	122	16	1,188	Permanent	Sakhalin	AS018

12-hr SSB

1	9H0A	1,350	182	1,596,763	Permanent	Malta	EU023
2	H2T	1,397	139	1,119,645	Permanent	Cyprus	AS004
3	M1A	735	123	687,615	Permanent	UK Mainland	EU005
4	KP2/AA1BU	911	101	580,188	100w DX	St. John	NA106
5	OH6RX	1,100	84	512,064	DXpedition	Vaasa	EU101
6	G0ANH	416	138	484,794	Permanent	UK Mainland	EU005
7	DL3ABL/P	716	106	456,648	DXpedition	Fehmarn	EU128
8	PA9MR	523	113	452,226	Permanent	North Sea Coast	EU146
9	EA6AEQ	561	117	436,995	Permanent	Mallorca	EU004
10	JW7QIA	708	87	413,424	Permanent	Svalbard	EU026
11	SV1BRL/8	869	82	390,894	100w DX	Kefalonia	EU052
12	9H1DE	782	84	371,448	Permanent	Malta	EU023
13	OZ1ACB	413	97	295,947	Permanent	Sjaelland	EU029
14	LA4C	548	76	254,448	Permanent	Karmoy	EU055
15	GI0KVQ	306	76	181,716	Permanent	Ireland	EU115
16	8P6CV	403	69	176,157	Permanent	Barbados	NA021
17	F5CWU/P	585	59	168,681	100w DX	Re	EU032
18	IS0LLJ	162	81	149,202	Permanent	Sardinia	EU024
19	TA3J/0	1,056	50	142,200	100w DX	Alibey	AS099
20	9V1RH	177	75	140,625	Permanent	Singapore	AS019
21	JA4PXE/4	399	44	132,396	DXpedition	Yasiro	AS117
22	M0AFC/P	263	72	126,792	100w DX	UK Mainland	EU005
23	IM0/IK2AEQ	431	47	124,973	100w DX	La Maddalena	EU041
24	G0LUQ/P	225	83	121,263	DXpedition	UK Mainland	EU005
25	DF0IT	201	74	119,214	Permanent	Helgoland	EU127

RSGB Islands on the Air 1999 Contest Results

26	JI3DST/3	391	47	117,171	100w DX	Honshu Coastal	AS117
27	IK3PQH	208	65	106,080	Permanent	Lido	EU131
28	G0DIZ	157	73	102,711	Permanent	UK Mainland	EU005
29	6W1QV/P	512	45	91,523	100w DX	Goree	AF045
30	OZ1IVA	287	50	88,050	Permanent	Sjaelland	EU029
31	OZ1JSH/P	526	34	83,436	DXpedition	Anholt	EU088
32	IA5CNE	173	58	82,302	Permanent	Elba	EU028
33	FM5CD	71	70	73,710	Permanent	Martinique	NA107
34	NN2C	103	63	72,387	Permanent	Long Island	NA026
35	GM3RTJ	128	58	65,424	Permanent	UK Mainland	EU005
36	MM0BNN/P	342	32	65,088	100w DX	Skye	EU008
37	TA0S	318	36	61,992	100w DX	Bozcaada	AS099
38	FM5FJ	156	28	46,424	Permanent	Martinique	NA107
39	G3TTC	107	49	45,717	Permanent	UK Mainland	EU005
40	W1/VA3PL	194	35	40,530	100w DX	Mt Desert	NA055
41	SM1CXE	110	41	39,130	Permanent	Gotland	EU020
42	AH8LG	163	35	36,855	Permanent	Tutuila	OC045
43	VK6NU/P	92	39	34,164	DXpedition	Rottnest	OC164
44	JJ3OOZ	56	41	30,996	Permanent	Honshu	AS007
45	M0BAO/P	198	32	28,704	Permanent	UK Mainland	EU005
46	OZ5LH	55	38	24,966	Permanent	Sjaelland	EU029
47	GW4BLE	80	37	24,864	Permanent	UK Mainland	EU005
48	OZ1CJX	98	31	24,366	Permanent	Sjaelland	EU029
49	C6A/M0CIL	142	25	20,550	Permanent	Abaco Island	NA080
50	M5W	67	30	18,960	Permanent	UK Mainland	EU005
51	VE7XO	654	66	17,334	Permanent	Vancouver	NA036
52	YC6PUP	43	31	15,531	Permanent	N Sumatera	OC143
53	EA8AD	98	25	15,450	Permanent	Tenerife	AF004
54	JL3VUL	183	16	14,352	Permanent	Honshu	AS007
55	KH6GMP	74	21	11,970	Permanent	Hawaii	OC019
56	JJ3APB	40	23	11,868	Permanent	Honshu	AS007
57	JA3ETD	33	25	10,275	Permanent	Honshu	AS007
58	JD1BIA	56	10	7,200	Permanent	Ogasawa	AS031
59	GM4ELV	52	15	6,285	Permanent	UK Mainland	EU005
60	DU1SAN	28	15	6,000	Permanent	Luzon Gp	OC042
61	JA1STY	35	15	5,715	Permanent	Honshu	AS007
62	JA4TWZ	28	16	5,184	Permanent	Honshu	AS007
63	JR1BSV	17	14	3,402	Permanent	Honshu	AS077
64	JL3RDC	27	11	2,739	Permanent	Honshu	AS007
65	JG1GCO	12	11	1,980	Permanent	Honshu	AS007
66	AA2WN	14	14	1,708	100w DX	Kent	NA140
67	JA6QDU	30	7	1,386	Permanent	Kyushu	AS077
68	7N2UQC	145	9	1,305	Permanent	Honshu	AS007
69	JR2TRC	11	8	1,032	Permanent	Honshu	AS007
70	GM/IZ4CTM	27	5	765	100w DX	Shetland	EU012
71	JH2WHS	7	6	630	Permanent	Honshu	AS007
72	TA3YJ/0	20	4	432	100w DX	Alibey	AS099
73	YC8YZ	6	6	324	Permanent	Sangihe	OC210
74	DL6MHW/P	29	2	246	DXpedition	Fehmarn	EU128
75	JA3AER/5	26	2	192	Permanent	Shikoku	AS076
76	JA8TEZ	5	3	153	Permanent	Hokkaido	AS078
77	JM4UZM/4	3	3	135	Permanent	Honshu	AS007
78	JG3WCZ	3	3	135	Permanent	Honshu	AS007

12-hr Multi Mode

1	OH0V/P	941	159	979,735	!00w DX	Aland	EU002
2	9A4W	251	158	532,776	Permanent	Brac	EU016
3	UA0FDX	355	355	371,392	Permanent	Sakhalin	AS018
4	9A5ST	580	121	363,726	Permanent	V.Drvenik	EU016
5	OX3NUK	539	91	304,395	Permanent	Greenland	NA018
6	JA6LCJ/6	226	67	223,780	DXpedition	Kami	AS012
7	9A6A/P	597	66	222,980	100w DX	Hvar	EU016
8	7L4IOU	175	94	173,430	Permanent	Honshu	AS007
9	JI5SKS	431	58	172,782	Permanent	Shikoku	AS076
10	N2US/P	239	66	115,434	100w DX	Chincoteague	NA083
11	JA0BMS/1	227	48	68,496	Permanent	Honshu	AS007
12	9M2TO	345	32	60,768	Permanent	Penang	AS015
13	SM0JHF/7	273	35	59,325	DXpedition	Oland	EU037
14	JR1LEV	121	45	48,735	Permanent	Honshu	AS007
15	YC9LQA	227	41	47,478	Permanent	Flores	OC151
16	JK2VOC	73	45	38,475	Permanent	Honshu	AS007
17	CU8/DF2SS	190	35	38,010	DXpedition	Fiores	EU089
18	G3ECS	44	36	22,032	Permanent	UK Mainland	EU005
19	G6QQ	71	35	21,735	Permanent	UK Mainland	EU005
20	G8DR	45	28	15,624	Permanent	UK Mainland	EU005
21	EA6ZS	49	20	11,580	Permanent	Mallorca	EU004
22	JJ1JRH	30	25	10,350	Permanent	Honshu	AS007
23	IT9VYY	60	21	9,072	Permanent	Sicily	EU025
24	JA7ARW	45	20	8,940	Permanent	Honshu	AS007
25	JA1MXY/1	30	19	6,498	100w DX	Izu-Osami	AS008
26	G4XPE	35	18	6,210	Permanent	UK Mainland	EU005
27	JH6RTO/1	20	15	4,140	100w DX	Jogashima	AS117
28	JF2FIU	31	5	645	Permanent	Honshu	AS007
29	7K2PBB	5	4	204	100w DX	Honshu	AS007

12-hr CW

1	G4BUO	756	145	684,375	Permanent	UK Mainland	EU005
2	DJ2HW	733	97	423,070	Permanent	Fehmarn	EU128
3	G3PJT	525	105	360,390	Permanent	UK Mainland	EU005
4	GM4FAM	402	113	343,746	Permanent	UK Mainland	EU005
5	JH3AIU	783	69	266,214	Permanent	Honshu	AS007
6	G3LHJ	457	97	258,699	Permanent	UK Mainland	EU005
7	IT9ORA	550	60	226,200	Permanent	Sicily	EU025
8	G3TXF	460	81	200,232	Permanent	UK Mainland	EU005
9	GM3CFS	347	83	184,746	Permanent	UK Mainland	EU005
10	VP9/N0ED	835	50	183,450	DXpedition	Bermuda	NA005
11	9A2FK/P	817	42	178,794	100w DX	Sipan	EU016
12	PA5TT	628	51	163,634	Permanent	Schowen	EU146
13	DJ5DT/P	249	75	157,725	DXpedition	Sylt	EU042
14	SV1BSX/8	585	50	150,750	DXpedition	Salamina	EU075
15	RM0F	639	47	148,755	Permanent	Sakhalin	AS018
16	KH6/W3LPL	636	45	141,480	Permanent	Hawaii	OC019
17	G0JQN	465	65	139,815	Permanent	UK Mainland	EU005
18	G4PZQ	294	71	135,894	Permanent	UK Mainland	EU005
19	GM4OBK/P	460	59	128,148	100w DX	UK Mainland	EU005
20	G3RSD	342	59	111,510	Permanent	UK Mainland	EU005
21	G3TJE	367	57	107,217	Permanent	UK Mainland	EU005
22	ISØ/DKZH/P	510	42	107,100	DXpedition	Sardinia	EU024
23	IT9NVA	435	45	96,525	Permanent	Sicily	EU025
24	OZ4FF	406	39	95,706	Permanent	Bornholm	EU030
25	GW3NJW	377	51	90,576	Permanent	UK Mainland	EU005
26	DL4FCH/P	457	38	89,490	100w DX	Pellworm	EU042
27	G2AFV	267	56	87,864	Permanent	UK Mainland	EU005
28	G3GMS	158	62	81,468	Permanent	UK Mainland	EU005
29	JQ1HIV	155	58	80,562	Permanent	Honshu	AS007
30	N4H	351	44	79,068	DXpedition	Hatteras	NA067
31	G5MY	170	54	69,012	Permanent	UK Mainland	EU005
32	G4PDQ	393	41	68,511	Permanent	UK Mainland	EU005
33	JF1SQC	683	22	62,766	Permanent	Honshu	AS007
34	JA5APU	473	20	56,440	Permanent	Shikoku	AS076
35	JH6WHN/6	308	26	55,510	Permanent	Tanegshma	AS032
36	G2HLU	66	57	53,694	Permanent	UK Mainland	EU005
37	YB4JIM	154	34	41,514	Permanent	Sumatra	OC143
38	G0IGP	121	42	35,910	Permanent	UK Mainland	EU005
39	DU1ODX	179	26	34,866	Permanent	Luzon Gp	OC042
40	9A2VN	71	42	34,650	Permanent	Krk	EU136
41	G3SXW	300	24	33,120	Permanent	UK Mainland	EU005
42	G3KKQ	199	37	30,266	Permanent	UK Mainland	EU005
43	2C3SB	100	35	26,460	Permanent	UK Mainland	EU005
44	LA3BX	79	33	25,641	Permanent	Hidra	EU061
45	M4T	306	18	19,764	Permanent	UK Mainland	EU005
46	G0KZO	63	29	17,777	Permanent	UK Mainland	EU005
47	JA2KKA	106	24	16,212	Permanent	Honshu	AS007
48	G3VQO	76	28	16,128	Permanent	UK Mainland	EU005
49	G3GMM	90	26	15,054	Permanent	UK Mainland	EU005
50	OZ5RM	149	16	13,296	100w DX	Sjaelland	EU029
51	JH1PXY	53	24	11,592	Permanent	Honshu	AS007
52	G3HZL	50	20	9,540	Permanent	UK Mainland	EU005
53	JP6GQN	160	11	9,240	Permanent	Kyushu	AS077
54	G4FDC	56	22	8,976	Permanent	UK Mainland	EU005
55	VE7/N7OU	107	12	8,880	100w DX	Vancouver	NA036
56	OZ/DF5ZV	100	11	6,072	DXpedition	North Sea Coast	EU125
57	JA1XCZ/4	89	13	5,811	Permanent	Honshu	AS007
58	SM7/K6JHF	100	9	4,860	DXpedition	Oland	EU037
59	G4ZME	26	20	4,820	Permanent	UK Mainland	EU005
60	2C3KJN	124	6	2,808	Permanent	UK Mainland	EU005
61	OZ/DK7ZT	65	8	2,808	100w DX	Fano	EU125
62	JK1LUY	19	10	2,130	Permanent	Honshu	AS007
63	JA3ARM	14	8	1,104	Permanent	Honshu	AS007
64	JA3NMV	8	8	960	Permanent	Honshu	AS007
65	JA1AAT	9	4	396	Permanent	Honshu	AS007
66	JL3SBE	4	1	24	Permanent	Honshu	AS007

Checklogs gratefully received from:

2U0ARE	HA0DD	PY7OJ	SP4EAK
4Z5DW	HA5AF	RA0CCV/3	SP5MBL
AA9KH	IK2WJT	RA0ZN	SP6OJG
DJ2IA	IK3XTY	RA3XO	SP6YGB
DJ3XG	LA2WIA	RA4LC	SP7XK
DL2AXM	LU6VCD	RA4UAT	SP8JMA
DL2HWI	OE6IMD	RK9CYQ (MO)	SQ5AAS
DL3JON	OK1XC	RM6A/P (MO)	SQ9CAQ
DL5MY	OK2HFC	RW3AG	UA0ZY
DL6KWU	OZ/DL2JRM	RW9MJ	UA3PNO
EA1APS	OZ/LA9DAA	SM4AWC	UA3UBT
EA2KV	OZ1LDM	SM5BUH	UA3XDO
EA3BJM	OZ5EV	SM5XW	UA9WUU
EA3BSE	OZ5PA	SM6AVD	WP4U
EA5RKX	PA0TV	SM6BSK	YC5SKR
EA7CA	PA3AFF	SM6BZE	YC5YCT
EA8AKN	PA3FFM	SM6CZU	YL2RP
EA8BVX	PU2TES	SP1DMD	YO6AUI
EC5AJP	PY1BNE	SP1GZT	YO9HH
G0RCI	PY3AU	SP2MEF	
H2T	PY5GVC (MO)	SP3NGB	(MO = Multi Op)

SWL

24-hr SSB

Pos	Callsign	Score	Ref No:
1	SP-0142-JG	1,124,418	1749
2	SP-3003-LG	968,188	2078
3	F15452	941,292	1845
4	ONL-3647	854,304	2055
5	NL-4276	828,366	2093
6	BRS91529	487,728	1840
7	OM3-0001	445,284	E
8	DE1MLB	427,635	E
9	F11556	408,618	1962
10	OK2-35255	333,216	1965
11	RS95258	208,971	1842
12	DE7BME	132,300	E
13	F14846	85,680	1937
14	4X4-1401	68,820	1843

24-hr Multi Mode

1	RV6LFE	682,310	E
2	NL-12461	337,554	E
3	SP2-09001	307,936	2073
4	US-T-324	558	E

24-hr CW

1	UA1-143-1	758,961	1964
2	BRS88921	335,580	2034
3	BRS44395	153,846	2065

12-hr SSB

1	ONL-383	914,593	E
2	UA3-147-505	823,725	E
3	US-W-5	381,537	E
4	OH2-836	231,528	2082
5	I3316VE	208,413	1898
6	DE7AXS	179,646	E
7	DLI04/1657634	114,720	E
8	F15828	36,327	1689
9	SP-0406-SU	13,782	1755
10	UA3-155-75	7,452	1726
11	UA3-155-776	3,060	1728

12-hr Multi Mode

1	OM3-27707	3,455,734	1968
2	RZ3EC	697,950	E
3	UA3-170-847	424,008	1866
4	PA5205	70,270	2035

12-hr CW

1	UA3-155-28	313,866	1727
2	JA4-4665/BY4	118,218	E
3	F5NLX	9,595	1868

RSGB Islands on the Air 1999 Contest Results

World 24-hr SSB

Pos	Callsign	Score
1	LA9HW	2,069,184
2	RA1TC	1,786,614
3	RU4HP	1,588,278
4	DL8UD/P	1,250,832
5	S51CK	1,232,952
6	RV0AR	1,198,980
7	RV3ACA	937,392
8	SP5ZIM	566,547
9	3Z6V	556,784
10	UR4EYN	555,244
11	RK3DZD	537,844
12	UT1WA	422,861
13	SP6GF	376,110
14	KA1UQ	367,539
15	YU1RE	330,660
16	LX2AJ	324,711
17	YU1KN	324,060
18	UR4UCM	324,000
19	DM4VDE	266,115
20	LU9HO	258,825
21	W4RA	247,086
22	SP6JLL	246,402
23	IN3XUG	245,998
24	LZ1KSN	229,716
25	SP3NUN	206,712
26	UA3BZ	205,068
27	US6EX	201,520
28	OM3YK	194,740
29	IK8WTM	188,496
30	YO9GJY	179,520
31	UA9ACJ	168,810
32	RX1CQ/1	160,308
33	ES4BG	158,784
34	VO1BC	139,590
35	SP3UIW	136,125
36	L2OF	134,400
37	N0ISL	130,977
38	K6ACZ	128,061
39	SP6GNJ	124,740
40	KG0ZI	117,810
41	SP6AOI/P	111,909
42	SP8OON	108,450
43	SP3JHY	103,314
44	EA5AEN	101,013
45	VE3ZZ	97,686
46	EA5BX	95,073
47	UT5EFV	93,558
48	SP5ICS	90,978
49	UA0SJ	89,432
50	CE6ABC	83,430
51	UR6QS	81,396
52	AA7KE	64,512
53	SP0AAZ	62,487
54	EA1BLX	60,690
55	SM7DXQ	56,940
56	SP2ATF	54,150
57	PR2G	47,988
58	LZ5PL	44,550
59	ZS4I	41,625
60	UN9PQ	40,833
61	CE7OZX	40,488
62	IK2YSJ	39,870
63	EA3MR	39,360
64	PR7AR	27,438
65	W8TTS	22,077
66	N9TU	21,984
67	YY1HFY	18,060
68	KC8HWV	11,760
69	N2LQQ	8,208
70	PR7SM	4,452
71	PY5TJ	3,732
72	PY5BF	2,299
73	PR7FN	1,113
74	PR7QI	72

24-hr Multi Mode

1	RW3QC	6,163,620
2	UU2JQ	2,858,040
3	IK2UCK	2,358,936
4	S53EO	2,206,500
5	W1NG	1,825,824
6	UU7J	1,949,744
7	LZ1KDP	1,862,322
8	LY3BY	1,861,440
9	UP5P	1,738,800
10	YT7W	1,622,379
11	DL4BQE	1,233,282
12	ON7RN	1,038,015
13	UT5HP	987,896
14	UX7MM	968,370
15	SP3FYM	898,128
16	HA5BSW	880,596
17	UR5EDX	822,780
18	OK2EC	624,348
19	DL5AUA	585,330
20	OK1TN	541,467
21	RA3NC	525,892
22	K4BAI	477,135
23	EU1SA	462,561
24	DJ6QT	457,560
25	YO7LCB	449,376
26	LZ1PJ	402,000
27	HA5JP	392,985
28	LZ1BJ	392,805
29	RZ3EM	376,047
30	ES4NG	362,600
31	DL6UNF	359,880
32	N6VR	358,680
33	DL1ARJ	316,800
34	S58MU	303,632
35	DL9MRF	276,555
36	RW9QA	274,082
37	RW3PN	239,976
38	W5FO	239,568
39	YO5OEF	225,631
40	OK2SGY	223,003
41	UA1ANA	207,900
42	YL2DZ	200,508
43	UA6BS	196,208
44	LZ2NB	193,248
45	F5ICC	179,124
46	OK2ZJ	176,472
47	KD7H	173,817
48	RW3DY	157,752
49	YT7TY	153,900
50	RV1CC	137,492
51	YU7KM	111,045
52	PA3HDP	104,066
53	AA1SU	77,231
54	UR5TAU	75,168
55	DL2RON/P	69,678
56	EW6BN	68,262
57	F6JSZ	66,861
58	RA0ZD	57,188
59	OK1KZ	56,316
60	IK0STM	55,980
61	OL5DX	48,528
62	N4MM	48,515
63	F2NZ/P	48,504
64	OK1KCF	34,686
65	SP6DNZ	34,524
66	RA6AR	29,397
67	RU3WR	21,792
68	SP5PB	9,936
69	EA7TG	9,000
70	SM7CWI	5,265
71	UA4LU	4,304
72	W4NTI	1,680

24-hr CW

1	HA1CW	1,325,016
2	DK3DM	1,112,496
3	UR3QCW	1,030,280
4	9A1AA	1,010,152
5	UR5QN	1,005,760
6	DL6KVA	824,586
7	UR7IA	803,088
8	UT2IA	783,272
9	RK3UWA	699,776
10	YL2UZ	616,875
11	OK1HX	524,847
12	SP2AVE	499,224
13	RW1QD	496,305
14	RA1ACJ	437,664
15	EW8DX	420,849
16	UX3ZW	415,152
17	RK0SXF	391,500
18	UA9XEN	378,459
19	OK2QX	356,944
20	DL5CL	343,380
21	LZ1QZ	340,920
22	HA5AZC	336,966
23	HA6NL	330,270
24	OK1JOC	323,904
25	LY2BBF	313,014
26	UR3PDT	297,344
27	DJ1YFK	249,912
28	OK1FCA	239,904
29	SP6LV	235,125
30	SP5UAF	218,064
31	PY1ARS/4	200,718
32	HB9ARF	196,533
33	SP6BEN	194,880
34	Z31CN	194,184
35	UA9APA	192,348
36	DL7VOX	188,916
37	RA3UT	187,500
38	RX3AEX	170,478
39	K9QVB	160,896
40	RV1AC	147,987
41	OK2BJT	145,944
42	SP8BAB	139,941
43	OK2SJ	133,848
44	S53AU	129,825
45	UT7QF	126,888
46	UA9AOL	125,625
47	UA4SS	112,530
48	UA9AX	103,284
49	OM1AF	101,964
50	F6GQO	95,226
51	RN1AO	77,407
52	SP3VT	73,416
53	DM3PKK	64,350
54	UT7WR	64,242
55	YL3FW	64,108
56	SP6CXH	61,299
57	IZ5AXA	60,372
58	DL3KWR	55,728
59	LZ1WL	51,978
60	DL2HRN	28,002
61	RA9KM	27,506
62	SM7BHM	13,662
63	SM7BQX	12,282
64	EA4AMO	11,781
65	OH7DK	10,758
66	PY4WAS	7,686
67	PA0RRS	2,035

12-hr SSB

1	LY3BH	677,079
2	DK7YY	659,960
3	SP9XWD	631,482
4	I2OKW	530,101
5	ON6NL	521,235
6	UAØZBK/Ø	508,464
7	RN3OA	501,120
8	I2AT	484,866
9	UR5QBB	352,506
10	UR7M	262,774
11	UN2O	245,575
12	LU2BA	242,802
13	I7FMN	203,760
14	OZ6PI	195,426
15	EA1ACP	194,655
16	I4CSP	178,002
17	SV2AEL	171,108
18	EA4EMC	169,020
19	RW1QF	162,582
20	IK2QPO	160,734
21	EA5XX	159,165
22	SV1CID	151,925
23	F2NH	145,359
24	UA9SNQ	132,060
25	9A2BD	128,340
26	OH5PA	126,400
27	UA3QOG	125,052
28	ON6CR	124,956
29	IK7WPD	122,688
30	OK1GW	121,572
31	YT1AT	116,937
32	EA3LS	109,896
33	SQ4CUX	107,484
34	IZ2BHQ	101,932
35	ON7YP	101,925
36	IK2SFQ	95,976
37	4Z1GY	91,845
38	SP3BVA	90,531
39	EA1CS	88,074
40	RX3MX	82,200
41	OK2BHM	81,000
42	RX9UKF	80,154
43	WA1MKS	79,758
44	UA9MAZ	79,488
45	UX7UU	76,500
46	PA0IJM	74,464
47	CE8EIO	72,471
48	YO5CRQ	71,550
49	DL1ASF	65,943
50	UR6MX	65,610
51	LR0H	65,001
52	IV3AJZ	64,077
53	S59D	62,856
54	SP8OOB	62,784
55	EA1BZP	62,271
56	LO7H	57,684
57	DL3KDC	57,168
58	RW3QF	56,970
59	PY7ZY	54,054
60	RV3YR	52,104
61	SM3LIV	50,094
62	IK4QIB	49,995
63	SP5BB	49,818
64	OM4KK	48,576
65	OK2PHI	48,444
66	SP9OUK	47,400
67	I0SBA	47,256
68	CE3WDH	44,733
69	EA1ET	42,504
70	KD2N	42,347
71	YT1CS	42,000
72	PA3GZC	40,320
73	IK2WYI	39,816
74	SP2AHD	39,732
75	IK2UVR	39,438
76	F8BDQ	39,375
77	PY2DBU	38,610
78	SP3GHK/P	37,284
79	9A4SS	37,170
80	PY4OY	36,270
81	S57MSU	35,763
82	WB1GEX	35,760
83	DL2FK	35,475
84	S57UYX	35,154
85	UU4JQE	33,750
86	YL2TW	31,482
87	RA3OU	31,302
88	SP5DRE	29,274
89	UA0AOZ	28,980
90	CT1ELF	28,680
91	SQ9FQY	28,530
92	RA4SG	28,116
93	F5JBF	25,568
94	DJ2UB	25,515
95	UT7MD	25,086
96	EA5JC	24,300
97	DL1JGF	23,976
98	PY2NY	23,652
99	EA5GMB	22,359
100	RU9UG	21,888
101	W1ENZ	21,582
102	OZ1LGK	21,150
103	SP6IEQ	20,295
104	SP6OPE	19,890
105	UA4HAK	19,104
106	SP7A	18,990
107	EA3GHQ	16,434
108	DK4IO	16,020
109	AJ3M	13,700
110	PY1NEZ	13,689
111	YV1GUZ	13,158
112	RW9RF	13,090
113	DL2ECZ	13,050
114	4Z5FL/M	12,960
115	SM4AIO	12,960
116	SP9LDI	11,500
117	OH6LJN	11,286
118	RZ6LB	10,836
119	VE3SYB	9,900
120	OK1MFG	9,240
121	EA1EDF	8,580
122	W7KEU	8,190
123	IV3KSE	7,260
124	KB2EOQ	6,840
125	PY2OZF	6,069
126	IV3SKB	5,928
127	PY3AJB	5,145
128	YO8DHD	5,083
129	UR5EDO	4,998
130	EA1BVP	4,896
131	PY2QA	4,608
132	YO9AHX	4,416
133	UT4ZO	4,257
134	PY2KQ	4,176
135	YL2MF	3,600
136	OZ7AEI/P	3,330
137	SM0FM	2,925
138	LW7EGO	2,610
139	DL1HSR	2,535
140	DL1JMS	2,370
141	9A4ZJ	2,178
142	UA0ANT	1,860
143	EZ8CW	1,350
144	SP1JCJ	1,200
145	YU1AXY	1,120
146	PU7ENW	480
147	VE6JY	420
148	DL9JW	216
149	PR7SD	198
150	SP3JZI	135
151	PA3DDP	99
152	PY2ELG	60
153	PY5DC	41

12-hr Multi Mode

1	PT2BW	2,610,072
2	UT5UGR	1,197,212
3	UT5UDX	983,077
4	RW3GU	918,000
5	DL3ECK	780,600
6	LY2BM	761,688
7	N8II	752,400
8	RSØF	610,740
9	OM3EA	457,002
10	OK2SG	438,045
11	UX1UA	434,412
12	ON4CAS	370,575
13	UA0ACG	357,408
14	9A3ZG	335,472
15	WB2YQH	309,636
16	N4UH	269,448
17	SP4GFG	268,389
18	DL3BRA	250,584
19	YU7AL	233,310
20	LY2HN	226,485
21	DL3ZAI	209,708
22	DL3JPN	196,512
23	OK1AYU	195,650
24	9A2FJ	184,307
25	SM3CER	183,600
26	PA0MIR	166,842
27	SP8HXN	155,791
28	OM7RC	153,846
29	RA9AUH	146,372
30	SP7EXJ	137,538
31	EA3ALV	132,768
32	F5YJ/P	125,040
33	SM3CVM	123,480
34	SP9LAS	119,136
35	RA3AUM	118,389
36	OK1AK	116,964
37	F5MDB	113,664
38	IK1NLZ	112,566
39	EA7ALO	108,756
40	HA5FW	107,352
41	RA1QFX	92,415
42	UR6IJ	78,942
43	OZ4RT	76,050
44	W6FA	67,704
45	OK1ANN	67,431
46	LZ2UF	67,320
47	SP3TYF	66,861
48	LZ2HM	57,435
49	N6JM	49,980
50	CX9AU	47,232
51	UA6XT	46,332
52	DL5ZB	45,315
53	DL3YEI	43,056
54	PY1KS	41,796
55	4Z5FW	41,678
56	WB0YJT	41,031
57	RV6BW	38,499
58	LZ4BU	35,250
59	DL8DXL	29,718
60	W6ISQ	29,274
61	OH6MIL	26,460
62	DL0GEL	22,116
63	DL1EV	21,840
64	YO4AAC	21,780
65	UA0KCL	18,900
66	SM3AF	18,060
67	SQ4GXO	17,829
68	DL1DQY	15,540
69	DL0AKR	14,973
70	OE1WEU	13,962
71	EA1DFP	13,050
72	UR5NX	10,269
73	UA1ZMM	8,304
74	K0COP	7,011
75	NM1K	2,457
76	LZ5QZ	64

12-hr CW

1	HA8VK	491,028
2	EA2IA	424,424
3	OK1AVY	406,665
4	YU1AAV	386,100
5	SP4JWR	356,289
6	SQ3DWR	335,016
7	UA3LID	267,900
8	SP5CJQ	267,003
9	LY2KM	265,089
10	YO6BHN	260,660
11	YU7SF	228,000
12	I7PXV	215,736
13	UT9IR	208,794
14	UR4UU	208,086
15	YU7KW	200,490
16	RU4WE	199,554
17	IZ3ALS	192,696
18	IK1QBT	192,192
19	UA0LS	181,696
20	LZ2PEP	178,245
21	OM4DN	176,934
22	HG3G	174,192
23	UA3ABT	171,948
24	UY0ZG	167,280
25	UT1WZ	165,336
26	OK1ZP	151,571
27	SM6CNS	138,084
28	ER3DX	132,825
29	OH2GB	132,273
30	DL2TG	127,374
31	ES4MM	126,240
32	SP9KJM	124,875
33	EW6AL	124,530
34	OH8BQT	122,850
35	UT5ECZ	120,714
36	YO2ARV	119,340
37	IK5RLS	116,298
38	OK1ZL	116,226
39	RA3WDK	115,479
40	HA3JB	115,014
41	LA2HFA	113,463
42	EA5FID	112,464
43	RX3AP	108,324
44	SP9IIL/P	107,520
45	DL2GBB	104,940
46	HB9CRV	104,185
47	F9CI	103,719
48	9A5Z	103,005
49	UA1QBE	101,824
50	UA4AO	101,184
51	LZ2TF	100,926
52	RW4CW	96,831
53	F5JBR	88,512
54	ON6TJ	87,261
55	UA3TGC	86,346
56	SP5FLA	85,680
57	DJ2QV	84,912
58	RW4YA	83,616
59	YL2BJ	82,992
60	HA4YG	81,744
61	RV3DAK	81,084
62	UY5TE	77,040
63	EU6AA	76,669
64	UX7QQ	74,400
65	DJ5GG	67,512
66	PA3AIK	65,832
67	K2SX	63,726
68	SP9FT	62,730
69	YU1BO	61,320
70	LU1EWL	56,745
71	4N1N	48,981
72	DL2HCB	44,604
73	HB9DOT	43,692
74	RU4HH	43,596
75	SP5MBA	42,939
76	RN2FA	41,985
77	YO4ZF	41,664
78	VA3UZ	40,242
79	SP2QVS	38,290
80	UA0FAI	37,992
81	SP9EMI/P	36,720
82	DL7AXM	36,378
83	IK0CNA	34,020
84	UA1ACC	31,824
85	OM5AR	31,044
86	DL1LAW	28,320
87	DL2DRZ	28,290
88	SM3DXC	27,714
89	DJ9DZ	25,752
90	OH1BOI	25,704
91	ES6PZ	24,804
92	PP2JT	23,424
93	UA0IDA/P	23,030
94	DK9EA	21,780
95	DL2HUM	19,251
96	DL2DWP	17,808
97	DL8ZAJ	17,760
98	LU2YA	17,484
99	LA8LA	17,472
100	OK1FTW	17,028
101	OH3TZ	16,605
102	OH7HMC	16,038
103	4K9W	15,024
104	SP9MDY	14,700
105	DL5SVB	13,032
106	PY4MBJ	11,952
107	UA9FEG	9,990
108	PA3BEJ	9,891
109	WA2VQV	8,496
110	UA0SBQ	8,250
111	UA4SBZ	7,830
112	SP3AOT	7,152
113	SP2EIW	5,346
114	UT/UA0QGQ	4,829
115	IK4WMH	4,320
116	LZ3AA	3,936
117	YL2MF	3,600
118	OK2BHE	2,871
119	UA3LPF	2,808
120	UA4QK	2,730
121	HP1AC	2,574
122	UA3YCX	2,457
123	DL5CX	2,310
124	KC2AFK	1,980
125	LZ3AB	1,914
126	DL5FCO	1,863
127	SP5AHR	1,500
128	OM3TU	1,500
129	DK5ZX	1,275
130	UY5YA	1,197
131	UT5UGO	1,152
132	W7/JR1NKN	1,030
133	RN3AU/3	324

Trophy Winners...

IOTA	**MW8Z**	(G3NAS, G3NKC, G3NLY, G4BWP, G5LP, G0KRL, G0MTN)
CDXC Geoff Watts Memorial	**GU8D**	(G3SJJ, G4DRS, G4JQL, G4TSH, G0OPB)
Roger Balister, G3KMA	**9A0DX**	(9A2CP, 9A3LG, 9A3PA, 9A3SK, 9A3ZA, 9A4RV, 9A4VV)
David King, G3PFS	**M1A**	(G0WCW)
G3DYY Memorial	**G4BUO**	
W9DWQ Contest Award	**CY9CWI**	(VE2AYK, VE2SEI, VO1NO, VE1MR, VE2AYU, VE2TBH, VY2OX)

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Alinco DJ-G5 Dual band h/held Tx.....£269.00

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★ Superb performance SW receiver ★ True SSB ★ 0.2 - 30Mhz (AM/SSB) ★ 240 or 12V ★ Attenuator ★ S-meter ★ Timer

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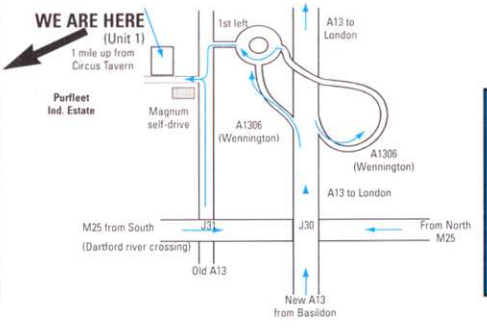

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70cm	12ele (boom 48"/13.8dBd)	£49.95

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END FED HALF WAVES Ground plane free.

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

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

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PL-20	20m whip (approx 1.5m long)	£19.95 *Del £8.00*
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Multi-stranded PVC coated heavy duty flexweave wire. All parts replaceable. Stainless steel and galvanised fittings. Full size - 102ft.

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6m + 2m + 70cm. A superb compact 4-element, 3-band yagi. 4.5dBd gain (all bands). Boom length 1.13m (max). Longest element 2.96m (max).

ONLY **£69.95** del £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-2000	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,¾ths, 4.5dB (1.8m)	£29.95
DB-285	144MHz, ¾ths, 3.4dB (1.3m)	£15.95
PL-6M	50MHz ½ 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
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Multi-Stranded (Grey PVC)	£9.95 P&P £4
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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
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Copper earth rod (3ft) + 10m wire attatched	£14.99 P&P £6

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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
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1kw Handling

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

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 ..... £18.99 P&P £1

★ 20ft BARGAIN MAST SET ★

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

SSP ~~£60.00~~
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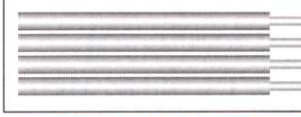
DEL £10



FIBRE GLASS MASTS

1½" Dia	£8.50 per metre	(Max length 3m delivered	*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

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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**
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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*

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Standard kits (complete with wire)	£23.95 P&P £6
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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.

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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
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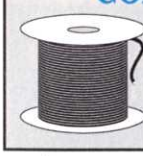
3-way guy ring		£3.95
4-way guy ring		£4.95
2" mast sleeve		£9.95
1½" mast sleeve		£8.95

COAX BARGAINS



100m roll of RG-213 coax
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100m roll of RG-58 coax
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SP-350V

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

INTRO PRICE **£19.99** P&P £1

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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 £6.00

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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

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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

SEC-1223

23 amp PSU

ONLY **£99.95**

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SGC-230 HF smart tuner	£289.00
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HF digital SWR analyser + 1.8-170MHz counter/resistance meter.

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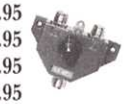
RS-402	125-525MHz (200W) £59.95	£49.95 P&P £5
RS-101	1.8-60MHz (3kW) £79.95	£69.95 P&P £5
RS-40	144/430MHz Pocket PWR/SWR Meter (200W) (SO239)	£34.95 P&P £1
RS-40N	As above with N-type	£39.95 P&P £1

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

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

SALE PRICE **£315.00**

Street Pilot	GPS	£419.00
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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 £7 (P&P £2.50)

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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 **£7.50** 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

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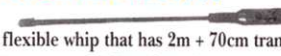
REGULAR-GAINER RH-770

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

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

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The Magic of Six Metres

By Kerry Rochester, G0LCS, and Chris Deacon, G4IFX***

SIX METRES, or 'The Magic Band' as it is affectionately known by its devotees, is arguably the most interesting, exciting, frustrating yet addictive of all the amateur bands. Spectacular worldwide DX contacts can be made around the years of solar maximum. With NASA scientists currently predicting the peak of solar cycle 23 for mid-2000, there cannot be a better time for you to equip yourself for action.

THE BAND

THE LEADING UK station has worked nearly 170 countries on 50MHz, but on a quiet day you could be forgiven for thinking that you didn't have your antenna plugged in. At other times you might think you'd tuned to 20m by mistake!

This unpredictability in propagation is probably the key to the allure and challenge of Six metres. In an average eleven-year solar cycle, there might only be *one hour* of propagation between the UK and a distant part of the world, and that hour might be broken up into 5 or 10-minute periods that are spread over numerous days around the years of solar maxima.

That is not to say that long openings don't occur. On 12 October 1999 around 1830 UTC there commenced one of the longest openings between the UK and South America that most band operators have witnessed. Over a five-hour period numerous contacts were made with stations located in Argentina, Brazil and Paraguay, with signal strengths ranging from barely audible up to 20 or 30dB over S9. And, as is typical of Six metre propagation, *no* contacts were made on the following evening!

Keen Six metre DXers try never to be far from their receivers, because as avid band-watchers they know that the next spectacular opening may only be just around the corner. Persistence pays off on Six metres, and it is noticeable that the real enthusiasts can often be found in the thick of the action right from the start of an opening.

For class B licence holders, the band offers the prospect of DX contacts that could only be dreamt of before its release; for example, regular contacts were made during cycle 22 between stations located in the UK and Australia. And high power and large antennas, which help of course, are *not* pre-requisites for success; there are a number of stations who have made 'Worked All Continents' with QRP power levels and moderate antennas.

Another exciting aspect of Six metres is that of breaking new ground. Six is still a relatively new band to operators in the UK and because of this numerous 'firsts' are still to be made. For example, at the time of writing, no contacts have yet been made with 5X or J28, which were both heard and worked by other European operators last autumn – indeed, in the case of 5X, stations located as close as Holland made contacts. These and other 'firsts' will be up for grabs in 2000 and beyond, and your chances of working one will be even higher if you live in one of the smaller regions of the UK like GU, GJ or GD.

PROPAGATION

SPORADIC-E and F2 are the 'bread and butter' DX modes on Six, although others can also bring exciting contacts. One of the keys to successful DX working is to develop an understanding of propagation. If you learn to recognise characteristics of the different modes you will be able to target your efforts in the directions and at the times most likely to bring results.

Sporadic-E: 'Es' propagation is caused by reflections from the lower levels of the ionosphere (90 - 130km), giving a normal range of between 700km - 2,500km. Double-hop Es, to the eastern Mediterranean for instance, is quite common, and triple- or quadruple-hop contacts to North America occur most years. At the other end of the scale, when the ionisation is particularly intense, ranges as short as 350 - 400km can be worked.

Es conditions are literally 'sporadic' - they are unpredictable, developing quickly and disappearing just as quickly. Signals can be (but aren't always) very strong but highly localised, frequently with rapid QSB.

Although it can occur at any time of year, in the northern hemisphere sporadic-E is most likely between May and August, with a secondary peak in December and January. Openings can also take place at any time of day, or even 24 hours a day, but the likelihood is higher mid-morning and around 1800.

Es accounts for the majority of contacts made with stations outside of the UK during the years of solar minimum, although it's there at solar maximum too (albeit not quite as often). In the peak months of June and July, Es occurs somewhere in Europe on most days; there is a high level of Inter-European activity and you will find in excess of 50 countries active on the band in a typical season.

F2: The mainstay of communication on the HF bands, F2 only reaches as high as 50MHz near solar maximum. It is caused by reflections at a much greater height in the ionosphere (300-400km) and therefore gives greater range; 3000-4000km for a single hop, with multi-hop taking signals out to several times that distance.

The best of the F2 action takes place around the equinoxes, during February-March and October-November. Signals can be strong, but are more often quite weak. They normally vary much more slowly than Sporadic-E and openings have a tendency to occur to the same region and at the same time of day for several days running. Under good conditions the band can open shortly after daylight, firstly to the east, then following the sun's path across the earth's surface and closing to the west not long after dusk.

TEP: Transequatorial propagation is a variant of F2 which occurs because of two zones of maximum F-layer ionisation which are located just north and south of the geomagnetic equator. 'True' TEP is observed when signals are reflected by both of these zones, possibly without a ground-reflection in between. The stations involved must be roughly equal distances on either side of the magnetic equator, which means that it is only possible to work southern Africa or South America by TEP from Europe.

TEP can be worked between February and April and between August and October, often with Es assistance. TEP continues even away from sunspot maximum, although it does tend to disappear at sunspot minimum.

Because the incidence of F2 drops off rapidly the further north you go, stations in the Mediterranean tend to have a better time of it than we do in the UK. But quite often mixed-mode propaga-

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tion, with a single Es hop from the UK down to lower latitudes linking up to F2 or TEP from there on, can get us in on the DX, especially to Africa and South America, in which case the openings can last well into the evening.

Scatter: Backscatter and sidescatter are also interesting and useful modes. They occur when a small portion of the signal is reflected from the Es or F2 ionisation itself or from the ground, either back towards the transmitter (*backscatter*) or to the side (*sidescatter*). Particularly strong scatter can happen when the signal hits a rough body of water. Scatter signals have a hollow, echoing sound, which is quite distinctive.


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6 Meters

#57

01/21/1992

G3RFS' DXCC Certificate, for working 100 countries on 50MHz.

Backscatter can give QSOs with stations a few hundred km from you and can be a useful way of filling-in missing grid squares, as well as giving a strong indicator of a possible 'normal' opening in the direction from which the scatter comes.

But it's sidescatter that *really* comes up with the goods. The vast majority, if not all, of the contacts which have been made between the UK and Japan have been by sidescatter from a point somewhere in (or over) the Indian Ocean. The lesson of this, once again, is to make sure that you *listen* carefully - the best beam heading for those contacts with JA was 90-100°, rather than the direct path at 30-40°.

Others: Although they aren't normally long-distance DX modes, aurora, meteor scatter, tropo ducting and troposcatter all occur on Six and can give lots of interest when the band is otherwise closed. Even EME (moonbounce) is worked by some, although for real success the antenna requirements can be prodigious!

By the way, although a full-bore sporadic-E opening is quite easy to identify for what it is, sometimes the situation is not as clear cut. It may not be possible to tell the difference between (say) persistent meteor scatter and a marginal Sporadic-E opening, or F2 and multi-hop Sporadic-E, and 'mixed mode' propagation is common. Sometimes you have to rely on circumstantial evidence to build up a picture of what is going on.

SUCCESS ON SIX

GOOD OPERATORS aren't born into DXing, and even successful HF and VHF DXers will need to make adjustments for operation on Six metres. The Recommended Operating Code of Practice included in this feature will give you a good basis from which to work and should help you avoid any catastrophes. If you always strive to be better, you will win the 'war' that Six metre DXing can be.

Your *ears* are the most effective weapons that you have in your DX arsenal. It is you who must be the hunter, constantly on the lookout for your prey. Listen to the band as often as you can, get to know it; and, more importantly, be there first. When you have pulled off the contact of the cycle due to your vigilance, sit back and listen to the others sweating as the pile-up grows ever bigger! Actually, don't sit back and listen, while the other operators are attracted to the station that you've just worked, tune the band searching for other DX. Another rare one may be lurking in the band noise or video-carriers that are often propagated from other continents along with the intended signals. Listening to and searching the band is the most effective way to work DX, bar none.

Almost as important as a good pair of ears is the use of CW. As all UK licence classes meet on Six metres, there is naturally a large number of stations trawling the band who have yet to acquire this valuable skill.

But although Six metres *can* bring crashingly loud DX signals, often the signals received from the DX station will be weak, perhaps in and out of the noise. In this instance it is likely that only CW will 'make the trip'. If your goal is to work as many countries as possible, CW will give you the advantage over those who are yet to discover its benefits. If you do know CW but are a bit rusty, try operating in a few of the many HF CW contests that fill the bands on most weekends and you'll soon be up to speed. In fact, some DX stations will only appear on CW and won't go over to SSB for fear of wasting valuable propagation time working the same stations again. A good example of this is the well known DXpeditioner Jimmy, W6JKV. Last summer, as VP2E/W6JKV, he had an amazing multi-hop Sporadic-E opening from Anguilla to Europe lasting over *12 hours*. Of the hundreds of contacts made with stations in Europe, and for the reason stated above, *none* were made on SSB!

Getting connected to the DX cluster, either by packet radio or the Internet, is a very worthwhile addition to your station, and will help you on Six metres, particularly if - like most of us - you can't sit in front of the rig all the time. Of course not all openings are reported on the cluster, and it isn't hard to see that if all stations are waiting for someone else to spot the DX no one will benefit! While using the DX cluster will enable you to keep abreast of band developments, you are reading about the DX that someone else has already worked and with an announcement on the cluster a pile-up is almost guaranteed. So try to be the first one to hear the DX - not only will you work more countries but you'll get the satisfaction in being the first to spot it on the cluster!

If using the cluster, don't forget to join your local cluster support group. Sysops and their teams put in long hours on behalf of their users, which is often a thankless task.

Another way of increasing your chance to be the first one to spot that rare DX is to monitor non-amateur signals on frequencies between 30 and 50MHz, because these lower frequencies usually show propagation before it reaches Six metres. Many of the countries around Europe still have high-power Band 1 television transmitters in the 48.250 and 49.750 MHz range which can often be heard shortly before Six metres opens in the same direction. More exotically, at times PMR, pager and utility signals can be heard from other continents and they can also give you valuable early warning. During the last cycle, for instance, advance notice of openings to the Caribbean was often found by monitoring the Jamaican Fire Service frequency just below 50MHz.

Pileup technique is another area to work on. Listen to the DX station, find out whether he is listening on-frequency or split, is he responding to full calls or the last two letters or whatever, and above all *time* your call to when he is actually listening and make it brief! You would not believe how many times stations call on top of the DX because they aren't listening carefully enough - and that doesn't help them or anybody else. And it sounds obvious, but is often forgotten in the heat of the moment, that if you aren't *hearing* the DX station well enough to work him, do *not* call. Wait for the signal to come up so that you stand a chance of completing the QSO.

By the way, when the band is full of DX signals it is often tempting to get involved in the pile-up for the loudest DX station. Unless you have a big station and can break through quickly, this may not be the best tactic. Quite often other DX can be heard (albeit at a lower signal strength) which may be more easily worked by you. The majority will always go for the loudest signal - think about it - so keep tuning around.

Finally, don't forget your friends. Starting a circle of warning telephone calls with other Six metre DXers in your area is another way in which you can spread the listening time needed for success. Get together with other stations and agree to telephone a set station, who in turn agrees to

telephone another up the line, and so on. This method takes some time for news to reach the operator at the top of the chain, but has helped both of us on many occasions.

EQUIPMENT

GETTING STARTED on Six couldn't be easier these days. A growing number of HF transceivers now include 50MHz, and in fact the resultant pile of redundant transverters on the market gives another, cheaper way of getting on the band

If purchasing a transceiver, either new or second-hand, go for one that has the 'standard' 100W power output on Six metres. Transceivers and equipment are regularly reviewed in *RadCom* and *QST*, and it would be as well to scan through any back issues that you, a friend or local radio club may have when you are considering a new purchase. Functional details along with performance figures can be handy when evaluating a rig for your needs.

Antennas are an emotive subject, not least due to the gain figures claimed by some manufacturers. A 3-element Yagi, or perhaps a 2-element quad, can be considered as a sensible minimum, with a 5-element being around average these days. For the really keen, stacked arrays of 5-elements or more will probably move you into the premier division in terms of receive capability. The best person to advise you on the subject of antenna purchase will be a dealer who carries a large selection from a good cross-section of manufacturers.

Of course it is perfectly possible to work DX on Six with a vertical or a dipole, particularly around Europe by Sporadic-E in the summer. Six metres is a noisy band, from both natural and man-made interference, and a horizontally polarised beam will pick up much less noise than an omni-directional vertical. Remember the old adage: *if you can't hear 'em, you can't work 'em*!

The UK power output levels were raised back in 1994, and now a station can run up to 400W PEP. So, if you have the budget for an amplifier, which should you buy? First up there are solid-state linears available that will practically deliver the legal limit and will give you instant service. They are handy in the event of a short opening, or simply getting you in and out before the real pile-up develops. Valve amplifiers are more robust and will handle a considerable amount of abuse, the penalty being warm up time, although at least one manufacturer makes a Six metre linear using the 3-500Z, which does not require any warm-up - perhaps the best of both worlds. But don't forget, higher power increases EMC problems.

UK SIX METRE GROUP

NO DISCUSSION about Six would be complete without mentioning the UK Six Metre Group. Formed in the early 1980s, the group is dedicated to promoting Six metres both in the UK and internationally - a third of the group's 1000 members being outside the UK.

The group maintains a beacon fund to finance and provide beacons in various parts of the world, and over the last few years has also supplied many pieces of equipment and information to encourage and help Six metre enthusiasts to activate new and rare countries. The group's quarterly newsletter, *Six News* provides the best information available on all aspects of the band, including DX news and reports, propagation articles, equipment reviews and technical articles [1].

CONCLUSION

WORKING DX ON Six metres is fun, challenging and frustrating in equal measure. Although to reach 100+ countries can require years of dedication, it is possible to work 50 countries around Europe and elsewhere with simple equipment - and very many stations do.

Try it, it's addictive!

REFERENCE

[1] FOR FURTHER information on the UK Six Metre Group, contact the Secretary, Iain Philipps, G0RDI, 24 Acres End, Amersham, Buckinghamshire HP7 9DZ; or visit the group's web site: www.uksmg.org ♦

Voluntary Operating Code of Practice for Six Metre Operators

Six Metres as a DX Band: Six metres is a DX band and it, along with other Six metre operators, should be treated with respect and tolerance.

Local Band Plan: Always respect your local band plan. In Europe this is issued by the IARU.

Local QSOs: Do not cause nuisance and disturbance to other operators with local QSOs within the 50.100MHz to 50.130MHz DX Window.

Learn to Listen: True Six metre DXers spend about 5% of their time transmitting while 95% of time is spent listening and observing changing band conditions and propagation modes. This will be far more effective than just calling CQ DX at random.

50.100 - 50.130 DX Window: The DX Window is widely accepted and should in principle be used for inter-continental DX QSOs only. The definition of what constitutes a 'DX' station lies with an individual operator, especially when a station within your own continent constitutes a new country.

50.110 Intercontinental Calling Frequency: This should be used for long-range DX contacts only. Do not under any circumstances engage in local continental QSOs on this frequency, even for a minute or two. Do not encourage pile-ups on 110.

50.110 CQing: *Listening* is the first rule of working rare DX on Six metres, so think twice before calling CQ on 110. But the occasional CQ is good, as it can discover an unrecognised opening.

QSO Techniques: Follow the style and take the lead of the DX operator in providing information. Otherwise keep it simple, as there are other stations waiting in line.

DX Pile-up Operating: You should listen to the DX stations carefully and not continue to call if they request a particular country or prefix if that is not you. You should *not* call if you cannot hear the DX station!

Split Frequency Operation: When a DX station creates a large pile-up, split-frequency operating is recommended. To minimise interference with other DX stations operating simplex, it is recommended that a *maximum* split of 10kHz is used.

Duplicate QSOs: It is always tempting to call a rare DX station every time you hear it. This should be avoided, as it means that you taking away the opportunity for the DX station to work a new station and give them their first QSO with the DX country.

CW Operation: CW is probably the major mode of operation on Six metres, due to the usually weak nature of many real DX openings.

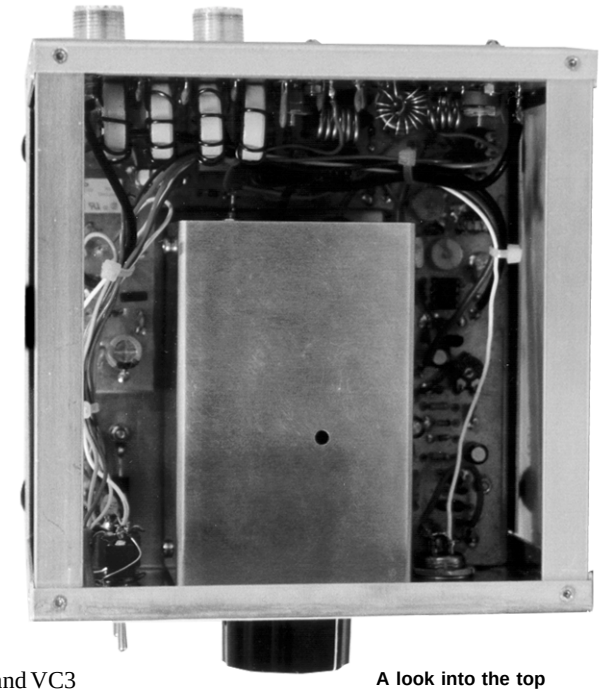
FM QSOs: (Europe) All FM transmissions should be made above 50.300MHz for the obvious reason that FM is wide-band and could wipe out weak DX signals.

Microphone Gain: Proper gain adjustments will reduce distortion and will also reduce interference with operators on nearby frequencies.

This is a summary of the recommended Operating Code of Practice as issued by the UKSMG in conjunction with JAROC, HARDXA and SixItaly. The full version can be found on the Internet at http://www.uksmg.org/code.htm. Comments, additions or amendments should be sent to Chris Gare, G3WOS.

A 10m FM Transmitter

Final part, by Ian Liston-Smith, G4JQT*



A look into the top of the transmitter.

IN THE FIRST part, the possibilities of making contacts on 29MHz FM were discussed and the circuit of the transmitter was described.

SETTING UP

THE PHYSICAL layout of the boards is shown in **Fig 3**. The VFO board in its screened case sits in the centre of the U-shape of the main board. Having built the transmitter, it requires some setting-up. Following these step-by-step instructions should enable you to accomplish this without difficulty.

1. Connect 12 volts to the circuit. Set RV1 and RV2 to their mid points.
2. Connect a dummy load via a power meter to the RF output socket.
3. Select 'Net' from the 'Net/Off/Operate' switch S1.
4. Select 'Low' from the 'High/Low' switch S2.
5. With the PTT open, 12 volts should now be available at the points marked 'A', ie only PTT transistor TR9 emitter and VFO voltage stabiliser IC1 via C66. Now the VFO range can be set.
6. Loosely couple a frequency counter or general coverage receiver to the VFO output.
7. Keep the PTT open.
8. Close VC1 and adjust L3 for about 10868kHz at the VFO output.
9. With VC1 fully open, the oscillator frequency should be about 11268kHz, giving a range of around 400kHz (in fact it should be a little more than this, but this will depend on the tolerance of the components in the VFO circuit and the proximity of the VFO case to frequency sensitive components).
10. If the range is a lot more then 400kHz, a small polystyrene capacitor in series with VC1 and/or increasing C16 and adjusting the inductance of L3 should correct this. Dependent upon layout, the exact frequency and range of the VFO might require some experimentation with component values. With the board and aluminium VFO case suggested, the quoted values were suitable. If the range is a lot less than 400kHz, try reducing the value of C16 and re-adjusting L3.
11. Staying in 'Net' mode, close the PTT. 12V 'C' should appear at the mixer circuit voltage stabiliser IC2, via TR9 collector.
12. Using an oscilloscope or diode probe, confirm that the crystal is oscillating and giving about 400mV peak-to-peak at pin 6 of IC3.
13. Confirm that the VFO is also running and giving about 150mV peak-to-peak at pin 1 of IC3 (the crystal oscillator should only operate with the PTT, but the VFO should always be running).
14. Set the VFO tuning capacitor VC1 to about mid position.
15. With the PTT closed, adjust VC2 and VC3 to give the maximum signal on TR5 base.
16. Now switch S1 from 'Net' to 'Operate'. This places 12 volts 'B' on the microphone pre-amp, RF driver and PA circuits.
17. Keep S2 set to 'Low'.
18. Press the PTT.
19. The signal on TR5 base should be about 400mV peak-to-peak and at TR5 collector about 2V peak-to-peak.
20. At the collector of TR6 there should be about 12V peak-to-peak. There should also be some indication on the power meter.
21. Adjust RV2 for the highest output power.
22. Carefully adjust VC2 and VC3 again to give an approximately even power output from 29.400 to 29.700MHz.
23. Slightly readjust RV2 for maximum output. The power should now be constant at about 2W across the range.

As with any mixer, unwanted products occur. If possible, check for these on a general coverage receiver by tuning plus and minus about 3MHz from the transmitter's output frequency. If any are found, adjust VC2 and VC3 slightly to minimise them. When these capacitors are properly adjusted, any spurious products from the mixer will be at least 43dB below the fundamental output.

Speak into the microphone and 0.5 to 0.7V peak-to-peak audio should appear across D1/D2. Shouting should produce clipped, rounded peaks across RV1.

POWER AMPLIFIER

IF YOU HAVE also built the 20W PA, this must now be adjusted carefully for full output. It is important to get it tuned up correctly to obtain the full power. The PA design is quite conventional, but is a little dependent upon the gain of the specific transistor used. It is quite easy to obtain 10W output, but all the adjustments in a simple PA like this interact slightly, so patience is required!

1. Switch the power meter to read at least 20W.
2. Put the power switch S2 in the 'High' position.
3. Press the PTT.
4. Adjust VC4 and L12 (by gently stretching or squeezing the turns) for maximum output on the meter.
5. Repeat with VC5 and L16.
6. Continue these adjustments at both ends of the band until no more improvements are made.

If after repeated attempts, maximum power is still less than about 10W, and this is reached when VC4 or VC5 is fully closed or fully open, the values of C46, C50 or C51 may need altering. However, with the layout shown, the values given were satisfactory.

Any sudden jumps in power meter reading at any point in these alignment instructions probably indicates instability, but if the layout is adhered to this should not be a problem.

With the aid of a couple of other stations, set the deviation with RV1 so that everyone agrees it sounds fine. However, a more precise method of setting the deviation is by using the 'Bessel null' as follows:

1. Key the transmitter and tune in the unmodulated carrier on a receiver using the narrowest CW filter setting available.
2. Turn RV1 fully clockwise.
3. Inject a 1kHz audio signal into the microphone socket of an amplitude that causes D1 and D2 to just start clipping.
4. Carefully adjust the deviation by turning RV1 anticlockwise while listening to the carrier.
5. The carrier will get weaker and weaker until it disappears from the receiver. Set RV1 at this point.

Using a 1kHz tone to find the Bessel null will set the deviation to 2.4kHz. This is about right for 10m FM, for which deviation is nominally 2.5kHz. Using a 1.25kHz tone will set the deviation to 3kHz. Amongst other things, this method depends upon the effec-

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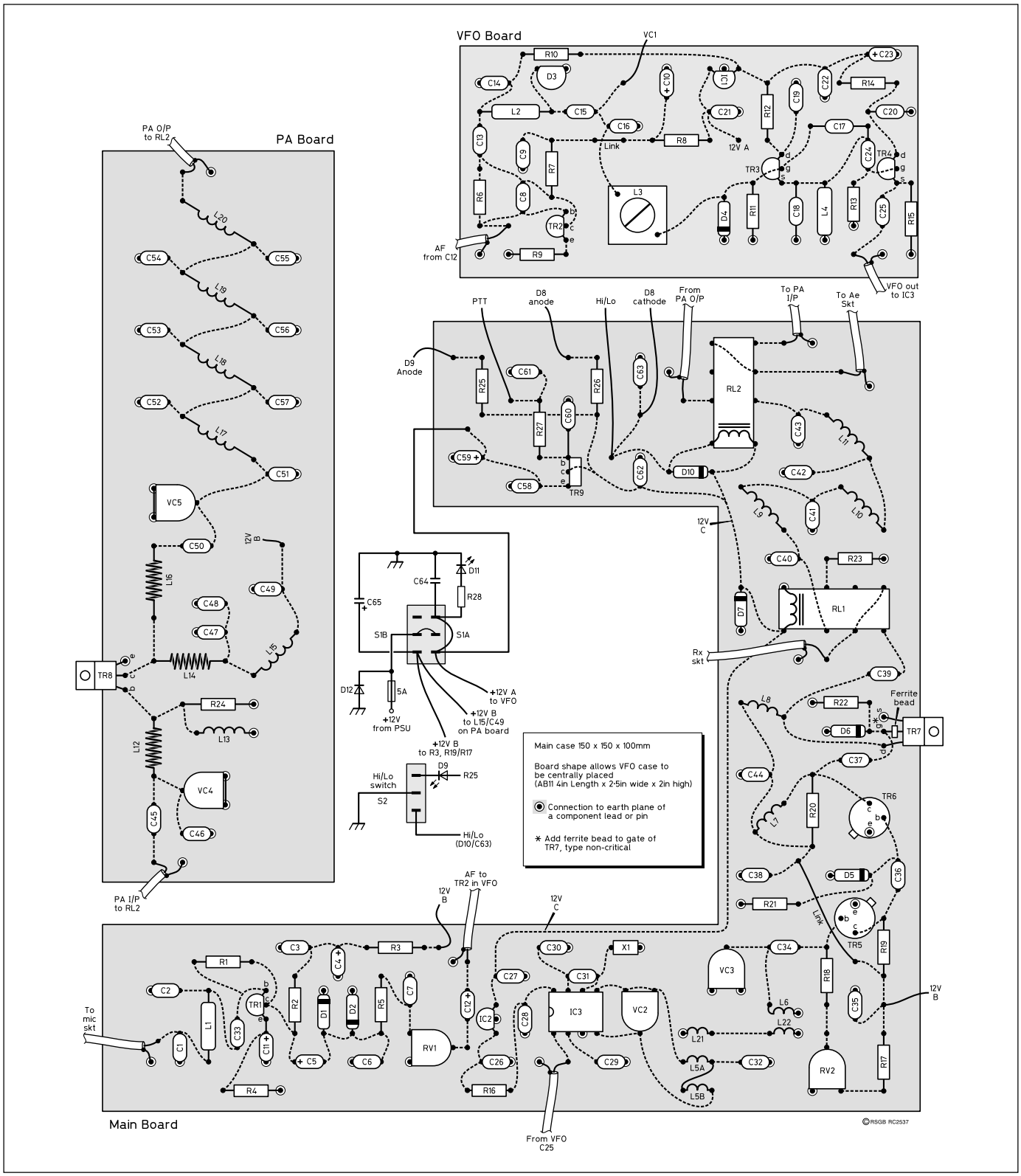


Fig 3: Physical layout. The top layer of the boards is a solid copper ground plane. Drill through, countersink the holes, and wire point-to-point underneath. Alternatively, design your own PCB.

tiveness of the receiver's CW filter to select the carrier from all the FM sidebands generated, to enable you to detect the null. Nevertheless, it does give a more accurate indication of the correct setting of RV1.

CONCLUSIONS

THE TRANSMITTER described here has been in weekly use over the past year or so. With a half size G5RV antenna I have worked across Europe with 2W via sporadic-E and also accessed various European 10m repeaters. This transmitter has provoked a number of unsolicited compliments from other stations regarding the modulation - and occasional surprise when they hear that it is completely home brew.

I would like to thank G3RZP, G8ROG and G3OUC for their help with this project.

AMENDMENTS/CORRECTIONS

REFERRING TO Fig 2: the capacitor between L7 and L8 is C44. Delete the dotted line alongside L14. In the parts list: add C11 (1µF 25V); add C33 (220nF); add C44 (1nF). C65 is listed twice - the second is C66. RV1 and RV2 are horizontal preset pots. Referring to RL1 and RL2, it is necessary to observe the polarity of some types. ♦

Newcomers' News

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

AS YOU READ this, the Novice Radio Amateurs' Examination will be imminent and I thought it might be useful to include some points in this column to help with last-minute revision. At the same time, I hope the information will be equally useful to readers who are already licensed.

REVISED POWER LIMITS

FOLLOWING HARD work by the RSGB in lobbying the Radio Communications Agency, the Novice Licence conditions were revised last year. The changes were set out in a Notice of Variation outlined in the June 1999 edition of *RadCom*, but at that time little detail was given about the revised transmitter power limits.

The original licence conditions set limits of 5W DC input power and/or 3W RF output power, and the methods for measuring these powers formed an important part of the Novice syllabus. You will recall that DC input power, *W*, is calculated by multiplying the power amplifier's supply voltage, *V*, by the current, *I*, passing through it *(W=VI)*, whereas RF output power is measured directly using a RF power meter.

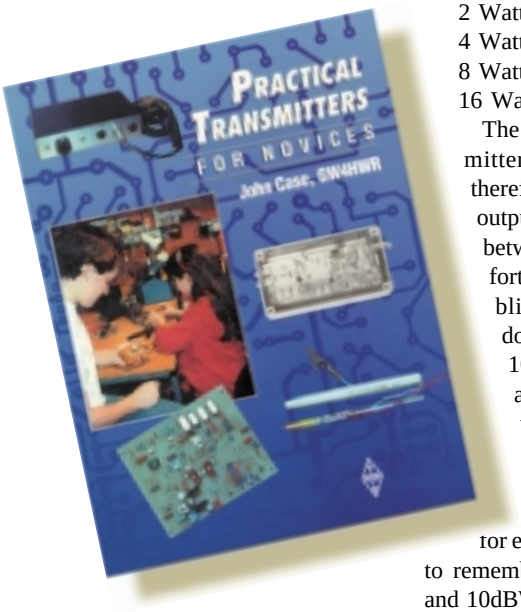
However, the Notice of Variation not only changed the transmitter power limits, but it changed the units of measurement to 12dBW DC input and/or 10dBW RF output. dBW units have been used for the full Amateur Radio Licence for some time and are covered in the RSGB *Radio Amateurs' Examination Manual*, but they are not included in the *Novice Licence Student's Notebook*. So what are they?

The decibel (dB) is a widely-used unit based on a logarithmic rather than a linear scale. The mathematics are quite complex, but don't despair, there is an easy 'rule of thumb' to help us out - each time there is an increase of 3dB, the power is doubled. Starting with the basic unit of power (ie 1W) we can work out how much power 12dBW represents:

1 Watt represents 0dBW
2 Watts represent 3dBW
4 Watts represent 6dBW
8 Watts represent 9dBW
16 Watts represent 12dBW

The revised Novice transmitter DC input power is therefore 16W and the RF output power is somewhere between 8 and 16W. Unfortunately, the 3dB doubling 'rule of thumb' doesn't fit so neatly for 10dBW, but the maths actually works out so that 10dBW represents 10W. What could be easier than that?

In summary then, for exam purposes you need to remember: 12dBW DC input and 10dBW RF output; for practical measurements you should remember: 16W input and 10W output. To make it easier to remember which is input and which is output one of my students once said "you should think of socks going into the washing machine - you always get less out than you put in!"



Practical Transmitters for Novices by John Case, GW4HWR, is available from RSGB Books (see 6m Construction).

6m CONSTRUCTION

LAST MONTH I included information about construction projects for Novice students. Some time ago, Esde included a plea for help from me because I was having problems building the 50MHz FM transmitter from John Case's book *Practical Transmitters for Novices*. I have done a fair amount of construction in the past, but despite correspondence with John, GW4HWR, this project had me baffled.

I am pleased to report that I have received some helpful information on the topic from Richard Mills, G4LPD. Richard and the rest of the crew at the Central Nottinghamshire Scout Radio Club have built a number of the transmitters and have developed a series of modifications to the published design that ensures a more repeatable performance. With the modifications in place, the group have managed to squeeze 500mW output from the transmitter "without melting it"! (If anyone doubts whether this sort of power level is useful, see my contest score in the 50MHz Backpacker contest in the January 2000 *RadCom*, p78).

Richard's very detailed e-mail included modifications to the audio amplifier, the power amplifier and the PCB layout for the transmitter, together with changes to the accompanying receiver from one of John Case's other books *Practical Receivers for Beginners*. I haven't had the opportunity to do further work on my transmitter, but I will report progress through this column.

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

If anyone would like copies of Richard's modifications I would be happy to pass them on. Send me your details via e-mail or in an SAE to the address at the foot of this page.

WHERE ARE THEY NOW?

DARLENE, MWØCQR, wrote to tell me that she has been following *Newcomer's News* for a while, especially Esde's quest to find out why some Novices never pick up a microphone. Darlene goes on to say that she has found nothing but help and support on the bands.

Mike Bryant, GW6NLP, ran the Novice course that led to Darlene gaining her first amateur radio callsign, 2W1GAU, at the Wrexham Amateur Radio Club. Mike then ran a full RAE course and Darlene was again successful, upgrading her callsign to MW1DAC. Further hard work with the Morse key resulted in another change of call to full Class A status. I think this is one of the best examples of progressive licensing I have seen; well done Darlene and Mike!

I have now taught dozens of Novices students but have worked very few of them on the air; that does not mean that they are not active. The amateur bands are quite wide and there are so many modes these days that it should not be a great surprise that we do not hear more of our fellow amateurs on the air. That said, I have also spent long periods building projects and listening on shortwaves, so just because stations are not transmitting does not mean they have turned their back on the hobby.

If you have any views on this subject, or any other items for *Newcomers' News*, please do not hesitate to let me know. ♦

Spread The Word!

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

e-mail: newcomers.radcom@rsgb.org.uk

Down To Earth

An Introduction to Frequency Modulation

By Ian Poole, G3YWX *

FREQUENCY modulation or FM is widely used in amateur and professional circles. Although the most obvious way of superimposing audio onto a radio frequency carrier is to modulate the amplitude, modulating the frequency has a number of advantages that can be exploited for several types of application. As a result, FM is almost universally used for voice communications at VHF and UHF where its resilience to signal strength changes and interference makes it ideal for portable and mobile use.

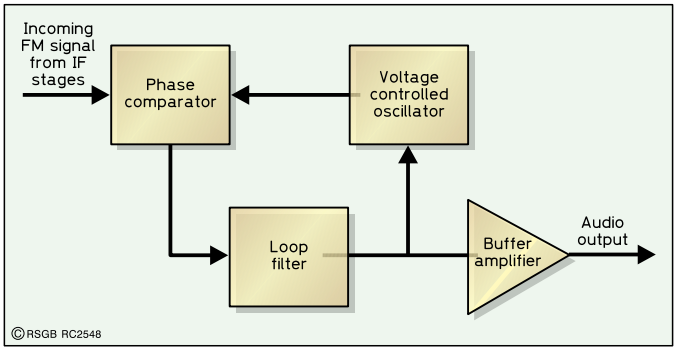


Fig 2: A phase locked loop used as an FM demodulator.

THE BASICS

WHEN A SIGNAL is frequency modulated, the actual frequency of the RF signal is made to vary in sympathy with the modulating voltage (see **Fig 1**). Here it can be seen that the frequency of the radio frequency carrier changes with the level of the instantaneous modulating voltage. The main requirement is that the relationship between the deviation or change in frequency of the carrier and the level of modulating voltage should be linear. In this way the same modulating voltage or waveform can be reproduced at the receiver with the minimum amount of distortion.

The level of frequency shift or deviation is also important. It is normally quoted as the number of kilohertz deviation. For example, a signal may have a deviation of ±3kHz. In this case the carrier is made to move up and down by 3kHz. As the level of deviation in this case is relatively small, this type of frequency modulation is known as narrowband FM, or NBFM.

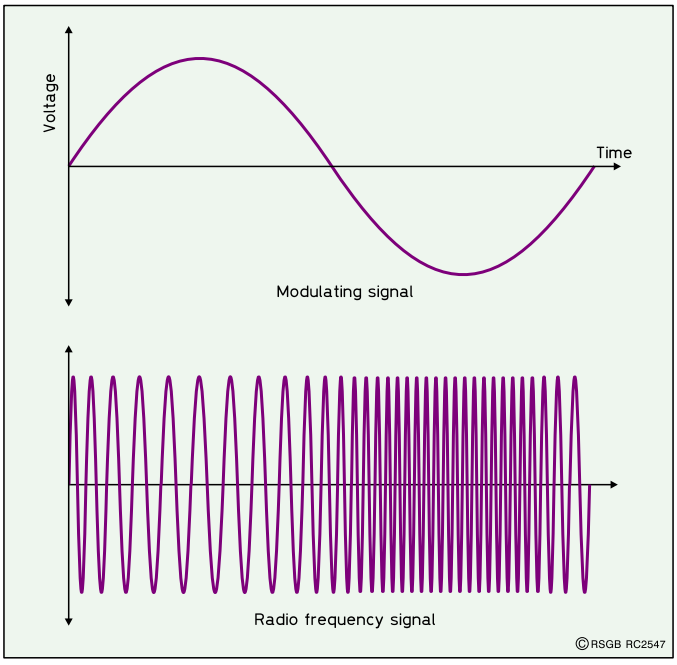


Fig 1: A frequency modulated signal.

Broadcast stations in the VHF portion of the frequency spectrum between 87.5 and 108MHz use much large levels of deviation, typically ±75 kHz. This is known as wide-band FM, or WBFM. These signals are capable of supporting high quality transmissions, but occupy a large amount of bandwidth. Usually 200kHz is allowed for each wideband FM transmission.

FM has several advantages. One is its immunity to signal level variations that arise because the modulation is carried only as variations in frequency. This means that any signal level variations should not affect the audio output, provided that the signal does not fall to a level where the receiver cannot cope. This makes FM ideal for mobile or portable applications, where signal levels are likely to vary considerably. The other advantage of FM is its resilience to noise and interference, and again this makes it ideal in applications where amplitude noise may be present - for example in a car. The resilience of FM to noise also makes it ideal for high-quality broadcast transmissions. When compared to amplitude modulated (AM) transmissions, FM is far superior in terms of the reduction of interference.

DEMODULATION

TO DEMODULATE an FM signal it is necessary to convert the frequency variations into voltage variations. This is slightly more complicated than demodulating AM, where a simple diode detector can be used. Even so, demodulating FM can be achieved relatively easily. The main requirement is that the detector or demodulator should be frequency sensitive. In this way variations in frequency are converted into variations in output voltage.

There are a number of circuits that can be used for this. Today, most are contained within integrated circuits, so it makes them very easy to construct. Possibly the easiest form of demodulator to understand is that based around a phase locked loop, as illustrated in **Fig 2**. In this, the incoming signal is fed into one of the ports of the phase detector and the output from the voltage controlled oscillator is fed into the other. When the loop is locked onto the incoming signal it will try to track the instantaneous frequency of the signal. Accordingly, the VCO will move up and down in frequency in line with the variations on the incoming signal. For the VCO to move in frequency, the control voltage must change. It is this voltage that corresponds to the demodulated signal, and it can be buff-

*5 Meadway, Staines, Middx TW18 2PW.

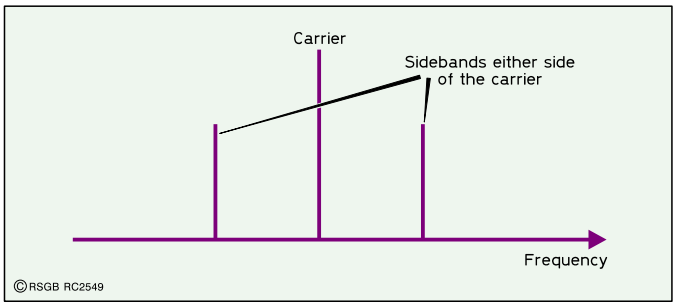


Fig 3: The spectrum of an FM signal with a low modulation index.

ered and amplified as the output.

Other types of detector generally require the use of an inductor. Two of the most common types are known as the ratio detector, and the Foster Seeley detector. They are commonly incorporated into integrated circuits, but versions can be made using discrete components.

MODULATION INDEX & DEVIATION RATIO

ONE OF THE values often quoted for an amplitude modulated signal is the *modulation depth*. Similarly, it is often necessary to know an equivalent figure for a frequency modulated signal. As shown in **Formula 1**, the *modulation index* for an FM signal is the ratio of the frequency deviation to the modulating frequency for a given set of values.

This means that the modulation index will vary according to the frequency that is modulating the transmitted carrier *and* the amount of deviation. However, when designing a system it is important to know the maximum permissible values. This is given by the deviation ratio (D) and this is obtained by inserting the maximum values into the formula for the modulation index.

SIDEBANDS & BANDWIDTH

IT IS FOUND that when any signal is modulated by whatever means, sidebands are produced. In the case of AM signals they are easy to determine, but for FM the situation is a little more complicated. For small values of modulation index, the signal consists of the carrier and the two sidebands spaced at the modulation frequency either side of the carrier, as **Fig 3** shows. This looks to be the same as an AM signal, but the difference is that the lower sideband is out of phase by 180 degrees.

As the modulation index increases it is found that other sidebands at twice the modulation frequency start to appear. As the index is increased further, other sidebands can also be seen. It is also found that the relative levels of these sidebands change, some rising in level and others falling as the modulation index varies. It is also found that the level of the carrier varies. All of this makes prediction of the exact levels of all the sidebands more difficult than for AM. If a mathematical calculation of the levels of the sidebands is required, a function known as a *Bessel function* or *series* needs to be calculated.

$$\text{MI} = \frac{\text{Deviation of the carrier in frequency}}{\text{Audio frequency producing the deviation}}$$

Formula 1: Calculation of Modulation Index (MI).

To illustrate how the levels of carrier and sideband vary with changing levels of modulation index, a limited table of values is given in **Table 1**, and graph of the levels is shown in **Fig 4**.

With sidebands spreading out either side of the main carrier, it is important to know the bandwidth that the signal will occupy. For an NBFM signal operating with a 25kHz spacing, a deviation of 5kHz is accepted as the required value. However, with the move to 12.5kHz spacing, the deviation needs to be reduced to 2.5kHz. Any greater levels of deviation will cause the signal to spread out over adjacent channels, causing interference.

For broadcast stations operating with wideband FM some bandwidth limitation is required, otherwise they would occupy very large amounts of bandwidth and reduce the number of channels available. This bandwidth limitation or filtering must be accomplished so that it does not introduce any undue level of distortion. To achieve this it is normally necessary to allow a bandwidth equal to twice the maximum frequency of deviation *plus* the maximum modulation frequency. In other words, for a VHF FM broadcast station this must be 2 x (75 + 15kHz), ie 180 kHz. In view of this, a total of 200kHz is usually allowed, enabling stations to have a small 'guard band' and their centre frequencies on integral multiples of 100kHz.

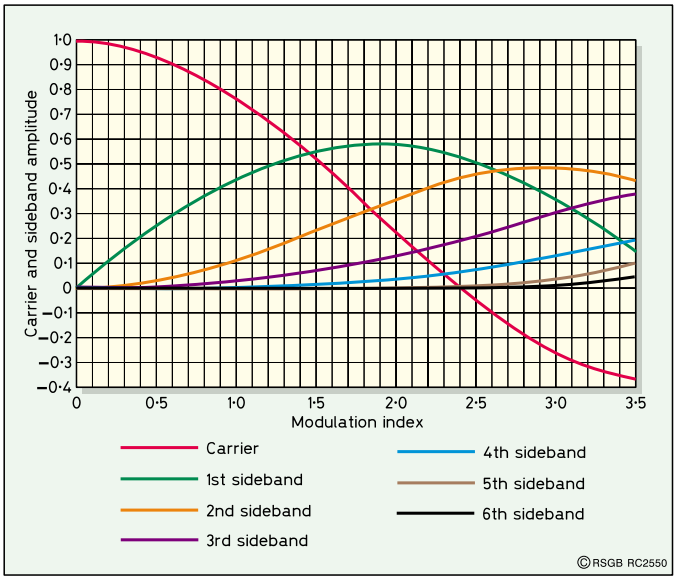


Fig 4: Sideband and carrier levels with varying levels of modulation index.

SUMMARY

FM HAS GAINED wide acceptance, especially for use on the VHF and UHF bands. Not only does it have advantages in communications applications, but its resilience to noise makes it ideal for high quality broadcasts, for which it is also widely used. Here, increasing the level of deviation actually improves the noise performance. Whilst some of the mathematical aspects of its operation are a little more complicated than those for AM, it is nevertheless still very easy to use. ♦

Mod. Index	Carrier Value	1st set of sidebands	2nd set	3rd set	4th set	5th set	6th set	7th set
0.00	1.000	-	-	-	-	-	-	-
0.01	1.000	0.005	-	-	-	-	-	-
0.02	0.9994	0.025	-	-	-	-	-	-
0.05	0.9900	0.0995	-	-	-	-	-	-
1.00	0.7652	0.4401	0.1159	0.0020	-	-	-	-
2.00	0.2239	0.5767	0.3528	0.1289	0.0341	-	-	-
4.00	0.3971	0.0661	0.3641	0.4302	0.2811	0.1321	0.0491	0.0152

Table 1: Sideband levels with varying levels of modulation index.

Feedline Verticals for 2m & 6m

By Rolf Brevig, LA1IC *

DURING DECADES of portable operation on the 2m and 6m bands I have met amateurs who needed antennas that were efficient, simple to construct and also easy to hang up almost anywhere. The feedline vertical antennas described here provide an excellent match to a transceiver, without a separate antenna tuner. They can be easily coiled-up and stored in your luggage or even stuck in your pocket, as they are made from only one piece of flexible coax cable. The basic design is extendable to any frequency segment between 50 and 150MHz.

The point of departure is the coaxial sleeve antenna (**Fig 1**), which was popular until the advent of modern SWR analysers. A true resonance will always be found, but I have never achieved a better SWR than 2:1 in such antennas, probably due to stray capacitance. The lesson learned, however, was that the RF current had no trouble in travelling up the inside of the coax and then making a 180° turn to travel back down the outer sleeve.

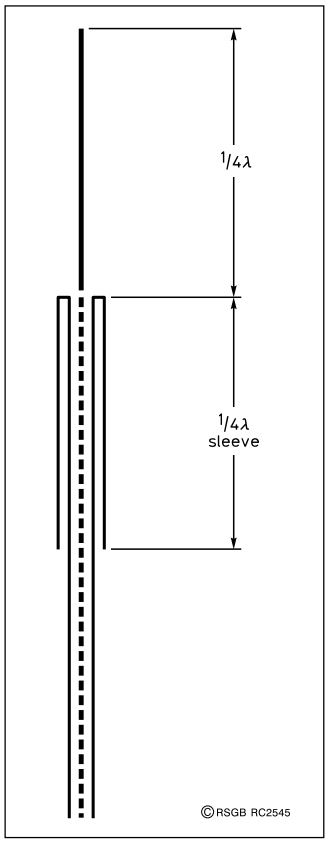


Fig 1: The coaxial sleeve antenna. The best SWR that could be obtained was 2:1.

Because of this, perhaps we don't need the sleeve. Why not just use the braid of the coax itself? If we do this, however, how do we let the RF 'know' when it should stop flowing and reflect back towards the centre of the dipole, as it did when it came to end of the braid in the coaxial sleeve antenna?

After trying different wideband devices, I found that a coaxial cable choke resonating within the band segment in question was the best solution to meet my requirement. Very low SWR, broad- bandedness, and the possibility of working out reliable dimensions from the formulas in **Fig 2**.

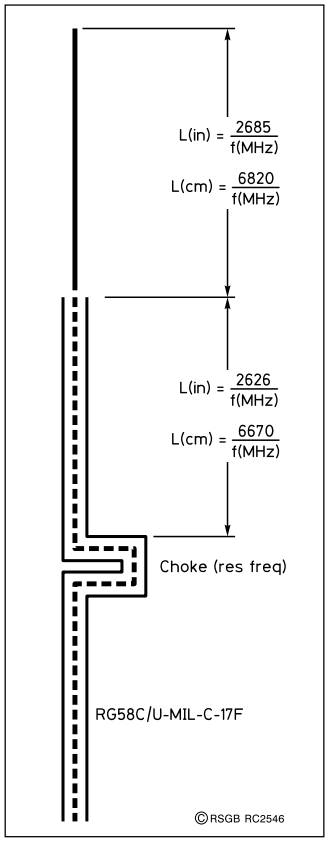
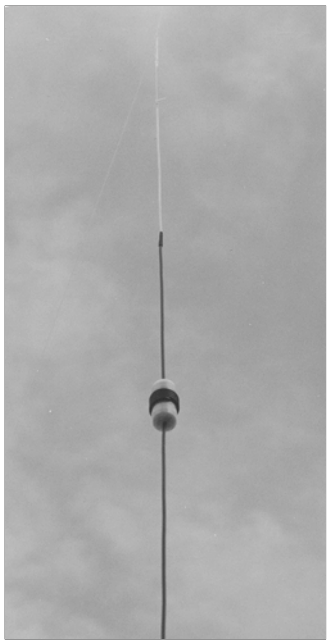


Fig 2: The feedline vertical. The best SWR that could be obtained was 1.1:1.

2M ANTENNA

IN THE PHOTOS you can see the 144MHz version of this antenna. It is made from a 387cm (152¼in) long piece of RG58CU coaxial cable, of which a quarter wavelength (use the formula) of sheath and braid is stripped off, this forming the upper part of the dipole. Next, measure the lower part of the antenna (use the formula) and mark the starting-point of the choke. For the choke, wind 4.6 turns of the coaxial cable onto a piece of 32mm (1¼in) diameter PVC tube. The caps on each end are not essential, but they are useful to centre the cable and lock the turns.

A ring terminal or tag needs to be soldered to the tip of the dipole, bearing in mind that this will lower the resonant frequency a bit. Trimming, if necessary, should be done at the tip, outdoors, well away from objects that might affect the resonance. Don't cut more than 6mm (¼in) at a time. The SWR should be less than 1.3:1 and the impedance very close to 50Ω across the entire band. Observant readers will see that I have used exactly 5 electrical halfwaves (340cm) of feeder. It is a good idea to make any additional feeder a multiple of 68cm (26½in).



The feedline vertical can be suspended by nylon line from a tree limb or any other convenient support. It should dramatically extend your maximum communication range when operating portable, in comparison with a whip or 'rubber duck' antenna.

Rolled-up and ready to go, the 2m version of the feedline vertical.

6M ANTENNA

FOR A 50MHz vertical dipole you start with a 728cm (286½in) length of RG58CU. Using the formulae, follow the same constructional procedure as previously. In this instance the choke consists of 11.8 turns on 50mm (2in) diameter PVC tube.

Although not critical, you can centre the antenna to your favourite 6m frequency by cutting the tip little by little, and still enjoy a 1.3:1 SWR across the band. Adding feeder to this antenna should be in multiples of 198cm (78in). ♦

What Do You Know?

Last month's answers:
1d, 2b, 3c, 4a, 5b, 6b, 7c, 8a, 9a, 10c, 11a, 12c.

* *Dyrefaret 3, 3470 Slemmestad, Norway*

eurotek

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

__Mains filters__ help to keep mains-borne noise, eg spikes from computer power supplies, from getting into a sensitive receiver and to keep transmitted RF from reaching the mains. G-QRP Club member __Jean Revidon, F6AOD,__ made two versions with salvaged ferrites. From Radio-REF 3/99.

THE MAINS FILTERS used in amateur radio applications are configured as balanced low-pass filters, ie they pass 50Hz mains but stop RF. A diagram is shown in **Fig 1**. Some also have a third inductor in the earth lead. The ferrite-core series inductors, typically 1mH, have a high impedance at RF but almost none at 50Hz. The shunt capacitors, between lines and from each line to earth, have a low impedance at RF but a very high one at 50Hz. The claimed attenuation of one such 'high performance' filter [1] is 50dB, 0.1-150MHz; although the data sheet does not mention if this applies to common mode (L and N together to earth), to differential mode (between L and N), or to both.

RATING

FILTERS FOR 230V mains are rated by their current-carrying capacity. For the typical station with no more than a 100W transceiver and a few low-power accessories, a 3A rating would be adequate. A 6A unit would be appropriate for the power supply of a legal-limit amplifier. A 10A model would handle the most pretentious amateur station. All are sealed in a metal can. Such filters, often built on the back of an IEC chassis plug, have been seen cheaply at rallies.

HOME BREW

ASSEMBLING A mains filter from new components bought at retail prices would be more expensive than the £15 price of a new complete filter [1], but those willing to do the work using salvaged ferrites and a shielding box can make their own inexpensively.

F6AOD offers two designs. The one shown in **Fig 2** employs two ferrite rods, as used for the LW/MW loopsticks in broadcast receivers, while the one in **Fig 3** employs the core of the EHT transformer from a junked television set (its use results in a much smaller unit, but insulation paper is required under and between the layers of the winding. The capacitors are the same as those in Fig 2).

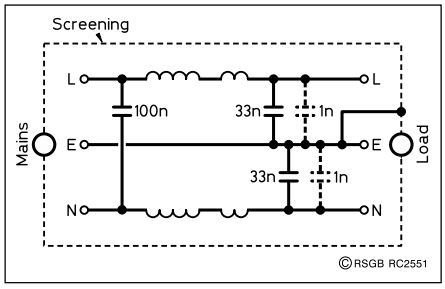


Fig 1: Diagram of F6AOD's mains filters.

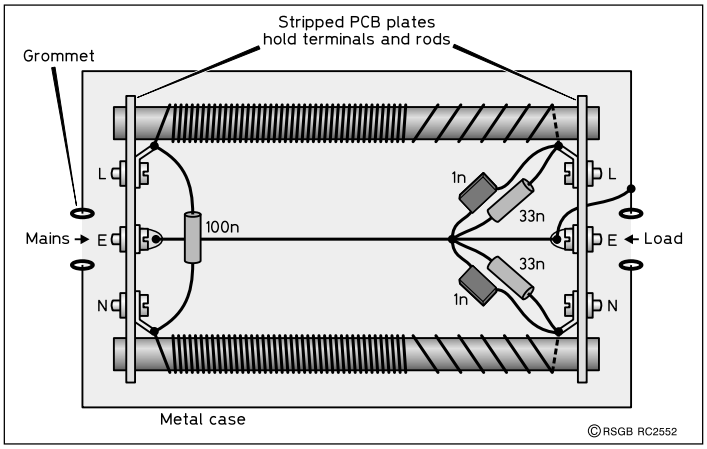


Fig 2: Mains filter construction with inductors wound on ferrite rods.

These filters are intended for use in HF/VHF stations, so the inductances can be much smaller than the 1mH mentioned previously.

F6AOD shows small mica capacitors, dotted in Fig 1, across bigger ones, to increase the attenuation of the filters at the highest frequencies. Their effectiveness is in doubt [2] and besides, no mica capacitors rated for 250V AC were found in the catalogues of several major UK distributors (see 'SAFETY'). Those in **Table 1** may be used instead.

CONSTRUCTION

THE RODS IN Fig 2, typically 9-10mm diameter and 15-20cm long, are single-layer wound. For 3A, use 80 close-wound plus ten triple-spaced turns of 20SWG (0.92mm diameter) enamelled wire; for up to 10A, use 16SWG (1.6mm diameter) wire, 60 turns close-wound plus ten turns triple-spaced.

The windings in Fig 3 consist of 40 turns of 20SWG or 30 turns of 16SWG wire, in one or more layers, depending on the size of the core and the wire. Proper insulation paper must be used between the core and the wire and between layers. If, originally, a U-shaped steel rod through the channels shown in the sides of the core held the half-cores together, it should not be used in this application; two straight rods squeezing the core between two plates of insulating material are OK.

Value	Dielectric	Class	Maplin Cat
100nF	PETP film	X2	JR34M
33nF	PETP film	X2	FT34M
1nF	Polyprop	Y	JA93B
1nF	Ceramic	1000WV	VI71N

Table 1: Capacitors for mains filters.

SAFETY

OBSERVE THE RULES when constructing anything that is to be connected to the mains. The capacitors *must be* specifically rated for continuous 250V AC or more ('Class X' where a fault does not create a risk of shock, 'Class Y' where it does); see Table 1.

Connections must be mechanically sound before soldering. The minimum clearance between current carrying and earthed parts is 6mm. Use grommets and strain relief where a flexible cable passes through the metal shield.

Earthing also requires caution. If, in an effort to eliminate noise interference, it becomes desirable to try earthing the filter to an RF earth rather than the mains earth, do not do so without first reading about the *dangers* [3].

NOTES

[1] Schaffner Model FN321 (1, 3, 6 or 10A) from RS or Electronic Services.

[2] See 'Why use two if one will do?' in TT, *RadCom*, 10/92 p.34.

[3] 'Mains Safety - the killing grounds', by G3RZP, in these RSGB books: *Guide to EMC* by G3JWI, p.75 ff; *HF Antenna Collection* p.XII ff; *Radio Communication Handbook* 7th ed. p.22.10 ff. ♦

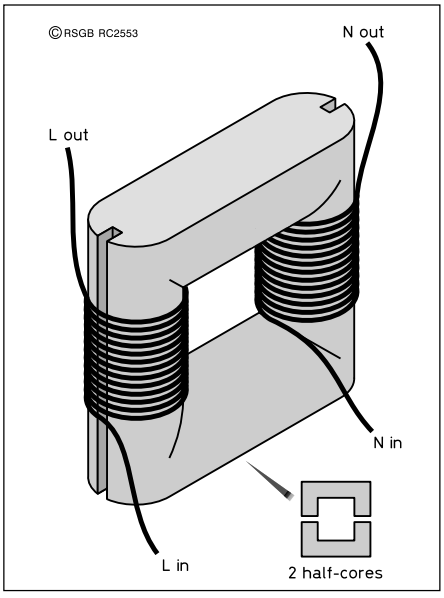


Fig 3: Filter inductors wound on a TV EHT transformer core.

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FLEXIBLE COUPLERS

WHERE CAN I buy insulated flexible couplers for 0.25in shafts - or how can I make one?

AS FAR AS I know, the only manufacturers of 'classic' insulated flexible couplers (**Fig 1**) in recent years was Jackson Bros, which went into receivership in 1998. However, Mainline Electronics bought the company and have now re-started production of most of the product lines. Mainline sell direct from their Leicester headquarters (Tel: 0116 278 0891) and confirm that they have two sizes of flexible couplers in stock for a little over £5 + VAT.

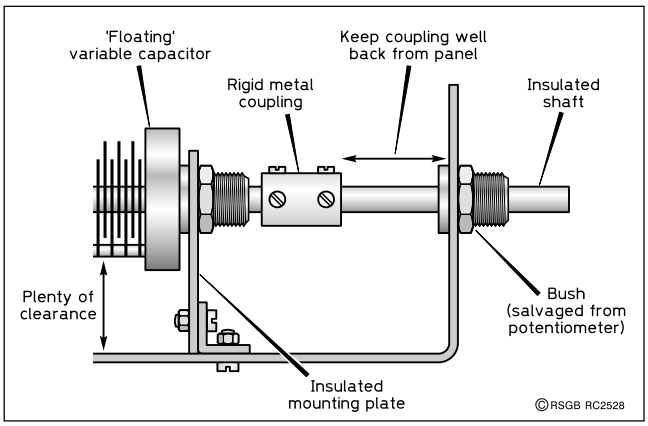

Fig 2: Using a rigid coupler and an insulating shaft for a 'floating' variable capacitor. Keep the metal coupler well back from the panel (shorten the capacitor shaft if necessary).

However, you may want to consider some alternatives. One of the most common reasons for using an insulated flexible coupler is for variable capacitors whose shafts are 'floating' above ground potential, as in the popular T-match ATU (*In Practice*, September 1999). In this case you need not only insulation but also low capacitance between the capacitor shaft and the extension shaft through the front panel. The easiest way to achieve this low capacitance is to use an extension shaft made from insulating material, in which case the mechanical coupling itself doesn't need to be insulating. **Fig 2** shows a typical example, using a brass coupling and nylon extension shaft (Maplin RX29G and RX36R). The nylon is a bit springy, so it gives some degree of flexibility if needed. However, it's best to align the extension shaft accurately with a hole in the front panel, and use a bush to give support and a solid 'feel' when you turn it. For a suitable 0.25in bush and nut, simply crunch up an old potentiometer in the vice, to leave exactly what you need - at most, you may need to pass a drill through to remove any internal shoulder. Nylon may be readily available, but it isn't the best RF insulating material and it has a reputation for melting under stress. You can get rod made of better materials such as fibreglass from RS/Electromail (at a price), but generally the best solution is to make life easier for the insulator by moving the coupler back from the metal front panel. This reduces the self-capacitance and, more importantly, it avoids concentrating the electric field in the insulator. By doing this, you can often use almost any material instead of needing to search for something special.

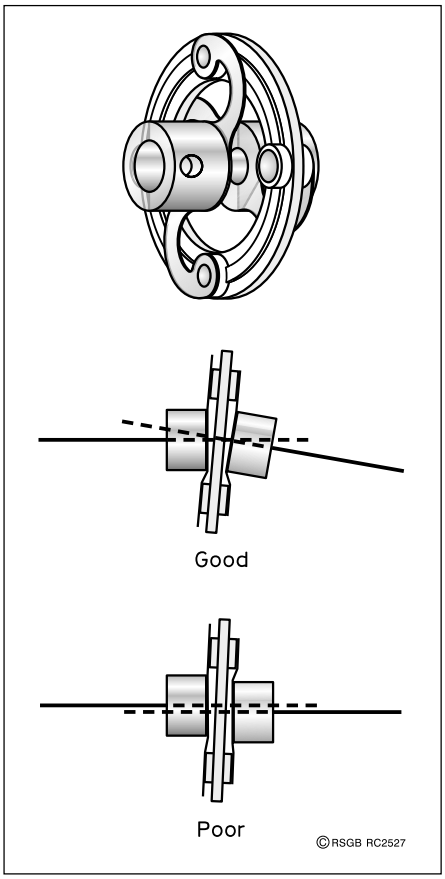

Fig 1: The 'classic' flexible coupler can absorb angular displacement well, but is poor at absorbing sideways displacement.

Turning now to the mechanical aspects, I've already indicated that it's best to avoid the need for flexible couplers in the first place. Also, we often ask these couplers to do impossible things. As shown in Fig 1, flexible couplers are good at absorbing a change in angle between two shafts, but more often we try to make them absorb a sideways misalignment between two parallel shafts - which they really cannot do. For example, the small Jackson Bros coupler (5610, 19mm overall diameter) is capable of absorbing only 0.12mm of sideways displacement, and even the large coupler (4693, 35mm diameter) can only absorb 1mm. It really is far better to take the trouble to remove this displacement, and then use a straight coupler, as in Fig 2.

However, Bill Cole, G0KFW, offers an alternative coupler that is fully flexible and very suitable for low-torque applications such as variable capacitors. "Fit about 30mm of 6mm plastic tubing (as in wine-making kits, lawn mower/ motorbike fuel pipe, etc) over the shaft and spindle, leaving a gap appropriate to the voltage (8-10mm) but not far enough to kink the tubing when turned (**Fig 3a**). It's surprising how tightly the tubing grips without any adhesive. This should be flexible enough to accommodate any alignment problems. If the shaft is mounted through the panel using a bush, this gives a nice 'feel' to the operation. I have been using this in my home-made ATU for at least ten years and it has been so

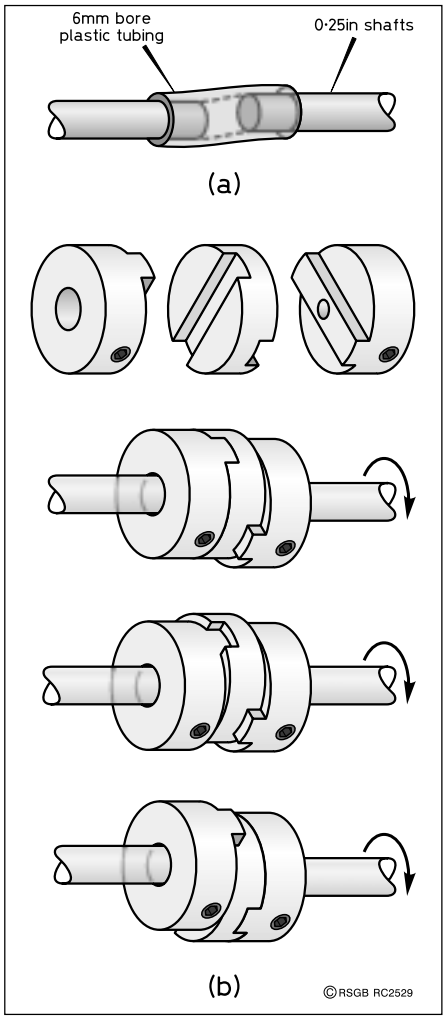

Fig 8: (a) Flexible coupler made from 6mm-bore plastic tubing (G0KFW). (b) 'Oldham'-type coupler can transmit high torque and absorb considerable sideways displacement.

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

trouble-free that I'd almost forgotten about it!" This is an excellent low-cost idea, and should meet most low-torque requirements. The only exception would be VFO tuning capacitors, where the shaft rotation must be transmitted very accurately indeed. The Jackson Bros type of coupler (Fig 1) performs very well for this, and also has the advantage of absorbing any small push-pull movements.

For higher-torque applications, such as large switches, you could also consider the 'Oldham' pattern of coupler (**Fig 3b**) which has a sliding intermediate disc that can absorb large amounts of sideways displacement. Although these couplers are not totally backlash-free, they are perfectly adequate for switches. They are obtainable from RS/Electromail, and a 0.25in coupler would require two of 319-483 (£3.01 + VAT each, sold in multiples of 4) and one of 319-499 (£0.468 + VAT each, in multiples of 10). A packaged alternative is the Uni-Lat coupler, a derivative of the Oldham pattern (748-336, £11.80 + VAT). These are not cheap solutions, but for some home-construction applications they might save the day.

S-UNITS

WHAT IS AN S-unit? Is there any standard? THE ORIGINAL definition of signal strength was in words. The original RST (Readability, Strength, Tone) system of reporting defined nine levels of signal strength, as shown in **Table 1**. Signal strength reports were largely guesswork... and who knows how those nine carefully graduated English descriptions came out in other languages? When S-meters began to appear, they gave a slightly more objective indication based on signal strength alone - but the calibration was still guesswork. In an SSB/CW/AM receiver, the S-meter is connected to the AGC circuit which holds the audio output reasonably constant by controlling the gain of the IF and RF amplifier stages (**Fig 4**). The stronger the signal, the more AGC voltage it generates, and the S-meter indicates this. (In an FM receiver, the S-meter often works on a different principle, but still indicates signal strength.)

There are two big problems with this. One is that AGC is usually not applied on very weak signals, because turning down the IF/RF gain will degrade the signal-to-noise ratio. This can lead to interesting situations where a signal is perfectly copiable in the absence of QRM, but the S-meter hasn't started to move off the stop - it doesn't seem right to give someone a report of 'Readability five, strength zero', does it? Manufacturers usually avoid this problem by being very vague about what happens below S1, rather like your car's speedometer below 10mph. The other problem is what to do with signals that are stronger than S9: what does 'Stronger than extremely strong' mean... if anything?

S1	Faint signals, barely perceptible
S2	Very weak signals
S3	Weak signals
S4	Fair signals
S5	Fairly good signals
S6	Good signals
S7	Moderately strong signals
S8	Strong signals
S9	Extremely strong signals

Table 1: The original signal strength scale.

The interesting property of most S-meters is that they give a fairly linear decibel scale. This is because the AGC-controlled amplifiers have a fairly linear relationship between gain in decibels and the applied AGC voltage that is driving the S-meter. The accuracy of this relationship is by no means guaranteed, because it depends on the design of the controlled amplifiers and the way that AGC is applied, but it does lead to the notion that each S-unit should represent the same number of decibels increase in signal strength. And as we know, after reaching S9 the scale then continues in plain decibels: S9 +10dB, +20dB and so on, up to maybe +60dB. However, decibels are always a *relative* measurement, ie a measurement of power *ratio*, not simply power. This means that the entire S-unit scale also needs to be referenced to some absolute signal level.

So how many decibels *is* an S-unit, after all that? The answer is: it varies! It varies between manufacturers, it almost always varies along the scale of the S-meter, and quite possibly it varies between different examples of the same receiver. There is an IARU standard that each S-unit represents a received signal level change of 6 dB, but a glance at Peter Hart's receiver reviews shows that real-life S-units vary enormously [1]. Typically, the manufacturer aims to get the 20dB step between S9 and S9+20 about right, but below S9 the 'value' of one S-unit gets smaller and smaller, and can be less than 2dB per S-point at the bottom of the range.

The IARU recommendation is that S-meters should be referenced to S9=50µV for HF receivers and S9=5µV for VHF receivers. The difference reflects the greater sensitivity of VHF receivers, for a 5µV signal is indeed 'extremely strong' at VHF. However, Peter Hart's review measurements once again show that the 'S9' levels of commercial HF receivers can be anywhere from 250µV down to less than 20µV. The other important factor is whether the internal preamp is on or off - if it is on, all signals jump up the S-meter scale. Should you then modify the signal strength report you give to the otherstation? The answer of course is no, because the other person's signal strength cannot rationally depend on which buttons you choose to push at the receiving end.

Why are commercial amateur S-meters so bad? Well, first of all because the IARU has no authority to enforce a standard on manufacturers. But the manufacturers themselves will justly blame the market. It costs money to produce an S-meter with a truly linear decibel scale (although the more 'digital' the receiver becomes, the easier it would be). Also, an S-meter with a genuine 6dB per S-point calibration would seem very sluggish compared with existing meters, promoting the entirely mistaken rumour that the receiver is 'deaf'. Finally, there's the human factor that nobody likes to seem mean about the signal reports they give.

The only logical conclusion is that none of this makes sense! If you look for deep inner truths from your S-meter, it will drive you crazy. In the end, most experienced amateurs almost ignore the S-meter and give subjective reports based on some personal version of Table 1... so much for progress.

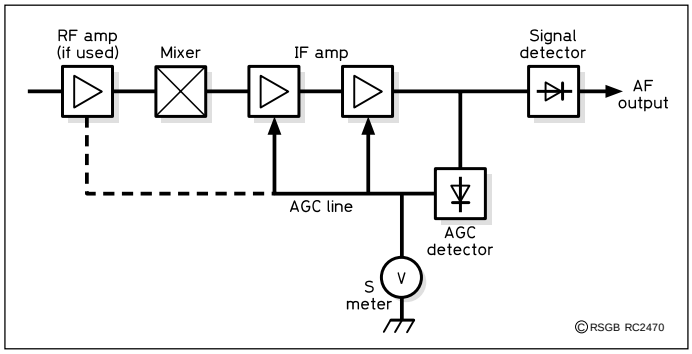

Fig 4: The AGC loop in a receiver keeps strong signals at a constant output level. The S-meter measures signal strength in terms of the AGC control voltage that needs to be applied.

REFERENCE

1. Peter Hart routinely measures the signal levels in microvolts required to give S1, S3, S5, S7 and S9, and then S9+20, 40 and 60dB. To calculate the difference in decibels between any two voltages, use the standard formula: dB = 20 $\log_{10}(V_2/V_1)$. Remember that the decibel differences you calculate from Peter's tables will be for steps of *two* S-units. ♦

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.

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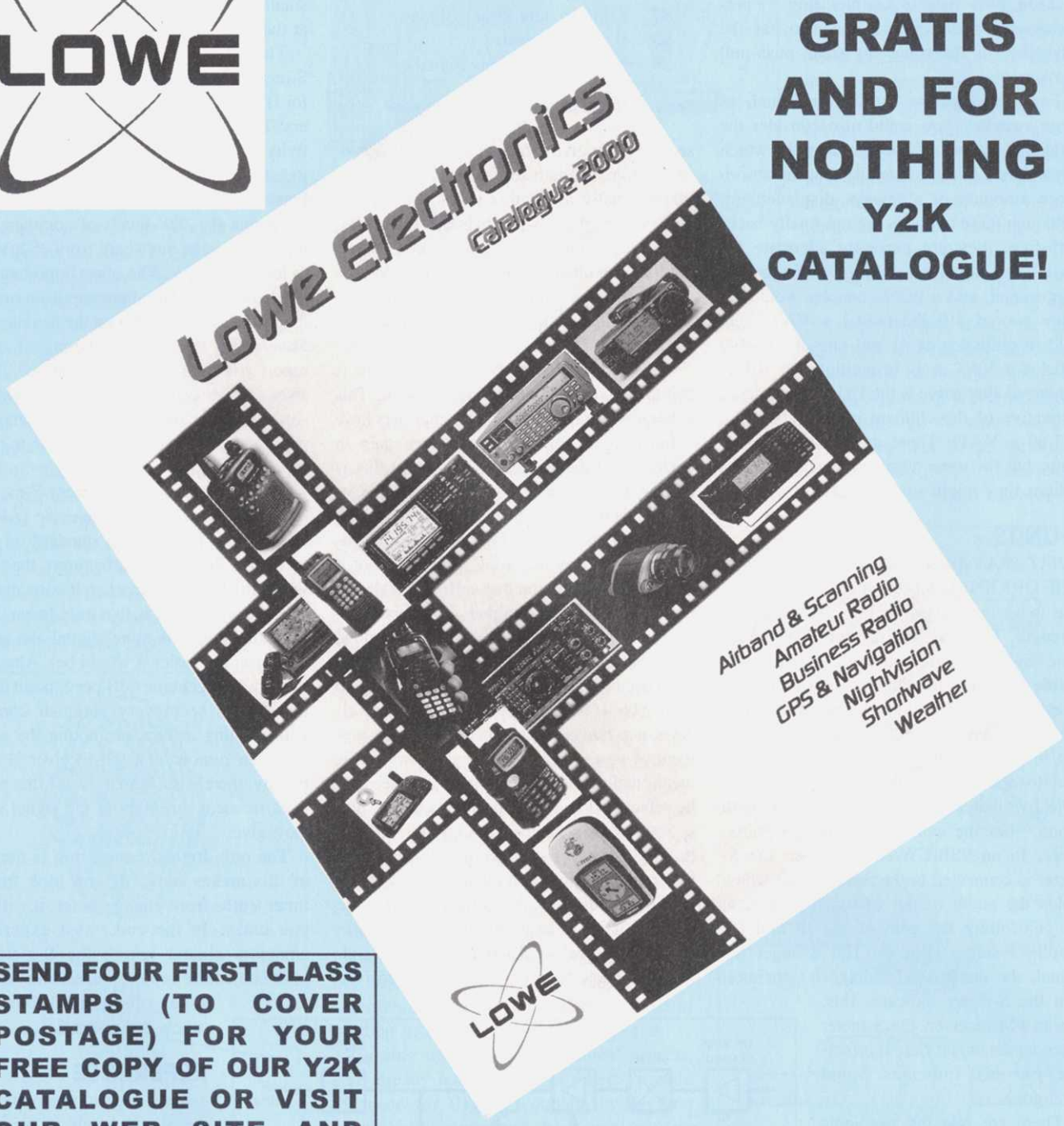

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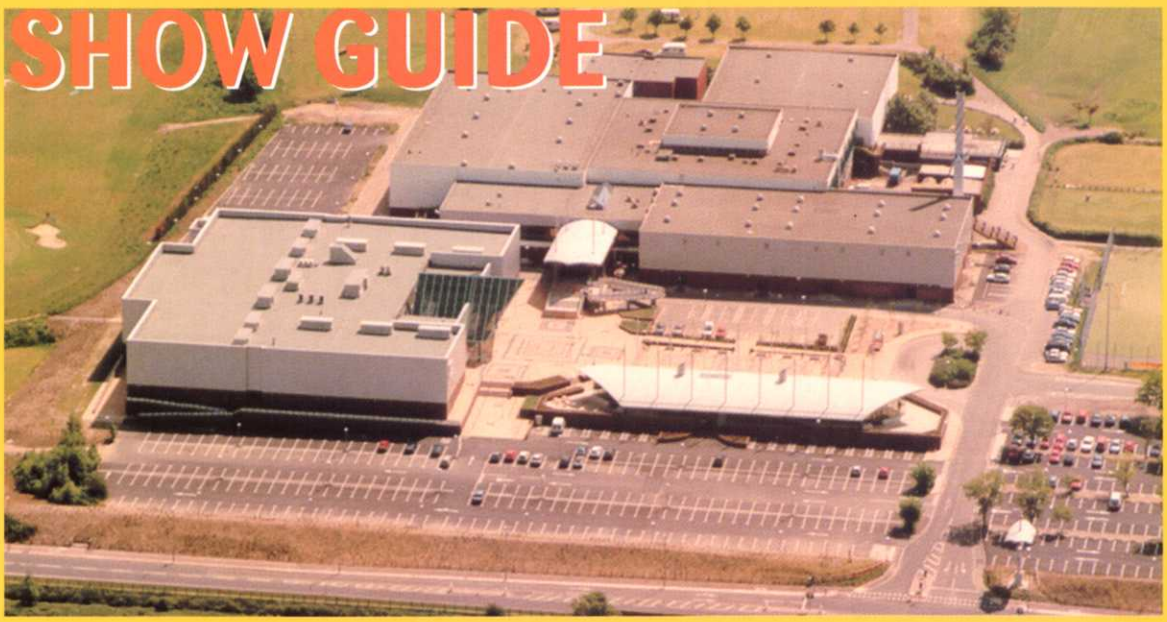

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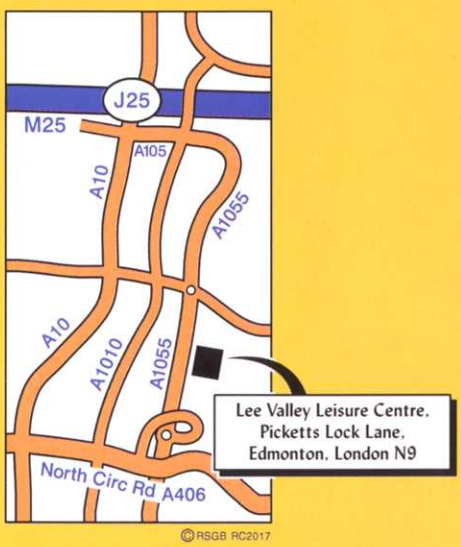

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Icom IC-756PRO HF & 50MHz Transceiver

Reviewed by Peter Hart, G3SJX*

SOMEWHAT OVER three years ago, Icom launched the IC-756, a high end HF + 6m base station which I reviewed in the May 1997 edition of *RadCom*. Very recently Icom have released the IC-756PRO, which from its number may convey the impression of just an upgraded version. The outward appearance is very similar, indeed the same solid multi-partitioned diecast chassis is used, with the same front and rear panels. Some of the buttons have been reassigned to provide additional features, but the mouldings are identical. However, internally the electrical architecture is very different, relying heavily on DSP for IF as well as AF processing functions and with a number of important new features added.

PRINCIPAL FEATURES

THE IC-756PRO is 12V operated, with a peak current drain of up to 23A. It is a table-top size measuring 340 x 111 x 285mm and weighs about 9.6kg. USB, LSB, CW, RTTY, AM and FM modes are selectable, with normal or reverse sideband on CW and RTTY. RTTY is FSK with selectable mark frequencies, shifts and polarity, and requires a logic level input on transmit. For use with AFSK terminal units, AMTOR, PSK31, SSTV etc, voice modes are used. On all the voice modes, a long push of the mode key selects data and this mutes the microphone.

The receiver tunes continuously from 30kHz to 60MHz, with the transmitter enabled only within the exact amateur band allocation (make sure that you have the appropriate version for the country from which you wish to operate). Individual buttons select the bands, with a triple band-stacking register employed that is useful if you operate frequently on three modes, eg SSB, CW and RTTY. One of three last used frequency/mode combinations is returned for each press of the band key.

The smooth action tuning knob tunes in 10Hz steps at 5kHz per knob revolution, with auto speed-up on fast sustained tuning. Faster tuning rates for rapid frequency changes and slower rates for precision tuning are also provided. 101 memory channels are included with the usual facilities, and frequency and memory channel can be entered directly. A memo-pad feature allows frequencies to be quickly stored and recalled by a simple key press, on the basis of last-in, first-out. RIT and transmitter incremental tuning operate over a range of ±9.99kHz and various scan modes are implemented. Comprehensive switching manages access to the VFOs and split frequency operation. For repeater use, separate splits are programmable on HF and 50MHz and there is also a CTCSS tone encoder and decoder for repeater access or tone squelch operation.

The receiver front-end configuration may be optimised to suit different requirements, with two selectable preamplifiers, three levels of signal attenuation and a novel combined RF gain/all mode squelch control. Preamp 1 has a gain of about 10dB for use on all frequencies above 1.6MHz and preamp 2 is intended for use on 21MHz and above with a gain of about 16dB. The CW pitch is adjustable over the range 300-900Hz to suit personal preferences. A front panel pushbutton selects between two antenna sockets and also enables external receiver antenna. The last used antenna / external receive antenna combinations are stored with the band stores. It can be useful to be able to select external receive antennas automatically for the LF bands for loop antennas or for those fortunate to have access to Beverages. An auto ATU is built-in, matching up to 3:1 VSWR and covers all bands including 50MHz. Tuning settings every 100kHz are stored to enable rapid and accurate reselection.

The transmitter power is variable from about 2-100W on all bands and the analogue meter indicates power output, SWR, compression or ALC level. An IF DSP speech processor is provided with three bandwidth settings, treble and bass adjust, VOX and a transmit signal monitor. Full and semi break-in is available on CW, with a front panel control for adjustable delay.

The rear panel carries the usual interfaces, common to all Icom radios, for control of linears, ATUs, data terminals, etc. The standard Icom CI-V serial computer interface is provided with data

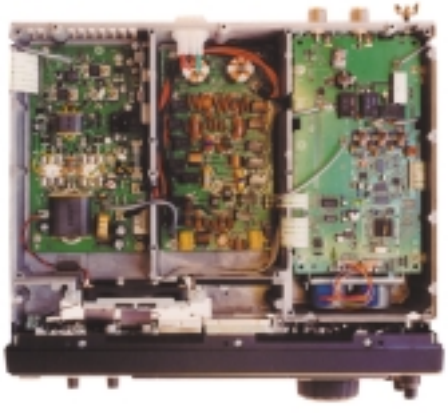
* *The Willows, Paice Lane, Medstead, Alton, hants GU34 9YA.*

TRANSMITTER MEASUREMENTS

FREQUENCY	CW POWER OUTPUT	SSB(PEP) POWER OUTPUT	HARMONICS	INTERMODULATION PRODUCTS 3rd order	5th order
1.8MHz	106W	106W	-64dB	-30dB	-44dB
3.5MHz	108W	108W	-64dB	-36dB	-45dB
7MHz	108W	108W	-64dB	-28dB	-42dB
10MHz	108W	108W	-64dB	-32dB	-42dB
14MHz	108W	108W	-64dB	-22dB	-36dB
18MHz	108W	108W	-60dB	-30dB	-40dB
21MHz	108W	108W	-70dB	-35dB	-36dB
24MHz	108W	107W	-70dB	-26dB	-36dB
28MHz	107W	107W	-70dB	-22dB	-38dB
50MHz	104W	103W	-70dB	-20dB	-36dB

Carrier suppression: 25dB (see text) Sideband suppression: 70dB @ 1kHz
Transmitter AF distortion: <1% Microphone input sensitivity: 3mV for full output
SSB T/R switch speed: mute-TX 12ms, TX-mute 1ms, mute-RX 22ms, RX-mute 1ms

NOTES:
All signal input voltages given as PD across antenna terminal.
Unless stated otherwise, all measurements made on SSB with receiver preamp 1 switched in.
All two-tone transmitter intermodulation products quoted with respect to either originating tone.



Top view with covers removed, showing PA, filters and ATU.

transfer rates from 300 to 19200 baud, which also allows transceiving with other Icom radios. Two key jacks are fitted, the jack on the front panel for a keying paddle to control the internal keyer, and the jack on the rear panel for a straight key or external keyer. A transverter jack is also provided which outputs about -20dBm on transmit and functions as the receiver input on receive.

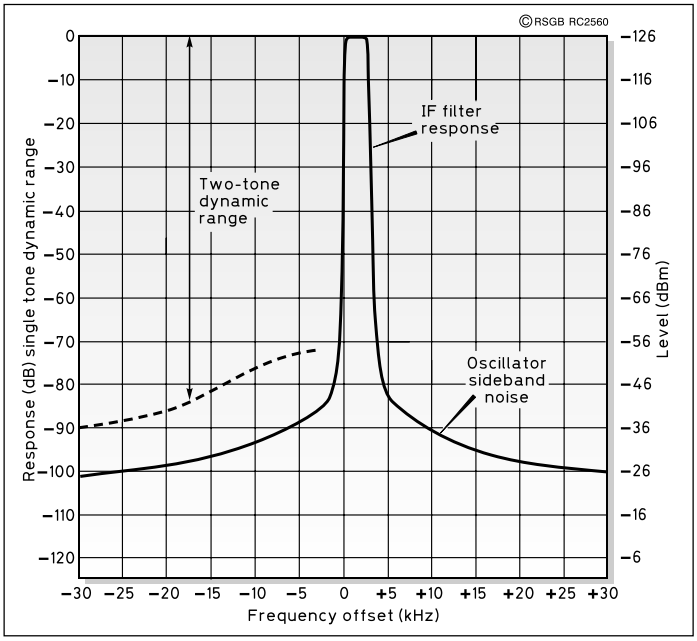


Fig 1: Effective selectivity curve on USB.

DSP

THE MAJOR difference between this radio and the earlier IC-756 lies with the DSP circuitry. The IC-756 used a quadruple conversion superhet with the main selectivity achieved through crystal/ceramic filters at both the 9MHz and 455kHz IFs prior to feeding the DSP at 15.6kHz for demodulation and audio processing. The IC-756PRO is a triple conversion superhet with a first IF of 64.455MHz, a second IF of 455kHz with fairly broad (15kHz) selectivity and a third conversion to 36kHz to feed a 32-bit floating point DSP which provides all the IF filtering, demodulation and audio processing functions. The channel filtering is impressive, providing 41 different passband widths on CW and SSB from 50Hz to 3600Hz with shape factors superior to any crystal filters. There are 32 passband widths selectable on RTTY (50-2700Hz) and 3 each on AM (3, 6, 9kHz) and FM (7, 10, 15kHz). Three separate selectable bandwidths are available for each mode by a simple push of a front panel key, selectable from the available menu via the set-up routine.

The DSP also provides the twin passband tuning function which enables the filter sides to be both independently moved and narrowed. The AGC is also implemented by the DSP, with three separate time constants selectable from the front panel. These three values may be set from a menu of 13 different values (0.1 to 6s) and are set separately for all modes except FM. Two separate notch functions are provided in this transceiver, both using the DSP. A particularly effective manually-tuned IF notch with a depth of 70dB is included within the AGC loop, and hence does not result in desensitising with strong carriers. An auto-notch is implemented at AF and will automatically attenuate several beat notes, even if they are moving.

An adjustable DSP noise reduction system is included and there is also a conventional (not DSP) IF noise blanker for pulse type interference such as car ignition. The modulated transmit signal is also generated by the DSP, with adjustable bass and treble microphone equalisation and adjustable compressor.

OTHER SPECIAL FEATURES

A DUAL-WATCH facility is incorporated via a second receiver. The two receivers use separate first mixers and synthesisers and a common signal path for all RF, IF and AF circuitry. Hence the second receiver will use the same IF bandwidth and mode and must be broadly within the same

band, or for the higher frequencies, on adjacent bands. A balance control sets the gain of the two signal paths via PIN diode attenuators following the mixers. A single tuning control is used, assignable to either receiver and both receive VFO frequencies are continuously displayed together with the separate selected memories (active or not). A quick dualwatch function equalises the frequency of both receivers.

The IC-756PRO includes a built-in RTTY (baudot) demodulator and decoder circuit for displaying the received data directly on the display panel. This is a new feature, a first in any transceiver. The DSP provides a sharp two-tone dual peak filter demodulator limited to 2125Hz mark, 170Hz shift 45-baud RTTY. A tuning indicator is also provided on the display panel to assist with tuning RTTY signals.

A built-in full message keyer with some useful features for contest operation is provided for CW. The keyer operates over a wide range of speeds, with adjustable weighting and a variety of keying paddle arrangements. Four memories will each store up to 54 characters, with a provision to send automatically incrementing serial numbers and auto-repeat after a time delay. The message stores are programmed in text from front panel push buttons, not using the keying paddle.

The IC-756PRO also includes a digital voice recorder with four memory channels on receive and four on transmit. Each memory store is limited to a maximum message length of 15 seconds. This is useful for repeated CQ calls in long contests and other fixed contest messages. The transmit stores can be tagged with labels up to 20 characters long for easy identification on the display panel. As an optional extra, a voice synthesiser module can be installed.

MEASUREMENTS

Measurements are given in the table when powered from a 13.8V supply with additional comments as follows. Note that I have now included the 136kHz band in my standard set of measurements.

RECEIVER

With the higher gain preamp in circuit, preamp 2, the sensitivity on 21MHz and above was about 3dB better than with preamp 1. Note that no preamp is selectable on 136kHz. The S meter reading is independent of mode. The rejection of images and all IF frequencies was exceptionally good, in excess of 100dB. The initial AGC attack time was fast, but took around 200ms to settle the last dB.

The filter bandwidths shown in the table are just a representative selection from the 40+ filters available. The shape factors and steep skirts are really excellent, even with bandwidths down to 50Hz. This is where DSP scores, as these figures are unattainable with conventional IF filters. The reciprocal mixing performance is very good - better than the original IC-756 - and the overall dynamic range figures are reasonable. Even the close-in dynamic range is quite creditable (see **Fig 1**), considering that all the channel selectivity is in the final IF, a potential problem with this approach. The in-band intermodulation performance is exceptionally good.

TRANSMITTER

The power output figures in the table were measured with the ATU out of circuit. The ATU introduced an additional loss of about 10%. The SSB carrier suppression with no modulation was greater than 80dB, but degraded to only 25dB with modulation. The CW rise and fall times were fairly sharp and there was about 30% character shortening at 40WPM on full break-in. There was no character shortening on semi break-in.

RECEIVER MEASUREMENTS

	SENSITIVITY SSB 10dBs+n:n		INPUT FOR S9	
FREQ	**PREAMP 1 IN**	**PREAMP OUT**	**PREAMP 1 IN**	**PREAMP OUT**
136kHz	-	2.5µV (-99dBm)	-	280µV
1.8MHz	0.18µV (-122dBm)	0.45µV (-114dBm)	18µV	56µV
3.5MHz	0.18µV (-122dBm)	0.45µV (-114dBm)	18µV	56µV
7MHz	0.16µV (-123dBm)	0.35µV (-116dBm)	14µV	45µV
10MHz	0.16µV (-123dBm)	0.35µV (-116dBm)	14µV	45µV
14MHz	0.16µV (-123dBm)	0.35µV (-116dBm)	13µV	45µV
18MHz	0.14µV (-124dBm)	0.35µV (-116dBm)	13µV	45µV
21MHz	0.16µV (-123dBm)	0.40µV (-115dBm)	14µV	45µV
24MHz	0.16µV (-123dBm)	0.40µV (-115dBm)	16µV	50µV
28MHz	0.16µV (-123dBm)	0.45µV (-114dBm)	16µV	56µV
50MHz	0.22µV (-120dBm)	0.45µV (-114dBm)	20µV	45µV

AM sensitivity (28MHz): 1µV for 10dBs+n:n at 30% mod depth
FM sensitivity (28MHz): 0.3µV for 12dB SINAD 3kHz pk deviation
100dB above AGC threshold for +1dB audio output
Max audio before clipping: 1.5W into 8 ohm, 2W at 10% distortion
Inband intermodulation products: better than -50dB

AGC threshold: 1.3µV
AGC attack time: see text
AGC decay time: see text

S-READING	INPUT LEVEL SSB	
(7MHz)	**PREAMP 1 IN**	**PREAMP OUT**
S1	1.6µV	5µV
S3	2.5µV	8µV
S5	4.5µV	14µV
S7	8µV	25µV
S9	14µV	45µV
S9+20	63µV	200µV
S9+40	800µV	2.5mV
S9+60	6.3mV	20mV

FILTER	IF BANDWIDTH	
	-6dB	**-60dB**
10kHz	10.9kHz	16.2kHz
6kHz	6.6kHz	10.8kHz
2.4kHz	2520Hz	3560Hz
500Hz	515Hz	1140Hz
250Hz	263Hz	859Hz
100Hz	107Hz	216Hz
50Hz	63Hz	141Hz

INTERMODULATION (50kHz Tone Spacing)

	PREAMP 1 IN		PREAMP OUT	
Frequency	3rd order intercept	2-tone dynamic range	3rd order intercept	2-tone dynamic range
136kHz	-	-	+16dBm	84dB
1.8MHz	+3dBm	90dB	+13dBm	92dB
3.5MHz	+3dBm	90dB	+13dBm	92dB
7MHz	+0dBm	89dB	+11dBm	92dB
14MHz	+2dBm	90dB	+13dBm	93dB
21MHz	+0dBm	89dB	+13dBm	92dB
28MHz	-2dBm	88dB	+14dBm	92dB
50MHz	-4dBm	84dB	+13dBm	92dB

CLOSE-IN INTERMODULATION ON 7MHz BAND

	PREAMP 1 IN		PREAMP OUT	
Spacing	3rd order intercept	2-tone dynamic range	3rd order intercept	2-tone dynamic range
3kHz	-27dBm	71dB	-18dBm	72dB
5kHz	-26dBm	72dB	-17dBm	73dB
7kHz	-26dBm	72dB	-16dBm	74dB
10kHz	-22dBm	74dB	-12dBm	76dB
15kHz	-14dBm	80dB	-4dBm	82dB
20kHz	-8dBm	84dB	+3dBm	86dB
30kHz	-2dBm	88dB	+9dBm	90dB
40kHz	+4dBm	92dB	+12dBm	92dB
50kHz	0dBm	89dB	+11dBm	92dB

FREQUENCY OFFSET	RECIPROCAL MIXING FOR 3dB NOISE	BLOCKING PREAMP1 IN	BLOCKING PREAMP OUT
3kHz	83dB	-32dBm	-22dBm
5kHz	86dB	-32dBm	-22dBm
10kHz	92dB	-29dBm	-19dBm
15kHz	96dB	-21dBm	-10dBm
20kHz	98dB	-13dBm	-3dBm
30kHz	101dB	-7dBm	+2dBm
50kHz	106dB	-7dBm	+2dBm
100kHz	111dB	-7dBm	+2dBm
200kHz	115dB	-7dBm	+2dBm

LCD panel showing RTTY decoder display (full screen).

LCD DISPLAY PANEL

THE FRONT PANEL display uses a 5-in colour TFT LCD panel. Associated with this are seven buttons down the side and five function keys along the bottom. These buttons and keys are assigned functions according to context. The top half of the panel indicates all the frequencies, modes, split and dual-watch status, IF filters etc at all times. A graphical representation of IF bandwidth is also portrayed, responding also to PBT settings. The 24-hour clock time is also displayed and a timer with programmable on/off times may also be enabled.

The bottom part of the display has a number of functions. It can show the spectrum on either side of the receive frequency, with a selectable span from ±12.5 to ±100kHz. The current spectrum trace is shown in green, with a blue background trace for peak hold. Peak hold can be useful for monitoring transient openings on 50MHz. The transmit frequency is indicated for split operation or the sub receiver frequency for dual watch. A section of the memory bank can be displayed showing up to 13 consecutive locations. Alphanumeric names can be assigned for easy reference and it is a simple matter to scroll through, locate and select channels. This section of display also shows the set-up and message stores for the voice and CW keyers and decoded RTTY messages.

This radio has a host of user programmable settings. These are easily accessed and set, without constant reference to the manual, by the simple presentation in words and the assignable keys provided on the display. This same approach allows the memory keyer, scanning options and other functions to be set up in a very user friendly way.

ON-AIR PERFORMANCE

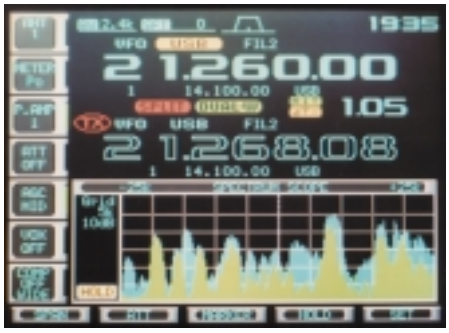
THE FIRST THING you will see when you turn on this radio is the start-up screen saying that the DSP is calibrating. This takes ten seconds. Overall I found the radio an excellent performer, easy to use after initial familiarisation and with all the features that anyone could possibly want and well implemented. The filters were really superb. The narrower filters offer some interesting possibilities for 136kHz DX and narrow data modes such as PSK31. The performance on 136kHz seemed very good and although I am currently without my LF antennas, several stations were heard on this band. The receive performance was very good on all modes, although some strong signal problems could be found on 40m with the preamp switched in circuit. I found the speaker somewhat restricted in frequency range and lacked bass response, with much better quality on headphones. The built-in RTTY decoder performed effectively and the spectrum display was particularly useful for monitoring 50MHz band activity. The transmit performance was good and CW break-in effective.

CONCLUSIONS

The IC-756PRO is an excellent all-round buy for HF and 50MHz, packed with features and a good electrical performance. The list price is £2099 and, most importantly, there are no expensive extra filters needed for serious use on CW and RTTY.

ACKNOWLEDGEMENT

I would like to thank Waters and Stanton PLC for the loan of the equipment. ♦



LCD panel showing spectrum display.

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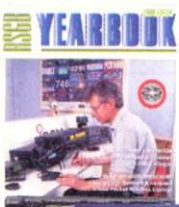

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AMATEUR RADIO & COMPUTER SHOW

Lectures, seminars, forums...

Saturday 11 March, 12.00pm
100 Years of Amateur Radio, by Ian Poole, G3YWX

The first amateur radio station was set up in 1898 at Woolwich Arsenal. Since then amateur radio has changed beyond all recognition. This talk tells the exciting story of how amateur radio has developed from the time when the first station was set up to the present day, recalling achievements during the early days as well as those that are taking place today. There will be many photos from the new RSGB book 'Amateur Radio - The First 100 Years', as well as many other interesting dates and facts.

Saturday 11 March, 2.00pm
Windows 2000, by Bob Fuller, G6PWS

Come and hear what Microsoft's latest Operating System has to offer the computer user. The talk will be illustrated, will cover the evolution of Windows, and will take a look at an in-depth look at the facilities offered by the latest version.

Sunday 12 March, 12.00pm
Internet Linking Forum, by the RSGB Datacommunications Committee

Without doubt the hot topic of the moment is the linking of amateur radio to the Internet. This forum will give interested parties the opportunity to acquaint themselves with what kind of links it will be possible to establish, and how. It will be chaired by the DCC Chairman Iain Philipps, G0RDI, and attended by other members of the committee.

Sunday 12 March, 2.00pm
Practical Wireless – Into the Future, by Rob Mannion, G3XFD

Come and hear the editor of PW talk about the editorial approach of the magazine and give a round-up of his 'Radio Basics' column. The talk will conclude with a question and answers session, so if there's something you've been meaning to say or a question you've been meaning to ask, this would be an ideal time and place to do it.

Lectures, seminars, etc are held in 'Studio One', which is a room immediately above the gymnasium where the Bring & Buy is located. Disabled access is via the passenger lift and then through the Oasis restaurant.

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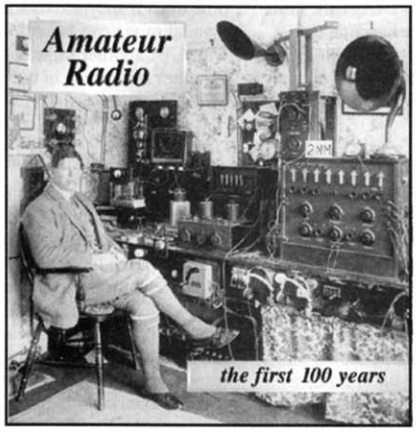

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The NEW IC-756PRO

HF+50MHz, 32bit DSP Transceiver

I am sitting quietly minding my own business when the phone rings; it is Mr Martin Lynch commanding me to pick up an IC-756PRO for review. I attempt to argue, but to no avail, when he sets his heart on a review there is no escape! Obligingly, I appeared at the emporium, and was peremptorily handed a packing case by the dreaded Chris (see my web page for photo and info on this gentleman). 'Do a review on this', he said. I nodded obediently, and slunk off with a big grin on my face!

I have decided to make this a comparative review with the previous IC-756, and to this end, my previous description of that rig follows below. In view of the similarities between the two radios, repetition is unnecessary and I will deal primarily with the differences and improvements.

GENERAL DESCRIPTION

The Display - Visually, the similarities between this radio and its predecessor are very obvious. Most of the controls both physical and on screen are the same. However when switching on, the first major difference becomes obvious. We now have a multicolour TFT display, and the opening screen (to which your own call sign may be added), displays a digital signal processor self calibrate routine during the first ten seconds. This is a great improvement on the previous purple screen, which to a certain extent lacked contrast. It also provides even more information, the colour scheme making it much easier to locate specific items. Additionally, the viewing angle is much increased.

A comparative review between the 'original' IC-756 & the new digital 'Pro' version by one of the U.K's most prominent DX'ers, Mr Henry Lewis, G3GIQ

The next obvious difference is the panoramic display or band scope. This was always good but now there are added effects. It is possible to lock the display at any instant, and also invoke a storage mode, which retains the total display over a given period. As this is in a different colour, there is no loss of clarity of the real time trace, which continues to update. Finally, and most importantly in my view, the trace amplitude may be varied by a three stage attenuator. Thus this feature becomes really useful for any band with any level of crowding or noise level. The receiving frequency is always in the middle of the scale, and transmit or sub receiver frequency markers can be called up, which could be useful with split frequency operation.

The display doubles up, on request, as a multifunction analogue meter. The moving coil meter as before can be set to read power out, SWR, compression and ALC during transmission. Obviously only one of these functions may be viewed at a time. The 'on screen meter' consists of a set of bar graphs, displaying all these parameters at the same time, plus the 'S' meter on receive - very slick! The maximum level on each trace is also retained for a few moments.

Recorders - A recording facility, for both receive and transmit have now been added as standard. These consist of four channels on receive and four channels for transmit. All channels are of 15-second duration. When recording on receive, the duration, time, frequency and sideband mode are recorded and displayed on replay. By starting recording on a particular channel, the previous contents are overwritten. On receive, to my mind it is a great pity that 'barrel mode' recording is not provided. This would enable the recorder to continue running until stopped, overwriting the beginning when the memory space is full. This is what DX'ers want so that they can always capture the last few seconds. When that very weak DX station comes back in a pile up, it is great to be able to play back and confirm (or otherwise) a QSO. The system of button pushes as it stands, would be too inconvenient to use, for this purpose. The quality of the recording on receive is excellent, exhibiting none of that D/A distortion one hears on telephone answering machines!

Speaking into the microphone without pressing the PTT switch makes four recordings for future transmitting purposes. These may be checked off air and monitored on the internal speaker, and then used to transmit. A minor criticism is that a 15 second recording is just not long enough for a CQ call. I did notice a low level of background noise, on listening to recordings, but this was well below the average voice level, and may have been a function of the monitor circuitry.

RTTY - RTTY is well catered for. The transceiver has five RTTY filters in addition to the normal IF filtering. A twin peak filter is also available. There is an inbuilt RTTY decoder for Baudot, thus for this mode an external decoder is not necessary. When RTTY is selected, a tuning meter is automatically displayed at the top right of the screen.

Receive Functions

The receiver design is considerably different to the 'original' IC-756. There are now no crystal filters. Instead we have a digital signal processing system operating on the second IF. I did look at the circuit and found that there are in fact, a number of the cheaper ceramic filters present, but signal processing provides the ultimate selectivity.

The pass band tuning (PBT) now controls the DSP. The pass band indicator is still there, but in place of the filter descriptions are two numbers showing bandwidth and overall centre shift. There are three available default bandwidths for each mode. These are chosen by use of the FILTER switch. For example the default bandwidth for SSB may be set at 3.0, 2.4 or 1.8KHz. As the concentric PBT controls are adjusted, the LED in the PBT CLR switch glows to indicate that an adjustment has been made. By pushing the PBT CLR switch, the default setting will be restored. Although any setting may be obtained by use of the PBT controls as well, this arrangement allows speedy adjustment. Also the PBT last setting is memorised for each band, and restored when returning.

Three AGC decay rates are available as before, but in addition the lengths of decay may now be set manually for each position - slow, mid and fast. There are 14 choices including 'off' for each switch position when using SSB, CW or RTTY. Happily the default 'slow' rate is noticeably slower now at 6 seconds, a real improvement when listening to long SSB overs, where there is a good signal level. The maximum decay rate for AM is 8 seconds

The notch filter now sports both manual and automatic modes. The handbook claims that in auto mode, it will notch out more than three signals at the same time even if they are moving! The manual mode can be called up for use with CW, another improvement. Whichever mode is in use is indicated on the screen.

Transmit Functions

There is less to say about the transmitter, which subjectively functions much as before. However even here there has been thought to improvement. The speech processor now comes with bandwidth controls, in addition to the quaintly named TX Tone settings, which are used to roll off the bass and treble responses. The auto ATU remains very fast and accurate.

For CW the electronic keyer provided allows alteration of the dot/dash ratio (weighting), and can be set so that the paddle will function as a bug or straight key. The memory keyer remains unchanged with the ability to store up to four CW messages each of 54 characters. However, in common with many other functions, the screen presentation at set-up is improved. Contact serial numbers for contests can also be transmitted.

On The Air

Well, here's what you've all been waiting for - how did it perform for real? In short, very well indeed, in fact much better than I had expected. The IC-756, which I have owned for three years, is a fine radio. I had assumed that the PRO would just be a bit better, with a few more bells and whistles added. I was wrong, this rig is substantially different. As described above, the display is much more user friendly and a delight to look at. The receiver is different to use, and I think slightly better in a number of respects, although it has to be said that the original receiver performance was very acceptable. The menu system is improved and very well thought out, and the designers have obviously gone to great pains to update all the small details. Knowing the IC-756 quite well has made all this obvious.

As mentioned above there are now no crystal filters present, and I was anxious to test the receiver in difficult conditions. A persistent nightmare for receiver designers (including myself), are the problems caused by amplification of signals and noise in front of mixers and other devices with their propensity for non linearity at high input levels, and the consequent

intermodulation. Gain distribution and signal levels at each stage become all important. Usually, the crystal filter at the beginning of the first IF chain, narrows the bandwidth greatly. Thus, there is a great reduction in the total of signal plus noise passed on.
I therefore carried out a number of tests at night on 40 metres, using a full size dipole as an antenna. This can yield signals of up to 10 millivolts (0.02uW) from the huge broadcast signals just above our band, and is a good test for intermodulation. Surprisingly, only by abusing the receiver by putting the RF amplifiers on, could I generate any trace of intermodulation at all. This is a fine performance and I look forward to seeing the results of some third order intercept tests, which will undoubtedly be carried out by Mr Hart in due course!

The DSP controlled pass band tuning (PBT) is a revelation. I have never used one with such a precise control of the band edges. It is like sliding a knife across the spectrum. I was continually surprised at how far one could narrow the pass band without affecting SSB intelligibility. In fact the default bandwidth of 2.4 KHz is a little too wide for my taste, and narrowing it brings a noticeable improvement. With adjacent interference it may be narrowed further, with little detriment to the wanted signal. I found that the memorising of the pass band setting for each band is very useful, especially when switching from SSB to CW.

On CW I still find it hard to believe what I am hearing, when using the DSP filter at extremely narrow bandwidths down to 50Hz. There is no ringing, just a gentle, singing hiss. Tuning across a signal whilst watching the frequency shift, endorses the fact that, what the filter display indicates is what you get! Having the beast on my bench I decided that it was too good an opportunity to miss an experiment. I injected 1mV into the antenna socket (S9+45dB) with the bandwidth at 150HZ and tuned slowly towards the signal. The S meter began to rise when I was about 1KHz away, but there was no audible change in the noise level. Then I reduced the signal to an indicated S9+10db, I could not detect a rise in the noise level until I was 200Hz away. This is an empirical test, and I am not saying what this would mean in terms of a true phase noise measurement, but it reassured me!

Transmit reports were mostly favourable. Using the default set-up the comments received tended to indicate excess bass. The TX TONE settings were altered to good effect, and further improvements were obtained by selection of the middle bandwidth position on the speech compressor. Once adjusted for the best reports, I was informed more than once, that turning on the speech processor sounded almost equal to using an amplifier.

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

The instruction manual is excellent, giving a clear description of all the huge number of controls and functions. I was more sad than amused, to see that the makers now find it necessary to describe what terms like AGC, preamp, attenuator and VOX mean. This has to be a reflection of the ever-decreasing standards required for entry into the hobby!

All the memory manipulation, VFO and scanning functions are as before, and present in total all the functionality that an operator could require and expect from a top flight 21st century transceiver.

Finally

I have certainly omitted some items, which would have been of interest, but it would not be possible in this sort of review, to cover all of the features. I do hope that I have given a good idea what the radio is like to use. I leave it to the lucky few among you who will eventually purchase it, to discover some of the 'goodies' that have not been mentioned.

I kept it as long as I could, but after a week, two large, unpleasant looking gents appeared on my doorstep. They seemed to want the transceiver - when I realised who'd sent them I tearfully parted with it!

Henry Lewis G3GIQ - 06.02.00

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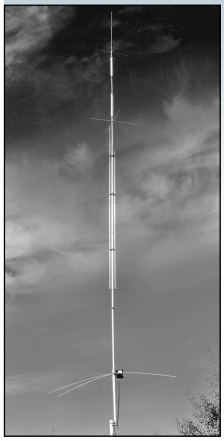

THE NEWEST multi-band HF antenna from Cushcraft covers the 6, 10, 12, 15, 17, 20, 30 and 40m bands. It has been designed specifically for use with an amplifier and tuner, thus being able to withstand the rigours of contemporary operating. Although it is best operated within its 2:1 VSWR bandwidth, it can sustain a 3:1 mismatch at full power for typical operating intervals. See it on ***Block W in the Blue Hall***.

The retail price is £399.

Waters & Stanton PLC, Spa House, 22 Main Road, Hockley, Essex SS5 4QS. Tel: 01702 206835.

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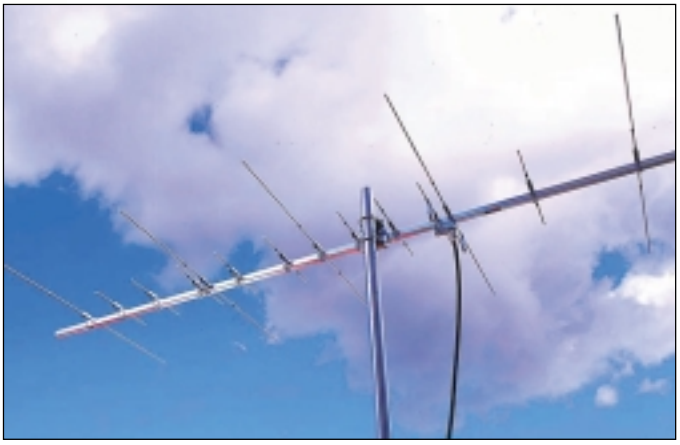

five elements on 2m, and provides useful gain and a low-profile installation. Wind loading is small, enabling any modest TV rotator to turn it.

Matching is achieved using a revolutionary dual-gamma match, which enables a single feeder to be used. However, the bandwidth is quite broad, the VSWR being well below 2:1 across the whole band, with values around 1:1.2 at resonance.

The retail price is £79.95.

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

HF ACTIVE ANTENNA

THE NEW TARGET HF antenna will be on display for the first time on ***Block R in the Red Hall***. It is a high-performance active antenna, complete with power coupling unit, power cable, 7m coaxial cable, and has a frequency range from 30kHz to 30MHz. The power consumption is a mere 20mA at 12V DC. The aerial is robust and waterproof, and is 4m long. Also on display will be the popular Target HF3S receiver, which comes complete with software, data lead, power supply and long wire aerial, ready for instant use. The AKD range of transceivers will be on display: the 2001, a 144MHz transceiver with 12.5kHz spacing; the 6001, a 50MHz transceiver with CTCSS; the 4001 and 7003 transceivers for 70MHz and 430MHz, respectively.

The retail price is £39.95.

AKD, Unit 5, Parson's Green Estate, Boulton Road, Stevenage, Herts SG1 4QG. Tel: 01438 351 710, Fax 01438 357 591.

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.

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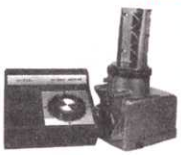

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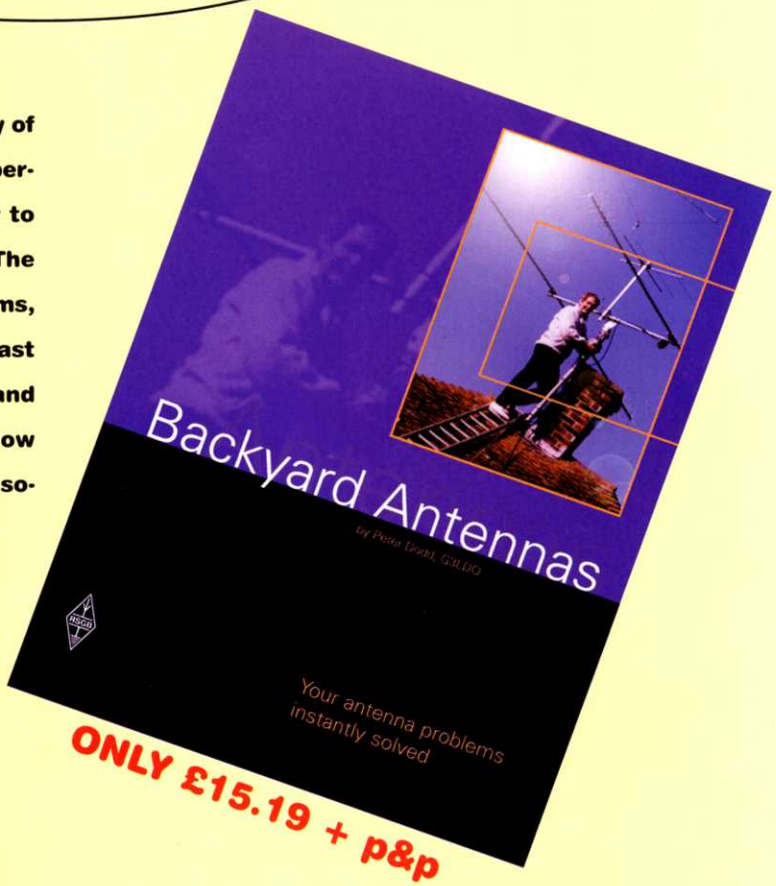

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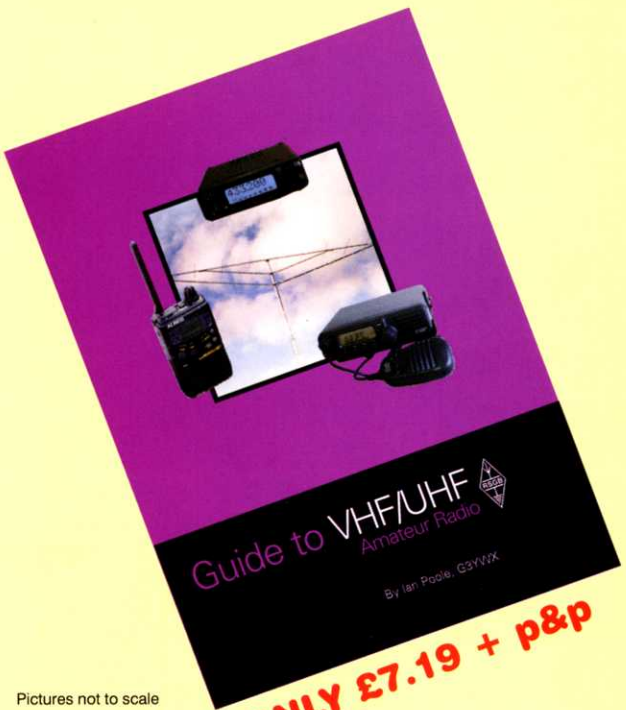

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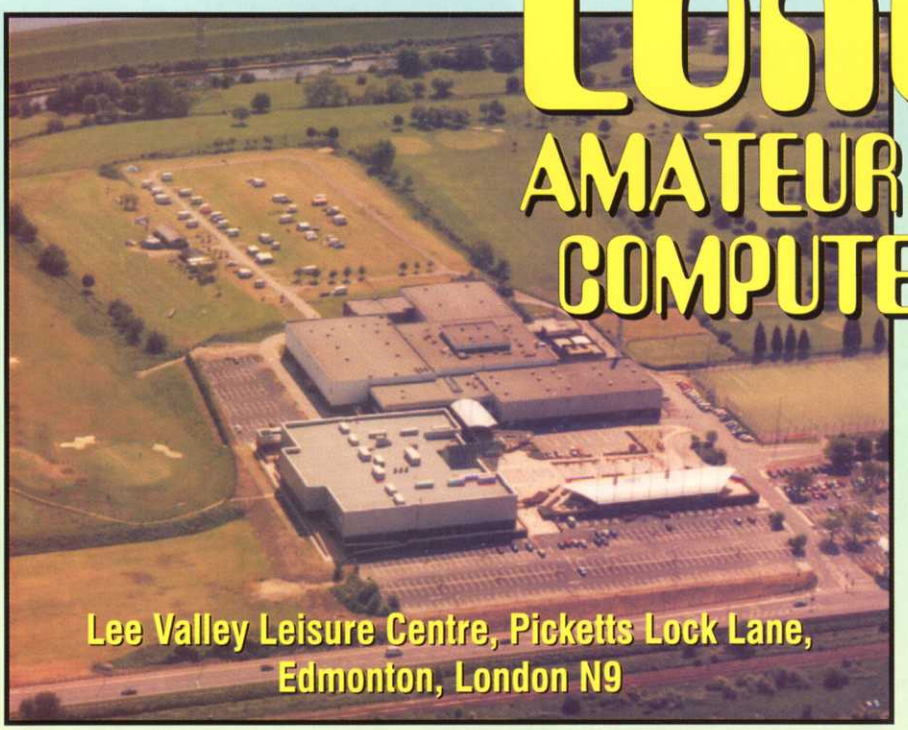

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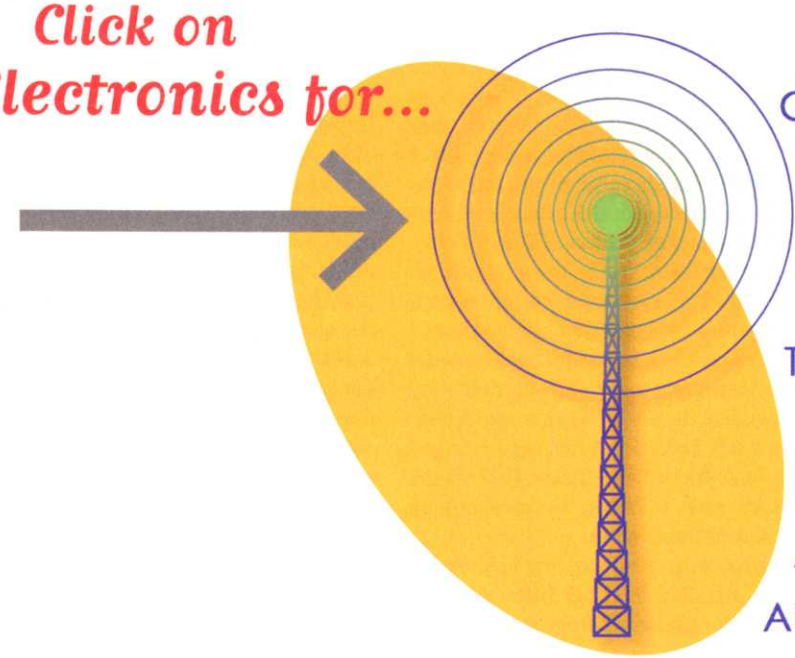

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technical topics

by **Pat Hawker**, G3VA*

CERAMIC FILTER FOR 12.5kHz SPACING

IN THE JUNE 1999 *TT* item 'Ladder Filters Using Ceramic Resonators' (pp60-69) Jack Harcastle, G3JIR, reported that he was looking again at the possibility of using ceramic resonators in a filter sufficiently wideband to be used for NBFM in an 455kHz IF amplifier with 12.5kHz channel spacing. His original intention was that such a design might be suitable for those working on 'Emma's Challenge' as well as finding application in the modification of older VHF receivers to make them suitable for the new channel spacing.

However, the Editorial Committee felt that such an IF amplifier was rather beyond the beginners for whom the Challenge was intended and required test equipment which might not be available. G3JIR's full-length article was declined, but *TT* welcomes the opportunity to present the bare bones of this original, interesting and potentially very useful ceramic-resonator ladder filter for use by the more experienced amateur. G3JIR writes: "Broadening the bandwidth of a 4-pole ladder filter to the degree where it will be suitable for 12.5kHz channel spacing NBFM accentuates its inherently asymmetric shape to the point where it would be unusable in an IF amplifier if nothing were done about it. To rectify this situation an upper-sideband filter has been added. Together they provide a reasonably balanced frequency response.

(a) Increasing freq Capacitance		(b) Decreasing freq Inductance	
(pF)	(+Hz)	(µH)	(-Hz)
10,000	400	10	320
4700	800	20	660
3900	1000	40	1300
2700	1400	80	2800
2200	1700	100	3700
1800	2000	130	5000
1500	2300	150	6000
1000	3200	180	7700
680	4200	200	9000
470	5400		
330	6600		

Table 1: Shifting Ceramic Resonator Frequencies.

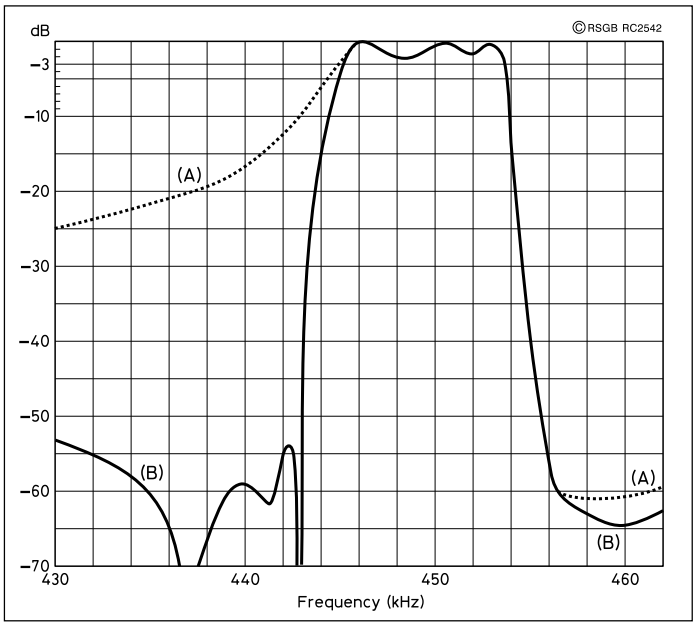

Fig 2: Response curve of G3JIR's filter for 12.5kHz channel spacing (-3dB bandwidth about 8.5kHz).

"The USB filter comprises the three resonators shown on the left-hand side of **Fig 1** (X1, X2 and X3). These were selected as the lowest frequencies from a batch of twelve 455kHz ceramic resonators. They provide peaks of attenuation in the lower stopband, each of which must be trimmed for an optimum response. In my filter, luck dictated that one resonator (X3) was just right and did not require trimming; one (X2) needed moving higher, and the other (X1) lower. To raise the frequency needed a series capacitor and to lower it an inductance: **Table 1** shows the amount of shift that can be achieved by adding these components.

"The final frequency response achieved is shown in **Fig 2**. The USB filter needs to operate at a much higher impedance than its LSB partner (X4-X7), so to match the two a 2N3904 buffer amplifier was inserted between them. This has a modest gain of 2.5, but its primary purpose is its impedance-transforming function.

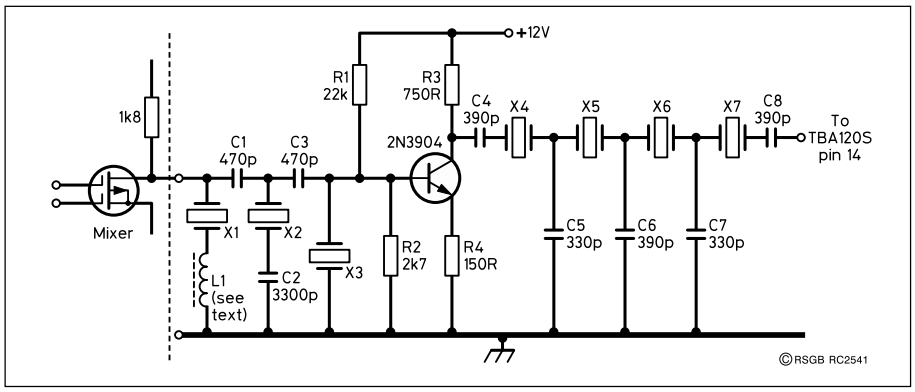

Fig 1: G3JIR's 4-pole ceramic resonator ladder filter (centre frequency 450kHz) for 12.5kHz channel spacing, preceded by a 3-pole filter to improve the upper-sideband characteristics. The filter can be used to modify an existing VHF or a home-constructed rig.

"Although existing 25kHz bandwidth discriminators will happily handle the new deviation, the audio output will be halved; so a new discriminator tuned circuit has also been provided and, finally, for completeness, an audio output stage has been added: **Fig 3**. This means that the circuit can be added to any rig which has a 455kHz IF just by connecting the unit to the output of the second mixer via a small capacitor. Hopefully, this will prolong the useful life of older equipment. All that is then required to complete the job is to reduce the deviation of the transmitter to the point where you don't interfere with stations half-a-channel up or down."

G3JIR found that out of a batch of 12 resonators there was a difference of almost 2kHz between the highest and the lowest samples. While, conventionally, the ladder filter design procedure assumes that all resonators are of identical series resonant frequency, in this design the frequency spread was turned into an advantage. The mechanical properties of quartz crystals severely limit the bandwidth achievable with ladder filters, confining their use to SSB or CW equipment at an IF of around 455kHz. By contrast, the piezoelectric ceramic used in these resonators has completely different properties, which allow much higher-percentage bandwidths to be achieved. For a 12.5kHz channel it is desirable to limit transmitter deviation to 5kHz peak-to-peak, so that this filter was designed to have a -3dB bandwidth of 8.3kHz. Of the batch of resonators, two with the highest series resonances were found to be within 10Hz of each other and these were selected for X5 and X6. The flanking resonators (X4 and X7) are required to resonate 6kHz higher in frequency, and this is normally achieved by inserting a 390pF capacitor in series with each of them. In practice, because of the frequency spread of the resonators, it was found necessary to place each of the resonators in turn into the test circuit and trim the capacitor until the combination resonated at the required fre-

*37 Dovercourt Road, London SE22 8SS.

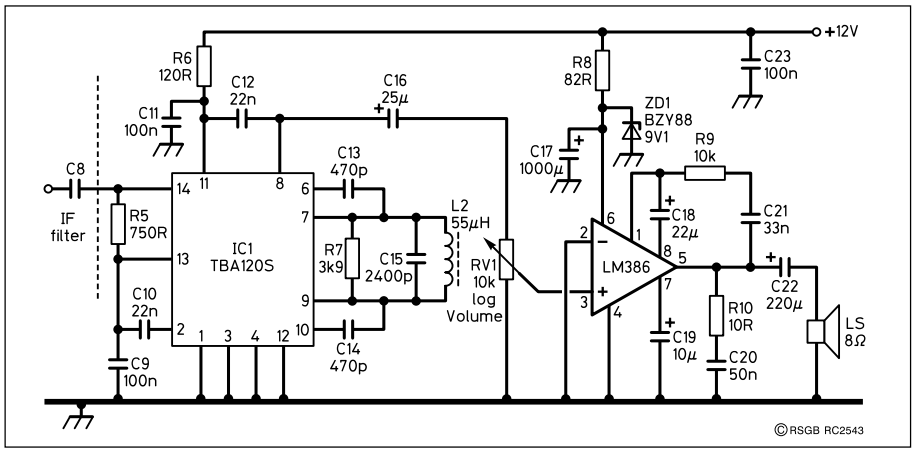

Fig 3: Suitable discriminator/audio stages for 12.5kHz channel working.

quency: **Fig 4** shows a test rig for checking the series resonant frequencies of the resonators.

THROWN-AWAY DUMMY LOADS

THE JANUARY 2000 *TT* referred briefly to the increasing tendency to 'throw-away' domestic electronic and electrical appliances when they develop faults which may often be quite trivial but which would be expensive to have professionally repaired. One result is that one sees many discarded appliances in skips or otherwise cast away. I have to confess to sometimes being tempted to 'rescue' such goods, in the hope that at least something useful can be retrieved. Unfortunately, unlike old valve equipment, modern solid-state equipment with printed-circuit boards seldom yields much that proves recyclable, although a recent find yielded three most-acceptable hi-fi loudspeakers with tweeters and enclosures.

But one badly damaged item has proved surprisingly useful as a roughly 50Ω dummy-load for use at RF powers of several hundred watts. This started life as a pop-up toaster, and must have been discarded when the outer plastic casing was damaged (presumably by being dropped). I stripped-off the remaining casing and removed the small electronic board which presumably governed the popping up of the toast, leaving four series-connected flat elements which measured (cold) approximately 50Ω DC. This has replaced my use of a 100- or 150-watt electric light bulb (which suffer from the major difference in resistance when hot and cold). The toaster element appears to have a far lower temperature coefficient and - of course - does not reach such a high temperature. Up to 30MHz I cannot detect any significant inductive effects, although this may be a lucky feature of the particular toaster design and my use of a balanced pi-network tuner.

I thought at the time that this was a personal discovery that supplemented the earlier *TT* items from readers on the use of discarded microwave ovens to provide high-voltage power supplies (see G3PEN's suggestions in *TT*, November 1993, and the 3kV 600mA PSU by G3IZM in February 1994, both items reprinted in the *Technical Topics Scrapbook 1990 to 1994*, pp239 &251). However, I now find that an item 'Toaster elements for LF dummy loads' stemming from ZL4MD appeared in the 'LF Scene' column of *Break-In*, May/June, 1999, p19.(The New Zealand LF allocation is around 181kHz). ZL4MD reported experimenting with making a dummy load from a toaster element, noting: "Nichrome wire has a low temperature-coefficient of resistance, whether it is cold or running cherry red. A resistance check of a toaster element showed it was around 82Ω (which would dissipate some 645W from a 230V supply)."

Although ZL4MD found it was a useful load as it was, he contemplated removing turns to arrive at a resistance nearer to 50Ω [apparently, unlike my recycled toaster element, his was spiral-wound making it unsuitable for use at HF - G3VA] but ZL2BBJ suggested using a TV line-output core to wind a matching auto-transformer. An auto-transformer with 11-turns primary and a 2-turn over-winding (equivalent to a 13-turn secondary) going to the toaster element "was found to be the optimum for 'looking like' 50Ω. 'Power factor correction' for the winding inductance was obtained by parallel connection of 300pF, resulting in a very low SWR dummy load for the LF band. In practice two TV cores side-by-side were used, as initial tests in the 500W region with one core was found to run rather hot."

ZL2BBJ continues: "Note that an autotransformer, rather than a transformer with separate primary and secondary windings, gives best core utilization for a given core size. The 'trick' with this approach is not to be too concerned that a toaster element, or other convenient power resistor, is somewhat away from being a 50Ω resistance, as it is fairly easy to use a step-down or step-up transformer to obtain the best resistive match. For higher power rating, more toaster elements could be used, in suitable parallel or series-parallel connection. Transformer turns along with 'compensating capacitance' can be experimentally adjusted for best overall match."

The New Zealand group have also experimented with using electrical oil-filled heaters for use as LF dummy loads: "Quite good results can be obtained at LF with almost any 1200W oil-jacket heater, since these measure close to 50Ω." But they warn that "Consistently poor to useless results are obtained in trying to use it as a load for 3.5MHz (about 20 times the frequency of their LF band). Bob Vernall, ZL2CA, suggests that "skin effect has quite an influence on increasing the resistance at higher frequencies. When both resistance and reactance rise with frequency, it is not so attractive as a dummy load. In short, using an oil-filled heater is good for a dummy load at LF, but a waste of time at HF."

I am not familiar with oil-filled electrical heaters, but apparently the element is in the form of a loop which presumably makes it inductive and thin enough to be significantly affected by skin effect. For HF it would seem that the flat, non-spiral type of element as in my 'find' does seem to offer possibilities.

BATTERIES, CELLS & CHARGERS

THE INCREASING USE of battery-operated ('cordless') equipment has meant that we all need to have greater awareness of the whys and wherefores and how of modern battery technology, if only to understand why their performance may fall short of expectations. For example, in 'A cold look at batteries' (*CQ Amateur Radio*, December 1999, pp 11-14, 18), Jim Andera, K0NK, carries an editorial note: "The better you understand batteries, the more operating time you will be able to squeeze out of your portable gear - especially in winter temperatures." The article provides a short course on what to expect from different types of battery at low temperatures, and gives a number of useful tips on getting the most out of them - not only when the temperature falls to zero and below.

By the time these notes reach you, spring

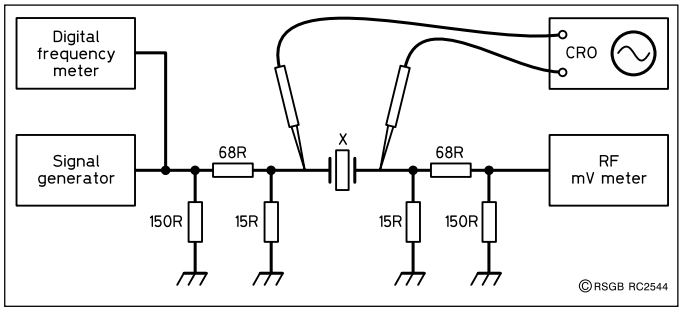

Fig 4: Test set-up for checking series-resonant frequencies of ceramic resonators.

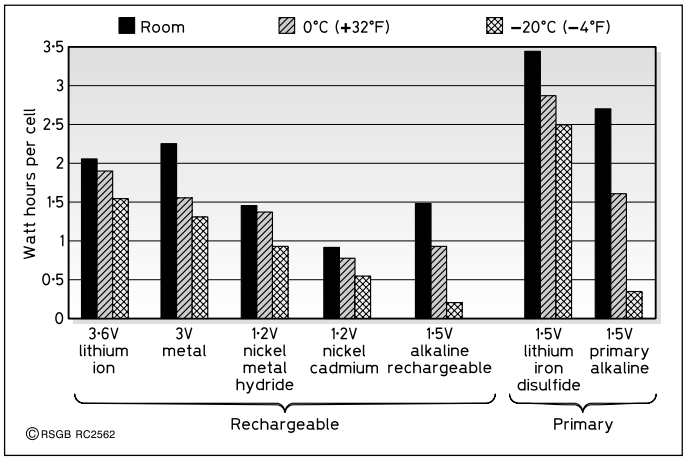

Fig 5: Typical energy capacity of AA-size cells at room and cold temperatures, showing how the amount of energy that can be recovered from a battery diminishes as the temperature drops. A transmit duty cycle of 5-10% is assumed in a typical handheld transceiver application. Although still not available in AA packages, 3V lithium-manganese-dioxide cells will exhibit temperature characteristics similar to lithium iron disulfide. (The capacity is expressed in watt-hours, but can be converted to the more usual mAh units by dividing the watt-hour rating by the cell voltage and then multiplying by 1000. *Source K0NK (CQ)*

may not be too far off, but it's never too late to store away hints and tips for future use. K0NK emphasises that: "It is no secret that some types of battery perform better in amateur radio applications than others. Nor is it any secret that when a battery is placed under heavy loads or is operated at sub-freezing temperatures, its performance will suffer. . . Even warm-weather handheld transceiver users quickly learn that the way to squeeze more operating time out of a battery pack is to minimize the transmitted power and keep the length of the transmissions short. Why? There are actually two reasons for the shorter operating time when transmitting. The most obvious is that the battery's energy is being consumed at a faster rate when transmitting. A second, less obvious, reason is that the capacity of the battery actually decreases with heavier load currents."

K0NK illustrates how the performance of a lead-acid gel-type battery may have 100% of its specified usable capacity at room temperature when discharged at the 0.05 capacity rate (20-hour discharge rate), dropping to about 95% at 0°C, but only about 60% at -20°C at the 0.05 rate. At the 0.2 capacity rate (5-hour discharge rate) even at room temperature the percentage of usable capacity is only 80%, and 40% at -20°C. If the discharge rate is increased still further to capacity rate (ie 1-hour discharge rate) even at room temperature only about 60% of usable capacity will be achieved, dropping to a lowly 30% at -20°C.

Fortunately we do not expect to encounter -20°C in the UK, (even if it sometimes feels like it!), and since performance at 0°C is usually not reduced by much more than 5% compared to that at room temperature we shouldn't expect too much of a problem. However, the effect of a high-discharge rate is important at any temperature and increasingly so as the mercury falls.

Fig 5 shows comparable results for a various types of AA-size cells at room and cold temperatures, as given by N0NK, and this together with lead-acid batteries is further expanded in his 'Battery encyclopaedia for polar bears', divided into rechargeable and non-rechargeable batteries. A few brief extracts are given here (confined to rechargeable types):

- *Lead-acid batteries* are a mainstay in amateur radio, whenever significant capacity is required. Both sealed lead-acid (gel cell) and vented lead-acid (deep-cycle marine) batteries exhibit similar temperature performance, tending to retain about 95% of their room temperature capacity at 0°C.
- *Lithium-ion cells* are good cold-weather batteries, with only slight degradation at 0°C. These 3.6V cells have good energy density and are becoming increasingly popular in miniature handheld transceiver applications.
- *Lithium Metal* batteries generate 3V per cell and are rated for use down to -30°C, although their density advantage may disappear with cold temperatures. Makers have worked to address safety problems.
- *Nickel Cadmium (NiCad)* batteries offer respectable performance at low temperatures and can provide up to 40% capacity under light loads at -40°C. Mediocre shelf life. 1.2V per cell.
- *Nickel Metal Hydride (NiMH)* batteries are usually considered usable down to -20°C. 1.2V per cell. One drawback is poor shelf life.
- *Rechargeable Alkalines* have fairly high internal resistance, even at room temperature, which means their voltage will sag significantly when transmitting more than a fraction of a watt (maximum recommended current, about 400 to 500mA). At cold temperatures the problem becomes noticeably worse, making them a poor choice for winter operation. An attractive feature of these 1.5V cells is that for a rechargeable battery they exhibit very good shelf life, although they offer only a limited number of charge-discharge cycles.

K0NA provides notes for alkaline, carbon-zinc, lithium iron disulfide and lithium manganese dioxide non-rechargeable batteries. He also adds a footnote that due to special charging and safety concerns, rechargeable lithium batteries are usually only available as part of manufacturer-supplied battery packs. However, Irwin Math, WA2NDM, in *CQ Amateur Radio* (March 1999, pp36-37) describes 'An inexpensive charger for lithium-ion batteries', built around the Linear Technology LTC1541 chip**.**

WA2NDM writes: "The newest rechargeable battery on the scene is the one using lithium-ion technology. This battery offers performance superior to the common nickel-cadmium type, since it does not have a 'memory' and can be trickle charged continuously. You never have to 'deep discharge' or recondition these devices, and even disposal is safe for the environment. Furthermore, individual lithium-ion cells provide 3 to 4.1 volts, which is much closer to the

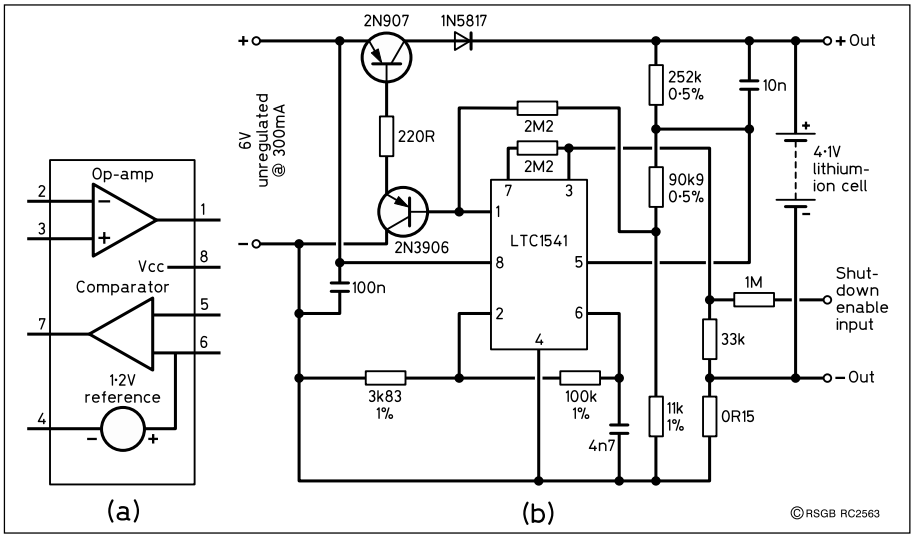

Fig 6: (a) Internal configuration of the LTC1541. (b) Complete lithium-ion battery charger circuit. *Source WA2NDM (CQ)*

voltages needed by modern integrated circuits (such as the emerging 3.6V devices) than 1.2V Ni-Cads or 1.5V zinc-carbons. There is a small problem, however. Lithium-ion batteries are somewhat difficult to charge, since they require a constant-current, constant-voltage circuit that is quite different from their Ni-Cad counterparts. Fortunately, Linear Technology has made the job much easier with a new chip. . . the LTC1541. This chip contains a precision voltage reference, comparator and op-amp (**Fig 6(a)**) which can be easily and inexpensively interconnected to form a complete lithium-ion charger (**Fig 6(b)**).

The 2N2907 controls the battery charging current, driven by the output of the internal op-amp via the 2N3906. The 2N2907 dissipates up to 1W and should be adequately heat-sunk. The 0.5Ω resistor senses the battery charging current and feeds it to the positive op-amp input via pin 3. The internal reference is divided to 44mV by the 100k and 3.83k resistors and applied to the negative or inverting input. The difference drives the 2N2907 to produce 300mA of charging current. At the same time, the divided battery voltage present at the junction of the 252k and 90.0k resistors is applied to the positive comparator input at pin 5. This is compared to the reference (internally connected to pin 6) and when 4.1V is reached, shuts down the linear regulator by controlling the op-amp via pin 3. A shut-down input is also provided to turn off the LTC1541 when the charging function is not required. This can be used to reduce current drawn by the chip when the battery is being used to power the external circuit.

In *TT* (January 1999, p63) it was briefly noted that when powering equipment from two separate batteries connected in series, one battery virtually always becomes exhausted (ie high internal resistance) before the other. This occurs also with any single battery containing two or more cells. A battery thus not only takes up at least twice the space of a single cell but also has the disadvantage of becoming unusable before all the individual cells have become fully exhausted.

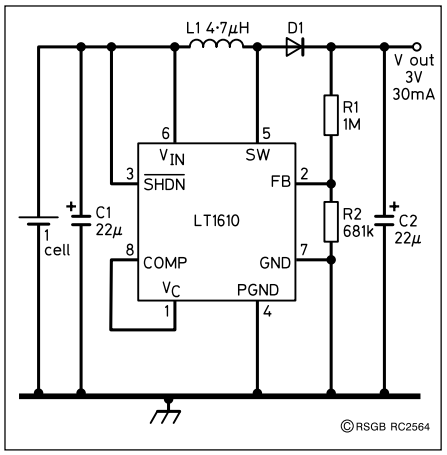

Fig 7: 1-volt to 3-volt step-up DC/DC converter, based on the LT1610 chip.

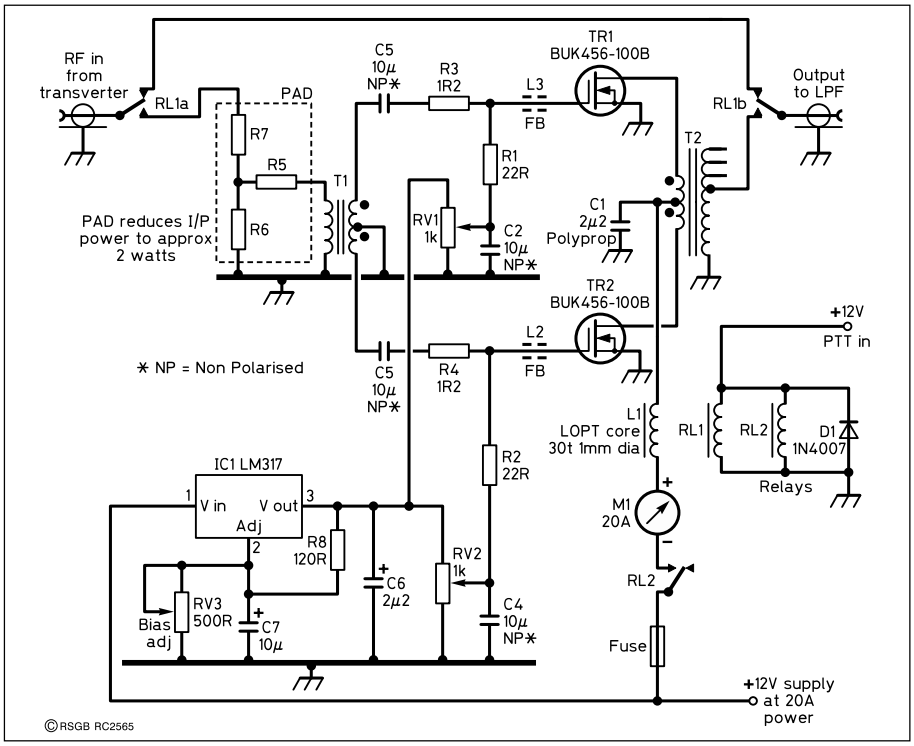

Fig 8: ZL4OL's 100W LF power amplifier using two MOSFETs and run from a 12V, 20A supply. T1: E-core ex-TV set 35 x 30 x 12.5mm. Primary; 20t 0.5mm dia. Secondary; 4t 1.9 sq mm twin speaker cable. Secondary; 10t + 10t, 0.5mm dia. T2: LOPT core. Primary; 41.9 sq mm twin speaker cable. Secondary; 55t 1mm dia.

An advertisement in *Electronic Times* (13 December, 1999) draws attention to the Linear Technology LT1610 chip. This is a micropower fixed frequency DC/DC converter that operates from an input voltage as low as 1V: **Fig 7**. Intended for small, low power applications, it switches at 1.7MHz, allowing the use of tiny capacitors and inductors. It can generate 3V at 30mA from a single cell (1V) supply. An internal compensation network can be connected to pin 1, eliminating two components. No-load quiescent current is 30µA and the internal NPN power switch handles a 300mA current with a voltage drop of 300mV. It is available in 8-lead MSOP and SO packages [www.linear-tech.com]. A possible problem might be some small degree of RFI arising from the 1.7MHz switching.

MOSFET LF POWER AMPLIFIER

IT IS NOTICEABLE how the release to amateurs of LF spectrum in various parts of the world has led to a marked revival of interest in home-brewing. Valve and solid-state transmitters and antenna systems have again become home-built, reviving something of the old amateur radio approach to experimentation and technical interest.

The 'LF Scene' column in the now bi-monthly *Break-In*, conducted by Andrew Corney, ZL2BB, and Bob Vernall, ZL2CA, includes both operating events and happenings, plus a strong technical content. The May/June 1999 issue contains not only reports on the use of PSK31 on LF, information on toaster elements as dummy loads, but also details of an un-tuned MOSFET LF power amplifier (**Fig 8**) that provides about 100W output at LF (eg 181kHz) from a 12V supply (and presumably considerably more with a 24V or 36V supply).

According to ZL2CA: "A pair of push-pull 456-100B power MOSFETs have their individual bias voltages pre-set (RV1, RV2), with each bias-line adjusted from front-panel controls. The amplifier can thus be varied from linear into a Class B or Class C mode. It is thus a versatile unit, for use on CW or SSB, with the bias set to suit the mode. The bias can be set initially with a 200mA-range meter connected temporarily in the place of the fuse to about 50mA per MOSFET. Current in the idle condition increases as the devices warm up. They are rated for 100V, 32A, 150W dissipation as packaged TO220 devices. They are readily available in New Zealand for around $5 a piece. No source resistors are used, since MOSFETs are much less susceptible to thermal runaway than bipolar transistors. ZL4OL uses a 0.4°/W heatsink, but advises that good thermal contact is needed between the TO220 cases and the heatsink. "It may be overkill, but 'big' heatsinks pay off in long term reliability." Salvaged ferrite cores from discarded TV sets are used for input and output transformers. The input transformer uses a core with 20:10+10 windings. The attenuator pad on the input is intended to absorb some excess drive power, but this will depend on individual use depending on the level of drive available. About 2W can drive the PA to

full output.

"The output transformer uses a line output core wound with 4+4:55 turns with taps on the secondary. Since a 12V PA of the 100W class is basically a low-impedance circuit, it needs a step-up transformer to deliver power to a 50Ω feeder and antenna system. The low-pass filter used by ZL4OL (**Fig 9**) has air-wound inductors, wound on 67mm PVC pipe. Polypropylene capacitors are used in the output filter as well as for bypassing the centre-tap of the output transformer; highly recommended for achieving low loss at LF. Other capacitors in the signal path of the amplifier are non-polarized electrolytics."

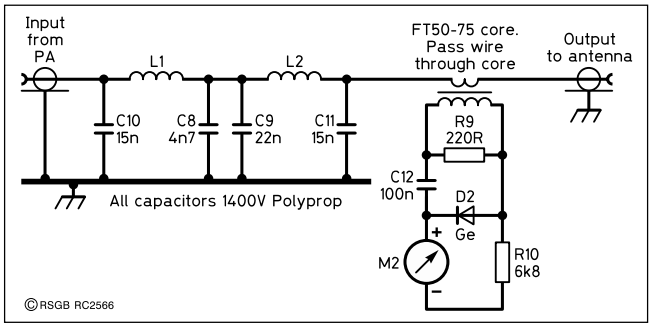

Fig 9: Low pass filter for the LF MOSFET amplifier. Although designed for the New Zealand 181kHz allocation, it should prove satisfactory for 136kHz, although it could be optimised for this band by increasing the number of turns on L1 and L2 etc. As described in *Break-In*, L1 and L2 49µH wound on 67mm dia PVC pipe, 39 turns 1mm dia enamelled wire 100mm long.

Bob Vernall, ZL2CA, in a later issue (*Break-In,* September/October 1999) provides some hints on curing instability problems that he had experienced in bipolar LF amplifiers. He traced his problem primarily to instability in the driver stage, arising from using the same supply rail as the final stage. In his case this was 100V, used with high-voltage push-pull transistors, which deliver about 100W output. It seemed convenient to use similar devices in the driver stage, although in this case requiring only a few watts output to drive the PA to full output, achieved by increasing the value of the emitter resistors. Using ferrite transformers for interstage coupling gives a broadband response across the LF band, resulting in a 'no-tune' transmitter (as for the MOSFET amplifier).

ZL2CA continues: "In hindsight, my problem came about by thinking it was a good idea to try for impedance matching at the driver output, running a fairly high impedance load reflected into the primary of the inter-stage coupling transformer. With a 100V rail for just a few watts output, a relatively high-impedance load is required, and the stage gain can readily be 30dB or so. While the drive gain and efficiency with this arrangement is very good, the high gain invites local feedback from Miller capacitance. In short, the stability margin of the driver stage is reduced. The bipolar final is also not without some reaction from output load variations reflecting on the input loading, which in turn reacts on the driver stage.

"This means that some load conditions of the PA may result in instability in the driver stage, even though the amplifier appears stable when operated into a dummy load, and can result in burnt-out PA devices. I use this driver transmitter for testing even higher powered finals. I must confess to having murdered quite a few power transistors before the penny dropped that it was not the fault of the final stage, but the earlier driver stage. It was folly to attempt to impedance-match a driver running off the high voltage rail, with consequent needlessly high stage gain. Stable results are now obtained by using an inter-stage step-down transformer with no higher than about 3:1 turns ratio. Even then the stage gain will be about 20dB (say, 100mW in for 10W out). However, the moderate amount of power wasted in driver dissipation is part of the compromise for the convenience of using one higher voltage power supply rail. The 100mW or so to drive the driver stage can be easily generated, including the use of ICs and a 12V rail for all low-level stages.

"After curing the driver instability I have had no further problems with spurious oscillations and no blow-ups of transistors. Bipolar power transistors with an F_t of a few MHz can make good power amplifiers at LF. Transistors designed for switch-mode power supplies using rectified mains are generally good candidates for LF finals with a 100V rail. In practice, as my experience shows, the driver stage can be more of a challenge than the PA."

MATTERS ARISING

IN 'MATTERS ARISING' (December 1999 *TT*, p83), GW4DYY questioned the availability in the UK of the 'petrol stabiliser' recommended by NT0Z after using petrol-electric generators (*TT*, October, p61) to stop the fuel from oxidising and jamming up the carburettor. John Taylor, G0AKN, writes: "My Briggs and Stratton generator handbook recommends two brands of additives – 'STABIL' and 'Fuel Fresh'. Both appear to be American products. However, Machine Mart in the UK import 'Briggs and Stratton Gasoline Additive' from the USA, which they say does the same job. My own preference is to use 'Redex', which is readily obtainable." G3HEE, who spent some 25 years in the motor trade, reports that a fuel stabiliser designed to cope with gumming-up problems in storing fuel for up to 24 months and suitable for both two- and four-stroke engines is manufactured by Tecumseh UK Ltd (Tel: 01784-460684, Fax: 01784 453563), although personally he drains his 600W 4-stroke generator after experiencing this problem when first given the PPG with its carburettor completely gummed up. After cleaning and reassembling the engine and using fresh fuel it ran perfectly at the first pull of the starter cord.

HERE & THERE

BOB WELLBELOVED, G3LMH, is concerned that there is now a widespread view that the threat from Power Line Telecommunications (PLT) has vanished, with the decision of United Utilities to suspend their trials of this technology. Elsewhere, he feels, this technology is very much alive and would pose far more of a threat to amateur radio than Asymmetric Digital Subscriber Line (ADSL): see *TT*, October 1999, pp80-81. He writes: "It is clear that with the amount of investment in R&D that is being put into PLT, there is little doubt in my mind that we shall be hearing a lot more about its implementation in the not-too-distant future."

G3LMH continues: "As you point out, ADSL is already with us and is due to be rolled out nationwide within the next few years. At the moment, BT is proposing tariff levels that would rule it out for 99% of domestic users, but this situation is unlikely to inhibit the widespread take-up of ADSL for very long. The extent to which ADSL/VDSL may affect amateur radio remains to be seen, but I trust the RSGB EMC Committee and amateur radio societies world-wide will be monitoring developments carefully. I have a friend, VE3PZ, living near Ottawa, Canada, who is already using ADSL. So far he has not observed any detectable increase in noise level on any of the HF bands, which is encouraging [unlike VDSL, ADSL utilises spectrum below 1MHz, so that *egress* of RF noise in the HF bands should not prove a significant problem, though this does not apply to VDSL - G3VA] One problem is that being a permanent connection, it is not possible to make 'before and after' tests under the same reception conditions."

ALAN LANGFORD, G4ARY, makes some further points regarding the October 1999 item on battery charging from solar cells (page 62). He notes an error at the top of the second column where the calculation 8 x 17 = 136 should have given the result in watt-hours, not watts. He also queries the following paragraph as implying that a voltage drop using diodes is more power-efficient than using resistors, which he feels would require a rewriting of Ohms Law. But surely he has overlooked the fact that a diode is not a linear resistor; the voltage drop in the forward direction will be the same independently of the current passing. ♦

HF

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MUCH NEWS this month, so I'll keep the introductions short. Suffice to say that HF conditions remain good, though not outstanding, but March is a good time for DX on all bands, especially around the solstice. And there are plenty of interesting DXpeditions scheduled, as you will see below. Good hunting!

DX NEWS

GU4GG, WHO OPERATED as GJ4GG from 1990-1999, intends to close the logs at the end of July. Anyone requiring a card should send direct to Derek Wintle, 4 Hautville, Alderney, GY9 3UA, Channel Islands, UK.

Polish amateurs may use the special 3Z prefix to celebrate 70 years of PZK and the Millennium year. Each PZK member can use the 3Z prefix plus their call area and own suffix. Ed, SP1MHV, will use his special contest callsign, 3Z1V, for the whole year. While on the subject of Millennium prefixes, Swiss amateurs have permission to use HB2 in lieu of HB9 throughout the year.

Phil, G3SWH; Jim, G3RTE; David, G3UNA; Rob, 5Z4RL; Ian, 5Z4IC; and Graham, 5Z4GS, will operate as 5Z4WI from Wasini Island (IOTA AF-067) from 8-15 March. They will have one station on CW and one on SSB, operational 24 hours a day on all bands except 30m which is currently not permitted in Kenya.

The Association Tunisienne des Radioamateurs (ASTRA) has appointed Mustapha, DL1BDF, as the official QSL manager for both 3V8BB and the new scout station, 3V8ST. Mustapha, who recently helped install the new scout station, will soon be going to Tunisia to help set up a QSL bureau for ASTRA.

Andy, G4ZVJ, will be in Ethiopia (ET) from 24 February until 7 March and expects to get on the air as guest of one of the local amateurs. From 7-20 March he will be active again as 9G5VJ from Ghana, a period which includes the RSGB Commonwealth Contest. All operations will be CW only. During his November/December visit to Kampuchea he made over 18,000 QSOs as XU7AAV, including 3,825 in the CQWW CW contest. Andy has a Web site at: http://www.g4zvj.demon.co.uk Bob, PA3DEW, and Vincent, PA3FQX, will also be active from Ghana from 2 March, reactivating their 9G1AA call. QSL to PA3ERA.

The Radio Amateur Society of Thailand (RAST) has announced a first operation from the Malay Peninsula South East Group of islands (see IOTA Directory), to take place during March.

Takeshi, JI3DST, will be active as JI3DST/6 and 7N3UXO/6 from Koshiki Archipelago (AS-037) from 17-20 March. Activity will be on 40, 17, 15, 12 and 10m. QSL to his home call via the JARL Bureau (preferred) or direct.

Art, NN7A, plans to operate from Turneffe Island (NA-123), Belize as V31JZ from 26-31 March, on all bands using CW with some SSB around 21,260 and 14,260kHz. QSL to his home call.

Daniel, F5LGQ, and Frank, F5JOT, will be in Martinique (FM) from 18 March to 1 April. They will be active on SSB and CW from 10 to 80m. From 23-25 March they will take a side trip to Dominica (J7) for the CQ WPX SSB Contest.

Harry, W8KKF, will sign J37K from Grenada from 4-7 March. Outside the ARRL contest he will be looking for non-North American QSOs. QSL to his home call.

Members of the South West Ohio DX Association plan to operate the CQ WPX SSB Contest from St. Lucia, as follows:

J68AS - 10m Single Band, Low-Power, via N9AG

J68DD - Single Band, Low Power, via N6JRL

J68ID - Single Band, Low Power, via W8QID

J6/KD4YHY - Single Band, Low Power, via KD4YHY

N6DE, W7MH, and W6XK will sign WP2Z (Windwood Villa on St. Croix in the US Virgin Islands) in the multi-single category during the CQ WPX SSB contest. Team members will operate before and after the contest with their home call signs /KP2. QSL WP2Z via KU9C. QSL N6DE/KP2, W7MH/KP2, and W6XK/KP2 via home callsigns.

Bert, PA3GIO, will be V31GI on NA-180 on Southwest Caye, Glovers Reef, Belize, from 19-24 March, then from 26-29 March he will relocate to Little Water Caye, Belize (also NA-180). He will be active on 80-10m, SSB, using 100 watts and a doublet. Pictures from last year's trip appear at: http://www.xs4all.nl/~pa3gio QSL to his home call, preferably via the bureau.

W1HL plans to operate from St Marten from 29 February to 5 March. He will use either PJ9/W1HL or PJ9/W1FC.

Bob, G3PJT, will be VP5/G3PJT from Turks and Caicos from 8-15 March, and VP5C in the Commonwealth Contest.

Richard, G3RWL, was due to reactivate his 8P6DR (Barbados) call from 14-28 February, CW only on the higher bands, with 100 watts and wire antennas. QSL to his home call.

Gene, K7DBV, will activate Cayos Cochinos (NA-160) on 26/27 February. This will be primarily a 15m CW operation around 21,040kHz, listening up 2kHz. He has requested HR3GAW/6 but if that is not granted he will use HR6/K7DBV. QSL to his home call.

The 'Clipperton 2000' expedition is scheduled for 1-8 March, with four HF stations on all bands and modes. For additional information, see http://www.qsl.net/clipperton2000

Following January's DXpedition from Juan Fernandez, two more have been announced. It looks as though several groups, quite independently, were planning activity from the island. The first is a German team, which is planning to be active from 17-29 February. This is the same group that activated T20FW, 3D2DK, ZL7DK, P29VXX and S21XX in recent years. This year's operators are DL2OAP, DL3DXX, DL7UFN, DK1BT and DK7YY. They expect to use CE0ZX or CE0ZY with two complete stations, all bands, mostly CW and RTTY, but also some SSB and PSK31. Thanks go to CE0ZIS, CE3CWF and XQ3IDY for making the trip possible. It is also reported that OH2MXS, OH2NSM and OH3JF plan an operation, signing homecall/CE0Z, from 17 March to 8 April. They will have three complete HF stations, operating on all bands, using CW, SSB and RTTY. The QSL Manager will be OH2BOZ.

PA3DES and PA5BW were due to operate from Ilha do Mel (SA-047) between 14 February and 13 March, signing PY5CDA/A. They will operate all bands, using 100 watts. QSLs, for this operation only, go to PA3DES.

A multi-national group will activate the Chesterfield Islands, New Caledonia (OC-176) as TX0DX from 15 March until 1 April. The operators will be FK8GM, FK8HC, JA1BK, N4GN, N7NG, OH1RY, OH2BC, OH2BH, OH2RF (team doctor) and one other. I was able to discuss this one with Martti, OH2BH, at the Contest Club Finland meeting in Helsinki in January. The team has

The LF antenna farm for XZ0A with the 80m 4-square and the 180ft 160m vertical far right

1999 WARC BANDS TABLE (final)

	10MHz	18MHz	24MHz	Total
G0NXX	164	168	150	482 (all CW)
G3WGV	148	163	152	463 (all CW)
G3YVH	146	165	152	463
G3SXW	108	101	112	321 (all CW)
G4UCJ	103	111	98	312 (all CW)
G4MUL	75	116	112	303 (all CW)
G4OBK	69	67	150	286 (all CW)
G0BMS	77	93	84	254 (all CW)
G3ING	60	72	50	182 (all CW)
G3WP	36	64	71	171 (all CW)
G4KHM	54	68	14	136
MM0BQI	30	52	35	117
GM4OBK	37	33	45	115 (all CW)
G0VLC	33	35	24	92 (all CW)
GM0NTL	0	56	33	89 (all SSB)
M0BIB	14	12	54	80
2U0ARE	74	0	0	74 (all CW)
5Z4GS	0	44	25	69 (all SSB)
M0BUY	9	10	6	25

applied for DXCC status for the Chesterfield Islands on the basis of its separation from other parts of the New Caledonia group. This is only possible if New Caledonia is itself recognised as a category 1 DXCC entity (I may have the terminology slightly wrong here) which is dependent on the national radio society of New Caledonia being accepted as an IARU member society. Given that the society has been in existence for several decades, and that its application to join IARU has REF (the French national society) backing, Martti believes this should be a formality. So, if you chase DXCC, you need to work TX0DX to be on the safe side. The team will operate from two sites, far enough apart to allow simultaneous CW and SSB operation on the same band. Four HF stations, each equipped with Yaesu FT-1000MP transceivers, will allow activity on all bands and modes. The TX0DX web site can be found at http://www.n4gn.com/tx0dx/ Because the Coral Sea typhoon season is still very active during March, weather is likely to play a major role and may affect the exact timing and the operating pattern.

Alan, VK0MM, on Macquarie Island, has announced there will be "no Europe schedules until April". Apparently he has become disillusioned with European operating standards. Unfortunately, this impacts on all European operators, not just the poor ones. Check http://www.geocities.com/vk0ld/1.html for the latest information.

Peter, HB9BMY, will be active (CW only) as ZK1XXC from Aitutaki (OC-083), South Cook Islands, from 27 February until 11 March. He might also operate from Penrhyn (OC-082), North Cook, depending on the availability of local flights. Look for him around 14,040, 21,040 and 28,040kHz. QSL to his home call.

Jack, VK2GJH, and Nev, VK2QF, should be active from Nauru (C21) sometime during March/April. Jack will sign C21JH and Nev will use C21/VK2QF. QSL both to their home calls.

Bill Horner, VK4FW, is reported to have a large team of operators to activate Norfolk Island (VK9N) from 23-30 March, this period including the WPX SSB contest.

The ITU has stated that meetings are currently underway with

HFF-LayerPropagationPredictionsForMarch2000

	7.0MHz	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	88862.122678	...876756888	....887788..	....888888 1.	....88888...	.....8888...
*** Asia						
Yakutsk	4..1.....233	5..31...2445	....212...51	....32......	.........1..	.......1....
Tokyo	..........1.	1.1.....1242	....11......	....11......	.....1......	....
Singapore	....	11.....1..12	1....1...11.	.....1..111.	...1....22..	.......2...
Hyderabad	3.......133	4.....1.324	1.11..1.2441	....111144..	....434444..	....44443...
Tel Aviv	6661.....466	...642.24666	....5545566.	....655556..	....655556..	.....556....
*** Oceania						
Perth	....	1.........11	1.....112..	....1..12...	....1.1.2...	...1.12.....
Sydney	....	.........12.	.....11.12..	.........2..1	.....12.....	...1..13....
Wellington	....	.....124..	....433..5..	....44.455..	.....545..1.	.....5......
Honolulu	....	....1.....1.	.....11.11..	.........1..	....1.1.1...	....
W. Samoa	....	....1...11..	....322232.1	.....32332..	.....3.....	....1..1..1.
*** Africa						
Mauritius	11.......112	22.......122	2322	...211.1233.	....111223..	....2112.3..
Johannesburg	11.........1	1.2.....311	...2.....331	.....1.133.	....11.1122.	.....11..44.
Ibadan	4443.....244	5466.1.1.545	44.633334544	44445664	.1..6555566.	....6555566.
Nairobi	332......133	44.1.....534	...422114454	..143322445.	....3433....	....4.....
Canary Isles	8876.....277	888865446888	8...76667888	7677888	....87777.8.	....8..88881
*** S. America						
Buenos Aires	111.........	33331.....13	....2.1...23	....3....13.	.....11124.	.....12234.
Rio de Janeiro	3431.....12	44.41.....44	...43.1.1244	4....1122344	1....3233444	.....3334.5.
Lima	11..........	22..1.....12	....2.....12	...12.....1.	.........112.	.....1112..
Caracas	4443.....2	555.4....114	13111344	4223355	.....134445.	.....14444.1
*** N. America						
Guatemala	22431.......	444.4.1....3	....411.113.	.....22233.	.....333.1	.....34.4.
New Orleans	33321.....1	44..3..1.2.3	212344	....1.32334.	.....334..	.....344..
Washington	4544.1.....1	455..2.21444	5.....234454	.....34444.	.....4556.	.....555..
Quebec	4454.1.....4	55...2.13445	1.....444555	.....144455.	.....455..	.....14551.
Anchorage	.131..1.1...	2.....2322	.........31.	....	.....11.....	.....1...
Vancouver	.211.1.....	23..1....122	.....121.	.....11.221.	.....1..	....
San Francisco	1.211......	22..211...12	.....122.	.....1232.	.....22..	.....32..

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 January 2000 issued by the Sunspot Data Centre, Brussels, was 90.2. The maximum daily sunspot number was 166 on 15 January and the minimum was 48 on 1/2 January. The predicted smoothed sunspot numbers for March, April and May are respectively: (SIDC classical method – Waldmeier's standard) 101, 100, 98 (combined method) 116, 120, 124.

28MHz COUNTRIES TABLE 1999 (final)

G4DUW	251	
G3TMB	247	
G3JFH	235	(all SSB)
M0CCQ	223	
M0BIB	222	
G3ZKN	220	
M0BZQ	218	
G0VHI	211	
G0TSM	200	
G3SNN	190	
GW0MOW	190	
G0CAS	182	
G0NXX	172	(all CW)
G3WGV	171	(all CW)
G3XMM	170	(all CW)
G3YVH	165	
G3IFB	159	
GM3COQ	158	(all CW)
G3MDH	151	(all SSB)
G3ZBE	148	
M0CAL	148	(all SSB)
G3NKS	144	(all CW)
G3SXW	144	(all CW)
G0KDS	140	(all SSB)
G3LME	136	(all CW)
G3LVP	133	
G4BGW	133	
G4UCJ	131	(all CW)
G4PDQ	130	(all CW)
G4OBK	129	(all CW)
G4FUJ	128	
G4IDL	125	(all CW)
G3TEV	118	(all CW)
GM4CHX	117	
MM0BQI	83	
GI4XSF	77	
GM0NTL	74	(all SSB)
G4ENA	71	
G0KDS/M	60	(all SSB)
G3WP	59	(all CW)
G4OVB	56	(all SSB)
G3SZS	51	
G0BMS	49	(all CW)
2U0ARE	48	(all CW)
5Z4GS	46	(all SSB)
GX0WAW	46	
G3ING	42	(all CW)
GM4OBK	37	
G4OTY	35	(all CW)
MI0BVK	33	
M0ASJ	32	
G0NCS	25	(all RTTY)
GU0SUP	22	(all RTTY)
GI0NQC	9	

the telecommunications administrations from East Timor and the United Nations, regarding the transfer/re-allocation of a call sign series. Once completion of these procedures takes place, the pertinent information will be given to the ITU Member Nations. This would then open the way for East Timor's re-accession to the DXCC list (it used to be Portuguese Timor, with the prefixes CR8 and CR10, but was removed from the list in September 1976). At the time of writing, Indonesia had yet to renounce its sovereignty over the island, so it's not clear how long the overall process will take.

A further report says that officials from China are currently seeking to secure a call sign series for their newest Special Administrative Region, Macao. This former Portuguese Territory was handed over to the Chinese on 20 December. Macao is not a member of the UN and does not have its own IARU society, so in order for Macao to remain on the DXCC list it will need to have its own unique listing on the ITU S42 appendix.

I have quite a lot of QSL information relating to the various expeditions above, which will appear next month in QTH Corner.

TABLE TALK

THE FINAL 1999 tables appear this month, the CW-only section of the 9-band table being held over until next month. Congratulations to John, G4DUW, who leads the 28MHz table, and to Jim, G0NXX, who leads the WARC band table. Here's just a selection of notes from the various entrants, to give you a flavour of what challenges they have faced. Jim, MM0BQI, uses less than 100 watts and a dipole, but puts in a fair score and worked a total of 163 DXCC countries in 1999, including a very respectable 39 on 160m. He comments on the thrill when his modest station lands a rare one; maybe the operator has something to do with it as well Jim! Darren, G0TSM, writes that his 1999 28MHz total included several new ones on the band: 3C0, T32, FO0/Marquesas, ZD9, XF4, HK0M, TN (an all-band new one) and MJ. John, G4DUW, ended his year on 28MHz with just 11 more countries than in 1998, his final ones being HV0A, 8Q7 and YI. He celebrated by working 32 countries on the band on 1 January this year, to get himself off to a flying start, and had 102 countries in the log, all bands, by 14 January, having been chasing the DXCC Millennium award. Stuart, G0KDS, amassed 140 countries on 10m using just 80 watts, but linking this modest power to a 5-element monoband Yagi. From his mobile station, 80 watts to a mobile whip, he managed to knock off some rare ones, including Bangladesh and Gabon. My thanks to Tom, G3XMM, for sending along scores from the Cheltenham club. He singles out a few members for special mention: G3JFH with 235 on SSB exclusively, G3ZKN with 185 on SSB plus another 157 on CW, and GM3COQ, who operates in his loft literally sitting among his indoor antenna farm! And Tom himself achieved his excellent CW result with a maximum of 100 watts to a wire doublet, without any packet or other assistance. I particularly want to thank Colin, 2U0ARE, our only Novice entrant, for his participation. Colin was hoping his efforts might encourage other Novice interest, though he laments the fact that he himself worked only five different novices in 1999, four on 10MHz and one on 2m SSB. Colin was pleased to achieve WAC on 10MHz in the course of the year. His 28MHz score was adversely affected by abandoning the band in the summer to chase 6m DX.

Roger, G3SXW, has made a suggestion for the 28MHz table which I believe has some merit. That is, to record country scores for CW, SSB and mixed. This should take up little or no more space than the existing table, but would show how the country totals have been achieved. I plan to give this a try. If you only operate single-mode it will make no difference, but for those of you who operate both CW and SSB, send me three numbers each month. We'll see how it goes.

CONTESTS

I HAVE DETAILS of the UBA Spring Contest, which takes place on 12 March (0700-1100) on 80m CW and on 9 April on 80m SSB. The contest exchange is RS(T) + serial number (UBA stations also send a three letter abbreviation for their UBA Section). If you need a copy of the rules, please send me your request, along with an SAE.

Due to shortage of space, I am still holding over a number of UK results from major international contests including last year's ARRL events, but will run them at the earliest opportunity.

AWARDS

DIPLOMA 20th ANNIVERSARY URA

Joan Sauri, C31US, writes that a commemorative diploma will be given to amateurs working special prefixes during March to celebrate the 20th anniversary of the Andorran Amateur Radio Union. Further details are available on the URA web site www.sta.ad/ura or by contacting the association at P.O Box 1150, Andorra.

THANKS

MY THANKS TO all who have provided information. 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 **May** issue by **18 March.** NEXT DEADLINE 8 April 2000. ♦

9-BAND TABLE No 33

MIXED MODE

Call	1.8	3.5	7	10	14	18	21	24	28	Total
G3KMA	243	293	325	303	331	319	330	302	323	2769
G4BWP	229	297	329	308	331	321	329	290	313	2747
G3XTT	227	271	312	271	330	298	321	273	297	2600
G3GIQ	143	243	301	255	331	308	328	275	318	2502
G3MCS	67	233	294	220	331	315	326	272	311	2369
GW3JXN	169	237	278	255	319	295	295	254	265	2367
G4OBK	140	196	252	242	318	278	291	263	267	2247
G3TXF	126	223	280	243	312	250	312	207	284	2237
G3TBK	118	230	262	226	316	262	296	230	262	2202
G3YVH	123	144	243	266	310	295	284	251	250	2166
G3WGV	106	183	250	267	295	272	283	249	254	2159
G3VJP	107	184	254	185	326	261	309	216	269	2111
GM3PPE	148	210	246	260	292	243	259	202	224	2084
G3SED	218	232	263	238	253	228	208	188	212	2040
G3IGW	128	197	316	233	282	237	242	107	216	1958
G3KMQ	57	194	257	179	313	212	267	176	234	1889
G3NOF	5	125	131	0	329	285	328	257	303	1763
G4XRX	3	65	166	141	288	221	291	184	242	1601
G5LP	63	215	183	64	310	126	300	106	284	1562
G0JHC	1	28	135	143	126	228	238	233	277	1409
G4NXG/M	23	56	129	0	277	170	264	161	237	1317
G4UCJ	15	73	172	111	202	134	176	125	152	1160
GM4OBK	39	94	128	53	159	89	144	87	178	971
M0AWX	37	90	85	0	214	129	170	99	109	933
G4FVK	40	74	101	54	178	97	168	54	146	912
G0LRX	1	69	105	0	222	10	240	2	202	851
GW0VSW	28	35	87	111	153	115	113	77	72	791
M0BIB	1	24	56	14	67	46	89	77	209	583
M0DBW	31	45	80	34	109	38	94	28	67	526
M0BDW	67	28	87	38	109	34	80	45	31	519
MM0BQI	23	40	65	26	88	48	88	29	48	455
AVERAGE	**87**	**149**	**202**	**154**	**254**	**195**	**241**	**167**	**221**	**1669**

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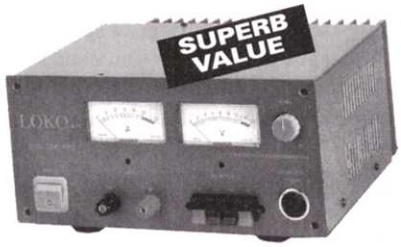

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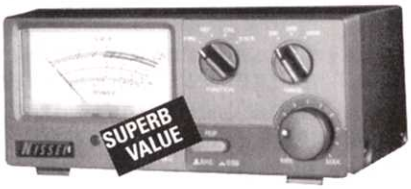

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THE PROPOSAL to allow connections between amateur radio and non-amateur networks has been outlined. The dates for the annual European EME contest have been agreed. There is news of several future 50MHz contests. In the Reports section an asterisk (*) after a call sign indicates a CW QSO and all times are given in UTC.

LICENSING NEWS

SOME IMPORTANT news regarding the proposal to link amateur radio to the Internet was broadcast on GB2RS on 16 January. Reference was made to *Gazette* notices published on 10 January dealing with Notices of Variation (NoV) covering all classes of amateur radio licences in the UK. Full details of these are on the RSGB web site.

One states that as from 31 January: "The Licensee shall not connect the Station to any non-amateur network, including the Public Switched Telecommunications Network except with the written permission of the Secretary of State". This means that you will have to apply for an NoV if you want to connect your station to the Internet, for example. Proposals should be addressed to The Radiocommunications Agency, Amateur Radio Section, 10G/9D, Wyndham House, 189 Marsh Wall, London E14 9SX. The telephone number is 020 7211 0158 and the e-mail address is amcb@ra.gtnet.gov.uk

REPEATER NOTES

THE FOREGOING item has a direct bearing on the proposal to use repeaters to link amateur radio to the Internet. The RA has stated: "The RSGB's Repeater Management Committee will be responsible for the initial processing of applications. Applications must be made through repeater keepers who will be responsible for co-ordinating connections to their repeaters so that maximum use can be made of this facility and to prevent unnecessary overlap.

"It is envisaged that for any repeater, one or two gateways will be authorised with a call sign made up of the repeater call sign/1, 2, 3, etc. One area still under discussion is whether separate frequencies should be identified for the link or whether the established repeater input and output frequencies could be utilised. We welcome any input to this discussion". The full text can be seen on the RA's web site - see the panel.

The Essex Repeater Group currently operates VHF repeater GB3DA on 145.725MHz (RV58) and UHF repeater GB3ER on 433.075MHz (RU246). In its *Millennium Newsletter* there is a useful item on deviation levels and how to adjust them on 14 popular transceivers to comply with the 12.5kHz system adopted for GB3DA last year. Murray Niman, G6JYB, edits the *Newsletter* and his address is in the *RSGB Yearbook* (QTHR). His e-mail address is miniman@iee.org and the ERG has a web site - see the panel. Membership inquiries should go to Secretary Richard Merrell, G4GUJ (QTHR). His e-mail address is rpmerrell@iee.org

In the Gloucestershire Repeater Group's December 1999 *Newsletter*, Chairman Nick Negus, G6AWT, reviews the 16-year history of the group. The GRG runs 11 assorted repeaters, nodes, mailboxes and beacons. The VHF voice repeater GB3CG on 145.725MHz (RV58) was a little off frequency and adjustments were scheduled to be made in the New Year. UHF voice repeater GB3GH on 433.125MHz (RU250) also had some transmitter drift problems, which were being investigated. For membership details contact Secretary Graham Nye, G8URP (QTHR), whose e-mail address is grg@tyndale.demon.co.uk

James Bobbett, G0MSL, reports that the Mendip Repeater Group has established a web site - see the panel. It is part of the Repeater WebRing, which links together sites of similar interests. I've had a look at it and can confirm it is very informative. There is a detailed account of the tortuous path to get the change of site for GB3WR on 145.600MHz (RV48) approved. The application has had to go through the RIS, the Prime User (PU) and the National Frequency Assignment Panel (NFAP). For details of the MRG, contact G0MSL (QTHR) whose e-mail address is jimbob@g0msl.freeserve.co.uk

ATV NEWS

THIS COLUMN is now the focal point for all news and views regarding amateur television (ATV), so please send any information, especially photographs or jpeg files, to me for inclusion.

The British Amateur Television Club, which is affiliated to the RSGB, has its own journal, *CQ-TV* - see the photograph.

PUBLICATION

THE NEW PUBLISHER of the quarterly journal *VHF Communications* is Andy Barter, G8ATD. The current edition includes a couple of articles by Radec Vaclavic, OK2XDX, on Simple Meteosat Reception, further details of which can be found on his web site - see the panel.

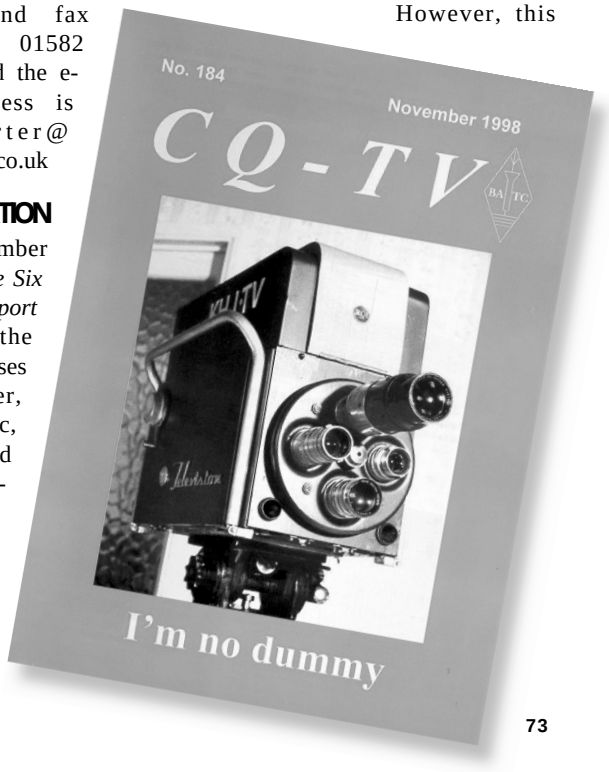
Matjaz Vidmar, S53MV, contributes two more articles on accessories for spectrum analysers and Duncan Head, G7NPE, has an interesting piece on amateur 23cm TV reception with a low-cost conversion of a Pace PRD800 satellite receiver. The journal is still published by KM Publications, but from a new address: 63 Ringwood Road, Luton, LU2 7BG, UK. The telephone and fax number is 01582 581051 and the e-mail address is andy.barter@vhfcomm.co.uk

PROPAGATION

THE November issue of *The Six and Ten Report* includes the usual analyses of E-layer, tropospheric, auroral and meteor scatter propagation as well as F2 events, already noted in *VHF/UHF* last month. The table of solar and geomagnetic data shows that the peak solar flux at 2.8GHz was 249 units on the 10th, the minimum 143 at the beginning of the month, the average being 191.7. The maximum Ap index was 33 on the 8th. The *Report* is compiled monthly by Dr Steve Reed, G0AEV, and Prof Martin Harrison, G3USF, and is an activity of the RSGB Propagation Studies Committee. Subscription inquiries are handled by G0AEV (QTHR), who can be contacted at the email address g0aev@explore.force9. co.uk

The first item in the December issue of *SunMag* is an article on the solar wind that blows constantly from the Sun at a velocity of around 200km/s upwards. In the period 10-12 May 1999 it virtually disappeared, '…the most drastic and long-lasting decrease ever observed'. The NASA ACE and Wind spacecrafts each recorded a 98% drop in its density.

One effect of this was to enable energetic electrons from the Sun to flow to Earth in narrow beams known as the *strahl*. In turn, this produced an intense 'polar rain' over the North Pole, observed for the first time when a steady glow was detected in X-ray images. At the same time the Earth's magnetosphere swelled to five to six times its normal size, with several satellites observing the most distant bow shock ever recorded. However, this



USEFUL WORLDWIDE WEB SITES

Radiocommunications Agency	http://www.open.gov.uk/radiocom/
Mendip Repeater Group	http://www.mendiprg.freeserve.co.uk
OK2XDX	http://www.qsl.net/ok2xdx
K2UYH 432 & above EME News	http://www.nitehawk.com/rasmit/em70cm.html
G4KGA (Propagation puzzle)	http://www.dxradio.demon.co.uk/unid.html
Six Club (USA)	http://www.6mt.com
G4HBA (6m info)	http://www.6mdx.eurobell.co.uk/index.html
MM1CXE (IO86OE)	http://www.mm1cxe.co.uk
SM7VHS (Station lists)	http://www.qsl.net/sm7vhs/indexen.htm
G4CQM (Antenna info)	http://welcome.to/powabeam

event does not seem to have caused any unusual propagation phenomena as far as VHF was concerned. Looking back at the GB2RS propagation information for this period, these data were not mentioned.

The second article discusses sunspot cycles, in particular the current one. Instead of the usual steady increase in sunspots as maximum is approached, we are observing some ups and downs. However, the maximum still seems likely to occur in the middle of this year with a smoothed sunspot number of around 140. 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 address is neil@g0cas.demon.co.uk and you can telephone him on 01302 531925 (Doncaster).

Now a VHF mystery. At 1115 on 29 November 1999 Mark Hattam, G4KGA (UB), was monitoring 87.7MHz for meteor scatter signals from Europe when up popped a male American voice. He states: "I've checked through everything I can find for any European sources of US originated material on that channel to no avail," so he concludes it could have been the audio from the US TV channel 6. He has posted the audio clip on his web site - see the panel.

I have listened to this 18s clip several times. At the start, down in the noise, there is a constant but unintelligible signal followed by the clear voices, which have all the characteristics of a meteor burst. The male voice is typical of a US - or Canadian? - news broadcast. The phrase "...right now at five twenty-six..." seems like a reference to the time, six hours behind UTC. This would indicate the stations were in the US or Canadian Central Zones. Have a listen and see what you think.

CONTEST NEWS

LISA, KA0NNO, HAS advised of three 50MHz contests organised by the Six Club that you may like to enter in your diaries. The first is a five-hour 'sprint' starting at 2300 on 22 April. The next is a Major Six Club Contest beginning at 2300 on 19 May and finishing at 0300 on the 22nd. The last is another five-hour sprint starting at 2300 on 15 July. For further details contact The Six Club at PO Box 307, Hatfield, Arkansas 71945, USA or e-mail them at sixclub@6mt.com There is a web site - see the panel.

MOONBOUNCE

THE ANNUAL EUROPEAN Worldwide EME Contest, sponsored by the French national society, REF, and *DUBUS*, will comprise the usual two sessions. The first, for 144 and 1296MHz operation, will be on 18/19 March. The second, for 432MHz and 2.3GHz and above, will be *three* weeks later on 8/9 April. Both periods start at 0000 on the Saturday, ending at 2400 on the Sunday.

The referee for this event is Ian White, G3SEK (QTHR), who says: "The 144MHz weekend was chosen for the lowest possible sky noise, but for 432MHz and the microwave bands we chose a weekend with a broader combination of other factors in its favour."

For London latitude stations, the March weekend will provide just over 26 hours of Moon time, the declination varying from +13.77° to +4.91°. The 144MHz sky temperature range is 216K to 268K and the signal degradation is -0.45dB to -0.87dB, referred to perigee. The Sun offset at Saturday midnight is +164°.

The April weekend coincides with perigee and the maximum signal degradation is -0.12dB at the start, dropping to 0dB at the end. The 432MHz sky temperature range is 31K to 44K and the declination varies from +17.38° to +20.90°. The Sun offset at Saturday midnight is +56°.

David Hilton-Jones, G4YTL (IO91), added 35 new 'initials' - stations worked for the first time - last year on 144MHz. The most notable were PY2DP (GG66), T98LWT (JN84), TA/DL5MAE (KM37), XE1/SM0KAK (EK09) and R1MVZ (KP40) on Malyi Vysotskij Island. But 8J1RL (KC90) in Antarctica, who was only using two 3-wavelength Yagis, was probably a UK 'first'.

David runs the legal limit to four 5-wavelength DJ9BV Yagis on 144MHz and expects to be operational (QRV) on 432MHz by this month. He has six 11-wavelength Yagis on this band and was putting the mechanical work and cabling together when he e-mailed on 19 January. Peter Blair, G3LTF (IO91), wasn't QRV for the December sked weekend due to a combination of the fierce gales and the influenza bug that afflicted many at the time.

The January issue of Allen Katz's, K2UYH, *432MHz and Above EME News* runs to 14 pages and can be downloaded from the 'nitehawk' web site - see the panel. G3SEK's *Lunar Weekend Calendar* is also available there, although when I logged in on 23 January the sked weekends had not been decided. In the *Newsletter* Ian explains the difficulty in choosing these dates.

METEOR SCATTER

THE ONLY MENTION of the Quadrantids shower was by Mike Johnson, GU6AJE (GY), who completed on 6m with PA2VST (JO22) at 2259 on 3 January in a single burst, and G1SWH (IO83) at 1154 on the 4th. John Palfrey, EA7IT, wants to upgrade his MS station. At present he is using an ageing Uher tape recorder and can transmit up to 1200 letters-per-minute. He wonders what is the current state of the art gear? Please e-mail him at ea7it@larural.es

G4YTL was QRV on 2m CW last summer and highlights completions with T98CHR (JN84), HV4NAC (JN61), OH5IY (KP31), ES0SM (KO08), ES2WX/1 (KO18), 9A0DX (JN82), 9A5D (JN92) and G0KZG/MM in four 'wet' Atlantic grids.

Peter Varadi, HA5OV, with friends HAs 7PL, 7UL and 5CRX, made a successful MS expedition to KN07 and KN17 in August 1977. If there is a demand for these grids, they offer to organise it again for the first week of August. They have some potent gear, so e-mail Peter at ha5ov@dpg.hu if you are interested.

BAND REPORTS

50MHz

Roger Horne, G4HBA (EX), has established a web page on the Internet - see the panel - and it includes a propagation section. Andrew Ireland, MM1CXE (KY), is keen to create some activity on 6m and is also QRV on 4m, 2m and 70cm. You can e-mail him at andy@stmonans.co.ukandhe,too, has a web site - see the panel.

Steve Wellon, G6DMG (WR), was alerted to a trans-Atlantic

opening on 20 December during a 2m QSO with GW0GHS, so he QSY-ed, put out a CQ call and worked K1SIX (FN43) at 1435. He went on to work VE1s and W1s in FN41, 42 and 74. His station comprises an FT-736 running 200W to a 5-ele Yagi at 65ft AGL.

GU6AJE also caught this opening, working VE1YX (FN74) at 1251 and VE1ZZ (FN84). Next day Mike contacted K1SIX at 1522. Jamie Ashford, GW7SMV (NP), heard W1JJM and VE1YX at 1320 on 19 December but, with an inch of ice on his antenna, couldn't operate. On 11 January he completed auroral QSOs with GM7WLE (IO88) and GM3WOJ (IO77).

70MHz

Tomasz Babut, SP5XMU, says that some Polish broadcast stations still have permits to transmit in the band but that the Radiocommunications Office is looking for new frequencies for them in Band 2. He reckons the first amateur permits will be issued in May or later. G3USF mentions a posting from S51DI in Slovenia that beacon S55ZMB (JN76VK) is QRV on 70.029MHz running 40W ERP beaming towards the Britain and Ireland.

G4YTL operated in the 16 January leg of the Cumulatives and David hopes to be more active this year. David Edwards, M0CNP (NR), is now fully QRV on all modes on 4m, 2m and 70cm from his new QTH. GU6AJE (IN89RL) is now QRV with 10W to a Delta-loop antenna, soon to be upgraded to two elements. Mike was on for the 16 January Cumulative session working seven stations, ODX (best DX) being GW8ASA/P (IO81GN) at 240km.

David Dodds, GM4WLL, was out portable in IO85NR for the first leg of the Cumulatives and made 13 QSOs. ODX was G4RFR (IO90). Others worked included G4ZAP (IO81), G3XDY (JO02) and GW0GEI (IO73) for his 26th grid. In spite of the absence of "…a few famous call signs…", activity seemed pretty good and conditions reasonable.

144MHz

Ken Punshon, G4APJ (BL), worked ON5NY (JO10) on 2 January for a new country, and next day brought G8WVR (TA). On the morning of the 17th the Wrotham beacon GB3VHF was pounding in, but no real DX was heard. It soon dropped dramatically but at 1030 F6GEX (IN97) popped up from 743km away.

Reporting on the 1999 results from club station G3KAC, Ross Wilkinson, G0WJR, reckons activity was down. He has now left the University and it's likely that future G3KAC operation will be on the HF bands. GW7SMV worked the millennium station M2000A on 31 December and Jamie's first QSO of the new year was with ON1CKL (JO11) on 2 January. On the 16th at 2113 he contacted EI9AE (IO62).

430MHz AND UP

G4APJ reports a slow start on 70cm until 14 January when he worked G8BRF (SK) and 2E1CPQ (CW). Conditions seemed up on the 16th when Ken contacted G8DKK (SG) and G4FHN/P (BS) and the latter again at 1930 next day. During the first leg of the 4m Cumulatives GM4WLL/P occasionally "…wandered off…" to 23cm to work G0EHV (IO94) and GM6CMQ (IO86). David runs just 2W to either a 30-ele Yagi or 27-ele Quad-loop antenna.

FINAL MISCELLANY

MARTIN RASK, SM7VHS, has established a new web site - see the panel. He hopes to add to this continually. Derek Hilleard, G4CQM, has re-designed his web site to include photographs and comparison details of Yagis - see the panel.

The deadline for the May issue is **16 March,** *not* the 23rd as previously stated, and for June it's **20 April.** My telephone answering and fax machine is on 020 8763 9457 and for CompuServe ISP users my ID is g3fpk. ♦

μWAVE

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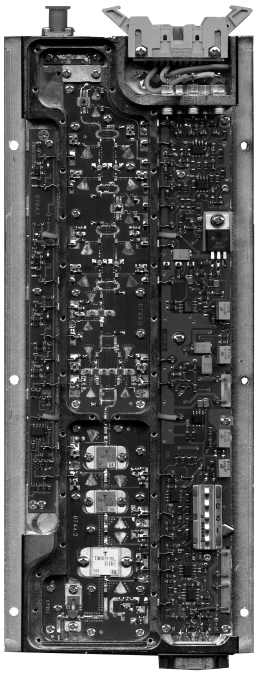
MICROWAVERS are always on the lookout for ways of increasing their transmitted signals, but modern solid state power devices capable of operating at 10GHz are still very expensive, so most run either low power (1 watt or less) or surplus Travelling Wave Tube Amplifiers (TWTA) at around 10 watts. A recent e-mail from Germany has turned up a source of surplus solid-state 10GHz amplifiers that are more affordable for the average amateur. The MIKOM MLA9207 was designed as a solid-state power block for Electronic News Gathering (ENG) applications. These are the very nice mobile satellite trucks you can see in the background of outside TV broadcasts! The MIKOM units are consequently robust and well built, capable of surviving with ease some heavy-handed portable operations.

The units measure 256 x 105 x 28mm and weigh around 3kg. They are solidly built on a one-piece milled chassis, with a bent, stainless steel cover. RF connections are SMA on both input and output. Three DC power and control connectors are fitted (1 x 9-pin D and 2 x 16-pin IEC connectors). Internally the unit is beautiful and a true work of art, as the photograph right shows. The main board runs from input to output, cascading devices and power couplers along the way. The device is high gain (around 50dB) so requires very little drive power, removing the need for additional amplifiers in the typical amateur transceiver. Power requirements are 12VDC at 8A and -9.5VDC at 100mA. Interfacing it into a transceiver is very easy. Both the 12V and -9.5V supplies should be present at all times and the unit is switched from transmit to receive by applying a +5VDC signal to one of the control connectors. A final output stage voltage monitor line is also provided on these connectors.

The unit is an excellent addition to a performance 10GHz station and removes the need for dangerous TWTA power supplies (especially on damp mountains whilst portable!) and allows a high power 12V portable station to be constructed. Although the units are supplied as surplus, they are new and come sealed in original packing with test data and full connection details as standard. Priced at around £300 they are quite affordable when compared with new commercial amateur kits. Further details from Jochen Zilg at mmwave.zilg@t-online.de



Internal view of the MIKOM MLA9207 10W 10GHz PA.

DUBUS NEWS

SOME ITEMS OF recent news from the *DUBUS* magazine staff. Issue 4/99 was published at the end of January and should have been received by all current subscribers. Subscriptions for the year 2000 are now due and cost £12.50 for UK subscribers. Please note that this is less than last year's price! Please send your renewals on the form enclosed with the last issue to the UK representative, Roger Blackwell, G4PMK. The 'Microwave Europe' column editorial has changed hands over the New Year and I (GM4PLM) will be editing the column from the 1/2000 issue due for publication in the spring. Look out for some changes in the format and content of the column. If you are unfamiliar with *DUBUS*, it is a bilingual magazine (German/English), published quarterly, catering for amateurs with an interest in the 50MHz and up spectrum. It is well worth the subscription and very useful to have around the shack. More information can also be found on the web at www.marsport.demon.co.uk

BEACON NEWS

MARTYN KINDER, G0CZD, reports that a new 13cm beacon is active from Wales. GB3PYS operates from a site just outside Newton, Powys (IO82HL), frequency 2320.925MHz, beaming due East using a sectoral horn and an ERP of just less than 10dBW. Martyn states it should be audible on a bearing of +10 to +170 degrees and has so far been heard at a distance of over 80km. It is currently only about 10 feet above ground and will be raised when the weather improves. Reception reports would be appreciated by Martyn Kinder, G0CZD, via e-mail to martyn@g0czd.clara.net

PRIME FOCUS

THIS NEW ADDITION to the column is primarily intended for newcomers and people who may like to learn more about microwaves and how to become operational on them. This month's focus - the 23cm band.

The 23cm band lies at the bottom of what can be classed as the microwave spectrum (in amateur terms this is any frequency above 1GHz) and is an excellent choice for the newcomer to microwave radio. There are numerous reasons why it is a good choice, but it can be summed up quite simply. The technology used on 23cm is within the microwave spectrum, but is still at the high end of the VHF/UHF spectrum, so still has a lot in common with it. The technology, while still capable of being at the leading end of development, is still within the grasp of the average amateur; commercial equipment from the leading manufacturers is still available, making it easy to buy a ready-built commercial unit if you so desire, something that is not available for the higher microwave band allocations.

So what does the band have to offer and what can you expect to work on it? The 23cm band has one big advantage over the lower bands and that is space! It's one of our biggest allocations. The band plan has allocations for all the modes used on the lower frequencies, but has additional allocations for amateur television and for high-speed packet radio links. ATV on these frequencies is 'true television' with full colour and intercarrier sound, unlike that used on 70cm. ATV can also be used via repeaters and the UK has a number of units operational across the country. 23cm also offers the traditional terrestrial VHF/UHF modes, such as SSB and CW. Satellites also have allocations within the 23cm band and the next generation OSCAR Phase 3D will utilise the band both for up- and down-links.

Propagation on the 23cm band is interesting and varied. As mentioned earlier, it is still at the high end of the VHF/UHF spectrum and so has a lot in common with those bands. Typical tropospheric modes such as ducting are more prevalent than on the lower bands, because the depth of duct required is much smaller at 23cm than on, say, 2m, due to the shorter wavelengths. The band also offers typical microwave modes such as the ever-present troposcatter, caused by the scattering of radio waves by dust, ice and changes in air density. These offer weak but continuous propagation for higher-powered stations.

So what equipment do you need to get active? Commercial transceivers are available for 23cm and many stations use modules fitted to their existing equipment like the Yaesu FT-736R or the Kenwood TS-790E. 23cm offers an excellent opportunity to build some fine homebrew equipment and several manufacturers offer kits for complete transceivers. In the UK, the Microwave Components Service run by Petra Suckling offers an excellent high-performance 23cm transverter and matching amplifier modules to allow the construction of a top-class 23cm transverter driven from any 2 metre multimode (an FT-290, for example).

There is plenty of activity on 23cm and the RSGB Microwave Committee organises activity periods throughout the year. There are also numerous contests on VHF through to SHF and even a modest-sized station can boost the points.

See you on the bands. ♦

QRP

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IN PREVIOUS QRP columns I have mentioned medium-wave QRP DX reports of restricted-power local stations. Steve Whitt, of the Low Power DX League, has sent me an update of their medium-wave QRP DX listings. For those who do not know about these stations, Steve Whitt's notes, which accompany the listings, will put you in the picture.

"Many medium-wave listeners will be familiar with the current Restricted Service Licence (RSL) and Low-Power AM (LPAM) stations operating in the UK. However, there have been other low-power temporary stations such as those with Test and Development (T&D) licences and experiments in micro-local radio by the BBC. The listings show the furthest confirmed reception (by sky-wave and ground-wave propagation) of these low-power stations. To get in the list, a station must be low power. For instance, RSLs operate with no more power than 1 watt eirp (non-directional) and a maximum antenna height of 10m for up to 28 days in a year. LPAMs have similar rules, but most operate continuously. Despite an erratic operational schedule and the fact that reception is made difficult by the weak signal, some amazing DX has been achieved".

DISTANCE REPORTS

TOP OF THE listings for ground-wave reception is *Jam AM* on 1575kHz, which was received by Clive Rooms in Sheigra, Sutherland, a distance of 600km. In fact, the next three reports on the list are from same location, these being of *Radio Oakwell*, Barnsley (1575kHz) at 580km, *Radio Rovers*, Blackburn (1413kHz) at 560km, and *Calderdale Sound*, Calderdale, Lancashire (1575kHz), at 560km. One that is of special interest to me is *Radio Cavell* (1566kHz) in Oldham, heard by Steve Whitt himself, 225km away in Suffolk. Ben, my younger son, does part-time broadcasting with this local hospital radio station. The complete list gives many reports of reception over 100km by ground wave propagation only.

Sky-wave propagation of these low-power medium-wave stations around dawn or dusk, especially in mid-winter, can allow reception over many hundreds of kilometres. For some time, the DX record was for South Shropshire Communications in Ludlow, logged by Jari Korhonen in Kitee, Finland, a distance of 2227km. Then, on 4 August 1999, Jean Burnell in Newfoundland successfully logged, and recorded on audiotape, RNI in Frinton-on-Sea, Essex, a distance in excess of 3850km. The logging was confirmed on e-mail, complete with a 'RealAudio' file which included the station ID, e-mail address and extracts from three songs.

THE NORCAL-20 IN GHANA

IN THIS COLUMN for September last year, I announced that the Northern California QRP Club (NorCal), in conjunction with the G QRP Club, were to send kits for the NorCal-20 QRP transceiver to amateurs in locations where equipment is difficult to obtain or simply too expensive to buy. Since that time, the distribution of the NorCal-20 kits has begun. My wife took kits to Pakistan and other kits have been taken to Romania, Ukraine, India, Sarawak, and will shortly be taken to Cuba.

Responding to the same item, Roger Western, G3SXW/9G5SX, contacted me about his trip to Ghana in November, reported on p10 of last month's *RadCom*. Roger was able to take two NorCal-20 kits, which were presented to the Accra Technical Training College for the use of their radio amateur students.

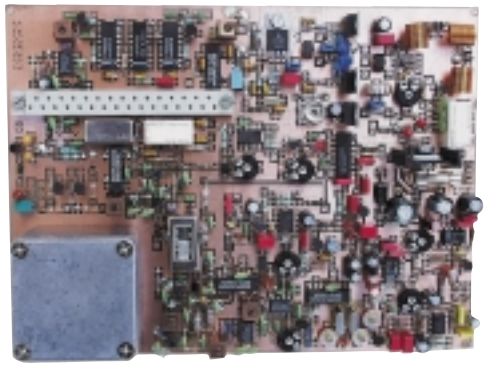
As time permits, NorCal's Doug Hendricks, KI6DS, is making these kits available to me for distribution to worthy recipients. Ideally we are looking for radio amateurs or radio clubs in poorer countries who would benefit from receiving kits to build complete QRP 20m transceivers. An important factor is finding individuals or companies who can deliver the kits direct to the recipients. Please contact me if you can help.

NEW QRP KIT

THE GERMAN club DL-QRP-AG was founded by Peter Zenker, DL2FI, in May 1997. Currently the club has almost 1,500 members and publishes a fine glossy quarterly called the *QRP Report*, produced (in German) by *Funk Amateur*, one of Germany's best-known amateur radio publications. The *QRP Report* has built-up a fine reputation for amateur radio construction projects, the latest of which is a QRP SSB Transceiver.

The Black Forest Transceiver is an all-band CW and SSB transceiver. To reduce costs, it uses plug-in modules for band changing. The kit is now in the final stages of development, with an estimated price of 500DM. The photographs show a prototype of the transceiver built by DL2FI.

Information about the kit and down-loadable circuit drawings can be found on the DL-QRP-AG web site at www.qrpeter.de Information about the DL-QRP-AG can be found at the same web site or by writing to Peter Zenker, DL2FI, Saarstr 13, Berlin, D-12161, Germany.



Views of the Black Forest QRP SSB transceiver.

The Millennium Award certificate.

16th YEOVIL QRP CONVENTION

ONCE AGAIN the Yeovil Club is putting together plans for the Yeovil QRP Convention, which will be held at The Digby Hall, Hound Street, Sherborne, Dorset on Sunday 16 April 2000, beginning at 10am. With a programme of lectures, component and surplus traders and friendly atmosphere, the Yeovil QRP Convention is a popular event for QRP fans and all radio amateurs interested in home-built equipment. An annual feature is the Construction Challenge.

The Construction Challenge for Yeovil 2000 is devised by last year's winner, G3KLT, and is 'to construct the most efficient 1W DC input power, 14,060kHz transmitter, complete with low-pass filter'. The Yeovil Club will provide a 12-volt power supply and a DC ammeter, to enable the constructor to set the input power to 1 watt. The output power will then be measured across a 50Ω dummy load. A full circuit diagram is required with each entry. Details about the Convention, the Construction Challenge and the Fun Run (a QRP contest run in conjunction with the convention) can be obtained from George Davis, G3ICO, Broadview East Lanes, Mudford, Yeovil, Somerset BA21 5SP.

MILLENNIUM AWARD

ROY WALKER, G0TAK, wrote to me enclosing to copy of the splendid Arkansas QRP Club Millennium Award certificate. The award was received for making 2,000 QRP contacts in 1999, all using less than 5 watts of RF output. Roy qualified for the award by the end of May 1999, after which, he says, his life returned to normal. In the attempt, he worked 58 DXCC countries including CN, FM, HB0, JA, P4, SV, UA9, W and VE. His transceiver was the Index QRP Plus, a dedicated QRP transceiver. The only antenna used was a G5IJ twin-line, 20 metres long. Our congratulations go to Roy. ♦

SPACE

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GREAT EXCITEMENT as Phase 3D flies at last! Admittedly, it is with a borrowed pair of wings and the engines of an Air France 767 *en route* for Kourou in French Guayana. The satellite in its container weighs-in at some 1000kg and the SBS-adapter with associated test gear adds another 1600kg, so the 767 has a pretty full cargo bay. This is at a cost of some $20,000, so it is still vital to indulge in yet more fund-raising to cover costs of this nature.

ON A WING AND A PRAYER

THE AIRCRAFT was routed from Atlanta to Paris and then on to Cayenne, French Guayana's sole airfield (the roundabout journey being necessary because there is no direct flight from America). Phase 3D now awaits integration with an Ariane-5 in air-conditioned quarters. All systems are powered down and flight batteries uncharged until the magic moment arrives. Although no personnel are required until integration, the spacecraft was accompanied by Bob Davis, KF4KSS, Jay Ramdas and Peter Gulzow, DB2OS, the operations manager.

An official start date has not been announced, but the chances of an early launch are pretty good after the last successful Ariane-5 launch. Phase 3D will be the first secondary payload for a subsequent launch. It is a case of waiting for the main commercial passenger to be ready to fly or, if it doesn't, an alternative satellite. Arianespace is doing its best to accommodate us as soon as possible. The next flight is in March, Ariane-505, but that is fully subscribed with 'Asia-Star' and 'Insat 3B'. We can only wait, but everything looks very close now. Try pointing your browser at http://www.arianespace.com/status_nearterm.html It is regularly updated with flight manifests; you might just beat the official announcement!

Some wonder why a proven Ariane-4 rocket wasn't commissioned for the Phase 3D launch, which could then have happened months ago. It is basically a question of power. Ariane-4 would result in the Phase 3D orbit having a perigee of some 200km, whereas Ariane-5 delivers a 500km perigee. The spacecraft would hence need to supply more fuel to attain the desired orbit by making up the difference plus any other adjustments needed. On-board fuel is very precious and is best conserved for minor orbit corrections.

MIR

MIR IS NEVER out of the news. It has been reported that it is hoped to send a crew to Mir in March according to Sergei Gromov, spokesman for Energiya, Mir's builders. Funding to the value of $20 million has been promised by an American Company, Golden Apple. The mission is planned to last 45 days. $7 million has already been supplied, however the decision must be confirmed by the Russian Space Agency. Finally, the Russian Government must give its consent. If the Mir space station programme is ended, a crew will probably fly a brief mission to shutdown all systems before Mir is guided on a crash course for the Pacific.

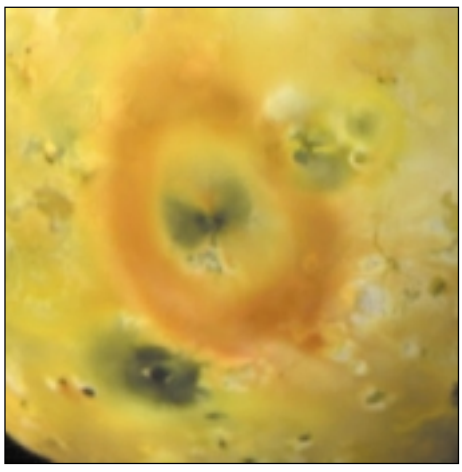
The Mir programme has given Russia unrivalled experience of long-term manned space flight. America is keen that this experience is channelled into the International Space Station programme instead of Mir. Obviously, Russian space authorities have been very reluctant to abandon their prize and have searched for additional funding from many quarters.

GEOFF PERRY

THE ELATION over Phase 3D was sadly tempered by the sudden death of Geoff Perry. He died suddenly at his home in Cornwall at the age of 72. He was the founder of the world famous Kettering Group. Geoff taught Physics at Kettering Grammar School prior to his retirement. In 1966 the school discovered the Plesetsk launch site and pre-empted those who should have known. He was a born teacher of both the young and not-so-young, and a seasoned satellite veteran was heard to remark about him: "You can tell the Professionals"!

NASA

WITH THE SUCCESS stories from SSTL at Guildford University and all the interest in amateur radio projects, it is only too easy to be rather parochial and forget to comment on some of the phenomenal success stories (and failures) of the NASA probes. Looking over the NASA Science web pages for example provides some real science non-fiction stories, with equally startling pictures and animations. Try exploring http://www.spacescience.com/newhome/headlines/ast19nov99_1.htm noting particularly the various dates and links. The page given is called 'A Volcanic Flashback' and describes a pass of Io, Jupiter's moon by NASA's Galileo spacecraft. The information is designed for parents and educators; even I can understand it, so everyone else should have no problems!



NASA's *Galileo* spacecraft sees the 808-mile wide ring of sulphur around the volcano Pele on Jupiter's moon, Io, in October 1999. The image is approximately true colour.

Photo: NASA/JPL.

THE SHUTTLE

THE SHUTTLE Endeavour's projected launch of 31 January should produce detailed mapping of the earth in unmatched detail. To make the launch possible, Air Force officials agreed to postpone the proposed shutdown of their tracking system which monitors all Shuttle operations. The shuttle proposes to use radar mapping to produce a three-dimensional map of the earth.

Y2K

THE SPACE ARENA had its share of Y2k anomalies. NASA was only too keen to bring back the Shuttle with its Hubble repair programme incomplete - just in case. It would seem, however, that there were no really serious problems. Various satellite tracking programs had slight hiccups, mainly in the acceptance of tracking data - keplerian elements (keps) - bearing the new date. Many fixes have been produced as well as a raft of new programs designed for DOS or LINUX, so that elements are no problem to load.

The popular, if old, *Satscan II*, produced a few date quirks which were easily hand-edited, but the all-too-essential calculations were correct. *InstantTrack*, an imported and again elderly programme will not at present accept year 2000 keps, but a fudge is available from http://www.ccr.jussieu.fr/physio/amsat-france/epatch-it.htm

Wisp had a slight problem, but a new issue by Chris Jackson is available on the Amsat-NA web page or from Amsat-UK to replace your current programme. Please note that the 16-bit version of the program is no longer supported. The *Station Programme* by Paul Williams is Y2k compliant. Should you have problems with your tracking programs, please drop me an e-mail. Whilst not promising miracles, I can probably point you towards some real assistance. ♦

WWW

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WITH THE Internet representing the current state of the art in communication technology, it's refreshing to see it used to carry information about some of the earliest radio technologies. One web site that demonstrates this admirably is that of 'The Xtal Set Society' [1], previously recommended by Pat Hawker, G3VA, in January's 'Technical Topics' column. I had actually stumbled across this site just before the January *RadCom* arrived on my doormat, after following a link from a non-amateur radio web site, which was also a pleasant surprise.

The Xtal Set Society is an organisation based in St Louis in the USA, dedicated to promoting the virtues of the humble crystal set receiver, which it achieves via a bimonthly newsletter and a very readable web site. Here you will find detailed plans for building a couple of different types of crystal set receiver, including one built using just three basic electronic components, a lot of wire, some high impedance headphones and an empty breakfast cereal box! This type of simple project is often cited as a way to get young people interested in radio construction, so pointing them towards this web site would be a good way of introducing them to a new hobby.

As well as the construction pages, the site contains extracts from the society's newsletter, plus copies of vintage articles, tips for science fairs (an idea that might be worth importing to mainstream education in the UK), and the usual commercial features that small societies need to support their activities. Membership details are provided, with a very reasonable international subscription rate being available, together with details of how to obtain any hard-to-find components needed for crystal set construction. In all, this web site is a joy to see, as it demonstrates how the world wide web makes it possible for those with very specialised interests to advertise their presence to the world at large, whilst keeping alive an interest in early technologies.

SKY LIGHTS

A RECOMMENDATION for another solar information site has reached me via *RadCom* Editor Steve White. The 'Sunspots and the Solar Cycle' web page [2] is sponsored by NASA and functions mostly as a portal into the detailed solar information available on other NASA web sites. The Sunspots web page does however fulfil a role in its own right, explaining in low-tech language what sunspots are and what the state of the current cycle is.

The page is well presented and concentrates on the physics of solar activity, rather than swamping the reader with masses of data. As an introduction to sunspots the page is excellent, suitable for anyone from school age upwards, and even those with some previous knowledge of the subject may learn a thing or two; I must admit 'Solar Butterflies' was a new concept to me.

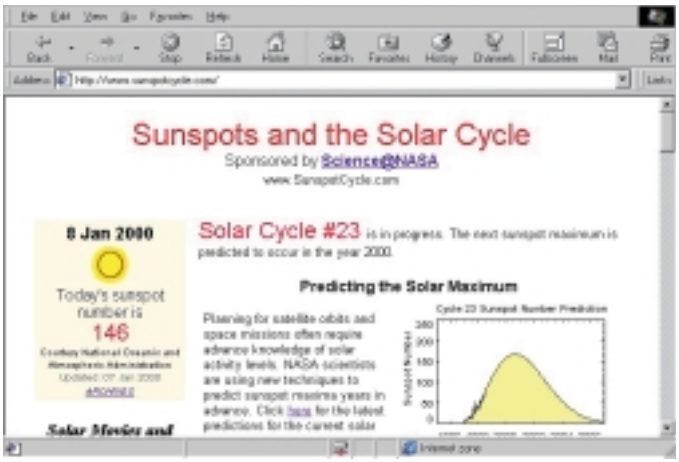
For an interesting view of weather of a more terrestrial nature, Bob Sroczynski Wilde, EA1TH (ex G3URY), has a couple of suggestions. Bob takes an interest in the weather, in particular storm activity and lightning strikes. He suggests "it may be amusing to see where the QRN is actually coming from when you can't complete your QSO on 80m or 40m because of it", adding that "intrepid mountain-toppers can also see how close they came to being zapped next time they come home after a stormy weekend operating /P".

Bob's suggestion for a good starting place is the Tornado and Storm Research Organisation web site [3], known as TORRO, a UK-based 'independent and privately-supported research body' with an interest in severe weather and storm activity. The URL given is for the 'Sferic Location' page, which gives a thorough explanation of how lightning strike data are collected. However, it is also well worth visiting the TORRO home page to look at the rest of their weather observations (remove the 'sfinfo.htm' part of the URL).

TORRO explains how the location of a lightning strike is determined by the UK Meteorological Office using five radio sensors around the UK plus one each in Gibraltar and Cyprus. The information collected is analysed using an 'Arrival Time Difference' system, using times recorded from atomic clocks. All this allows lightning strikes to be pinpointed with remarkable accuracy, and the TORRO web site provides links to archives of data for worldwide lightning activity.

Data are provided by the Meteorological Office in text format, but it is often easier to interpret the activity when presented graphically. Fortunately, the University of Karlsruhe in Germany provides this service, although Bob recommends using the archive of current and previous pictures at the University of Barcelona web site [4]. The latter is only available in Spanish, although this does not affect the usefulness of the graphics. Neither is it too difficult to navigate if you have no knowledge of the Spanish language.

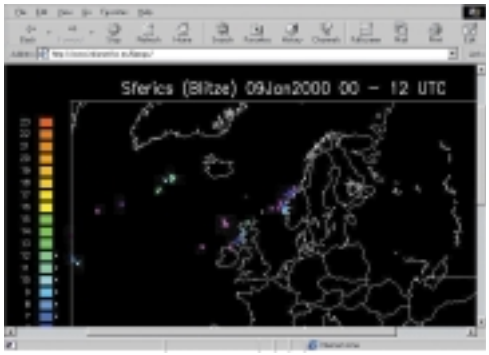
As an example of how interesting the data can be, Bob tells me "I downloaded the earth's visual image from Meteosat via Nottingham University the other morning and saw some bright clouds in the North Sea where it wasn't yet daylight. Sure enough, the Sferics map confirmed the location of the storms and gave the number of discharges". So take a look for yourself, and do some storm-chasing from the comfort of your shack. ♦



Sunspots explained on this NASA page.

REFERENCES

[1] http://www.midnightscience.com/ (The Xtal Set Society)
[2] http://www.sunspotcycle.com/ (Sunspots and the Solar Cycle)
[3] http://www.torro.org.uk/sfinfo.htm (TORRO)
[4] http://www.infomet.fcr.es/llamps/ (University of Barcelona)



Lightning discharge plots.

Crystal sets live on.

IOTA

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IOTA 2000 GOT OFF to a resounding start on 1 January with worldwide activity. CDXC (Chiltern DX Club) the UK DX Foundation, which is managing the year-long activity programme on behalf of the IOTA Committee, reports considerable interest with more than 400 people downloading data from its web site in the month up to mid-January - a rate of about 20 a day.

You can join in any time during the year but, to gain premium points for contacts with IOTAs in particular time zones, you should do this sooner rather than later. Download all the information you need from the CDXC web site www.cdxc.org.uk using software such as *WinZip* to unzip the files. To make it really easy, CDXC has even provided an evaluation copy of *WinZip* there for downloading. For those who would like details but do not have Internet access, please refer to the 'IOTA' column of *RadCom*, September 1999, p68.

A new addition to the web site files available is one for recording contacts counting towards your score for the certificates. Developed by Bengt Högkvist, SM6DEC, this contains an IOTA 2000 database where records of contacts can be maintained and a cumulative score generated. Our thanks to Ben for his work in developing this facility.

A list of the regularly-activated island groups counting for premium points for March/April 2000 is shown top right.

ACTIVITY REPORT

THE FIRST NEW IOTA of the year 2000 hit the bands on 12 January in the shape of XZ0A from Thahtay Kyun in the Mergui Archipelago (AS-144/Prov). This is memorable also as the first-ever IOTA activity from Myanmar. A large multi-national team of experienced operators, including Steve Wilson, G3VMW, and Ray Gerrard, HS0/G3NOM, expected to keep this rare one on the air for DXCC and IOTA into early February. For more information about this island - it looks a real paradise with a nice hotel - and the XZ0A operation, check the DXpedition web site at http://www.getnet.com/~k7wx/myanmar.htm

This welcome 'new one' more than compensated for some disappointment felt at the absence of activity from Millennium Island, formerly Caroline Island, at the turn of the year. No doubt the logistics of getting to this outpost, remote even in Kiribati, proved too daunting. Now that the world knows of this island, it is only a matter of time before a stalwart IOTA DXpeditioner succeeds in getting there.

As the column went to press, reports of other planned IOTA new ones were coming in. A team of five operators, F5VCR, G3OCA, G3SXW, G4BWP and G4CWD, will activate Abokwa Island in Ghana from 1 to 5 April. There are no facilities at all on this small island, so they will be operating two stations under canvas. At least four other new ones are scheduled for the period up to May. Details will be published when available, so keep an eye on the DX bulletins.

BI7Y DXPEDITION FROM AS-143

I MENTIONED in the January column the BI7Y DXpedition last September from the remote Xisha Archipelago (Paracel Islands) in the South China Sea. Here's the abridged story of this operation, as reported by Alan Kung, BA1DU, the team's co-ordinator.

"Yongxing Island (Woody Island) is the largest island in the Xisha Archipelago, some 450km south of the Chinese mainland. During the period 19 to 21 September 1999, a group of Chinese amateurs were on the island for the BI7Y IOTA DXpedition. The team consisted of nine amateurs from four different Chinese provinces, coordinated by Alan Kung, BA1DU and Yang Dehao, BA7JA.

"The DXpedition made 4890 QSOs on CW and SSB, covering 35 CQ zones and 91 DXCC entities, during 48 hours' operation. Two stations were equipped, each with one linear amplifier, a beam antenna and a vertical. For a reliable power supply we used two generators of our own. The island's two 400kW diesel generators could not supply a constant voltage level - the voltage would go up sometimes from 220V to 380V when the generators were exchanged between the primary and backup system.

"The Paracel Islands are, as most people know, an entirely military base of the Chinese Navy. There are no normal civilian residents there. We had managed to get a lot of written permissions before we started, but when the team arrived on Hainan Island (AS-094) we were told by the port police that we needed to get extra permissions. So we had to rush between several higher level local government agencies and military organisations in three cities, begging for the necessary approval. That cost us five days' delay.

"Unfortunately, by the time we managed to get all the necessary documents, a typhoon was bearing down on us, moving very, very slowly. This meant that we had to delay departure again. Such a long time was spent waiting on Hainan Island that everyone felt the urgency to go back to work, because vacations were fast disappearing. Some decided to fly back urgently for their work and then return to Hainan Island after the typhoon had passed, others stayed on Hainan Island and busied themselves getting everything ready.

"We travelled from Hainan Island to Yongxing Island by an 87-ton fishing-boat. It took about 21 hours in a force eight rainstorm, and there was *total* seasickness! It was a really great adventure and a very precious experience for the Chinese hams. We finally won through, but we had to condense our operating time to two days."

Congratulations to the whole team. This was a really difficult one to put on. Even though they were delayed 11 days, they still managed to get nine of the original 11 operators to the island! ♦

IOTA Millennium Programme: regularly-activated islands counting for premium points in March and April 2000

MARCH 2000

AS-006	VR2	Hong Kong
AS-015	9M2	Pinang State
AS-019	9V	Singapore
AS-042	UA0B	Severnaya Zemlya
AS-053	HS	Malay Peninsula West
AS-075	XX	Macau
AS-094	BY7	Hainan Island
OC-002	VK9X	Christmas Island
OC-003	VK9C	Cocos (Keeling)
OC-021	YB0-3	Java
OC-022	YB9	Bali Island
OC-088	YB7/9M/V8	Indon. Kalimantan/ E.Malaysia/Brunei
OC-143	YB4-6	Sumatra

APRIL 2000

AF-006	VQ9	Diego Garcia Island
AF-017	3B9	Rodrigues Island
AS-003	4S	Sri Lanka
AS-005	UA0B	Kara Sea Coast West
AS-013	8Q	Maldives
AS-083	UA9K	Kara Sea Coast East

NEW REFERENCE
AS-144/Prov Myanmar: XZ Mergui Archipelago (Thahtay Kyun)

RSGB IOTA Programme, PO Box 9, Potters Bar, Herts EN6 3RH

SWL

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ACTIVITY FROM the BRS32525 shack has been 'zero' since mid-December. My involvement with M2000A has been the main reason, but the local Planning Authority ruled that I should take down my R6000 vertical while the revised planning application was being considered such that having to use 'the bits of wire', although they perform excellently, acted as a bit of a turn-off! To say that activity has been 'zero' is not quite correct because I had heard M2000A on sufficient bands to submit a claim to the Awards Manager - none other than my daughter Clare! I hope that other listeners had been logging our special event station, not only to claim the special awards, but to obtain one of the special QSL cards. SWL cards should come to me - not G4DFI - but Owen has passed me quite a bundle already. The M2000A QSL card will not be available until after the event, as we want to include some really super photographs on the 4th side of the card. Full details of the M2000A awards can be found on the Internet at www.qsl.net/m2000a or by writing to Clare at my QTH.

SWARL ANNUAL COUNTRIES TABLE

KARL DRAGE, RS177461, has run this annual table on the Internet and has advised me that congratulations are due to David Whitaker, BRS25429, for winning the overall competition with a truly excellent score. Arthur Miller, GW5218, also did a great job in reaching second position.

SWARL Annual Countries Table - Final Result

HF BANDS - ALL MODES

Callsign	160m	80m	40m	30m	20m	17m	15m	12m	10m	9 Band	All Bands
BRS25429	63	143	181	0	251	168	231	170	218	1425	282
GW5218	54	146	184	0	254	165	225	172	211	1411	274
RS174461	67	120	132	81	208	107	195	147	212	1269	260
BRS32525	61	73	103	0	91	96	71	143	74	712	217
F11556	39	52	102	0	138	89	128	66	140	754	204
DE1UCS	12	32	50	34	60	57	96	47	56	444	187
F15452	2	29	89	0	89	16	54	12	17	266	141
BRS31976	57	57	23	1	59	24	63	20	32	336	140
OE20272	6	9	1	0	5	0	2	0	0	23	19

NEW YEAR CONTEST 2000

CONGRATULATIONS to Lambert, NL-10175, for adjudicating the event. 26 SWLs took part in the contest from 7 different countries - PA0, ON, F, G, DL, I and JA. The winner was Geo, ONL-3647, from Belgium, with Gerd, DE1UCS, from Germany second and Hans, NL-7403, from Holland third. Somewhat disappointing that only one RSGB member entered, but well done to RS94177 for his 17th place in the listings. All 26 listeners who took part will receive a certificate of merit.

New Year Contest 2000

Pos	Call	80	40	DXCC	Pts
1	ONL-3647	24	27	38	283
2	DE1UCS	22	16	31	215
3	NL-7403	25	11	28	213
4	F-11734	18	17	31	206
5	ONL-3058	23	14	33	205
6	NL-11982	8	30	31	204
7	NL-12461	24	7	29	185
8	DE5OLI	29	—	29	172
9	NL-290	19	11	24	160
10	ONL-4299	4	21	23	156
11	ONL-9509	18	8	23	151
12	ONL-4638	8	15	22	127
13	I1-14016	—	19	19	114
14	ONL-9514	5	15	17	109
15	NL-11976	12	6	16	107
16	G-20915	11	6	17	106
17	ON1DHT	7	12	15	102
18	RS-94177	—	16	16	97
19	F-20553	6	7	12	86
20	I3-66256	3	12	14	78
21	NL-11099	3	7	10	69
22	NL-12124	10	—	10	61
23	ONL-10304	3	5	8	55
24	JA1-20784	6	3	7	52
25	NL-9723	—	7	7	45
26	IZ7ATH	—	6	6	45

TX0DX DXPEDITION 2000

THE NEXT NEW DXCC entity will be activated next month. Here is the latest news about the Chesterfield Islands DXpedition. The islands are located at 158 degrees 19 minutes east, 19 degrees 52 minutes south. The Association des Radio Amateurs de Nouvelle Caledonie (ARANC), the amateur radio society of New Caledonia, has announced that the DXpedition remains on target for the window of 15 March until 1 April 2000.

The New Caledonian telecommunication authorities have issued the distinctive call sign TX0DX for this multi-national expedition. The DXpedition vessel *MV Night Crossing* is an Australian-registered 75-foot cruiser and will depart from Koumac, the northern port city of New Caledonia. The *Night Crossing* made its maiden voyage in July, 1999. It cruises at a speed of 10 knots, comfortably handles up to 16 passengers in addition to the crew, and is fully equipped with all the latest in navigation, communication, roll-stabilisation and safety gear. The TX0DX team will operate from two sites, far enough apart to allow simultaneous CW and SSB operation on the same band. Four HF stations, each equipped with Yaesu FT-1000MP transceivers, will provide for plenty of activity on all bands, as well as RTTY operation. A separate station, equipped with a Yaesu FT-655, will be dedicated to six metres. The TX0DX web site can be found at http://www.n4gn.com/tx0dx/

Because the Coral Sea typhoon season is still very active during March, weather is likely to play a major role in this expedition and you can follow the weather in the Chesterfield area by using the links from the TX0DX web site. TX0DX QSLs will be available from OH2BN.

QSL returns

Year	Reports	Confirmed	%
1999	372	19	5.1
1998	444	160	36
1997	365	187	51
1996	281	147	52
1995	157	87	55
1994	138	91	66
1993	194	110	57
1992	220	135	63
1991	257	167	65
1990	204	128	62
1989	357	250	70
1988	316	198	63

SWL QSL RATES

I AM OFTEN asked about QSL rates, so it is interesting to have seen the following details posted on the SWL Internet Reflector from Peter, ONL-5923. I would be interested in any opinions or statistics from UK listeners - if any SWL keeps such records going back for such a long period of SWL activity.

Peter has little time for SWLing, but likes to be able to send one SWL report per day (for 365 days of the year!). He has kept a record of incoming QSL cards since 1988. His breakdown of QSL returns is shown. By excluding the 1999 entry, as it is too early for all cards to be received via the bureau, this gives a healthy 58% average success rate - most SWLs would be pleased with that. In 1999, Peter sent 33 QSLs direct (always with $1) and 339 via bureau. In 1998, 54 were sent direct and 390 via the bureau. ♦

Simon, RS177448, logging at the RS178500 multi-operator multi-receiver SWL station in last year's CQ WW SWL Challenge.

CONTEST

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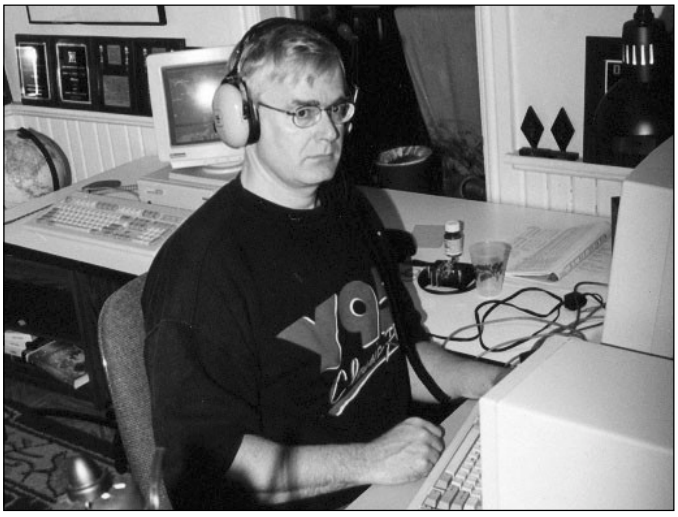
MARCH BRINGS one of my favourite events of the year, the Commonwealth Contest. The Commonwealth Contest has a real history behind it and a really distinctive flavour. It is the sort of contest where skill and experience, particularly in terms of knowledge of propagation, can really be made to tell. To achieve a high placing from the UK is a major achievement, but is also great fun to try for. It's also a great opportunity to work some nice DX stations with something less of a pile-up than they might have in one of the larger events. Each year, some very well-known stations take part and support the contest. The least we can do is to go and work them on as many bands as possible! Once you've taken part for a few years, you'll find that your callsign gets recognised and contacts will be more personal than they might be in other contests. Look out for regulars such as VE3EJ, VE7CC, 5B4AGC, VK2BJ, 6Y5HN and 9J2BO, together with the globe-hopping Bob Whelan, G3PJT, who will be operating from VP5C this year. Bob has done so much to promote the contest in recent years including writing his excellent book *Reflections in a Rosebowl*. Bob reminds us that there are special certificates this year for working '63 band call areas'. So, don't forget that this is on 11/12 March. You won't regret it, I promise!

COMPUTER LOGGING

THOSE OF YOU who know me will also know that I have been an advocate of computer logging for many, many years. The removal of the need to plough through logbooks with dubious writing and coffee stains was a very welcome one for me. Until last weekend I had been able to say that we'd never had a serious problem with the software losing contacts.

The ARRL RTTY Roundup is a contest that Roger, GW5NF, Julian, GW4JBQ, and I have enjoyed entering for several years. RTTY contesting can be very relaxing and enjoyable. How many other types of contesting can you run a string of stations at 100 an hour and still have time to read a book, eat dinner or chat? The world of RTTY contesting was changed when personal computers became widely available in the shack. The leading software for RTTY contesters worldwide is WF1B's *RTTY*. I want to make it very clear that what follows is *not* a criticism of Ray, WF1B, or his excellent software, just a cautionary tale of what can happen and how you can avoid disaster.

Some hours into the contest, with around 200 QSOs in the log, Roger was operating when he was called by a G0 station signing with a 2K suffix. I'm not going to name names, so as to spare the operator his blushes. In any case, it wasn't his fault! The callsign was entered and the program immediately crashed with a run-time error. Certainly it shouldn't crash just because of an unknown suffix but, as someone with a software background, I know how these things can happen! Roger thought he knew what the problem was and immediately did a 'reindex' on the file. This proved, later, to be what saved us from a fate worse than - well, you get the idea… Roger started up the program again, only for it to show zero QSOs. Six hours into the contest, this is not good news! I started to do a little troubleshooting and discovered that the data file for the contest was only 87 bytes long. It should have been around 145K bytes! I realised that when the program had restarted, it had overwritten the existing data file. Fortunately, when Roger did the reindex, that particular utility takes a backup of the data file before running the index. I tried copying the backup file to the data file and restarting the program, but no. Things were starting to look grim indeed and we were having thoughts of starting the contest again in the morning with a different callsign!



John, VE3EJ, a regular entrant to the Commonwealth Contest.

Having inspected the manual a little, I discovered that there was a utility to write out the data file in a variety of formats, including some human-friendly readable ones. I did that and printed it out. The only way I could overcome the difficulty was to enter the QSOs manually again, one by one, minus the /2K one! Having done that, we were up and running again, but what a panic!

There is a clear moral to this story. Make sure that you enable automatic backup saving where possible – using AUTOSAVE or even just doing a SAVELOG (those commands work in most contest software). At least that way you have got something to go back to, if it all goes horribly wrong and your main file gets corrupted or deleted. If you need to use a utility on the fly, during a contest, make sure that you take a copy of the .BIN file (or whatever the appropriate extension is for your software) before you run the utility. If you are not sure if the utility will do it for you, be safe rather than sorry and do a DOS copy or make a copy from Explorer.

As a postscript, next day, the WF1B reflector was full of people who'd had the same problem during the contest. Amusingly, they'd all logged the same G station with the /2K suffix. We were amused at the fact that this poor, unsuspecting gentleman was a bit like a virus, or was it that the much-discussed Millennium Bug had got a radio licence? The software problem is, I am sure, trivial; by the time you read this it will almost certainly be fixed. But the whole episode served to remind me how important it is to play safe, even if you think you know about software and computers!

As I mentioned, RTTY contesting does give you time to chat! We were reflecting how short contests (of maybe four hours) have become so popular. No surprise really, given the demands on people's time. It's noticeable in the HF arena with contests such as the excellent Sprints and also in the VHF events such as the RSGB's Backpacker contests. Both have done a great deal to stimulate new interest in the contesting field. If you haven't taken part in these events, why not make an effort to do so this year? You can do it with a minimum of effort and disruption to your life and, if you've not tried one before, may well find it is a new facet of amateur radio which appeals to you.

2nd 70MHz FIXED 1999

MOST ENTRANTS found conditions flat, with heavy QSB and the QSO numbers verified this. The only station to do well was GD0EMG, who found over 80 stations to work. This is almost certainly due to the large station they managed to put together. Coupled, perhaps with the fact that GD is in an almost ideal location to take advantage of 70MHz propagation. Once again there were several stations active who failed to put in an entry - please try to give your neighbour or friends a nudge if they are one of these. Although the advent of the FT-847 has brought more activity to this band, transverters were the order of the day. Thanks to Roger, G4BVY, for his checklog.

Martin Platt, G4XUM

2nd 70MHz Fixed 1999

Single Operator

Pos	Call	Score	Loc	QSO	Power	Antenna	Best DX	km
1	GD0EMG	26330	IO74QD	82	160	2x8	GU6EFB	543
2	G4RFR	9918	IO90AS	55	90	12	GM6CMQ	596
3	G6RC	4411	IO91VC	34	100	4	GD0EMG	452
4	G7RIH	4170	IO91RR	38	20	5	GD0EMG	383

Multi Operator

1	G3MEH	5267	IO91QS	51	80	6	GD0EMG	377
2	G3NKS	5116	IO81XU	45	100	6	GM6CMQ	477
3	G3XDY	5057	JO02OB	27	150	6	GD0EMG	453
4	G3TCU	4120	IO91QE	35	150	6	GD0EMG	425
5	G0GCI	4113	JO01ED	28	100	4	GD0EMG	474
6	G3LVP	3209	IO81WV	34	50	7LPY	GD0EMG	301
7	GW4HBK	2946	IO81KP	23	40	5	G3XDY	302
8	G4JTJ	2767	IO92SD	31	30	6	GD0EMG	356
9	G1KHX	2561	IO81MI	21	90	5	GD0EMG	330
10	G3FIJ	2479	JO01KV	17	15	4	G3BPM	278
11	G4OUT	1734	IO92AT	14	10	HB9CV	GD0EMG	230
12	G3UHN	1644	IO91UT	17	30	3	GD0EMG	394
13	G3BPM	1497	IO80OV	11	50	DIPOLE	GD0EMG	386
14	G4SJH	1293	IO91PI	14	10	3	GD0EMG	407
15	GM3TAL	1282	IO86GA	8	30	6	G3SKR	505
16	GW1SXT	892	IO81LQ	10	10	3	GD0EMG	293
17	GM4DIJ	388	IO85IW	7	50	4	GD0EMG	217
18	GM4UYZ	184	IO86HK	6	10	4	GM4ULS	57

144MHz TROPHY 1999

THE MAJORITY OF entrants rated conditions this year as 'above average' to 'very good'. The number of contacts made, the total scores and the best contact distances were significantly above those made in 1998. While entrants were enthusiastic about the level of activity from Europe, a number bemoaned the poor activity levels within the UK. The weather conditions were rated as perfect across the majority of the country, exceptions being sea fog on parts of the East Coast and dull, cold and wet weather in Northern Scotland.

A number of stations suffered equipment problems with failed linears and mast head preamplifiers. The prize must go to G4IVH/P, who operated from a bunker fifteen feet below ground level and claimed to have a bombproof receiver!

Logging standards were generally high, but some entrants lost significant points by failing to log correctly the callsigns of portable stations and exceptionally optimistic locators which bore no relevance to the country identified by the callsign prefix.

A close contest at the top of the Open Section resulted in The Northern Lights reversing the top two positions from 1998 to relegate the Parallel Lines into the runners-up position. M1A, operated by G4BAH, led the single operator section by a huge margin from GM4ZUK who repeated his runner-up performance. G4AEQ triumphed in the SS section for the third year in succession. Congratulations and certificates go to these stations and to those identified by (*) in the tables.

Roger Dixon, G4BVY

144MHz Trophy 1999

Multi Operator

Pos	Call	Score	QSOs	Locator	Pwr	Ant	Best DX	Loc	km	Group
1*	M0V	408257	933	IO94RJ	400	4*15+4*10	DL4MDQ	JN58SP	1050	The Northern Lights
2*	G8P	398304	1028	JO01QD	400	8*17+2*13	LA9CY	JO59HN	1101	Parallel Lines CG
3	G5B	312305	895	JO03AD	400	8*12+8*11	SM7WSJ	JO67WI	991	Five Bells CG
4	G8L	184912	565	IO90JO	400	4*19	F8NSC	JN12EK	948	Victory CG
5	G0VHF/P	178224	515	JO01PU	400	4*9+2*15	OL2O	JN79IO	976	Villa CG
6	DL2KK	177886	675	JO30FQ	400	2*10	GM4JJJ	IO86GB	887	Reigate ATS
7	G3ZBI/P	119834	512	IO93BA	400	18	SK7MW	JO65MJ	1003	Nunsfield House ARG
8	G3WRS/P	105938	326	IO94MJ	400	4*17	DF9ZP/P	JN49PU	862	Wakefield&DARC
9	G2XV/P	71847	327	JO02CD	200	4*17	SK7MW	JO65MJ	916	Cambridge&DARC
10	GX4NOK	69181	246	IO93FR	400	10	SK6HD	JO68SD	1057	North Wakefield
11	G8SRC/P	67431	303	IO91CL	150	2*17	DF0TAU	JO40XL	829	Swindon&DARC
12	G7RIH	61218	276	IO91RR	160	17	OZ1BEF	JO46OE	807	Dacorum AR&TS
13	G0DLR	36899	209	JO01EI	400	15	GM4VHU	IO87FH	709	Culverstone CG
14	G6YDD/P	24968	149	IO82OC	100	10	F1DBE/P	JO09TD	830	Hereford ARS
15	GM0FRC/P	24617	102	IO76UA	100	2*15	TM1H	JN09TT	796	Falkirk RC
16	M1BWT	22247	161	IO91PR	100	2*11	DK0BN	JN39VX	627	

Single Operator

Pos	Call	Score	QSOs	Locator	Pwr	Ant	Best DX	Loc	km
1*	M1A	350331	902	JO02OD	400	2*2*17	OE5M	JN69PC	970
2*	GM4ZUK/P	137202	329	IO86RW	400	4*13	TM6P	JN19PG	936
3	G4IVH/P	63264	251	IO92WN	400	13	DK0ES/P	JN48TN	819
4	GM4WLL/P	55553	185	IO85NR			DL2KK	JO30FQ	836
5	G4HLX/P	49487	238	IO91FN	100	13	DF9ZP/P	JN49PU	785
6*	G4HGI	32544	154	IO83PL	20	11	DL2KK	JO30FQ	698
7	G0IBZ	31001	138	JO02KA	280	2*14	SK7MW	JO65MJ	883
8	PE1EWR	26752	101	JO11SL	25	10	SM7LXV/7	JN65TM	803
9	GW8ZRE/P	18287	85	IO83JF	10		DL2KK	JO30FQ	719
10	G1TWS	15211	75	JO01HO	25	11	F5MSL/P	JN36BP	666
11	GW4HBK	5108	21	IO81KP	60	9	GM4ZUK/P	IO86RW	589
12	2U0ARE	1947	14	IN89RL	10	Discone	G5B	JO03AD	445
13	GM1BKF/M	326	8	IO85JV	5	rubber duck	GM0PSQ/P	IO86NL	78

Six hour, Single Operator, Fixed

Pos	Call	Score	QSOs	Locator	Pwr	Ant	Best DX	Loc	km
1*	G4AEQ	42259	132	IO93PE	200	2*9	SK7MW	JO65MJ	924
2*	G3MEH	26648	118	IO91QS	180	2*9	DK0BN	JN39VX	623
3	G4DEZ	19273	100	JO01IN	250	2*13	GI6ATZ	IO74AJ	545
4*	G4XPE	7552	34	IO92GU	10	10	TM6P	JN19PG	518
5	G7NBE	5930	28	IO92GS	80	9	GM4ZUK/P	IO86RW	470

Six hour, Open

Pos	Call	Score	QSOs	Locator	Pwr	Ant	Best DX	Loc	km	
1*	G4ADV/P	10351	44	IO70MM	400	2*8	GM4ZUK/P	IO86RW	731	Newquay&DARS

SSB FIELD DAY 1999

THERE ARE TWO vital ingredients that go towards making a successful field day weekend - good weather coupled with good band conditions. In recent years the weather has been challenging, to say the least, and propagation has varied from poor to good. Well, there weren't many complaints this time, hot and sunny weather prevailed.

21MHz was particularly productive, staying open until well into the evening, with long runs of Stateside contacts available for the Open Section groups. 14MHz was busy as usual and certainly helped the restricted stations to increase their QSO and multiplier rates. Broadband noise affected 40m in the early evening, causing many groups to miss out on vital inter-G contacts. In the weeks prior to SSB Field Day, the solar flux climbed to an amazing 248, giving expectation that 10m would be in great shape. Unfortunately, over the weekend, WWV was showing a figure of 130 and correspondingly few contacts were made. My observations over the months since indicate that an SFI of over 200 will bring good sustainable DX conditions, with plenty of runs to Stateside. Under these conditions, W6, 7 and 0 call areas are very workable on even modest antennas. It pays to keep an eye on the DX Packet Cluster which regularly shows the current WWV SFI, A and K index figures.

This event is particularly attractive to amateurs new to HF or indeed the hobby. It provides a fun weekend out of doors, together with the chance to operate a competitive station under supervision. There were some 200 operators overall listed on the summary sheets with, as last year, plenty of G0, M0 and Class B licensees. It is hoped that we now see an emergence of M5 callsigns also.

Congratulations once again to the Bristol Contest Group, G6YB/P, for another convincing win in the Open Section. The Windmill Contest Group, G3GRS/P, regained their now-traditional position at the top of the Restricted Section also by a good margin.

Chris Burbanks, G3SJJ

SSB Field Day 1999

Open Section

Pos	Group	Call	3.5 Qs	3.5 Ms	7 Qs	7 Ms	14 Qs	14 Ms	21 Qs	21 Ms	28 Qs	28 Ms	QSOs	Mults	Score
1	Bristol CG	G6YB/P	180	30	205	38	831	92	302	64	38	34	1556	258	1,303,932
2	East Notts CG	G3TBK/P	173	20	219	29	433	56	659	56	27	16	1511	177	895,089
3	Lichfield ARS	G3WAS/P	211	21	219	32	379	67	474	52	30	30	1313	202	779,518
4	Windy Yett CG	GM5VG/P	192	22	209	36	254	56	508	54	29	21	1192	189	655,074
5	Port Talbot ARC	MW0AGE/P	104	12	195	30	434	64	284	45	13	9	1030	160	559,840
6	South Notts ARC	G0OAU/P	133	16	48	17	207	45	632	50	24	16	1044	144	496,656
7	Swansea ARS	GW4CC/P	121	15	174	24	194	37	411	45	30	17	930	138	445,464
8	South Wirral CG	G3CSA/P	97	13	142	22	320	37	445	41	8	6	1012	119	401,030
9	Melton Mowbray	G4FOX/P	137	15	207	20	142	38	404	43	7	5	897	121	381,392
10	Ipswich RC	G4IRC/P	155	15	247	24	98	41	168	29	23	13	691	122	307,928
11	Banff & DARS	GM0PYC/P	171	15	141	15	227	42	87	28	3	3	629	103	233,089
12	Clifton ARS	G3GHN/P	129	13	55	7	206	47	218	34	3	3	611	104	228,280
13	Highland CG	GM0LRA/P	117	14	81	15	208	53	127	27	5	5	538	114	225,834
14	Horsham ARC	G4HRS/P	171	14	115	14	91	32	149	21	35	19	561	100	211,400
15	Strathmore ARC	GM3GBZ/P	212	18	143	14	218	39	45	18	1	1	619	90	206,280
16	Edgware & DARS	G3ASR/P	163	15	98	16	118	35	19	11	7	5	405	82	127,346
17	Hastings E & RC	G6HH/P	131	11	77	10	74	30	66	25	9	5	357	81	114,210
18	S Derbys & Ashby	G0SRC/P	96	8	81	14	76	28	85	19	21	10	359	79	104,043
19	Bangor & DARS	GI3XRQ/P	79	13	51	7	130	21	20	12	1	1	281	54	53,622

Restricted Section

Pos	Group	Call	3.5 Qs	3.5 Ms	7 Qs	7 Ms	14 Qs	14 Ms	21 Qs	21 Ms	28 Qs	28 Ms	QSOs	Mults	Score
1	Windmill CG	G3GRS/P	208	22	188	22	107	42	109	36	21	15	633	137	342,500
2	Granta CG	M0CAM/P	212	18	155	21	110	41	54	21	17	9	548	110	248,820
3	Echelford ARS	G3UES/P	151	16	177	26	118	29	58	24	7	5	511	100	202,300
4	Crowborough & D	G0CRW/P	173	15	87	17	67	30	42	21	10	6	379	89	142,756
5	South Downs	G3WQK/P	155	15	96	15	69	35	45	19	9	7	374	91	128,856
6	Havering & DARC	G4HRC/P	244	20	133	15	33	22	34	16	1	1	445	74	134,458
7	Wisbech AR & E	G4PQL/P	182	18	122	19	33	18	49	21	9	8	395	84	132,384
8	Hereford ARS	G3YDD/P	160	13	87	9	64	22	58	32	7	3	376	79	124,346
9	Queen Mary CG	G6QM/P	151	12	136	18	59	27	32	17	2	1	380	75	117,150
10	North Norfolk	G0NWT/P	131	11	163	13	57	24	27	15	1	1	379	64	95,936
11	RAFARS	G8FC/P	143	10	96	18	58	23	37	15	3	1	337	67	95,274
12	Itchen Valley	G0IVR/P	60	8	71	9	77	32	33	15	4	4	245	68	67,932
13	South Dorset RS	G3SDS/P	57	9	73	12	66	32	33	19	3	3	232	75	57,675
14	Isle of Wight CG	G3SKY/P	146	11	59	9	65	27	9	9	0	0	279	56	63,504
15	Basingstoke ARC	G3TCR/P	97	9	53	8	72	28	22	14	0	0	244	59	53,985
16	Wigan-Douglas V	G3BPK/P	65	8	61	7	31	18	6	6	0	0	163	39	28,158
17	Widnes/Runcorn	G0FWR/P	23	7	103	15	21	12	8	3	0	0	155	37	20,535
18	Gt Yarmouth RC	G3YRC/P	37	5	47	4	26	17	25	10	0	0	135	36	19,872

Checklogs: GM4LVW/P, GM0AYR/P, G3UFY, YU7SF

LOW POWER 1999

THIS YEAR THE weather in most areas was fine and sunny, which made the event more enjoyable than ever. The contest coincided with VHF Field Day, which caused some shortage in CW operators for the Low Power contest. It also overlapped a DARC contest. There was a slightly lower entry than last year, probably because of the clash with VHF Field Day.

Poor conditions on 80m were evident, and after about an hour in some areas 80m was almost dead. This got worse the further north one operated. Most of the high scores were due to those stations who had activity on 80m.

Congratulations to East Barnet ARCC who won the Houston-Fergus Trophy for the10W Portable section, and G3HEJ who won the 10W Fixed Section and receives the 1930 Committee Cup.

In the 3W Section, the Leicester Radio Society, G2AA, won the Southgate Trophy for the portable event, and GM3JKS won the fixed station award. A certificate goes to G0KRT for his first contest entry.

D Mason, G3RXP

Low Power July 1999

Fixed Section 10W

Pos	Callsign	Score
1*	G3HEJ	1297
2	G4ARI	1107
3	G4CZB	1088
4	G3GLL	843
5	G2HLU	745
6	G4XPE	560
7	G3JQV	407
8	G4BJM	115
9	G0KRT	111

Fixed Section 3W

Pos	Callsign	Score
1*	GM3JKS	1016
2	G4OGB	1013
3	G3VIP	869
4	G4DDX	762
5	G4EDG	544
6	GW0KZW	331
7	M0AEK	146
8	G0VZC	102

Portable Section 10W

Pos	Callsign	Score
1*	G6KQ/P	1419
2	G4FOX/P	1186
3	G4BP/P	831
4	G8CA/P	612
5	G3CQR/P	381
6	G3YRC/P	266

Portable Section 3W

Pos	Callsign	Score
1*	G2AA/P	944
2	G4HRC/P	743
3	G2CP/P	702
4	G0IGP/P	675
5	G4AYM/P	646
6	GW4LZP/P	622

2nd 23cm/13cm FIXED, 1999

MOST FOUND CONDITIONS for this contest poor, with little in the way of DX available. The exception was G7LRQ, who managed to find some good contacts resulting in an excellent score on 23cm. 13cm entries are up on the previous contests, with G3XDY just heading the field. There were no multi-op entries this year, although at least one group did operate portable. Hopefully the opening-up of this and other 'fixed' contests to all will see a further improvement in activity in 2000.

Pete Lindsay, G4CLA

2nd 23/13cm Fixed 1999

23cm Single Operator

Pos	Call	Loc	QSOs	Points	Best DX	Dist	Power	Ant
1*	G7LRQ	IO91TQ	33	4819	DK1KJG	531	100	4x55
2*	G3XDY	JO02OB	20	3489	GW8AWM	283	300	4x23
3	G4THI	IO93HC	15	2441	G3KTU	266	100	35
4	G4BRK	IO91DP	19	2227	PE1EWR	363	40	35
5	G8NEY	IO81VK	19	2120	G4DDK	249	200	55
6	G3MEH	IO91QS	21	2015	PA0WWM	352	100	2x35
7	G8ZQB	IO92JN	18	1904	G3KTU	207	100	40
8	G4GFI	IO91VH	19	1678	G8OHM/P	211	20	28
9	G4JTJ	IO92SD	14	1365	PE1EWR	285	25	2x23
10	PE1EWR	JO11SL	6	1292	G4BRK	363	10	2x23
11	G4LDR	IO91EC	9	1232	G4DDK	226	8	55
12	G4SJH	IO91PI	6	276	G4DEZ	101	18	15

13cm Single Operator

Pos	Call	Loc	QSOs	Points	Best DX	Dist	Power	Ant
1*	G3XDY	JO02OB	7	848	PA0WWM	223	60	44
2*	G4BRK	IO91DP	7	822	G4DDK	210	5	1.2m
3	G8ZQB	IO92JN	6	454	G3XDY	173	25	60
4	G4THI	IO93HC	3	307	G4BRK	164	4	25
5	G8NEY	IO81VK	3	305	G3XDY	245	40	44
6	G3MEH	IO91QS	4	135	G3XDY	130	5	67

*certificate winners

CONTEST CALENDAR

HF Contests

Date	Time	Mode	Contest
4/5 Mar	*0000-2359*	*SSB*	*ARRL DX Contest*
11/12 Mar	1200-1200	CW	RSGB Commonwealth Contest
18 Mar	*0001-2400*	*CW/SSB*	*Bermuda Contest*
25 Mar	*0000-2359*	*SSB*	*CQWW WPX Contest*
27 Mar	1900-2030	CW	RSGB Slow Speed Cumulative #1

VHF Contests

Date	Time	Mode	Contest
4/5 Mar	1400-1400	CW/SSB	RSGB 144/432MHz
18/19 Mar	*0000-2359*	*CW/SSB*	*DUBUS/REF EME Contest*
18 Mar	*1600-1900*	*CW*	*AGCW 144MHz Contest*
19 Mar	*0500-1100*	*CW/SSB*	*French 'Short Period' Contest*
28 Mar	1900-2100	CW/SSB	RSGB 144MHz Cumulative #1

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, which are listed in italics above, can often be found in the *HF* and *VHF/UHF* columns.

LF

DAVE PICK, G3YXM
178 Alcester Road South, Kings Heath, Birmingham B14 6DE.
E-mail: lf.radcom@rsgb.org.uk

PETR, OK1FIG, HAS been active from his country QTH and has added SM, G and PA to his tally of countries worked on CW. It is always interesting to see how stations develop over the months and increase the distances that they can work. In Petr's case, not only has he built a very neat switch-mode transmitter to replace his original experimental 'cardboard box' version, but he has also increased his receive performance with preamplifiers and filters. It is worth remembering that receiving is often the most difficult part of LF operation and at least as much effort needs to be spent on the receiving system as on the transmitter.

CALLING SWLS

TALKING OF receiving - if you are an SWL with a receiver covering the 136kHz band, why not see what you can hear? Many LF operators are experimenting with some aspect of their stations and usually appreciate reports, especially if they've been calling for ages with no reply! It's certainly a challenge and I am surprised that more SWLs are not active on LF, so how about it?

PSK31 AND QRS

NOT MUCH NEW on the PSK front, as not many stations are equipped for it at present. The distance record now stands at 1816km following a QSO between OH1TN and G3YXM. Reino, OH1TN, is always ready to try the mode, so I imagine that the record will be broken soon.

The most popular computer-aided mode, QRS (extremely slow CW), has been improved by Rik Strobbe, ON7YD. His *QRS* software now includes a 'dual-frequency CW' mode, which uses different frequencies to represent the dot and dash elements. They can now both be the same length and there need be no gaps within characters. The element length can thus be as short as a dot under the old version of *QRS*. This, and the lack of gaps, gives almost a three times speed advantage. I used to appreciate those long CQ calls; I had time to make a cup of tea...

If you have Internet access, you can download *QRS* and some other very useful free software to help you with your LF operation. *QRS 2.05* may be found at http://www.picks.f9.co.uk/QRS205.zip The most popular reception program is *Spectrogram* by Richard Horne, which enables you to read the 'visual CW' modes such as QRS. It may be found at http://www.monumental.com/rshorne/gram. html

A programme to calculate aerial efficiency, design loading coils, etc is *tant136.exe* by Reg, G4FGQ. His website, which has many other handy programs, is at http://www.btinternet.com/~g4fgq.regp

Finally, the 'Long Wave News' page, which keeps you up to date on activity, is at http://www.picks.f9.co.uk/136.htm

NEW CW DISTANCE RECORD

ON 19 DECEMBER, Marzio, I5MXX, had a two-way CW QSO with OH1TN. The distance between them is 2138km, which sets a new two-way CW record. The previous record QSO, between IK5ZPV and OH1TN, was CW from I to OH and QRS CW from OH to I.

NEW USA BEACON

AMRAD MEMBERS have set up a new, more powerful beacon, WA2XTF/12, in Front Royal, Virginia, USA. It has a 500m-long aerial which is supported by many trees and is earthed at both ends. At the transmitter end, 30m of wire are connected to an 80m 'well casing' and the far end of the aerial drops down to an earth stake in a pond! The 5WPM transmission on 136.745kHz has been copied at good strength in London, Ontario, a distance of about 500km. The beacon also transmits a few seconds of plain carrier between each callsign, for *Spectrogram* viewers.

CONDITIONS

THE WINTER HAS seen excellent propagation much of the time, with OH and SM being worked at 579 some evenings and still being Q5 during the day. Conditions vary from day to day, but mornings generally yield the best combination of low noise and good signals, whilst evenings can give the ultimate distances and signal levels. On the other side of the coin, there have been periods of bad weather and some LF stations with big aerials have suffered storm damage. Several stations across Europe have been off the air for quite some time over the winter. We hope to hear you all again soon.

John, G4GVC, in his shack. He has been the first contact for many LF operators and has now worked 18 countries on 136kHz CW.

INSULATORS

THERE HAS BEEN heated debate on the Internet recently about insulators for LF aerials. A high-Q LF aerial with a few hundred watts feeding it may have to withstand about 20kV. Most of us have had some problems with insulators and it seems that almost everything you can think of, from a cable tie to a ball-pen has been used. Mal, G3KEV, recommends trying ships' chandlers for a supply of suitable aerial insulators or, if those are too big or expensive, 'crab pot spinners' are an alternative. I'll stick to my toothbrushes! ♦

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DX-70TH

100W HF Transceiver plus 100W on 6 mtrs

£699.00

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*
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- *Superb TX audio and RX*
- *Excellent RX sensitivity*
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- *Scan facilities*
- *CTCSS encoder*
- *Noise blanker*
- *Quick offset for DX pile-ups*
- *IF shift control*
- *Separate HF & 6M antenna sockets*

DX-77 (E)

£599.00

- *Covers all HF Amateur Bands*
- *General coverage receive (150kHz - 30MHz)*
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EJ33U Electronic keyer **£29.95**
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DJ-491

70cms Handheld Transceiver

£189.95

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.

- *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!*

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Dual Band Handheld

£269.00

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.

- *Spectrum channel display*
- *Optional extended receive including Airband 108-173.995MHz 400-511.995MHz 800-999.990MHz*
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- *Over air cloning*
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- *100 memories*

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A new slim line 2 meter handheld that's easy to use and has an enormous clear display.

£169.95

- *Up to 5W output (with 9.6V NiCad pack)*
- *40 memories channels*
- *Cloning capable*
- *CTCSS encoder*
- *DTMF fitted*
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DJ-190E *Low Cost 2mtr Handheld*

A powerful slim line 2mtr handheld with a huge easy to read display.

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- *Up to 5W RF output (with opt. EBP-36N battery pack)*
- *40 memory channels*
- *Includes NiCads and charger*
- *CTCSS tone encoder fitted*
- *Battery save function*
- *Scan function*
- *Time out timer setting*

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**

£429.00

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."

DR-150E *2 Metre Mobile*

£279.95

- *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

- *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*

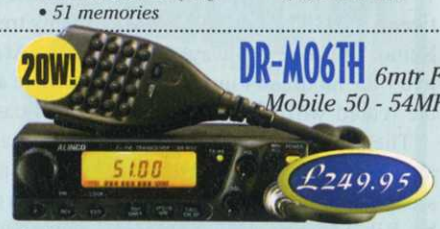
DR-605E *Dual Band Mobile*

- *50W (2m) - 35W (70cms)*
- *100 memories*
- *Full Duplex*
- *CTCSS encoder fitted*

£329.95

DR-M06TH *6mtr FM Mobile 50 - 54MHz*

20W!



£249.95

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*

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5 Watts output as standard!

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The new Alinco DJ-195 offers more power, features and convenience than ever before at no extra cost.

- *5 Watt output (with standard battery)*
- *Alphanumeric display*
- *CTCSS Encode and Decode fitted as standard*
- *DCS, Tone bursts and DTMF*
- *40 memory channels*
- *13.8V DC direct input facility with battery charge feature*
- ***THEFT ALARM!** Emits a tone when disconnected from power*
- *S Meter with easy to read display*
- *Direct frequency input*
- *Audio dialer*
- *Call cloning facility*
- *Computer programmable (with third party software)*
- *Experimental insect repellent feature!*

  Can the DJ-195 actually repel mosquitos? Activate the special tone and decide for yourself!

OPTIONAL ACCESSORIES

For DJ-195

EBP-48N	*9.6V 700mA high output NiCad battery pack*	£39.95
EDC-88	*Rapid Charger*	£64.95

For DJ-V5

EDC-91	*Rapid Charger*	£45.95

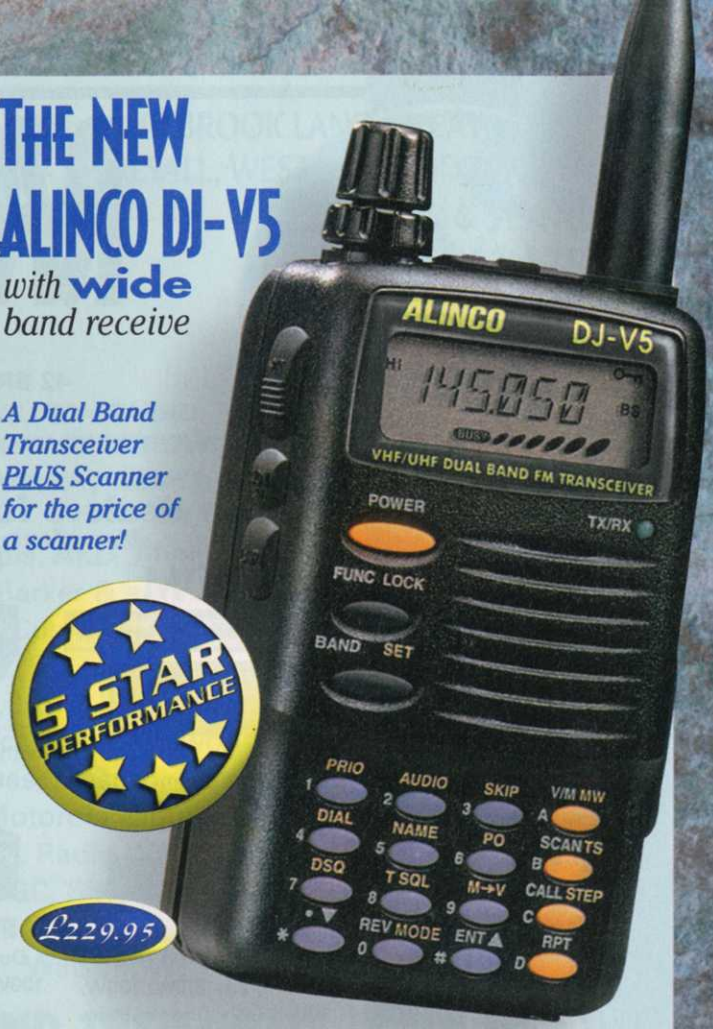
For DJ-195 & DJ-V5

EDC-36	*Car lighter cable with filter*	£13.95
EDC-37	*Cable for external power source*	£6.95
EMS-9	*Speaker microphone*	£29.95
EMS-47	*Speaker mic with volume control*	£19.95
EMS-51	*Miniature type speaker mic*	£24.95

THE NEW ALINCO DJ-V5

with **wide** *band receive*

A Dual Band Transceiver PLUS Scanner for the price of a scanner!



£229.95

*ALINCO introduces an exciting **NEW** VHF/UHF handie transceiver that will change the way you think about communications!*

The new Alinco DJ-V5 offers better value than ever before! Housed in a rugged case it is solidly constructed, with easy to use menus and outstanding audio quality. Its hefty 5W output ensures maximum possible range too!

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- *Wide FM for FM broadcast*
- *Up to 5W output (3 output settings: 0.5W, 1W, 5W)*
- *200 memory channels plus two call channels*
- *4 scan modes*

  BAND SCAN - Scans entire band in VFO mode

  PROGRAMMED SCAN - Scans channels programmed in memory for dedicated frequency range.

  MEMORY SCAN - Scans memory channels

  SKIP SCAN - Scans memory channels less ones marked to skip
- *5 programmable scan bands*
- *Priority Watch - monitors priority channel every 5 seconds*
- *Alphanumeric Display*
- *CTCSS Encode + Decode, DTMF squelch and 4 different European Tone Bursts*
- *Input voltage display with over voltage warning*
- *Autodial memories*
- *Automatic high temperature protection feature*
- *Standard high power 700mAh NiCad battery pack EBP-45N*
- *SMA antenna connector*
- *Eight different tuning steps*
- *Wire cloning capability*
- *Superb audio quality on receive*
- *Ideal for Packet operation*
- *Auto Power off*
- *Battery save function*

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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**

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

FT-1000MP AC
Dual Receiver. Digital 100W Competition radio.
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FT-VX 1R
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£POA

FT-847
The new mobile-base. DSP HF 2m-70cm 50MHz.
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FT-100
HF 6m/2m/70cm extra small mobile. Information to follow.

KENWOOD

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

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

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

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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
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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.

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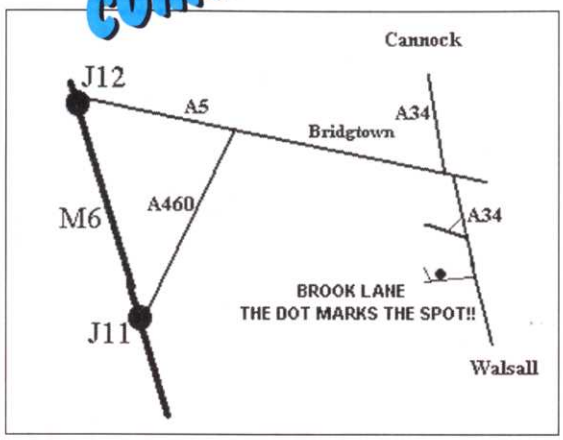

Remember, if you don't need it, we wont sell it to you phone or visit us for friendly, impartial advice on ALL of your communications needs.

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AND THEN SOME MORE!!

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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
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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
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KENWOOD	TS-850 TRANSCEIVER 0-30MHz	£695.00
KENWOOD	TS-870 DSP TRANSCEIVER	£1,195.00
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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
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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
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YAESU	FT-290R11 2M MULTI MODE	£275.00
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YAESU	FT-690 6M MULTI MODE	£295.00
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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
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YAESU	FT-730R 70cm/FM	£100.00
YAESU	FP-707 PSU	£95.00
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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
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The WiNRADiO Trunking Option
Trunking systems are used by public safety, transportation, business, law enforcement, government, military and other organisations. This software include major trunking modes: Motorola SmartNet® and MPT1327.

ONLY £69.00 inc vat

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3. Aircraft Addressing and Reporting System (ACARS)
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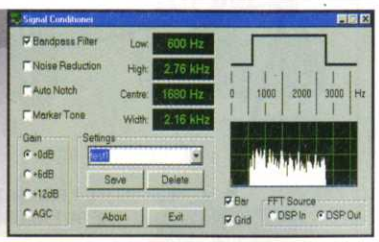
5. Squelch-controlled AF Recorder
6. DTMF, CTSS decode and analyse

The DSP applet provided with the WR3100i spectrum monitor ISA card (£995+VAT) allows continuous control of audio bandwidth and other signal conditioning functions.

ONLY £81.07 inc vat

(requires SoundBlaster 16 compatible sound card)



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- **WR1000e - £359 INC VAT**
- **WR1500e - £429 INC VAT**
- **WR3100e - £1169 INC VAT**

Each stand-alone unit connects to your PC through either the basic RS232, or through an optional PCMCIA adapter (for high speed control).
The units are powered through either your existing 12v supply, or through an (entirely optional) NiMH rechargeable 12v battery pack.

"It's software is excellent.. more versatile and less idiosyncratic than that of the Icom IC-PCR1000"
WRTH 1999 Review

"Five stars for its mechanical design"
WRTH 1999 Review

"Most Innovative Receiver"
WRTH 1998 Awards

Model Name/Number	WR-1000	WR-1500	WR-3100
Construction of internals	WR-1000i/WR-1500i-3100iDSP- Internal full length ISA cards		
Construction of externals	WR-1000e/WR-1500e - 3100e - external RS232/PCMCIA (optional)		
Frequency range	0.5-1300 MHz	0.15-1500 MHz	0.15-1500 MHz
Modes	AM,SSB/CW,FM-N,FM-W	AM,LSB,USB,CW,FM-N,FM-W	AM,LSB,USB,CW,FM-N,FM-W
Tuning step size	100 Hz (5 Hz BFO)	100 Hz (1 Hz for SSB and CW)	100 Hz (1 Hz for SSB and CW)
IF bandwidths	6 kHz (AM/SSB), 17 kHz (FM-N), 230 kHz (W)	2.5 kHz(SSB/CW), 9 kHz (AM) 17 kHz (FM-N), 230 kHz (W)	2.5 kHz(SSB/CW), 9 kHz (AM) 17 kHz (FM-N), 230 kHz (W)
Receiver type	PLL-based triple-conv. superhet		
Scanning speed	10 ch/sec (AM), 50 ch/sec (FM)		
Audio output on card	200mW	200mW	200mW
Max on one motherboard	8 cards	8 cards	3-8 cards (pse ask)
Dynamic range	65 dB	65 dB	85dB
IF shift (passband tuning)	no	±2 kHz	±2 kHz
DSP in hardware	no - use optional DS software	YES (ISA card ONLY)	
IRQ required	no	no	yes (for ISA card)
Spectrum Scope	yes	yes	yes
Visitune	yes	yes	yes
Published software API	yes	yes	yes (also DSP)
Internal ISA cards	£299 inc vat	£369 inc vat	£1169.13 inc
External units	£359 inc vat	£429 inc vat	£1169.13 inc (hardware DSP only internal)

PCMCIA Adapter (external): £69.00 inc when bought with 'e' series unit (otherwise: £99 inc)
PPS NiMH 12v Battery Pack and Charger: £99 inc when purchased with 'e' series unit (otherwise: £139 inc)
The WiNRADiO Digital Suite: £74.99 inc when purchased with a WiNRADiO receiver (otherwise: £81.05 inc)

To receive your completely free (no obligation) info pack and WiNRADiO software emulation demo disk all you have to do is get on the internet and go to our website at http://www.broadercasting.com. If you don't yet have easy access to the internet then by all means feel free to telephone us or send a fax.

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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

HALLICRAFTERS SX-101A rcvr, dedicated amateur band coverage 80-10m plus 50-52MHz. SSB/CW/AM, variable selectivity and IF notch filter. A classic rcvr in gwo, any demonstration, £85 ono. MCR-1 WW2 spy rcvr c/w 4 coil packs and matching AC PSU. Collectors Item. Serious offers only please. G3VLH, QTHR. 01342 714 402 (Crawley, Sussex).

HANSON W-730 SWR/power, 140-450MHz, also F-711V SWR/power 6m. 4 DRAE 3-way ant switches, 'N' connections, 70cm ZL 12-ele antenna special (new). 70cm Tonna crossed 21-ele. 70cm/2m 3301 colinear (new). Cushcraft 2m 10-ele beam. Yaesu AD-2 2m/70cm dual link duplexer. Winch for mast with wire. 50m UR67 cable. 12m 6-core cable with connectors. 2 stand-off wall brackets. Collection of RadComs, Jan 95 to Dec 99. Offers please for any items. Peter, G1MVV. 01703 863 709 (Southampton).

ICOM filters: FL-53A 250Hz, £65. FL-32A 500Hz, £30. FL-100 500Hz, £35. Icom IC-706 MkII DSP, mint, boxed, £580. Ameritron ALS-600 600W no-tune solid state HF linear, mint, boxed, £790. Sony SW-77 world band radio, boxed, £155. Icom IC-738 HF tcvr, £440. GI3KDR. 01238 542 669 or mobile, 0836 639 608 (N. Ireland).

ICOM IC-756 HF+6m tcvr, boxed, man, in vgc, with Diamond GSV-3000 25A PSU or Icom IC-PS30 PSU and IC-SP3 speaker, £900. Icom AG-35 70cm masthead pre-amp, boxed, unused, £60 ono. Icom AG-25 2m masthead pre-amp, used, boxed, £35. Diamond triplexer, MX-2000, HF/VHF/UHF, £25. CX-401N 4-position co-ax switch, £20. CX-201 2-position co-ax switch, £10. Buyer pays carriage. 01986 798 524 (Woodbridge).

SIX metres? Mutek TVVF-50a transverter, £95. BNOS 100W amp, £95, vgc. Gone integrated rig. G3SVD, QTHR. 01635 434 37 (Newbury). E-mail: andy-hewitt@compuserve.com

STANDARD C-510A handie, 2m/70cm plus wide range receive, with nicad battery pack + rapid charger, cost £150 at Xmas, £130. 01782 723 444 (Stoke-on-Trent)

STRUMECH wind-up tower (60ft) plus Hy-Gain explorer beam, £250 the lot. Buyer inspect/collect. G6GNW, QTHR. 01297 560660 (E. Devon).

TS-700G, old but cond excellent, collectable, VOX mic, man, original carton, £180. No hagglers please. 01474 534 694 (Gravesend). Email: lbelger@aol.com

YAESU FT-101ZD FM, vgc, £250 inc new spare valves. Amplifier 2100Z, £250 inc costly new spare valves. 3-ele Yagi, damaged but all traps OK, £50. G4ISB. 0161 766 5265 (Manchester).

144MHZ QRO linear, Sagra, 600W+ output, brand new cond, £650 ono. IC-706 Mk1 vvgc, clean, £450. Carriage extra. Richard, G4HGI. 01744 895 139 (St Helens).

25FT Adapt-a-Mast, wall-mounted, 18in brackets, all galvanised, 2 years old, vgc, £150 ono. 01752 214 165 (Plymouth).

60FT three-section tilt-over tower in gc, 2 winches, £200. Buyer dismantles and collects. 02392 252 134 (Waterlooville).

ADVANCE signal generator type D1/D, 10-300MHz in 6 bands. 100mV, CW with 100dB attenuator. Sine wave or square AM, £60. Paxolin tubing 1¼in dia. Wall thickness 3/16in: 6in, £3; 12in, £5 plus postage. G3TJT. 01302 365 472 (Doncaster).

AERIAL tuner. Your prayers answered. Ex-military aerial tuning unit will tune anything HF, £25 ono, size dictates buyer collect. 01821 650 456 (Perth).

ALINCO DJ-95E dual band tcvr, boxed with spare battery, soft cover and mobile headset, £160. 2m-20m transverter, £8. M0COK, 0121 243 3805 (Birmingham).

ALINCO DJ-G5 dual-band h/held, c/w drop-in charger, 12V car lead, speaker mic, new nicad, dry cell battery case, £160. 01379 740 742 (Diss).

ALINCO DR-150E 2m mobile tcvr, no airband, £120. ADI AT-600 dual-band handy with two nicads, £100. Both boxed as new with mans and accessories. 01772 335 049 (Preston).

ALINCO DX-70TH, vgc, c/w h/book, DC lead, mobile mount, remote head cable (unused), £475. Come & try it out! Superb radio. 01354 741 168 (Cambs).

COLLINS complete HF/VHF station: 75S-3B, 32S-3, 312B-4, 516F-2, 30L-1, 62S-1 (very rare), SM-1 or SM-3, DL-1, valves, original mans & leads. Unusual opportunity to acquire all the famous Collins S-line at one time. Offers over £2,000 to Brian, GI4GNZ (non-smoker), QTHR. 028 2588 0740 (Ballymena). E-mail: gi4gnz@riola.com

DATONG FL-3 with leads, mint cond, used only twice, £65. 6m Tonna 5-ele beam, £35. Ray, G0WWU. 01553 761 309 (Kings Lynn).

DRAKE station, R-4B rcvr, T-4XB tx, MS-4 spkr-PSU, c/w mans and leads. Exceptional cond, ideal collector, £495 or offers. 01789 267 430 (Stratford-upon-Avon).

FT-840 under 12 months old, £400 ovno. 01327 350 632 (Northants).

FT-920 HF+6m, with MH-31 mic, FM board, CW filter, in exc cond, £800. Revex 12V 30A PSU, £55. SMC 12V 8A PSU, £15. Kenwood TH-205E 2m FM tcvr, £50. Icom IC-290D FM/SSB/CW 2m tcvr, £120. MFJ-948 VersaTuner2, £55. Comet CD-120 SWR 200W power meter, £25. Altai dip meter, £40. Grundig Yacht Boy short/medium wave rcvr, £10. All property of silent key G0JVG. Contact G3ZAY. 01223 424 714 (Cambridge). E-mail: g3zay@btinternet.com

FT-990 new 1998, mans, h/mic MD-1, desk mic, auto ATU not fitted, little used, £690. Palstar Hi pwr roller coaster ATU, £150. ATU plus FT-990 as package, £800. Prefer collect but discuss delivery. Bob, G3JJU. 01252 615 831 (Fleet).

IC-725 with FM, man, £350. 35A PSU, £60. MFJ-948 VersaTuner, £50. Lake 80m QRP, £60. 3.5-500MHz 200W load, £30. 01328 863 283 (Fakenham).

IC-735, CW filter, boxed, man, £295. SSM Europa 4m & 6m transverters, £15 each. MML144/30-LS, £20. MFJ-202 noise bridge, £15. VFO-120, £10. CDE AR-40 and Sky King 2303 rotators, £15 each. All above with mans. Power supply for Europas available if required, buyer collects or pays p&p. 01642 872 762 (Stockton-on-Tees).

ICOM IC-706Mk1, boxed, as new, £425. IC-2E h/held, £40. TR-2200 portable, £45. Yaesu ATUs, FC-707, £80; FC-757AT auto ATU, £120. Both as new. ERAII microreader, as new, £85. MC-60 base mic, £60. Outbacker Perth plus junior HF/2m/6m mobile antenna, as new, £100. FT-767GX base station, auto ATU, PSU, filters, boxed, £435. FM-1000 4m, £120. FT-726R 2m, 70cm, 6m, HF satellite board, as new, boxed, £595. Tokyo HT-20 20m mobile, £100. SM-220 + BP-5, £200. 07970 214 039 (Norfolk).

ICOM IC-735, keyer, 500Hz filter plus PS-55 PSU, all boxed, mans, immaculate, £475 no split. New unused desk mics - Yaesu MD-100, £35; Icom SM-20, £25. Tektronix D-755 100MHz dual beam 'scope, man, probes, £200. AR-88D, £60. Daiwa CN-620A QRP/QRO SWR bridge, £35. International & US Callbook CD-ROMs; Dec 1996, £5; Nov 1997, £5. G3WGN, QTHR. 01531 660 461 (Ledbury, Herefordshire).

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-756PRO bought in error, still boxed and sealed, brand new, reasonable offers. 01623 484 950 (Mansfield).

JAYBEAM TB3 3-ele beam, dismantled, fit roof rack, £195. Yaesu rotator, £40. Comet 160m VSWR/power meter, £40. Balun 1:1, £19. 01568 614 470 (Leominster).

KENWOOD TL-922 linear amplifier. A perfect example of this high quality amplifier, cw man & original packing. £985. Roger, G3XFA. 01832 273 123 (nr Peterborough).

KENWOOD TR-751E 2m multi-mode tcvr, boxed, as new, with mans, 25W, 2 x Kenwood mics, bargain, £375. Tokyo hi-power HL-160V, up to 200W, 13.8V DC with 10W input, mobile amp, very substantial on 2m, £180. 150A 13.8V DC PSU!! Ideal for large mobile amps! Easy run 1kW, £220. Alex. 0956 388 184 (Bucks).

KENWOOD TS-140S HF all-band rcvr complete with mic, h/book, leads, £350. Kenwood PS-430 PSU, £50. Both exc cond. 01723 862 169 (Scarborough).

KENWOOD TS-430S complete, filters + FM, boxed, mans, PS-430, AT-230, £425. Mutek TVVF-144a 10m-2m transverter, £75. Altron 3-section dual winch telescopic tiltover mast + head, ext tube, Kenpro KR-600RC rotator, £450. 01268 757 263 (Benfleet). E-mail: lesr@travel-travel.co.uk

KENWOOD TS-520SE tcvr, TU-4 antenna tuner, 500ohm dummy load, Morse key (plus spare), table-top mic, Daiwa CN-520 antenna tuner, headphones, Yaesu FT-230R mobile tx, prof aerial + boot mount, Kenwood TH-25E h/held, Kenwood BC-9 wall charger, Kenwood HMC-2 h/set with VOX/PTT, Kenwood battery charger. Many extras incl: 18 x 4.5ft mast sections, guy ropes, cabling, soldering irons & many more extras. Entire parcel for £400 ono. Len Rees, GW0RIL. 01597 823 823 (Llandrindod Wells). E-mail: len@dunblair.ndo.co.uk

KENWOOD TS-940S, £600. CN-620A SWR and power meter, £50. Icom IC-W21ET with battery charger BNC-03-UK, £150. MC-425 Trio mic, £20. All in gc in original boxes with instruction mans. Offers invited. Carol-Ann Williams. 01695 723 601 (office hours) or 01254 831 581 (eve).

KENWOOD-Trio TS-830S HF tcvr, £350. Yaesu HF-1200 linear, £425. Kenwood 770E, 2m/70cm tcvr, FM/SSB, £195. Kenwood SP-230 speakers (2), £50. MFJ-962C VersaTuner Mk3, £150. Sagra 6002MFM linear, £300. KR-400 azimuth indicator, £100. DRAE 4A PSU, £15. Squeezeele Morse key, £25. Tono Theta-9000E Morse/RTTY terminal and monitor, £100. KDK VHF/FM 2m mobile tx, £35. Jason kit oscilloscope, AVO sig gen, Universal AVO meter – offers? All items vgc and in wkg order, many boxed with mans. 01737 373 373 after 6pm.

LINEAR Amp UK Explorer 1000, 1kW output all bands 160 - 10m, 2 hours use, 2 x 3-500Z tubes, weight 83lb, buyer must collect, cost £1350, accept £800 ono. Vibroplex original, immaculate, s/n 102939, little used, £60. FT-101, tatty, gwo, fan, no mobile PSU, £100. Prefer buyer collects or by arrangement. 01603 270 363 (Norwich).

MARCONI Atlanta rcvr, vgc, £80. G2DAF SSB rcvr, £50. 813 linear with built-in PSU, £30. 813 valves, £15 ea. Eimac 4CX250Bs with bases and chimneys, £25 ea. Leak Troughline tuner, £25. Will haggle or PX for military radios. Simon. 02380 394 912 (Southampton).

MARCONI TF-2960 test set with band three, IFR-1200S test set with spectrum monitor, 1000MHz. Offers. Band three radios, some new. Offers. Can deliver. 07802 227 934 (Leeds). E-mail: chris.j.gill@nokia.com

MORSE keys. Type D, £35. Gambrell, ebonite base, c1910, £75. Single paddle, heavy black base, £20. H/made bug, £10. Headphones. Browns A&K low resistance, £15. Dr Nesper, 2000 ohms, £20. Roller coaster, £12. Ceramic coil formers up to 6x4in. Eddystone capacitor mounting brackets. SX-200N scanner with accessories, man, 26-88, 108-180, 380-514MHz, £50. Postage extra. G2HLU, QTHR. 01929 423 927 (Swanage).

OFFERS for following equipment: Trio TR-7730, Yaesu FT-290R, Alinco DJ-480, Tokyo 2m linear. Sony ICF SW55, boxed, as new. TH-25E. G3UCE, QTHR. 01524 822 125 (Lancaster).

PAKRATT PK-232, software, h/book, leads, £80. G0WHO. 01723 352 879 (Scarborough). E-mail: g0who@fdn.co.uk

QTH Devon-Cornwall border, 650ft ASL, very private but not isolated, original part of house 300+ years old, ½ acre 3-beds, double garage, large workshop, summer house, lovely views over Bodmin Moor. Offers around £185,000. M0AZG, Jan. 01566 782 464 (Launceston).

RADCOM bound volumes 1965-1997, vgc, kept in display case, £250. G3UGL, QTHR. 01234 750 050 (Cranfield).

RADIO QTH, 3 beds, 2 rec, 100ft garden, radio room plus basement workshop, 70ft tower, TA-33jnr, 80m, 40m dipoles, £125,000. 01273 605 132 (Brighton)

RADIO shack PRO-2042 scanner, 25-520MHz, 520-1300MHz, 1000 memories, new, £95. Reason for sale, bought IC-8500. 01235 868 498 (Wantage).

SALE FT-707 Yaesu tcvr with h/mic, instruction book, £200. Plus carriage, or collect. 01407 832 841 (Anglesey).

SHACK clearout (proceeds help sick animals). Assorted old valves, some unused, 65 for £20. Assorted circuit boards, ex-equipment, some DIY, etc, great for spares, 5kg weight for £20. Assorted 'junk box' full of 1000s of parts, great bargain, 8kg weight for £30. Assorted computer spares, modules, some unused, 8kg, £20. Cheques/POs to: Mrs A Green, 40 Seymour Close, Birmingham, B29 7JD.

SHACK clearout (proceeds help sick animals). Assorted resistors, mostly unused, including $^1/_8$W, ¼W, ½W. Great range of values. 2000 for £10. Assorted electrolytic capacitors, mostly unused, including radial, axial, up to 100V, 1µF to 1000µF. 500 for £10. Assorted 1W, 2W resistors, ideal valve work, all unused, 300 for £10. All post free. Cheques/POs to: Mrs A Green, 40 Seymour Close, Birmingham, B29 7JD

SHACK clearout: 13.8V 30A PSU kit, new, needs finishing, £40. Eddystone 898 dial, unused, £40. Tech TE-15 GDO, boxed, £15. WWII German key, £20. Giant ceramic knife switch, ex-US Navy, for open wire line, £25. SEM Z-match, £30. 2m J-pole, £5. DRAE 3-way antenna switch, £5. 1m-5m lengths of 75-ohm hardline/double shield coax, N-type connectors, £5-£15. G3WGN, QTHR. 01531 660 461 (Ledbury, Herefordshire).

SILENT key sale, G3OEM. Collins KWM-2, £350. 30L1 linear, £400. PM-2 PSU, £40. Homebrew 4CX-1000A linear, £150. Bird 4410A thruline, £100. Icom IC-29A, £50. Various Marconi test gear. G4YRT. 01273 593 162 (Brighton). E-mail: g4yrt@freeserve.co.uk for listing.

SILENT key sale, GM0TKM. IC-735 (hardly used), £350. TR-751, £275. FT-23 plus accessories, £100. AT-230, £100. PK-232, £100. Logikey, £50. Kent keyer, £35 (no paddles). Daiwa SWR CN-620, £35. Kenwood SW-100 SWR (140-450MHz 200W), £50. FL-3 filter, £60. Datong Morse tutor, £50. Discone ant, £25. Altai GDO, £10. NiCad chargers, £5. Yaesu SP-55 LS, £2. 7.1MHz traps, £5. 2-way coax switch, £10. Other items open to offers: Megger, Taylor meter, clip-on AC current meter, Sony ICR-2001 rvcr, AOR AR-1000 scanner, Audioline CB and PSU, R-1000 rcvr, 2m colinear, 2m HB9CV and 2m beam, Heatherlite mobile headset. Range of h/tools and verniers, micrometers, metal squares, etc. BNOS LPM50-10-100 6m linear amp, £100. Wanted: pair 4-400s and filament trans. GM4DGT, QTHR. 01506 890 959 (nr Edinburgh). E-mail: bill@gm4dgt.demon.co.uk

SILENT key sale. 2m station complete, working, separate SSB, FM units. 30W o/p. Rotators, antennas, mostly boxed. All mans, seen working, £250. Yaesu FRG-100, as new, boxed, £300 (or £250 with above equipment). G1XWZ. 01278 781 513 (Somerset).

SILENT key sale. Heathkit SB-100 with PSU, man, £50. Sommerkamp FRDX-500 rcvr with man, £45. Yaesu FT-290 multimode 2m tcvr, £100. Yupiteru MVT-5000 scanner rcvr, £50 with mains adapter. Realistic DX-400 mains/battery rcvr, SSB/AM, 100Hz-30MHz, £50. 12V PSU, 10A, £15. Eddystone GDO in wooden case, good cond, £50. Various valves, components, etc. Mike, G4BTE. 01902 751 936 (Wolverhampton).

SILENT key sale. Trio TS-520 tcvr (boxed, as new), Trio TS-700G tcvr (boxed, as new), Trio TR-2300 tcvr, Icom IC-240 VHF (boxed, as new), Icom IC-3PA power supply (boxed, as new), KW77 rcvr, M-PU1 tcvr, Stolle multimatic aerial (inc rotar box desk top and rotator attached to aerial), AEC SWR 40 antenna transmitter (boxed, as new). Best offers please. 01625 525 890 or 0771 343 9881 (Cheshire).

SILENT key, late GM3EXS. TS-940S, £650. FT-902DM, £350. FL-2100Z, £400. SP-901P, £30. Capco SPC-300 ATU, £85. Ham IV rotator, £200. Welz SP-250 SWR meter, £25. Jaybeam HF TB-3 MkII, £125. Strumech M3 P60, complete, £350. Carriage extra. Alastair, GM3WED. 01349 877 435 (Dingwall).

SONY ICF-2001D PLL synthesized rcvr with synchronous detection, 150kHz-30MHz AM/SSB/CW, 76-108MHz FM, airband, keypad entry, memory, 32-channel, scanning facility, battery/mains, h/book, gwo, £60 ono. Diamond X-510N 2m/70cm vertical base antenna, 8.3/11.7dB gain, 200W, 3x5/8, 8x5/8, centre loaded, 17ft long. This exc antenna is almost new & cost £140. Now surplus to requirements will sell for £55 ovno. 01239 654 880 (Cardigan).

SPECTRUM analyser Hewlett Packard HP-8558B, 100kHz-1500MHz, mans, bargain, £575. Eddystone 840, immac, EP14 Panadaptor 5-60MHz inc mans, £100, more!!! 01344 627 869 (Slough).

SWR & power meter, Daiwa, 1.8-150MHz, 15/150/1500W, £40. Dummy load, Vectronics, 1-650MHz, up to 1500W, £30. ATU, MFJ, model 949E, 1-30MHz, up to 200W, £80. Trio TS-930S with 500Hz CW filter, no auto tuner, £395. Heatherlite Hunter amp, (fault on 7MHz – otherwise good), £400. Emotator model 747SR (circular readout) for Tribander, £165. Used TB3 traps (11 off), £40. Ten-Tec 1500W ATU model 4229, £95. All equip of good appearance. G3IEW, QTHR. 01392 876 606 (Exeter). E-mail; g3iew@cwcom.net

TANDBERG 15 series reel-to-reel, £45. 9-pole ceramic switch wafers, 5kV, £6.50. Audio level indicators - AF in, LED moves - stereo, £2. HP-1415A TDR, offers? 100-ohm professional audio attenuators, £3. Wanted: Redifon R-551N synthesizer ARUII, working or not! 0181 297 2440 (London). E-mail: nikkioi@btinternet.com

TELEQUIPMENT D-52 dual-beam oscilloscope, £15. Philips 5108L func gen, £15. Two 4CX250B + bases, £15 per pair. All gwo. Suggest heavy goods collect or arrange. Ted, G4TLY. 01666 822 935 (Malmesbury). E-mail: g4tly.ted@virgin.net

TELEQUIPMENT S-51B 'scope, £25. 6B Mk1 'scope, £15. Oscillator 0.05-5.2MHz, 6 ranges, 75ohm o/p, in wooden case, + ext PSU, £20. Asynch carrier systems test units tx, 1& 2kHz outputs, £10, rcvr contains, 1CP1 CRT, GC108, 6AM6s, internal PSUs, £10. Plessey TDMS-6, 2¾in CRT, 12x12AU7, 3x12AX7 1x6X4, £15. TDMS-5, 2¾in CRT, 13x12AU7, 2x12AX7, 1x6X4, 1x6AQ5, £15. Two Heathkit Cotswold hi-fi loudspeaker cabinets, £25. Heavy duty 50V

PSUs, £12 each. Tony, G3KAG. 01335 324 393 (Ashbourne).
TENNAMAST, £125. G4MH minibeam, £40. Yaesu rotator, £40. FT-990AC all mode, auto ATU, filters, man, boxed, £650. Buyer collects & dismantles mast. Eric. 01253 726 685 (Lytham St Annes).
TEN-TEC Corsair MkII rcvr plus Ten-Tec PSU/LS, boxed, receipts. Vectronics & SEM ATUs. Diamond SX-200 SWR meter. Netset SWR meter. Straight key. Headphones. New complete G5RV plus 80m loading coils. Two low pass filters. Microset 20A PSU. Ten-Tec mic. All complete station, £950 ono. No splits. Buyer collects or carriage at cost. Everything in gwo, mostly used on QRP CW. Dave, G0NEZ. 01442 245 832 (Hemel Hempstead).
TL-922 vgc, £1060. TS-850SAT, narrow CW/SSB filters, voice keyer, £1060. Rotators: KR-400RC, £90; KR-600RC, £160. 53ft Tennamast, £230. 'Suffolk' 2m transverter, 10W, £90. 4m 'Meon' transverter, £90. 250W 4m amplifier with h/duty PSU (8122 valve), £230. Eagle 6Y 4m Yagi, only six months use, £105. M2 12-ele 2m Yagi, £130. Cushcraft R-7 40-10m vertical, £230. Butternut HF-3V 80/40m vertical, £95. 8122 valves £30 ea. 01248 750 615 (Llangefni).
TS-140S incl PSU, vgc, boxed, £600. 01925 269 655 (Warrington).
YAESU FT-1000MP HF tcvr, mint cond, mans, boxed, £1550 ono. HQ1 beam, Stolle rotator, plus cables, £75. MFJ-949E ATU, as new, £75. Hi-mound marble base HH-808 key, £25. FT-102, gc, mans, £250. M0BCB, QTHR, Tony. 0115 950 2138 (Nottingham).
YAESU FT-101E & spare PA valves - offers. Yaesu FRG-7700 HF rcvr - offers. Ray, G4LPZ. 01332 703 778 (Derby).
YAESU FT-102, FC-102, FV-102DM, SP-107, FTV-107R (144MHz only), 2 mics, mans, £250. 01234 852 007 eves (Bedford).
YAESU FT-726R 2m & 70cm. Satellite unit, workshop mans, technical supp, £400 ono. KW E-Zee match, £30. Datong D70 Morse Tutor, £20. 01952 251 478 (Wellington).
YAESU FT-726R with 2m, 70cm and satellite modules, mic, man, mint cond, £410. Buyer collects or carriage extra. G6FIT, QTHR. 0151 426 3375 (Rainhill).
YAESU FT-757GX2 with man, gwo, £300. Edward, G0WDT. 01782 717 837 (Staffs).
YAESU FT-901D HF all-mode tcvr, vgc, £250 ovno. 01579 344 935 (Liskeard).
YAESU FT-990 with FV-901DM, SP-901P, SP-6, silent key sale, £700. 01922 418 438 (Cannock).
YAESU line-up. SP-901P speaker, FT-101ZD Mk3 FM, FV-101DM ex-VFO-DIG, FL-2100Z 1kW linear, two FC-902 ATUs, YS-2000 2kW SWR/W meter, dummy load, Shure 444 mic, all mint cond with spare valves & mans at today's prices all worth over £900, will take £750 ono. Please ring after 7pm 0151 475 5706 (Liverpool).

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 510 400 (Bournemouth)

COLLINS 75A4 rcvr. Still looking! Any associated bits, loudspeaker, etc. Also need Taylor 45C valve tester and 455kHz Collins filters. 01743 884 858 (Shrewsbury).

SPY/Clandestine radio sets wanted by private collector. Accessories & incomplete units for spares also required. Bill, G8PUJ, QTHR. 0181 505 0838 (E. London).

TMC CV-591A SSB adapter or similar unit. Anything considered, but will pay fair price for good, original adapter. Also Collins accessories, eg speakers, filters, dummy loads, controllers, etc. Simon, G8POO. 01434 633 913 (Corbridge). E-mail: simon@nomis.co.uk

ANTENNA wanted: HF 10/15/20m vertical or mini beam. Will collect or pay shipping. Rich, G0TZD, QTHR. 01457 834 213 (Mossley, Lancs).
BAIRD mirror drum, any cond considered, for restoration as a working exhibit. Peter, G4JNU, QTHR. 0118 947 7573 (Reading).
CODAR CR-45 rcvr with coils and valves. Tony, G2AGH, QTHR. 01603 860 963 (Norwich).
CUSHCRAFT R7000 vertical antenna. G3RHR, QTHR. 01423 868 139 (Harrogate).
EDDYSTONE 880 rcvr required. 01484 654 650 (Huddersfield).
FOR nostalgic reasons Trio 9R59 and/or JR-500S(E) rcvrs. Please advise price wanted and cond. 01223 424 714 (Cambridge). E-mail: g3zay@btinternet.com
FT-990AC, low mileage with all filters. Substantial HF valve rcvr, 1950/60s, eg Labgear LG300, Panda or Viceroy. Thanks, Ken, G3XSJ. 01453 845 013 (Gloucestershire).
ICOM AT-150 ATU. Icom 435 linear amp. G3BPE, QTHR. 01373 826 939 (Westbury).
KENWOOD SP-230, AT230, must be in vgc. Also TS-830S h/book and service man. 01379 783 657 (nr Diss).
MILITARY radio equipment: A-16/PRC-316 in any cond and any accessories, also related test set R-5/RT-316. Racal TM-944 linear and COMCAL or similar manpack and associated items. Canon BJ-30 or similar compact printer to fit briefcase. John, G3GTJ, QTHR. 01963 240 319 (Castle Cary).
Mk123 & Mk122 'spy sets' & accessories. Mans for Plessey TSG-20 & PV-138 RTTY equipment. Siemens T-100 teleprinters, tools & unused spares. Ferrograph valve tape recorders. Nigel, G0UGD. 01323 486 822 (Eastbourne).
RE: Ken Bailey and RAE, many thanks to all who donated/lent books/papers to help me in 1997/8. Have Passed! On air soon, callsign awaited. If you lent me books and have not had them back yet please let me know, regret have mislaid names/addresses of 1 or 2 donors. 73! Ken Bailey, 40 Seymour Close, Selly Park, Birmingham B29 7JD.
RESLO ribbon mic. Rectangular version, as used by Beatles in 60s. Andy, G3UEQ, QTHR. 01903 690 371 (Worthing). E-mail: hearn@ic24.net
SHORT Wave Magazine volumes 1-5, also Short Wave Listener and Short Wave News. Good price offered. Please call Philip, RS95258. 01630 657 206 (Market Drayton).
SILENT key clearout or just not needed. Wanted for research project, QSL card accumulations, old call books, etc. Can collect. 0113 269 3892 (Leeds).
TEN-TEC Argonaut 515 QRP tcvr in perfect working order, for partially-sighted G3. 01264 352 619 (Andover).
TWO 'N' plugs for Andrews Heliax LDF 2-50 coaxial cable. Man for Heathkit SB-200 linear amplifier. G3JFC, QTHR. 01529 413 547 (Sleaford).
WANTED 2m rig, FM+SSB, 25W+ output, £100 (approx). Will collect 40 mile radius of Leeds. Alan. 01274 682 991 (Bradford).
WANTED Icom IC-706 Mk2G. 01294 607 232 (Stevenston).
WANTED Kenwood DFC-230 VFO. GW3HGJ, QTHR. 01291 650 252 (Chepstow).
WANTED T-1154 transmitter and R-1155N rcvr. Please call Peter on 0161 743 9544 after 6pm (Pendlebury).
WANTED Trio-Kenwood type YK-88SN 1.8kHz SSB narrow filter. G3IVH, QTHR. 01473 730 442 (Ipswich).
WANTED urgently, please help. Cannon cable mounted sockets, two 16-way females & two 12-way females, also two 10V 5A mains transformers or one 10V 10A transformer. Also to buy or borrow, April 1986 Short Wave Magazine. Frank, G3KJG. 0113 284 2597 (Otley).
YAESU YVM-1 video monitor, Yaesu SP-901P speaker, Yaesu YE-7A h/held mic. Please help. Thank you. Bob. 01667 455 338 (Nairn). E-mail: bobsus@tinyworld.co.uk

EXCHANGE

MOSLEY TA-33jnr 3-ele beam, 10/15/20m, for good 10m beam. G3BZB, QTHR. 01283 813 209 (Burton-on-Trent). E-mail: cunliffe@globalnet.co.uk
ROBIN 16th edition electrical test set for FT-901/902, c/w matching ATU & external VFO & speaker, for FT-901/902 complete with matching ATU and ext VFO + spkr or FT-102 complete with FC-102 & FV-102DM. FT-101ZD with matching equipment also considered. Ask for Steve, M0AJI. 01379 741 778 (Diss).

CONGRATULATIONS

To the following whom our records show as having reached sixty years' continuous RSGB membership this month:

M A Pyle, G2BLA Mr J D Baker, G3AJP Mr J G Carroll, GD0GBA

Corrections to the RSGB Old Timers' Honour Roll, published last month: Mr P J Cooper, G3CXI, joined the Society in January 1946; Mr J Spivey, G2HHV, joined in March 1939; Mr TWA Smith, G3EFY, joined in February 1948; Mr CDS Wintle, GU4GG, joined in February 1941; Mr I D Brotherton has the call G2BDV and joined in February 1941.

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*.

ABERDEEN ARS – 3, JS; 10, Talk by Maurice Hately, GM3HAT; 17, T 'Knots Bends & Hitches' by Stan Sutherland; 24, Coast Guard Visit; 31, T 'Digital Update' by Graham Knight, GM8FFX. Robert, 01224 896142.
APPLEDORE & DARC – 15, AGM. Brian Jewell, 01237 473251.
AYLESBURY VALE RS – 1, AGM. Roger, G3MEH, 01442 826651.
BANGOR & DARS – 1 T 'Air Traffic Control & Analogue Electronics', by Mike, GI4XSF. Mike, GI4XSF, 028 42772383.
BARRY ARS – 7, OTA, MP; 14, Preview of new Amateur Radio Promo Video, by Richard, GW4BVJ; 21, Final Planning Meeting, WARE; 28, Exhibition de-brief. Rich, GW4BVJ, 029 20762333.
BRAINTREE & DARS – 6, Sausage Supper; 20, ISWL by Keith, M0CLO. Keith, M0CLO, 01376 347736.
BROMSGROVE ARS – 7, Technical Topics Discussion (Using the RadCom items); T 'Micro Electronics' by Dave, G4EYJ. B Taylor, G0TPG, 01527 542266.
CAMBRIDGE & DARC – 3, T 'Noise Bridge Debugging - Mine Don't Work!!', by Mike, G8VCN; 17, T 'The Noise Bridge - Tuning Your Aerial', by Mike, G8VCN; 24, AGM. Bob, G0GVZ, 01223 413401.
CHELMSFORD ARS – 7, Technical Forum. Charles, G0GJS, 01245 256654.
CHELTENHAM ARA – 3, Constructors' Exhibition. John, G4PDQ, 01242 242336.
CHESHUNT & DARC – 1, Members' Forum; 8, JS, B&B; 15, OTA; 22, MP; 29, T 'Phase IIID Satellite', by John, G3WFM. David, M1DGS, 01920 463746.
COCKENZIE & PORT SETON ARC – 17, T 'Moonbounce', by David, GM4JJJ. Bob, GM4UYZ, 01875 811723.
COLCHESTER RA – 2, A talk from Peter Kirby, RSGB General Manager; 16, T 'Efficient Use of Energy in the Home', by Kevin Bell, M0BCK; 30, T 'Using the Packet Network' with a demonstration, by Clive, G1EUC. Frank, G3FIJ, 01206 851189.
CORNISH RAC – 2, T 'Pre-IMD and DX Radio Operation', by Robin, G0MYR. Robin, G0MYR, 01209 820118.
COVENTRY ARS – 3, Indoor HF; 10, OTA - Novice Class – MP; 17, Skittles (provisional); 24, OTA - Novice Class – MP; John, G8SEQ, 01203 617367.
CRAWLEY ARC – 29, T 'Radio Navigation For the D-Day Landings', by Wally Blanchard, G3JKV. Stewart, G3YSX, 0772 0068493.
CRAY VALLEY RS – 2, CC; 16, T 'Kent Repeater Group: Trials & Tribulations on the Kent Repeater Scene', by Martin, G4RVV. Tony, G4WIF, 020 7 739 5057 (OH).
CRYSTAL PALACE & DRC – 1, Transverter Project and MP; 18, CON. Vic, G1PKS, 0208 653 2946.
DARENTH VALLEY RS – 8, ES; 22, AGM. K W Halls, G8VJG, 01322 663022.
DENBY DALE RS – 1, Denby Dale Club VID (Safety First); 15, T 'Stamps', by Geoff Bond; 29, ES at the Pie Hall Denby Hall; Tony, G4LLZ, 01484 664360.
DERBY & DARS – 22, AGM; 29, Q. Martin, G3SZJ, 01332 556875.
DORKING & DISTRICT RS – 28, T 'PSE QSL', by John, G3AEZ. 'Meteor Scatter', live demo by Nick, G7DND. John, G3AEZ, 01306 631236.
DUNDEE ARC – 7, T 'Construct Your Own Yagi', by Stewart Cooper, GM4AFF; 21, T 'Computer Logging', Bob Ganson, MM1BTD; 28, T 'RADAR Days', by Bill Dow. M Black, GM0PIV, 01382 455771.
ECHELFORD ARS – 9, T 'The Gramophone Lecture' & Demo by John Taylor; 23, T 'Discussing Valves', by Rod Burman, G4RSN. Robin, G3TDR, 01784 456513.
EDGWARE & DARS – 9, T 'Those Magnificent Men', by Tony, G0IGP; 23, T 'Computer Viruses', by Mark, M0CMC. David, G5HY, 01923 655284.
EXETER ARS – 13, CC; 20, OTA. D I Smith, G0WHJ, 01392 434078.
FAREHAM & DARS – 1, T 'How To Use a Multimeter', by G3XPH; 15, T 'The £400 Radio'; 22, T '10,000 Years of Radar'; 29, T 'Circuit Diagrams & Components - Part 3'. Steve, G7HEP, 01329 663673.
FARNBOROUGH & DARS – 8, T 'Helical Dipoles', by John, G3KND; 22, 'Hernia Cup' – Q. Norman, G0VYR, 01483 835320.
FELIXSTOWE & DARS – 6, Rig Clinic by Iain, G0OZS; 19, (Sunday) 2pm - set up R7000 antenna; 20, T 'Fixed & Mobile Antenna Installations'. Paul, G4YQC, 01394 273507.
GLOUCESTER AR & ES – 6, T 'Gloucestershire Repeater Group'; 13, OTA; 20, MP 5WPM; 27, OTA. Tony, 01452 618930, OH.
GOOLE RES – 3, Fund Raising Night; 10, Hobbies Exhibition Planning; 17, Contest equipment check; 31, T 'Dxing', by Neil, G4DBN. Ken, G6YYN, 01757 638539.
GRIMSBY ARS – 2, VHF OTA; 16, RSGB VID. Brian, G4DXB.
HALIFAX & DARS – 21, T 'Emergency Planning for Calderdale Council', by Dr. Paul Steed. Ray, 01274 600297.
HAMBLETON ARS – 1, OTA & Election of Secretary; 15, RSGB VID; 29, OTA. John, G0VXH, 018 HARWICH ARIG – 8, Hosting the Annual Inter-club Q. (Harwich, Clacton & Colchester). Eugene, G4FTP, 01206 826633.
HASTINGS ELECTRONICS & RC – 15, T 'General Astronomy', by Keith Woodcock & John Potter. Doug, G4ERA, 01424 812350.
HORNDEAN & DARC – 28, T 'Salvaging of the SS Great Britain', by Doug Hotchkiss, G4BEQ. Stuart, G0FYX, 01705 472846.
HORNSEA ARS – 8, ATV by G7MFO; 15, Museum pieces by G4IGY; 22, T by G4GPY; 29, RSGB VID, G4YTV. John, G0TPS, 01964 562258.
HULL & DARS – 3, Inter-club Q; 17, ARDF by G3PQY; 24, Field Day discussion and video by G0VVP. John, G0TPS, 01964 562258.
ITCHEN VALLEY ARC – 10, AGM; 24, ES. D C Symonds, G0PRZ, 01703 261877.
KINGS LYNN ARC – 20, ES; 30, ES. Robin, G0OJP, 01485 600473.
LEICESTER RS – 6, OTA; 20, OTA; 27, T 'Packet Radio', by Stan, G3HYH. A T Wann, G0TNI, 0116 2630947.
LEISTON ARC – 7, T 'Aerial Paraphernalia' by Alan Martindale, G3MYA. Sam, G4IFD, 01728 832999.
LINCOLN SHORT WAVE CLUB – 1, OTA; 15, Rig Operation - the FT920; 22, T 'Flying by Radio', by Ken, G3RRN. John, G1TSL, 01522 793751.
LOTHIAN RS – 8, T 'RADAR', by Prof John Roulston; 22, ES, St Fillans Church Hall. Brian, GM4DIJ, 0131 3342247.
LOUGHBOROUGH & DARC – 7, OTA 80m; 14, Annual Inter-club Q; 21, On Air with Weather Fax; 28, T 'Packet Radio-DANPAC', by Roger, G8XAN. Chris, G1ETZ, 01509 504319.
MAIDSTONE YMCA ARS – 3, Dummy RAE test; 10, Operating for beginners; 17, Peter Pickering on his Antennas; 24, Practical evening, Wiring Plugs; 31, Equipment testing & alignment. John, G0RHO, 01622 832259.
MID-CHESHIRE ARS – 1, Phase 3D Satellites by G0CZD; 8, Bring a piece of equipment; 15, 'Antennae 2', by G8DHQ; 22, Rifle Shooting in South Wales; 29, VHF OTA. Peter, G8HAV, 01606 553401.
MID-WARWICKSHIRE ARS – 14, AGM; 2, T 'Bits & Bauds 3' by Peter, G0HIH. Bernard, M1AUK, 01926 420913.
MORECAMBE BAY ARS - 14, ES; 28, Ron Bilson (Senior Air Traffic Controller, Warton). Brian, G0RDH, 01524 424522.
NEWBURY & DARS – 22, T 'Sporadic-E', by Geoff Grayer. Ian, G3RVM, 01635 826019.
NORFOLK ARC – 8, T 'How to go Digital...in one easy Lecture', by Chris Lorek, G4HCL; 22, T 'Science For All', Arnold, G3PTB. John, G0VZD, 01953 604769.
NORTH KENT RS – 7, JS; 21, Valve CC. Pete, G0GIR, e-mail: Silversands@aol.com
NUNSFIELD HOUSE ARG – 3, T 'Effects of TVI', by Derrick Brumbill; 10, T 'The Changing Face of Derby (with slides)', by Tony Bowler; 17, ES; 24, T 'History of Pencil Making', by Mr N Chambers; 31, T 'Magnetic Loop Antennas', by Martin Moss, G4WBK. Ann, 2E1GMP, 01332 752997.
OXFORD & DARS – 23, B&B. Dave, G3BLS, 01865 247311.

KEY

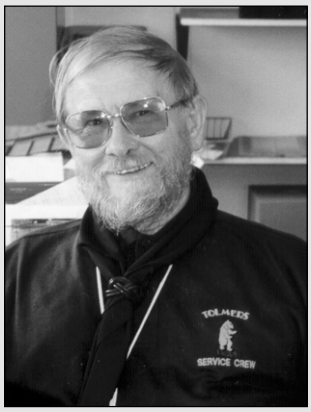
Club News
AD - Annual Dinner; **AGM** - Annual General Meeting; **ARDF** - Amateur Radio Direction Finding; **B&B** - Bring and Buy; **CON** - CONstruction; **CC** - Construction Competition; **D** - Details; **ES** - Equipment Sale; **EW** - Evenings/Weekends; **JS** - Junk Sale; **MP** - Morse Practice; **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.

Events Diary

PAISLEY (YMCA) ARC – 8, Data Transmission; 22, Safety in the Shack. Jim, GM3UWX, 01505 862817.
POOLE ARS – 10, T 'Fibre Optics and Lasers', by Dr Phil Mason. Colin Redwood, G6MXL.
RADIO SOCIETY OF HARROW – 10, AGM Grimsdyke Room; 11, GB2DHH OTA Mosquito Museum Special Event Station, Salisbury Hall, London Colney; 17 & 24, National Science week. Shack evening and activities; 3, T 'Radio control techniques for models' with demo by Dave bell, G0FAO. Jim Ballard, G0AOT, 01895 476933 or 020 72786421.
READING & DARC – 9, JS. Pete, G8FRC, 0118 969 5697.
SALOP ARS – 2, T 'Marine Radio & GPS', by Mr Beaman; 16, T 'When I was a Lad', by Stan Brown, G4LUT; 30, T 'The start of Television', by Tony, M0AMP. Fred, G3NSY, 01743 790457.
SHEFFORD & DARS – 2, T 'SETI, The Search For Extraterrestrial Intelligence', by Alan, G4LWA; 16, VID 'Campbell Island DXpedition' - ZL9CI; 23, G8EMJ Challenge Winners - 10 min talks; 30, Pre-junk sale sort out. Mike, G8BEG, 01462 816738.
SILVERTHORN RC – 3, Talk by Waters & Stanton PLC; 24, JS. David, G0KHC, 020 8505 1871.
SOUTH BRISTOL ARC – 1, 15m OTA; 8, Simple home Construction by Ken, G0TDS; 15, Radio Books - Buy/Sell/Exchange, Doug, G3KUL; 22, Q & RP, Muriel, G4YZR; 29, 10GHz OTA, Peter, G0DRX. Len, G4RZY, 01275 834282.
SOUTH NORMANTON & DARC – 6, AGM; 13, PSK31 The New Data Mode Demo by Russell, G0OKD (Shack); 20, JS; 27, SSTV (Shack). Russell, G0OKD, 01773 783394.
SOUTH NOTTS ARC – 1, OTA HF & VHF; 8, Peak 2000 Planning Meeting; 15, OTA HF & VHF; 22, 10-minute talks by club members; 29, OTA HF & VHF. 01509 672846.
SOUTHDOWN ARS – 6, Biannual ES. Brian, G4LYU, 01323 840530.
SPEN VALLEY ARS – 2, T 'Homebrewed Beer', by Roy, G4YDL. D. Russell, G0FOI, 01274 875038.
ST AUSTELL (G0ECC) ARC – 6, T 'Digital Cameras', by Chris, G4MXB; 16, ES. Reg, G4TRV, 01726 72951.
STOCKPORT RADIO SOCIETY – 8, Club Project Night 1; 22, T 'Weather Satellites', by Geoff, G4FAS. David, M1ANT, 0161 2850017.
STRATFORD UPON AVON & DRS – 13, ES; 27, GSM with G0JUQ. Ron, G0MRH, 01789 267430.
SURREY RADIO CONTACT CLUB – 6, ES. Ray, G4FFY, 020 86447589.
SWANSEA ARS – 16, T 'Digital Television'. Esso Lecture Room. Dave, GW4BNJ, 01792 519046.
SWINDON & DARC – 2, T 'Radio Controlled Steam Powered Boats and Miniature Engineering', by George Kirkham; 30, T 'Radio Kits & Kit Construction', by Tim, G3PCJ, of Walford Electronics. Den, M0ACM, 01793 822705.
TELFORD & DARS – 1, OTA; 9, Over £5 CC; 16, Pre-AGM and contest planning evening; 23, AGM; 30, T 'Stereocode Receivers' with demo by G3JKX. Mike, G3JKX, 01952 299677.
TROWBRIDGE & DARC – 1, ES. Ian, G0GRI, 01225 864698 EW.
WAKEFIELD & DARS – 7, Club HF rig tutorial; 14, Contest Meeting (new site); 21, T 'Special Attractions', by Ian, M0BFO; 28, OTA. John, G7JTH, 01924 251822.
WEST SOMERSET ARC – 7, VID. Alan, M0AOJ, 01643 707207.
WESTON-SUPER-MARE RS – 6, B&B; 20, Workshop. Graham, G8WAR, 01934 415700.
WIDNES & RUNCORN ARC – 8, Analogue Satellite TV; 22, Table Top Navigation. Martin, G4LUQ, 01928 714843.
WIMBLEDON & DARS – 10, First Aid with St John Ambulance. 01737 356745.
WIRRAL & DARC – 8, Talk & Slides by Glyn Parry on locations near the Wirral; 22, T 'Liverpool Airport: Past, Present & Future', by Dave Eastwood, Marketing Dept, Liverpool Airport). Andy, G7HUD, 0151 6774448 (eves).
WOLVERHAMPTON ARS – 9, T 'Aircraft Tracking - Ground to UIR', by Mark Campbell; 16, Martyn Vincent, G3UKV on 6m; 23, T 'Tachographs' with demo, by G3RSX; 30, OTA 2000 145.325MHz. J Smith, 01902 751936.
WORTHING & DARC – 1, Plans for Hobbies Exhibition; 8, T 'Turkish Earthquake', by G1HIM; 22, Model Radio Control with G4BWJ. Roy, G4GPX, 01903 753893.
YARMOUTH RC – 10, Antenna Workshop; 24, OTA. Tony, G3NHU, 01493 721173.
YEOVIL ARC – 2, Open Forum on Club Activities; 9, Talk by Bob, G7LNJ; 16, CC Adjucation, by G3SXY; 23, T 'Radio Astronomy', by Joe, G3KSK; 30, OTA. Malcolm, M0BHE, 01460 54657.
YORK RADIO CLUB (AMATEUR) – 2, Q c/o G0WUY; 9, MP with G4XIV & G0WUY; 16, T 'The Internet', by G8IMI; 23, MP with G4XIV & G0WUY; 30, T 'Radio Communications Agency', by M1CXM. Gareth, G1DRG, 01904 421392.

F C (FRED) STEWART, G0CSF



FRED STEWART died unexpectedly on 19 January at the age of 64. He had been the Council member for Zone C since being returned unopposed in December 1995 and December 1998.
A retired power engineer, he came into amateur radio through Scouting, where he was an Assistant District Commissioner. 'Radio Scouting' at Gilwell Park, run by Bill Livens, G2CKB, had excited his interest, and he became licensed as G0CSF in 1985.
He was a member of the Cray Valley Radio Society and of the Medway Raynet Group, and was a keen 'packeteer'. He held full amateur radio licences in Australia and in the USA, and was a US Morse Examiner. He was interested in many things, being very active in the Masonic Orders, in the Governance of the RSGB and the future of amateur radio, and was planning to become interested in photography.
He is survived by his second wife, Dorothy, whom he married in 1990, his first wife having sadly succumbed to cancer. Our sympathies go to Dorothy, his son Ian, and daughters Diane and Marian and their families.

Ian Kyle, GI8AYZ

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'.

11 / 12 MARCH 2000
LONDON Amateur Radio & Computer Show - Pickett's Lock Lane N9. OT 10am, £3 (OAP & under-14 £2.50, under-5 free), MT B&B, CP free, SIG, LEC, C, LB. 01923 893 929.

12 MARCH 2000
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 2000
ABERYSTWYTH & DARC, West Wales Amateur Radio & Computer Rally – Penparcau School, Aberystwyth. OT 10am, £1.00, TS, B&B, TI S22, SIG, C. Ray, GW7AGG, 01686 628 778.

19 MARCH 2000
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 2000
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 & Computing Exhibition – Norbreck Castle Hotel Exhibition Centre, Queen's Promenade, North Shore, Blackpool. OT 10.45/11am, £3 (OAP £1.50, under-14 free), TI on S22, TS, B&B, CP free, DF. 0151 630 5790.

26 MARCH 2000
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.
SCOTTISH THISTLE AMATEUR RADIO CONVENTION Radio & Computer Rally – Thistle Hotel, Annick Road, Irvine, Ayrshire. Access via the Warrix interchange A78/A71. OT 10.30am/11am. TI on S22, TS, B&B, LB, MT, LEC, WIN, DF, FAM, CP. Roger, MM0BRG, 01294 558 306 or e-mail roger@mm0brg.freeserve.co.uk
VINTAGE Technology 2000 – de Vere Hotel, Leisure Centre & Golf Course, East Park Drive, Blackpool. OT 9.00am, £4, CP, SIG. Brian, 01253 508 232.

9 APRIL 2000
WEST MANCHESTER RADIO CLUB Red Rose Rally – Horwich Leisure Centre, Horwich, Bolton, Lancs, of Jcn 6 M61. OT 10.30am/11.00am, £1.50 (OAPs £1), C, TS, B&B. Don, G3BSA, 09142 871 620 or e-mail don@g3bsa.freeserve.co.uk

16 APRIL 2000
CAMBRIDGESHIRE REPEATER GROUP Annual Rally – Bottisham Village College, Bottisham, 6 miles east of Cambridge, access via A14 and A1303. OT 10.30am, £1.50, TS, B&B, A, CBS, CP, TI on S22. 01462 683 574.
SWANSEA ARS Amateur Radio & Computer Show – Swansea Leisure Centre, on the A4067 Swansea to Mumbles coast road. OT 10.30am, £1 (children 50p), TS, B&B, SIG, LB, C. Roger, GW4HSH, 01792 404 422.
YEOVIL QRP Convention – Digby Hall, Hound Street, Sherborne, Dorset. OT 10.00am, £2, TS, B&B, LEC. Peter, 01935 813 054.

22 APRIL 2000
CRYSTAL PALACE & DARC Spring Sale – St John's Hall, Sylvan Road, London SE19. OT 10.30am £1. Bob, G3OUU, 01737 552 170.

30 APRIL 2000
BREDHURST RECEIVING & TRANSMITTING SOCIETY, Rainham Radio Rally – Rainham School for Girls, Derwent Way, Rainham, Kent. M2 Jcn 4 or A2 – follow RRR arrows. TI on S22, OT 9.30am/10am, £2 (under-14 free), TS, SIG, C, B&B, SIG. Martin, 01634 365 980.
STIRLING & DARS with Morse Enthusiasts Group Scotland, Annual Get-Together – Throsk, nr Stirling. GM0PIV, 37 Clepington Road, Dundee DD4 7EL.

1 MAY 2000
DARTMOOR Radio Club Rally – Pannier Market, Tavistock, Devon. OT 10.30am, TI, CP, TS, B&B. Ron, G7LLG, 01822 852 586.
MID CHESHIRE ARS Rally – Civic Hall, Winsford. OT 11.00am/10.30am, CP, C. David, G4XUV, 01606 77787.

7 MAY 2000
DRAYTON MANOR Radio & Computer Rally. - .Drayton Manor Park, Tamworth, Staffs, on the A4091. TS, FM, B&B, SIG. Peter, 0121 422 9787 or 0121 443 1189.

14 MAY 2000
DUNSTABLE DOWNS RADIO CLUB 17th Annual National Radio Car Boot Sale – Stockwood Country Park, Luton, Beds. Leave M1 Jcn 10a – follow signs for 'The Mossman Collection'. OT 9am, TI on S22. DDRC, PO Box 4053, Dunstable, Beds LU5 5ZJ with an SAE. Information www.ddrcbootsale.freeserve.co.uk. FAX 01525 383 898, or e-mail DRC@magstripe.demon.co.uk

21 MAY 2000
RIPON & DISTRICT ARS Northern Mobile Rally, Harrogate. Gerald, G0UFI, 01765 640 229, or g0ufi@email.com
MID-ULSTER ARC Rally – Silverwood Hotel, Lurgan, Co Armagh. OT 12 noon, TS, B&B, TI on S22. Jim, GI0OND, 028 3885 1179.
THREE COUNTIES Radio & Computer Rally – Perdiswell Leisure Centre, Bilford Road, Worcester. OT 10.00am, £2, (OAP & disabled £1.50), TS, SIG, LB, C, CP. Eddie, 01905 773 181.

28 MAY 2000
IPSWICH RADIO CLUB East Suffolk Radio Rally (Wireless Revival) – 'The Hollies', Straight Road, Foxhall, Ipswich. OT 9.30am (buyers), 8am (traders), TI S22, CBS, SIG, TS. G4DDK, 01394 448 495.

4 JUNE 2000
SPALDING & DARS Rally – Ray, G8ELV, 01775 711 953 or Mick, 07976 271 796.
WEST MANCHESTER RC 4th Red Rose QRP Festival – 01942 870 634.

11 JUNE 2000
NUNSFIELD HOUSE ARG Elvaston National Radio Rally – Les, G4CWD 01332 559 965 or les@g4cwd.demon.co.uk

22 / 24 JUNE 2000
HAMRADIO 2000 – Friedrichshafen, Germany

25 JUNE 2000
BANGOR & DARS Radio and Computer Rally – Mark, MI1DRU, 028 9058 6515, or e-mail mi1dru@amrad.net
LONGLEAT RALLY – Longleat House, Warminster, Wilts.

2 JULY 2000
HARLOW & DARS Radio and Hobbies Rally – Len, G7UFF, 01279 832 700 or e-mail g6ut@qsl.net

8 JULY 2000
CORNISH RADIO Rally & Computer Fair – Robin, 01209 820 118.

9 JULY 2000
SUSSEX Amateur Radio & Computer Fair – Ron, G8VEH, 01903 763 978 or 01273 417 756.
YORK RADIO CLUB (Amateur) Radio Rally – Pat Trask, G0DRF, 01904 628 036.

16 JULY 2000
Humber Bridge Rally – Bob, G0VVP, 01482 834 240 or John, G0TPS, 01964 562 258.

23 JULY 2000
COLCHESTER Radio Rally & Computer Fair – Frank, G3FIJ, 01206 851 189.
RUGBY AMATEUR TRANSMITTING SOCIETY Radio & Computer Fair – Arthur, M0ASD, 01788 550 778 or m0asd@tesco.net

30 JULY 2000
RSGB RADIO HOBBY DAY – RSGB, 01707 659 015.

13 AUGUST 2000
BRIDGEND & DARC Millennium Rally – Maurice, GW0JZN, 01656 864 579 or e-mail gw0jzn@yahoo.com
KING'S LYNN ARC 11th Great Eastern Rally – Derek, G0MQL, 01553 841 189, Fred, 01760 440 570 or www.qsl.net/g3xyz.

10 SEPTEMBER 2000
LINCOLN SHORT WAVE CLUB Rally – John, G8VGF, 01522 525 760.
VINTAGE Technology 2000 – Blackpool. Brian 01253 508 232.
22 / 23 SEPTEMBER 2000
LEICESTER Amateur Radio Show – Geoff, 01455 823 344, fax 01455 828 273, or e-mail g4afj@argonet.co.uk

For information of rallies beyond this date call the RadCom office on 01707 659015

Please note that, due to lack of space, the 'Silent Keys' list has been held over until next month.

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

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GB2000SET: Science Engineering Technology. Sully, Vale of Glamorgan. TLHV27PS (GW4XKE)
11 Mar GB0MIL: Millennium RSARS. Picketts Lock, Edmonton. LH2 (G0SWY)
7 Mar GB1BTV: Baird TV. Hastings, East Sussex. (G8OGO)
21 Mar GB2MIL: Millennium. Haverford West, Pembrokeshire. TLHV27P (MW0CAB)
24 Mar GB4SET: Science Engineering & Tech.. Swadlincote, Derbys. LHV27 (G4CRT)
25 Mar GB0NSW: National Science Week. Barry, Vale of Glamorgan. TLV27 (GW4XKE)
GB2000SET: Science Engineering Technology. Swadlincote, Derbyshire. (G4CRT)
GB2HG: Hertfordshire Guides. Cottered, Herts. TLHV27 (G4ETG)
GB4RAF: Royal Air Force. Bedford. LH (G0EYM)
26 Mar GB5HCM: Holsworthy Collectors & Models. Holsworthy, Devon. 27 (G1GZI)
27 Mar GB0NSW: National Science Week. Sully, Vale of Glamorgan. TLHV27PS

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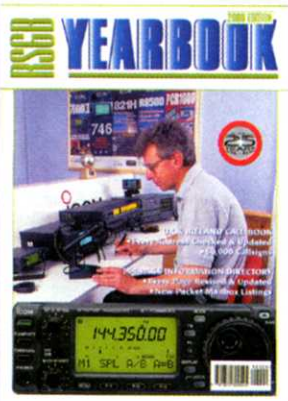

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the last Word

Rally Bargains

How many of us have arrived at a rally venue and joined the queue some half hour before opening time, only to witness through the windows of the sports hall or community centre the traders scurrying about buying all the bargains before opening time.

When we are finally let in the bargains are long since gone, most of them now on sale at many times the bargain price they were purchased by the traders before opening time.

Can I suggest that rally organisers make it a condition of trading that no goods are brought or sold before opening time? If this is not heeded, then the traders involved should be asked to pack up and leave the rally immediately.

The alternative to this is to have open access for all to the venue so the rally starts when you arrive, as happens with the open-air car boot sale type rally and with the more enlightened organisers of indoor rallies.

J Hill, G4CFH

/2k Suffix

As January draws to a close, I would like to pass on my thanks to those responsible for negotiating the availability of the /2K suffix for UK radio amateurs. Throughout the month I had great fun, meeting friends old and new. I inadvertently caused some confusion in a couple of contests, at least to those participants who do not read *RadCom*, but I had confirmed the acceptability of the suffix with the HF Contest Committee beforehand.

I recall that, in the summer of 1977, we were permitted to use the GE prefix to celebrate the Silver Jubilee of Her Majesty. Perhaps negotiations will give us another opportunity to use it during the forthcoming Golden Jubilee in 2002.

Les Allwood, G3VQO

Let's use SSB on 10MHz

I have formed the habit of listening for a few minutes on 10MHz and counting the number of signals that are present. I have listened at various times on various days without any attempt at a systematic study, but my conclusion is the band is virtually empty for significant periods. A typical QSO count is 5-6 CW, 1-2 data, and a very occasional SSB. Compare this with the situation on 7MHz, which is never less than crowded, often to an impossible level.

With 'LF' spectrum space for amateur radio as restricted as it is, I think the Society should review its continued support for the present policy of forbidding SSB on this band. Can the debate be reopened?

John Teague, G3GTJ

Well Done Esde

One of your contributors, Esde Tyler, has handed over her column to a successor and I would like to record that her articles over the period of eight years have really been a banner or rallying point for those who have been looking for encouragement and 'motherly' sympathy on their tentative way along the route towards some form of amateur licence. I am sure that both young and not-so-young have profited from how Mme Tyler has written about the problems of others and how they are being overcome. Instead of the newcomers feeling isolation and desperation, they have been able to read that they are not the only ones with the same problems.

Mme Tyler's articles have always shown sympathy and generosity which have appeared throughout her writings. I would therefore ask that all those that feel the same as I to send a 'Thank you' card with a few personal words inside to Mme Tyler, as I am sure she would be very pleased.

Dennis Williams, G3RNQ (in France)

Crystal Clear Memories

Re Technical Topics 'Crystal Sets - Recruiting or Experimental Aid' (*RadCom*, January 2000), this took me back to the age of 15 when I was dabbling in crystal sets. I am now aged 81. I then moved onto shortwave sets – cardboard formers for coils, home made things, 60V battery, wet battery whose name I forget. With this receiver at the top of a 3-storey house I was able to receive Spain during the Spanish Civil War. I had QSL cards from three stations, alas all gone. With work, the army during 1939-45, children and most of the difficulties of life, I never got round to obtaining a licence. Now I am just a listener.

Thank you, Pat, for taking me back all those years.

William Rowan, RS179788

Training For Real Life

The article by G3XWH (*RadCom*, February 2000) poses some interesting observations. Richard raises a very important point when comparing radio to flying, in the highlighting of the practical nature of the PPL. The same is also true of driving a car so I see no reason why we should not treat radio in a similar manner.

I have been an RAE instructor now for about 15 years and have found, as Richard, that the numbers of students is less than it was. Some years ago one of my students suggested that some practical experience may be of benefit. To that end we started to introduce some construction of simple circuits, namely those form the *RAE Manual*. These certainly do not function as usable equipment, but give the student valuable hands-on experience which has been shown to be of benefit on exam night.

This year we are expanding this, to producing some simple antennas, (which hopefully will be of use to students afterwards) and soldering connectors onto cables. Also, as we operate from within an old military command bunker and radio signals barely penetrate the walls, we intend to have some hands-on operating sessions between students.

Robertson D Bibby, G1PIX

Non-compliant Rigs

On 5 January I purchased a new VHF rig and expected the deviation to be set at 2.5kHz, ready to cope with the new spacings. Not one bit of it, the deviation was set at 4.5kHz. In consequence I couldn't even get into my local repeater 10 miles from home. The rig has now been altered down to 2.5kHz by a local engineer and is working fine.

It is not my intention to name and shame the dealer in question, because my enquiries reveal that all of the 'big 5' are selling unmodified VHF rigs. However, I do feel that they should start asking customers at the very least what deviation they would like the rigs set at prior to purchase, as many of us do not possess equipment to measure frequency deviation.

Andy Suter, G0GXI

The Wrong Image

Many things have been said about the technical level of the RAE; is it too difficult or too easy? Do we really need to know the difference between a PLL and an oscillator? Would knowing these things make the individual a better operator? I doubt it. I work as an electrical engineer and I sometimes listen to some amazing theories on how a piece of equipment works, but nonetheless the people involved in the discussion may be very professional operators and vice versa. Agreed, some technical knowledge is required, ie EMC, licensing conditions, safe operation, etc, but not to the level we have at the moment (and that does not even consider the Morse debate).

Second point. Most of the operators I know who have passed the RAE in the last 20 years started on CB, a large portion of whom operated on SSB or AM. Not all but some of these operators now openly put down the very place where they got their first taste of radio. CB radio had the potential to be a great recruiting element for ham radio, but a small minority ruined it for everyone else. Also, it was marketed as a toy for older children. Looking back, the outcome was obvious.

The final point is image. Amateur radio seems to convey a nerdish image, similar to the image computer buffs had in the early days of sad little people who have some sort of social interactive difficulty. Luckily for those people the giants of Microsoft and IBM etc came to the rescue and remarketed the image into a business/professional image. Many people do have quite the wrong image of our hobby.

I think what we need is a marketing manager (look what one did for 'Eddy the Eagle').

On the face of it, radio is playing less of a role in our daily lives. Yes, we all know cellphones, digital TV etc are radio signals, but does Joe public?

Gerald Mack, G7LDA

The Joy of HF

I am just writing to say how much I am enjoying my new class A/B licence. After over 20 years as an SWL it really is fantastic to be on HF at last.

So far I have found other stations to be welcoming and patient, and I haven't been refused a contact by any grumpy G3s! It is quite wrong to suggest that the M5 development is discouraging Morse code, the very opposite is true: Had the M5 slow Morse licence not been introduced I would never have considered upgrading from my class B, as the Morse requirement for a full A licence was just too much.

Jonathan Kempster, M5AEO

CLOSING DOWN SALE !

It had to come !

Regrettably in view of the declining amateur radio market, the decision has been taken

We are pulling out of Amateur Radio Retail !

Our Reg Ward shop will close on Friday March 31st, followed in due course by our Chandlers Ford retail outlet.

SMC would like to thank all their retail amateur radio customers for their past support

The following is a small sample of what must go

Everything must go

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Comet HR21	21 MHz HF mobile	WAS £49	NOW £26
Comet HR14	14 MHz HF mobile	WAS £41	NOW £27
Comet HR7	7 MHz HF Mobile	WAS £50	NOW £28
Colt SG7000	2M/70cm mobile	WAS £12	NOW £10
Colt SG7200	2M/70cm mobile	WAS £14	NOW £12
Colt SG7900	2M/70cm mobile	WAS £23	NOW £14
Comet CHL21J	2M/70cm mobile	WAS £19	NOW £8
Comet Z740	2M/70cm mobile	WAS £35	NOW £25
Comet SB-7	2M/70cm mobile	WAS £41	NOW £27
Daiwa DAX1000	2M/70cm mobile	WAS £28	NOW £18
Daiwa DAX1500	2M/70cm mobile	WAS £29	NOW £19
Daiwa DAX3000	2M/70cm mobile	WAS £33	NOW £22
TSM1316	2M/70cm mobile	WAS £17	NOW £11
TSM1312	2M/70cm mobile	WAS £20	NOW £14
TSM1314	2M/70cm mobile	WAS £34	NOW £24
Comet SMA3	2M/70cm & 900 MHz portable	WAS £29	NOW £20
TSC2603	2M/70cm & 900 MHz portable	WAS £22	NOW £15
Colt V2000	6M/2M/70cm base colinear	WAS £52	NOW £32
Comet GP95	2M/70/23cm base colinear	WAS £109	NOW £62
Hokushin WX4/N	2M/70 base colinear	WAS £149	NOW £89
QTEK25E	2M 5 element Yagi		£32
QTEK28E	2M 8 element Yagi		£41
QTEK211E	2M 11 element Yagi		£58
TSB3301	2M/70cm base colinear	WAS £65	NOW £45
TSB3305	2M/70cm base colinear	WAS £84	NOW £58
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ICOM

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