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RadCom

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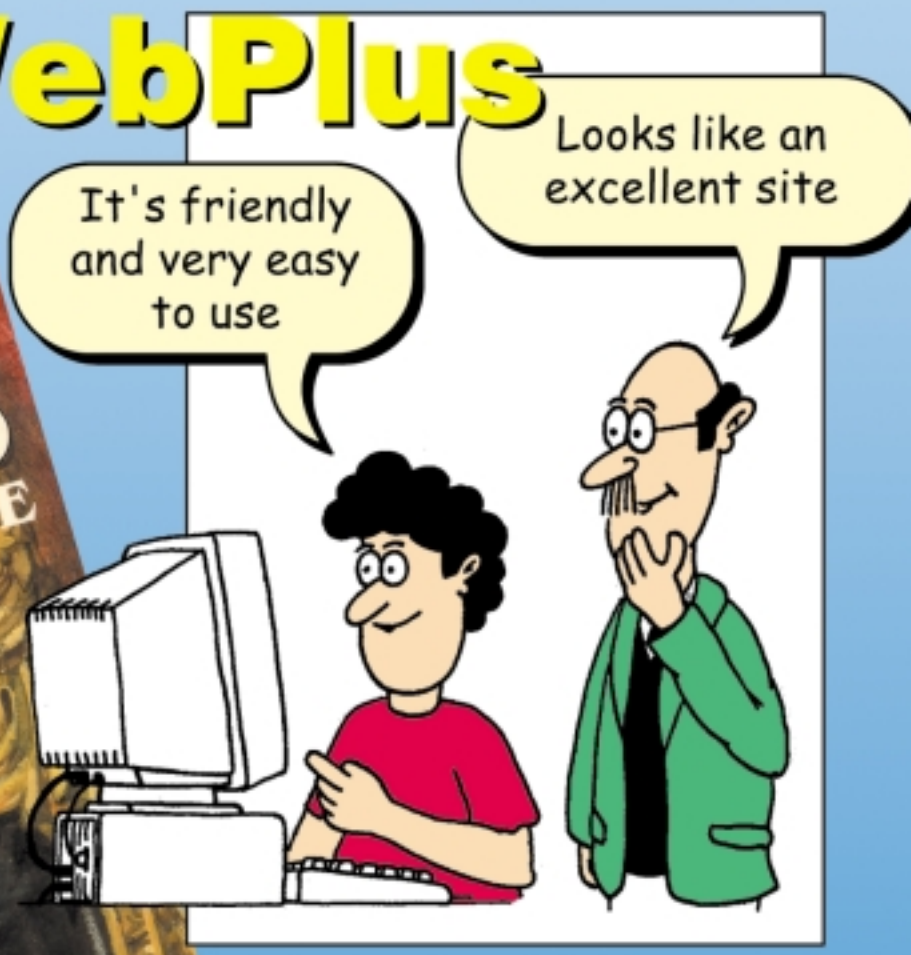
The Voice of Amateur Radio

RSGB WebPlus



Barbara Cartland and the RSGB?

Directory 2000

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Welcome! New 2000 sq. ft. Showroom

No clutter or cramped surroundings
Air conditioned with plenty of seating
50 radios on permanent demonstration
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We've created the UK's most spacious amateur radio showroom, with comfortable surroundings and plenty of space to sit down and try any radio of your choice. There are no compromises. Imagine sitting in comfort, with coffee and tea on call, and being able to play with whatever rig takes your fancy. Experience the widest range of accessories ever displayed. Browse through an amazing variety of items dedicated to radio communicatoions.There's only one truly dedicated Ham Store!

YAESU
Choice of the World's top DX'ers

£699 Plus £7.50 Carr.

This diminutive HF transceiver will pump out 100 Watts of RF power from 1.8 - 50MHz ham bands. It will also give you 50 Watts on 2m and 20 Watts on 70cm. The removable head makes it easy for car installation, yet it is just as much at home when used for base station operation. There's a choice of extra CW filters and a front-end performance that matches many rigs costing much more. Yaesu make wishes come true!

Modes:	SSB CW FM AM	Head Unit:	Remote option
Receive Range:	100kHz - 970MHz	Bandwidths:	6kHz to 60Hz
Power HF & 6m :	100 Watts	Output 1:	HF - 6m
Power:	2m 50 Watts	Output 2:	2m -70cm
Power:	70cm 20 Watts	Size:	160 x 54 x 205mm
Memories:	300	Weight:	3kg.

YAESU FT-840 160- 10m

£589 Plus £7.50 Carr.

A firm favourite, this 100W radio is an ideal rig for those on a budget. Impossible to fault, it just goes on and on!

24-Month FREE Warranty on Yaesu

ICOM IC-756PRO 1.8 - 52MHz 100W

Phone Plus £7.50 Carr.

You've read the rave reviews, and you have seen our recommendation on the web site. This radio with its amazing receiver and digital filtering, also includes auto ATU and real-time spectrum scope. A great DX rig.

YAESU FT-847 SAVE

160m - 70cm All Mode

£1329 with switch mode power supply

PRICE MATCH

£1249 Plus £7.50 Carr.

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!!

YAESU FT-1000MP AC

160 - 10m All Mode SAVE

£1795 Plus £7.50 Carr.

19.4% APR Available

If you are looking for the rig with every feature including dual receive - then look no further!

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.

YAESU FT- 920AF

HF 160m-6m-100w SAVE

£1099 Plus £7.50 Carr.

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.

ICOM IC-746

160m - 2m All-mode

£1349 Plus £7.50 Carr.

Your chance to purchase one of the most popular "all-band, all-mode" transceivers at a very competitive price. The IC-746 offers 100 Watts output on all bands and has a receiver performance to match.

ICOM IC-706IIG 160 - 70cm All Mode

£Phone Plus £7.50 Carr.

Still a firm favourite with mobile operators and those who want a compact all-mode, all-band station. Phone for latest leaflet.

KENWOOD TS-570DG

160 - 10m All Mode

£825 Plus £7.50 Carr.

19.4% APR Available

Probably the most underestimated transceiver on the market. Don't be fooled by the low price, the TS-570 has one of the best receivers around. One of the best buys if you want top HF performance on a budget.

We Will Match or BEAT Competitor's Prices

On genuine UK Stock

wsplc.com Go

ADI AT-600
Dual Bander Airband Rx

£199 Plus £6.00 Carr.

* 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
2m / 70cm Data Mobile

£429 Plus £7.50 Carr.

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 Software
The Secret's Out!

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 Plus £6.00 Carr.

C-150 2m Handy

£99.95 Plus £6.00 Carr.

* 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

£269 Plus £6.00 Carr.

* 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

£199 Plus £6.00 Carr.

* 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 70cm Handy

£69.95 Plus £6.00 Carr. Previously £89.95

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

NEW

Optoelectronics
CD-100 MULTICOUNTER

Reads Frequency & Codes

£379.95 Plus £6.00 Carr.

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

KENWOOD TH-D7E

£259 Plus £6.00 Carr.

* 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

YAESU FT-90R Can you believe the size?
2m/70cm Dual Band

SAVE

£309 Plus £7.50 Carr.

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.

ADI AR-147

AM Airband Receive

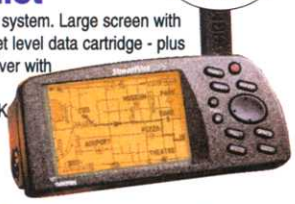
£199 Plus £6.00 Carr.

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

GARMIN In-Car GPS Street Pilot

£419 Plus £6.00 Carr.

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. With CD & card £539.**



GARMIN In-Car GPS-III Plus

£349 Plus £6.00 Carr.

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!

£310 Plus £7.50 Carr.

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

Includes FREE Remote head cable.

ICOM IC-207H

£245 Plus £7.50 Carr.

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

KENWOOD TM-G707E

£239 Plus £7.50 Carr.

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

YAESU FT-8100R

£349 Plus £7.50 Carr.

* 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.

KENWOOD TM-V7E

£299 Plus £7.50 Carr.

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

E & OE

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

£169.95 Plus £7.50 Carr.

160 - 6m Wire, Coax or Balanced

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

MFJ-949E 300W ATU

£139.95 Plus £6.00 Carr.

160 - 10m Wire, Coax or Balanced

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

MFJ-948 300W ATU

£119.95 Plus £6.00 Carr.

160 - 10m Wire, Coax or Balanced

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

MFJ-901B 300W ATU

£75.95 Plus £6.00 Carr.

160 - 10m Wire, Coax or Balanced

MFJ-962D 1.5kW ATU

£239.95 Plus £7.50 Carr.

160 - 10m Wire, Coax or Balanced

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

MFJ-986 3kW ATU

£289.95 Plus £7.50 Carr.

160 - 10m Wire, Coax or Balanced

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

MFJ-989C 3kW ATU

£299.95 Plus £7.50 Carr.

160 - 10m Wire, Coax or Balanced

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

MFJ-912 Ladder Feed Balun

£39.95 Plus £6.00 Carr.

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

WD- 25 Duplexer

£24.95 Plus £2.00 Carr.

- 1.3 - 35MHz 500W
- 50 - 225MHz 300W
- 350 - 540MHz 300W
- Insertion loss 0.2dB
- VSWR <1.2
- SO-239 Sockets
- Wall or mast mounting
- Mast size 58mm
- 98 x 35 x 70mm

This duplexer may be used both indoors or outdoors. It is supplied with mast mounting clamps and weatherproof shrouds for the coaxial plugs. The mast bracket can easily be removed, allowing the unit to be used for indoor use.

MFJ-269 Analyser

As Reviewed by RadCom

£299.95 Plus £6.00 Carr.

160m - 70cm Amazing Value

Imagine being able to plug into your antenna or feed line and make meaningful adjustments on site. Or be creative and turn hours into minutes and ideas into antennas! Read what RadCom says and make your own mind up. One of the best investments you will ever make!

MFJ-418 CW Tutor

£69.95 Plus £6.00 Carr.

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

Vectronics ATU

With Digital PEP Indicator

NEW

£169.95 Plus £7.50 Carr.

1.8 - 30MHz 300W (150W 1.8MHz)

- Digital PEP Bargraph
- Internal Dummy Load
- 2-way Coax Switch
- Tune or Bypass
- Balanced wire terminals
- End Fed wire terminals
- Cross Needle VSWR/Power
- 30/300W Readings
- Adjustable PEP level and delay
- Requires 12V at 500mA approax.

MFJ-259B Antenna Analyzer

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.

£229.95 Plus £6.00 Carr.

MFJ-1026 Noise Phaser

£159.95 Plus £6.00 Carr.

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 Amplifiers

£895 Plus £7.50 Carr.

UK Ranger 811H (illustrated)
- 1.8 - 30 MHz. 800 watts output
- Drive: - 10-100W * Built in Power Supply

UK Discovery-Two Amplifier £1395 Plus £7.50 Carr.
- 144 - 146MHz *400 - 1KW Output
- Drive:-10-25W *Built-in Power Supply

UK Explorer 1200 Amplifier £1595 Plus £7.50 Carr.
- 1.8-30MHz x 100W-1300W Output
- Drive:-10-120W *Built-in Power Supply

British made Amplifiers with a Pedigree

GREAT VALUE

Cushcraft

5 Band Compact Beam

NEW MA5B Mini - Beam

£289.95 Plus £7.50 Carr.

NEW

10-20m Inc WARC bands
1.2KW 50 Ohm feed
2 Elements on 10,15,20m
Dipole om 12m & 17m
Max element length 5.2m
Boom Length 2.2m
Turning Radius 2.7m
Weight 12Kg

Regular HF Beams from Cushcraft

A3S	3 el 10,15,20m	£389.95
A3WS	3 el. 12 & 17m	£299.95
A4S	4 el. 10,15,20m	£469.95
X7	7 el. 10,15,20m	£549.95
Ten-3	3 el. 10m	£139.95
XM520	5 el. 20m	£529.95

Full Cushcraft range stocked - Check our Web Catalogue

Carolina Windoms

CW-80 Special

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

£84.95 Plus £7.50 Carr.

Just 66ft Long!

Other Models (all with low angle radiator stub)

CW-160	160 - 10m 171ft long	£109.95
CWS-160	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

Plus £7.50 Carr.

PacComm TNCs from USA

Tiny-2 1200bps	£139.95
PicoPacket 1200bps	£139.95
Spirit-2 9600bps	£199.95

Plus £6.00 Carr.

The lovely little PicoPacket even permits APRS with your mobile transceiver. Phone for leaflet.

Power Supplies

£99.95 Plus £6.00 Carr.

SEC-1223

13.8V PSU

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

WATSON

UK's top selling power supplies.

£89.95 Plus £7.50 Carr.

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	Plus £6.00Carr. £29.95
W-10AM	10 Amp variable supply	£59.95
W-25AM	25 Amp variable supply	£89.95
W-30AM	30 Amp variable supply	Plus £7.50 Carr. £119.95

Compact 10 Amp Switch Mode PSU

£49.95 Plus £6.00 Carr.

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.

Number ONE in Amateur Radio — Waters & Stanton

Order Details on inside Front Cover

Diamond GSV-4000

Switch Mode PSU 40 Amps!

Just arrived! This lightweight switch mode power supply will punch out 40 amps with ease! Hour after hour. Voltage and current metering with over current and over voltage protection. Variable voltage. Full details on our web site, wsplc.com. Weighs just 3.5kg.

£159.95 Plus £7.50 Carr.

NEW

Low carriage charges for web orders

RF Metering

Avair AV-600 1.8 - 525MHz 400W

£59.95 Plus £6.00 Carr.

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 Plus £6.00 Carr.

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

WATSON 144/ 430MHz Dual Band Yagi.

£79.95 Plus £7.50 Carr.

Amazing Performer

Superbly Built

.142-146,428-442MHz
.Single feed
.SO-239, 50 Ohms
.100W max power
.VSWR 1.1 -1.5:1
.Gain 10 dBi 2m
.Gain 14 dBi 70cm
.Boom length 203cm
.5 elements 2m
.9 elements 70cm
.Gamma match
.Weight 3.4kg

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 Watson Frequency Counters

£59.95 Plus £6.00 Carr.

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 and signal strength meter	£79.95
Super Hunter	- 10Hz to 3GHZ and with signal strength meter.	£149.95

Plus £6.00 Carr.

Antenna Rotators

£49.95 Plus £7.50 Carr.

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 Plus £7.50 Carr.

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 Plus £7.50 Carr.

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

Plus £7.50 Carr.

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

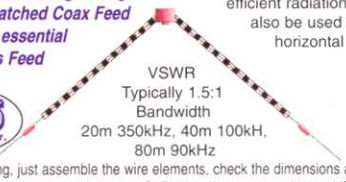
80/40/20m Dipole 50ft Long!

G3OJV 80-Plus-2 Space Saver

Approx 50ft long (Horizontal)
400 Watts PEP
Wire elements - light weight
Balun Matched Coax Feed
ATU not essential
50 Ohms Feed

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

£79.95 Plus £6.00 Carr.



VSWR
Typically 1.5:1
Bandwidth
20m 350kHz, 40m 100kH,
80m 90kHz

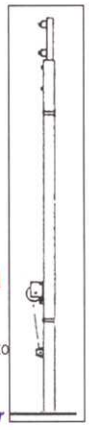
No soldering, just assemble the wire elements, check the dimensions and fine tune as per instructions. Unlike the G5RV, it self-resonates with low VSWR on all three bands. A unique design that offers LF operation from your back garden. Erect as an inverted V and you can fit it into around 40ft. Element comprises pvc covered copper wire with 450 Ohm ladder linear loading section.

SGC SG-230 Smartuner

1.8 - 30MHz Wire ATU

£329 Plus £7.50 Carr.

NEW Lighter weight version



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

Much Stronger than Alloy Poles!

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 full information and drawings*

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

Plus £7.50 Carr.

Mobile Antennas PL-259 bases

W-285	2m 5/8th foldover base 1.33m	£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

Plus £6.00 Carr.

W-77LS	2m/70cm 0.39m low profile	£14.95

Plus £2.00 Carr.

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

Plus £2.00 Carr.

Diamond GSV-3000

30 Amps PSU

Typical Diamond engineering gives you a superbly built power supply with variable output from 1 to 15V. Dual meters and weigng 9kg. Full dcetails on web.

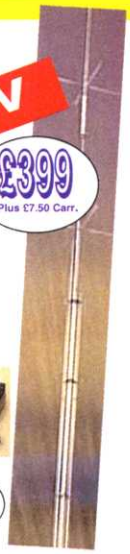
£149.95 Plus £7.50 Carr.

Cushcraft

R8 8-Band Antenna
40m to 6m 1500 Watts
A Great Vertical

NEW

£399 Plus £7.50 Carr.



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.

TEN-TEC 1340/1320 CW TRANSCEIVER KITS

40/20m

£94.95 Plus £6.00 Carr.

- 3W RF output
- VFO tuning any 50KHz
- Full break-in keying (QSK)
- 4-pole crystal IF Filter (3dB at 1KHz)
- Rx sidetone
- RIT adjustment
- Supply 12V at 800mA (Tx)
- 69 x 152 x 152mm
- Case and all hardware included
- Absolutely nothing else to buy
- 50 page step-by-step manual with circuits

Build yourself a new transceiver over the weekend. Everything you need, including case and all controls.

Heil Headsets In Stock

Proset

HM-10

Hear the Difference!

A choice of normal or DX inserts when ordering

Pro Headsets (Dual ear)	£119.95
Pro 54 or 55 (Single ear)	£109.95
Pro Micro (Dual ear)	£99.95
HM-10 Hand Mic	£69.95
HM-10 Dual	£109.95

Plus £6.00 Carr.

CC-1 Adaptor cables Y,I,K	£23.95
FS-1 Foor switch	£29.95
TB-1 Table stand	£22.95
HS-1 PTT switch	£26.95
AD-1 Adaptors Y,I,K	£14.95

Plus £2.00 Carr.

Texas Bugcatcher HF Mobile Antenna

- *Bands 3.5 to 30MHz(80 - 10m)*
- *Optional 50MHz (6m) adaptor*
- *High power 1500W*
- *Adjustable capacity hat*
- *Quick disconnect whip*
- *2.5 Inch diam. - Hi-Q resonator*
- *Up to 7dB gain over thin whip designs.*
- *Easy band change.*
- *Set coil taps to any frequency*
- *C/W 4-coil clips for 5-band operation*
- *Two-piece stainless whip*
- *Stainless steel base*
- *Air inductor 2.5in wound 14ga. wire*
- *3/8in fitting. Total length approax 2m*

The Texas Bugcatcher is the most efficient all-band mobile antenna available. We measured gain of up to 7dB when compared to thin helical whips. The open wire 2.5 inch coil is the secret. It offers high Q and very low loss. The antenna mounts on a standard 3/8" base. Band changing is simply achieved by changing coil taps. Fine tuning is done using the adjustable capacity hat vanes and the bayonet fitting enables the top whip to be quickly disconnected.

W-BM1 Ball Mount

BG-1500	Complete	£129.95 (£6.50)
ADAPT-6m	6m adaptor	£19.95 (£2.00)
BM-EXT	18" base extension	£25.95 (£2.00)
W-BM1	Ball Mount	£19.95 (£2.00)
MFJ-910	Base Matcher	£22.95 (£6.00)

MFJ-910 Magic Mobile Matcher

Matches the very low base impedance of a mobile whip to 50 Ohms. Place just inside boot and connect to antenna base with short coax cable length. Magic! All of a suddent 1:1 VSWR and full powere transfer.

Introducing something very special for the Year 2000

The All-New FT-1000MP MARK-V from ML&S and

YAESU

- 200 watts TX Output
- Class A operation at full 75 Watts - first in an Amateur Transceiver, offering the cleanest purest form of RF on the bands today.
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Elite-Class HF Transceiver Design Milestone

For those of you that have been patiently waiting the arrival of a new H.F. Flagship, the new FT-1000MP MKV is the answer to your prayers.

Today's HF Transceivers do not simply listen to signals at a level of 1 microvolt or less. The Amateur Bands, especially during contest or pile-up conditions, are jammed with local and DX stations that may present a Volt or more each to a receiver's front-end. Moreover, the commercial broadcast bands, especially in the 6-10MHz range, are full of 500kW stations creating a hostile environment for a receiver. And multi-operator contest groups may run six stations simultaneously, with antennas in close proximity, causing many Volts of energy to impinge on the early stages of a receiver. This is an environment for a serious radio:

The new Mark V FT-1000MP

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- *To reserve one from your favourite Yaesu dealer call 020 8 566 1120 today.*
- *To get a full colour brochure on the product either visit the web site - www.hamradio.co.uk or call the sales desk.*

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Front Cover:

Mike & Victor approve of *RSGB WebPlus*, the new members-only web site. Now you can buy any book from the RSGB... even Barbara Cartland novels! The new *IOTA Directory* is out, and Roger Balsiter features it in his column. Deep underground, G4AEE communicates to the surface by radio.

RadCom
Radio Communication

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The RadCom Leader

Mobile Phones and RF Safety

CONCERNS ABOUT RF safety are not new. The RSGB has been keeping an eye on various standards and guidelines on recommended maximum exposure for a number of years. The difference with mobile phones held to the head is that the user could be exposed to a much higher field strength than would be expected in traditional communications systems where the antenna is mounted at a reasonable distance from the operator. This is, of course, due to our old friend the inverse square law. However, questions surrounding mobile phone safety have been extended in the public mind to include base station antennas. From here it is a small step to questioning the safety of all transmitting antennas.

The National Radiological Protection Board (NRPB) has issued a leaflet for radio amateurs 'Investigation Levels for Amateur Radio' (available on the NRPB web site, http://www.nrpb.org.uk). This gives "investigation levels" for RF exposure, along with a short explanation of what this means. This is not the place for a detailed discussion, but it is clear that sensible operation of an amateur station (excluding in some cases high power UHF, or microwave to high gain antennas) is very unlikely to give rise to such levels where people are living.

Anyone generating the "investigation level" field strength in a neighbour's house would have serious EMC problems, to say the least. Put another way, if an amateur station follows the 'good radio housekeeping' rules set out by the EMC Committee, it won't come anywhere near the NRPB limits in their own or their neighbours' houses.

What can members do to avoid ill-informed publicity, which might eventually result in unnecessary restrictions being placed on amateur stations? Put simply:

- Don't get drawn into making statements to the media, unless you are an expert on both the topic and in handling reporters. All too often, people are horrified when they see the edited version of their interview on TV or in the local paper.
- Take your radio housekeeping seriously. In the present climate, an acrimonious neighbour dispute could easily be escalated into an 'RF safety issue'. High-profile cases are very damaging to the amateur radio movement, particularly at this sensitive time.
- Finally, support your national body. The RSGB is represented on various working groups and forums dealing with radio issues. We speak for all UK radio amateurs, whether members or not, but the more members we have, the more weight we carry.

Don Beattie, G3OZF, President

RSGB VHF Awards

TWO CLAIMANTS for awards this time, both for the 50MHz band. The first is from Heath Rees, GW3HWR (SA), who successfully claimed a certificate and sticker for 25 squares and the same for 10 countries (2-way). The second claimant is Grant Wilson, MM1ALC (GS), who is also awarded a certificate and sticker for 10 countries (2-way).

A new IARU award, sponsored by the RSGB, is now available. This can be claimed by any amateur resident in IARU Region 1 who has made a contact of more than 2000km in the 50, 70 or 144MHz bands by means of Sporadic-E propagation.

Details of all VHF, UHF and Microwave awards can be obtained from Tony Jarvis, G6TTL, QTHR, or on www.argonet.co.uk/users/tonyg6ttl/awards/awards.htm

Kits Available

THE CRAY VALLEY Radio Society has a few Howes DC2000 receiver kits (with 20m module) - as they were not all sold to the schools who visited M2000A. CVRS is keen that the few remaining kits should go to school radio clubs, novices or others involved with educating the radio amateurs of tomorrow. Anyone who is interested should write to Owen Cross, G4DFI, 28 Garden Avenue, Bexleyheath, Kent DA7 4LF.

- The RSGB VHF Committee has a new Manager. He is David Butler, G4ASR, and his address is correct in the *RSGB Yearbook*. His daytime telephone number is 01432 372737, and his e-mail address vhf.manager@rsgb.org.uk

- The Harlow and District Amateur Radio Society has announced the cancellation of this year's Rally, which was to have been held on 2 July.

Society initiative leads to launch of new service

RSGB offers Members Discount off *all* Books

RSGB MEMBERS will be familiar with being able to order Society publications, plus selected ARRL, DARC and other titles at a discount, but a new initiative means that members can now obtain 15% discount on the list price of any of a *quarter of a million* books.

To take advantage of this new service to members, you'll need to know either the ISBN number of the book that you want, or the title and author. When you have either of these, simply telephone the RSGB One Stop Shop on 01707 659015 (9.15am to 5.15pm weekdays). Alternatively, fax the details to 01707 645105, or e-mail: sales@rsgb.org.uk The sales staff will be pleased to let you know how much the list price is and at what price the Society is able to offer it to you. You'll then have the opportunity of purchasing, paying either by cheque or credit/debit card.

So now, whether your taste is Stephen King or Stephen Hawking, you will be able to afford more books – thanks to the RSGB.

de GKB AR SK

From David Barlow, the liaison officer for the Portishead Radio Special Event comes this message. "The Station Manager and Radio Officers at Portishead Radio would like to thank the amateur radio fraternity for the magnificent tribute they paid to the station on Saturday 29 April. The cross-band maritime/amateur event saw GKB in QSO with over 3000 amateur stations in over 100 DXCC countries – an average of four QSOs a minute. Thank you for making our penultimate day so memorable.

"The huge pile-up made operating very difficult and meant that many may be disappointed. If you think your callsign may have been misread and want to confirm it, e-mail d.barlow@u.genie.co.uk or write to David Barlow, PO Box 50, Helston, TR12 7YQ."

Bob Singleton - one of the GKB Radio Officers on duty.

GM4AUP

Ian Suart, GM4AUP, has stood down from Council with immediate effect due to increased work commitments.

Ian has recently taken up a new position with ntl: and has been appointed project manager for a new undertaking in the Far East. This increased workload and new responsibility do not allow him the time he would wish to give to Council or to the Society. Ian has also stood down as Chairman and member of the Licensing Advisory Committee (LAC).

He has served on RSGB committees since 1988 and as a Council member since 1990. He was President in 1994, has chaired the Management Advisory Board and the LAC, and has been a member of the RSGB/RA forum since its inception. Ian was also a key member of the RSGB delegation at the Tel Aviv and Lillehammer IARU Region 1 conferences.

The Society wishes Ian all good luck with his new appointment and thanks him for his meaningful contribution to Society affairs over the last twelve years

Amateur radio *IS* fun

Not tongue-tied: Colin Garland, from the Lipson Vale Community College, sends a greetings message to Richard Hill, M5AFC, under the supervision of Paul Thompson, M0CPW.

THE UNIVERSITY of Plymouth held a free 'Engineering and Technology Taster Day' for year 11 and 12 students recently. This allowed the students to sample communication and electronic engineering, mechanical and marine engineering, and civil and building surveying.

The day included a visit to the University's amateur radio station, G0UOP, in the Department of Communication and Electronic Engineering. Greetings messages were sent to local amateurs who had agreed to be on air for the day.

Amateur radio is seen as an important part of the Department, where it is actively supported at faculty and departmental level. University students are encouraged to obtain amateur licences, as it is felt that this offers many advantages and opportunities to experiment practically with radio communications.

Higher-Precision GPS

PRESIDENT CLINTON made the following announcement on 1 May: "Today, I am pleased to announce that the United States will stop the intentional degradation of the Global Positioning System (GPS) signals available to the public… This means that civilian users of GPS will be able to pinpoint locations up to ten times more accurately than they do now". We understand that APRS users are ecstatic.

● The Radiocommunications Agency has informed us of a change in the regulations governing the importation of single-band equipment covering the 28 to 29.7MHz range. According to the RA, in the past such equipment masquerading as being for amateur use was, in reality, intended for conversion to illegal CB frequencies. This threat appears to have receded, the removal of the restriction allowing amateurs access to commercially-manufactured single-band equipment. The restriction was removed on 1 May. A safeguard remains to protect other radio users and television viewers from interference from this equipment, because it remains an offence to adapt it for CB use.

M2000A Millennium Award

OWEN CROSS, G4DFI, the M2000A QSL Manager, is hopeful that QSL cards will have been printed by now. Clare Treacher, RS102891, the M2000A Awards Manager, has now dealt with the majority of claims that were received prior to the end of the operation. Anyone who heard or worked M2000A on 31 December 1999 or 1 January 2000 qualifies for the 'Millennium Award'. A sample is shown here. Additionally, anyone who heard or worked M2000A on five bands also qualifies. If you haven't sent your claim yet, you have not missed the opportunity. Clare's address is 93 Elibank Road, Eltham, London SE9 1QJ.Each award costs £3, $5 or eight IRCs.

The M2000A Millennium award.

QRP in Yeovil

THE APRIL QRP Convention in Yeovil had a full programme of talks and demonstrations. As well as a QRP Forum a sparkling demonstration was given by G0MDK of some of Tesla's very-high voltage experiments. A massive coil, 4ft high and 11in diameter, produced hair-raising voltages around 250kV. Other lecturers were G3MYM and G0SOF, pictured right.

Gordon, G0SOF; Chuck, G0MDK, with his Tesla coils, and Rob, G3MYM – all lecturers at the Yeovil QRP Convention.

New QSL Bureau Sub-Managers

AS A RESULT of the decision by the Radiocommunications Agency to issue licences out-of-sequence when requested, two new bureau sub-managers have been appointed.

The manager for the out-of-sequence calls between M1FAA and M1ZZZ is:

Mr J Adlington, M1DVT, 23 Newstead Road, Abbey Hulton, Stoke-on-Trent ST2 8HU.

The manager for the out-of-sequence calls between M0DAA and M0ZZZ is:

Mr D S Whitelock-Wainwright, M0CHR, 1 Axbridge Avenue, Sutton Leach, St Helen's WA9 4NZ.

A new appointment has been made of QSL sub-manager for the callsign prefixes GM1, 4, 5, 6 and 7 and 8. He is Mr R F MacLeod, GM4DZX, whose address is Vesquoy, Rendall, Orkney KW17 2EZ. He is also the sub-manager for the prefixes MM1 and MM5.

New Dealer for North Scotland

ULTIMATE AERIALS is a new company which has recently started trading in the north of Scotland, and is based in Huntly, near Aberdeen. A Main Dealer for Yaesu, Icom and the Dolphin Network Mobile Phone System, it aims to remain competitive by offering a mail-order service and not setting up shop premises. It can be contacted on 01464 841263 or on www.ultimateaerials.fsnet.co.uk

French now on 136kHz

AS OF 21 APRIL, the band from 135.7 to 137.8kHz was made available to French amateurs with a maximum ERP of 1W. The new ruling also covers the French territories such as Guadeloupe, French Guyana, Martinique and the Saint Pierre et Miquelon Islands, making these the first LF allocations in IARU Region 2.

PSK31 Inventor Honoured

PETER MARTINEZ, G3PLX, whose most recent claim to fame is the PSK31 narrow-bandwidth digital system, is in the news again.

Together with Pawel Jalocha, SP9VRC, he has been awarded the DARC's Horlheimer Prize "to honour their merits in the realms of digital amateur radio communication".

The award was due to be presented at the Friedrichshafen Hamfest.

WACRAL Award

WACRAL, THE World Association of Christian Radio Amateurs and Listeners, has announced an additional attraction for the holders of their Millennium Award. Entitled the *Sapphire Millennium Award*, the attractive new certificate is available to all members and non-members who contact or receive a further 30 licensed members of WACRAL during the current year. This will make a total of 90 WACRAL stations. The Awards Manager is Geoff Grundy, G4YJW, who will be pleased to provide information of their awards programme. He can be contacted at 47 Northiam Road, Eastbourne, BN20 8LP or by e-mail to geoff@g4yjw.freeserve.co.uk

Five Go To Copinsay

AFTER A FALSE start on the weekend of 31 March, due to bad weather, the Orkney Amateur Radio Club was gearing up for a second attempt to activate the Orkney Island of Copinsay the following weekend. They were forced to sit out the biggest aurora for years, but were able to embark for Copinsay (IOTA reference EU-009) on Saturday, 8 April. Five members of the Club were involved: Clive, GM3POI; Bob, GM4DZX; Donnie, GM0HTH; Alan, GM0HTT; SWL David. Two 35-minute trips were necessary in a 20ft boat, through hundreds of grey seals who didn't like the look of the invaders, but GB5RO finally went on the air on 40m at 1524 UTC, producing an extraordinary pile-up.

This was followed by sessions on 20 and 15m, changing operators at regular intervals. Calling CQ or changing frequency was never necessary, and in the non-stop eight-hour slog, the average QSO rate was over 100 per hour.

Shortly after dawn, VK and ZL stations were being received at S9 plus, before the astonishing DX faded into the noise as 20m changed into daytime mode. The 20m pileup was every bit as big, however!

Sunday was quieter, with several excursions to 40m to look for UK stations, before returning to the higher bands.

The last QSO was with RX3QLK at 0835 on Monday 10 April, making a total of 3094 QSOs in 94 countries, just missing 'DXCC in a weekend'!

Above: an old house provided by the RSPB was the home of GB5RO for the weekend. The location is shown on its QSL card (top).

● Satellite enthusiasts won't want to miss the Amsat-UK Colloquium at the University of Surrey on 28-30 July. For information contact G6ZRU, QTHR, or go to www.uk.amsat.org/

SAQ Back on Air

MANY PEOPLE MISSED the periods of operation over the New Year period of the massive SAQ transmitter in Grimeton, Sweden. The leviathan transmitter, whose 17.2kHz 200kW carrier is produced by a massive alternator, is the only one of its kind which is still operational. It will be on the air again on Sunday 2 July at 0830, 0845, 1230 and 1245 UTC. Associated with the special event will be an amateur station in Grimeton with the callsign SA6Q. QRM permitting, SA6Q will be operating CW on 3515, 7015, 14035, 21030 and 28030kHz. SSB operation will be on 3740, 7050, 14215, 21205 and 28415kHz.

The Grimeton site of SAQ, showing one of the six 127m masts and a rather smaller cubical quad.

Morse in Essex

Essex now has a team of Morse examiners which is at *your* disposal. Andy Kersey, G0IBN, Senior Morse Examiner for Essex, hopes amateurs will take advantage of his new team, which will be available in January, March, May, July, September and November, at dates and times suitable to all. Contact Andy by e-mail: g0ibn@ikersey.freeserve.co.uk

● The RA has confirmed that agreement has been received from Malta, allowing greetings messages by third parties to be sent and received. Each message must not exceed five minutes' duration. BR68 will be amended in due course.

● The Institution of Electrical Engineers is holding its Eighth International Conference on HF Radio Systems and Techniques at the University of Guildford from 10-13 July 2000. Full details can be found at www.iee.org.uk/conf/

Attention Zone A Members!

See the special notice about your Open Regional Meeting on page 64.

Farnell e-Commerce

ON 25 APRIL, Farnell launched a brand new e-Commerce web site (www.farnell.com.uk) for UK industry. Available to anyone with Internet access, the site combines an intuitive user interface with sophisticated searching facilities, offering unrivalled access to Farnell's 100,000+ branded products and services.

Our Aerial Friends

ALTHOUGH IT IS some years since Alred Hitchcock produced those eerie and thought-provoking images of birds congregating in absolute silence on telegraph wires, anyone who has put up an aerial must learn to live with such consequences.

Brian, G4OOC, the Membership Officer of the North Wakefield Radio Club, was forced off the air this spring because a Dove was nesting under the rotator housing on his 60ft mast (see photo, left). Prior to a storm, Brian lowered it to 40ft, where the birds seemed quite happy. The council advised him that he should wait until the birds flew the nest before cranking up his tower and operating again.

Harry, G3SBV, had a similar problem with his mobile mast (see below, left). A Thrush is raising its young in the nest, which is visible below the pulley. Harry's mobile activites are thus on hold while Nature takes its course!

The Dove's nest below G4OOC's rotator.

On the far right is a photograph of the 7-element TH7DX HF beam and the 14-element JayBeam parabeam of Chris, G0HFX. Nesting birds aren't a problem here, but the aerials do make wonderful perches for them in the evenings. There are other beams, out of shot, with not a single bird in sight, so there is obviously something special which attracts the birds to these!

Immobilised by a bird: Harry's mast.

No wind loading here - just birds!

UT5UDX Joins Spurs

TOTTENHAM HOTSPUR Football Club has just signed Sergei Rebrov in an 11 million pound deal. Not only is the Dynamo Kiev striker very good at football, he has also worked over 300 DXCC countries.

Now in action in England: UT5UDX.

Sergei, whose call is UT5UDX, is a keen contester and won the single-operator section of the IOTA Contest in 1997. In a recent contact on 21MHz, he told the RSGB that he was looking forward to coming to the UK and being able to operate from here. This news has already given amateur radio some publicity in a full-page article in the *London Evening Standard*.

First 73kHz Operation from Northern Ireland

Satisfaction: the team who put Northern Ireland on the 73kHz map.

LAST MONTH we reported the LF operation from Puckeridge in Hertfordshire using the Decca navigation mast. A similar undertaking, using the Decca mast in Lurgan, resulted in the first 73kHz QSO from Northern Ireland. The team involved comprised Ian, MI0AYZ, Ray, GI3PDN and Colin, GI0RQK, seen in the photograph supporting the base of the mast.

The mast was 168ft high, with a 600ft-long 'T' with three loading wires. This received all sorts of signals, few of which were really wanted. Cross-band 73/136kHz QSOs were completed with GI3KEV/P and G4GVC on 28 April, followed by the first-ever two-way QSO on 73kHz from Northern Ireland with G4GVC in Leicester. Other contacts were with G3LDO and G3YXM.

RAE Course Lists

IN THE August and September issues of *RadCom* we will be publishing lists of all the RAE, NRAE and Morse courses that have been notified to us. If your club or college has not yet submitted details, now is the time to send them to the News Editor, RSGB, Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JE.

● Trowbridge and District Amateur Radio Club now has a web site. It can be found at http://fp.geroff.f9.co.uk and includes the TDARC magazine *Frequency*.

WAB 6m Contest

FOLLOWING THE recent Worked All Britain 70 and 144MHz contests, the 50MHz SSB contest takes place on Sunday, 9 July. Full details and the rules are available from the Contest Manager G8XTJ (QTHR), or from the WAB web site: www.users.zetnet.co.uk/g1ntw/wab-cont.htm

RAE Error

IN RESPONSE TO queries expressed by many candidates who sat the May Radio Amateurs' Examination, We have been informed by the City and Guilds that question eight on greetings messages was invalid. Changes regarding greetings messages had taken place to the licence conditions since the question paper had been printed. The question is therefore *not* being included in the assessment process.

● A new 50MHz voice repeater became operational on 17 May. GB3BY in Bewdley, Worcestershire, has a transmit frequency of 50.860MHz and a receive frequency of 51.360MHz, with a CTCSS tone frequency of 67.1Hz.

MEMBERSHIP BENEFIT

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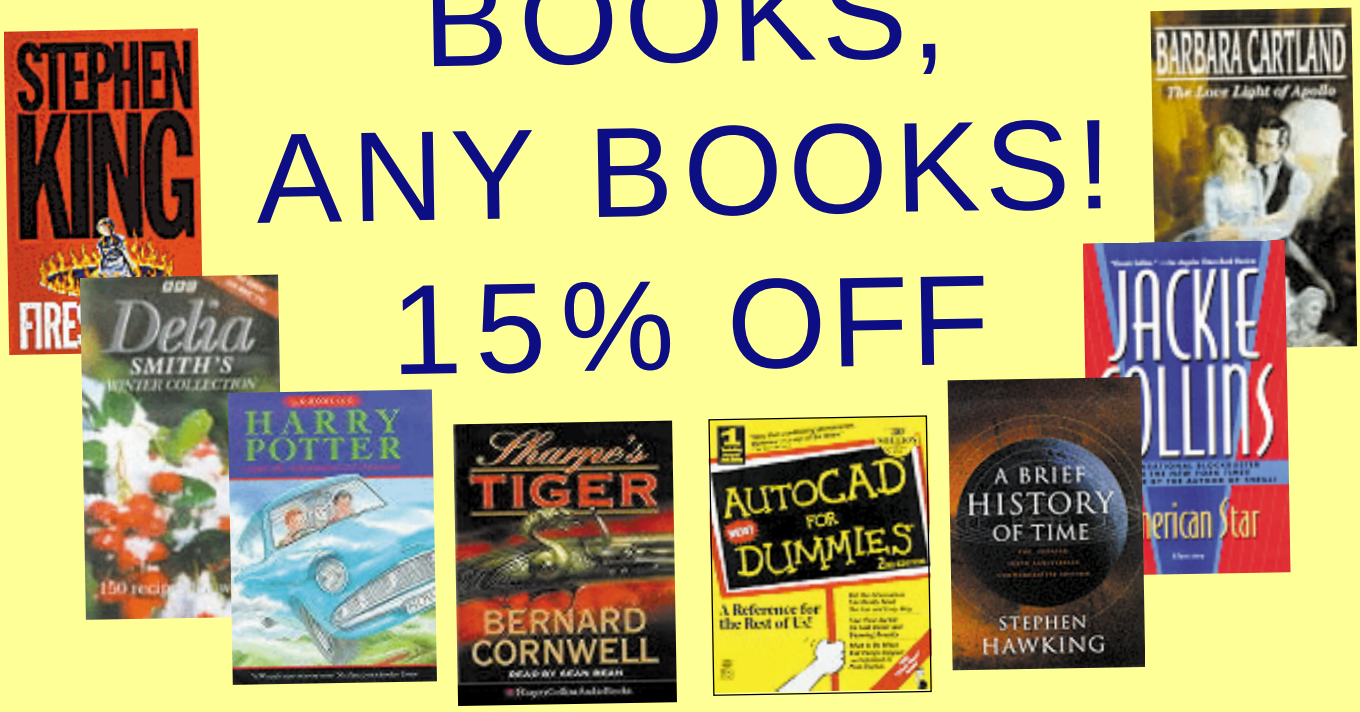

BARBARA CARTLAND, DELIA SMITH, STEPHEN HAWKING,

ANYONE!

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(SEE PAGE 47)

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ICOM

IC-718

IC-718 HF Transceiver

The Most Practical Rig You Could Ever Own!

Icom are pleased to announce the IC-718 HF transceiver. Aimed as an entry-level product, the IC-718 continues all the traditions of top quality engineering that you expect from Icom. Conveniently sized and easy to operate, the IC-718 utilises all the latest RF and digital technology and is designed to be one of the most practical rigs ever.

Forward Facing Speaker

The IC-718 offers an excellent overall specification coupled with ease of use. The first thing that strikes you about the IC-718 is the loudspeaker mounted on the front panel of the transceiver, facing the operator, making the audio more clearly heard.

Superior Performance

The IC-718 features a 100 watt transmitter for SSB and CW and 40 watts output on AM. A general coverage receiver is also built-in covering 30kHz -29.999 MHz across most modes. A newly designed PLL circuit has been adopted to improve signal/noise ratio characteristics. This, combined with a 4-element system mixer ensures truly superior performance.

Easy to operate

For ease of use, the IC-718 is equipped with a minimum number of switches and controls.

The 10-key pad on the front panel allows you to directly enter an operating frequency or access a memory channel. All popular operating modes are offered; USB, LSB, CW, RTTY (FSK) and AM. In addition there is a level adjustable noise blanker, a variety of scanning functions, a hand microphone and electronic keyer as standard.

Auto-tuning

The auto-tuning-steps function speeds up tuning but only activates when the dial is turned quickly. The band stacking register ensures that you always return to the last used frequency when changing bands.

Interference Buster!

To reject interference, the IC-718 has an IF shift function that shifts the centre frequency of the IF passband electronically to reduce nearby interference. A microphone compressor ensures really punchy audio, getting your signal through in difficult operating conditions. The compression level is easily adjustable from the front panel making a big difference when propagation conditions are poor.

Maximum Response

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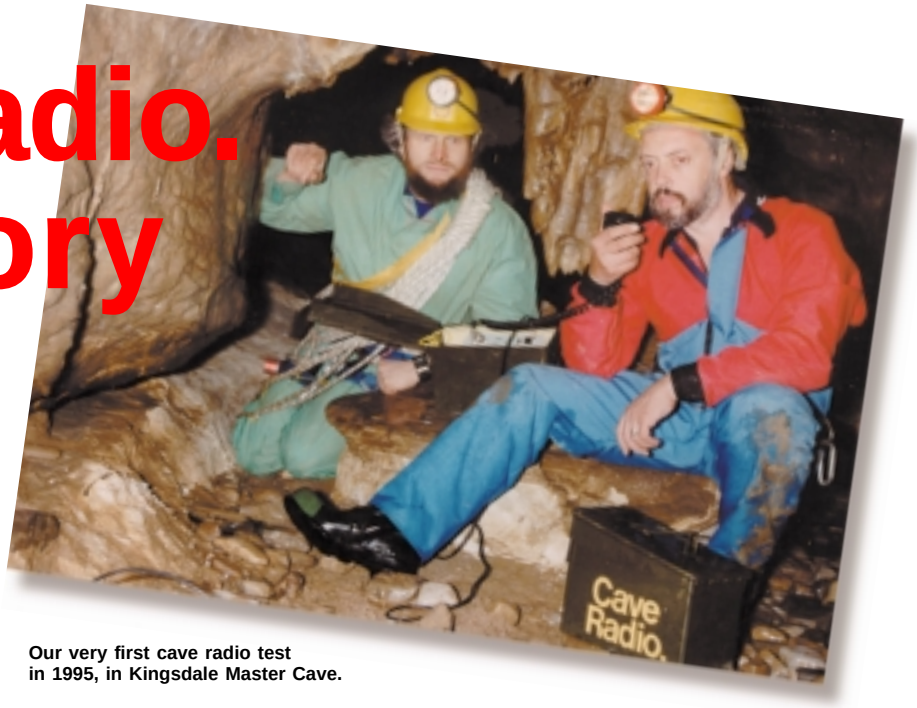
Cave Radio. The Story so Far

*By John Hey, G3TDZ **

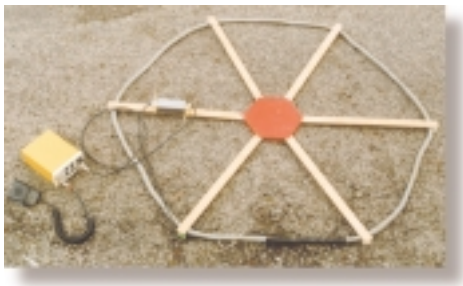


Our very first cave radio test in 1995, in Kingsdale Master Cave.

THE 'SO FAR' indicates that experimentation continues, there being no *convenience food* in the form of black boxes to make us lazy; construction is by radio amateurs.

Almost all the members of the CREG (Cave Radio and Electronics Group), who gather several times a year for experimentation, are indeed radio amateurs. Not all endeavours are radio communication, for we diversify into location beacons, alternative lighting methods, photographic flash systems and cave counters. Recently we have made two-way slow-scan TV, sound and picture contact between the surface and both Yordas Cave and Kingsdale Master Cave, using the Kenwood VC-H1 slow-scan adaptor connected to our cave radios.

G3PAI injects a known earth current. Down below, G8DSU reads signal strengths from a circle of electrodes.



Cave radio with loop aerial.

For voice communication, our workhorses are the latest in a line of development operating at the caving frequency of 87kHz USB, though the circuits should work just as well at 73 or 136kHz.

Our earliest attempts were based on PCBs from the old White Rose project and indicated the way forward; communication through rock was a challenge quite unlike other branches of amateur endeavour. By tradition, series resonant loop aerials (1m diameter hula-hoops) were the accepted propagation and reception systems. These only transmit a magnetic field, which decays according to an inverse cube law, ie a loss of 18dB every time the distance is doubled, starting at 1m! Taking field strength measurements at progressive short intervals and plotting them on a graph enabled the signal level at greater depths to be predicted. By 120m we expected the signal would be down to 1µV.

Our first experiments were to try to improve the loop. It was quickly found that using six spreaders to produce a roundish loop was 2dB better than the earlier square formations. Early models had used ribbon cable, but this is easily shredded or broken in the harsh environment of a cave. A similar gauge hook-up wire was substituted, being more robust; however, when a much heavier 6A cable was used, a 6dB stronger signal was measured. When this too was doubled, a further 6dB improvement resulted. One suspects this cannot go on forever: a loop the size of a motor tyre could prove tiresome. It was then found that the resonating capacitor was getting hot, even though a 400V polyester type. This was changed to a series parallel combination of four 10nF 1600V polypropylene types, resulting in a further 4dB increase in performance. These improvements were like increasing transmitter power 40 times (to double the distance, you need to increase the power by 64 times).

Other models had little legs fitted to their loops, to keep them away from the wet cave floor. Tests at home showed it hardly mattered: a wet garden, wet concrete or stone

The field strength meter.

* *8 Armley Grange Crescent, Leeds LS12 3QL*

paths made no difference; but complete immersion did awful things - it went off resonance 11kHz and the Q dropped like a stone from 60 to 10. A team wanting to use these sets under water has made a loop from screened cable, which appears to work.

THE RECEIVERS

THE FIRST RECEIVERS used a low noise op-amp in their RF stage. Unhappy with the noise figure, it was found that a 2dB improvement resulted from an order of magnitude reduction in feedback values. Substituting a good old-fashioned FET cascode RF stage, having the same gain, made a noise figure improvement of 22dB. The cascode has been retained in all later circuits.

The first mixers used the 1496 chip. This was inexpensive and reliable, but needed a balance pot. Later, analogue switches were used. The well-published op-amp circuit used with switching mixers will only balance the gain after adjusting a trimpot, input impedances are still unequal. It has been argued that careful balancing is not necessary, but examination of mixer outputs on an oscilloscope revealed so much 'mush' that the wanted signal couldn't be seen. Third order low-pass filters following the mixers improved matters.

An inherently balanced circuit familiar to instrument engineers but perhaps not seen by many radio amateurs and having two high impedance inputs has been fitted; its feed from the switchers form two sample and holds, the storage capacitors recently increased from 150pF to 1000pF, and well-balanced without any trim-pots. The outputs are now so clean that the filters have been discarded. The unwanted sideband rejection has risen from an adequate -32dB to a healthy -40dB (see **Fig 1**). Unfortunately, the mixers loaded the RF stage's tuned circuit, so a buffer has been added which has a modest gain of 6dB.

The audio phase shift networks are made from off-the-shelf values and driven from low resistance in the ratio 3.5:1, their outputs buffered and then combined. The signal now passes through a third-order Butterworth and a second-order Chebychev filter. With the demise of the 6270 chip, an audio AGC circuit has been devised. From here, normal volume control and power stages follow. Oscillator injection or switching signals come from the transmitter board. Jumper settings select the wanted sideband.

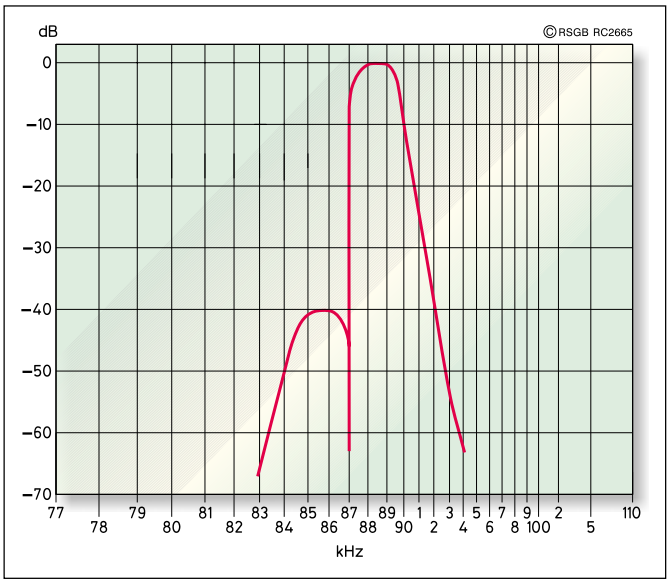


Fig 1: Receiver response and sideband rejection.

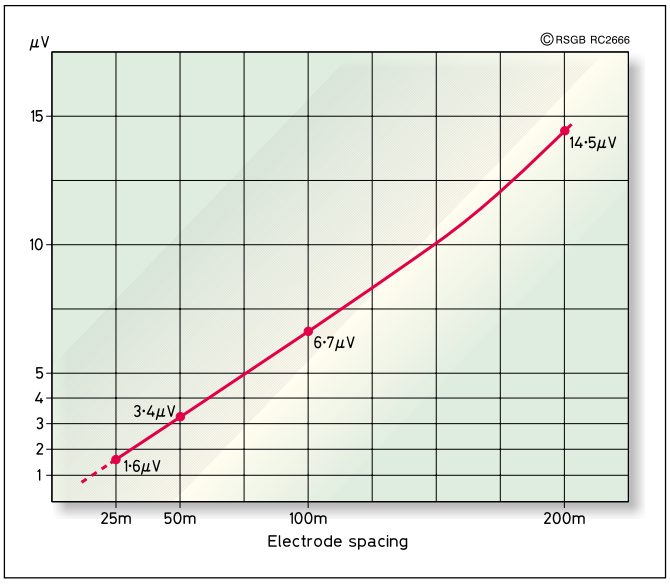


Fig 2: Received signal at County Pot, for various electrode spacings.

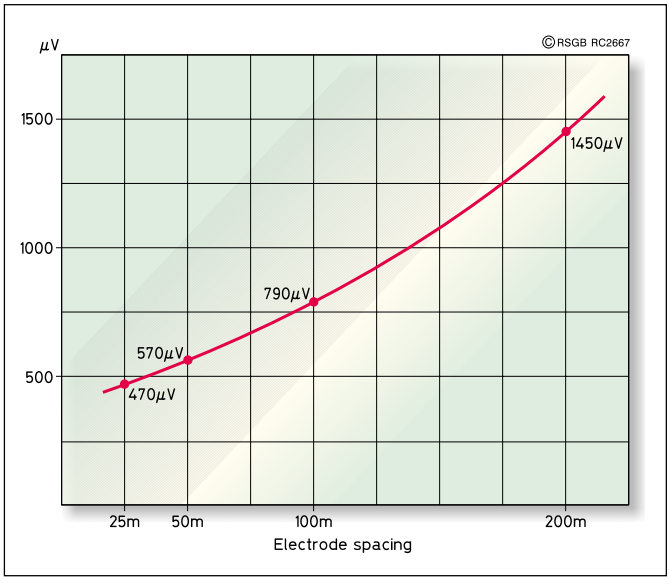


Fig 3: Received signal at West Kingsdale, for various electrode spacings.

THE TRANSMITTER

THE CIRCUIT FOLLOWS fairly familiar lines for a phasing exciter, with a single mic amp, a third order low-pass filter at about 2.8kHz and an inverting stage to give the two peak-to-peak signals in the ratio 3.5:1 for the phase shift networks. Switching modulators using 4053s are driven from a 4060 divider with 5.568MHz crystal and a 4013 to produce two quadrature signals. Carrier balance is achieved by adjusting the centre-line voltage at the two op-amps.

The combiner is as simple as can be imagined - a single transistor. The only tuned circuit in the whole transmitter is here. A TDA2003 car radio audio amp forms the PA.

Powered by an internal 12V 1.2Ah gel battery, the whole transmitter is housed in a steel case and on a steel chassis as part of the cave-proofing necessary. Controls and connectors are kept to a minimum and all mountings waterproofed. The loudspeaker is a mylar waterproof type

AERIALS & THINGS

AN EXPERIMENT was conducted to determine the effect of deforming the loop, by unhitching one of the spreaders and allowing one section to hang down. There was an 18dB loss. Retuning established the loss due to deformation was only -4dB, detuning being the main factor.

An alternative to the loop aerial is the use of earth current electrodes (the use of the word 'aerial' is one of convenience, as a loop does not transmit a radio wave). It has been known since WW1 that connecting a big audio amplifier to a pair of earth electrodes suitably spaced enabled speech to be picked up some distance away, say across a river, by a similar pair of electrodes. The amplifier must have been as big as could be made in those days, and very heavy. Unfortunately, reception could be ruined if there were overhead power lines in sight or a thunderstorm in the next

county. Superimposing the audio onto a carrier or, better still, transmitting SSB, together with selective circuits, overcomes these problems.

From our aerial socket a 1:10 step-up transformer feeds two electrodes about 50m apart. The received signal is now much stronger down in the cave, though still using a loop positioned vertically here. A field strength meter was constructed so that meaningful figures could be learned. We first tried this at Box Mines in Wiltshire, where a 35dB improvement over twin loops was recorded. This massive increase allowed communication at much greater depths.

Next we tried earth electrodes in the cave too, recording a further 30dB improvement. As you cannot drive electrodes into rock, lengths of copper braid at the ends of two 10m lengths of cable were placed in pools or muddy patches. When first tried at Bull Pot of the Witches, the signal overloaded the poor receivers. Reduced electrode spacing overcomes this.

A trial was organised at Peak Cavern in Derbyshire. Deep into the cave, where contact had previously been impossible, we took the radios and ground wires. At a point called Main Stream Inlet where two streams converge, we placed an electrode up each of the passages, just dropping the wires into the running streams. Our first call brought back a 'loud and clear' 5/9 report. We were *very* pleased. A second test at Far Sump brought a similar excellent report.

With such satisfying results, a demonstration was arranged, where visitors from rescue groups from France, Belgium and Britain gathered at Peak Cavern in April 1999. We had four stations working, two above and two below ground; the greatest distance achieved being 500m.

The French have achieved even greater depths. Originally with a circuit based on our design, they have reverted to superhet technique for their 'Systeme Nicola'.

John, G3PAI; Chris, G4OKW; and Mike, G4AEE, waiting to hear from G8DSU 'down below'.

Mike, G4AEE, deep down.

GEOLOGY & THINGS

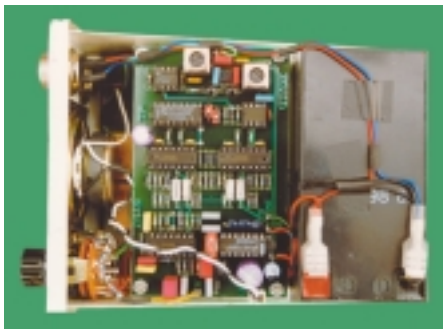
IN FRANCE IT WAS found their signal could be detected almost 1km away along the limestone bed. Here we have recently conducted tests to determine optimum electrode spacing. From the two graphs shown, widely differing signal strengths have been recorded. At County Pot (**Fig 2**), where there is a thick layer of sandstone over the limestone and a heavy overburden of peaty soil above this, signals were weak, though solid communication was maintained. In a similar test the next day at West Kingsdale, where the limestone is more obvious, very much stronger signals resulted (**Fig 3**).

Where the electrodes do seem to be 'insulated' from the limestone, the Americans have found it better to place the electrodes at the cave mouth rather than on the hill above.

The two graphs indicate that the wider the spacing, the better the signal - up to a point, that is. We found that with spacings of 400m the signal had dropped noticeably; somewhere just over 200m seems optimum, but we suspect this depends on depth and the local geology.

BRIGHT IDEAS

OUR GANG IS driven by 'Have you tried…'or sometimes, more negatively, by 'Why haven't you tried…'. It was suggested

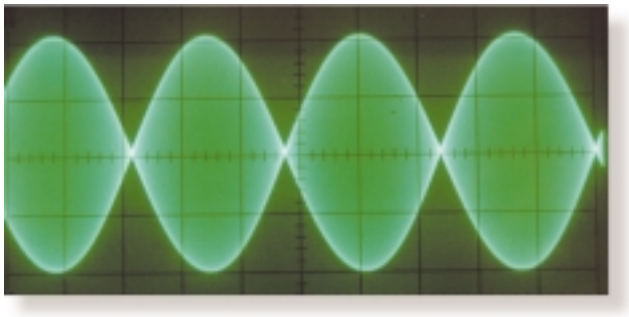


Inside the cave radio.

that the electrodes didn't actually do much and that the connecting wires acted as a loaded dipole, so off we went to Roger Kirk Cave, where we laid out the normal 50m electrodes. A field strength reading was noted, then the connecting wires were hoisted 1m above ground on garden canes. Exactly the same reading was achieved. Lengths of coax were substituted and their outers joined: just the same figure. Finally the ends were disconnected from the pegs; the signal was lost. We rest our case.

Someone insisted that our multi-turn loop would actually radiate a radio signal. A short active dipole using a pair of FETs and a NE592 was constructed and the loop powered up. I admit to a slight disappointment when a strong signal was copied a couple of metres away, but it soon became obvious as the distance was increased that the signal faded according to an inverse cube law. From a radiation resistance of maybe 0.04 ohms, what would you expect? Experiment closed.

I have been asked why I use the old LM380 rather than one of the new super class-D power chips? Anyone who has used a cave radio when someone nearby has switched on an electronic flash will know the answer. Of course it might be possible to synchronise the class-D switcher to our carrier frequency, but something to do with nuts and sledgehammers comes to mind. The good old clunker is well proven and requires only two peripheral components.



Textbook two-tone waveform of cave radio transmitter.

A talk-through box, used to interface the cave radio with an amateur HF or VHF transceiver.

CONCLUSIONS

ANY READERS WHO feel they might contribute to our efforts or just like to join in the fun, either above or below ground, might like to contact G8DSU (QTHR) for further details. The Cave Radio and Electronics Group is a special interest group of the British Cave Research Association. The circuits, PCB layouts and PCBs for our recent designs are available for those wishing to experiment - just contact me if you are interested.

I would like to acknowledge the work of earlier pioneers like the Molephone, which has been the standard radio for many years, and the Ogophone made in Wales. Now we have to find a catchy name for our radio. The first choice of Troglophone has already been used for a wired system, so how about K-phone? (say it fast)… unless someone has a better idea. ♦

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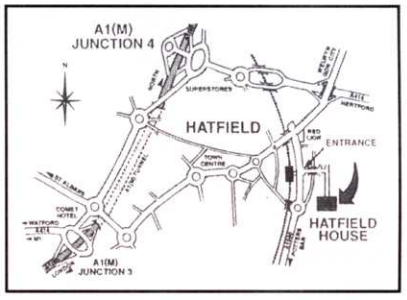

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Chirps: a New Way to Study HF Propagation

Part one, by Peter Martinez, G3PLX *

IN THE MAY 1998 edition of *RadCom* I described how, by using DSP-based narrow spectrum analyser techniques, useful information about propagation modes can be obtained, by studying the Doppler shift imparted to the signals reflected from moving surfaces such as meteor trails, ionospheric layers or even aircraft in flight. This technique provides a method by which anyone with an SSB receiver tuned to a suitable unmodulated carrier can display 'dopplergrams' which show the presence of the reflecting surfaces, so long as they are moving.

DOPPLERGRAMS NEED MOVEMENT

THE NEED FOR movement is an essential part of this technique: it is not possible, for example, to detect the presence of two separate reflecting layers if there is no relative movement between them. Further, since the amount of Doppler shift is a function of the angle-of-incidence, there is virtually no Doppler shift for low-angle reflection from the ionosphere, so this technique is not useful for long distance HF paths. For example, a dopplergram of an unmodulated carrier from a point nearly halfway round the world shows no sign of the presence of the two separate long and short path signals. This feature describes a completely new technique for studying HF propagation, which overcomes this problem and opens up many new avenues for exploration of the HF bands. Like the use of existing unmodulated carrier for dopplergrams, this technique borrows existing HF signals to make the details of the propagation visible.

I realised that for long distance paths on the higher HF bands, what was needed was a method of displaying the time-domain structure of a signal, not the frequency-domain structure as in the dopplergram technique. A few moments study of the theory showed that this would mean using some kind of wideband signal to probe the path, rather than the 'narrow' unmodulated carrier used in the dopplergram technique.

PULSES INSTEAD OF CARRIERS

A PULSE IS THE obvious choice for the probe signal. If I could arrange for a friendly distant transmitter to emit a regular pulse signal and feed the received signal to an oscilloscope, the presence of two received pulses would indicate directly the presence of two separate paths, whether they were moving or not. More study of the theory showed that if I was using a standard SSB receiver with a bandwidth of 3kHz, I might be just able to distinguish pulses that were separated by 0.33ms (the reciprocal of 3kHz). This is just enough to separate reflections from, for example, the E and F layers of a near-vertical-incidence path, but not enough to resolve the structure of propagation anomalies with smaller path differences than this. However, if I am just interested in studying HF propagation in order to understand how it affects the signals I normally receive in a 3kHz bandwidth, I won't be missing anything if that's the bandwidth I use for my experiments.

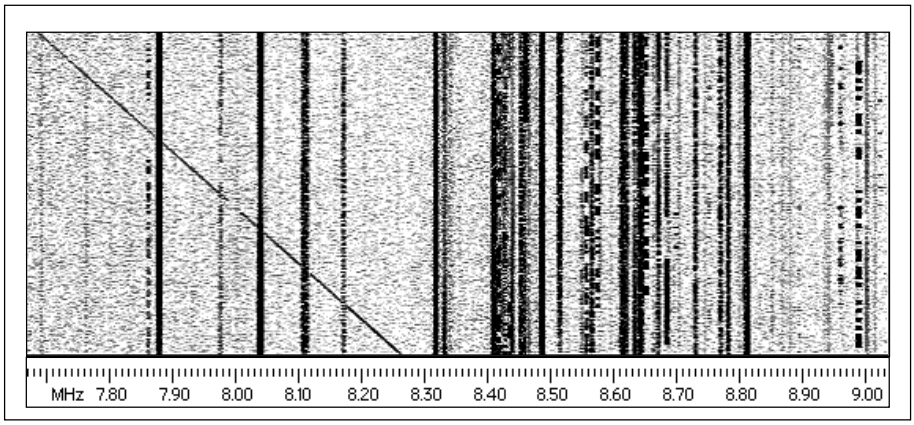

Fig 1: Spectrogram showing a sweep sounder passing 8MHz. The vertical axis represents about five seconds.

I could certainly have tried pulses if I could have persuaded another amateur at a suitable distance to transmit such a signal. However, what I was hoping was that there might be some suitable HF signal already in common use which could be 'borrowed' for this purpose, in the same way that unmodulated carriers which are plentiful on the HF bands were borrowed for the dopplergram technique. I tuned the bands looking for pulse-type signals that might be hijacked for the job, but it seemed that there was nothing suitable. Even the 'Woodpecker' was nowhere to be found!

THE PHANTOM VFO-SWISHER UNMASKED

THIS IDEA WOULD have remained just as a pipe-dream, but I stumbled on the breakthrough by chance soon after moving to a new location a few years ago. I had left the HF receiver on 28MHz, but came back into the shack late in the evening after the band had closed. I noticed a periodic sound like someone swishing a VFO across the band very fast and realised that this must be local to me. I decided to investigate. By tuning to different frequencies and noting the precise times at which I heard the signal, I deduced that this was a carrier that was sweeping in one continuous scan from 2 to 30MHz at a rate of 100kHz per second, repeating every five minutes.

Then I remembered that I had read about this somewhere before. This is a swept-frequency ionospheric sounder, sometimes known by the trade name 'Chirpsounder'. Radio researchers and professional HF operators use these for plotting the height and cut-off frequency of the ionosphere. The transmitter runs a few tens of watts into a broadband omnidirectional antenna and the return signal is received separately. A narrow-bandwidth receiver is swept up the band in step with the transmitter so that the direct signal is always zero-beat in the receiver. Think of it as a direct conversion receiver using the same swept oscillator that drives the transmitter. A signal reflected from the ionosphere will have originated from a slightly earlier point in the transmitter sweep because of the propagation delay and so give rise to a beat-note in the receiver. The beat-note frequency is a function of the propagation delay and the sweep rate, and can be in the range 0-500Hz for propagation

* *High Blakebank Farm, Underbarrow, Kendal, Cumbria LA8 8HP.*

delays of 0-5ms, which correspond to ionosphere heights from zero to 750km. A suitable spectrum analyser connected to the receiver output thus displays an 'ionogram', a chart of the ionospheric reflection height over the band between 2 and 30MHz.

Further research revealed that the signal I was hearing was about 50km away near Preston, Lancashire. Once I had recognised the sound, I realised that there were many more of them around the HF bands. Andy Talbot, G4JNT, sent me **Fig 1** which shows a 'waterfall' spectrum display of part of the HF band received in the south of England. Some marine coast stations can be seen on the right sending data and Morse code. The diagonal line on the left is a sweep sounder. A helpful research scientist provided a list of about 30 sweep sounders worldwide, but indicated that it was incomplete. At this point it became clear that here was the missing wideband signal for my pipe-dream system. Thus the Chirps Project was born.

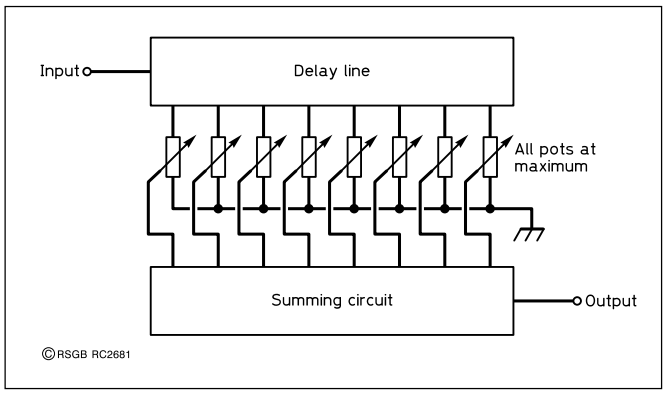

Fig 2: Simple low-pass FIR filter with delay-line with a potentiometer on each stage and a summing circuit to form the output.

THE MAGIC CHIRP FILTER

A PROJECT TO BUILD a sweeping HF receiver was not something to be taken lightly, and I wondered what could be done with an ordinary SSB radio. If the receiver was left on a quiet frequency in the USB mode, it would produce a brief upward-sweeping tone when the sounder went past. I decided to build a tunable audio filter that could be swept in step with the chirping tone. This was actually rather easier to do than it sounds and had some almost magical properties which transformed the pipe-dream into a working system.

To explain how this was achieved, consider first a circuit consisting of an audio delay-line. It's going to be a DSP delay-line eventually, but let's start by thinking of it as an analogue delay-line. Taps along this delay-line each connect to a potentiometer and the signals from all the potentiometers are summed together. To start with we turn all the pots to the top. In DSP-speak we say that the tap coefficients are set to maximum. The output will be proportional to the running average of the input signal over time, and that makes it a kind of low-pass filter. The cut-off point occurs when the input frequency is such that one whole cycle of the input signal just fills the delay-line and at that point the output sums to zero and there is a null in the output response. **Fig 2** shows a block diagram of such a filter. Notice that if we feed a very short pulse into this filter, the output (the impulse response) is a square pulse with the same duration as the length as the delay line. Filters like this are easy to implement digitally and are sometimes called Finite Impulse Response (FIR) filters.

To make a bandpass filter centred on a frequency of, say, 1000Hz, two such filters can be combined in a circuit such as **Fig 3**, in which the input signal is first converted from 1000Hz down to DC in a pair of mixers fed with 1000Hz oscillators which are 90 degrees out of phase. That is, one oscillator is a sine wave and the other is a cosine waveform. The outputs of the two mixers are each passed through a low-pass FIR filter and then through two more mixers, which convert the signal back up to 1kHz. The final output is the sum of both channels. The two frequency chages cancel out and the image responses of the first pair of mixers cancel out in the second of the mixers, so this arrangement forms a narrow bandpass filter that can be tuned around the audio band by varying only the oscillator frequency.

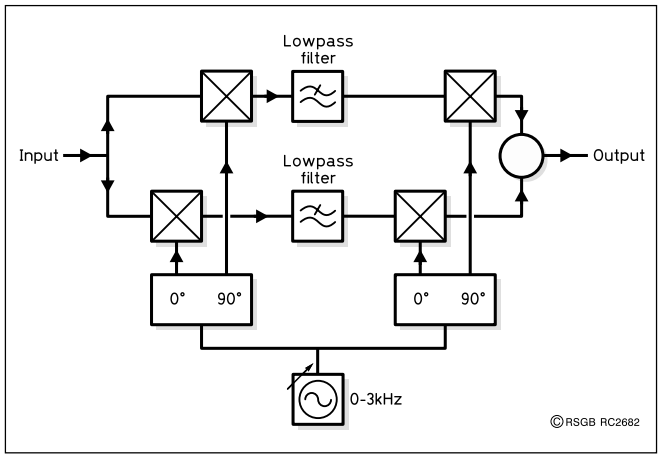

Fig 3: Tuneable bandpass filter made from two of the filters of Fig 2, built into an image-cancelling down-up converter.

Since we know that the expected signal sweeps at 100kHz per second and the SSB receiver is 3kHz wide, we can say that it will take 30ms for the received chirp to sweep through the passband, so that's how long we make the delay-line. This means that the low-pass filters will have a cut-off frequency of 33Hz (when one cycle of sinewave just fills the delay-line), and thus the tunable audio filter will pass frequencies up to 33Hz each side of the centre. When we know that the expected chirp has just started to arrive, we can start the local oscillator sweeping from zero to 3kHz at the 100kHz/sec rate. 30ms later, when the received chirp just fills the delay-lines, the filter output will be at its maximum. We have received 30ms-worth of the 3kHz-wide sweep-sounder signal in a matched filter.

At first sight it might appear that this filter is going to give us an impulse response which is of 30ms duration, and we are really hoping for something better than this so that we can resolve closely-spaced paths: recall that the fundamental theory says we should be able to resolve 0.33ms with a 3kHz bandwidth. But consider now what happens if the chirp signal arrives 0.33ms later that we expected. Its sweep will be 0.33ms behind, or 33Hz lower than the oscillator sweep, and the outputs of the mixers will be at 33Hz rather than DC, right on the cut-off frequency of the low-pass filters. The same applies if the received chirp was 0.33ms early, so a chirp that is early or late by 0.33ms will be cut off by the filter. This is another way of saying that the filter has a time-domain response of ±0.33ms, *but only to upward-sweeping chirps*. In other words, what we have made is a filter that selectively passes a chirping input signal of 30ms duration, with a passband of ±33Hz, but gives an output pulse that is only ±0.33ms wide. We will be able to resolve chirps separated by 0.33ms after all.

Finally, if we consider only the instant of time when the expected chirp signal has just filled the delay-line (which is the only time when we need to calculate the output), and we realise that the mixers can be implemented digitally by multiplications, we can dispense with the first pair of mixers in Fig 3 by replacing the constant tap coefficients in the filters by values pre-computed from the sine and cosine values of the sweeping local oscillator. The sequence of tap coefficients is no longer constant along the delay-line, but varies in a sinusoidal manner along one filter and in the complementary cosinusoidal manner along the other filter, with the frequency varying along the sequence. When we do the summing of the taps now, it is a

sum of products and one of the terms in these products is the sequence of pre-computed oscillator signals, spread out in sequence along the delay-line rather than spread out in time from the oscillator. To simplify the chirp filter further, we can note that if we are only interested in measuring the amplitude of the received chirp and we don't need to reproduce the original signal at the filter output, we can also dispense with the second pair of mixers and just combine the outputs of the low-pass filters together and achieve the same result. This means that we can now also throw away the oscillator, since all the outputs we needed from it have been pre-calculated and 'hard-wired' into the filter tap coefficients.

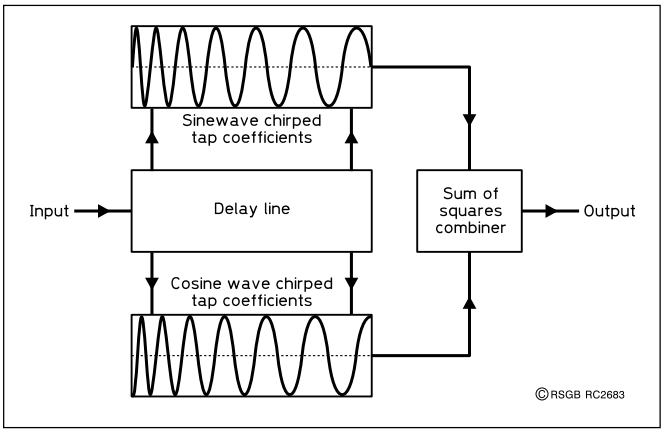

Fig 4: Final chirp filter consisting of one delay-line, two sets of chirped sine/cosine tap coefficients, two sum-of-products circuits and a sum-of-squares combiner.

THE FINISHED CHIRP FILTER

THE FINAL FORM of the chirp filter is given in **Fig 4**, with the audio input feeding into a single 30ms delay-line with two sets of 'chirped' tap coefficients alongside, each with a sum-of-products function and a combining arrangement at the far end which is simply done in DSP by a sum-of-squares function. In practice the chirp filter coefficient sets are shaped slightly in order to eliminate the sidelobes outside the first nulls at ±0.33ms (±33Hz), but this has the effect of filling-in the first nulls so that they become the 6dB points of the finished chirp filter. We end up with a chirp filter with a 66Hz bandwidth and a 0.66ms-wide chirp response, both figures now measured between the 6dB points.

To use the chirp filter in this form, we feed the incoming audio continuously through the delayline and perform the DSP calculation whenever we wish to see the output response. If we are expecting a single chirp we need only do this calculation once, when we expect it to have just filled the delay-line, but if we want to listen continuously for possible chirps we can do the calculation as often as we wish, typically at 8000 times per sec, the sample-rate of the DSP system. We have effectively created a continuous-time chirp filter: a strange device for which there is no equivalent in the analogue world. It's a filter that passes only upward sweeping tones and rejects everything else. Not only that, but when we input a 30ms-long chirp, it delivers a 0.66ms-long output pulse. We can just distinguish two chirps which are separated by 0.33ms, even though they overlap each other for most of the time that they are sweeping through the passband. It is effectively a device for transforming chirps into pulses. It's even 17dB better than if I had persuaded someone to transmit pulses for me, because there is 45 times more energy in a 30ms chirp than in a 0.66ms pulse.

I wrote the DSP code to implement such a filter in the Motorola DSP56002EVM kit, the same one that I used for the dopplergram experiments and for other projects. In addition to the receiver audio, an accurate timing signal was fed into the DSP card, initially derived from a crystal oscillator but later from a GPS navigator module equipped with a 1Hz output which is derived from the atomic clocks in the GPS satellites. The chirp filter output from the DSP card goes via a serial link to a computer which displays it on the screen in a raster scan with elapsed time along the X-axis, propagation delay along the Y-axis, and the signal level shown as the intensity of the displayed pixel, with a range of 64dB between black and white. This is very similar to the waterfall display used in the dopplergrams, but with the vertical axis showing time delay rather than Doppler shift. The Y-axis scan was configured like a delayed timebase, so that it displayed the signal received in a chosen 150ms slot in every five minute cycle. Each received chirp thus appeared as a blip in a vertical stripe painted on the screen once every 5 minutes, each stripe appearing slightly to the right of the previous one. A single path displays as a thin horizontal line over a period of hours, and multi-path, for example, shows up as fuzziness or extra horizontal lines above the main trace. ♦

In part two I will describe how the chirp filter was integrated into a complete monitoring system. The results are shown and the possibilities for the future discussed.

To be continued...

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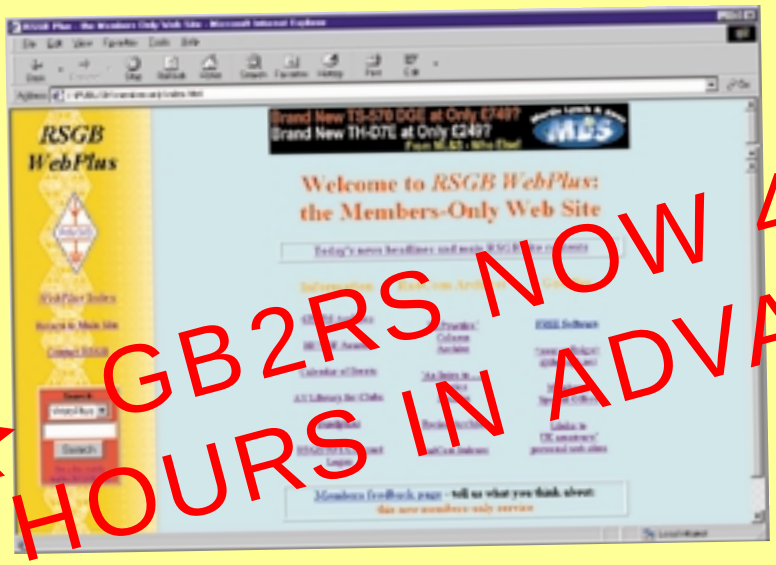

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A Compact, Modern HF Linear

Part two, by Bruce Edwards, G3WCE*

IN THE first part, the design criteria were discussed and the first parts of the circuit described. We now move on to describe the remainder of the circuit.

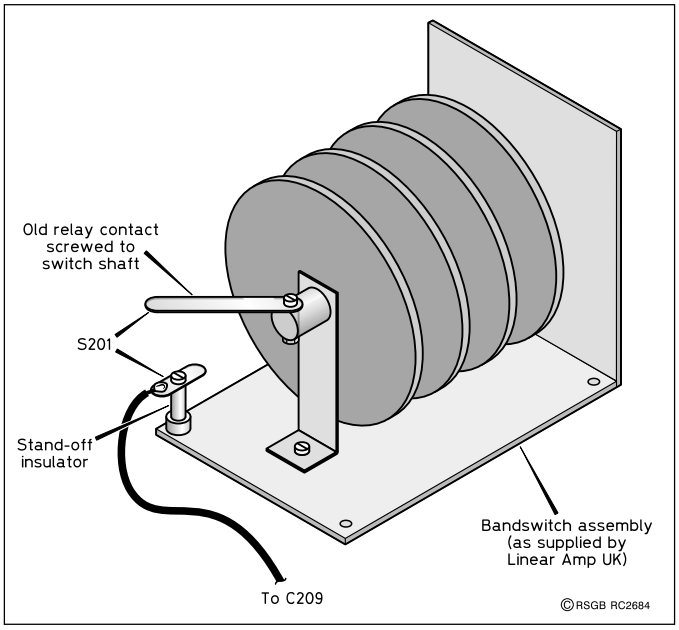

Fig 4: How the band-switch is modified, to add the contact necessary for switching-in the extra capacitance for the 1.8MHz band.

OUTPUT NETWORK

RF energy from the anode is coupled into the pi network by C207, which ideally is a 'doorknob' type. A disc ceramic will function here, but would be liable to failure if the amplifier were operated into a very high SWR, eg a short-circuit output lead. C209 is switched into circuit to provide extra capacitance for 1.8MHz, if operation is required on this band. This must also be a doorknob type, to handle the high current involved. S201 is fashioned by drilling the end of the band-switch shaft and fixing a relay contact (one from an old, Post Office 3000 type is ideal) and arranging this to come into contact with, thus grounding, a suitably placed stand-off insulator (see **Fig 4**). Using another wafer on the band-switch is not viable, as the voltage here is very high and would almost certainly result in arcing to the shaft of the switch.

L201 is a self-supporting inductor made from copper tubing. This was bought from a car parts shop and was described as: "OD 3/16in x 22 SWG soft copper tube to BS2871/2/C106. Pressure tested to 8000 PSI." Nine turns were wound onto a temporary former, an old electrolytic can-type capacitor (44mm diameter), with some to spare at the ends. The turns were then spread over approximately 65mm and the former removed.

The tapping points are:

28MHz – 4 turns from anode end
24MHz – 5 turns from anode end
21 MHz – 6 turns from anode end
18 MHz – 9 turns (whole coil)

L202 is a home made air-spaced coil. Soft copper wire is probably easiest to work with, but ordinary tinned copper wire is fine. 32 turns of 1.6mm wire are used. 6mm nylon rod is sold by Maplin as shaft extension rod.

Tape the rods to a suitable former to give an outside diameter as close to 65mm as possible. Now, using a fine felt-tipped pen, mark the position of each turn on each rod. The 32 turns are spread evenly over 102mm (this is based on 8 turns per inch, so you will probably find it easier to work in inches).

Next, using a suitable former (eg a half-sized wine bottle), wind the coil. Wind more turns than needed (36 is ideal), place it over the support rods, and, using a soldering iron, press the wire into the rods at the markings (see **Fig 5**). With this operation, time and care is needed to give a neat result. Each end of the wire is firmly anchored by winding it once round a rod (the same rod at each end). The rods should then be cut short at one end and left 30mm long at the other. This latter end will rest on the chassis, so make sure the rods are an even length. The whole coil can be firmly anchored by drilling two of the rods to take self tapping screws which pass through suitably placed holes in the chassis.

The tappings on the coil are:

14MHz – 4 turns
10MHz – 6 turns
7 MHz – 9 turns
3.5MHz – 18 turns
1.8MHz – 30 turns
(in each case from the junction of L201 and L202)

If the coils are made to the dimensions given, it should not be necessary to adjust these tappings.

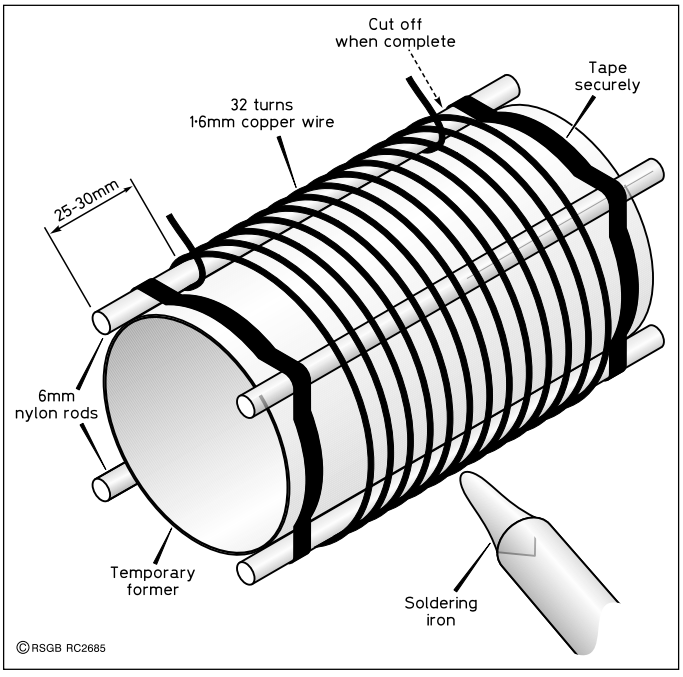

Fig 5: Melting L202 into the nylon rods, using a soldering iron.

C210, the loading capacitor, is mounted over a cut-out in the chassis, so that the moving vanes actually pass through as they are opened. C208, the tuning capacitor, is mounted on a platform over C210. This saves considerable space and means that a very compact unit can be built, but there is another not-so-obvious advantage to this arrangement: C210 can be grounded very close to C208, which avoids the large currents which circulate in the pi-network from hav-

*232 Earlham Road, Norwich NR2 3RH.

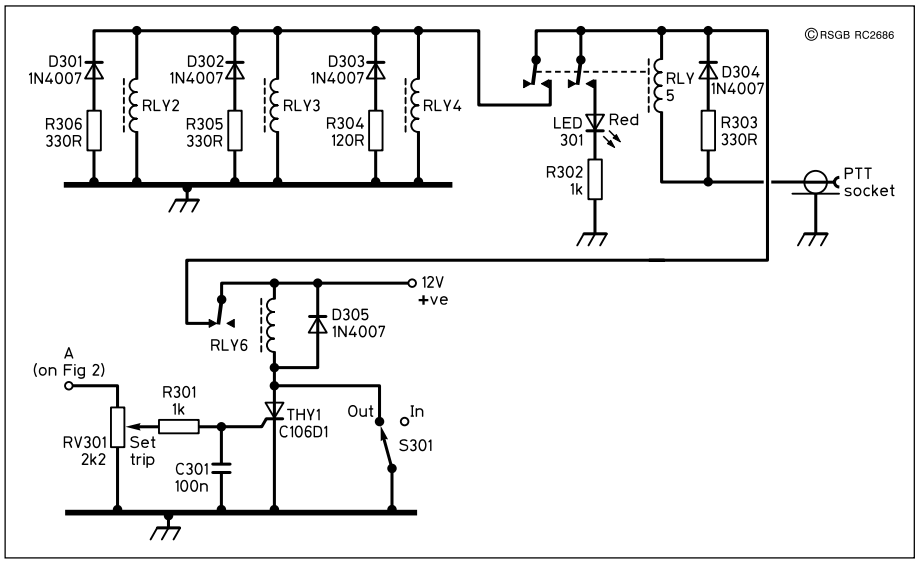

Fig 6: Circuit of the transmit/receive switching, plus grid protection.

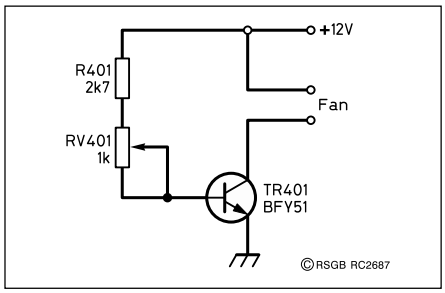

Fig 7: Fan speed control.

FAN CONTROL COMPONENTS

Resistors

R401	2k7 0.6W metal film
RV401	1k horizontal pre-set

Semiconductor

TR401	BFY51

Miscellaneous

Heatsink for TR401

T/R SWITCHING AND PROTECTION COMPONENTS

Resistors

R301, R302	1k 0.6W metal film
R303, R305, R306,	330R 0.6W metal film
R304	120R 0.6W metal film
RV301	2k2 horizontal pre-set

Capacitor

C301	100nF 16V ceramic

Semiconductors

D301-305	1N4007
LED301	5mm red LED
THY1	C106D1 (Electrovalue)

Miscelleaneous

RLY2, 3, 5	12V 10A mini relay (Maplin JM67X)
RLY4	Power relay DPDT 12V coil (8pin plug-in type) + socket. (Maplin JG58N and JG54J)
S301	SPST mini toggle switch

ing to cross the chassis.

RFC203 is included for safety reasons (if C207 should fail by going short circuit, the full EHT would appear at the antenna socket). This choke provides a DC path to the chassis, which will blow F103 if this ever happens. Any RFC of 1mH or more, wound with reasonably thick wire will do, but definitely not a component that is intended for use in solid-state equipment. Alternatively, a 75x10mm piece of ferrite rod wound with, 6/0.1 PVC covered wire was found to give a resonant frequency of 55MHz, so should prove entirely satisfactory. The ends can be secured with cable ties in a similar fashion to RFC204.

TRANSMIT/ RECEIVE SWITCHING

The circuit diagram for this is shown in **Fig 6**. RLY3 biases the valve 'off' for receive and 'on' for transmit, while RLY2 and RLY4 take care of the antenna change over. As some transceivers may use a solid state switch with limited current handling capabilities to control a linear, an additional relay, RLY5, is used to switch the 12 volt supply to the other three. This also switches the red transmit LED on the front panel.

The 12 volt supply to RLY5 is via a pair of normally-closed contacts on RLY6. For the amplifier to be out of circuit, this relay needs to be activated, which it is when S301 is in the 'out' position, or when THY1 conducts. This occurs when the level of grid current produces a large enough voltage across R203 to 'fire' the thyristor. When this happens, it is necessary to reset the circuit by switching S301 to 'out'. RV301 sets the actual level at which the amplifier is shut down

COOLING

As the 120mm fan chosen was more than capable of cooling the valve and the noise level was excessive, some means of reducing its speed was desirable. A series resistor would do this, but experimentation would be required to find a suitable value, so instead, the circuit shown in **Fig 7** was used. This was constructed on a piece of perforated board. The transistor should be fitted with a heatsink. ♦

To be continued...

R_L = 4200Ω

		C208		C210		L	
MHz	**Q_L**	**Xc**	**C(pF)**	**Xc**	**C(pF)**	**Xc**	**L(µH)**
1.8	12	347	240	58	1445	369	30.9
3.5	12	347	126	58	753	369	16
7.0	12	347	65	58	389	369	8.33
10.1	12	347	45	58	270	369	5.8
14	12	347	32	58	191	369	4.13
18	15	280	32	38.5	230	303	2.68
21	18	233	33	29.5	256	255	1.8
24	21	200	33	24	276	219	1.49
28	24	175	32	21	270	192	1.07

Note: An optimum Q_L of 12 is maintained on 14MHz and below. On 18MHz and above this is no longer possible because of stray capacitance, so the Q_L is allowed to rise, resulting in an achievable value for C208.

Table 4: Pi output network data.

INPUT MATCHING COMPONENTS

Capacitors

1200pF	(for placement of
1000pF	these components,
560pF (x2)	see Part One)
270pF	
220pF (x2)	
180pF (x2)	
150pF (x3)	
120pF	
68pF (x3)	
33pF	
22pF	
65pF trimmer (x6)	Maplin WL72P

Inductors

Coil formers (x7) see text

Audio-Driven S-Meter for DC Receivers

*By Chas Fletcher, G3DXZ**

DIRECT conversion (DC) receivers do not normally have automatic gain control (AGC). The reason for this is primarily that they do not have intermediate frequency (IF) amplifiers, whose gain can be varied to control their output without introducing too much distortion. If the amplifier's output is to be held reasonably constant, then the AGC voltage must track the received signal strength and is therefore a convenient means of driving a signal strength meter. Alas, the DC receiver does not have this feature. The mixer produces an audio output and is normally directly followed by a low noise pre-amp of fixed gain and wide dynamic range. The primary gain control of the receiver is usually placed after the audio pre-amplifier. With such an arrangement, the audio signal across the gain control is directly proportional to the incoming RF signal over the linear range of the receiver's front end, so why not use the audio output to drive a signal strength meter via a rectifying circuit? The answer to this question is perhaps best appreciated by considering the actual signal strengths typical of the HF bands and how they vary.

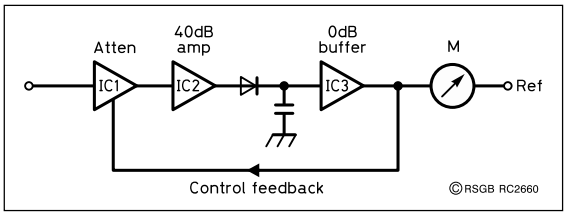

Fig 1: Block diagram of the audio-driven S-meter.

COMPONENTS

Resistors (all fixed resistors, 0.25W 5%)

R1	22k
R2	1k
R3	100k
R4	56k
R5	1M5
R6	1M0
RV1	4k7 mini carbon pre-set
RV2	10k mini carbon pre-set
RV3	2k2 mini carbon pre-set

Capacitors

C1	1µF 63V electrolytic
C2	1nF 63V mylar
C3	1µF 63V electrolytic
C4	10µF 63V electrolytic
C5	2.2nF 63V mylar
C6	0.47µF 63V electrolytic
C7	100nF 63V mylar
C8	22µF 16V electrolytic
C9	47µF 16V electrolytic

Semiconductors

IC1	MC3340P
IC2	TL071
IC3	TL071
IC4	78L05
TR1	VN10LM
D1	1N4148

Miscellaneous

M1	100-400µA

S UNITS

AMATEUR SIGNAL strength reports use the scale 1 to 9, S9 being a noise-flattening solid signal. Way back in the 1940s, commercial receiver manufacturers tried to standardise on a value of 50µV rms (into a 50 ohm load) as being an S9 signal and this is still a good figure to use. When listening on a receiver with an S-meter calibrated to this standard and not having excessively narrow pass-band, the sound of the signals seem to match the indication, so let's use 50µV as the S9 level and consider what lower levels mean.

One 'S' point is taken to mean a 6dB change in signal strength, which is a clearly discernible level change to the ear. If the signal is getting weaker, then one 'S' point down is -6dB. A -6dB change occurs when the signal strength is halved in value, ie reducing from 50µV to 25µV is a one 'S' point drop. If you continue to halve the signal level eight times you arrive at 0.19µV as equivalent to S1, which is clearly a very weak signal. In fact, constructing an HF receiver which will resolve an S1 signal is no mean achievement.

Having established the signal range, if you attempt to display the signal strength using a conventional, linear, op-amp style audio rectifier, there is a problem.

For example, if you use an ordinary 0-10 scaled meter as an indicator with scale digit 9 being S9, then an S8 signal will appear at 4.5 on the scale and S1 would be difficult to read at all. Alternatively, re-scaling the meter to indicate 'S' points results in a very cramped scale. Clearly, for an 'S' meter to be easily read it must display 6dB steps as equal increments. In other words it must have a logarithmic response. This is very difficult to achieve directly in a moving coil meter and is most easily accomplished using non-linear driving circuits. There are a number of ICs on the market with logarithmic responses, but one of the easiest to use (and the cheapest) is the old Motorola MC3340P. This is a straightforward voltage controlled attenuator chip and it forms the heart of the following circuit.

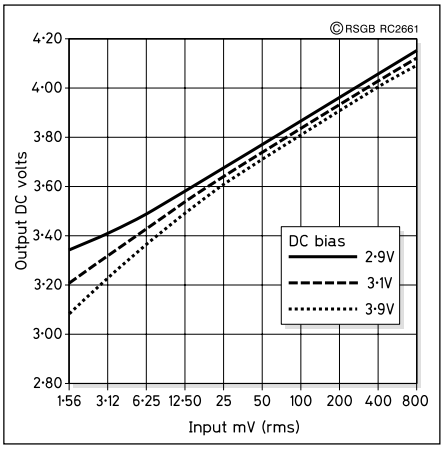

Fig 2: MC3340 output for various bias voltages.

USING THE MC3340

THE MC3340 IS a wideband attenuator chip, claimed by the manufacturers to have an staggering 80dB range. The control characteristic is substantially linear, in dB/volt, provided you do not operate at gain levels of 0dB and above. The control voltage range is a little difficult to handle, as it is somewhat dependent upon the supply voltage and has a positive offset of about 2.6 volts at maximum gain. The manufacturers' performance curves, which I obtained from a data CD ROM issued by Farnell [1] were helpful in establishing the general shape of the IC's response, but the optimum working point was found in time honoured fashion by painstaking measurement. Motorola's ICs do however seem to maintain their characteristics from sample to sample; the two

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

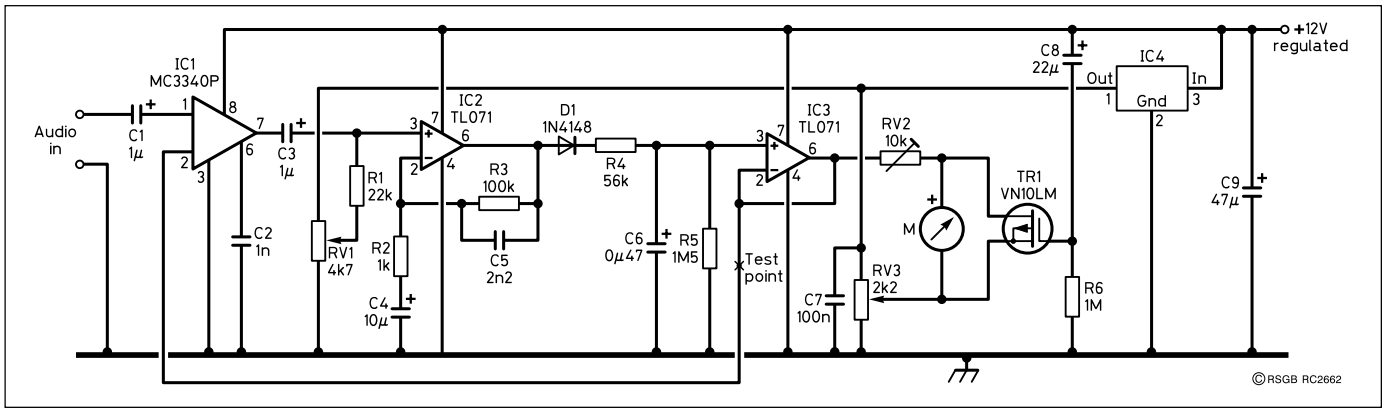

Fig 3: Complete circuit of the audio-driven S-meter.

I tried were almost identical in performance, even though they were purchased some 15 years apart!

Fig 1 is a block diagram of the meter driver. It is designed to take audio from across the AF gain control and the S9 level is assumed to be 400mV rms. The input resistance of the attenuator chip, IC1, is about 20kΩ and may need to be buffered if the AF signal comes from a source resistance much above 5kΩ.

IC1 is supported by an AF amplifier, IC2, a diode peak rectifier, and a buffer stage, IC3. It was found that for best linearity, IC1 must be operated in a region where it introduces a significant loss of signal and the 40dB amplifier stage IC2 is included in the loop to recover the audio to a level suitable for rectification. After peak rectification and buffering, the resulting DC signal is returned to IC1's control pin, forming a negative feedback loop. This feedback has a twofold effect. Firstly it stabilises the output of IC1 and secondly it helps to linearise the control characteristic. **Fig 2** shows the measured response of the circuit, based upon an S9 audio level of 400mV rms. The three traces illustrate the effect of changing the zero signal bias voltage. Best overall linearity is achieved with a zero signal bias set at around 3.15 volts when using a 12 volt supply. Note the equal increments in control voltage for each doubling of the signal strength. Thus, if the indicating meter has its negative pole set at 3.15 volts, its response can be scaled using a series resistor to show 'S' units directly.

A linear increment range of ten 'S' points can be displayed with this arrangement, which makes the circuit well suited to drive a standard 0 - 10 scaled meter. Again, scale 9 is set as S9 and is achieved with an audio signal input of 400mV rms. However, this limits the maximum indicated signal to one 'S' point over nine. Compared to a commercially produced receiver, with an 'S' meter scaled to 60dB over S9, this performance may look limited until you realise that such an indication means a signal 1000 times more powerful than S9 and is perhaps of limited application! Practically speaking, since this circuit is intended to be added to DC type receivers, which usually employ an RF attenuator to cope with extra-large signals, if steps that are multiples of 6dB are used, the range can be extended without the need to modify the meter scale. An RF attenuation of 6dB simply adds one 'S' point to the meter indication, and so on.

GENERAL CIRCUIT POINTS

THE FINAL CIRCUIT is shown in **Fig 3** and PCB layout in **Fig 4**. Stable DC supplies are essential. A 12 volt regulated supply was available in my DC receiver and I used that in conjunction with a low power regulator, IC4 (78L05), to fix the 5V bias rail voltage. The circuit will work just as well from a 15V regulated supply, but IC1's bias voltage would need to be adjusted to 4V. Operation from lower supply voltages is not recommended, as linearity suffers.

The meter used should have a full scale sensitivity in the range of 100 to 400µA. Small meters with a light pointers are the best types to use as they can follow variations in signal strength quickly, the movement having low inertia. Good VU indicators meet this requirement but are usually scaled in 3dB steps and need re-scaling.

Helpfully, because the meter is driven from the output of an op-amp, the actual full scale sensitivity is of little importance - provided you do not exceed the maximum current output of the amplifier. The value of RV2 may be varied to suit the meter if outside the range specified.

To overcome switch-on transients, which tend to cause vigorous full scale pointer movement, C8 is used to temporarily bias the MOSFET TR1 into conduction and short out the meter. After a second or two, when the circuit capacitors have reached their working voltages, C8 has also charged via R6 and the circuit reverts to its normal state as TR1 switches off.

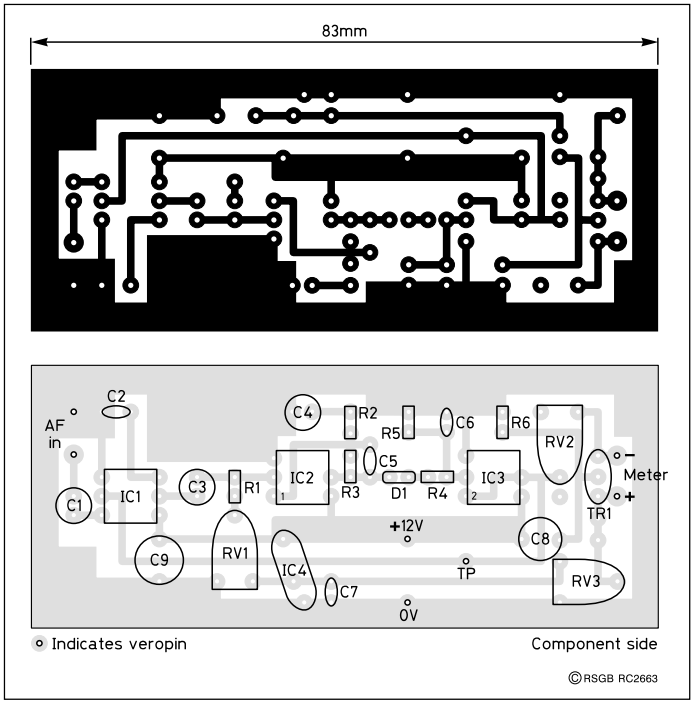

Fig 4: PCB layout and component placement.

INITIAL ADJUSTMENT

SETTING UP THE circuit is quite straightforward, but does need a DC meter and an audio signal generator. Firstly, short the audio input to guarantee no signal. Adjust RV2 and RV3 to mid range. Connect the DC meter to the test point or the output of IC3 (pin 6).

Audio-Driven S-Meter for DC Receivers

Now switch on the supply and adjust RV1 for the correct zero signal bias, appropriate to the supply voltage you are using. Next, set RV3 for a zero reading on the 'S' meter. Finally, apply 400mV rms at about 800Hz to the audio input and adjust RV2 for an S9 reading. Repeat this cycle of events until stability is reached.

Following this routine, it is comforting to reduce the AF signal input to half its level and see that the meter indication reduces by one 'S' point. It is possible to repeat this action right down to S1, but beware, you need a well earthed/screened test bench when the input signal level is down to a few millivolts.

Connecting the meter to the receiver audio requires that an audio level of 400mV be produced across the AF gain control for a 50µV input signal. This may require a low gain amplifier, either to achieve the audio level or to prevent loading of the audio stage in the receiver. **Fig 5** is suggested if such an amplifier is needed. Remember, the input resistance of the MC3340P is about 20kΩ. Unless this is high compared to the output resistance of the receiver audio pre-amp stage, it may load the amplifier and perhaps cause distortion. Also, if this pre-amp is used, the polarity of the input capacitor C1 should be reversed. This is because the pre-amp output is at +5V.

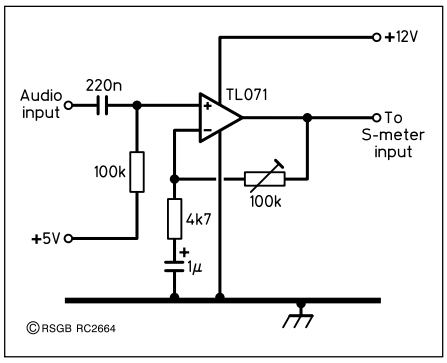

Fig 5: Circuit of the optional pre-amp.

At G3DXZ, the current low-band DC receiver sports an edgewise 'S' meter, obtained surplus and re-scaled. With many of this type of meter, the scale is a strip of paper that simply clips into the plastic housing and is very easy to remove, lay flat and re-scale or simply replace. Re-scaling also has the advantage of allowing you to shift the 10 'S' point range of the circuit to start, say, at 'S3' and give some over-9 indication if that is preferred. The real bonus in using one of these surplus indicators is that they often have a built in lamp to illuminate the scale, and that does add a touch of class!

REFERENCE

[1] Farnell, Canal Road, Leeds LS12 2TU. Tel: 0113 263 6311. ♦

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● John, G0GUL, would like to buy or borrow a copy of the **Kenwood TS-830S** service manual and circuit diagram. G0GUL, QTHR. Tel: 024 7672 1930. E-mail: pjsolman3@ic24.net

● B J Payne, G4CJY, is looking for a copy of the manual for the '**Sowester' marine VHF transceiver**. Also, a source of software program for the **Philips PRM-8020** 4m transceiver. G4CJY, QTHR.

● Steve, M1ECS, is interested in finding fellow amateurs in the South East who are interested in **PSK31** working on 2m and 70cm. E-mail: steveseabrook@compuserve.com

● Chris, G6YAH, would like to obtain a copy of the instruction manual, circuit daigram and servicing information for the **Realistic PRO-2042** scanner. G6YAH, QTHR. Tel: 01737 779038 (evenings/weekends)

● Simon, G3VNI, is looking for a copy of the manual for the **Kenwood TR-8300** UHF FM transceiver, especially information on the transmit and receive crystals. Also, any information on fitting an outboard display for the **Yaesu FT-290R**. Not QTHR. Tel: 01947 895895. E-mail: simon_cammies.lineone.net

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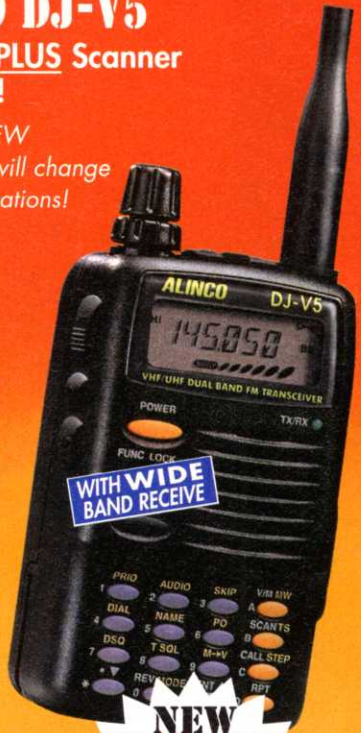

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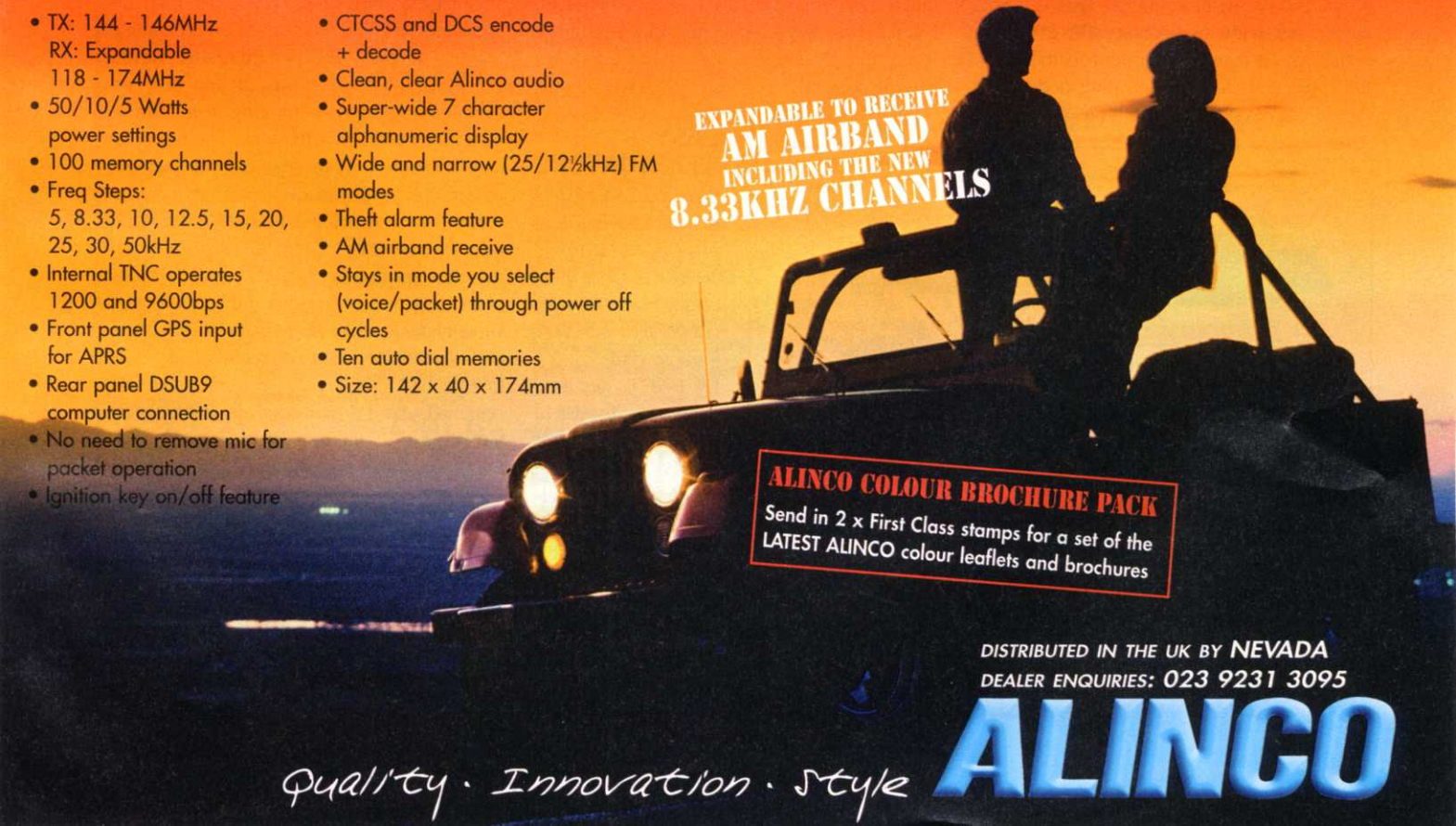

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A BETTER PL-259

GOOD NEWS - a source of PL-259 connectors with cable clamps, at reasonable prices. WE ALL KNOW how difficult it can be to get a good soldered joint between the outer shield of a coaxial cable and the body of a PL-259 or 'UHF' plug. It needs a very large soldering iron to heat the body of the plug quickly up to the temperature where the solder flows and 'wets' the metal to give a good joint [1]. An ordinary soldering iron tends only to melt the pool of solder in the holes (**Fig 1**), leaving a 'dry' joint to the connector body. Faced with these difficulties, many people just screw the cable into the plug body, and solder only the inner conductor. I've done it myself, especially outdoors where heavy-duty soldering is even more difficult and inconvenient... but a few years later, every single one of those bodged connections has failed.

Farnell Components now have a solution: a range of 'UHF' plugs with a screw-down pressure sleeve cable clamp, the same as is used with modern BNC and N connectors. These use a ferrule that slides up the inside of the outer braid and is held firmly in place by a clamp nut that compresses a rubber sleeve (**Fig 2**). The resulting connection to the braid is extremely strong and reliable. The only soldering required is at the end of the hollow inner pin, which is gold-plated. The body of the new connector is nickel-plated, to keep the cost down, but the insulator is PTFE. The pressure sleeve design has another significant advantage for us radio amateurs because, unlike the professionals, we often remove and re-use coax plugs. This is a very messy job with an ordinary PL-259 - the better you fit them, the harder it is to remove the cable and clean up the plug body. With the improved connectors, you simply unscrew the clamp nut, unsolder the inner pin and pull the cable out.

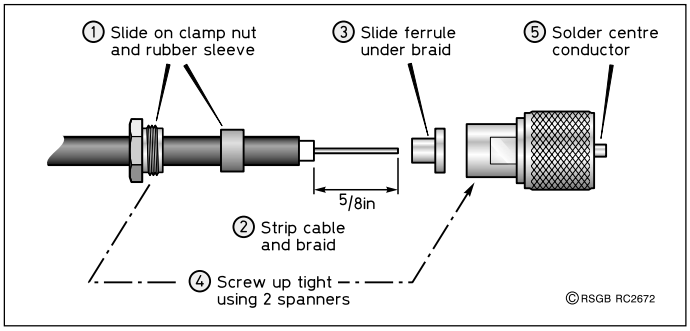

Fig 2: Improved 'UHF' connector with pressure sleeve cable clamp. Large and small cables require a different plug.

Unlike the ordinary PL-259, which normally takes large cable (URM67 or RG213) and uses a reducer for the smaller URM76, RG58 etc, these new connectors come in two separate sizes. The one for large cables is Farnell stock code 724-816, and at £1.96 + VAT it is almost twice the price of a cheap ordinary PL-259. The connector for small cables is code 724-804, and at £1.58 + VAT the price compares more favourably with the cost of an ordinary plug plus the extra reducer. However, if you don't already have a monster soldering iron, you can also include that saving in your calculations, along with the ease of re-use.

As I've noted in earlier columns, the pressure sleeve design is so superior to the original MIL-spec cable clamps in BNC and N connectors that I don't use anything else these days. Because the old MIL types are so much more difficult to re-use satisfactorily, I don't even buy them as surplus any more. It's a real pleasure to have found a modern PL-259 as well.

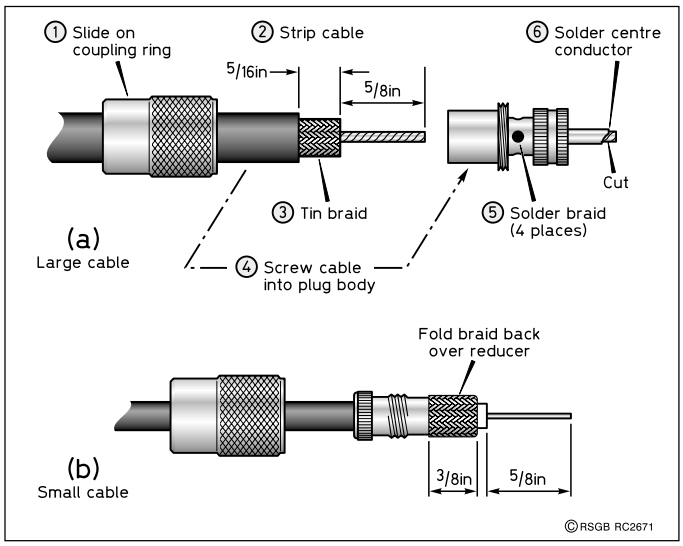

Fig 1: Ordinary PL-259 'UHF' connector requires a large soldering iron to avoid dry joints to the connector body. Small cable requires an additional reducer.

EASY ATTENUATORS

WHERE CAN I FIND resistors for building 50Ω attenuators? These need to be precision resistors with values that are very hard to find.

IN FACT, accurate attenuators for use in a 50Ω system can be easily built using standard resistor values. **Table 1** shows a set of useful attenuators that can be made from standard resistor values in the E12 and E24 range [2]. The attenuation values are pretty close to round numbers in dB. The values are obtained from a handy BASIC program by G4PMK [3] which calculates idealised values, optionally chooses the closest E12 and E24 equivalents, and shows how small the errors usually are. The attenuators in Table 1 are all pi-networks (**Fig 3**) but sometimes the alternative T-network allows more manageable values is better; G4PMK's program offers both.

Nominal atten.	R1, R3	R2	Theory (50Ω system)
1dB	910R	5R6	0.98dB
2dB	430R	12R	2.1dB
3dB	300R	18R	3.0dB
6dB	150R	39R	6.2dB
10dB	91R[1]	68R	10.1dB
20dB	60R[2]	240R	19.9dB

[1] 91R, or 100R paralleled with 1k.
[2] Two 120R, paralleled.

Table 1: Attenuators using standard-value resistors.

For a low-power attenuator you can use small, wire-ended metal film resistors, cut to 'zero' lead length (just the minimum necessary to solder to). As well as individual fixed attenuators, you can easily make a switched attenuator set using miniature DPDT slide or toggle switches. By switching the various 1-2-3-6-10-20dB sections in and out, you can get attenuations ranging from almost zero up to 42dB in 1dB steps. The important requirements for accuracy are to choose low-inductance (ie physically small) switches, to screen each individual attenuator from the next in line (Fig 3) and to use the closest possible spacing with the shortest possible connecting leads. Various publications have shown how to make a box from PCB material, with screens between the sections, as shown in Fig 3 [4, 5]. If each section is carefully screened and 1% resistors are used, the attenuation will be remarkably accurate, for individual sections and also for the whole box, up to at least 100MHz. Above this frequency, the inductance of the switches and connecting leads becomes important (much more so than the self-inductance of miniature film resistors), so the attenuation tends to rise above theoretical; but it can still

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be within a fraction of a dB, even at 432MHz [4].

For higher power, Electromail/RS and Farnell have thin-film 20W and 50W resistors in a two-lead TO220 package that can be bolted to a heatsink. These resistors are suitable for power attenuators and dummy loads at HF and VHF because they have reasonably low inductance, and also reasonably low capacitance to ground if used 'floating' in the R2 position (Fig 3). Prices are under £3, which is good value for RF power resistors, but they *must* be used with a heatsink as the power dissipation in free air is only about 2W! Higher-power resistors using the same thin-film technology are also available, but although they claim to be 'non-inductive' they are also physically large, so their inductance may in fact be too high for some RF applications. G4PMK's program [3] calculates the power dissipation in each resistor, for your given input power.

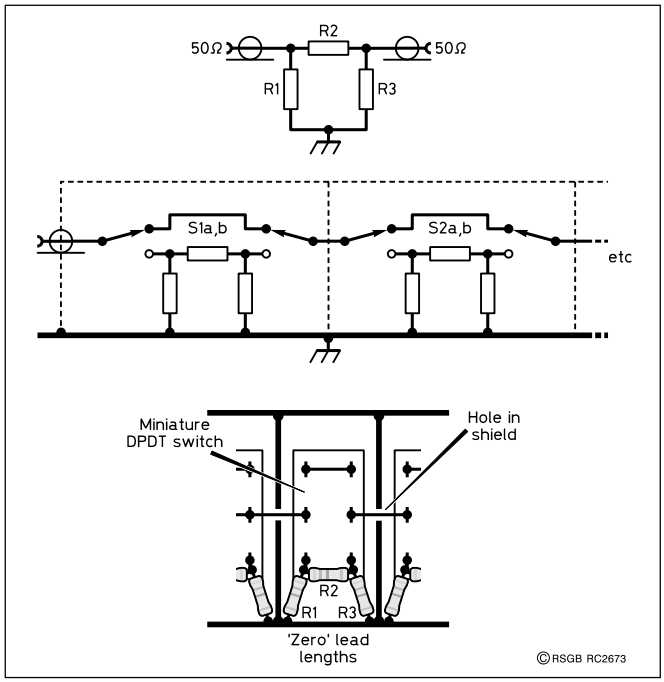

Fig 3: Pi-attenuators can be built singly or in switched sections. For high accuracy you must use miniature components with 'zero' lead lengths, and careful screening in multi-stage layouts.

WHAT DO YOU mean by '50Ω attenuators'? None of the resistors in Table 1 is 50Ω.

IT'S STANDARD shorthand for 'attenuators designed for use in a system where the coax and interface impedances are all 50Ω.' If you terminate the output of a '50Ω' attenuator with a 50Ω load (ie 50Ω in parallel with R3), the impedance at the input still looks like 50Ω. Likewise, if you feed a '50Ω' attenuator from a source impedance of 50Ω, the attenuated output also has a source impedance of 50Ω (go on, do the sums for resistors in parallel, series and then parallel again, using the values in Table 1). Many resistor combinations can be used to give attenuation, but it needs special values to preserve the 50Ω system impedance in both directions. The point of the original question is that readily available values from the E12/E24 preferred range [2] are surprisingly close.

STEALTHIER STILL!

ANOTHER 'STEALTH WIRE' trick, from W4MB.

VERY THIN enamelled copper wire will work as an antenna, but it may not be strong enough to support its own weight, especially when the wind blows. To add strength, twist the wire together with a length of light blue monofilament fishing line. A few turns per foot is enough to keep the two strands together. There is some loss due to the small wire, but it works and is very difficult to see.

SILICONE RUBBER

I'VE HEARD THAT silicone rubber that smells of vinegar will cause corrosion in electronic components. Is this true?

THERE ARE TWO kinds of common silicone rubber sealants, the ones that smell of vinegar and the ones that don't. The vinegar-smelling formulations are acetoxy silicone compounds that release acetic acid as the smooth paste 'cures' to form the familiar rubbery compound. You smell the vinegar because the reaction starts as soon as the compound is exposed to moisture in the air. Indeed, fast curing is one of the main advantages of acetoxy silicones, along with the low cost that makes it so readily available in DIY stores. However, the acetic acid diffuses very rapidly out of the bead of sealant, leaving no discernible smell or taste - chew some and see (no, *after* it has set!)

So what's the story on corrosion? Some people (including myself) have never had any problem in applying acetoxy silicones to copper braid or PC board, while others have reported the familiar blue-green corrosion afterwards. However, one has to ask whether that corrosion was going to happen anyway, because there was still a path for water to creep in somehow, or because moisture was trapped underneath the sealant. In such cases, the presence of free acetic acid will undoubtedly accelerate the corrosion. Also, it's possible that there are differences between formulations of various brands, and as casual purchasers we can have no information on that.

The other type of silicone rubber contains no acetoxy and definitely has no corrosion problems. The disadvantages are that it's more expensive and it takes 24 hours to cure. On the other hand, it keeps longer than the acetoxy type, which can cure in the cartridge if the opened cartridge is kept for a few months in moist conditions, even if the end of the nozzle is plugged and covered. By contrast, the cartridge of Dow Corning 744 non-acetoxy compound out in my garage is still in prime condition after about nine months. This is quite expensive at £9.28 + VAT for a standard 310ml cartridge (from Farnell Components, code 521-838), but it seems to be the best value for money in non-acetoxy silicone sealants.

There are also many other alternatives to silicone sealants or adhesives in electronic applications. Some that have been mentioned in previous *In Practice* columns, include epoxy adhesives (for permanent applications), clear Bostik or UHU (peelable once set), the white translucent variety of hot-melt glue (which can of course be re-melted), Coax Seal (Maplin YS18U - messy but effective) and even office products such as Blu-tak and Sticky Fixers.

By the way, I was recently shown how professionals make a perfect fillet of silicone sealant along a bathtub. Lay down two parallel strips of masking tape first, and smooth the bead of sealant down with a finger that has been well soaked in a very strong solution of washing-up liquid. This prevents the silicone from sticking to your finger, far better than water alone. Apply more sealant than you need, and push the excess out on to the masking tape. Smooth both edges of the bead right down to the thickness of the tape. Then very carefully peel away the masking tape, and just run your soapy finger along each exposed edge of the fillet to remove the roughness. Voilà - a professional job!

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[1] 'Fitting Coaxial Connectors' by Roger Blackwell, G4PMK, *RadCom* May 1988, reprinted in several RSGB publications.
[2] 'In Practice', March 1998.
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[4] *The VHF/UHF DX Book* (DIR/RSGB), Chapter 12.
[5] *The ARRL Handbook*, all recent editions. ♦

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.

eurotek

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

AMATEUR RADIO manufacturers periodically introduce new models. Their marketeers' buzzwords imply continuous technical innovation, to give a must-buy impression. In fact, what has been added during the past 25 years is mainly 'bells and whistles'. The few remaining manufacturers have, at considerable R&D cost, acquired expertise in analogue circuitry and the manufacturing techniques to mass-produce these radios in ever-smaller size at reasonable cost and, in spite of their staggering component count, good reliability. This is an investment they cannot easily write-off in favour of an entirely new concept.

Even the introduction of DSP (Digital Signal Processing) has not greatly improved performance. True, the ideal, steep-sided filters attainable with DSP improve close-in selectivity, but thus far, in amateur radio, the technique has been applied to audio or extra-low intermediate frequency stages only, ie after the signal has gone through too-wide roofing and other high-frequency filtering, downstream from where the irreparable damage from cross-modulation and oscillator noise sidebands has been done.

SOFTWARE RADIO

THIS NAME STANDS for a new concept in HF receivers and transmitters. The signal from the antenna is fed straight into an analogue-to-digital converter (ADC). In it, the entire spectrum from zero to 30MHz is sampled at a rate of 65MHz and converted into a parallel bit stream, which is then processed digitally under software control. From there, the name 'software radio'.

The advantages are many fold:

- The DSP is distortion-free.
- Several problems of analogue circuitry, such as unintended coupling, tendency to oscillate, and birdies, do not exist.
- All modes of modulation can be supported, from AM through Code Division Multiple Access (CDMA, spread spectrum). New modes can be added by downloading the applicable software.
- The precision can be scaled. This permits, with suitable software, an S-meter accuracy of ±1dB over a range of 120dB.
- Filters can be designed with properties unattainable by analogue means and a choice of many bandwidths is available.
- The above features also apply when the range of the HF 'software radio' is extended by the use of VHF, UHF or microwave transverters.
- The reproducibility is perfect; eg a filter designed with a given shape factor performs exactly the same from prototype through the entire production run.
- The reduced component count and the introduction of ever-better components, often developed for cellular radio, make home-brewing easier.
- Experimentation, eg with new modes of modulation, or to develop new algorithms for the suppression of QRM, does not require much additional hardware.

Some commercial analogue/digital receivers which embody most of the above advantages do exist, eg the Rohde & Schwarz model EK895 [1] or the Collins 95S-1A [2], but they are well outside the amateur price range.

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E-mail: eurotek.radcom@rsgb.org.uk

***SOFTWARE RADIO** is the **technology of the future. Hans Zahnd, HB9CBU,** described what has been done in no-cost-spared military and commercial radios and what amateurs might do with affordable components. From 'Old Man' (CH) 2 & 3/2000, with some more recent improvements.*

THE DSP FUNCTIONS

THE COMPOSITION of a basic all-digital receiver is shown in **Fig 1**. The entire spectrum picked up by the antenna, restricted by an analogue low-pass filter with a sharp cut-off at 30MHz, is fed to the ADC.

The LP filter serves to keep signals above 32.5MHz (ie above one-half of the 65MHz sampling frequency) away from the ADC. The ADC is the link between the analogue world and digital signal processing. Since its performance determines the properties of the entire receiver, this component deserves special attention.

To match the performance of an EK895, a 16-bit ADC would be required. The closest to that at an affordable price would be a 14-bit ADC with a 65MHz sampling rate, such as the recently announced Burr-Brown model ADS852 [3]. Analog Devices' model 6644 [4] is almost as good. What receiver performance can be expected from these models? An ideal 14-bit ADC can split an input voltage range of, say, 1V into 2^{14} (= 16,384) equal increments of 61µV. In-between values are rounded down, the error representing 'digital noise'. This noise can be calculated; the signal-to-noise ratio referred to 1V is:

1.76dB + 6.02dB x the number of bits,

in our case 86dB. In practice, this value cannot be achieved; S/N = 78dB is more realistic.

This first impression is not very encouraging; 1V - 78dB = 125µV = S9 + 8dB of noise! However, this noise level refers to the whole bandwidth 0 - 32.5MHz (called the Nyquist bandwidth). The ADC then generates an enormous bit-stream of 14bits x 65MHz = 0.91Gbits/s, containing the entire spectrum, 0 - 30MHz. We are only interested in a small slice of that spectrum, say the bandwidth of an SSB signal. The enormous bit-stream can be cut down accordingly, 'decimation' in DSP parlance, by a special digital filter. It averages a number of samples and passes the result to a following decimation stage at a reduced sample rate. This averaging reduces the noise by what is called the 'processing gain', amounting to: $\mathbf{10log(f_S/2B_{AF})}$. In our case, the sampling rate f_S = 65MHz and B_{AF} is the required audio bandwidth, 2.4kHz for an SSB signal, for a processing gain of 41.3dB. The original 125µV of noise has now been reduced to 1.07µV.

For the lower amateur bands this would be adequate, but to achieve the usual value of 0.1µV, a 20dB preamp would be required. Without one, a 17- or 18-bit ADC would do the trick, but today these are so expensive that they are used only in military radios. The advances of the recent years lead one to believe that they will become affordable before too long.

ZERO-FREQUENCY PROBLEM

THE DESIRED signal is selected similarly to the way a traditional DC (Direct Conversion) receiver does it, ie by mixing the incoming signal with a local oscillator exactly at its carrier frequency. For AM signals, this means that one sideband would appear in the negative frequency range.

It can be shown mathematically that this sideband is actually flipped over about the zero

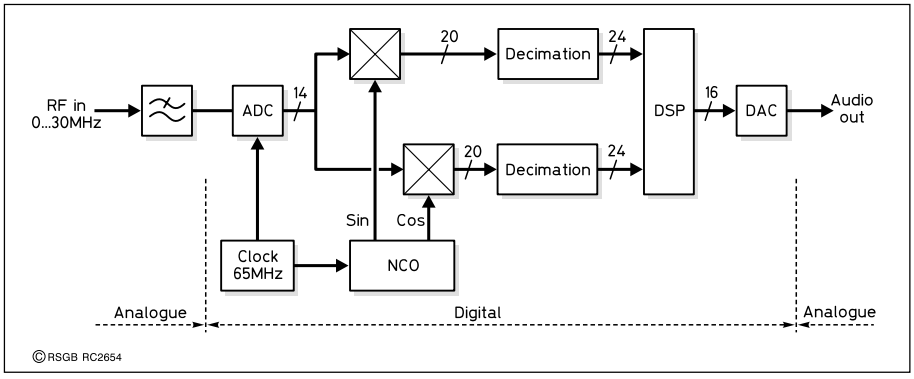

Fig 1: Block diagram of a digital HF receiver.

frequency. For AM signals, this creates no problem as the sidebands are identical and symmetrical with respect to the carrier. As users of simple DC receivers know, when tuning in an SSB station, an unwanted signal in the channel on the other side of the (suppressed) carrier is similarly flipped over to interfere with the desired one. This is shown in **Fig 2**.

In sophisticated analogue DC receivers, this problem is attacked by the 'phasing method' [5]. As shown in **Fig 3**, two mixers are used; one receives the local oscillator signal directly, the other receives it with a -90° phase shift, ie 'in quadrature'. The outputs from these mixers are applied to identical low-pass filters which remove non-audio mixing products and restrict the audio bandwidth, typically to 2700Hz for SSB reception. The outputs of the two filters are then recombined after one of them has passed through a -90° phase shift network, thus, theoretically, eliminating the unwanted sideband. The problem lies in the two phase shifters: with analogue components it is very difficult to achieve a shift of exactly 90°, and a deviation as small as ±½° causes a noticeable deterioration of the unwanted sideband suppression.

DIGITAL WORKS BETTER

THE SAME FUNCTIONS, local oscillator, mixer, filter and phase shifter can be implemented more easily, more precisely and reproducibly by digital means. Using 24-bit DSP, suppression of the unwanted sideband can exceed 100dB. As an example, **Fig 4** shows the passband characteristic of an SSB filter (solid trace) designed as an FIR (Finite Impulse Response) structure with 256 taps [6]. Without the complex data processing mentioned above, a virtual second receive channel would exist (dotted trace). The shape factor of this filter (-3dB/-60dB) is an incredible 1:1.1 and its passband phase characteristic a constant 0° for the I channel and 90° for the Q channel.

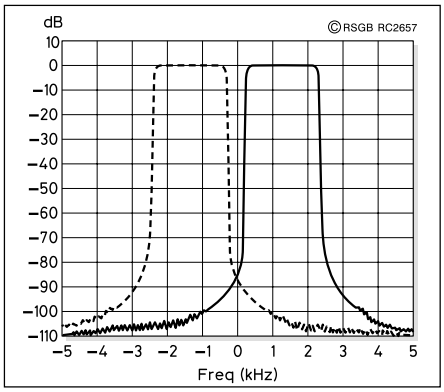

Fig 4: Trace(s) of a digital SSB filter.

AN IDEAL VFO

ANOTHER FEATURE is the NCO (Numeric Controlled Oscillator). It is similar to the DDS (Direct Digital Synthesis) oscillators used in modern analogue transceivers, but minus the DAC (Digital-Analogue Converter) which is being blamed for spurii caused by the low DAC resolution - usually only 8 or 10 bits - even though the preceding processing has taken place at 32-bit resolution. In the completely digital receiver, no reversion to analogue is required and the mixer can be driven with 20-bit precision. In a DDS oscillator with a 10-bit DAC, spurii are 55dB down, so, at 20 bits, one could expect them to be 110dB down, ie negligible.

The principle of the NCO is shown in **Fig 5**. In the accumulator, an increment is added to the value read out of the register, the sum being used to update the register. In this way the accumulated value increases in every clock cycle until, at a count of 2^{32}, the accumulator overflows to zero. The conversion from sawtooth to sine and cosine outputs takes place in ROM look-up tables. The output frequency is controlled by the increment according to the formula:

$f = 2^{32}$ x increment/clock frequency

For an NCO frequency of, eg, 3.5MHz, at a clock frequency of 65MHz, a register value of 52,969 is required; an increase of one, to 52,970, produces a frequency change of -0.066Hz. This demonstrates the accuracy of the frequency control.

The software radio with an NCO has important advantages.

- The generated frequency is as stable as the crystal-controlled clock oscillator.
- Large frequency changes can be effected in microseconds (eg for spread-spectrum modes).
- The NCO sideband noise is orders of magnitude lower than with LOs using DDS.
- The frequency cannot be pulled by changes in supply voltage, loading, etc.
- Being isolated by the ADC, the NCO cannot leak into the antenna.

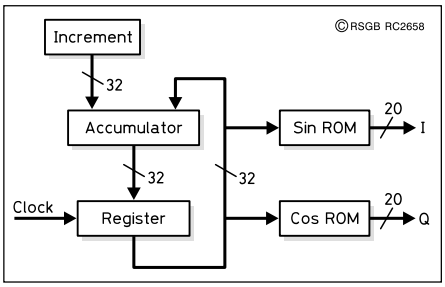

Fig 5: Block diagram of a Numeric Controlled Oscillator.

HARDWARE FOR SOFTWARE RADIOS

THE FIRST AFFORDABLE fast 14-bit ADCs, the two models named previously, are to become generally available this year. The functions of mixer, NCO, decimation and filter can be handled by the Analog Devices AD6620 down-converter. To generate a transmitter signal up to 80MHz with virtually any type of modulation, the Analog Devices AD9856 up-converter is on offer.

A digital signal processor is required to perform the following tasks:

- Filtering the received signal to the bandwidth best suited to the signal mode, eg 2.4kHz for SSB.
- Measuring the received signal strength for the S-meter and gain control (AGC).
- I/Q demodulation and modulation.
- Control of a CODEC, here the Analog Devices model AD1819B [4], for communication with an (analogue) speaker and microphone.
- Control of the up and down converters for configuration, frequency setting, AGC.
- Communication with the external controls and display, ie keyboard, incremental shaft encoder [7] (tuning knob), PC.

The Analog Devices SHARC-DSP21065L (32-bit floating point) is well suited to these tasks.

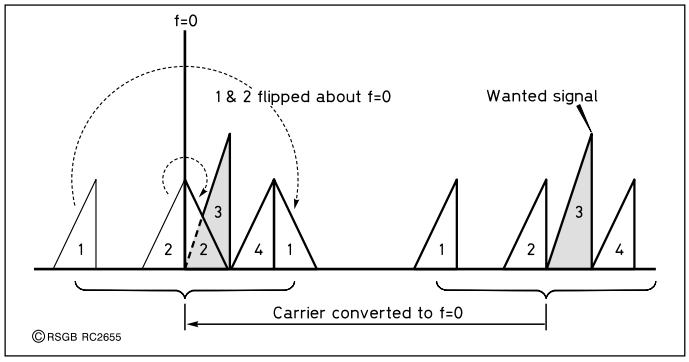

Fig 2: Overlap due to conversion to zero-frequency.

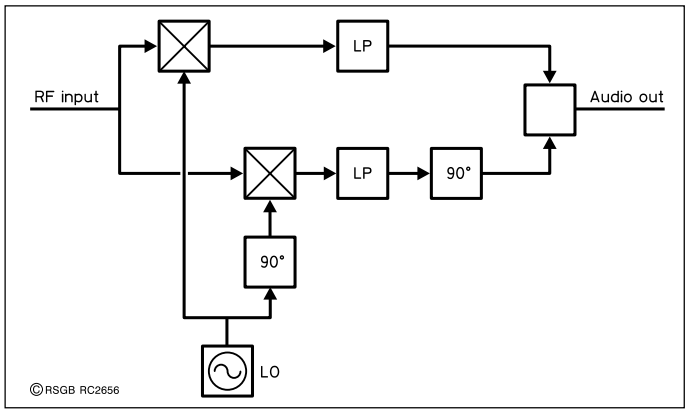

Fig 3: Block diagram of a phasing-type direct-conversion single-signal receiver.

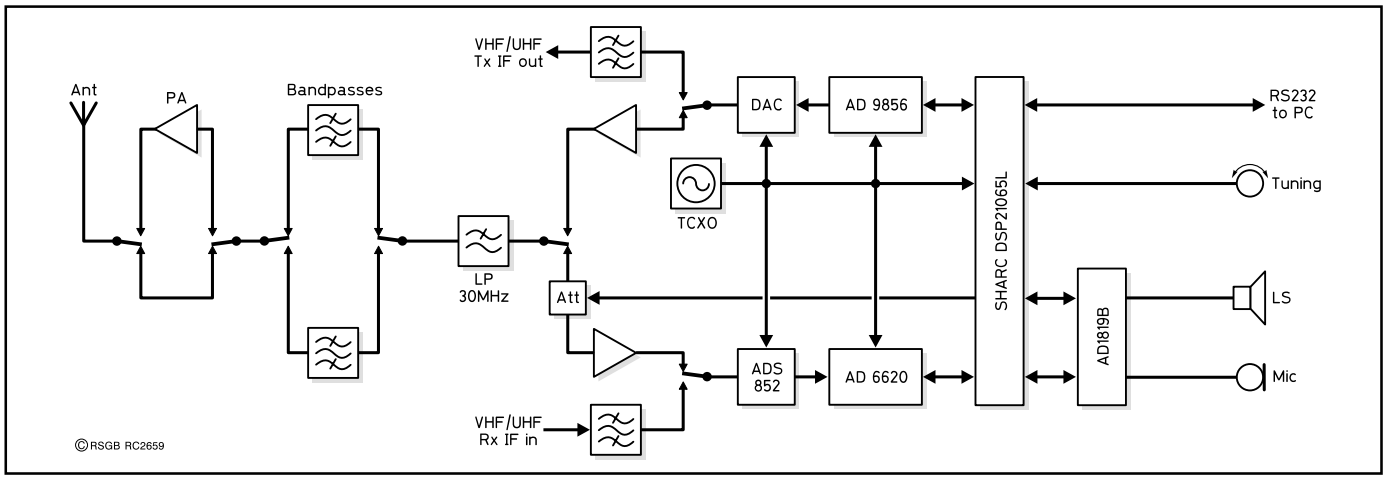

Fig 6: Block diagram of an HF amateur transceiver, digital where possible in Y2k.

A SOFTWARE AMATEUR RIG

THE BLOCK DIAGRAM of an amateur HF software-transceiver design is shown in **Fig 6**. Note that the filters indicated by dual and triple waves and the amplifiers shown as triangles are analogue; all other modules are digital units available in Y2k. The chip-set costs approximately US $180. The power amplifier is considered to have the usual harmonic filtering built in. The author is in the process of developing this design.

It seems likely that in the not-too-distant future some manufacturer will offer a kit or a card to plug into a PC which can serve as a platform for the development of an amateur 'software transceiver'. How it will perform will largely depend on the software.

Here is a chance for amateurs to re-take the initiative in the development of better HF communication, which has been all but abandoned to the few manufacturers of state-of-the-art analogue transceivers. That amateurs can do it was shown by the development of the Linux computer operating system, now supported by universities and industry, which was started by a handful of enthusiasts, Linus Torvalds and friends, and now is in use world-wide.

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[7] See *Radio Communication Handbook*, 7th ed. p5.50 (RSGB). ♦

Newcomers' News

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

CHANGES TO the licence conditions seem to be having some effect, at least around the West Country. Interest in Novice courses and RAE classes has really taken off of late. In previous years we have only started to get enquiries a few weeks before the start of our courses, but this year we have a waiting list. Welcome to all you newcomers! How are things in your area? Are there enough courses being run? Do you have any interesting snippets or photographs to share? Contributions are always gratefully received.

RAE PRACTICE ON LINE

REGULAR READERS know all about the fine work done by Murray Ward, G3KZB, in producing RAE practice software for use on the PC. You can choose to answer questions on one or more specific areas from the syllabus or take a mixture of topics, as you would in the real exam. Murray's program provides questions in RAE format and gives feedback as you answer them. It even points you to the relevant section of the *RSGB RAE Manual* for further study on a particular question.

Murray has now gone one step further and has put the software on the Internet. It can be downloaded from http://freespace.virgin.net/murray.g3kzb For those without the Internet, Murray is also QTHR.

Most of our RAE students in Bath used the software this year and all found it extremely useful in testing their knowledge and monitoring their own progress. I have also heard from Michael Clarke over in Northern Ireland, who speaks highly of Murray's work. Michael and some of his friends have been studying hard for the RAE, I hope it pays off. Good luck!

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

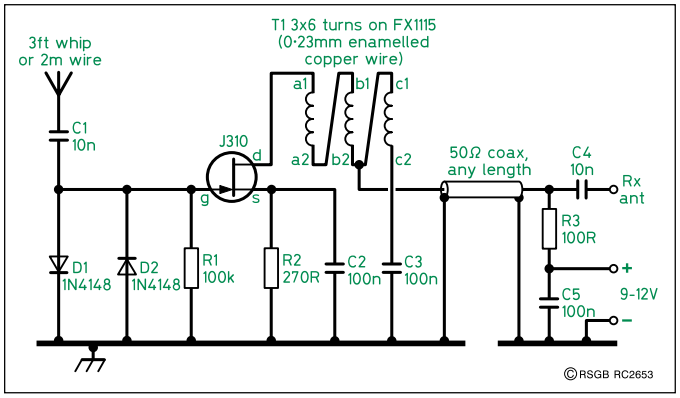


Fig 1: G0BBL's Active Antenna Circuit (see 'Antenna Project').

ANTENNA PROJECT

IAN CARTER, G0GRI, from the Trowbridge and District Amateur Radio Club, has recommended a project for newcomers that isn't a medium wave receiver, but it can be used with one!

The *Active Receive Antenna Project* by Jan Verduyn, G0BBL, was featured at a recent club construction evening. Several were built by the various members and I'm told that most, if not all, actually worked first time. I met Jan at the Yeovil QRP Convention and he kindly agreed to share the design with readers of this column (**Fig 1**).

The antenna design has served Jan well since he first built it in his sailing days with the Merchant Navy some 20 years ago. It can be used at home, in the car or anywhere you can string up a short piece of wire. Reception with the antenna is said to be good from long wave to VHF, but don't expect it to out-perform a three-element yagi on top of a 20m mast!

The circuit is built 'ugly-style' on a piece of scrap PCB material small enough to fit inside a plastic 35mm film container. The whip can be a telescopic car radio antenna, a 2m whip, or just a couple of metres of hookup wire. The transformer is wound on a FX1115 ferrite bead with 6 turns of three-ply 0.23mm enamelled copper wire, and the value of R2 may have to be reduced to 47Ω if you have a dedicated amateur band receiver.

One word of warning: do not try to transmit with this antenna, it will blow the J310 for sure and your transmitter will not be too happy either! The circuit is reproduced above, and I do have more comprehensive construction details. Please send me an SASE if you would like a copy.

SCOUT RADIO NEWS

THE LATEST EDITION of the *Scout Radio Newsletter* was sent to me by Geoff Dellbridge, G0PMF, who looks after subscriptions. It is intended to provide a means of keeping those involved in amateur radio and Scouting in touch with events, news and activities that unite these two great pastimes.

The editions I have seen appear to achieve this objective admirably, but it would seem that input to the *Newsletter* is in short supply. If you have a view on amateur radio and Scouting, or a report on what your Scout group is planning for this year's Jamboree on the Air, please send it to the *Newsletter*'s editor, Malcolm Bell, G4CXT, QTHR, or by e-mail to scoutradio.news@lineone.net

Geoff is currently seeking views on whether the *Newsletter* should be made available through the Internet, perhaps on a dedicated UK Radio Scouting web-site. Please let Geoff, G0PMF, know your views on the subject by letter (QTHR) or by e-mail to geoff@proj13.demon.co.uk

NOVICE TABLES

IN THE MAY column I floated the idea of having tables specifically for Novices, similar to those in Don Field's 'HF' column. To date there has been just one expression of interest from Jack White, 2E0AUL. Jack is very active on 28MHz SSB and has recently rediscovered his Morse key on 10MHz. He now has over 60 DXCC countries in the logbook.

Can anyone top that? Are there any others willing to join a league table? I thought a second mention might be worthwhile, in case the last mention passed you by.

It is also worth mentioning at this point that this year, to mark the Millennium, there will be a special DXCC certificate for those who manage to work 100 countries in the year 2000. I am also told that there is no requirement for QSL cards to claim the special award. If anyone has more details on this, please 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 FETs

By Peter Buchan, G3INR *

A CHARGE-controlled device similar to the Field Effect Transistor (FET) was explored in 1928, but it was not until 1958 that a practical FET was developed. In the 1960s they became generally available and nowadays are to be found in most electronic equipment, especially so in such things as wrist watches, pocket calculators, mobile phones, computers, etc, not to mention our world of communication.

The FET is a semiconductor device which depends upon an electric field to control current flow. There are two common types of FET, the *Junction Field Effect Transistor*, abbreviated JFET, and the *Metal Oxide Semiconductor Field Effect Transistor*, abbreviated MOSFET (also known as an IGFET, *Insulated Gate Field Effect Transistor)*. Both of these FETs can be made using P-type or N-type semiconductor material, though the majority use N-type.

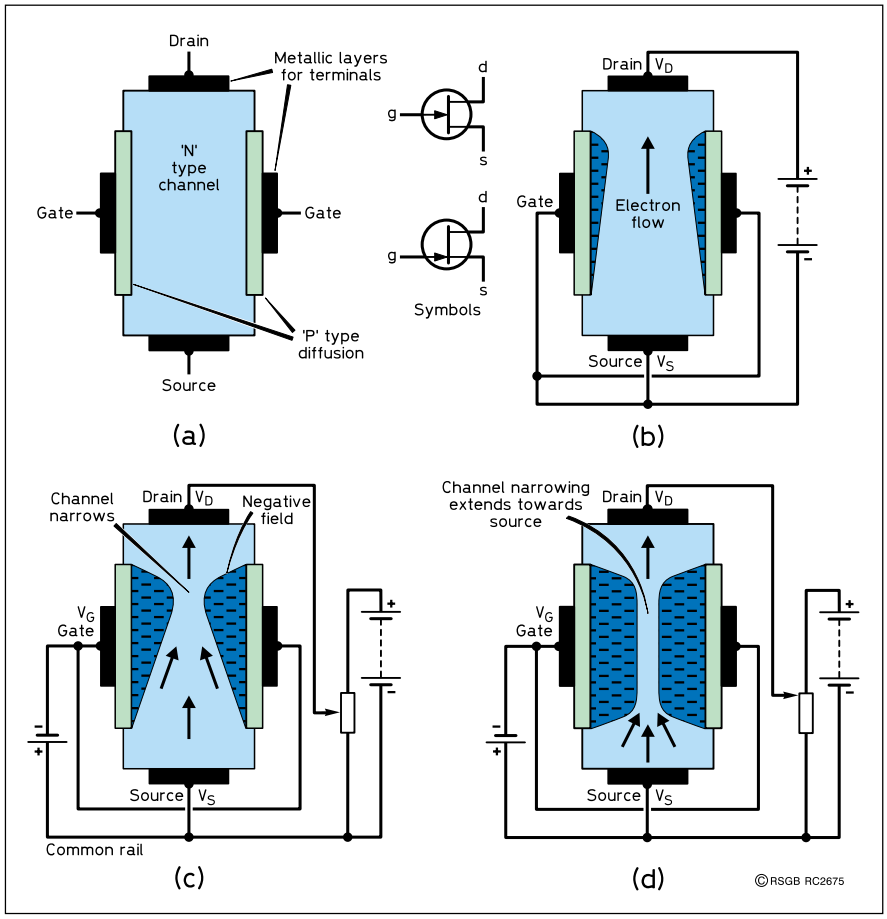


Fig 1: (a) General idea of the construction of a FET. (b) With the Gate tied to the Source and a potential applied across Drain and Source, current (electrons) flows. Negative charge moves into the channel from the reverse biased P-N junction. (c) Negative potential on the Gate causes constriction of the channel, being greatest at the Drain end. (d) Increasing Drain-to-Source potential causes the constriction to move toward the Source, although the channel width remains constant. Therefore the channel resistance increases linearly.

HOW IT WORKS

THE JFET, the most straightforward to understand, is constructed from a tiny 'bar' of N-type semiconductor with a connection at each end. On opposite sides of the bar, P-type semiconductor is diffused into the N-type, these also having connections. One end of the bar is called the Source and the other the Drain. The P-type sections are called the Gate. The section between the source and the drain is known as a *channel*, along which the current (electrons) will flow, the rate of flow being governed by the Gate (see **Fig 1a**). It is possible for current to flow either way, but since the JFET is constructed to ensure the capacitance between the Gate and the Drain is least, the Drain should always be positive with respect to the source. This particular JFET would be called an N-channel FET.

If both Gate terminals are connected together and to the Source, and a positive voltage is applied across the Drain and Source (V_{DS}), current (I_{DS}) will flow in the channel. The Gate potential (V_{GS}) will be 0V, as shown in **Fig 1b**. Should V_{GS} be made negative, the channel current will be reduced. With a negative V_{GS} between Gate and Source, a negative electric field surrounds the P-type diffusion and encroaches into the channel, reducing its width, as **Fig 1c** shows. By increasing V_{GS} the channel width may be reduced to the point where I_{DS} approaches zero (**Fig 1d**), a further reduction of channel width causing I_{DS} to cease altogether. This point is known as 'pinch-off' (V_P).

It may not be immediately obvious that the P-type diffusion into the N-type channel forms a semiconductor diode, a P-N junction. Due to the polarity of the potentials used, the P-N junction is reverse biased. For this reason the input resistance/ impedance is very high, 10^8 ohms or greater, so the Gate draws virtually no current (except for leakage). Normally the Gate is never forward biased, since this would cause high current to flow through the Gate and into the channel. For a P-channel JFET all the voltages and currents would be reversed.

Fig 2 shows that at a fixed Gate bias voltage, when V_{DS} is increased beyond a certain point, the curve levels off and remains almost constant. This indicates that the output resistance/ impedance is high.

MOSFETS & IGFETS

THE CHARACTERISTICS of these are very similar to the JFET, the outstanding difference being the input resistance/impedance which is considerably greater, with figures equal or greater than 10^{12} (one trillion) ohms. This is due to the 'insulated gate' of this device, which ensures the input leakage current ap-

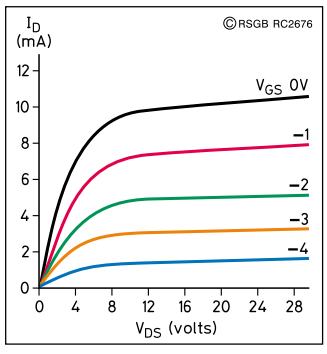


Fig 2: Typical characteristic of a FET, which are similar in both the JFET and the MOSFET.

* 79 Cavendish Avenue, Cambridge CB1 7UR.

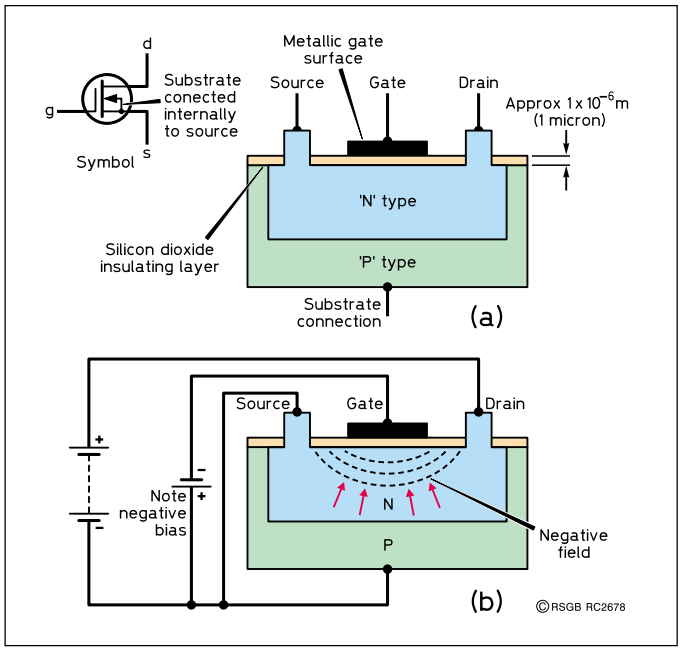


Fig 3: (a) General idea of the construction of a MOSFET intended to work in the 'depletion' mode. It consists of a P-type substrate with an N-type channel diffused into it, an insulating layer laid on the top with a metal surface for the Gate connection, and the N-type connections for the Source and Drain protruding through. (b) Showing potentials connected across Drain and Source, and a negative bias potential on the Gate. The field surrounding the Gate is shown, and the red arrows indicate positive current carriers (holes) attracted up into the N-type channel, causing 'depletion'.

proaches zero. The construction of these FETs is quite different.

For an N-channel IGFET, the device is built-up on a P-type substrate into which an N-type channel is diffused. As with the JFET, terminals are connected to each end of the channel. On top of the channel a thin layer of silicon-dioxide - SiO_2 - is formed (basically glass), with an additional thin layer of metal to provide a Gate connection: **Fig 3a**. This truly insulates the Gate from the channel, so much so that the input impedance/resistance is now 10^{12} ohms or even more. This FET has four terminals, one of which is connected to the P-type substrate, plus the other three; Source, Gate, and Drain. In operation the substrate is connected to the Source or a point of lower potential (in some FETs the substrate is connected internally to the Source).

In a similar manner to the JFET, a positive voltage is applied across the Drain and Source. If the Gate is tied to the Source, ie V_{GS} = 0V, a current I_{DS} will flow. However, if the Gate is taken negative with respect to the Source, though the field produced in the channel is negative (as before), the effect is to draw positive current carriers (holes) up into the channel from the P-type substrate, reducing the net current flow in the channel. This FET, like the JFET, is operating in the 'depletion' mode, ie the channel current is depleted. See **Fig 3b**.

Another form of IGFET is constructed, still using a P-type substrate, but instead of diffusing an N-type channel, two 'wells' of N-type material are diffused into the P-type substrate (see **Fig 4a**). As before, a silicon-dioxide insulating layer with a thin layer of metal for the Gate connection is laid down on the surface of the P-type substrate between the two N-type wells. Connections are made to the two N-type wells, one being the Source and the other the Drain. Connecting the Gate and Source together and applying a positive voltage across Drain and Source does not cause current to flow, despite V_{GS} being 0V! If, however, the Gate is taken positive with respect to the Source, current will start to flow between Source and Drain. The positive voltage on the Gate creates a positive electric field in the P-type substrate, repelling the positive holes and creating a channel, allowing a current (electrons) to flow from Source to Drain. The substrate and Source are connected as before. This FET operates in the 'enhancement' mode (see **Fig 4b**).

CHARACTERISTICS

AS FAR AS characteristic curves are concerned, the shape of the JFET and MOSFET curves are very similar, it is the input impedance/resistance that distinguishes one type from the other. One important precaution that should be observed when dealing with MOSFETs is to remember that with the Gate impedance/resistance being so high, a static charge can destroy the FET in a microsecond, so it is wise to take precautions as per the manufacturers instructions.

There is a great deal more that can be learned about FETs. Also, there are many other types, such as the GaAs-FET (Gallium Arsenide), used at microwave frequencies. ♦

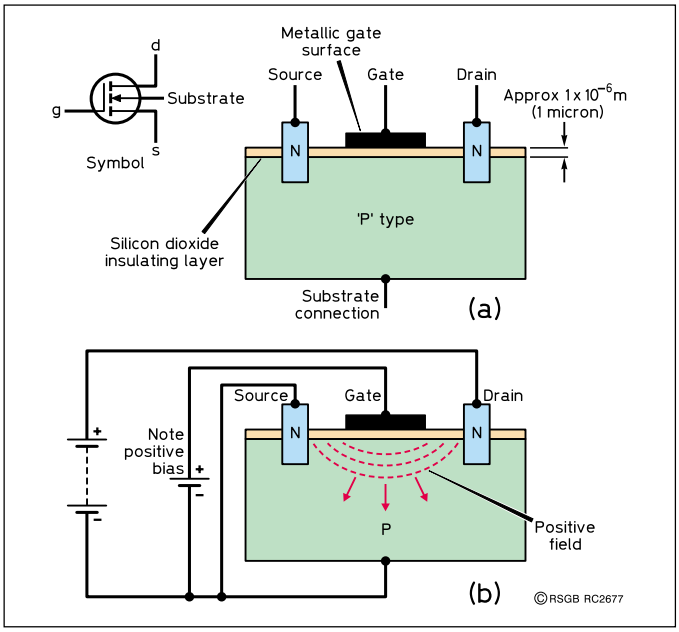


Fig 4: (a) Again the general idea of the construction of a MOSFET, but this time intended to work in the 'enhancement' mode. Two N-type 'wells' are diffused into the P-type substrate. As before, an insulating layer is provided with a metal Gate connection. (b) With the positive bias potential, the field surrounding the Gate is a positive one, which tends to drive away positive current carriers (holes) down into the substrate (red arrows), thereby creating a channel for the negative current carriers (electrons) to form a channel between the two N-type wells. In other words, the conductivity is 'enhanced'.

ABBREVIATIONS AND SYMBOLS

BBC	British Broadcasting Corporation
CIA	Central Intelligence Agency
DDR	Deutsche Democratic Republic (the former East Germany)
DXCC	DX Century Club (an award)
HF	High Frequency
kW	kilowatt (one thousand watts)
MHz	Megahertz (one million Hertz)
Ω	Ohm (the unit of resistance)
PC	Personal Computer
PCB	Printed Circuit Board
QRP	Low power
QSL	Confirmation of a contact
QTHR	Location as given in the RSGB Yearbook
RAE	Radio Amateurs' Exam
RCA	Radio Corporation of America
SSB	Single Sideband
TV	Television
VHF	Very High Frequency
VOA	Voice of America (broadcast station)

The Voices

Part two, by Gordon L Adams, G3LEQ *

IN THE FIRST part of my feature in last month's *RadCom*, I dealt mainly with the machinations involving Britain's 'Voice'. However, at the same time, the USIA (United States Information Agency) and their CIA bed-fellows were very busy in Germany. The short wave transmitter that I had heard playing 'cat and mouse' with the Russian jammers, I later found was located originally in Lampertheim, a former Luftwaffe base near Mannheim, then in the American zone of Germany. Nicknamed 'Barbara' by the Radio Free Europe engineers who were to operate it, this 7.5 kilowatt RCA transmitter had been secured from the US army by the CIA and made available to the fledgling RFE station. It was evidently 'Barbara' that I had heard on my own Philips radio set!

In November 1950 RFE had also negotiated another transmitter site at Biblis in Southern Germany, where one 50kW and three 10kW senders were rapidly installed. A third site was leased at Holzkirchen, about 20 miles to the South-East of Munich, where a 135kW Swiss Brown Boveri medium wave transmitter was established on 1196kHz. This frequency was originally assigned to the French zone of occupation, but had been occupied instead by a 20kW Russian zone transmitter at Halle-Magdeburg in the GDR.

FUND RAISING TO HELP THE CIA!

THE PURPOSE of RFE was to use emigrés from Eastern Europe to broadcast back to their native countries, which were then behind the so-called 'Iron Curtain'. It first came on the air on 4 July 1950 – American Independence Day - with a broadcast to Czechoslovakia. Soon afterwards, the Committee responsible for RFE commissioned a British company to cast a Freedom Bell. This bell was taken on a fund raising tour of America, before being installed on 24 October 1950 outside the Berlin Rathaus (Town Hall), in Schoenenberger Platz, West Berlin, before a crowd of 400,000. The tolling of the bell was used subsequently as the RFE interval signal.

Independence Day clearly loomed very large on the USIA's calendar, because exactly one year later on 4 July 1951, RFE's 7.5 kilowatt transmitter was moved to Gloria-Maxoqueira on the South bank of the river Tagus, to the East of Lisbon. Here they set up 'Barbara' in a picturesque grove of cork oak trees - along with a rhombic antenna - much to the dismay of the local peasant farmers. However, destruction of the cork trees allowed a charitable fund to be set up - using the proceeds of the cork sales. Thus RFE was able to provide some much-needed community services in the Gloria area!

Amateur Band	Radiation angle
28MHz	10°
24MHz	12°
21MHz	15°
18MHz	17°
14MHz	20°
10MHz	32°
7MHz	45°

Table 1: Optimum radiation angle for the HF amateur bands. A 'rule of thumb' for remembering the angle is that it is roughly the same as the wavelength of the band in metres.

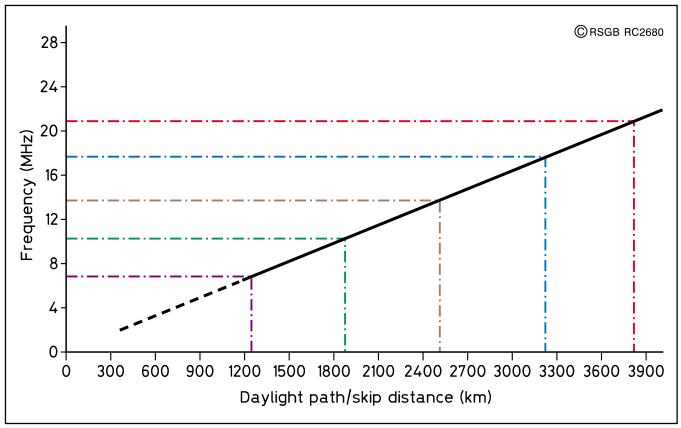


Fig 1: Typical ionospheric single-hop path distances, plotted against frequency for E- and F-layer propagation. The amateur bands from 7 to 21MHz are indicated by broken lines.

TWILIGHT IMMUNITY

FROM A propagation point of view this choice of site on the Iberian peninsula is interesting. Typically, a single hop of a short wave signal via the higher F-layer of the ionosphere, brings it down about 1500 miles (2400km) from the transmitter. This 'skip' distance can be altered somewhat by changing the radiation angle of the antenna. The 1500-mile path is therefore considered optimum, and clearly the distances from the short wave transmitter sites in Southern Germany, to the target countries in Eastern Europe, were too short. Furthermore, in order to target the Eastern Bloc countries, the RFE engineers favoured a South-West to North-East path, to avoid the of-

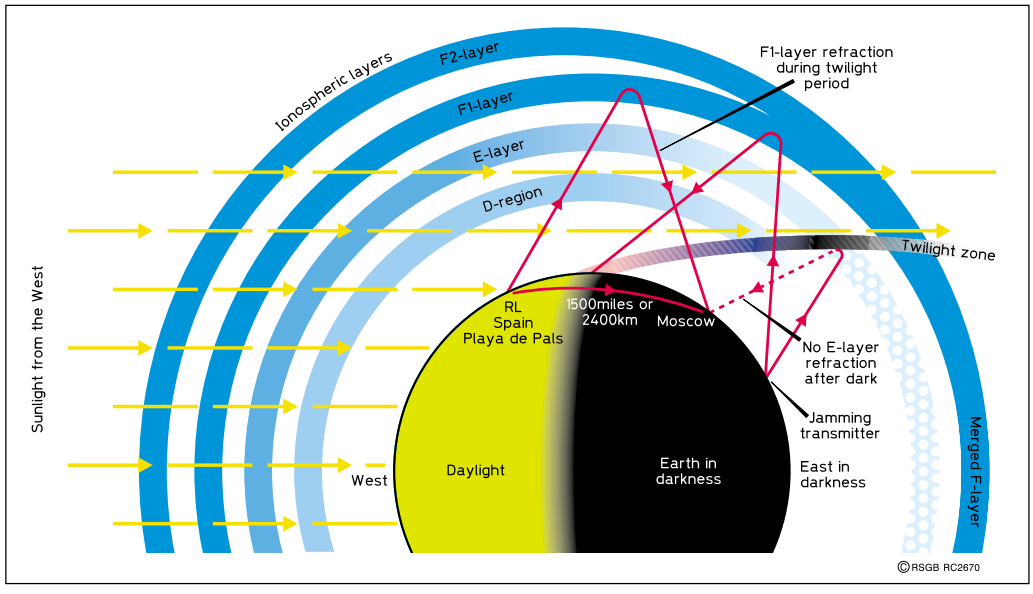


Fig 2: Grey line transit provides twilight immunity.

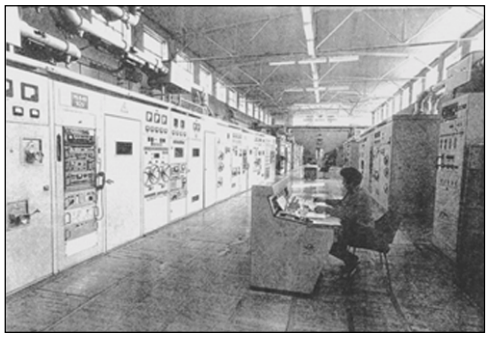
* 2 Ash Grove, Knutsford, Cheshire WA16 8BB.

ten-disturbed area of the ionosphere, and the Aurora Borealis, near the Earth's magnetic North Pole. These comments are necessarily generalised, and are based upon the 13.6MHz broadcast band with the aerial system placed at least one wavelength above ground (or, as a special case, one half wavelength). In practice, radio amateurs' HF aerials tend to be too close to the ground, resulting in a higher-than-optimum radiation angle. Nevertheless, **Table 1** and **Fig 1** demonstrate the theory.

The effects of jamming by the Russians and their satellite countries had also to be considered. Gloria lay on a South-West to North-East axis, which would give 'twilight immunity' to RFE's broadcasts. This is a term used by radio engineers to describe the grey line zone, where the broadcast transmitters' propagation path is still largely in sunlight whilst the jamming transmitters' path is in darkness. This is explained more clearly in **Fig 2**. Typically, for about an hour-and-a-half before sunset, the RFE transmission will not be wiped out by jammers to the East of the target area.

OSS COMEBACK

THE CIA HAD used an ex-OSS (Office of Strategic Services) staff member, who knew the Iberian peninsula well, to negotiate with the Portuguese government, headed by their then President Antonio de Oliveira Salazar. A company was set up called Radio Retransmission de Portuguaise SA (or RARET for short), which was to be responsible for the transmitter site at Gloria. Early in 1952 four 50 kilowatt transmitters were up and running at Gloria; and on 12 November a replica of the Berlin 'Freedom Bell' was erected and dedicated in front of the main transmitter building.



SNEG-M 200kW HF jammer transmitters at Popovka-Krasny Bor, South-East of St. Petersburg.

COSTA BRAVA TANNING?

WHILST RADIO Free Europe was growing rapidly, another 'charitable' organisation was being formed in the USA called the 'American Committee for the Liberation of the Peoples of Russia Incorporated'. This tongue twister just had to be called 'Amcomlib' for short! Another 'Voice' was to be created, backed by the CIA and former members of the war-time OSS, under the 'Radio Liberation' banner. The purpose of Radio Liberation (renamed Radio Liberty in January 1964) was to broadcast specifically to Russia. Various writers, editors and producers were recruited in New York and a Russian-speaking American was even recruited from RIAS!

To direct signals over the optimum 1500-mile path to Moscow, Kiev and Leningrad (now called Saint Petersburg), a transmission site was selected on the Spanish Costa Brava. An ideal site was discovered beside a flat beach, known as Playa de Pals (near the little village of Palafrugell, in the province of Gerona). Here, low angle radiation could be directed to the target areas, with the added benefit of reflection off the Mediterranean Sea. The Spanish government could see benefits too, because this undeveloped area would need electricity supplies and a golf course for tourists.

RADIO HOLE-IN-THE-HEAD

BOTH RL and RFE staff were housed in the operational headquarters of the pre-war Munich airport. It was there in 1938 that Hitler had greeted Neville Chamberlain, the British prime minister, for talks which led to the dismantling of the Czechoslovak state. The RL staff rapidly turned into numerous warring factions, because they came from different political entities within the Soviet Union. As a result, the RFE staff members shunned them and quickly nick-named RL as 'Radio Hole-in-the-Head'!

RL started transmitting on 1 March 1953 from the Lampertheim Luftwaffe site originally employed by RFE. Their propaganda campaign was extremely hostile towards Stalin. By an amazing quirk of fate, Stalin died just four days later! Initially, RL broadcasting was on the short waves, but it was estimated that there were no more than 2-million receivers equipped with short wave in Russia.

Political cartoon, taken from a Russian publication in the Cold War years, reads "Radio Liberty and Radio Free Europe – These two old toads love croaking loudly from an old trash can containing provocations, lies, slander and inventions."

RATTLING THE BEAR'S CAGE

THE SOVIET UNION first started jamming the VOA on 3 February 1948, and on 13 April of the same year they began partial jamming of the BBC. By the time of the lifting of the Berlin Blockade in 1949, the Russians had begun all-out jamming of the VOA, RIAS and the BBC, using mainly the 'buzz saw' technique. Once RFE and RL appeared, the jamming of nearly all their short wave and some medium wave outlets using Russian and Eastern European languages had reached a crescendo. It is estimated that in 1950 there were about 500 jamming transmitters in use, and this had risen to some 2500 by 1955. The power of these transmitters varied from 5 to 200 kilowatts, and for greater effect two senders were sometimes operated in parallel. Many of these valve-based units were built in the 'Komintern' factory in Leningrad and distributed amongst over 200 separate sites.

In addition, all the European countries of the Communist Bloc except Albania were contributing to the jamming mayhem. This bedlam could be heard in all the regular short wave broadcast bands including 3.95- 4.00MHz. On 15MHz up to 14 separate frequencies might be jammed at one time. There was even a 'mystery' West German broadcast transmitter operating out-of-band on 5435kHz with an accompanying Moscow 120 kilowatt sender on 5455kHz. Older radio amateurs will also remember that Russian radio amateurs were not allowed to speak to those in the West, even though they were operating in the same amateur bands. ♦

In the next part of 'The Voices', Gordon Adams will explain how the Russian jammers were staffed, and will deal with the epidenic of voices that were to break out at the Eastern end of the Meditteranean and in Cuba and Florida.

Electrical Noise Detector

By Steve Ortmayer, G4RAW *

I ENVY THE radio amateur of yesteryear because of the very small amount of electrical noise that was about to cause problems. How different it is today, with every house full of electrical equipment, all capable of emitting electromagnetic radiation to interfere with the poor radio amateur who is trying to listen to signals on the bands.

This project detects the radiation that causes problems to the amateur and the noise can be heard. When we say to other members of the household "Please don't turn on that computer, vacuum cleaner or TV" they cannot understand why we are complaining, but this little device will allow you to show them and let them hear the 'noise' we have to contend with.

The circuit (**Fig 1**) uses a telephone pick up coil as a detector, fed into a 741 IC pre-amp, followed by an LM386 power amp.

29MHz oscilloscope	0.56V
Old computer monitor	0.86V
Old computer with plastic case	1.53V
New computer monitor	0.45V
New tower PC with metal case	0.15V
Old TV	1.2V
New TV	0.4V
Plastic-cased hairdryer	4.6V
Vacuum cleaner	3.6V
Drill	4.9V

Table 1: Readings obtained by placing the pickup coil next to various household items.

Inside the finished project.

CONSTRUCTION

THE PROJECT IS built on perforated board (**Fig 2**), with the component leads pushed through the holes and joined with hook-up wire underneath. There is a wire running around the perimeter of the board, to form an earth bus.

Build from the loudspeaker backwards to VR1, apply power and touch the wiper of VR1. If everything is OK you should hear a loud buzz from the speaker. Too much gain may cause a feedback howl, in which case you will need to adjust RV1 to reduce the gain. Complete the rest of the wiring and test with a finger on the input, which should produce a click and a buzz. The pick-up coil comes with a lead and 3.5mm jack, so you will need a suitable socket.

RELATIVE NOISES

I PLACED A high-impedance meter set to a low AC voltage range across the speaker leads, to give a comparative readout between different items of equipment in the home. The readings that I obtained are shown in **Table 1**. ♦

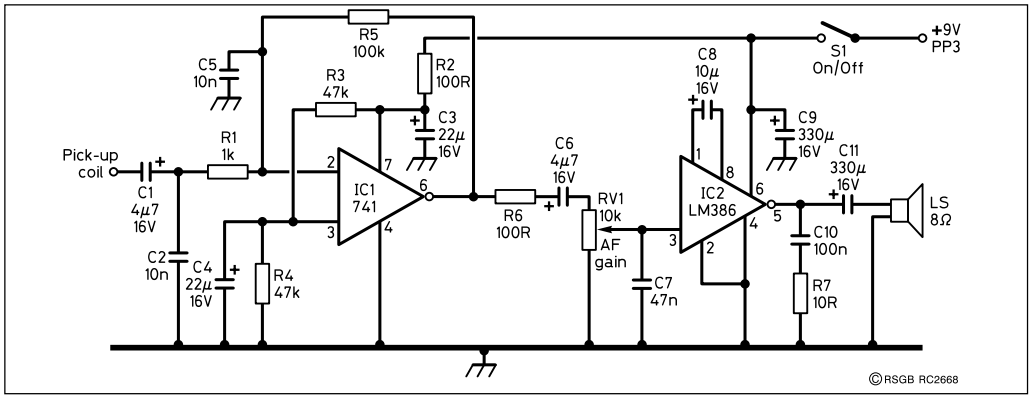


Fig 1: The detector works by receiving stray radiation on a telephone pickup coil and amplifying it to loudspeaker level.

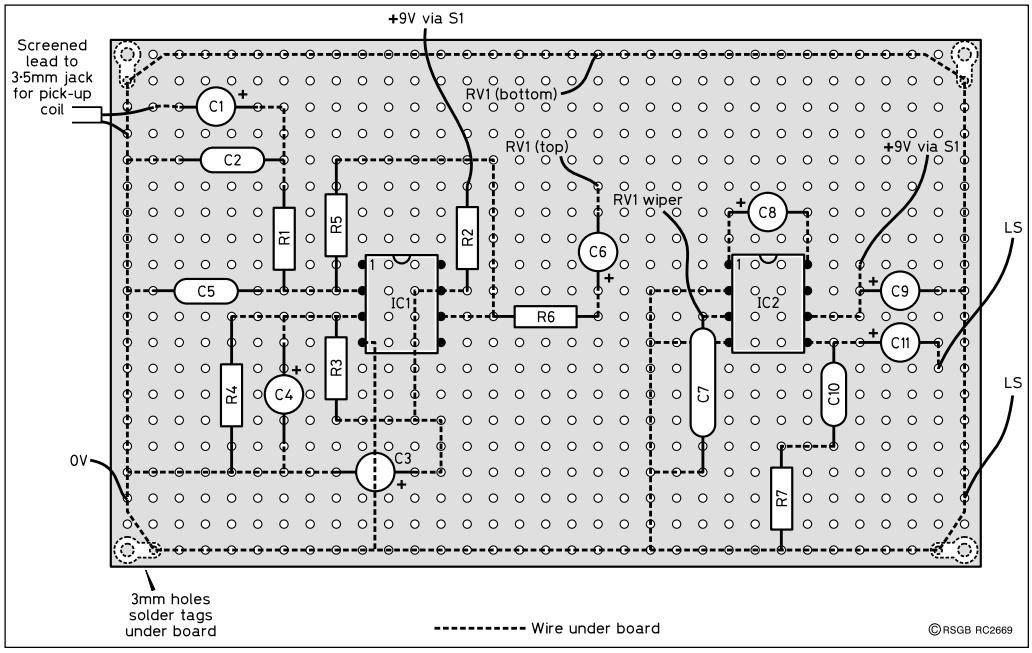


Fig 2: The project is built on perforated board with point-to-point wiring underneath.

COMPONENTS

Resistors (all ¼ watt)

R1	1k
R2	100R
R3	47k
R4	47k
R5	100k
R6	100R
R7	10R
RV1	10k, with switch

Capacitors

C1	4.7µF 16V electrolytic
C2	10nF
C3	22µF 16V electrolytic
C4	22µF 16V electrolytic
C5	10nF
C6	4.7µF 16V electrolytic
C7	47nF
C8	10µF 16V electrolytic
C9	330µF 16V electrolytic
C10	100nF
C11	330µF 16V electrolytic

Semiconductors

IC1	741
IC2	LM386

Miscellaneous

LS1 Small 8-ohm speaker
Perforated board, 7cm x 7cm
PP3 battery + clip
3.5mm jack socket
Case to suit
Telephone pickup coil (Maplin)

* 14 The Crescent, Hipperholme, Halifax HX3 8NQ

Handy Hints

by various people

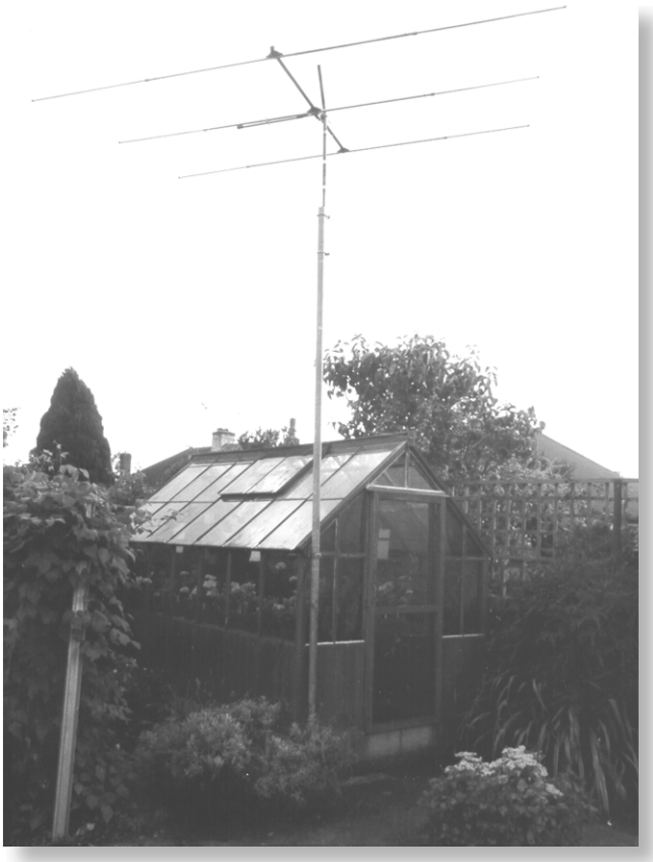
TEMPORARY ANTENNA

INTERESTED IN the 50MHz band, which is active in the summer months, but living with neighbours who are not keen on aerials, I rigged up a 12ft mast with a 3-element Yagi on the corner of my greenhouse (see photo right). The mast was fitted in two suitable places on the greenhouse corner by brackets and Terry clips of a suitable size, so that it can be taken down in winter. To prevent the clips opening-up in high winds, locking U-shaped clips were made from 1/8in steel sheet, which fit tightly across the clips (see photo below).

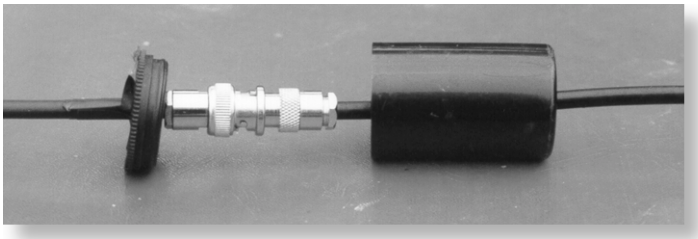
The coax to the antenna is laid across the lawn to my bungalow, so there is a need to remove it when cutting the grass. A BNC connector was introduced at the base of the mast, the plug and socket being inside a 35mm film container (see photo right). If you drill holes each end of the container slightly smaller than the cable size, a waterproof seal with the soft plastic is obtained.

With a second, undrilled film container, it is possible to cap-off each end of the cable for storage.

George (Squibbs) Squires, G7HGS



The 50MHz antenna of G7HGS, mounted on the corner of his greenhouse.



A BNC plug and in-line socket can be weatherproofed in a 35mm film container.

Home-made steel U-clips prevent the wind from springing the mast out of the Terry clips that hold it up.

[Do you have any other 'Handy Hints'? If so, please send a photo and a short write-up to *RadCom* - Ed]

DIECAST BOXES

IF YOU HAVE an old diecast box that you want to use for a new project, the odds are that it will be full of holes already – all of them in the wrong places.

All is not lost! Mix up some epoxy adhesive and load it with aluminium filings. Lightly mask-over one side of the holes to be filled, then pack the adhesive carefully into them. After it has set, any surplus can be smoothed down to the surface and the complete box given a coat of paint. With a little care you'll barely be able to see that there were holes there at all.

This technique will work for aluminium sheet as well, but the filler will need to be allowed to stand proud on one side in order to maintain a bond.

Robin Hurley, G0CGH

FRONT PANEL LEGENDS

ONE PROBLEM with home-made equipment is labelling the controls. Letraset is an ideal solution, except that it rubs off, even when covered with the protective varnish that can be bought with it.

This problem can be solved by protecting the surface with a layer of thin, transparent self-adhesive plastic of the type that is often used for covering books. It is available from many High Street stationers, and isn't too expensive.

When applying, care must be taken to exclude air bubbles and avoid creases. Once firmly in place, the edges can be trimmed and any holes cleared. Care is needed when fitting the controls, as over-tightening nuts causes the film to distort or crease.

Ian Poole, G3YWX

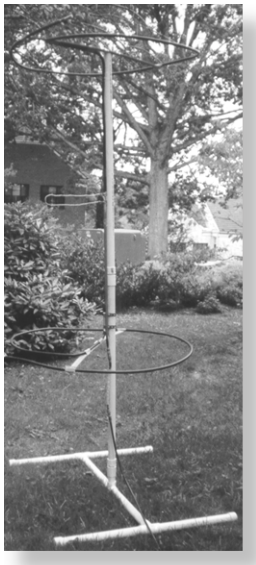
technical feedback

The Neighbours'll Never Know!

RADCOM, APRIL 2000

THIS IS A SUBJECT that has been very much in mind for the last few years that we have lived in an apartment. A couple of years ago I decided to see if a 1-metre loop antenna could be improved upon as a confined space antenna. I had in mind a half-wave, 5ft-long dipole that would fit on the 8ft PVC pole that I had my 1-metre loop antenna mounted on. No ground planes, traps, J-poles, radials or ATUs to tune it. No computer design was necessary or electrical calculations needed to determine the capacitive/inductive end-loading effect, just a few minutes with the slide rule on the circumference/radius dimensions.

Two 10ft 6in lengths of 'hardline' were taken, 4in-radius bends made 30in along from the feedpoint, then 1-metre diameter loops formed. The two halves of the dipole were attached to the PVC pipe with a 2in space at the centre, as the photos right and below show. A W2DU balun [several ferrite beads, threaded onto coax – *Ed*] was fastened to this centre point. Checking with the SWR analyser, a little trimming was done of the circumference to bring the antenna into the 28MHz band. Since the feed impedance is not 50Ω in this configuration, an 11in-long hairpin match was introduced. This lowers the resonance, and the antenna can be brought back to the desired part of the band with a little more end trimming.



The 2:1 bandwidth is about ±600kHz, which is about the same as a full-sized dipole. The transmission line should be brought directly away from the antenna, to reduce its effect on the radiation pattern. Ideal construction would be to use ½in copper tubing for the lower upright section and feed the transmission line up the centre, with the balun at the bottom to keep the RF from radiating back down the transmission line. The antenna was later configured in this manner, with good results and no problem with the transmission line affecting the antenna pattern. This whole operation took an hour. I don't know if this is a new invention, but I have not seen such an antenna in the last 70 years.

I have since made an 18MHz version of the latter configuration. The antenna works fine and seems better than my loop, although I cannot make direct comparisons.

Such antennas should be installed where passers-by and shrubbery cannot touch the high voltage ends. A lightweight wooden bar across the circumference of the loops was required for support, in the case of the 18MHz version, as the photograph left shows.

Wayne Cooper, AG4R

Introduction to VHF/UHF Range

RADCOM, MAY 2000

THE FREE-SPACE path-loss equation should read: $32.4 + 20\text{Log}(f) + 20\text{Log}(d)$

Richard Newstead, G3CWI

Eurotek

RADCOM, MAY 2000

IN THE FEATURE the inductances are quoted in mH, when in fact they should be in µH. [This applies only to the text. The illustrations were correct – *Ed*]

Dick Rollema, PA0SE

SEE OUR NEW BUSINESS CARD SECTION ON PAGE 96

BREAKING NEWS

Kenwood Developing an All-Band, All-Mode Transceiver

Kenwood is currently developing an all-band all-Mode transceiver that features a smart metallic-grey design with large LCD and represents a breakthrough in HF performance. It creates an immediate impression of being sophisticated, solidly reliable and superbly suited for the new millenium.

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The transceiver is equipped with an IF DSP for main-band use (AF DSP for sub-bands). TS 870 technology has thus been adopted for all-mode applications - VHF and UHF as well as HF.

Packet cluster information, so vital for HF operations, can be displayed on the LCD. Moreover, this data can be used for automatic tuning, though it is not possible to connect with a node station using the internal modem.

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technical topics

by **Pat Hawker**, G3VA*

NEW LIFE FOR THE SKIRTED DIPOLE?

AT ONE TIME skirted and sleeve dipoles were a popular form of vertically-polarized VHF antenna as a variation on the conventional ground plane with horizontal or sloping radials, providing in effect a vertical dipole antenna with reduced high-angle radiation and the advantage that the feedpoint impedance approaches that of a half-wave dipole and is thus much easier to match to a 50- or 75Ω coaxial feeder. I was interested to find in the September 1999 issue of the *IEEE Transactions on Broadcasting* (pp261-275) a paper by Valentin Trainotti of Buenos Aires 'MF AM grounded dipole for stereo and digital transmissions', which appears to be a high tower version of the classic skirted dipole.

The paper reports that experimental scale models have been made for HF (21MHz) and VHF in order to check at minimum cost the theoretical predictions for the full size MF version. For broadcasters a major advantage would be an efficient radiator without the need for an extensive (120-radial) ground system or high-power matching network; a disadvantage is the high (half-wave) tower needed, although in recent years the benefits of half-wave vertical dipoles have become recognised by some MW and even LW broadcasters. At HF the tubular [aluminium] mast height becomes modest, particularly for 14MHz and above. For amateurs a disadvantage is that basically this is a monoband antenna.

To quote the introduction: "MF AM vertical dipoles have been introduced some time ago and have proved to be very efficient radiators with or without the standard 120 wires buried ground plane. This good efficiency is achieved because the dipole operates with a lower power density close to the base compared to a standard monopole of the same height. This effect lowers the power dissipation of the ground losses. Dipole power density close to the base is generally lower by 20 or even 30dB compared with a standard monopole. For this reason it can operate without the artificial ground plane with high radiation efficiency. Monopole power density is always maximum at the base regardless of its physical height, making the use of an artificial groundplane a first priority in order to achieve high radiation efficiency.

"Tower grounding has been used for many years. Such antennas are very simple, but have problems in their radiation patterns due to the shunt feeding system that affects the vertical and horizontal field distribution. . . A grounded tower permits static discharge. . . and the possibility to use the high mechanical structure as support for VHF, UHF or microwave antennas without interaction with the MF antenna.

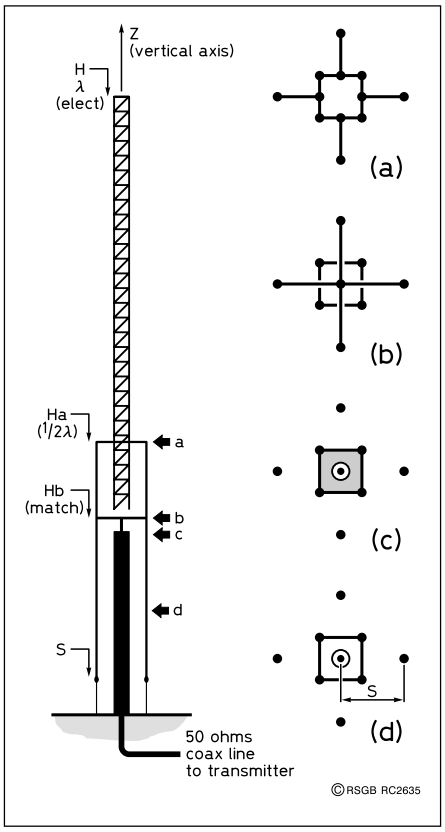

Fig 1: Direct-fed cylindrical skirt grounded vertical dipole. Detail a: Skirt to support tower connection. Detail b: Hot coaxial point connection to skirt. Detail c: Coaxial shield connection to support tower. Detail d: Skirt separation from vertical axis.

"MF antennas have always been fed with a series or shunt system whose input impedance is generally very far from the characteristic impedance of the transmission line, making it essential to use a matching system. . . Nowadays the standard transmission line is generally a 50Ω 'flexible' pressurized coaxial line that can be buried under the artificial ground plane, providing good protection against weathering and mechanical effects. . . The possibility of having an entirely grounded tower and at the same time an input impedance very close to 50Ω makes this antenna ideal for modern high-fidelity, stereo and digital transmitters, and can be achieved with a direct-fed cylindrical skirt grounded vertical dipole." **Fig 1** shows a typical drawing for a square broadcast tower installation.

The paper describes MF antennas with skirts made of four and eight wire skirts for square towers and three and six skirts for triangular towers These antennas achieve favourable radiation patterns with low radiation at high elevation angles; especially above 55° where the radiation level is 20dB below the ground level, and consequently very good antifading properties compared with MF antennas that propagate both skywave and groundwave signals.

In a section 'Experimental Model', Valentin Trainotti reports: "The bigger model was made for a centre frequency of 21MHz and can be useful, as a grounded vertical antenna, for amateur use in the 15m band. This model (with a tubular mast) has a four-wire skirt. Initial input impedance measurements showed that the antenna had optimum behaviour at some 2.85% below theoretical predictions. Antenna height was readjusted and the impedance found to be very close to 50Ω with a minimum SWR of 1.02 at the centre frequency and 0.65MHz bandwidth for VSWRs lower than 1.22 (3% bandwidth).

HF PROPAGATION BEACONS & FORECASTS

THE USEFULNESS of the DK0WCY beacon transmissions for both aurora alerts and the Boulder and Kiel ionospheric data was emphasised in *TT* in December 1999 and April 2000. However, for real-time DX conditions on the 14, 18, 21, 24 and 28MHz bands, there can be little doubt of the value of the magnificent service now being provided by the fully-implemented World Wide Net organised by the North California DX Foundation. With 18 stations, each with a ten-second slot on each band and a cycling time of just three minutes, an initial power output of 100W, reducing to 10W, then 1W and then just 100mW to omnidirectional antennas, it provides a rapid overall view of which paths are open on which bands. In April, for example, on some days I could hear during mornings and afternoons upwards of 12-14 of the 21MHz beacons in a single cycle, (some very weakly). On other disturbed days only about 4 or 5 of the beacons could be heard at one time. I suppose that at the peak of a good sunspot cycle it might be just about possible to hear all 18 stations on the same band in the course of a single cycle, although that would be pretty unusual!

For the record, the full list in sequence order is:

OH2B	Espoo, Finland
CS3B	Maderia
LU4AA	Buenos Aires, Argentina
OA4B	Lima, Peru
YV5B	Caracas, Venezuela
4U1UN	New York, USA
VE8AT	Alert, NT, Canada
W6WX	Nr San Jose, California
KH6WO	Honolulu, Hawaii
ZL6B	Masterton, New Zealand
VK6RBP	Nr Perth, Australia
JA2IGY	Mount Asama, Japan
RR9O	Novosibirsk, Siberia
VR2HK	Hong Kong
4S7B	Colombo, Sri Lanka
ZS6DN	Pretoria, South Africa
5Z4B	Nr Mombasa, Kenya
4X6TU	Tel Aviv, Israel

*37 Dovercourt Road, London SE22 8SS.

Frequencies: 14.100, 18.110, 21.150, 24.930 and 28.200MHz.

A new ionospheric prediction system on the Internet is being implemented by the Radio Science and Propagation Group of the UK Defence Evaluation and Research Agency (DERA). It is stressed that a very disturbed ionosphere and magnetosphere affects a variety of electromagnetic systems; for example HF communications; the Global Positioning System (GPS) and UHF satellite communications: "During disturbed conditions, utility companies also have to contend with much larger induced current levels in pipelines and cables. Consequently, solar-terrestrial environment predictions have an important bearing upon the specification and operation of a number of services. To meet this operational need, DERA is developing nonlinear prediction techniques to provide more accurate temporal and spatial predictions of the solar-terrestrial environment. Some of these predictions will feed into improved propagation codes that form the basis of techniques for ray tracing through the ionosphere. Other predictions will be used to provide risk assessment for spacecraft and utility operations."

According to an article in *IEE E11 News* (April 2000, pp3-5), a new Ionospheric Forecasting Demonstrator (IFD) computerised system will help develop predictive algorithms. HF radio users will also benefit from this experimental system: "We are now generating six-hourly *foF2* forecasts for Europe based upon Chilton UK measurements and real time, hourly updated *foF2* forecasts from 1 to 24 hours ahead, including a method of indicated the rms errors for our predictions. A tabular presentation of short-term ionospheric forecasts for North Western Sub-Auroral Europe at six-hourly intervals is supplemented with the daily NOAA data (as available from WWV, DK0WCY etc) short-term forecasts and *foF2* predictions.

The DERA Internet online forecasting data is freely available: http://rasp.dera.gov.uk/ifs/ifs.html although at the time of writing (early May), the tabular forecasts are temporarily unavailable due to software updating. Further details are available from: Nick Francis, DERA, Malvern, Worcs, Tel: 01684 896484, e-mail: nmfrancis@dera.gov.uk

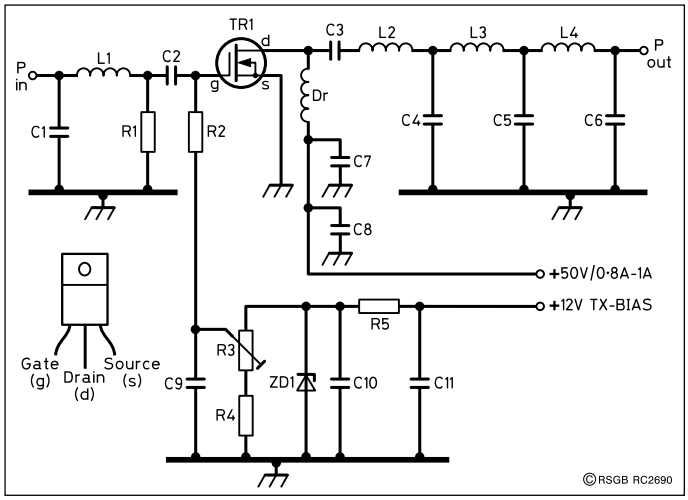

Fig 2: 50MHz linear amplifier using a single low-cost IRF610 V-MOSFET, designed by DJ9FG and capable of providing up to 25 watts output with about 1 watt drive and 50V power supply. C1, 68pF (63V); C2, C9, C11, 10nF (63V); C3, C7, 10nF (100V); C4, 82pF (100V); C5, 100pF (100V); C6, 47pF (100V); C8, 100nF (100V) or electrolytic less than 20µF (100V); C10, 100nF (63V); R1, 68R (1W metal); R2, 10k (0.25W); R3, 1k trimpot (0.1W); R4, 1.8k (0.25W); R5, 680R (0.25W); ZD1, 3.9-4.7V Zener diode; TR1, IRF610; L1, 4t, 8mm dia, length 10mm, 0.6-0.8mm copper; L2, 4t, 8mm dia, 10mm length, 1.0mm copper; L3, 4t, 8mm dia, length 5mm, 1mm copper; L4, 5t, 9mm dia, 5mm long, 1mm copper; Dr, RFC choke, 10-20t, 0.5mm copper, wound on resistor, 0.5-1µH.

V-MOSFET LINEAR AMPLIFIERS FOR 50MHz

BERNARD BALE, G2ACN, draws attention to a two-part constructional article by Rolf-Dieter Mergner, DJ9FG, in the German magazine *Funk Amateur* (Part 1 12/1999 pp1426-1429 and Part 2, 1/2000, pp 72-74) featuring the use of V-MOSFET (HEXFET) device(s) in single-ended or push-pull 50MHz linear amplifiers, capable of up to 25W (single) or 50W (push-pull) RF output when fed from 50V power supplies. The IRF610 device(s) used in these amplifiers are low-cost devices (0.60DM per device in Germany, under £1 in the UK) intended for use in switch-mode power supplies. The very high internal capacitances would tend to suggest that they are more suitable for use at 136kHz than 50MHz, but in November 1998, p35 in *Eurotek* Erwin David, G4LQI, condensed a Technical Note (*Electron*, August 1998) by the late Klaas Spaargaren, PA0KSB, who reported that following up work by DL9AH (*Funk*, February 1998) he had successfully implemented a 50MHz linear amplifier using an IRF610 MOSFET,

MATTERS ARISING

IN CONNECTION with the 'Wonder Bar Antenna' (*TT*, February 2000), enquiries have been received as to the central mounting panel of the original version by K6OFM. In fact, this was simply specified as "constructed of any non-conducting weatherproof material, such as plastic, Formica, etc. The dimensions of the panel are not critical and may vary depending upon the method of construction used for the centre section." For the *CQ* 50MHz version, Plexiglass sheet was specified. Dr Dick Biddulph, M0CGN, points out that the British equivalent of Plexiglass is Perspex, both are registered trade marks, Plexiglass by Rohm and Hass and Perspex by ICI (no longer made by them, but still sold under the same name). It is also called Lucite (DuPont). The generic name is acrylic resin or polymethyl methacrylate to give it its generic name. Actually the impedance at the centre is so low that well painted plywood would do.

THE FEBRUARY *TT* paid credit to the leading role of Harold Kenworthy, G6HX, in the interception of the German Occupation Police W/T communications during WW2. But G6HX did much more than that. I cannot resist adding a tribute to his work written in 1945 by Commander Alistair Denniston who was Director of the Government Code & Cypher School (GC&CS) from its start until 1942, when he moved from Bletchley Park to Berkeley Street in London as Deputy Director (C), concentrating on the Abwehr and Diplomatic traffic: "It was soon apparent that Kenworthy processed a flair for this work which amounted to genius. To him, the Foreign Office and the Service intercepting authorities owe a very great debt, not only as a technical W/T engineer designing and constructing suitable gear, but also as the instructor in the matter of interception of difficult transmissions and as a pioneer in the interception of non-Morse transmissions." G6HX played a key role in the interception of the modified Feldfernschreiber and of the highly important RTTY 'Fish' traffic.

FURTHER INFORMED comment on the Telefunken variable bandwidth crystal filters (see *TT*, January 2000 and September 1999, from Dick Rollema, PA0SE, who has provided measured selectivity curves of the Koeln E52 receiver) and Jan Smeets ON4ASZ (who has found versions of this filter in several German military equipments other than the E52. I hope to return to this topic when space permits. Similarly, with several comments on electronic tuning diodes (*TT*, February 2000). On the hopefully 'dead' topic of conjugate matching, Dennis Roddy, writing from Thunder Bay, Canada, draws attention to the article 'Maximising power transfer in Class-C' (*Electronics World + Wireless World*, November 1995, pp964-966) of which he was one of the co-authors at Lakehead University, Ontario.

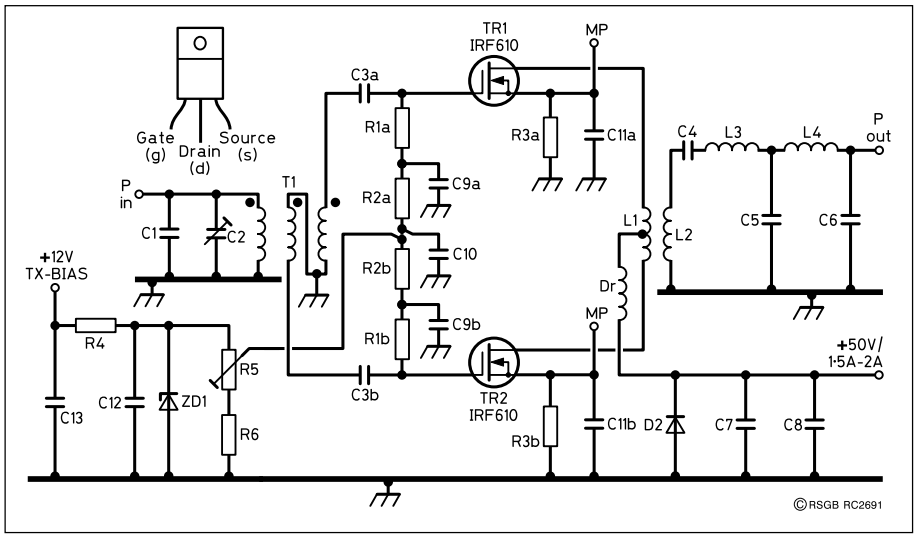

Fig 3: Push-pull version of the DJ9FG 50MHz linear amplifier, using two IRF611 devices and capable of providing up to 50W output. C1, 150pF (63V); C2, 5-90pF trimmer (rotary); C3a, C3b, C9a, C9b, C10, C13, 10nF (63V); C4, 68pF (500V, high current); C5, 100pF; C6, 68pF; C7, 10nF; C8, 100nF (C5-C8 100V); C11a, C11b, 4.7nF SMD; C12, 100nF (63V); R1a, b, 68R (1W metal); R2a, b, 47k (0.25W); R3a, b 1R (1W metal); R4, 680R (0.25W); R5, 1k (0.1W trimpot); R6, 1.8k (0.25W); ZD1, 3.9-4.7V, 0.5W Zener; D2, 100V 1A silicon diode (eg 1N5401, BY251); L1, 5t, 10mm dia, 25mm long, 1.5mm copper; L2, 3t, 10mm dia, 25mm long, 1mm copper; L3, 4t, 8mm dia, 8mm long, 1mm copper; L4, 4t, 8mm dia, 10mm long, 1mm copper; Dr, 10-20t, 0.5mm copper around resistor, 0.5uH. T1, 3 x 3 turns, 12mm dia, trifilar, of 3 x 15cm of 0.4mm copper.

obtaining an RF output of some 16W from 0.2-0.3W drive. He had also obtained some 35W CW output on 28MHz, but abandoned this with the limited size heat sink he was using, as the device was getting very hot.

It was noted then that "MOSFETs require only voltage drive, no power, but this must be developed across their high gate-source capacitance, 140pF for the IRF610. If some driving power is available, a swamping resistor across that capacitance helps and also eliminates the tendency to oscillate due to the 35pF drain-gate capacitance."

DJ9FG appears to use them successfully in a 28/50MHz transverter. It is proposed here only to reproduce the circuit diagrams **Fig 2** and **Fig 3.** I suspect that it would be advisable for anyone wishing to use these devices on 50MHz to read and understand the full German text, as it would be easy to 'blow' the devices if the amplifiers burst into self-oscillation etc.

The IRF610 is specified as having a maximum drain voltage of 200V and maximum drain current of 3.3A, but for these RF linear applications can be powered from a 35 - 50V source at about 1A, with a separate adjustable positive gate-bias supply of up to 12V. Efficiency depends on the drain voltage, but can be up to 50% with a single IRF610 and up to about 66% with two IRF610s in push-pull, for which the 50V power supply should be capable of providing a current of about 1.5 - 2A. In *Funk Amateur*, DJ9FG provides detailed information on the performance of these amplifiers under various conditions, together with a PCB layout etc for the 50MHz push-pull amplifier. Also, a 50V power supply using two 115V (primary) mains transformers with their primaries in series and 45V (9V + 36V) secondaries in parallel with separate diode bridge rectifiers (GBL04 or GBU4B/D). However, it is hoped that the brief details given here will at least allow further experimentation as a follow-up to the earlier notes by G4LQI, based on the experimental amplifier by PA0KSB: **Fig 4**.

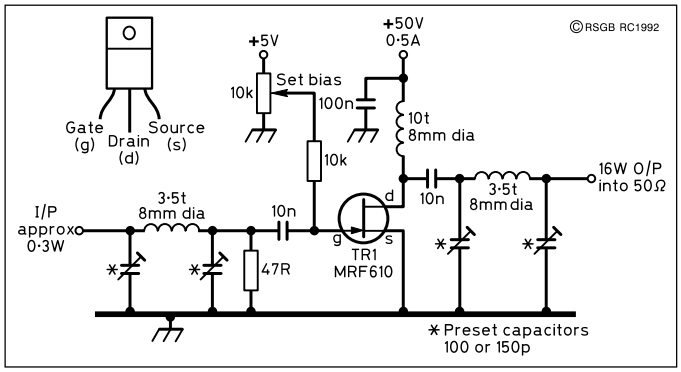

Fig 4: Low-cost prototype 50MHz linear designed by the late PA0KSB and capable of 16W output with less than 300mW drive, as noted by G4LQI in November 1998.

It seems worth adding a quotation from G4LQI's notes on this experimental circuit: "The output was 16W from 0.2-0.3W drive. With a two-tone input, third-order distortion was 24dB below either tone; not brilliant, but not bad. With less drive, that figure improves. . . The disadvantage of a single-ended arrangement is that even harmonics do not cancel out. With the 2nd harmonic of 50MHz falling into the 88-108MHz FM broadcast band, the low-pass pi output section should be augmented by an additional low-pass filter." The later designs given above by DJ9FG would appear to meet these qualifications. There would thus seem to be useful applications for such low-cost amplifiers as home-built amplifiers for QRP transmitters or as 50MHz amplifiers for home-built transverters etc.

MULTIBAND WIRE ANTENNAS

OVER THE YEARS, *TT has* provided details of many wire antenna designs for HF and VHF applications. Low-cost wire antennas can be home-brewed, can use fixed supports without the complexities of beam-elements and rotators, are relatively unobtrusive and yet can provide respectable DX capabilities. On 28MHz, 50MHz and above, 'long-wire' antennas including rhombics and bi-directional vees (both in classic and 'inverted' configurations), provide substantial power gain in specific directions and can be contained within average gardens. These points have been made a number of times in *TT*, yet there remains among many amateurs the belief that rotary beams are a *sine qua non* for reliable long-distance operation on HF and VHF. Admittedly, Yagi and quad

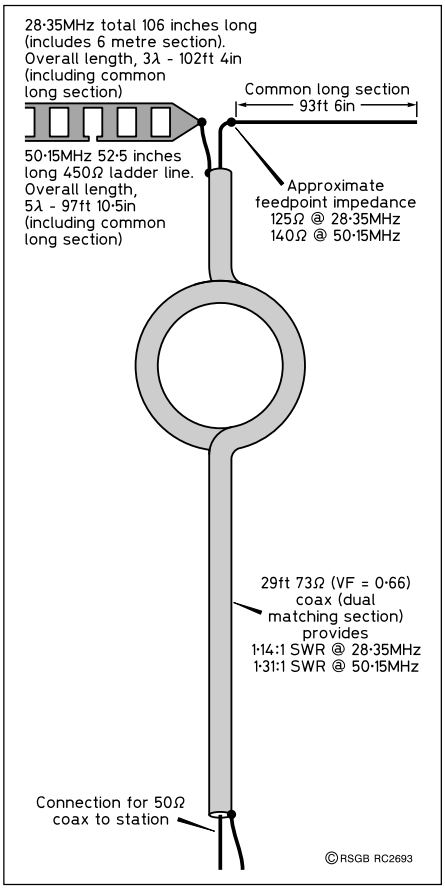

Fig 5: Coax-fed long-wire antenna designed by W3RW for 50 and 28MHz. At 28.35MHz the total element length is 102ft 4in (3λ). At 50.15MHz the overall length is 5λ (97ft 105in).

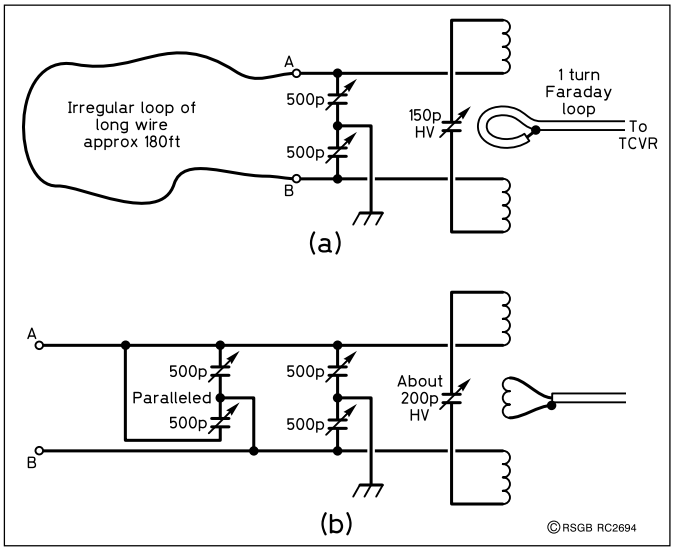

Fig 6: An irregular long-wire horizontal 'loop' antenna, as used by G3VA in conjunction with balanced-output pi-network ATUs (a) for 14, 21 and 28MHz (probably suitable also for 18 and 24MHz), and (b) ATU used on 3.5 and 7MHz, including a 3-gang loading capacitor (500 + 500 + 500pF) but a two-gang unit would probably be suitable. No great claims are made for this version, but large horizontal square or rectangular loop antennas can provide excellent results if at a good height above ground.

arrays tend to dominate the HF pile-ups, but plenty of good DX can come to those prepared to listen and get in before the piles become too high.

Bob Wilmer, W3RW (*QST*, April 2000, pp46-48) describes a 28 and 50MHz long-wire antenna providing "better than dipole" performance on 28 and 50MHz without investing in a beam and rotator, including a matching section to deliver a near-50Ω match to coaxial feeder on both bands: **Fig 5**. The horizontal wire element (including the quarter-wavelengths formed from the 450Ω ladder line) represents 3λ (102ft 4in) on 28 MHz and 5λ (97ft 10.5in) on 50MHz. This results in a feed-point impedance of about 125Ω on 28.35MHz and 140Ω on 50.15MHz, transformed down to roughly 50Ω by the common 29ft of 73Ω (VF 0.66) coaxial cable for connection to any required length of 50Ω cable. W3RW also provides information on an improved dual matching section.

For many years I tended to use a long-wire antenna approximately 132ft long, fed against quarter-wave counterpoises for the main HF bands. This had to be partly indoors, running through the roof space, then back outside and down to an ATU in an upstairs shack. This worked reasonably well, but eventually the wire broke where it passed over a branch of a tree.

It continued to operate as a random length fed from a pi-coupler, but eventually my neighbour cut down the tree that gave the antenna some height and I had to be content with using a lower tree. I was never happy with the various counterpoises (which ran indoors) and converted the system into a form of a ragged - and much elongated - 'loop', by running back a return wire along a different route and feeding the result through a balanced pi-network, using separate ATUs for 3.5/7MHz and 14/21/28MHz to avoid the need for tapped or roller-coaster coils, without having any clear idea of the total length of wire in the 'loop': **Fig 6**. This antenna seems moderately directional towards the East but has reasonable performance in most directions, despite being quite low (about 20-25ft above ground). Not a world-beater, but it happily provides contacts and can also be used on 1.8MHz with inductive loading. The large semi-horizontal loop antenna, whether square, rectangular or just made to fit whatever space and supports are available (the higher the better), whether random-length or resonant, seems a much neglected form of multi-band antenna.

Another useful antenna is an outdoor or roof-space 'doublet' essentially a non-resonant dipole feed with 450 or 300Ω ladder-line feeder acting as resonant open-wire line, preferably adjusted in length to provide a medium impedance to an ATU with balanced output. This can be the same as that shown for the long-wire loop.

Large loops and doublets were featured in a *QST* article 'HF amplifiers vs Antennas' by Kirk A Kleinschmidt, NT0Z, reprinted recently in *Radio-ZS* (December 1999, pp10-11). To quote briefly from this article: "To save wear and tear on your neighbours, fellow hams, your wallet and even your house wiring, consider improving your antenna system before investigating in an amplifier. . . One almost universal way to get out more signal is to get your antenna(s) further up in the air . . . build a taller mast, find a taller tree, or put up a tower. If that dipole just isn't cutting it, put up a contest-winning and DX-catching secret weapon, a full wave horizontal loop for 40 or 80m (up as high as possible, of course). Feed it with coax and use a tuner on bands above the fundamental frequency. That's a cheap way to snag an extra 2 to 10dB. depending on frequency.

"An alternative system is to disconnect the feed line from your centre-fed single-band dipole and replace it with 450Ω ladder line: **Fig 7**. With a coax-fed dipole used on other bands, even if you may be presenting a happy impedance to the transmitter, the high SWR on the coax may slash your signal by 6, 10 or 25dB, depending on the band and the size of your dipole. By using 450Ω 'open-wire' line you will very likely retain most of that lost power. Now that's a 6 to 20dB shot in the arm that anyone can afford!

"You can increase the performance of a simple dipole by using low-loss open wire 450Ω windowed feed line. This is one of the easiest, most inexpensive antennas for the HF beginner. Just string up a dipole made of two equal lengths of copper wire. Don't worry about the overall length, but just make it as long as you can. Connect the feed-line to the centre-insulator and run it back to an antenna tuner with a balanced output. Attach coax between the tuner and the radio and you're in business on several bands!"

A word of warning. The ATU or - more correctly - ASMU needs to be adjusted (on low power) to present a low SWR on the coaxial feeder, particularly with a solid-state power amplifier. Similarly, beware of power losses in many ATUs, particularly on the lower bands, often denoted by heating up of the coils. Preferably, the length of feeder should be such that it presents reasonably low impedance (current fed) to the ASMU on all bands. This can be facilitated by providing an optional fairly short length of feeder that can be plugged into the chosen length on bands where this presents a high impedance (voltage fed) situation. Pi-networks providing a balanced output, such as that shown in Fig 6 cope more readily with low rather than high impedance, but there is no need to worry about critical or resonant element lengths. A centre-fed doublet, no matter how long or short the span, should be capable of being resonated by the ASMU to any band and provide a good match to the coaxial cable to the transceiver, although if less than a half-wave long at the lowest frequency band there will be some small loss of radiation efficiency. ♦

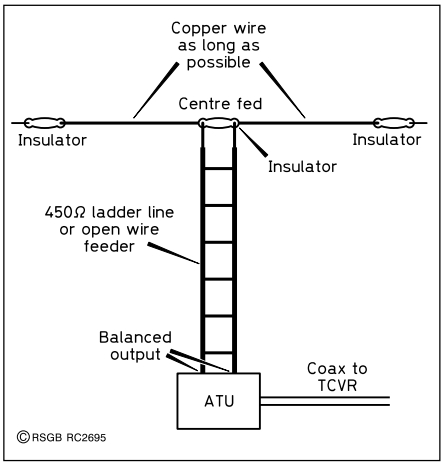

Fig 7: The classic centre-fed 'doublet' (non-resonant dipole) using open-wire or ladder-line feeders and brought to resonance by the ASMU can form an excellent multi-band antenna.

RSGB WebPlus

LAST MONTH the Society introduced a new membership benefit. Called *RSGB WebPlus*, it comprises dozens of Internet web pages, exclusively for the use of members. Access is by typing your callsign (or RS number) and your membership number. Your membership number has been re-introduced on the *RadCom* label specially for this.

In its first week, *RSGB WebPlus* was used by more than a thousand members and their comments included: "Please give yourselves a pat on the back", "One great leap forward", "Looks good, friendly and very easy to use", "A fine start".

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http://www.rsgb.org/membersonly

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The RSGB reserves the right to withdraw this service from any member found publicising his/her membership number for the purpose of non-members gaining access to the site.

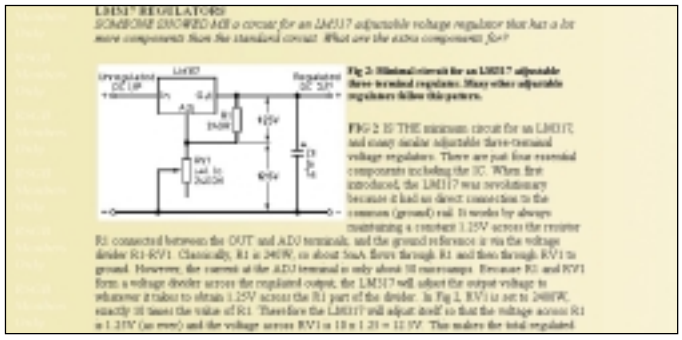
What's in it for me?

GB2RS NEWS BULLETINS for the last six months are archived and benefit from a search facility. You can find that elusive news story, check out what your local club has been up to recently, or correlate your log book with the propagation forecasts. The GB2RS news bulletin is now published first on *RSGB WebPlus*, usually on a Wednesday evening or Thursday morning. This is up to two days in advance of its publication on the public web site.

A collection of freeware and shareware programs is available directly from the web site, with links to other useful programs. Each program is described and can be downloaded in Zip format. Programs include antenna analysis, signal strength plotting, grey-line display, distance calculation, S-parameters and log books. Members are invited to suggest additions to this area.

Members benefit from special offers on brand new publications as well as some of the older ones, and on sets of books such the three *Technical Topics Scrapbooks*. It is well worth re-checking this page every time you visit so as not to miss just the offer you want.

Reviews from *RadCom* will be archived here, so that you can easily find the review you want just when you are ready to buy a new rig. Reviews include transceivers, books and software.



Perhaps you need some circuit information.

One area comprises back issues of Ian White's 'In Practice' column from *RadCom*. An index is provided to help you find just what you want, when you want it.

For those members wanting to include RSGB copyrighted logos on their QSL cards, headed notepaper and web sites, several versions are included of the RSGB, IOTA and Raynet logos for download. A notice explains the small print about who may use the logos with and without permission.

The IARU and UK bandplans are published every year in *RadCom* and again in the *RSGB Yearbook*. However, there is still a demand for bandplans online, and here they are. It is likely that they will be moved to the public web site shortly but, along with other useful pages, the policy has been to let you, the members, benefit from the pages first.

An online list of QSL Bureau sub-managers has been requested by many people and it is now available to members, together with a description and diagram of how the Bureau works. Check this page from time to time for changes to sub-managers and their addresses.

Indexes for 11 editions of *RadCom* were published on the launch of *RSGB WebPlus*, including that for 1999. A search facility makes this a very useful resource.

The events calendar from *RadCom* is reproduced here to be at your fingertips.

Half a dozen articles from the *RadCom* 'An Introduction to...' series are available, including: Superhets, Sudden Ionospheric Disturbances, Frequency Modulation, Radiation Resistance, and Baluns.

Sign up for another new membership facility! You can get an easily-remembered e-mail address of your callsign @thersgb.net plus 10MB of web space and Internet access, all for free.

Many members have their own web sites, especially now it's free with thersgb.net. A *WebPlus* page features links sorted by callsign, and a featured site of the week. This is the place to find out more about those you chat to on the air.

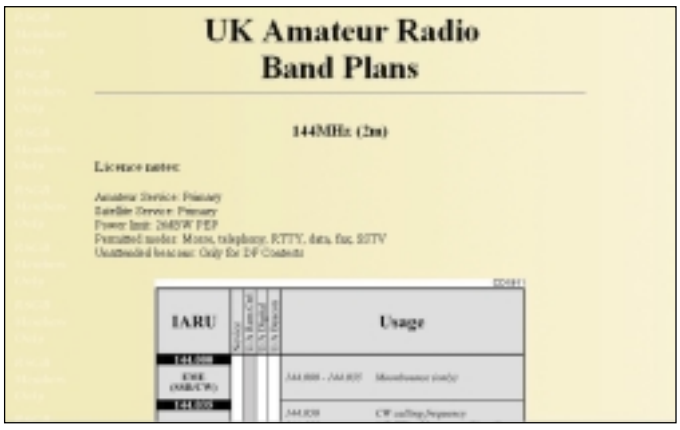
Our feedback page is where you tell us your opinions. Every few days a new question is posed and your e-mails are invited so that we can discover just what you think.

Where's it going?

RSGB WEBPLUS will expand over the next few months. Not only will the existing sections be enlarged regularly with more reviews, more archives, more software and so on, but sections will be added. In particular, we expect to feature clubs, committees and local stories, as well as making the site more interactive.

In response to a request for feedback, many members sent in their suggestions on how to make *RSGB WebPlus* even better. More ideas are welcome, as we want to make this exclusive area as useful as possible. Please e-mail them to: publications@rsgb.org.uk ♦

The *WebPlus* index page.



The bandplans page at your fingertips.

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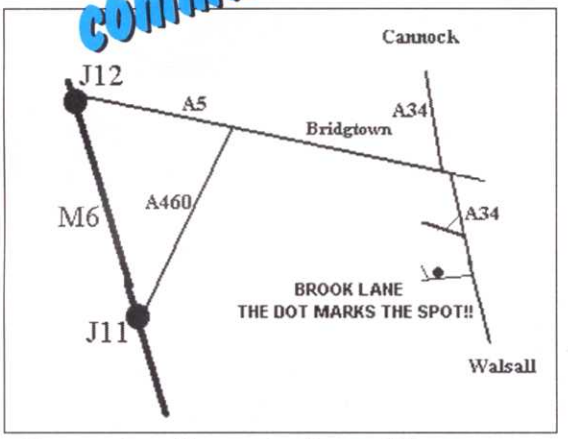

Remember, if you don't need it, we wont sell it to you phone or visit us for friendly, impartial advice on ALL of your communications needs.

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ALINCO	DR-510E DUAL BANDER	£195.00
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AOR	AR-8100 SCANNER	£280.00
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ICOM	IC-706MK11 SUPER TRANSCEIVER!	£599.00
ICOM	IC-706MK11G LATEST!	£850.00
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ICOM	IC-730 100w SOLID STATE	£250.00
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ICOM	IC-735 TRANSCEIVER	£450.00
ICOM	IC-737 BASE TRANS, INC TUNER 0-30MHz	£600.00
ICOM	IC-745 0-30MHz	£500.00
ICOM	IC-746 HF/VHF	£999.00
ICOM	IC-751A 0-30MHz	£595.00
ICOM	IC-821H DUAL BAND BASE	£895.00
ICOM	IC-8500 TOP RECEIVER!	£1,199.00
ICOM	IC-970H 2m 70cm BASE TOP RADIO!	£1,299.00
ICOM	IC-970H P/S WIDE RECEIVE 900MHZ	£1,495.00
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ICOM	IC-T8E 2 m 70m & 6m HANDIE	£230.00
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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

ADVANCING years prompt disposal, most now surplus equipment: Yaesu FT-101B, FV-101B VFO, Icom 260A 2m tcvr, Heath SB303 rcvr, AVO AFM2 sig gen, Scopex 14D15 dual trace oscilloscope, Optoelectronics 7010 freq counter 10Hz - 600MHz, Heath 1G18 audio generator, Variac 0-270V 8A, Datong FL-1, MFJ-16010FT antenna tuner, coax RG8, crystals, meters and more. Offers and enquiries to G4BFM, QTHR, You collect. 01823 272750 (Taunton). E-mail: a.kimble@cwcom.net

ICOM AT-500, IC-701, IC-701PS. IC-RM3 remote keypad, SM-2 desk mic, IC-EX1 extension terminal - complete Icom HF base station, all for £425. Trio TW-4000A FM 2m/70cm dual band mobile, £85, all in original boxes, in exc cond and including UPS next day delivery. G4GYI, QTHR. 01789 763565 (Alcester). E-mail: ward.p@virgin.net

ICOM-725 HF tcvr, Icom PS-55 PSU, £350. Icom AT-100 HF automatic ATU, £140. Yaesu SP-102, £45. Daiwa 140-450MHz SWR meter, £20. Chelcom HFV-1 80m helical vertical, 7.2m fibreglass multiband with ATU, £80. All mans. If taking job lot, £600 cash. Going QRT. Get a brass CW key worth £50 and earphones, never used, free. 01952 251478 (Wellington).

YAESU FT-290 MkII, 25W linear amp, £200. Yaesu FT-990 100W HF rig with DSP, all filters, late model, only four years old, vgc, £725. Yaesu FT-726R, 6m, 2m & 70cm multimode with satellite module, mint cond, £525. Ameritron AL-80A 1200W HF linear amplifier, new valve (great for DX), vgc, £425. All items are boxed with mans and postage paid (UK) only. 01224 712370 (Aberdeen). E-mail: cug@clara.co.uk

YAESU FT-990AC with all filters, auto tune, man, boxed, immaculate, £750. 01524 823277 (Lancaster). E-mail: ldavid@btinternet.com

60ft mobile heavy duty Versatower, new stainless steel cables and winches, £650. Cushcraft XM2-40, never assembled, £300. Linear amp USA, 2 x 3-500, little use, boxed, £900. FT-990AC, immaculate, narrow CW, £750. PK-232MBX, vgc, £80. KWM-2A, £100. T-2X Tailtwister rotator, £250. 01226 761499 (S. Yorks)

ALINCO ALM-203T/E 2m FM h/held, plus accessories, £45. Toyo meter T435 RF watt meter, 20-120W, £20. Hodec P12 AC/DC converter, £7. Gould TC-314 time counter, £20. Sagant BL-40x dipole centre, £10. Mutek SLNA 144MHz converter, £7. Reasonable offers accepted. 01708 551158 eves (Essex).

ALINCO DL-119 mobile 2m FM radio, gc, £120 ono. 01473 624529 (Woodbridge). E-mail: bayjur@bayjur.screaming.net

ALINCO DR-605E dual band 2m/70cm tcvr, 45/35W, never used mobile, £175. Datong FL-3 audio filter, £45. Watson HF SWR meter, new, £25. GM4NJZ, QTHR. 01383 823305 eves (nr Dunfermline).

ALTRON tiltover mast, rotator, controller, HF mini beam, 2m beam, cables etc, buyer dismantles, £230 ono. M0ASD, QTHR. 01788 331804 (Rugby). E-mail: m0asd@tesco.net

CAP-CO antennas. AM- 5, 3.5-11 MHz and control box, £180. AMA-3, 13.9-30MHz and control box, £140. Both in exc cond. 01993 702096 (Witney).

COLLINS 390A, £300. GEC BRT-400, £50. RA-17 plus MA-79G SSB unit, £175. VHF military tcvr, 36MHz to 60MHz, type C42 Mk2, inc PSU, £100. Rcvr type A-417, 2.8MHz to 18MHz, all items in working order, buyer collects. G4MH, QTHR. 01484 654650 (Huddersfield).

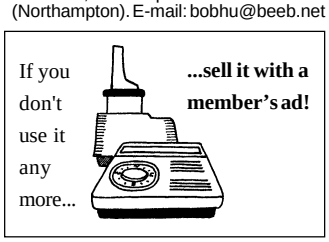
COLLINS 51S-1 rcvr. One owner, instruction man, spare set of valves. Very little used, £450. Yaesu FT-767GX with 6-2-70 modules. MD-1 mike/stand. SP-102P speaker/phone patch. FIF-232C CAT interface, one owner, as new, £675. 01539 726909 (Kendal). E-mail: tapline@aol.com

CUSHCRAFT 13B2 13-element 2m Yagi, £50. Cushcraft A-14810S 10-element 2m Yagi, £40. Mitsubishi LS-120 floppy disk drive for 120MB disks, 8 blanks supplied with unit. Internal installation, will also run standard floppies, £40. Buyer collects or pays carriage. 01986 798524 (Woodbridge). E-mail: steve@sbowdvic.demon.co.uk

CW enthusiasts TS-930S with CW filters, 500Hz and 8.8MHz, classic tcvr with Shure desk 444, man, original box, any trial, £650. TS-940SAT with tuner, man, box, £750. Kenwood AT-230 with built-in 1:1 balun for balanced feeders, £145. Richard. 01398 361215 (Tiverton).

FOR sale. TL-922 linear amplifier, mint cond with new valves fitted, original box and packaging. A snip at £950 ono. 01698 424311 or 07932 688799 (Hamilton).

FT-290R, IC-32E 2m/70cm h/held, MML 144/30-LS linear amp, PacComm Tiny-2 TNC, BNOS 12/5E PSU, Kenwood PS-10 PSU, Pye MX-290, 3-ele 69-ele 2m ant, loads of coax and connectors, £325 ono, or will separate. 01604 891258 (Northampton). E-mail: bobhu@beeb.net



FT-847 boxed, as new, with Cushcraft 7000 ant, £1000, buyer to collect or pay postage. M0CIZ. 01709 877405 (Rotherham).

FT-920 c/w Inrad CW & SSB filters, £925 ono. Peter, G3ZSS. 01252 783124 (Farnham). E-mail: pbacon@iee.org

HAM 'M' rotator series V, c/w control unit, £150. 01738 626941 (Perth). E-mail: bert@ferg33.freeserve.co.uk

HF-150, exc, £250. Tokyo HX-640 6m/HF transverter, boxed, mint, never used on tx, £200. Spectrum 2m amp, £60. Carriage included on all items. All ovno. David, G6STD, QTHR. 01736 756385 (Hayle).

HIGHLANDER 9-band mobile antenna, unused, with base, £120. Wanted for restoration; KW-2000A, 2000B, KW-201, 301. Collected within 100 miles. 023 9238 0705 (Portsmouth).

HY-GAIN Explorer 14, 4-element tribander, £95. Emotator 747SRX, £60. Heatherlite Hunter amplifier, £350, prefer buyer collects. G3UEN, QTHR. 01262 850258 (Flamborough).

IC-275H 2m all mode 100W tcvr, mint cond with SM-8 desk mic, £350. 01895 230006 (Uxbridge).

ICOM 706 Mk1 gwo, £400 ono. Also Icom 2m FM IC-24G, faulty, but not dead, £30 ono. Harry, G3NGX, QTHR. 01491 872919 (Reading).

ICOM 730, c/w mic and matching PSU, £140. 01422 365990 (Halifax).

ICOM IC-207H dual band 2m/70cm FM tcvr, £225, FT-790R 70cm multimode with FL-7010 10W linear, £100. OS CD-ROM UK atlas ver4, £20. Davis weather monitor (Perception 2), £60. Oregon weather station, £35, Logitech Trakball (marble), £20. SSTV Commslab module, £15. Tandy 3¾ digital meter, £20. Watson mobile antennas; W-7900, £20; W-627, £25. Duplexers; MX-72, £15; DX-10N, £10. Trio TR-2300, offers. Post extra. 01689 826891 (Orpington). Web site www.g8kpy.freeserve.co.uk

ICOM IC-T7E 2m/70cm h/held FM tcvr, £135. Spkr/mic, £15. Desk holder/stand, £10. Mobile dual band antenna, £10. AOR h/held scanner, model AR-2700, £120, all boxed with mans, little used, as new. No reasonable offers refused. M0ALP, QTHR. 01625 511991 (Macclesfield). E-mail: ivanblunt@mighty-micro.co.uk

ICOM IC-U16T 70cm FM tcvr portable, with CTCSS tones, two batteries and speaker mic, 1W or 5W £65. AOR 2m h/held portables AR-240 and AR-240A 1W tcvrs with charger, £55 each or £100 the pair. 01543 685694 (Rugeley).

ICOM IC-W2E, 2m/70cm h/held, £100, Trio TW-4000A 2m/70cm mobile, hands-free mic, £125. Yaesu FRG-7700 rcvr, £100. Yaesu FRV-7700 VHF converter, £30. Standard marine 55-channel marine h/held, £50. MFJ-945C ATU, £35. Most boxed, mans and accessories. Graham, G4FUJ. 01242 518776 (Cheltenham). E-mail: graham-g4fuj@talk21.com

JRC JST-135 HF tcvr, 150W, 200 memories, option fitted. BWC ECSS c/w man, mic, £525. 01332 880633 (Derby).

KENPRO KR-500 elevation rotator, brand new cond, £150. Kenwood TV-502 2m transverter, exc cond, service man, (rare), £100. AOR SDU-5000 spectrum display unit, Hawk software, perfect cond, £250. Hoka code 3 decoder, latest full V5 software, £200. MFJ-490 memory keyer, £80. Adrian. 01288 331113 (Bude). E-mail: g4jbh@compuserve.com

KENWOOD TS-440SAT with all filters and voice, £425 ovno. Kenwood TS-811E, £400 ono. Kenwood TS-711E, £380 ono. Yaesu FT-101Z, £130 ono. Trio 9000 with all base stn accessories, £225 ovno. Icom T-81E with spare battery, £190. John, G0CHQ. Phone before 9pm (have very young children). 020 8561 3837 (Hayes). E-mail: john@pepps.demon.co.uk

KENWOOD TS-530S (WARC) with external VFO, narrow CW filter and man £250, ono. Collect or plus carriage. G3LCG. 01723 355071 (Scarborough).

KW-107 supermatch, £70. MFJ-9020 20m QRP rig, fitted Curtis keyer chip, £120. Both items gc. G4DWU. 01723 364959 (Scarborough).

LARGE tuning knobs, 4 brand new, one other for AR-88, £4 each. 50mm diameter fluted knobs, brand new (10K5355-99-933) (CR-100/CR-300), £2 each. Box 50 assorted knobs, some with skirts, mostly WW2, £5. T-1154 HF choke, new, in packing (10C578), £5. AR-88 filter choke, part 901433, used, OK, £6. AR-88 switch S23/S24, off/trans/rec, £4. 28 AR-88 metal multiple caps, £6. 01229 584466 (Ulverston). E-mail: jackradham@cs.com

LATTICE tower 45ft, 3-section Altron tiltover, complete. Yaesu G-600RC rotator, gwo. Cushcraft A3S beam, gwo. Trio TS-530SP with Kenwood VFO-240. Yaesu FC-301 ATU. Drake L-4 linear amplifier. Full list, all offers considered, buyer collects. 01603 437560 (Norwich). E-mail: myhamstuff@aol.com

MFJ model 962C 1.5kW ATU, £95 + carriage. 01435 864803 (Heathfield). E-mail: g4awj@thersgb.net

MILITARY radios. Larkspur C12, choice of two. C13, choice of two. Both with vehicle mounting brackets. Buyer to inspect and collect. 01775 766398 after 7pm (S Lincs).

MOSLEY TA-33JR NW 3-ele beam, £250. Home-brew mag loop for 40/80m, no controller, 6ft dia, £25. 01903 722753 (Littlehampton). E-mail: mervyn@harwoodrd.ndo.co.uk

PK-232MBX data controller, as new, boxed, with leads and loose-leaf operating manual, £150. 01252 515790 (Farnborough).

R-5 28-14MHz 3dB ½wave 2:1 SWR all bands, 1800W PEP, 17ft, 8.7lb, boxed, instructions, vgc, no radials required, £100. G3BVW, QTHR. 01647 440223 (Moretonhampstead).

RACAL RA-1772 HF rcvr, fitted all filters, two IF amps for ISB, £375. Also RA-1772 modified by G3UGQ, full digital display, two VFOs for transceive operation using separate transmitter, £350. Three-volume man for RA-1772, £40. 10m lattice mast with head unit, Radio Structures Ltd, £75. G3OGQ, QTHR. 01925 267553 (Warrington). E-mail: g3ogq@cwcom.net

SALE CW QRP station. MFJ-9020 14MHz tcvr, MFJ-971 ATU, Ramsey QRP amplifier, SEM iambic keyer, 6-8A regulated power supply, £150. Prefer buyer collects. G3JWY. 01422 373804 (Huddersfield).

SILENT key sale. Late G0CSF. Offers for the following: VX5, IC-04GE, IC-02E, IC-32E, FT-727R, FT-4700R, IC-765 with SP-20 and SM-6, FT-736 with 50MHz module, FP-757HD, SMC RS-12-08-10 12V/8A PSU, Ten-Tec 225 12V/9A PSU, BNOS LPM-50-10-100, BNOS 144-10-100, Heathkit SB-200, Black Star Meteor 600 counter, Kantronics KAM TNC, TNC-2H, PacCom Tiny 2 Mk2, Storno 5000, Motorola MC-micro, G-Whip 40 & 80m. 01732 823323 (Gravesend). E-mail: g0afh@qsl.net

SILENT key sale. Late G4MXH. Trio TS-530SP, £210. Offers for following: Uniden 2030 VHF rcvr, Yaesu FT-7B with PSU, Dentron HF matching unit and monitor, Netset SWR/power meter, Ross headphones, AEG SWR-50A SWR meter, Labpack variable output PSU, Trio 9R59D rcvr and SP-5DS speaker, Tech TE-20D signal generator, Yaesu FR-50B rcvr, Eagle TT-145 transistor/diode tester, Codar PR-40 preselector, Datong DTO Morse tutor. Grundig Satellit 3400 pro SW rcvr, £200. 01642 653159 (Stockton).

SMARTUNER SG-230 automatic antenna coupler, exc cond, used little, indoors only, £240. Jim, G4LWY, QTHR. 01925 762485 (Warrington).

SPECTRUM analyzer Meguro MSA-4902 DC to 1000MHz, mains/battery, USA, vgc, £300. 3 x 500m coax cable URM-57, 10.3mm, new, £100 each. 01304 240162 (Dover).

TEKTRONIX 2215 portable scope, 60MHz, dual TB, as new, man, calibrated, £295. Tektronix TW-0120 digital 100MHz scope for use with PC, all instructions and software, £295. Redifon R-50 classic valve comms rcvr with PSU and man, £140. Zenith portable Trans-Oceanic, 13 bands FM/VHF to 30MHz, copy man and instructions, £140. Tektronix 602 storage display, as new, copy man, £75. 01344 627869 (Slough).

TEKTRONIX 475, £250. TM-255E, £200. TH-78E dual band h/held, £140. Richard, G4AOJ. 020 8660 8259 (Purley). E-mail: 100014.1216@compuserve.com

TELESCOPIC tiltover tower, 2 x 2m beams, £260 ono, c/w head unit with rotator.01630 658136 (Market Drayton).

TH-6 aerial, £175. 4m PA, CC1 conduction-cooled valve, £50. Electric winch, big, £125. Drake TR-4 tcvr, mobile PSU, £120. Drake MN-4 ATU, £45. Big HT transformers, ring for details. Vacuum relays, £2.50 each. Strumech head unit, £50. 01844 213381 (Thame).

TRIO 820S HF tcvr, 1.8-30MHz, no WARC bands, hence only £200 ono, buyer collects or carriage extra. G4FAS, QTHR. 0161 4377784 (Stockport). E-mail: geoff.royle@lineone.net

TRIO 9130 plus BO9A base, SP-120 speaker, Kenwood MC-60 desk mic. £200. 01994 230773 (Carmarthen).

VARIABLE voltage transformers, some with covers, 0-270V, output 20A, £75 ono each. GW0ALR. 01267 222445 (Carmarthen). E-mail: adrian@amgenerators.com

YAESU FL-2100Z linear, very clean, gwo with man, no box, £400 ono. 01992 632434 (Waltham Cross).

YAESU FT-100 HF/VHF/UHF, new, boxed, exc cond, £700 ono. Mosley PRO 57B large HF array, covers 10/12/15/17/20 metre bands, £575 ono. Telescopic mast, 40ft, tilt-over, wind up, £250 ono. 01623 484950 (Mansfield).

YAESU FT-101ZD, exc cond, fully working, c/w man and mic, £225. Buyer collects. G3KAE. 01723 864236 (Scarborough). E-mail: g3kae@aol.com

YAESU FT-2500M 2m 50W mobile, mint cond, boxed with man, £120. Frank, G0OFX. 023 8057 9123 (Eastleigh).

YAESU FT-747GX tcvr with h/book and hand mic, £250. Yaesu FP-757HD PSU, £100. Thermionic products 20A PSU, £75. SEM Tranzmatch HF ATU with instr leaflet, £75. All ono, pictures with e-mail. Stuart, G0SLG. 01458 250124 (Langport). E-mail: s.gough@bigfoot.com

YAESU FT-757GX tcvr, FP-700 PSU, AT-230 tuner, mic/leads, £350. AOR AR-2002 scanner, £140. Marine radios NAVCO RT-6500 base/mobile, £200. Swiftech M-198 h/portable, £150. Yaesu FRG-9600 HF/VHF/UHF rcvr, all mode, PSU, £275. KDK FM-2030 144-145MHz mobile, £150. All gc. 01909 478060 (Worksop).

YAESU FT-902DM 160-10m including WARC bands, FV-901DM synthesised scanning VFO, FC-901 antenna tuner, SP-901 speaker, set of mans, original boxes. Complete station. £400. 01892 770776 (Hartfield) E-mail: nigel@dxbands.com

YAESU lineup: FT-101ZD, FV-101DM digital VFO, SP-901 speaker, FC-902 ATU, YO-901 scope, YR-901 reader, YVM-1 monitor, FL-2100Z amp with spare tubes, YO-148 mic, please ring. Also FT-902DM, £150. FT-101B, £100. FV-101 VFO, £30. Yaesu YS-2000 PWR/SWR meter. All with mans and vgc. 01829 760072 eves (Tarporley).

EXCHANGE

YAESU FT-76 70cm tcvr h/held with extras, in exchange for 4m tcvr, AKD or whatever other make. In working order. 01704 892088 (Ormskirk).

WANTED

SPY/Clandestine radio sets wanted by collector. Incomplete units for restoration/spares also required. Bill, G8PUJ, QTHR. 020 8505 0838 (E. London).

WANTED CTCSS unit for Rexon RL-102 VHF h/held tcvr, part number RTN100. Steve, G7CAF, QTHR. 01524 416711 or 07773 607409 (Lancs).

40ft Tennamast or three-section Altron or similar telescopic tiltover mast. 01285 821571 (Cirencester).

ATARI STE computer. Will pay good price for working model. 01297 23421 (Devon). Or write. Mr V McClure, 43 Roman Way, Seaton, Devon EX12 2NT.

EDDYSTONE EC-958/7 in gwo, would consider the /7E version or the EC-958 (analogue readout). Tony, G0LGT, Not QTHR. 01494 778352, eves (Chesham).

FOR Panasonic CF-25 laptop, plug-in CD-ROM drive, any CF-25 accessories or machine working or not for parts. Can collect. 01354 741168 (March).

HAC battery valve short-wave rcvrs and associated items - WHY? John Constance, G0VGD, QTHR. 07974 041486 (Maidstone). E-mail: john@vwconstance.freeserve.co.uk

IC2100H service man or circuit diagram. Will pay for copy/costs. G4EMM. 02380 276423 (Chandlers Ford). E-mail: neil.richardson@breathemail.net

INTERFACE cables or 12/16 pin male connectors for Kenwood Trio TS-820S to R-820, TV-502 and TV-506 transverters. Require TV-506 transverter. 01462 871353 (Shefford).

JRC JST-100 tcvr, must be in excellent, unmodified cond. GM4MKU, QTHR. 01343 812626 (Lossiemouth).

KENWOOD speaker SP-230, operating and servicing mans for TS-830S. 01379 783657 (nr. Diss).

KW-160 L-match. Any cond will be considered and reasonable offer made. David. 01823 323015 (Taunton).

MOBILE trailer tower 40/60ft, must be in good roadworthy cond for use by radio club. Arthur, G0TNI, QTHR. 0116 2630947 (Leicester).

RACAL Speedrace oscillator coupling unit type MA-275. Mans for Plessey PV-318 and TSG-20 RTTY equipment. 'Spy sets' Mk122 and Mk123, inc spares, accessories, 12V PSU and hand crank generators. Nigel, G0UGD. 01323 486822 (Eastbourne).

SILENT key clearout or just not needed. Wanted for research project, QSL accumulations, old call books, etc. Can collect. 0113 2693892 (Leeds). E-mail: g4uzn@qsl.net

TH6DXX or other large HF tri-band beam, plus rotator to suit. G3ZVW, QTHR. Tel: 020 8882 5125 (London).

TRIO 3200 crystals for channel RU246 (RB3) 434.675MHz and 433.075MHz. Required for novice course. Don, G0ACK, QTHR. 020 8845 9575 (Ruislip). E-mail: g0ack@nasuwt.net

WANTED Headphones and headsets for my collection, any cond, even parts only. Graham, G0UIF. 0116 2238100 eves (Leicester).

WANTED Norfolk, Suffolk area, QTH edge of village, 2 to 3 beds house, workshop, some land for antennas/dogs, detached preferred, max £125,000, cash buyer. GW0ALR. 01267 222445 (Carmarthen). E-mail: adrian@amgenerator.com

WANTED please to borrow, copy and return, Heathkit man for HWA-9 (upgrade for HW9), all expenses met. Also wanted, HWA-9 kit or any components from kit, especially coils. Peter, G4DPY. 01775 720170 (Spalding).

WANTED *T&R Bulletins* pre-1936 for my collection, offers or swaps from the 1960s *RadCom*s. Offered to collector only, bound volumes *Radio Constructor* magazine 1968 to 1979. Offers please, or gift to charity. Exchanges also available. Harry, G3NGX, QTHR. 01491 872919 (Reading).

YAESU FT-620 6m tcvr or similar. Working or not working, in need of attention. Brian, GM8BJF. 0131 4474043 (Edinburgh). E-mail: bwf@ee.ed.ac.uk

YAESU YVM-1 video monitor, Yaesu 70TV 4m (70MHz) module for FTV-901R. Non-working Yaesu FT-980 for spares. Please can anyone help? Bob. 01667 455338 (Nairn). E-mail: gm7bcc@tinyworld.co.uk

Club NEWS

ABERDEEN ARS

21, Junk sale; 28, On the Air Night. Robert, 01224 896142.

APPLEDORE & DARC

17, Barbecue. Brian Jewell, 01237 473251.

ARC OF NOTTINGHAM

6, Forum; 13, Radio Detection on foot, Fish & Chip Supper; 20, Radio Detection Hunt No 4; 27, 'Candid camera' Shack visit. Ron, G4XOU, 01159 199177.

BARRY ARS

1/2, VHF NFD, GW4BRS; 4, VHF NFD debrief; 11, 'DX4WIN and DX Telnet programmes', by John, GW0ACH; 18, On the air and Morse practice; 23, Barbecue for members and their families at Nash Point; 25, Planning meeting re GB4GT (3-8 August 2000). Rich, GW4BVJ, 01656 658830.

BRACKNELL ARC

12, HF Contesting. Baugh @compuserve.com

BRAINTREE & DARS

3, 'RTTY' by Mike, G4GGC. Keith, M0CLO, 01376 347736.

BROMSGROVE ARS

11, Barbecue; 25, Holiday time topics, radio of course. B Taylor, G0TPG, 01527 542266.

CAMBRIDGE & DARC

1/2, VHF NFD - all welcome; 7, Your equipment feeling poorly? Bring it in to our Rig Doctors Surgery repair night; 14, Open Construction awards night. Judges Mr Screw and Mr Handy Tip; 21, 'Radio Coverage Planning', by John Worsnop, G4BAO. Bring floppy disc for copy; 23, Cambridge & DARC Club's Annual Barbecue; 28, 'Solid State and Helium Neon Lasers and Modulation Techniques', by Clive, G8BOU/M5CHH. Bob, G0GVZ, 01223 413401.

CHELMSFORD ARS

4, Microwaves - amateur equipment and application. Charles, G0GJS, 01245 256654.

CHESHAM & DARS

5, General monthly meeting; 12, Night on the air; 19, Pedestrian treasure hunt; 26, Night on the air. P Blakeney, G8BLB, 01494 784811.

CHESHUNT & DARC

5, Members' Forum; 1, Lecture by Peter, G3YJE; 19, Open Air Meeting - Baas Hill Common, Broxbourne; 26, Junk Sale and Bring & Buy; 30, RSGB Hamfest. David, M1DGS, 01920 463746.

CHICHESTER & DARC

18, Open Evening - Chichester Festivities. Graham, G0WSD, 01243 788292.

COCKENZIE & PORT SETON ARC

1/2, VHF Field Day; 29/30, RSGB IOTA Contest from the Island of Tiree. Bob, GM4UYZ, 01875 811723.

COLCHESTER ARS

23, 32nd Annual Mobile Rally. Colchester Radio Rally & Computer Fair. David, M1CZY, 01206 523123.

CRAWLEY ARC

26, Constructional Evening (not a competition). Stewart, G3YSX, 0772 0068493.

CRAY VALLEY RS

6, 'Marine Communications', by Paul, G3SXE; 8, Summer Barbecue, hosted by Richard, G8ITB and Christine; 20, 'On the Buses', by Richard, G7GLW. Tony, G4WIF, 020 7739 5057 (office hours).

CROWBOROUGH & DARS

1, Special Event Station, GB2JBS, at Jarvis Brook School; 27, Preparation for IOTA Contest. Margaret, G6UIF, 01892 663666.

CRYSTAL PALACE & DR

15, 'RF and Audio Signal Probe', by Victor Johnston, G1PKS. Bob, G3OOU, 01737 552170.

DERBY & DARS

5, Junk Sale. Martin, G3SZJ, 01332 556875.

DORKING & DISTRICT RS

1/2, VHF NFD, venue to be advised; 2, 1900-2100, Activity Evening. Talk-in. John, G3AEZ, 01306 631236.

DUDLEY ARS

17, 'Build Your Own Vertical'. A slide presentation by G3CAQ. Bill, G3CAQ, 01902 843873.

ECHELFORD ARS

13, 'GPS for the Lighthouse Service',

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 (eg 26 January for the March Issue). News items should be sent in writing (fax, letter or e-mail gb2rs@rsgb.org.uk) by the club secretary or the person responsible for publicity. Post cards for this purpose are available from RSGB HQ. A database of all meetings is shared by *RadCom*, *Radio Today* and GB2RS, so information only needs to be sent once.

Club News is a service for clubs and societies affiliated to the RSGB. The announcements are intended to notify non-members and potential members of your club of specific events, therefore 'informal', '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*.

by Duncan Hawksbee; 16, The McMichael Rally; 27, 'The latest in TV/ATV', by Paul Mathews, G4AWZ. Robin, G3TDR, 01784 456513.

EDGWARE & DARS

13, Data Evening - displays and round table discussion; 2, VHF Field Day briefing. David, G5HY, 01923 655284.

EXETER ARS

10, Fox Hunt. D I Smith, G0WHJ, 01392 434078.

EXMOUTH ARC

12, Barbecue at Woodbury Common; 26, Hi-Fi Evening (Classics). Alec, G8GON. 01395 264872.

FAREHAM & DARS

5, 'Vintage Military Equipment', by John Lines, G6XBG; 1, Club Station G3VEF/G8KGI on the air; 19, Video Night; 26, F&DARS Extraordinary General Meeting. Steve, G7HEP, 01329 663673.

FARNBOROUGH & DARS

12, 'Data Communications', by Steve, G0WAF; 26, 'Motor Vehicle Emissions & the Environment', by Mike, G4YFU. Norman, G0VYR, 01483 835320.

GLOUCESTER AR & ES

3, On the Air evening; 10, 6-metres outdoors; 17, 5WPM Morse practice; 24, 31, On the Air evenings. Tony, 01452 618930, office hours.

GRIMSBY ARS

6, Talk 'Friedrichshafen Rally'; 20, Video Night. Brian, G4DXB.

HALIFAX & DARS

18 'Taking a Rig on Holiday', by Gerald Edinburgh, G3SDY. Ray, 01274 600297.

HAMBLETON ARS

5, Sale of oddments and more respectable bits. John, G0VXH, 01845 537547.

HARWICH ARIG

12, 'The RNLI', by Captain Rod Shaw. Eugene, G4FTP, 01206 826633.

HORNDEAN & DARC

4, Club Social Evening; 25, American Supper. Stuart, G0FYX, 01705 472846.

HORNSEA ARS

5, Foxhunt; 12, 'Shafts and Bearings', by G0TPS; 19, Activity; 26, Metal bashing, with G7MFO. John, G0TPS, 01964 562258.

HORSHAM ARC

6, 'ONdigital', by Chris Hibbert. David, G4JHI, 01403 750228.

ITCHEN VALLEY ARC

1/2, VHF NFD at Mockbeggar; 14, Talk on 'Wildlife Crime', by G Culbertson; 28, 'Amateur TV on a shoestring', by Jim, G0DQH, and Peter, M1DBB. D C Symonds, G0PRZ, 023 8026 1877.

KIDDERMINSTER & DARS

4, Talk by Raynet. Geoff, G0RJP, 01299 888826.

LEICESTER RS

3, Video night on Robot Wars by Roger, G4LRO; 10, Night on the air; 17, Chairman's Birthday! Video of his travels, by Colin, G0IFM; 31, Night on the air. A T Wann, G0TNI, 0116 2630947.

LINCOLN SHORT WAVE CLUB

1/2, VHF NFD; 5, Operating the FT-920; 15, Boultham Park Gala; 19, Computer contest logging. John, G1TSL, 01522 793751.

LIVERPOOL & DARS

4, Oliver Lodge Video; 11, Club on the air; 18, Confessions of a taxi driver; 25, Surplus Sale. Ian, G4WWX, 0151 7221178.

LOUGHBOROUGH & DARC

4, Kites on air - weather permitting - at Hind Leys College; 11, Radio Ramble with Mike, 2E1GYB; 18, Annual fun golf competition; 25, 4th DF of the year - bands TBA. Chris, G1ETZ, 01509 504319.

MAXPAK

3, Talk & Demonstration of a UI-View weather station by Peter, G6GUH and Andy, G7OCW. Ron Taylor, G6LRD, 01922 684496.

MID-WARWICKSHIRE ARS

11, DF Contest - 145MHz Fox Hunt; 2, Club Field Day planning meeting. Bernard, M1AUK, 01926 420913.

MORECAMBE BAY ARS

4, Social Evening with refreshments. Brian, G0RDH, 01524 424522.

NORFOLK ARC

12, Table Top Sale - bring your surplus equipment; 26, A visit by the Radiocommunications Agency. (Details TBA). John, G0VZD, 01953 604769.

NORTH WALES RRC

6, 'The History of Morse', by Tony, GW4PVU; , Free evening Morse Tuition, Ted, GW0DSJ. Ted, GW0DSJ, 01745 336939.

OXFORD & DARS

13, Talk by David McQue, G4NJU, RSGB Zonal Council Member; 27, Video Evening. Dave, G3BLS, 01865 247311.

RADIO SOCIETY OF HARROW

16, GB2DHH on the air with aircraft photo day, London Colney. Jim Ballard, G0AOT, 01895 476933/020 7278 6421.

SALOP ARS

6, GW0NVA... in a suitcase; 13, Third foxhunt; 2, 'RAF Communications', by Norman; 27, Summer Social. Fred, G3NSY, 01743 790457.

SHEFFORD & DARS

1/2, VHF NFD. Mike, G8BEG, 01462 816738.

SILVERTHORN RC

21-24, Provisional dates for Club Camp. David, G0KHC, 020 8505 1871.

SOUTH BRISTOL ARC

5, Bob's Computer Clinic, with Bob, M1BOB; 12, Club Barbecue, with Bob, G0LHD; 19, Bring & Buy Sale, with Len, G4RZY; 2, Simple home construction, with Ken, G0TDS. Len, G4RZY, 01275 834282.

SOUTHGATE RC

13, 'Setting up a Major Special Event Station', by Malcolm Wood, G7VRT; 27, 'Adding a Hard Disc to a PC', by Keith Mendum, G8RPA; 30, RSGB Hamfest, Hatfield House. Brian, G0MEE, 01707 257534.

SOUTH MANCHESTER RC

7, 'The Mobile Phone Sell- Off', by G3ZDM; 14, Technical Topics; 21, Mini-Lecture Evening; 28, 'Digital Photography', by G4HON. G E Spark, G7FQY, 0161 9691964.

SOUTH NOTTS ARC

5, On Air HF & VHF; 7, Club Summer Dinner at Ye Olde Flying Horse; 12, Open Forum - Members Only - Preparations for SSB Field Day; 19, Summer clear up/take down evening. 01509 672846.

SPEN VALLEY ARS

6, Barbecue. Russell, G0FOI, 01274 875038.

STEVENAGE & DARS

4, De-brief on VHF National Field Day; 11, VHF/UHF operating. Peter, 2E1CRK, 01462 637404.

STRATFORD-UPON-AVON & DRS

10, Visit TBA; 24, Construction Competition/Contest Cup. Ron, G0MRH, 01789 267430.

STOURBRIDGE & DARS

3, Portable evening; 17, 'My Time in the WAF', by Nancy Watson. Tom, 2E1HLT, 01384 374902.

SURREY RADIO CONTACT CLUB

3, Barbecue at QTH of G3ZPB. Berni, G8TB, 020 86607515.

SWINDON & DARC

1/2, VHF NFD SSB Contest at Barbury; 13, Used equipment sale; 2, Contest preparation; 29/30, IOTA HF SSB Contest at Barbury. Den, M0ACM, 01793 822705.

TELFORD & DARS

1/2, VHF NFD at Long Mynd, Church Stretton; 5, On The Air; 12, 3rd DF Hunt. Fox - Don, M5FHM; 19, 'Using Surface Mounted Devices', a demo by G4NKC/G8VZT; 26, Talk by Rob Mannion, G3XFD, of *PW* and barbecue. Mike, G3JKX, 01952 299677.

THORNTON CLEVELEYS ARS

3, Club on Air; 10, Auction of Silent Key's equipment; 17, 'Technical', by Charles, G4FWM; 24, Club on the air; the 31, Barbecue. Jack, G4BFH, jack@duddingt.u-net.com

TORBAY ARS

21, 'Atmospheric Railway'. Peter, G4VTO, 01803 864528.

TROWBRIDGE & DARC

5, 144MHz Direction-finding event ,OS map 173. 19.30 start; 9, Aerial/Kite Day at the White Horse, Westbury from 1000 to 1630 BST; 19, Social Event. Ian, G0GRI, 01225 864698, evenings and weekends.

VERULAM ARC

25, Barbecue, - venue TBA. Walter, G3PMF, 01923 262180.

WATERSIDE (NEW FOREST) ARS

4, Speaker from HM Coastguard; 16, HF Picnic at Yew Tree Heath after 1300. Tony, G0LKG, 023 80841794 evenings and weekends.

WEST SOMERSET ARC

4, Living with Amateur Radio - Trials & Tribulations of an XYL. Alan, M0AOJ, 01643 707207.

WESTON-SUPER-MARE RS

3, DF Hunt - Nick Sparks; 17, Workshop. Graham, G8WAR, 01934 415700.

WIDNES & RUNCORN ARC

1/2, VHF & UHF NFD Contest. Starts 1400 Saturday ends Sunday 1400. Barbecue too; 1, Datacomms & PSK with Stuart; 26, Ten pin bowling at Ellesmere Port. Martin, G4LUQ, 01928 714843.

WORTHING & DARC

5, Plans for Sussex Amateur Radio Fair; 19, DF hunt; 26, Discussion - Fire Brigade Open Day. Roy, G4GPX, 01903 753893.

YEOVIL ARC

6, Satellites with G0SOF; 13, Brains Trust with M0ARO; 20, 'Miller Crystal Oscillators', by G3MYM. George, G3ICO, 01935 425669.

SILENT KEYS

WE REGRET to record the passing of the following radio amateurs:

G0ALT	Mr S E Beilby	03/00
G0BXK	Mr AEC Wilkie	/11/99
G0CKY	Mr C H Kirk	12/04/00
G0RXX	Mr M W Marshall	02/04/00
G1EIL	Mr C E Sharp	27/01/00
G1IYY	Mr W H Jackman	09/05/00
G2FFK	Dr G M Holme	21/02/00
G2HKW	Mr R Uphill	19/04/00
G3AFK	Mr V A Bagnall	/11/99
G3FJ	Mr J Sharples	11/05/00
G3JQI	Mr A N Barton	05/05/00
G3KVA	Mr J C Hall	29/04/00
G3LMP	Mr B Page	22/12/99
G3PZC	Mr F P Coles	05/05/00
G3WRX	Mr B C Cooper	
G4BBW	Mr A P Smith	11/04/00
G4LJQ	Mr E Glossop	10/05/00
G4NPQ	Mr G Pollitt	10/99
G4OO	Mr D Hoult	22/03/00
G4PTC	Mr V C Sievey	08/05/00
G4PZY	Mr J M Robson	22/04/00
G4UEW	Mr D Hoose	/00
G4VDD	Mr G B Sutton	/99
G6XHQ	Mr E J Saunders	06/12/99
G7NIV	Mr E Hornby	/99
GM3JDR	Mr D Robertson	12/05/00
GW0WPT	Mr H Griffiths	29/09/99
GW1SQT	Mr D T Jones	25/03/00
GW3JDJ	Mr C J Haycock	12/07/99
M0AVX	Mr P Cook	29/04/00
RS91360	Mr W Whiteway	11/99
ZL1BDU	Mr R Catton	08/05/00

Rallies & 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'.

8 JULY 2000

CORNISH Radio Rally & Computer Fair – Penair School, Truro. OT 10.30am, B&B, TI, CP, MT (two photos needed). Robin, 01209 820118.

9 JULY 2000

SUSSEX Amateur Radio & Computer Fair – Brighton Racecourse, East Sussex. OT 10.30am. Ron, G8VEH, 01903 763978 or 01273 417756.

YORK RC (Amateur) Radio Rally – Knavesmire Building, York Racecourse. OT 10.30am, £2, accompanied children free, CP, TI S22, SIG, MT (two photos needed), LB, C. Pat Trask, G0DRF, 01904 628036.

16 JULY 2000

Humber Bridge Rally – Bob, G0VVP, 01482 834240 or John, G0TPS, 01964 562258.

KEY

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.

McMICHAEL 2000, The McMichael Amateur Radio Rally & Car Boot Sale – Faymill Youth and Community Centre, 112 Burnham Lane, Slough, near jn 7, M4. OT 9.30am, £1.50, C, LB, TI on S22. Dave, G4XDU, 01628 625720 or g4xdu@amsat.org

23 JULY 2000

COLCHESTER Radio Rally & Computer Fair – Dave, M1CZY, 01206 523123.

RUGBY ATS Radio & Computer Fair – BP Truckstop, near Rugby. £2 per car, C, CP, TS, TI on S22. Richard, M1CVE, 17 Sheriff Road, Rugby, 01788 843435.

29 JULY 2000

LITHUANIAN HAMFEST 2000 – Balsiai watermill, 2km from Pasvalys. OT 1200 local time, LB, WIN, CS, FAM. Antanas, LY1DL, +370 2 709029, or Alvydas, LY2LK, +370 5 445988.

30 JULY 2000

HORNCASTLE Amateur Radio Rally - Horncastle Youth Centre, The Old School, Cagthorpe, Horncastle, Lincs. Tony, 01507 522482 or Chris, 01526 860320.

RSGB HAMFEST – Hatfield House, Herts, CBS, SIG, TS, FM, LB, C, FAM. RSGB, 01707 659015.

6 AUGUST 2000

DERBY & DARS Mobile Rally & Computer Fair – Littleover Community School, Pasture Hill, Littleover, Derby, on the A5250 just north of A38 junction, on Derby outskirts. Martin, G3SZJ, 01332 556875 or e-mail martin@martinshardlow.demon.co.uk

11 AUGUST 2000

COCKENZIE & PORT SETON ARC 7th Annual Radio Junk Night – Cockenzie & Port Seton Community Centre, South Seton Park, Port Seton. OT 6.30pm, £1, JS, C, DF. Bob, GM4UYZ, 01875 811723, e-mail bob.gm4uyz@btinternet.com or GM4UYZ @ GB7EDN.

13 AUGUST 2000

FLIGHT REFUELLING ARS Hamfest 2000 – Flight Refuelling Sports Ground, Merley, Wimborne, Dorset. OT 10am, TS, B&B, CBS, TI on S22, CS. Keith, G1VHG, 01202 577937.

KING'S LYNN ARC 11th Great Eastern Rally – Park High, Queen Mary Road, Gaywood, King's Lynn. TI on S22, CP free, B&B, C. Derek, G0MQL, 01553 841189, Fred, 01760 440570 or www.qsl.net/g3xyz

18–20 AUGUST 2000

PRINCE GEORGE HAMFEST 2000 – Prince George, BC, Canada. CP, CS, LEC, C, WIN. www.pghamfest.dhs.org/

20 AUGUST 2000

LEEDS & DARS Twice-yearly boot sale – Yarnbury Rugby Club, Brownberrie Lane, Horsforth, Leeds. CBS, C, CP free for buyers. J A Mortimer, M1CAI, 01943 874650.

27 AUGUST 2000

MILTON KEYNES ARS 14th Rally and Car Boot Sale – Bletchley Park Museum. OT traders 7am, buyers 9am, £1, TI on S22 and SU22, C, MT (two photos needed), museum tours, GB2BP open. Dave, G3ZPA, 01908 501310 or e-mail m0bzk@bletchley.net

TORBAY ARS Mobile Rally – Churston Grammar School, Greenway Road, Churston, Torquay. OT 10am, £1, TI, CP, C, TS, WIN, MT (two photos needed), B&B. John, 01626 205514 or rally@tars.org.uk

28 AUGUST 2000

HUNTINGDONSHIRE Amateur Radio Rally – Ernulf Community School, St Neots, Cambs, near Tesco superstore on the A428. OT 10am, £1.50, C, CBS, TI on S22. David Leech, G7DIU, 01480 431333 between 9am and 9pm.

3 SEPTEMBER 2000

SOUTH BRISTOL ARC Bristol Computer & Radio Rally – Brunel Centre, Temple Meads Station, Bristol. OT 10.15am/10.30am, £1.50 (accompanied under-12s free), B&B, C. Muriel, 01275 834282.

10 SEPTEMBER 2000

LINCOLN SWC Hamfest – Lincolnshire Showground, on A15, 5 miles north of Lincoln. OT 10.30am, £2 (under-14 free), CP, TI on 2m, CS by arrangement, C, TS, B&B, FM, MT (two photos needed). John, G8VGF, 01522 525760.

TELFORD & DARS Radio Rally – RAF Museum, Cosford. OT 10am, DF, TS, RSGB, B&B, FM, SIG, MT (two photos needed), FAM, TI on S22. www.telford-rally.co.uk or Bob, 01952 770922 or bob@somrob.u-net.com or Jim, 01952 684173.

VINTAGE Technology 2000 – Blackpool. Brian 01253 508232.

22/23 SEPTEMBER 2000

LEICESTER Amateur Radio Show – Donington International Centre, Castle Donington, Leics. Geoff, 01455 823344, fax 01455 828273, or e-mail g4afj@argonet.co.uk

1 OCTOBER 2000

GREAT LUMLEY AR & ES Rally – 0191 3842803 or 030 89372772.

8 OCTOBER 2000

NORTH WAKEFIELD RC 17th Radio Rally – http:/www.nwrc.mcmail.com or 01924 824451.

13 -15 OCTOBER 2000

RSGB International HF and IOTA Convention - RSGB, 01707 659015.

15 OCTOBER 2000

BLACKWOOD & DARS Radio, Computer & Electronics Rally – Stuart, 01495 243824 or 07970 777756, fax 01495 240260 or e-mail fireham@aol.com

HORNSEA ARC Rally – Duncan, G3TLI, 01964 532588.

29 OCTOBER 2000

GALASHIELS & DARS Annual Radio and Computer Rally – Jim, 01896 850245 or e-mail jimk@gm7lun.freeserve.co.uk

4/5 NOVEMBER 2000

NORTH WALES RRC Rally 2000 – Muriel Mee, GW7NFY, 01745 591704 or Ted, GW0DSJ, 01745 336939. Club web page www.nwrrc.org.uk

12 NOVEMBER 2000

GREAT NORTHERN HAMFEST – Ernie, G4LUE, 01226 716339 or 07787 546515 or ernest.bailey1@virgin.net

MIDLAND ARS 12th Radio & Computer Rally – Peter, 0121 4431189.

19 NOVEMBER 2000

WEST MANCHESTER RC Red Rose Rally – Don, G3BSA, 01942 871620, or don@g3bsa.freeserve.co.uk

25/26 NOVEMBER 2000

LONDON Amateur Radio & Computer Show - 01923 893929.

26 NOVEMBER 2000

BISHOP AUCKLAND RAC Rally – Mark, G0GFG, 01388 745353 or Brian, G7OCK, 01388 762678.

21 JANUARY 2001

OLDHAM ARC Rally – Geoff, 01706 846143.

28 JANUARY 2001

LANCASTRIAN Rally - G0GVA, 01772 621954.

4 FEBRUARY 2001

HARWELL ARS Rally – Ann, 01235 816379

SOUTH ESSEX ARS 16th Mobile Rally – Brian, G7IIO, 01268 756331 or briang7iio@yahoo.com

11 FEBRUARY 2001

CAMBRIDGE & DARC Radio Rally & Car Boot Sale – G0GKP, 01954 200072.

20 MAY 2001

DRAYTON MANOR Radio & Computer Rally - Peter, G6DRN, 0121 4431189 (evenings).

CONGRATULATIONS

To the following whom our records show as having reached fifty years' continuous RSGB membership this month:

Mr F E A Green	G3GMY
Mr G Halse	G3GRV
Mr F Robins	G3GVM
Mr M Barnsley	G3HZM
Mr R Wheeler	G3MGW

Our apologies to Mr B J Mitchell, G3HJK, who joined the Society in March 1950 and was omitted from the March listing.

RSGB Zone A ORM

An Open Regional Meeting will be held at the East Ardsley General Working Men's Club, Main Street, East Ardsley, Wakefield, on Thursday 6 July, 7.30pm for an 8.00pm start. The meeting is open to RSGB and non-RSGB members.

In attendance at the meeting will be:
RSGB President, Don Beattie, G3OZF,
General Manager, Peter Kirby, G0TWW,
Zone A Council Member, Peter Sheppard, G4EJP,
Ordinary Council Member, Richard Horton, G3XWH,
RLO for West Yorkshire, Derek Allen, G3WYP,
plus representatives from RSGB committees.

For further details contact Ken Baker, G3SPX, tel: 01924 824451.

GB calls

These callsigns are valid for use from the date given, but the period of operation may vary from 1 – 28 days before or after the event date. Operating details are provided in an abbreviated form as follows:
T = 160m; L = 80 or 40m; H = HF bands (30 – 10m); V = 6 and / or 4m; 2 = 2m; 70 = 70cm; S = satellite and P = packet. Please send operational details of your special event station to the RadCom office at least five weeks before publication.

1 Jul GB0MUL: Mull for the Millennium. Tobermory. LH (GM0UCB)
GB2BLE: Bristol Lundy Expedition. Lundy Island. TLHV2 (G0DRX)
GB2WRN: Womens Royal Naval Service. Lincs. LH (G0RHL)
GB4FT: Fordown Tower. Portslade, E. Sussex. (G4XKF)

2 Jul GB1SS: Summerbee Schools. Bournemouth, Dorset. 2P (G7VJJ)
GB2FX: Felixstowe. Felixstowe, Suffolk. LH2 (G4YQC)
GB2SCH: St. Catherine's Hospital. Doncaster. LH2 (G4AWT)
GB4SS: Summerbee Schools. Bournemouth, Dorset. LH (G0RSN)

3 Jul GB0SGI: St George's Island. St. George's Island, Cornwall. LH2 (M0ACK)

4 Jul GB75AFS: Air Formation Signals 75yrs. Wiltshire. TLHV2P (GW4XKE)

5 Jul GB0RAF: Royal Air Force. Co. Durham. LH2 (G0NRK)

6 Jul GB2CD: Chester & Dist.. Manley, Warrington. LHV27PS (GW4IGF)

8 Jul GB0RPO: Roath Park Open Day. Roath, Cardiff. L2 (MW0CCL)
GB2RVS: Rettendon Village School. Essex. TLHV27 (G4ZPE)
GB4CW: Cowes Week. Ryde, Isle of Wight. LH2 (G0NTH)

9 Jul GB0RID: Wartime Call sign. Great Yeldham, Essex. L (G3MMA)
GB2MBS: Market Bosworth Show. Market Bosworth, Warks. TLHV27P (G4ALB)
GB2RVF: Reedham Village Fete. Reedham, Norfolk. TLH2 (G3IWC)

10 Jul GB0BNA: Beinn Na Caillich. Isle of Skye. LH (G3LWM)
GB0BNC: Beinn na Calleich. Isle of Skye. LH (G3LWM)

14 Jul GB0SEM: Sussex East Millennium. Sharpthorne, West Sussex. LH2 (G0NAR)

15 Jul GB0KAA: Kettering Asthma Appeal. Northamptonshire. TLHV27PS (M0AQP)
GB1KAA: Kettering Asthma Appeal. Northamptonshire. V27PS (G7TZZ)
GB2RBL: Royal British Legion. Burghwallis, Nr. Doncaster. LHV27 (G3UWR)

16 Jul GB0YTH: Yew Tree Heath. New Forest, Hampshire. L27 (G0WCB)
GB2FTS: Fleetwood Tram Sunday. Fleetwood, Lancs. L (G4BFH)

19 Jul GB6WAP: War And Peace. Tonbridge, Kent. 27 (M1AOB)
GB6WAP: War And Peace. Kent. TLHV27 (G7PXB)

20 Jul GB2RCC: Radio Caravan Camping. Flixton, N. Yorks. (G4EPN)

22 Jul GB2CSG: Carcroft & Skellow Gala. Carcroft, Doncaster. LH2 (G3UWR)

23 Jul GB2RRR: Rugby Radio Rally. Rugby, Warwickshire. 2 (M0ASD)

24 Jul GB75AFS: RAFARS - RSARS. (GW4XKE).

27 Jul GB2CDI: Camp Downe International. Downe, Kent. LHV27P (G4WGZ)

28 Jul GB0RAF: Royal Air Force. Hatfield, Herts. TLHV27P (G0DAM)
GB2AS: Askern Scouts. Walesby, Notts. LH2 (G3UWR)

30 Jul GB0RIP: Ripley Castle Camp. North Yorks. LH2 (G0VGB)

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NEXT DAY DELIVERY TO MOST AREAS, £10.00.

Q-TEK PENETRATOR

"We've sold 100s all over Europe"

★ 1.8 - 60MHz HF vertical ★ 15 foot high
★ No ATU or ground radials required
★ (200W PEP). ONLY **£179.95** delivery £10

SEND SAE FOR LEAFLET

Wire version now available 45ft long end fed. (1.8-60MHz) spec. as above. Price £159.95.

Q-TEK ZL SPECIALS *Delivery £9.00*

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

Q-TEK YAGIS FOR 2/4/6M + 70CM *Del £9.00*

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

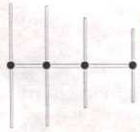
Q-TEK HB9-CV *Delivery £9.00*

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

END FED HALF WAVES

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

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



Q-TEK TRITAN

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 **£59.95** del £10

NEW HF MOBILE WHIPS (PL-259)

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

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

DELUXE G5RV

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

ONLY **£39.95**

Half size 51ft. Only **£34.95**

Carriage £6.00.

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

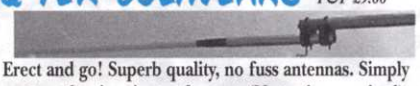
STANDARD G5RV

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

NEW Q-TEK INDUCTORS

80mtr inductors + wire to convert ½ size G5RV into full size. (Adds 8ft either end). **£22.95** P&P £2.50 (a pair).

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 (2.4m)	£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, ⅛ths, 4.5dB (1.8m)	£29.95
DB-285	144MHz, ⅝ths, 3.4dB (1.3m)	£15.95
PL-6M	50MHz ¼ wave (1.5m)	£16.95

ACCESSORIES *P&P £3.50 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

COAX BARGAINS

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

100m roll of RG-58 coax
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COPPER ANTENNA WIRE (All 50mtr rolls)

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

Q-TEK BALUNS & TRAPS

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

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

1kw Handling

RECHARGEABLE ALKALINE CELLS

Starter kit includes charger & 4 x AA cells.

£13.99 + £2.50 P&P.

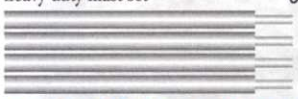
Please note that only the special cells can be recharged with this charger.

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

★ 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~~
LIMITED STOCK
£35.00
DEL £10



CLEARANCE BARGAIN

A digital multimeter with built-in transistor test socket and diode test position.
RRP £7.99.

TO CLEAR **£4.99**
P&P £2.00

FIBRE GLASS MASTS

1½" Dia	£7.50 per metre	*Delivery £10*
1¾" Dia	£9.50 per metre	*Delivery £10*
2" Dia	£10.50 per metre	*Delivery £10*

NOW WE CAN ONLY DELIVER 2.35m LENGTHS

TELESCOPIC MASTS

6 section telescopic masts. Starting at 2½ in diameter and finishing with a top section of 1¼" diameter we offer a 8 metre and a 12 metre version. Each mast is supplied with guy rings and stainless steel pins for locking the sections when erected. The closed height of the 8 metre mast is just 5 feet and the 12 metre version at 10 feet. All sections are extruded aluminium tube with a 16 gauge wall thickness.

8 mtrs **£79.95** 12 mtrs **£109.95** *Carriage £10.00.*
Weight approx 6kg Weight approx 8kg
Telescopic mast lenghts are approx.

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

MAST HEAD PULLEY

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

£8.95 + P&P £2.00

WALL BRACKETS + GUY KITS

2"	Mast base plate	£12.95 P&P £5
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U bolts (1½" or 2")		£1.10 each
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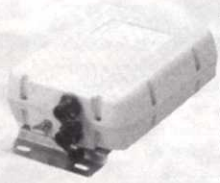

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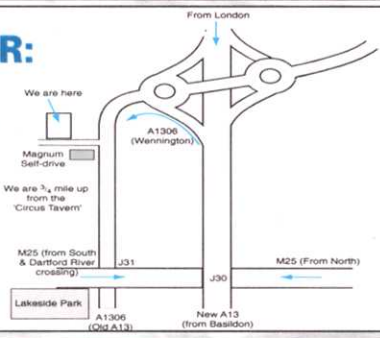

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NISSEI EP-320

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

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★ Typically up to 3Km range dependent upon terrain ★ Large, easy to read LCD screen with user-friendly icons ★ You choose who to talk to and select from 300 channel settings ★ Rugged and stylish design - choose from yellow or blue ★ One button operation - easy for adults and children to use, simply push to talk.

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CONTEST

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AN E-MAIL REFLECTOR is an e-mail address, coupled with a mailing list. When someone sends an e-mail to the address of the reflector, the message is directed to everyone on the mailing list. Many of you that take part in the larger HF contests may be familiar with the CQ contest e-mail reflector on the Internet. Certainly around the times of the big contests this group gets very busy indeed, with lots of interesting issues, claimed scores and so on being carried.

I'm pleased to be able to announce that thanks to Bill, W4AN, we are able to have our own e-mail reflector for UK contesting matters. Dave, G4BUO, put together the following mission statement for the reflector which, I think, sums up the objectives very nicely.

"The UK contest Internet e-mail reflector has been set up to enable discussion of contesting matters, HF and VHF, of interest to contesters in the UK. Subscription is not limited to UK hams, and we welcome contributions from overseas contesters relating to contesting in the British Isles.

"Most domestic contests in the UK are organised by committees of the national society, the RSGB. This Internet reflector is independent of the RSGB, though members of the HF and VHF Contest Committees are active participants in the reflector.

"To subscribe to the reflector, send a message to uk-contest-request@contesting.com with 'subscribe' as the body of the message."

Although Dave mentions HF and VHF, we would also welcome any ARDF participation as well. Someone pointed out the other day that the ARDF writeups in *RadCom* are always the most interesting. So, to the ARDF enthusiasts, please let us have your news!

We hope that you find the new e-mail reflector is fun and provides you with a forum to discuss contest matters, results, ideas along with the usual tall stories. We also hope that after some of the major events, claimed scores will be posted on the reflector, much as NFD scores have been posted on the DX Cluster in recent years.

VHF NFD RULES

LEE, G0MTN, of the Wythall Contest Group supplied the following interesting comments:

"Martin, G4XUM, has agreed that it is acceptable to have a group entering VHF NFD submitting two entries, ie one for four chosen bands, plus a single-entry band on the 'fifth' VHF NFD band. Operators will be free to operate for both 'entries', although the multi-band entry must be made up of the bands declared at registration - you can't mix and match after the event to put your best bands forward, or in case of a disaster and the loss of a main band entry.

"Our group is quite likely to be trying 6m this year. However, we felt it a shame to lose 23cm (our least productive band) as VHF NFD is one of the few times in the year when I get to operate on the band. We will be attempting to run five bands if we have enough masts, rotators and operators. It may be worthwhile pointing out to other groups, who have the resources, that they can operate on five bands if they wish, with the above proviso."

As Lee points out, there is now quite a bit of flexibility in the VHF NFD rules that allows a group to optimise their entry, depending on the bands that they can most easily cover and where they will score best. The 'Mix and Match' section is a very interesting one and I was pleased to see my old friends from the Cheltenham ARA win that section last year, from an area which was always historically quite difficult to do well from. This is mostly because of the proximity of the major centres of population.

Thanks to Pete, G4CLA, of the Parallel Lines Contest Group for responding to my plea for photographs for the column. This month's picture shows the leading stations on 2m, 70 and 23cm in VHF NFD

VHF NFD 1999 with the Parallel Lines Contest Group: l-r Mark, G4PCS, on 70cm; Bernie, G4HWA, on 23cm and Adrian, G0HAS, on 2m.

1999, all located in one tent! Who says you need lots of space to take part in NFD? Please keep those pictures coming.

432MHz CUMULATIVE, 1999

THIS YEAR THERE WAS a significant increase in the number of stations active during the cumulative series, which was reflected in a doubling of the number entering the Single Operator section. Plenty of DX was about, with stations in seven countries active, the biggest number of mainland Europe stations, 14, coming not unexpectedly from the Netherlands. Notable was the complete absence of Scottish stations, not a single one being recorded in any of the entrants' logs. 22 large locator squares featured and, on the statistics front, 27% of contacts logged were in excess of 200km and 10.7% above 300km. Most entrants agreed that conditions were best for the 2nd and 4th sessions, with the last session reported as "the worst conditions ever" or, at best, "a bit of a struggle".

Although the standard of logs was generally very good, some stations lost significant numbers of points. Details of the actual points scored, as well as the normalised results, are published on the VHFCC web page, or may be obtained from G4OUT on receipt of an SASE or e-mail.

Congratulations go to David Millard, G8NEY, who won the Single Operator section after a closely-fought tussle with second-place John Quarmby, G3XDY, who also claimed the certificate for leading station running 25W to a single antenna. In the All Other section, South Birmingham Radio Society reversed last year's result, taking the number one position ahead of keen rivals M1CRO/P.

Ian L Cornes, G4OUT

432MHz Cumulative 1999

Single Operator Normalised

Pos	Callsign	Score	Ant	Pwr	Loc	Pts 11/10	Pts 26/10	Pts 10/11	Pts 25/11	Pts 10/12	Best DX	km
1 *	G8NEY	2866	2x21	400	81VK	736	866	1000	1000	0	DC9KU	585
2 *	G3XDY	2813	28-el	25	02OB	1000	1000	761	0	813	DG1KJG	433
3 *	PA0GHB	2418	30-el	10	11WH	0	714	362	783	922	GW8ASA/P	514
4	G3MEH	2381	2x19	175	91QS	904	0	695	752	725	DG1KJG	550
5	G8HGN	2284	2x21	50	01FO	0	805	580	794	685	DG1KJG	472
6	G4JTJ	2042	21-el	80	92SD	583	837	622	498	0	DK5WO	475
6	G0GCI	2042	2x21	120	01ED	439	0	415	602	1000	DO1EP	436
8	PE1EWR	1980	2x21	13	11SL	0	749	526	705	0	G4WYJ	261
9	G0ODQ	1760	21-el	90	91NQ	0	481	604	525	631	PE1OUP	352
10	G4DEZ	1438	2x21	100	01IN	0	0	782	0	656	DL2DR	477
11	G0DVJ	1344	5-el	20	01MX	260	602	0	483	0	DD9EN	405
12	G4GFI	1306	19-el	30	91VH	455	0	134	392	458	G4APJ	296
13	G4APJ	1283	19-el	25	83UP	700	318	0	0	266	G0GCI	331
14	G7ULL	1133	16-el	20	11WH	438	135	401	203	294	G4APJ	292
15	G3FIJ	898	21-el	10	01KV	387	130	298	45	213	GW8ASA/P	305
16 *	2E1GUA	886	23-el	10	01FS	337	182	259	266	284	GW8ASA/P	271
17	G4SJH	863	11-el	25	91PI	0	201	0	179	483	G4APJ	276

All Other Normalised

1 *	G8OHM	3000	26-el	400	92AJ	1000	1000	1000	1000	1000	DG1KJG	651
2 *	M1CRO/P	2702	21-el	50	01IT	997	715	743	962	661	DG1KJG	459

* Certificate winner

AFFILIATED SOCIETIES (SSB), 2000

CONGRATULATIONS TO the Martlesham DX and Contest Group who retain the Flight Refuelling ARS Trophy as the winning team in this year's event. Andy Cook, G4PIQ, takes the RSGB Lichfield Trophy as the top individual station, with his score of 2877 points. Martyn Phillips, G3RFX, is the highest-placed 100W station coming 31st overall.

Activity was slightly down compared with last year, being reflected in lower overall scores from of the leading stations this year, but many entrants reported having a busy time. "Survival of the fittest!" - G3YAJ; "Bands seemed even busier and noisier than usual" - G0DVJ; "Good competitive contest" - G0BMS. While stations in the north and west found it slow during the first hour, stations in the south and east were suffering from European QRM towards the end and several commented that they had suffered from deliberate jamming. Several M5 callsigns were present in the logs, but none amongst the entrants. Hopefully there will be some next year.

Justin Snow, G4TSH

Affiliated Societies (SSB) 2000

Affiliated Societies Section

Pos	Team				Score
1	Martlesham DX & CG - A	G4PIQ	G4MRS	G4BWP	8363
2	Lichfield ARS - A	G3NLY	G3VHB	G3NAS	8117
3	Mimram CG - A	G0SAH	M0ABC	G4KZD	6608
4	Chiltern DX Club - A	G4JVG/P	G3RTE	G0WAT/P	6574
5	de Montfort University ARS - A	G3SDC	G3RIR	G4EOF	6478
6	Blackwood & DARS - A	GW4BLE	GW0ARK	GW0RYT	6272
7	Addiscombe ARC - A	G3SJX	G3UFY	G3JJZ	6206
8	Dragon ARC - A	GW4VEQ	GW0GEI	GW0MOI	5978
9	Newbury & DARS - A	G3RVM	G3SVD	G0ORH	5847
10	Bristol CG - A	M0AXF	G3RFX	G4WBV	5792
11	Stroud RS - A	G0MZK/P	G4VZR	G4SRS/P	5722
12	Horsham - A	G4LRP	G3WZT	G3ZBU	5415
13	Echelford ARS - A	G4TSH/P	G4WPD	G0VDZ	5285
14	Cheltenham ARA - A	G4PDQ	G3TA	G4ERP	5180
15	Chesham & DARS - A	G3RXQ	G0ODQ	G3MEH	4877
16	Harwell ARS - A	G0AOZ	G4AZN	G0LUQ	4575
17	Swansea ARS - A	GW4HAT	GW4HSH	GW4BNJ	4495
18	Torbay ARS - A	G0IVZ	G3LHJ	G0UWS/P	4420
19	Leicester RS - A	G5UM	G4SJX	G3HYH	4183
20	Grimsby SRS - A	G3RSD	G4EBK	G0IIQ	4123
21	Mid Beds CA - A	G5LP	G0KRL		4068
22	de Montfort University ARS - B	G3ORY	G4CZB		4032
23	Edgware & DRS - A	G4IUZ	G0IGP	G5HY/P	4005
24	Wythall RC - A	G0MTN	G3YCH	G0EYO	3701
25	Havering & DARC - A	G3TPJ	G3JSR	G3OBX	3626
26	Horndean & DARC - A	G3LIK	G0UHM	G4FBS	3518
27	RNARS Colchester - A	G3YAJ	G3YEC	G0DID	3473
28	Itchen Valley ARC - A	G0VNI	G3ABA	M0ACL	3351
29	Cheltenham ARA - B	G3LVP	G3ZKN	G3NKS	3203
30	Clifton ARS - A	G0WLY	G3GHN	G0DCG	3048
31	Southdown ARS - A	G3SVL	G3DQY	G0UAI	3007
32	Newbury & DARS - B	G3NVO	G4TPH	G0PUB	2957
33	Harwich ARIG - A	G4YJQ	G4FTP	G3YYZ	2952
34	Taunton & DARC	G4HTD	G3WNI		2948
35	Cockenzie & Port Seton ARC - A	MM0BQI/P	GM0CLN	GM0NTL	2902
36	Echelford ARS - B	G3KKQ	G0JSH	G3WWT	2869
37	Sutton & Cheam RS - A	G3WHK	G3OLX		2756
38	RAFARS Cosford - A	G3VAO	G8FC		2682
39	Stratford-upon-Avon & DRS - A	G0REP	G0OGN	G3MXH	2664
40	Isle Of Wight RS - A	G3SKY	M0AXD	G0WVD	2625
41	RNARS Portsmouth - A	G3CRS	G0FOD	G3OZY	2568
42	Reading & DARC - A	G3ULT/P	G0LHZ		2548
43	Lichfield ARS - B	G3SJJ			2442
44	Rolls Royce ARC - A	G3RR	G4ILG	G0TOU	2426
45	Dragon ARC - B	GW3PRL	MW0BXV	GW4DRR	2421
46	Farnborough & DARS - A	G4UEL	G0VYR	M0BJF	2251
47	Harwell ARS - B	G0THY	M0ACU	M0BRE	2031
48	Havering & DARC - B	G3TTB	G0BOF	G0BSF	2024
49	RAFARS South Yorks - A	G3SET	G0RAF		1927
50	Stevenage & DARS - A	G4DDX	G2BKZ		1906
51	Worthing & DARC - A	G3LQI	G3NDJ	G4KIT	1884
52	Crawley ARC - A	G6RC			1881
53	Mimram CG - B	G4WSL	G3YXX		1755
54	King's Lynn ARC - A	G0BMS	G3XYZ		1667
55	Stockport RS - A	M0CGF	M0BEX		1576
56	Scunthorpe Steel ARS - A	G4FUH	G4OGB		1531
57	Gloucester AR & ES - A	G3MA	G4HBV		1457
58	Southgate ARC - A	G0MEE	G3GUL	G0FQT	1427
59	South Manchester RC - A	G0LZL			1423
60	Martlesham DX & CG - B	G4CXT			1341
61	West Kent ARS - A	G0GCI	G3GWD		1334
62	Cheltenham ARA - C	G3SZS	G0UPU		1307
63	Worthing & DARC - B	G0WMG	G0RCB	G0UVA	1294
64	Clifton ARS - B	G0UXM	G4FAA		1171
65	Farnborough & DARS - B	G3KND	G0YYY		1137
66	Torbay ARS - B	G3BIT	G4VTO		984
67	Grimsby SRS - B	M0AJT			877
68	Horsham - B	G4TPO			871
69	Wythall RC - B	M0COP			820
70	Colchester Radio Amateurs - A	G3FIJ			814
71	RAFARS Cottesmore - A	G0TQJ			757
72	Echelford ARS - C	G3TDR			705
73	Cockenzie & Port Seton ARC - B	MM0CCC/P			691
74	Horndean & DARC - B	M0CAA			641
75	Harwich ARIG - B	G0DVJ			630
76	Leicester RS - B	G3WQL			484
77	Prudential ARS - A	GW0PRU/P			427
78	Edgware & DRS - B	G0STR			410
79	Southdown ARS - B	G0JHK			390

Affiliated Societies (SSB) 2000

Individual Section

Pos	Callsign	Score	Equipt
1	G4PIQ	2877	-
2	G4MRS	2811	-
3	G3NLY	2778	-
4	G3VHB	2765	4C17
5	G4TSH/P	2700	4C13
6	G4BWP	2675	-
7	G0SAH	2640	-
8	G3NAS	2574	-
9	GW4BLE	2467	4C
10	GW4VEQ	2462	4C-2
11	G5LP	2448	-
12	G3SJJ	2442	-
13	M0AXF	2414	4C16
14	G3SJX	2314	4C-2
15	G4JVG/P	2307	4C16
16	G3SDC	2254	4C
17	G0IVZ	2240	4C17
18	G4IUZ	2191	4C-3
19	G3RTE	2180	4C16
20	G3UFY	2178	4C-3
21	G4PDQ	2177	4C16
22	G4HTD	2138	4C14
23	G4LRP	2131	4C
24	G0MZK/P	2120	4C
25	M0ABC	2114	-
26	G3RIR	2112	4C
26	G4EOF	2112	4C
28	G4VZR	2104	4C
29	G0WAT/P	2087	4C16
30	G3ORY	2054	4C-5
31	G3RFX	2037	3C15
32	G3RVM	2024	4C14
33	G3SVD	2000	4C16
34	GW0GEI	1998	4C-3
35	G4CZB	1978	4C2
36	GW4HAT	1977	4C
37	GW0ARK	1971	4C
38	G0AOZ	1947	3W
39	G3RXQ	1910	3C
40	G3WHK	1905	4C12
41	G3WZT	1896	-
42	G6RC	1881	-
43	GW4HSH	1874	4W-8
44	G4KZD	1854	-
45	GW0RYT	1834	4C
46	G0ORH	1823	4C16
47	G3SVL	1787	4W13
48	G5UM	1748	3W
49	G4AZN	1741	3C
50	G3ULT/P	1718	4C
51	G3JJZ	1714	3W-1
52	G0MTN	1707	3C13
53	G3RSD	1695	3C-3
53	G3TA	1695	3C15
55	G0ODQ	1630	3C
56	G0KRL	1620	4C12
57	G3VAO	1618	3C
58	G3NVO	1530	4C15
59	GW0MOI	1518	4C
60	G3TPJ	1514	4W
61	G3YAJ	1499	3C-3
62	G4SRS/P	1498	3C
63	G3LIK	1494	4C13
64	G3RR	1472	3W
65	G4EBK	1444	3C13
65	G4WPD	1444	4C13
67	G0LZL	1423	3C14
68	G3CRS	1411	3C
69	G3ZBU	1388	3W15
70	G4CXT	1341	3C13
70	G4WBV	1341	3C16
72	G3MEH	1337	3C
73	G4SJX	1311	3C13
74	G4ERP	1308	3C12
75	G0VNI	1307	3C
76	G4YJQ	1304	3W12
77	G0IGP	1287	3C-2
78	G0UHM	1267	4W1
79	G3ABA	1237	3W
80	G4WSL	1234	-
81	G0VDZ	1141	3C13
82	G0REP	1137	3C12
83	MM0BQI/P	1128	3C12
84	G3KKQ	1125	3Q13
85	G3HYH	1124	3C
86	G3LVP	1111	3W12
87	G4DDX	1105	3C-2
88	G0WLY	1101	4C
89	G3SKY	1094	3W17
90	G4TPH	1077	3C12
91	G0GCI	1067	3C-1
92	G3JSR	1065	3W-7
93	G8FC	1064	3C
94	M0CGF	1056	3C
95	G3ZKN	1048	4W16
96	G3OBX	1047	3C
97	G3NKS	1044	4C13
98	G3YCH	1034	-
99	G3LHJ	1030	3W13
100	G3GHN	1007	3C13
101	G3SET	1000	3C-3
101	GM0CLN	1000	3C11
103	G3YEC	994	4C
104	G3SZS	987	3W12
105	G0IIQ	984	3C12
106	G0BMS	980	3W
106	G0DID	980	3C
108	G0EYO	960	3C
109	G0UWS/P	950	3C12
110	G0DCG	940	3W
110	G0JSH	940	3W
110	G0OGN	940	3C12
113	G0RAF	927	3C
114	GW3PRL	921	3C12
115	G0LUQ	887	3W12
116	M0AJT	877	3C12
117	G3TTB	874	3W
118	G4TPO	871	3W
119	G4FUH	864	3C13
120	G3OLX	851	3W12
120	G4FTP	851	3C14
122	G4UEL	840	3C
122	MW0BXV	840	3W
124	M0AXD	837	3C12
125	G0LHZ	830	3C
126	G0MEE	820	3C
126	M0COP	820	3W
128	G3FIJ	814	2C
129	G0VYR	810	3C-3
129	G3WNI	810	-
131	M0ACL	807	3W
132	G3WWT	804	3G
133	G2BKZ	801	3W
134	G3YYZ	797	3C14
135	G0FOD	780	3C
136	GM0NTL	774	4C
137	G0THY	770	3W13
138	G3MA	767	3C
139	G0TQJ	757	3C
139	G4FBS	757	3C1
141	G0UXM	753	3C
142	G3DQY	750	3W
142	M0ACU	750	3C
144	G3TDR	705	3W
145	G0WVD	694	3C12
146	MM0CCC/P	691	3G
147	G4HBV	690	3W
148	G3XYZ	687	3W
149	G3LQI	677	3W
150	G4OGB	667	3C13
151	G0BOF	660	3C
151	GW4DRR	660	3C13
153	GW4BNJ	644	3C-3
154	M0CAA	641	2W
155	G3NDJ	637	3C
156	G0DVJ	630	3C14
157	M0BJF	601	3C
158	G3MXH	587	4C14
159	G3KND	580	3W
160	G4KIT	570	3W
161	G0YYY	557	3W
162	G4ILG	537	3C
163	G5HY/P	527	3C-2
164	G3BIT	524	3C12
165	G3YXX	521	-
166	M0BEX	520	3C
167	M0BRE	511	3W
168	G0WMG	507	3W
169	G0BSF	490	4G
170	G3WQL	484	3W
171	G0UAI	470	3C
172	G4VTO	460	3C12
173	G0RCB	447	3W
174	GW0PRU/P	427	3C
175	G4FAA	418	2C
176	G0TOU	417	3C
177	G0STR	410	3C-2
178	G0JHK	390	3C
179	G3OZY	377	3C-2
180	G0PUB	350	3C12
181	G0UVA	340	3C
182	G0UPU	320	3C12
183	G3GUL	307	3C
184	G0FQT	300	3C
185	G3GWD	267	3C

Checklog: GW3KDB

CHRISTMAS CUMULATIVE, 1999

THESE ARE ALWAYS popular contests and, in spite of lousy conditions, the last contests before the dawn of the new millennium were no exception. Gary Hyde, G7LXK, easily walked away with the overall Single Operator Fixed Section for the second year running, by putting in a performance across all four bands, but with particular emphasis on winning two of them. G3IKR (using a 30-year-old antenna), G7RAU and G3NKS all put very strong single-band entries together, placing them high in the table, but you need to be on more than one band to win!

The Open Section was not well supported, but congratulations to Alex Wilson, 2E1GZY/P, for putting in a great performance on 2m. It's really good to see several of the Novice stations taking good advantage of their new allocations and putting in such competitive performances.

Top honours in the 25W and one antenna category go to Ken Punshon, G4APJ, which also gave him a particularly impressive second place overall. That regular, Frank Laanen, PE1EWR, takes the overseas certificate.

Andy Cook, G4PIQ

Christmas Cumulative 1999

Single Operator Fixed

		50MHz		70MHz		144MHz		432MHz		
Pos	**Callsign**	**QSO**	**Score**	**QSO**	**Score**	**QSO**	**Score**	**QSO**	**Score**	**Total**
1 *	G7LXK	44	3000	19	253	76	335	21	3000	6588
2 *	G4APJ	20	990	0	0	79	265	14	2345	3599
3	G3IKR	0	0	76	3000	0	0	0	0	3000
3	G7RAU	0	0	0	0	295	3000	0	0	3000
5	G0DVJ	7	770	6	54	110	560	10	1541	2925
6	G3NKS	0	0	69	2722	0	0	0	0	2722
7	G8ZRE	35	2041	0	0	109	438	0	0	2479
8	G4ZTR	0	0	0	0	197	1864	0	0	1864
9	G0PZO	21	306	0	0	49	92	10	1015	1412
10	G0TIB	0	0	0	0	49	134	8	1211	1345
11	2E1GUA	0	0	0	0	41	85	5	1044	1129
12	G7ULL	0	0	0	0	194	1076	0	0	1076
13	G0JJL	0	0	35	1004	0	0	0	0	1004
14	G0GJV	2	125	0	0	117	658	0	0	783
15	G4IVH	0	0	0	0	90	653	0	0	653
16	G4LXU	0	0	0	0	37	47	10	573	620
17	G1TWS	0	0	0	0	118	380	0	0	380
18	G0OKD	0	0	0	0	69	230	0	0	230
19	PE1EWR	1	31	0	0	42	75	1	111	217
20	GM4UYZ	0	0	18	196	0	0	0	0	196
21	2E0ATF	0	0	0	0	68	140	0	0	140
22	M0CLO	0	0	0	0	63	139	0	0	139
23	ON1DJC	0	0	0	0	41	78	0	0	78
	All Others									
1 *	2E1GZY/P	0	0	0	0	105	3000	0	0	3000
2 *	G4RFR	0	0	30	2000	0	0	0	0	2000

* Certificate winner

PE0MAR

PETE, G4CLA, ALSO told me the very sad news that Mar, PE0MAR, passed away recently, having been suffering from a serious illness since the beginning of the year. Those of you familiar with the VHF contest scene will know Mar's call well, from the excellent signals that he put out from the Dutch coast, often from a site located in a lighthouse! Meeting Mar face-to-face was also a pleasure, and I remember getting together with him in a Gloucestershire pub several years ago and swapping contesters' tales. We shall all miss him greatly.

THE IOTA CONTEST

IOTA ENTHUSIASTS will need no reminding that the IOTA contest takes place at the end of the month on 29/30 July. Those of you who enjoy working IOTA stations more casually may enjoy this one, which offers a great opportunity to work stations out of the IOTA net environment. The contest features both CW and SSB, so there is something for everyone over the 24-hour period. Some of the rarer island groups can generate massive pile-ups in this contest, even with a fairly minimal station setup. So, if you're near an island – and there seem to be lots of them – have some fun!

QSY - THIS IS *MY* FREQUENCY!

HOW OFTEN HAVE you heard those words from a contest station, when another station has just come up on the frequency and starts calling CQ? Certainly, when you're tired, this can be seriously annoying and it is easy to get quite wound up about it. I am sure we have all heard the instances where this has been the case. Of course, it is very easy for this to happen. Perhaps there is a sudden change in conditions, someone changes a beam direction, or someone simply calls CQ without listening on the frequency! It would be nice to think that this would never happen, but I have certainly noticed a greater incidence of

The GU8D team in the IOTA Contest 1999.

'larger' contest stations coming onto frequency and trying to muscle people out. I have a very good memory for people who try to do that to me! I find they are less likely to get a casual call when I am tuning around at home during a contest.

When a clash happens, you have to analyse what to do about it. The first step is always to tell the other station *calmly and politely* that the frequency is in use. Very often, you will get an apology and a clear frequency, but what if you don't? It could be that the other station can't hear you. Do you stop and have a frequency fight? Think carefully before you do. You will almost certainly kill your run rate, because it is pretty difficult to maintain a good rate and an accurate log with someone calling CQ and potentially working people on the same frequency. If the band is not too busy, it may well be better to slide off and find a clear frequency. In some of the larger HF events, this can be more difficult, of course, and you need to stand up for yourself a little more. In any event, think carefully about your rate, which station is likely to be loudest, where you are beaming and, finally, about your blood pressure!

Naturally, no reader of this column would ever call CQ without listening on a frequency! And when you ask, do listen for a reply. On CW, think about how you ask if a frequency is in use. 'QRL?' is ideal. Some people have a tendency to send a question mark, which is very non-specific. It might mean 'QRL?', it might be 'QRZ?'. Sometimes it just seems to mean 'Oi'! So if you use the question mark method, don't be surprised when someone comes up moments later and tells you that the frequency is busy.

The message here is to think about how you react to certain situations in a contest. This will help not only to optimise your score, but will help you enjoy the contest as well.

CONTEST CALENDAR

HF Contests

Date	Time	Mode	Contest
1 July	*0000-2359*	*SSB*	*RAC Canada Day Contest*
2 July	0900-1200 and 1300-1600	CW	RSGB Low Power
8-9 July	*1200-1200*	*CW/SSB*	*IARU HF World Championship*
8-9 July	*1200-1200*	*CW/SSB*	*World Radiosport Team Championship*
15-16 July	*0001-2359*	*CW*	*Seanet WW DX Contest*
15-16 July	*1800-0600*	*RTTY*	*North American QSO Party*
29-30 July	*0000-1400*	*RTTY*	*Russian WW Contest*
29-30 July	1200-1200	CW/SSB	RSGB IOTA Contest

VHF Contests

Date	Time	Mode	Contest
1-2 July	1400-1400	CW/SSB	RSGB VHF NFD
2 July	1100-1500	CW/SSB	RSGB 144MHz Backpackers #3
9 July	1100-1500	CW/SSB	RSGB 50MHz Backpackers #2
15 July	1400-2300	CW/SSB	RSGB 144MHz Low Power
16 July	0800-1400	CW/SSB	RSGB 432MHz Low Power
30 July	1100-1500	CW/SSB	RSGB 144MHz Backpackers #4

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.

Helplines

RadCom FOR MEMBERS

● Martyn, G3UKV, wonders if anyone has re-written (or patched) part of the **G3WGV contest logger software** to make it properly Y2K compliant, since there appears to be no way to configure the correct date into its set-up file. G3UKV, QTHR. Tel: 01952 255416. E-mail: ukv@globalnet.co.uk

● Ivor, G3RYK, is looking for details of the control codes for computer control of the **Lowe HF-150** receiver. G3RYK, QTHR. Tel: 01279 434040. E-mail: igr@ampmuk.freeserve.co.uk

● Peter, G3HQT, is looking for a copy of the workshop manual for the **Kenwood TS-930S**. G3HQT, QTHR. Tel: 01489 570735. E-mail: pjball@beeb.net

● Douglas, G3KPO, is looking for a copy of the circuit diagram of the A**vantic SPA11** stereo amplifier. G3KPO, QTHR. Tel: 01983 567665.

● Michael, G8MOB, is looking for information on a French multimeter made by **Brion-Leroux Cie**, entitled 'Boite de Controle Engins Mobiles'. It was made in about 1940. Also, information on the **Barr & Stroud EF5-04** low-pass / high-pass audio filter, or the present whereabouts of B&S. G8MOB, QTHR. Tel: 020 8224 8606.

● Stephen, G0PQB, would like to obtain a photocopy of the manual for the **Yaesu FT-709R**. Photocopying and postage costs covered. G0PQB, QTHR.

● Vic, G8QM, would like to contact other users of the **Sangean ATS-909** portable receiver, to compare performance, particularly on the amateur bands, and to discuss the merits of the various functions. G8QM, QTHR. Tel: 0191 488 1070.

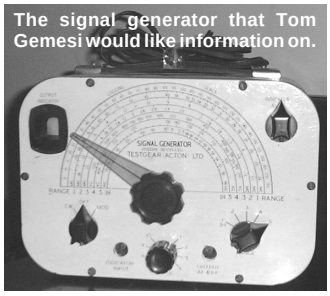
● Tom Gemesi would like a copy of the instructions and circuit diagram for the valve-based signal generator pictured right, made by **Testgear (Acton) Ltd**. E-mail: acjz95@dial.pipex.com

● Ron, G2AQJ, is looking for the circuit and parts list for the **CDE AR33** antenna rotator and control unit. G2AQJ, QTHR. Tel: 01722 325929. E-mail: ron@collins99.freeserve.co.uk

● John, VK3ZK, would like to know if there is any shareware or freeware available for computer control of the **Yaesu FT-747GX**. E-mail: johnzk@primus.com.au

● George, GM3NVU, would like to know where he can obtain a **step switch motor** with switch, for remote change-over of antennas. GM3NVU, QTHR. E-mail: george@gm3nvu.freeserve.co.uk

The signal generator that Tom Gemesi would like information on.



● Mick, M0AOH, is looking for a copy of the hex dump of the E-PROM that was used in the 1984 *RadCom* project '**The Morseman**'. M0AOH, QTHR. Tel: 01228 526436.

● Ken, G3XSJ, is looking for a handbook, circuit and sales brochure for the **Labgear LG-300** transmitter. All costs covered. G3XSJ, QTHR. Tel: 01453 845013. E-mail: mail@ken-brooks.fsnet.co.uk

● Clive, M0BGA, requires a copy of the circuit diagram and manual, plus any information possible about using the **Marconi Marine Kestrel Mk3** transmitter on CW or AM. M0BGA, *not* QTHR. Tel: 01637 875848.

● David, G8IDL, would like to know how to connect two standard **fax machines via a duplex 2m/70cm link.** Can anyone help with ideas and recommendations for interface units? G8IDL, QTHR. Tel: 01638 507230. E-mail: dadsmith@iee.org

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

HF

DON FIELD, G3XTT
105 Shiplake Bottom, Peppard Common, Henley on Thames, RG9 5HJ.
e-mail: hf.radcom@rsgb.org.uk

AS I anticipated last month, Bhutan has indeed been activated in a big way. The big operation I mentioned duly appeared under the callsign A52A, and UK stations were able to work them on all bands 80 through 10 metres. The group amassed over 80,000 contacts, which is quite amazing given that they were restricted to barefoot operation. One of the benefits of this turned out to be that if you could hear them, you could almost certainly work them, especially towards the end of the expedition as the pile-ups waned. One evening I noted a PacketCluster spot from a very excited GM station who had just worked A52A on 17m using 100 watts to an indoor dipole. Less than half an hour later a second spot recorded that same GM station had just made it on 20 metres too! Jim Smith signed A52JS, and continued his operations after A52A had closed down with over 12,000 QSOs at the time of writing. Other groups are promising major operations later in the year. Even better, A52A QSLs were available at Dayton, so many amateurs already have their cards (at one stage the queues were over an hour long, such was the enthusiasm to have this rare one confirmed).

VK9WI also duly appeared from Willis Island, and started well, but suffered an unexpected setback when Peter, VK4APG, who is also the expedition's QSL manager broke his leg. He had to be helicoptered back to Cairns to be operated upon. The team then lost a second operator, when it became necessary to keep someone permanently aboard the catamaran to ensure it didn't break loose in the high winds. Yet again, these incidents are a reminder that life at the sharp end of DXpeditions isn't necessarily a bed of roses. Despite the setbacks, the group made well over 15,000 QSOs, and is already talking about organising operations from the other VK9 islands.

Last month I also mentioned the 7O1YGF operation by German amateurs. News on this operation is that the expected paperwork failed to materialise, so there is some question as to whether the operation will be accepted for DXCC credit. Hopefully the matter will be resolved shortly.

The late Ron, ZL2TT, in the shack of Harry, G3MCN.

DAYTON 2000

AT THIS YEAR'S Dayton Hamvention Martti Laine, OH2BH, was named Amateur of the Year. Martti is, of course, well-known to all HF operators for his many DXpeditions, contest operations, and other HF-related activities. His most recent efforts were to get the Chesterfield Islands recognised as a new DXCC entity and to participate in the TX0CI operation, which then put that new one on the air. Jukka Heikinheimo, OH2BR, was named DXpeditioner of the Year for his VP6BR Pitcairn Island operation. The FO0AAA Clipperton Island DXpedition was named DXpedition of the Year. Tedd Mirgliotta, KB8NW, was recognised for outstanding service to the DX community, for his work in publishing the OPDX Bulletin every week on the Internet. Congratulations are due to all the above because, without the sort of efforts they put into the hobby, our HF activities would be much less fun.

DX NEWS

GM0CLN and GM0BWU will be travelling the Western Isles of Scotland during July, and hope to activate a number of islands for IOTA and the Scottish Islands awards, signing GM0CLN/P. They will start on Skye on the evening of 22 July, and end by joining the GM2T team (see 'IOTA Contest') on 29/30 July, taking in South Uist, Benbecula, Berneray, Baleshare, Grimsay, Lewis, Great Bernera and Scalpay en route. This is primarily a holiday, so no definite times can be given. However, they will make every effort to be active on, or near, the usual IOTA/IOSA frequencies. Equipment should be an IC706 with wire antennas.

The Dengie Hundred Amateur Radio Society is mounting a DXpedition to the Isle of Skye during the week 22-29 July. They will sign GS0UTT/P and will activate a rare WAB square as well as the island. QSLs will be sent out automatically for all contacts.

The Modum Group of NRRL will take a group of amateurs to Svalbard (JW) between 6-13 July, and operations (JW7M, QSL via LA7M) will take place from Barentsburg, Pyramiden and Ice Lake.

Dennis Motschenbacher, K7BV, will operate as SV9/K7BV from Crete between 27 June and 3 July, all bands SSB and CW. QSL via KU9C.

Steve, SO5ASL (G4ASL) writes that he was active recently for the first time from Prague under his Czech callsign, OK8SL, using an own-design 40m QRP CW transceiver, 1.5W and end-fed/counterpoise antenna system. Although now back in Poland, he plans to revisit Prague periodically to activate OK8SL. He says that obtaining the licence from the Czech Telecommunications Office was straightforward. He was able to choose his callsign during a personal visit, be on the air an hour later, and the printed licence followed in the post in 7 days. The cost: 100 CZK (about £1.75). As Steve says, operating with a CEPT licence is possible for up to 3 months, but his stay was longer. QSLs for OK8SL should go via the bureau to G4ASL.

28MHz COUNTRIES TABLE 2000

Call	CW	SSB	Mixed
G4DUW	134	199	220
M0BZQ	20	208	219
M0BIB	10	182	192
G0VHI		180	180
G0NXX	129	0	129
G0TSM	32	110	124
G3SXW	124	0	124
G4MUW			116
G3MDH	0	108	108
G0CAS	1	102	103
M0CTQ		103	103
GM4CHX	0	93	93
G4UCJ	82	0	82
M0CAL	0	74	74
GI4XSF			70
G0CGV	56	31	66
G4IDL	65	0	65
MM0BQI			50
GU0SUP			42 †
G4YWY/M			41
GM0FNE			36 †
M0CNP	0	36	36
GW0VSW	27	11	33
G0URR			31 †
G0KDS/M	0	30	30
G4FVK			27
M0ASJ			27
G0NCS			21 ‡
M5AFA			17
GM4OBK	15		15

† RTTY
‡ PSK

WARC BANDS TABLE 2000

Call	10	18	24	Total
G0NXX	125	114	128	367
G3SXW	118	114	100	332
G4UCJ	72	73	70	215
G4KHM	77	92	27	196
G4AFI	24	39	57	120
G0VLC	24	37	21	82
GW0VSW	21	20	40	81
GM4OBK	20	18	24	62
MM0BQI	18	17	19	54
M0CAL	0	21	31	52
2U0ARE	51	0	0	51
G4YWY/M	0	19	29	48
G4ERP/M	0	40	0	40
G0TSM	10	10	17	37
M0CNP	1	15	11	27
G4FVK	0	7	15	22
M5AFA	0	7	11	18

Five operators from Radio Club Vologda plan to be active from three IOTA groups for ten days in the second half of July, including an entry in the IOTA Contest. They are expected to use UF1P from Dolgy Island (EU-086), RF1P from Gulyayevskiye Island (EU-102) and UA1QV/1 from Kolguyev Island (EU-085). QSL via UA1RJ.

Twelve operators from the Royal Omani Amateur Radio Society will be active as 5I3A and 5I3B from the Tanga Region Island Group (AF-new) of Tanzania on all bands and modes between 1-10 July.

A German team consisting of Jo, DF6VI; Dieter, DJ9ON; Mark, DL1IAN; Jack, DL1YFF; Tom, DL1QW; and Tom, DL4OCM plans to operate from Lesotho between 3-22 July. The intention is to have three stations active simultaneously, covering all bands and modes, and will sign 7P8AA. QSL via DL7VRO, either via the bureau or direct. A web page can be found at www.qsl.net/7p8dxpedition2000/

Rodger Collins, G0TLC, has written to say he was in Baghdad recently, and met with one of the original members of YI1BGD, Dhiya N Sayah (YI1DZ). Rodger says that activity from YI1BGD has been declining in recent years, but that the licence is now being transferred to the National Union of Iraqi Students and a new club station is being set up on the other side of Baghdad. Although equipment is limited, the station will be active as much as possible. Dhiya had asked for assistance in obtaining GEOS version 1.2 for the Commodore 64, and service manuals for a Swan 350D and Atlas 350XL. These may well have been obtained by now, but if you can help please contact Cliff, G0MMI (QTHR).

A group of Russian amateurs plans to activate Begichev (AS-new) and Petra (AS-063) islands as UA4FWD/0 from 9-17 July and 20-26 July respectively. QSL via UA4FRV.

Robin A45WA (also G3ZYE) writes that he is looking for the UK most days around 28430kHz at 1200 UTC. He has already made about 1,000 UK QSOs. QSL to his UK call.

A large group of Japanese Amateur Radio operators will be active as TX8JNN from New Caledonia between 29 June and 7 July. They will be on all HF bands and modes.

The Kingman-Palmyra DX Group will activate both Kingman Reef (KH5K) and Palmyra Atoll (KH5) during the course of the year. Palmyra Atoll is currently being sold, and a series of operations will be co-ordinated with all parties to the sale transaction. In October it is hoped to mount a full-scale all-band expedition to Kingman Reef. However Chuck, N4BQW, has already been active from Palmyra, and also appeared unexpectedly for a brief operation from Kingman Reef in mid-May. QSL Chuck's operations via K4TSJ.

Gerard, PA3AXU will be active (SSB, CW, RTTY and PSK) between 3-7 July from Rarotonga (OC-013), South Cook Islands, and from 8-15 July from Penrhyn (OC-082), North Cook Islands. He expects to use the call ZK1AXU from both locations. There is a web site at www.qsl.net/pa3axu/zk.htm

An American team consisting of Duane, WV2B; Rick, AI5P;

HF-Layer Propagation Predictions for July 2000

	7.0MHz	10.1MHz	14.0MHz	18.1MHz	21.0MHz	24.9MHz	28.0MHz
Time (UTC)	000001111122 024680246802	000001111122 024680246802	000001111122 024680246802	000001111122 024680246802	000001111122 024680246802	000001111122 024680246802	000001111122 024680246802
*** Europe							
Moscow	7764.....67	888655555678	888776666788	87777888	1.....78..	.....11...	...1.....
*** Asia							
Yakutsk	21.....2	343...1.1.22	5443.111.24.	...43332..5.	..1..4.4....	.....1..	....
Tokyo	.....1.	....	221...1...1.	.1.11...2344	...1.11.3...	....	....
Singapore	11	....	11.....11	.....1...122	1122	..1.....1..	....
Hyderabad	2.....1	3.....1.2	442.....44	4..11...3344	..12211243 44	..1.1.....1	...11.....
Tel Aviv	664.....1.46	66521.1.366	6.64444445 66	.....54.5556	....	....	....
*** Oceania							
Perth	1	1.....1..	1.....	3.....	.....1....	....1.....	1..1.....
Sydney	.....	.....11.	.....1.	1.....1....	1..11.....	...1.....1	....
Wellington	.....	.....1..	....1.....	.....1.1.	....	....	...1.....
Honolulu	..1.....	....	....	1.....12	....	....	....1.1.1...
W. Samoa	.....	....	....	....	.....1....	.....1.....	....1.1....
*** Africa							
Mauritius	1.....1..	22.....1	3.....34	1.1.....123.	...121..233.	...2321123.4	....1.....1.
Johannesburg	.1.....	2.....1	.1.....	.....23.	.....1111...	.....222.4..	.....3...
Ibadan	444.....34	4552.....45	6664111..366	665544434566	65.544444566	.....55.	....
Nairobi	32.....23	542.....45	5441.....345	44.32212 3344	4...34333344	.....44...5.	.....5.
Canary Isles	7762 1...157	8876433 44577	8887666 65778	8888777778.8	88..87778888	.....8..	....
*** S. America							
Buenos Aires	11.....	222.1.....2	3331.....1.3	4443.....23	44.3.....133	234	....
Rio de Janeiro	221.....2	44311.....3	4443.1...44	4444..1.1144	555..2222345	55....333455	.....11114..
Lima	.1.1.....	121.1.....	2221.1...11	33.21.1...2	3.....112	....	.....11...
Caracas	333.....	444.....13	4454..1..134	55.442222345	5....3333445	....1.....	1.....1....
*** N. America							
Guatemala	.211.....	444.....1	4443.....13	.5....112244	54..1.333344	.....1.....	....
New Orleans	.211.....	..4.....1	5443.....123	44....212234	...1.....	.....11..	....
Washington	332.....	444..1...1.	545411..2354	55....344455	55....4.4555	....	....
Quebec	4441.....14	4552.....144	555..1133455	55....444555	.....1...11	....	....
Anchorage	1.....	333.1.....12	4442....1223	4.....	...1.....	.....11.	....
Vancouver	1.....	232.....2	3221.....122	2.....	.....1.....	....	....
San Francisco	...1.....	..2..11.....	3331...11123	23.1..11.243	3.....1.	....	....

Key: Each number in the table represents an 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 May 2000 issued by the Sunspot Data Centre, Brussels, was 120.8. The maximum daily sunspot number was 205 on 15 May and the minimum was 50 on 6 May. The predicted smoothed sunspot numbers for July, August and September are respectively: (SIDC classical method – Waldmeier's standard) 104, 102, 100 (combined method) 120, 122, 124.

Henry, KE1AC; and Rob, WA4RX will operate from St Paul Island (CY9) between 6-10 July. A web site has been set up at www.geocities.com/Heartland/Pines/7651/DXpedition.html

Vlad, UA1RG, and Michael, DL1YMK, plan to operate from St. Lawrence Island (NA-040), Alaska from 3-11 July. Look for them mostly on SSB on 15, 17 and 20m.

Rod, VE7VV, reports that Ivan, VY0O, plans to return to West Grass Island, James Bay on 27/28 June and stay until 11 July.

Mike, KM9D, who operated earlier in the year as XR0ZY from San Felix island, is on Easter Island as I write this, though not on the air. After Easter Island he is due to sail on to Pitcairn and to the Gambier Islands (OC-063), and is hoping to operate from both those locations.

IOTA CONTEST

THE ISLANDS ON the Air Contest, which seems to increase in popularity every year, will be held on the last weekend of July (29/30, 1200 to 1200 UTC). In addition to activities mentioned previously, here is a synopsis of those other operations which had been announced at the time of writing.

Jim, MM0BQI, will sign MM0BQI/P from Benbecula in the Outer Hebrides (EU-010). QSL via his home call.

A team from Cockenzie and Port Seton Amateur Radio Club (C&PS ARC) will again operate the contest from the Isle of Tiree (IOTA EU-008, IOSA NH04, WAB NM04), the most westerly of the Inner Hebridean Islands. They will sign GM2T. Some activity may take place outside the contest using the operators' own calls or the C&PS ARC Club call MM0CPS/P.

A group of Gs (including me) will operate as GU8D from the club station of the Guernsey ARS.

The Windy Yett Group will be active from Gigha (NH24 EU-008) from the Wednesday prior to the contest as GM5VP/P and during the contest from the same QTH, but signing GM5V. QSLs for both calls go to Ian, GM3UTQ (QTHR).

Members of the radio club UBA (ON4NOK) and Radioclub Kempen (PI4KAR) will be active before and during the Contest as PA6TEX from Texel Island (EU-038). QSL via ON4ALW.

A Belgian group will operate from Sein Island (EU-068), and will be on the island from 27-31 July.

Peter, GM3OFT, will sign portable from Horse Island (CL12) from 27-30 July, weather and the boatman permitting. If not, he will try again on the weekend of 4-6 August.

The radio club of Reykjanes will be active as TF7RX from the Westmann Islands (EU-071). QSL via K1WY.

Fred, KF9YL, will operate the contest from Cedar Key (NA-076). QSL to his home call, via the bureau or direct.

VE1JS (on SSB) and VE1JF (on CW) will operate from Brier Island (NA-127). QSL to VE1JS.

Takeshi, JI3DST, plans to operate as JI3DST/4 from Oki Archipelago (AS-041).

There will, of course, be many other DXpeditions and island activations for the contest.

WRTC

THE THIRD World Radio Teamsport Championship will run in parallel with the IARU HF Championship on 8/9 July. There will be 53 competing teams, all operating from Slovenia with similar stations and antennas. Roger, G3SXW, and Dave, G4BUO, will represent the UK. Each team will use a special call with a unique prefix from the S500A-S599Z block. The actual callsigns to be used are: S511E S521H S531R S541F S561C S571W S581I S512T S522R S532N S542B S562P S572L S582A S513A S523W S533G S543C S563X S573O S583D S514U S524G S534J S544Z S564Q S574V S584M S516M S526O S536P S546Q S566Z S576K S586U S517W S527K S537L S547B S567F S577V S587N S518N S528D S538F S548X S568Y S578R S588S S519I S529A S539D S549L. There will be a wide variety of awards available for contacts made with the contestants. I can provide further details, or check the WRTC web site at http://wrtc2000.bit.si/

AWARDS

THE MOLDOVA Banner Award is for QSOs with stations in all ER call areas, ER1, ER2, ER3, ER4, and ER5. QSOs with ER6 to ER0 callsigns (special prefixes) count for two ordinary QSOs. To qualify, European amateurs need QSOs with 15 different Moldovan stations on any HF bands, while those outside Europe need 8 QSOs. Contacts can have been made any time after 27 August 1993. To apply, send an application (an extract from your log, certified by two other amateurs) by registered letter to: P.O.Box 1561, MD2044 Chisinau, Moldova, ER1BF. Please include $15 USD or 30 IRC as shipping cost. Further information from er1bf@moldtelecom.md or at www.net.md/tincom/awards/

TABLES

NO GREAT LEAPS forward this month, but WARC scores continue to move on, no doubt as a result of recent expeditions such as A52A. Welcome this month to Bill, G4YWY, who only operates mobile. His all-time country total is 176 worked, 153 confirmed which would be a respectable score even from a home station.

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 **September** issue by **22 July.** ♦

QTH Corner

A52A	Glenn Johnson, W0GJ, 14164 Irvine, Bemidji, MN 56601 USA.
AY0N/X	Carlos A Ribas, LU2NI, Melvin Jones 696, Sgo. del Estero 4200, Argentina.
BQ9P	Steve Wheatley, KU9C, P.O. Box 5953, Parsippany, NJ 07054-6953, USA.
CV1Z	Montevideo Centro Radioafi, CX1CCC, Casilla De Correos 6000, Montevideo, Montevideo 11000, Uruguay.
CE0Y/UA6AF	V.Kravchenko, G0KBO, 16 Birchfield House, Birchfield St, London E14 8EY.
D2BB	Joseph L Arcure Jr, W3HNK, POB 73, Edgemont, PA 19028, USA.
DL5EBE	(new address) Dominik Weiel, Johannes-Meyer-Str. 13, D-49808 Lingen, Germany.
E29DX	HS0GBI, 56-31 Moo 10, Kookat, Lumlukka, Patum Thani, 12130, Thailand.
FK8KAB/P	ARANC, P.O. Box 3956, 98846 Noumea Cedex, New Caledonia.
JT1Y	Nicola Sanna, I0SNY, Str. Gualtarella 8/M, 06132 S. Sisto - PG, Italy).
JX7DFA	Per-Einar Dahlen, LA7DFA, Royskattveien 4, 7670 Inderoy, Norway).
KH8/N5OLS	Jon A Barclay, N5JA, Rt 1 Box 155, Kennard, TX 75847, USA.
PR500W	Emanual Tavares Filho, PY1NEW, P.O. Box 100659, 24001-970 Niteroi, RJ, Brazil.
PT500Z	Rogaciano de Lima Correa Filho, PY1NEZ, 91/1101 Belizario Augusto, 24230-200 Niteroi, RJ, Brazil.
S05R	Arseli Echeguren Bardeci, EA2JG, Las Vegas 81, Luyando, Alava 01479, Spain.
SY1D	Elias Bakopoulos, SV1DNW, P.O. Box 31669, Athens, GR-100 35, Greece.
T88LJ	Akira Miyata, JH8DEH, 4-28-5, Minami, Nishi 23 Jyou, Obihiro 080-2473, Japan.
T88MT	(New Address), Misao Tanzawa, JJ1DWB, 5-5-30, Cyuou kofu Yamanashi 400-0032, Japan.
T88YH	Hiroyuki Yamada, 7N1KAE, 2-9-209, Chigusasai, Inage-Ku, Chiba-City 263-0013, Japan.
TP2000CE	Francis Kremer, F6FQK, 31 rue Louis Pasteur, Dettwiller 67490, France.
TX0DX	OH2BN (see May QTH Corner)
V31JP	Lonnie W Miller, KA9WON, 12031 Blue Spruce Dr, Roscoe, IL 61073, USA.
V31OM	Baldur Drobnica, DJ6SI, Zedernweg 6, Bergheim 50127, Germany.
V63VL	Bruce D Lee, KD6WW, 17520 Kennison Ln, Lodi, CA 95240, USA.
VK9LEH	Ed Hula, AA4EH, 1776 Peachtree Street, Suite 410-N, Atlanta, Georgia 30309, USA.
XR0ZY	Juraj Sipos, OM2SA, 93013 Trhova-Hradska 550, Slovakia.
ZK2XO	Hans Ingenhaag, DL8NBE, Grabiger Weg 8, Unsleben D-97618, Germany
ZS31ER	Barry Fletcher , P.O. Box 53319, Kenilworth, Cape, 7745, South Africa.
ZV500A	Mario Negreiros dos Anjos, PY1MA, 20 Moacir Begado, 20240-790 Niteroi, RJ, Brazil.
ZW500BR	Murilo Martins Ferreira, PR7AYE, P.O. Box 60 - 58200-970, Guarabira - PB – Brazil.
ZY500BR	Leonardo Araújo Muniz, PR7QI, P.O. Box 60 - 58200-970, Guarabira - PB – Brazil.
ZZ500BR	Irapuan de Sousa, PR7AR, P.O. Box 60 - 58200-970 Guarabira - PB – Brazil.
3V8BT	Giovanni Bini, I5JHW, Via Santini 30, 51031 Agliana PT, Italy.
4W/N5KO	OH2BN (see May 'QTH Corner')
4W6/VK2QF	Nev Mattick, Hargraves, VK2QF, N.S.W. 2850, Australia.
4W/W3UR	OH2BN (see May QTH Corner).
4W6EB	Jose de Sa, CT1EEB, P.O. Box 79, 3860 Estarreja, Portugal.
4W6GH	Antonio Alberto Lopes Pereira, CT1EGH, R Guerra Junqueiro, 25-A, Vale de Milha, Corroios 2855, Portuugal.
4W6MM	Thorvaldur Stefansson, 4W6MM, POB 3699, Darwin, NT 0801, Australia.
7O1YGF	(CW) August Unterwallney, DJ3XD, Am Kummerberg 30, 30900 Wedemark 2, Germany.
7O1YGF	(SSB & RTTY) Hans Hannappel, DK9KX, Eschenbruchstr. 1, 51069 Cologne, Germany.
8J1RL	(from Feb.2000) Takumi Kondoh, JG3PLH, 1-23 Shinke- cho, Sakai City, Osaka 599-8232 Japan.
9A10C, 9A7K/P	Kresimir Juratovic, 9A7K, P.O. Box 88, HR-48000, Koprivnica, Croatia.
9G5MD	G3OCA Ken Frankcom, 1 Chesterton Road, Spondon, Derby DE21 7EN, England.

VHF/UHF

NORMAN FITCH, G3FPK
40 Eskdale Gardens, Purley, Surrey CR8 1EZ
E-mail: g3fpk@compuserve.com

AFTER A RATHER disappointing winter Sporadic-E (Es) season on 50MHz in Europe, the first widespread spring event occurred on 10 May. In contrast, a spectacular winter Es opening on 144MHz *and even on* 222MHz has been reported from the USA. In the Band Reports section, an asterisk (*) indicates a CW QSO and all times are UTC. 'QTHR' signifies that the operator's address is in the current *RSGB Yearbook* and (EX), (BL), etc after a call sign indicates the station's postal area.

BEACON NOTES

STEFAN HECK, LA0BY, reports that the antenna for the Svalbard beacon, JW7SIX (JQ78TF), was severely damaged in winter storms. Nearly all the element extensions have vibrated off, but he thinks they can be repaired and hopes to arrange for this if somebody will be able to visit the site this summer. JW7SIX is still operating (QRV) on 50.057MHz.

Alex Gavva, UR4LL, sent information about UT5G, a new 6m beacon in the southern Ukraine at KN66LS. It runs 10W on 50.084MHz to a ground plane antenna 45m AGL, the site being 60m ASL in the Kherson region of the Crimea. UT7GA is its keeper and reception reports can be sent via Alex, whose e-mail address is: alex@zcrb.kharkov.ua

On 25 April, Ted Collins, G4UPS (EX), heard a beacon on 50.060MHz signing EA3VHF (JN11MV). The listed EA3VHF (JN01) on 50.070MHz was also heard by Brian Hummerstone, G3HBR (HP), on 28 April, so it seems there are two different ones with the same call sign.

PUBLICATION

THE QUARTERLY *DUBUS* magazine is now in its 29th year and edition 1/2000 comprises 100 A5 pages. The *Technical Reports* section begins with the first part of an article by Werner Rahe, DC8NR, entitled 'Combiners, Couplers and Hybrids'. It runs to 28 pages and there are dozens of diagrams, tables and graphs, all in German, although the text is in English as well. The 'techies' among you will have a field day with this offering!

The majority of the issue is devoted to EME, 6m, tropo, aurora, Es and meteor scatter (MS) news, plus nine pages of *News and Comments*, and the popular *DUBUS Toplists*. The UK agent is Roger Blackwell, G4PMK (QTHR), whose e-mail address is dubus@marsport.demon.co.uk and there is a website - see the panel.

PROPAGATION

JOHN BUTROVICH III, W5UWB (EL17AX), was QRV on 6m on 13 February working ZLs between 2130 and 2345. At 2300 he noticed some winter Es propagation into Southern California, so worked a string of W6s. On a 5in TV monitor he noticed that the MUF had risen to US TV channel 6 (82-88MHz), so moved up to 2m.

From 0127 on the 14th he worked about ten station via Es in 20 minutes. At 0134, while in QSO with N6HKF (DM13FU), he suggested they move up to the 222MHz band and they instantly completed a record-breaking Es contact over 1975km. At 0140 he worked W6QIW (DM04CK) to extend the QRB to 2192km. That is about the theoretical maximum QRB for 'pure Es' assuming the height of the E-layer to be 105km, according to a formula in *Beyond Line of Sight*, edited by Emil Pocock, W3EP (ARRL).

I seem to recall reports many years ago of the MUF exceeding 200MHz in the summer in Europe, but it is astonishing for such a high frequency to be observed in winter.

In the period 1968-1970, John was stationed at Dungiven in Northern Ireland and operated on 4m and 2m using his reciprocal call sign GI5ALP. He ran daily skeds on 2m with John Stace, G3CCH, and occasionally worked into the London area in lift conditions.

The March issue of *The Six and Ten Report* starts with six pages of 10m data, mostly covering the reception of the beacons in the world-wide network. The following 6m commentary, compiled by Dr Steve Reed, G0AEV, refers to the disappointing conditions around the spring equinox, even though the mean solar flux exceeded 200 units on all but six days.

To quote, "There were no unambiguous reports of Es on 6m at all this month - possibly a first!". A few stations were copied by meteor scatter (MS), but auroral results were poor, due to 19 days when the Ap index was in single figures. One curiosity was reported by G8TIC (IO82) at 0952 on the 19th, when 9M6BAA was heard at RST419 in an MS burst in an unusual mixed-mode phenomenon. The Sabah station was also heard/worked in DL, OE, ON and PA that day.

Stations in continental Europe, especially those in the Mediterranean area, enjoyed some good inter-continental DX with stations in JA, KH6, VK, VP6, VR2, YB, ZL and 9M6 heard/worked. The band was open to ZS and 7Q every day for Mediterranean stations and to ZS for 21 days for the more northerly operators.

The table of solar and geomagnetic data shows that the 2.8GHz solar flux peaked at 234 units on the 22nd, with a minimum of 179 on the 15th, the average for the month being 208.2. The reports from operators further afield make interesting reading and JA1VOK submitted a most impressive list of stations worked in the Pacific, Africa, South America, the Middle East, Europe and Asia.

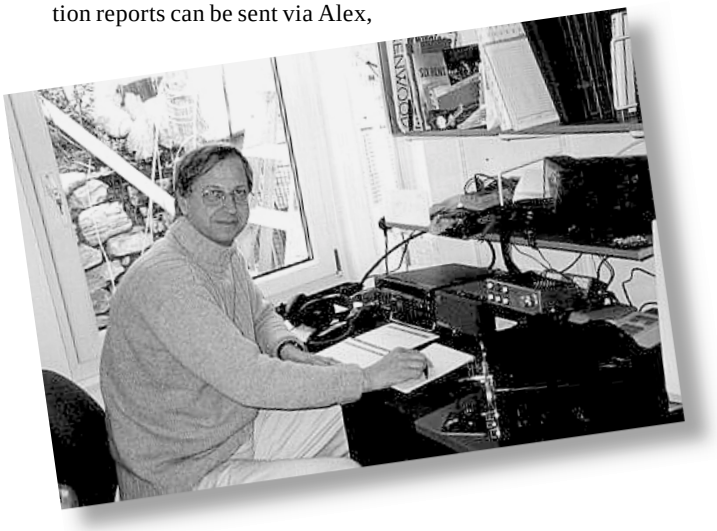
The *Report* is an activity of the RSGB's propagation Studies Committee (PSC) and is edited by Dr Steve Reed, G0AEV, and Prof Martin Harrison, G3USF. Subscription inquiries should be addressed to Steve (QTHR) whose e-mail address is g0aev@explore.force9.co.uk

The April edition of *SunMag* begins with an article entitled 'Sun's Got a Beat', describing scientists' discovery that the Sun has a 16-month cycle in its differential rotation 225,000km below its visible surface. This 'heartbeat' throbs in the same region suspected of driving the familiar 11-year cycle of solar eruptions.

The next article, 'Sunspot Numerology', concerns the count-

USEFUL WORLDWIDE WEB SITES

DUBUS	http://www.dubus.org
WAB	http://www.users.zetnet.co.uk/g1ntw/wab.htm
VHF Awards	http://www.argonet.co.uk/users/tonyg6ttl/awards/awards.htm
NECG	http://www.necg.de
K2UYH	http://www.nitehawk.com/rasmit/em70cm.html
Moon-Net	http://www.nlsa.com/moon-net/moon-net.html
VP8DBL	http://www.uksmg.org/falklands-1.htm



Chris, VP8DBL, operating from the Falklands Islands (see '50MHz').

1999 ANNUAL TABLE BREAKDOWN

50MHz
Final Placings - Top Three

Callsign	Dist	Ctr	Pts
GW6VZW	82	65	147
G4DEZ	48	60	108
G3FIJ	44	37	81

70MHz
Final Placings - Top Three

G4DEZ	43	5	48
G3FIJ	44	3	47
G3KAC	32	3	35

144MHz
Final Placings - Top Three

G4APJ	98	12	110
G3FIJ	83	15	98
G4DEZ	51	12	63

430MHz
Final Placings - Top Three

G4APJ	54	8	62
G3FIJ	52	8	60
G4DEZ	25	11	36

1.3GHz
Final Placings - Top Three

G3FIJ	18	3	21
G3KAC	14	5	19
G4DEZ	4	7	11

ing of sunspots and the various number systems in current use. The daily Boulder count reached 301 on 2 April, but scientists at the NASA's Marshall Space Flight Center in Alabama suggest that Cycle 23 will peak in mid-2000 with a smoothed average of around 140.

The Boulder count is computed by the NOAA's Space Environment Center (SEC) using the formula: R=k(10g + s) where R is the sunspot number; g is the number of sunspot groups on the solar disc; s is the total number of all the spots in all the groups and k is a variable scaling factor (usually <1) that accounts for observing conditions.

The third article deals with the 'Geomagnetic Storm' that occurred on 6/7 April and which was covered in the June *VHF/UHF*. The final article, 'Brushfires in the Sky', is a follow-on and describes how the aurora causes the ionosphere to glow in different colours. It includes a list of the nine 'Great Geomagnetic Storms' of the 20th century, to which this April 2000 one can be added.

The table of Daily Solar Data shows a general decline in the solar flux in April, with only eight days when it exceeded 200. The maximum was 223 on the 1st, the minimum being 158 on the 17th and the daily average working out to 184.2, about 12 percent down on the March figure. There are tables of daily geomagnetic, particle and sunspot group data and a Solar Flare List. *SunMag* is compiled and distributed by Neil Clarke, G0CAS (QTHR), whose e-mail address is neil@g0cas.demon.co.uk

CONTESTS AND AWARDS

A REMINDER THAT the Worked All Britain group's 144MHz QRP Contest takes place on 25 June and that the WAB 50MHz Phone Contest is scheduled for 9 July. Both are six-hour events starting at 0900. The rules can be found on their website - see the panel.

RSGB VHF/UHF Awards Manager Tony Jarvis, G6TTL, has forwarded details of the IARU Millennium Award, which is aimed at Es enthusiasts. It is designed to encourage the reporting of long distance propagation events on the 50, 70 and 144MHz bands, and is open to all radio amateurs resident in IARU Region 1. The period runs from 1 January 2000 through 31 December 2001. Full details are available on Tony's website - see the panel - and his e-mail address is vhf.awards@rsgb.org.uk

Oliver Droese, DH8BQA, regularly participates in the Nordic Activity Contests. After discussions with LA0BY and other Scandinavian operators, it transpires that many of them are only QRV in 'their' contests because, in the 24-hour European events, few stations beam towards them.

To try to encourage them to take part, Olli says that the DF0TEC/P group in JO73 will try to listen towards the north on the full hour of contests, starting at 1600. He suggests that other middle Europeans adopt this practice for the benefit of all. The North Eastern Contest Gang has a website - see the panel - and Olli's e-mail address is dh8bqa@necg.de

MOONBOUNCE

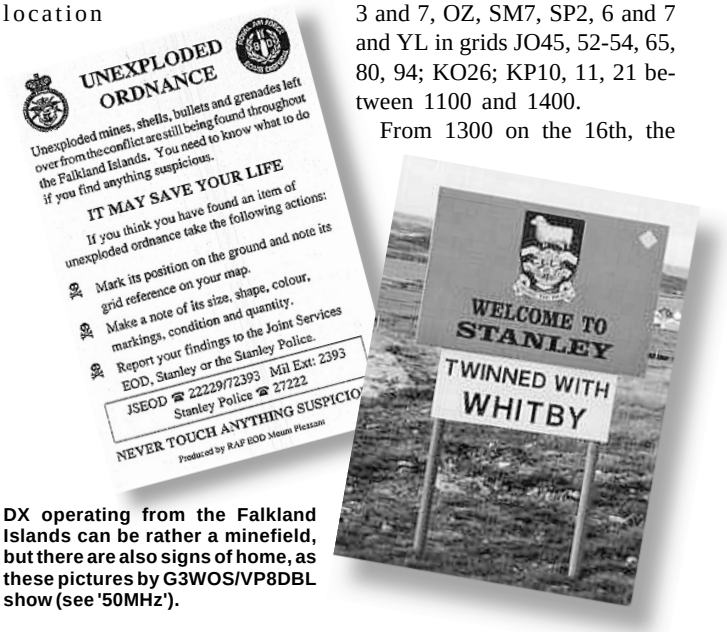
THERE WAS NO input from anyone on EME matters this month and the only reference in the May *432 and Above EME News* was to Peter Blair's, G3LTF, 13cm activity. The Newsletters are available at the K2UYH website - see the panel - which contains a vast amount of information for both experienced and 'wannabe' moonbounce operators. Another website for EME buffs is run by the Northern Lights Software Association (NLSA) and is called Moon-Net - see the panel. It has lots of 'space' software for subscribers to download.

Although the 29/30 July weekend is a high declination, perigee one, Sun noise will be a big problem with small Sun offset, so the proposed sked weekend is a 'Day/PM' one, a week earlier on 22/23 July. This will give just over 23 hours of Moon time for London latitude stations. The declination varies from -4.45° to +4.98°; the 144/432MHz sky temperature range is 278/24K to 342/25K and the signal degradation, referred to perigee, ranges from -1.19dB to -0.75dB. The Sun offset at Saturday midnight is -108°.

BAND REPORTS

50MHz

During April, Chris Gare, G3WOS, made a short trip to the Falkland Islands in the South Atlantic. As Vice-Chairman of the UK Six Metre Group, it was no surprise that he arranged to operate from there using the call sign VP8DBL. He ended up by working 33 DXCC countries and reckons it to be a super location for 6m operators. Chris has put a really excellent 15-page report, including lots of pictures, on the UKSMG website - see the panel.



DX operating from the Falkland Islands can be rather a minefield, but there are also signs of home, as these pictures by G3WOS/VP8DBL show (see '50MHz').

Mike Foubister, ZL3TIC (RE66), reports a claimed 'first', South Island New Zealand to Africa QSO on 6m. It occurred at 2046 on 28 April, when ZL3AAU worked CT3HF. The distance (QRB) is given as 18,560km (that's not a world record; that is held by ZS6LN and KH6IAA at 19,305km and was achieved back in 1979). ZL3ADT and ZL3NW also worked the Madeira station.

David Whitaker, BRS25429, logged-on at 0745 on 7 May to hear strong MS reflections from F4AHK and an IW5. A little later, presumably via Es, he copied LZ6T (KN23), YU1LA, YU1FU (KN03), YO7VJ and YO7VS (KN14), YO7FRJ/P (KN34), YO2QC/P (KN15), GI6ATZ (IO74) and SP9CCD (KN09). Ukrainian and Greek stations were spotted on the Cluster.

G4UPS worked YL2JN (KO26) at 1116 on 23 April. On the 25th, Ted copied beacon ZS6DN from 1230 peaking to S7. EA3VHF was heard at 1240, as was EH3ADW. CT0SIX was S5 at 1150 on 5 May, followed by a QSO with CT/F8BQQ (IM59). On the 10th, the band was open from about 1245 for four hours and he worked into SP, OM, DL, OK and OE in JN79, 88, 89; JO62, 71, 81, 82, 90, 91, KO00 and KO02. The next good day was the 14th, when he contacted stations in DL, EH5, OH1, 3 and 7, OZ, SM7, SP2, 6 and 7 and YL in grids JO45, 52-54, 65, 80, 94; KO26; KP10, 11, 21 between 1100 and 1400.

From 1300 on the 16th, the

opening favoured the southeast with lots of Italians worked plus T72EB/A (JN63), HB9FAF* (JN46), S59MA* (JN76) and 9A2ZH (JN73). Best of the day were 4Z5AO (KM72) at 1653 and JY9NX* (KM71) at 1657. Next day there was an afternoon opening to Spain and the Balearics until 1740. From 1843, in heavy rain static, weak LUs and a CX were heard.

Welcome to Geoff MacKenzie-Kennedy, GM4ESD (KY), who returned from Luxembourg, where he held the call sign LX2AO, in June 1999. At present he is using a 3-wavelength 'long wire' antenna. He reports assumed auroral-E reception of the Greenland beacon OX3SIX from 2227 on 2 May, when it peaked to S9, and again on the 4th, when it was S9-plus from 2212.

From Guernsey, Mike Johnson, GU6AJE, submitted an impressive log of 64 QSOs made between 16 April and 17 May. Pick of the bunch were ZP6CW* (GG14) for DXCC country number 51 and PY5CC (GG54) in the evening of 25 April, ZS6BTE* (KG33) at 1652 on 6 May and EH8BPX (IL18) at 2033 on the 17th. Continental European countries worked included DL, OH, OK, OZ, LA, SM and SP.

Jamie Ashford, GW7SMV (NP), caught the 28 April opening to Italy and Spain, his successes including HV3PUL (JN61). OH6JW (KP12) and OH6KTL (KP02) were worked in the morning of 5 May and in the long afternoon event on the 10th he lists DL, OE, OK, OM SP and YU worked. In a 45-minute period from 1230 on the 14th he completed 49 QSOs with DL, LY, OH, OZ and SP stations, and the next day Jamie contacted UR7TO (KN39) at 1752.

ANNUAL VHF/UHF TABLE - JAN TO DEC 2000

	50MHz		70MHz		144MHz		430MHz		1.3GHz		
Callsign	Dist	Ctr	Dist	Ctr	Dist	Ctr	Dist	Ctr	Dist	Ctr	Total Points
G4DEZ	36	18	18	2	26	8	18	2	17	6	151
G4APJ	20	3	-	-	59	7	27	4	-	-	120
G3FIJ	2	1	18	3	32	9	14	6	1	1	87
G4APJ	3	1	-	-	42	7	25	3	-	-	81
G7NBE	15	3	14	2	26	4	1	1	-	-	66
M0CNP	-	-	1	1	2	2	2	1	-	-	9

The District Codes are those listed on page 83 in the *RSGB Yearbook 2000*. Up to six different GI stations and up to three different GM stations in each Scottish district may be counted. Countries are the current DXCC ones plus IT9. The deadline for the next issue is 20 July.

144MHz

David Edwards, M0CNP, remarks on the "lovely opening" in the 11-13 May period, his best DX (ODX) being DJ9YE (JO43). Matthew Jeffery, G7ORR, operated portable on 1 May as GW7ORR/P (IO81LS) from 1500-2030, running 50W to two 6-ele Yagis. He worked 58 stations in 13 grids, ODX being DF9YK (JO31OH) at 711km.

GW7SMV gave some points away in the IARU Contest on 7 May, but conditions were not too good. Jamie worked DLs in JN39, JO30 and 31. There was good tropo along a weather front on the 11th with Dutch and German stations worked; beacon PI7CIS was S9+20dB. He contacted MM1CXL (IO86) on the 13th and F5TXM/P (IN88) next day, both running just 2W.

430MHz

David Dodds, GM4WLL/P, operated from IO85NR in the RSGB Trophy Contest on 7 May, but found local activity poor. It didn't help that the big East Coast stations rarely beam to the north, only to the continent. Running 20W to a 23-ele Yagi at 6m AGL, he made just 10 QSOs, ODX being PI4GN (JO33) at 677km. PI4GN was M0CNP's ODX in the 11-13 May tropo period.

DEADLINES

THAT'S IT FOR another month. The September deadline is **20 July** and the October date is **17 August**. My telephone answering/fax machine is on 020 8763 9457 and the CompuServe ID is g3fpk. ♦

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QRP

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FOR MANY years, QRP operating and portable operation have been closely linked. The small size of much QRP equipment and its low power requirements make it ideal for remote operation. Some of the classic designs, like the W7EL 40m optimised transceiver have been conceived with backpacking in mind. There is a very interesting web site by the Adventure Radio Society, devoted to outdoor and wilderness amateur radio. Amongst the range of QRP awards and events linked to outdoor operation, the Appalachian Trail Award scheme, sponsored by the Eastern Pennsylvania QRP Club, has recently appeared.

APPALACHIAN TRAIL

THIS IS A FAMOUS long-distance walking path in the USA. The award scheme is to promote hiking on the trail with QRP transceivers. All stations must be set up and operated within 100 yards of the official trail or at any shelter on the Appalachian Trail system. Special rules apply for those who wish to operate from state borders. Classes include Basic Award, Deluxe Award, Trail Award, Trail-to-Trail Award and Trail WAS Award. The full information about the awards can be obtained from the web site at: www.n3apa.org/Pages/AT

Several expeditions to the Appalachian Trail have already taken place including one in early April by Len, N2BSC, and Ron, WB3AAL, to the Pulpit Rock near Hamburg, Pennsylvania. Ron's equipment included a Ten-Tec Argonaut 515 (5W), a 7Ah battery, solar-charged by a Uni-Solar USF-5 flexible solar panel with a Solsum 5.0X solar controller, and a Poqet PC for keying and logging using Log Jr-EQF software. The antenna was a 'Killer Vertical' as described in *QST* June 1999, with 25 feet of ladder line and an MFJ-971 portable tuner. Len used the same set-up with his Elecraft K2 transceiver.

Len, N2BSC, operates from the Appalachian Trail.

QRP AND SMT

SOME TEN YEARS ago, Bill Mooney, G3VZU, ran a small company called Blue Rose Electronics which marketed a small range of surface mount technology kits, components and tools for the amateur radio constructor. Sadly, it was a relatively short-lived venture, because most constructors appeared to want to stay with the use of conventional leaded components. Some constructors did venture into SMD construction and I still marvel at the excellent work of Jack Glennon, G4ZQK, who built several projects from scratch using Blue Rose components. Blue Rose even produced, and I built, an SMD version of my 'Sudden' receiver.

Blue Rose appears to have been ten years ahead of its time, because recently there has been an upsurge of interest in amateur radio SMD construction. Several kits are beginning to appear in the USA and Hands Electronics in the UK has produced an SMD DDS VFO Kit. I hear mention of at least two future SMD kits which may be produced in the UK.

Part of the interest is born of necessity, because so many conventional through-hole, leaded components are being replaced by their SMD equivalents. Without being restricted in choice, it may be the way forward for the more ambitious amateur radio constructor.

Bill Mooney has left a legacy in his excellent book on SMD construction which I reviewed some years ago in *RadCom*. *A Practical Introduction to Surface Mount Devices* (Babani Electronic Books, BP411), is the only publication I know which deals extensively with the hand-working of Surface Mount Devices. It describes the basics of SMD components, their use and the production of one-off projects using surface mount techniques.

The NorCal SMK-1 surface-mount kit transceiver.

THE MFJ 'CUB'

The first major manufacturer to produce an amateur radio kit which includes SMD techniques is the American company MFJ Enterprises, although, to be completely honest, it is not an SMD construction project. The new MFJ 'Cub' CW transceiver is only about 3.5 x 3.5 x 1.5in, and is a hybrid of SMD and conventional components. It has about 85 SMT parts, but these are already mounted and soldered, so the constructor has only to install about 50 'regular' components. MFJ claim this makes the kit a great first project for newcomers. It can be built in about 2-3 hours with another half-hour for setup and alignment.

The Cub is a Single Band CW superhet transceiver, with versions available covering 80 to 15m. The transmitter power output is about 2W (except for 15m, where it is 1W) and is fully adjustable to milliwatt levels. The Cub has an adjustable tuning range of 50 to 60kHz (20kHz on 30m), settable to anywhere in the band. The receiver includes differential-mode AGC, 0.2µV sensitivity and a crystal filter. The transceiver weighs 8oz (226.4g) and has modest power consumption (36mA receive, 380mA transmit). Available at around $100, the Cub kit will be a popular item for QRP constructors, but it is not quite a true SMD kit!

THE NORCAL SMK-1

The Northern California QRP Club (NorCal), under the guidance of Doug Hendricks, KI6DS, has gained a reputation for producing its own range of QRP-related kits. The latest kit to be announced by NorCal is the SMK-1 SMD transceiver kit. This is a simple project designed by David Fifield, AD6A, an Englishman living in California who runs a company called 'Red Hot Radio'. Designed as an introduction to kit-building using surface mount components, rather than as a high performance transceiver, the SMK-1 has over 80 parts of which over 70 are surface mount.

The SMK-1is really the lashing-together of a simple QRP transmitter (the 'Tuna Tin 2' from Doug DeMaw, W1FB) and a simple direct-conversion receiver, the MRX. Both are VXO-controlled from their own 7,040kHz (the American 40m QRP calling frequency) crystals. The transmitter tunes about 1 to 1.5kHz, and the receiver about 4 to 5kHz. and they overlap, so transceiver operation is possible with separate VXO control for the transmit and receive functions.

The project is all surface-mount parts except for the two crystals, two trimmer capacitors, and the three control pots. It uses 1206 SMD parts, ie the larger type (0.12 x 0.06in, which is easier to handle). The printed circuit board is 2.5 x 2.25in, with the controls wired directly to the board. More information can be found on the web site of Red Hot Radio at http://www.redhotradio.com/

G QRP WEB SITE CHANGE

THE POPULAR G QRP Club web site, run by Tony Fishpool, G4WIF, can now be found at www.gqrp.com. In addition, all the G QRP Club Officers on e-mail can now be located by *callsign*@gqrp.com For example, I can now be found at g3rjv@gqrp.com ♦

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SEARCH ENGINES are essential tools for navigating the world wide web, and there are plenty to choose from! Unfortunately, most tend to contain links for just about every subject you can think of, which can make it difficult to sift out web sites for specialist topics. Amateur radio is a good example of this, so German amateur Willi Passmann, DJ6JZ, has created a search engine specifically for anyone with an interest in amateur or broadcast radio.

Willi's 'radio-portal' web site [1] contains a database of over 12,000 radio-related URLs, driven by an extremely powerful search facility, with all pages being available in the English or German language. All of the links in the database have been manually checked to ensure they are radio-related, so the chances of finding information that is relevant to your inquiry are considerably increased. Different levels of search are available, depending on the complexity of your query, so it might take a while for a new user to realise the full potential of the site.

Radio-portal has become the first recipient of the Radio Netherlands 'Media Network Millennium Award for Innovation', which indicates how highly it has been rated within at least one section of the broadcasting industry. Amateur radio users are likely to be equally impressed.

VALVE AND VINTAGE

ENTHUSIASTS OF vintage radio equipment will be delighted to find that The National Valve Museum [2] has been created by Allan Wyatt, G8LSD. This virtual presentation of information regarding valves and their uses is an elegant blend of old and new technology, and is certain to become a key resource for anyone with an interest in repairing and maintaining the 'older generation' of radio receivers and transmitters.

See a valve dissected at the National Valve Museum.

REFERENCES
[1] http://www.radio-portal.org (Willi Passmann's radio-portal)
[2] http://www.virtually-museums.co.uk (The National Valve museum)
[3] http://www.vmars.org.uk (Vintage and Military Amateur Radio Society)
[4] http://oh2aq.kolumbus.com/dxs/ (DX Summit)

The museum is divided into three main areas, the first being a reference section that provides cross reference data for over 3,700 different valves, sorted by type number. A simple but logical index breaks the listings up into manageable pages, with titles based on initial letters, CV number groups, or groups based on military usage. The data pages themselves present a simple (but no doubt extremely useful) table, giving just the valve type and a list of suitable equivalents - the sort of information that could be difficult to find by traditional means.

The second distinct area of the museum collects together various articles about valves, although it is a little sparsely populated at the moment. *The Story of the Valve* has been transcribed from a defunct 1960s magazine and, although very heavy reading, is an ideal introduction for anyone who knows nothing of the device's history. An American 6J5 triode is dissected for the 'metal striptease' page, showing just what's inside these mysterious objects. The final article is perhaps the most interesting, being a description of the rebuild of the Bletchley Park all-valve *Colossus* computer, written by Tony Sale.

No museum is complete without exhibits, so the third section of Allan's web site presents detailed information for over 270 different valves. Catalogued by various topics, including name, manufacturer, construction, etc, the exhibits pages are an archive of essential operating characteristics, electrical parameters, base connections and photographs.

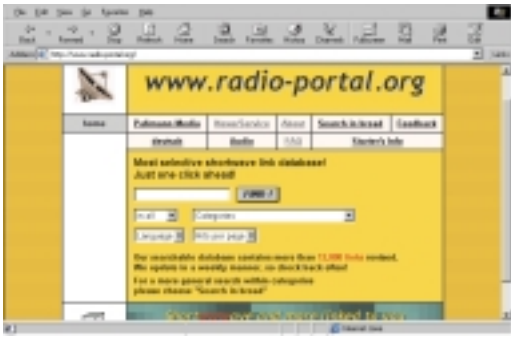
There is no doubt that Allan intends this web site to become a definitive source of valve data, and to this end he invites donations of valves and data for inclusion in the museum, adding "the museum needs to collect quickly, before the WW2 generation disposes of the boxes in the attic". Allan will be adding the John Lawrence collection held at *HMS Collingwood* to the museum, plus many of the *HMS Collingwood* valves as well, and he reports that by the end of the summer there should be over 1,000 valves displayed, but any additional submissions will, I'm sure, be most welcome.

If the sight of all these valves has whetted your appetite for mature equipment, then it might be worth stopping-by the web site of the Vintage and Military Amateur Radio Society [3]. When reviewed, this site was relatively new and obviously under development, but it did give details of society events, especially the regular HF nets which give the opportunity to use and discuss this particular genre of equipment. Beyond this, the site is a typical set of club web pages, although the links page stays true to the vintage and military themes, providing a good starting point for further research about this popular aspect of amateur radio operation.

DX CLUSTER

EARLIER THIS YEAR I received a request for help from an amateur radio operator in Ibiza, who was unable to access his nearest packet radio node but wanted to make use of the DX cluster network. A quick search of the web identified the OH9W DX Summit web site [4] as a suitable substitute. DX Summit is an on-line portal to the DX cluster information, providing near real-time updates of DX spots and announcements, with custom spots organised by band also being available.

Regular users of the DX cluster network will instantly feel at home here, although the site does not offer the power and flexibility provided by a genuine cluster BBS. With unmetered Internet access becoming more widely available, access to the DX cluster network via the web becomes a viable proposition for those without packet radio equipment. So, if you have never experienced a DX cluster in action, take a look at DX Summit, it may help you to work that elusive square! ♦



A more refined search at radio-portal.

DX cluster via the Internet.

IOTA

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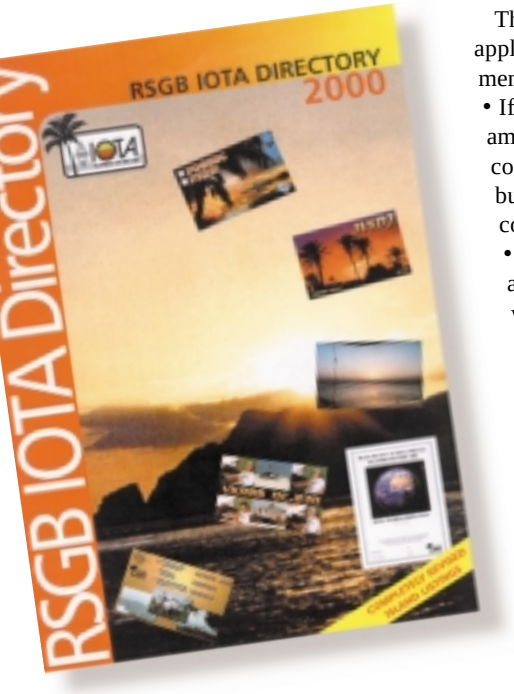
IOTA *DIRECTORY 2000* was published a few days ago - the culmination of a year's work by the IOTA Committee. The main highlights are given below.

NEW IOTAs

AN IMPRESSIVE 58 new IOTA groups have been added to the island list. This has been made possible by the deletion of 25 listed groups now found to have no qualifying islands and by the raising of the cap on the programme size from 1175 groups to 1200. More large islands have been given coastal island groups, with the largest ones having several. New geographical information and political change have justified other new groups, as has the need to reflect balance and consistency in the list. Following a decision by the Committee that it was undesirable that the Black Sea should, alone of the top 12 largest seas world-wide, be denied the possibility of having IOTA groups, 8 groups have been created in that area (to the undoubted pleasure of local amateurs). Also, several groups that have been closed to DXpeditioners for decades have had their coverage widened. In all, an additional 60 IOTAs are available to be targeted for an operation. Those wanting more details are advised to purchase the *Directory* (see p85). By the way, don't think that all 60 groups are in the Pacific, far beyond your holiday reach. Some 19 are in Europe, almost all accessible with your CEPT licence!



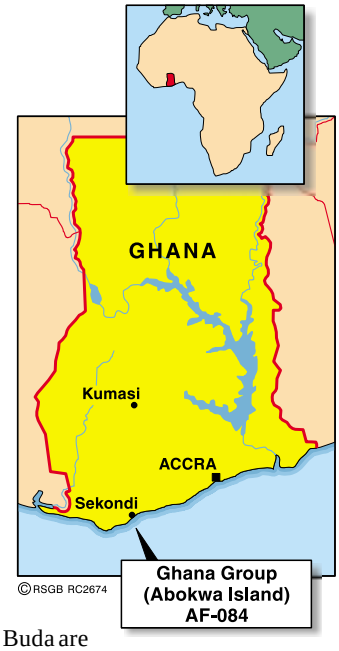
Good news often has some bad news tucked in behind, and the review came to the conclusion that five existing IOTA groups should be deleted for non-compliance with the rules: EU-98 and EU-154 where Poel and Buda are now found not to meet the minimum sea separation rule, AF-071 and OC-061 where Geyser Bank and Minerva Reefs, on research, are found to be totally submerged by water for part of each day and AS-052 where Okino Torishima, with its few drying rocks now completely encased in concrete, is regarded as a man-made island. The Committee considers that the IOTA community should temper its disappointment at the loss of these five groups with pleasure at the good news.

Approximately 20 islands in other numbered groups have also been found to fail the 200-metre rule. Almost all have been activated, in some cases many times. However, as there are other qualifying islands in each group, action taken does not affect group viability. The Committee has decided on deletion, but deferred in view of past activity and possibly current planned activity.

The following procedures will apply in the case of all deletions mentioned above:

- If there is an active resident amateur the island will cease to count from 1 February 2005, but new and old contacts will continue to count until then.
- If there is no active resident amateur, existing contacts will count until 1 February 2005 but no new operations can be accepted after 1 February 2001.

This means that in Spring 2005, after the Honour Roll and Annual Listings have been finalised, credits will be deleted from members' records. Such action will have no effect on certificates or awards issued on the basis of the list up to 31 January 2005.



NEW REFERENCES

AF-084	9G	Ghana group (Abokwa Island)
AF-085/Prov	ZS	Western Cape Province North West group (Elephant Rock)
AS-145/Prov	HS	Malay Peninsula South East group (Nu Island)
AS-146/Prov	BY4	Shandong Province North East group (Changdao Island)
OC-231	P2	Green Islands (Nissan Island)
SA-087/Prov	LU	Santa Cruz Province North group (Pinguino Island)

OPENING OF IOTA TO VHF/UHF

THE COMMITTEE has been aware for some time that 6m and 2m enthusiasts have been keen to see IOTA extended to VHF. Only now has it been possible to take this step and we are thrilled to be able to do it. Again, for full details, particularly of the contact requirements, you will need to get the *Directory*.

DIRECTORY LISTING

SOME 15,000 ISLANDS are now named, a five-fold increase! Most groups now have all or almost all qualifying islands listed, each checked against a marine chart to ensure rule compliance. The IOTA Programme has moved on since 1990/91 when the original work was done. A more precise definition of IOTA group boundaries and a fuller listing of qualifying islands were needed. Also, with the passage of time, IOTA group names and coverage had to be updated and adjusted to reflect latest geographical and political information.

NEW QSL CARD REQUIREMENTS

THE COMPLETE listing of qualifying islands for most IOTA groups now makes it possible to introduce tighter requirements on QSL cards. With effect from 1 January 2001, DXpeditioners and resident islands stations *must* include the name of a qualifying island named in the *Directory* on their QSL card if it is to count for IOTA. More about this next time.

DATE FOR NEW CHANGES

REGARD THE publication date of *Directory 2000* as the 'Start Date'.

However, where a new group has been created, contacts made in the past will not be accepted for credit until a reference number has been issued. Where there is an active resident amateur, this will be issued on the Start Date by means of an announcement on the IOTA Manager's web-site at www.eo19.dial.pipex.com/index.htm Where there is no resident amateur, the number will not be issued until the group has been reactivated subsequent to the Start Date.

New applicants operating from *Directory 2000* should apply on the basis of the island listing contained there. Existing members who already have a score credited are asked to delay submitting an update based on the new listing until an announcement is issued. A conversion sheet will be made available on the web-site and by post for the purpose of making the changes involved. Completion of this will be essential, so please be patient. Check either of the two web-sites (the IOTA Manager's, or the IOTA HQ site at www.rsgbiota.org) for latest news. ♦

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

LF

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THERE HAS BEEN something of a revival of interest in 73kHz and some ground-breaking QSOs have been made in the past few months. Building on the experience gained on 136kHz, the record distance worked on 73kHz now stands at 1,879km between G3LDO and OH1TN. Peter was transmitting very slow CW on 73kHz and Reino replied on 136kHz.

This technique has been used by several G stations on 73kHz and I'm sure we would all like to thank DF6NM, DK8KW, PA0SE, IK5ZPV, ON7YD, OH1TN, SM6LKM and all the other non-UK stations who participated in the tests.

To add to the excitement, the Rugby transmitter on 73.3kHz went off the air for three weeks in early April. This gave 73kHz enthusiasts a chance to work each other using normal CW. Some more cross-band QSOs took place with Gs working EI0CF, PA0SE and MM0ALM on CW.

Rugby was still off the air when G3GRO got permission to operate from the disused LF station at Puckeridge in Hertfordshire. This 100m mast had an efficiency of around 10% on 73kHz, ensuring a superb signal all over the UK and Ireland.

The Rugby transmitter returned to air just before GI3PDN and MI0AYZ visited another recently-closed LF station near Loch Neagh. In spite of the QRM they had several good 2-way 73kHz QSOs into G and some cross-bands into GW and GM.

Thanks to the efforts of the RSGB, the Notices of Variation have been extended until June 2001, so the fun will continue on 73kHz.

MEANWHILE ON 136kHz...

THE PUCKERIDGE mast also had an airing on 136kHz. The original aerial tuning room beneath the mast had been stripped out and, as an electricity supply was still available, it made an excellent shack. G3GRO, G3KAU and G3XDV set up the station and a team of LF operators from all over the country manned it over the week. Special permission was granted for G3WSC (the Crawley club call) to run 100W ERP from the site over the weekend of 15/16 April. The station had 65 QSOs in all, the best DX being a cross-band with UB5WF (2,225km) whilst running about 50W ERP.

Markus, DF6NM, put in a lot of work during the 73kHz QRS tests.

An interesting experiment was conducted by M0BMU and G3XDV, who set up (in the pouring rain) a typical amateur inverted-L aerial about 100m away from the mast. 1kW of RF was fed into this aerial and the aerial-current was measured. Calculations were then made, taking into consideration the heights of both aerials, to establish how much current would need to be fed to the big mast to achieve the same ERP. Reception reports from a local test set at 2km distance and from G3NYK at 80km distance confirmed the result to within a few dB. 200mA was all it took up the big mast, a power of about a quarter of a watt!

TRANS-ATLANTIC TESTS THIS WINTER

PLANS ARE well advanced for a Canadian attempt at a trans-Atlantic QSO this winter. Larry Kayser, VA3LK, has a permit to use the 136kHz band and is seeking collaborators on both sides. The attempt, which Larry calls 'Trans-Atlantic II', will take place between 10-27 November. He will set up a station at a coastal site in Newfoundland, from which he should have the best chance of getting a signal across the pond.

In addition to QRSS and CW, Larry is hoping to utilise low data-rate modes such as coherent-BPSK, C-BPSK using the work of Bill de Carle, VE2IQ.

He is especially interested in hearing from VO1 stations who can advise on receiving sites where QRM from the Cape Race Loran station and from CFH in Halifax is not too strong.

It is a difficult challenge, with numerous problems to overcome and it'll most certainly be cold and wet on both sides! If you are interested in participating on either side, contact Larry by e-mail at kayser@sypatico.ca

FRANCE ON 136kHz AT LAST!

THE FRENCH authorities have at last clarified the situation and all HF licensees in call areas F, FG, FY, FM and FP are now allowed to operate on the 135.7 to 137.8kHz band with 1W ERP.

The possibility of 136kHz stations operating from Guadeloupe, French Guyana, Martinique and the Saint Pierre and Miquelon Islands gives scope for some interesting DX QSOs. Welcome to LF! ♦

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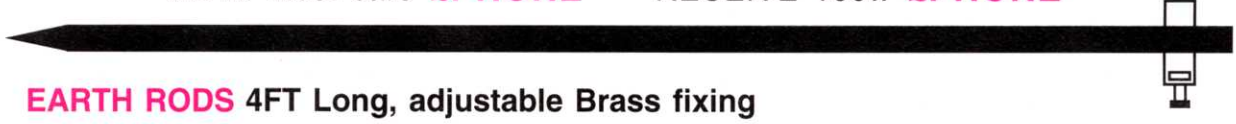

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MANY LISTENERS take a great deal of pleasure listening for and logging DXpeditions and receiving their QSL cards. A new book *DXpeditioning Behind the Scenes*, edited by Neville Cheadle, G3NUG, and Steve Telenius-Lowe, G4JVG, is now available which, although drawing on the successful 9M0C DXpedition, provides an insight into the planning, organisation and operation of a DXpedition. It is a first-class read and will appeal to listeners who avidly chase the big (and the not-so-big) DX trips. The book will be a great eye-opener to SWLs and they will be able to understand how much hard work and commitment goes into planning a DXpedition. The book covers every area of DXpeditioning. Even though I was privileged to be a very small cog in the 9M0C wheel, the book truly has plenty to offer the SWL. It can be ordered through the Internet at www.nevada.co.uk/book-DX.html

CONTRIBUTIONS

CONSIDERING HOW good conditions were in mid-May, I am surprised that there were so few reports this month. Surely we cannot be in the 'summer doldrums' for copy already? Please remedy the situation for next month. While on the subject of lack of contributions, this is your *very last opportunity* to let me have your details for the SWL address (either postal or e-mail) which you would like to see included in the 2001 edition of the *RSGB Yearbook*. There are some notable SWL names that are not in the listings. Surely you cannot all be shy? The current listing represents only a small percentage of the SWLs that are members of the Society, so please let me have your details no later than 30 June.

Also, more enthusiasm might be shown in respect of suggestions for this year's SWL exhibit(s) at the RSGB HF and IOTA Convention in October. The event is not that far off and it would be good to hear from a few more listeners confirming that they intend to be present, and to hear what they think should adorn the stand this year. It is suggested that the SWL Challenges, SWL Awards, Internet addresses of interest to SWLs and a display of Low Band DX QSLs make up the display. I'd be pleased to receive other ideas so that I know how much space to request from the organising committee. As I will be otherwise engaged for much of the Sunday, I would like to hear from any SWL who would be able to help staff the stand during the weekend.

ACTIVITY

IN VIEW OF the high SFI numbers during May, the HF bands have seemed 'patchy' whenever I have listened. Early morning DXing - before I go off to the office - has provided only FW5ZL on 21MHz of any real note. However, late in the day, it has been interesting to hear the higher bands open. On several occasions, 18MHz has been good to various parts of the world, and on 23 May, 24MHz was open to the USA as late as 2230 UTC. I found the Willis Island (VK9WI) DXpedition something of a disappointment. Even with my new Cushcraft R-6000 vertical, their signals were so weak on all bands that I was unable to claim a meaningful logging on the bands that I needed them on (18 and 24MHz). I could hear lots of Europeans calling them '5 - 10 up', but could not copy the DXpedition well enough to get any full callsigns of the stations they were working. On the other hand, the A52A (Bhutan) expedition was bagged on the three bands I needed them (7, 18 and 24MHz).

SSA 75 Award Rules

The objective is to hear Swedish amateur radio stations between 1 January 2000 and 31 December 2000. 75 points are required to claim the award. Points are available as follows:

Swedish station ..... 1 point
Swedish Club station (SJ, SK, SL and special callsigns during the year except District and HQ stations) ..... 2 points
District Anniversary station (SI0SSA - SI7SSA) ..... 5 points
HQ Anniversary station ..... 10 points

Logging (contact) on VHF counts double.
Each station counts once per band. Endorsements are available for single band, single mode (and QRP). The award costs £3 or 5 IRCs.
Award claims should be sent to: SSA Awards Manager, Bengt Hogkvist, SM6DEC, Harenegatan 11A, SE-531 34 Lidkoping, Sweden .

Simon, RS177448, has been continuing his contest activity, and entered the Italian ARI DX Contest, logging over 200 stations using EI5DI's *SDL* software.

QSL CARDS

LISTENERS MAY have noticed the FDS QSL card advertisement in last month's *RadCom*. Although no SWL cards were shown in the montage, the company is keen to point out that it is more than happy to supply cards to listeners. Indeed, FDS designed my cards several years ago. It provides an excellent service and specialises in unique QSL card design, as can be seen from the montage. If you need a distinctive full-colour QSL card, write and ask for some samples. Alternatively, you can e-mail the company at qsl@eclipse.com

SWEDISH MILLENNIUM AWARD

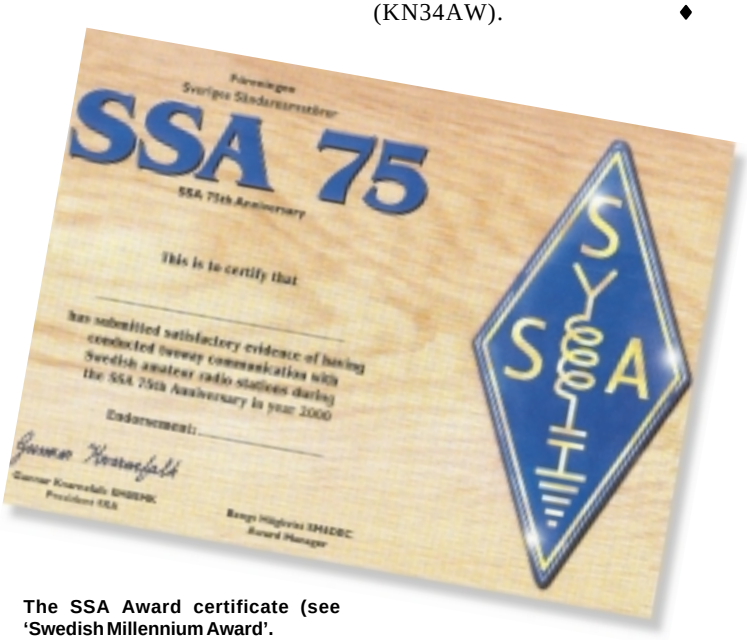
MY DAUGHTER Clare, RS102891, the M2000A Awards Manager, has given me details of the SSA 75 Award that celebrates the 75th Anniversary of the Swedish national society. It is available to SWLs (and licensed amateurs) for hearing (working) Swedish stations during 2000. The full rules are included in this column and a sample certificate is also reproduced.

NRD-515 RECEIVER

THIS WILL INTEREST listeners using an NRD-515 receiver. All the hardware goodies related to the radio are now publicly available on the Internet. Take a look by going to http://web.inter.nl.net/hcc/shortwave Just click on the index icon and go to the 515 page. The modifications include one to the JRC memory unit (515 and 518) and there are some for the NRD-515 receiver itself. Photographs are available. There is also a great deal of information about an active aerial project and some information about a huge (150 square metres) coaxial loop. It goes without saying that almost every modification will demand a thorough knowledge of radio, electronics and a good soldering skill. If in doubt, ask for help, otherwise you could do your radio great harm!

50MHz

AS WE ARE NOW into the 6m Sporadic-E (Es) season, David Whitaker, BRS25429, brings us his usual list of goodies. These are some of the best from early May. LZ6T (KN23ND), YU1LA, YU1FU (KN03HV), YO7VJ (KN14VC), YO7VS (KN14VH) and YO7FRJ/P (KN34AW). ♦



The SSA Award certificate (see 'Swedish Millennium Award'.

SPACE

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E-mail: space.radcom@rsgb.org.uk

AS EXPECTED, Mir is now inhabited and in full swing as a space station. Sergei Zalentin and Alexander Kaleri arrived safely via the 4 April launch from Baikonur for a nominal 70-day mission, although it may be subsequently manned for a rather longer period. The trip made space history, as it was the first manned flight to be privately funded. Since docking and boarding, the two crew have been extremely busy servicing all the systems in order to prepare the space station for an extended working life, possibly lasting for several years. They found and fixed a small air leak on one of the modules and pressure is holding up well. Their work load has been pretty heavy, but spasmodic amateur radio activity, both voice and SSTV, has been reported on 145.985MHz. The SSTV is the usual Robot 36 and the voice is FM simplex. It would appear that quite a lot of the activity is during the crew's breakfast time (0430 UTC).

Once the work load has diminished it is planned to activate the MAREX programme, which includes contacting schools in a similar manner to that practised by the Shuttle crew when duties permit. The school links will most likely be run as 'Live Audio' over the web, but as yet there is no firm detail. The school contacts will be complicated by the lack of a third-party agreement between Russia and the USA, which will mean that only students with some form of amateur transmitting licence can actually talk to the cosmonauts on *Mir*. Despite this, there is a fairly large backlog of schools world-wide waiting to make contact with the Russian space station.

QSL cards for Mir are currently out of stock but, according to reports, new ones should have been printed and issued by the end of July 2000. These will be for crew contacts only. Amateurs are asked to be patient when trying to contact Mir as the crew is still very busy and turn-in at 1900 UTC until 0400 the following day. Lunch is at 0900 and Dinner at 1500 UTC.

MORE ON PHASE 3D

THE PHASE 3D labs have been cleaned up and the web site brought up to date with some pictures of the latest stages of the integration phase and subsequent shipping out to the launch site. However, as Lou McFadin, the Integration Laboratory Manager was keen to point out, the job isn't yet complete. Some of the ground support equipment which has been borrowed from individual hams will still need shipping out to French Guiana for the launch site integration and testing. Other equipment must be retained in place until the spacecraft is safely in orbit with all systems verified.

Fingers will be crossed, if breath isn't already being held, because the Ariane 506 launch has been placed on hold until late July. Late July is when Ariane 507 was tentatively scheduled to carry Phase 3D into orbit. The delay has been caused by the late delivery dates for the Astra-2B and GE-7 communication satellites. The impact which this might have on Ariane 507 isn't yet known. There is a lot of information about Phase 3D on the AMSAT-NA home page, especially under 'Overview', which has a number of very useful links to other sites. The Orlando Integration Lab pictures can be found on http://www.magicnet.net/~phase3d/ (the Orlando facility is also working on some of the hardware to be sent out to the International Space Station on the Shuttle flight STS-106 in August this year). AMSAT-NA also has a booklet available, *Provisional Preflight Guide to Phase 3D*, which may be useful. AMSAT-UK will be rushing out a handbook on Phase 3D, written by Richard, G3RWL, just as soon as the spacecraft is safely in orbit.

Visitors to the Barry Rally have had a preview of the spacecraft in orbit. A magnificent half-scale model of Phase III D was soaring through the rafters of the Barry Memorial Hall for all to see (June *RadCom*, p11). The model was very accurately constructed from aluminium sheet by Ken Eaton, GW1FKY, a member of both the Barry ARS and AMSAT-UK committee. It even had a 'billy-can' microwave dish, just like the real thing! At one stage the model looked anything but real as it was bathed in an eerie green light from a spotlight – most spooky. A scale model of UO-36 made and provided by SSTL was also on show, along with some stunning pictures from the UO-36 high definition camera. No wonder it has been dubbed the 'spy satellite' by amateurs who have downloaded some of the pictures on its 38,400bps downlink.

The Mayor and Lady Mayoress of Barry with Glyn, GW0ANA, Chairman of Barry Amateur Radio Society, admiring the satellite models at the Barry Rally (see June *RadCom*, p11).

Wisp IMPROVEMENTS

A NEW VERSION of the MSPE module, 2.00i, has been written for *Wisp32*. Due to the power budget problems of UO-36, the picture downlink cannot be left in operation for lengthy periods. The new module will enable the sending of a turn-on request which will turn the downlink on when it is received by the satellite. Once turned on, UO-36 will transmit for about 15 minutes before switching off again. 15 minutes is sufficient to download between one and two megabytes of data at 38,400bps. The uplink is at 9,600bps. *QST* magazine for April 2000 carries a very good article on UO-36, written by Stacey Mills,W4SM.

The turn-on feature is automatic. *Wisp* will send a turn-on request every 45 seconds during a pass, until the satellite transmits. The Windows® 95/98 Registry needs to be edited to enable this feature. It should not be activated unless your station is equipped to receive the 38,400bps downlink. Details are available from AMSAT-UK or from Roy, W0SL, on the AMSAT BBS.

SPACE POWER

THE QUESTION of satellite power budgets is rather a vexed one, and universal, so perhaps it would be appropriate to quote Chris Jackson, G7UPN/ZL2TPO, Manager of UoSAT Command Station. "UO-36 has a lot of systems, and all these consume power. It has advanced attitude and orbit control, a number of flight computers and other systems that can't realistically be turned off. These consume a certain amount of power, and we can't change that. The orbit which UO-36 is in provides variable power (~50W OAP to >150W OAP). *[OAP - Orbit Average Power - basically the average amount of power input during an orbit, including the eclipse period.]* When we are in the low power season, we don't have much power to go round.

"Power isn't cheap in space. Solar arrays are *extremely* expensive. We therefore have a couple of options – leave half the spacecraft on the ground, or live with the fact that some payloads only operate for certain times. The latter is standard practice on many missions (not just amateur). Payload operating times are modulated by available power, to ensure that the power budget is maintained. In the case of UO-36, I have chosen to let the satellite decide when it has enough power, rather than simply switching the downlink off for long periods."

The fortieth anniversary of the inception of weather satellites has just passed. 1 April 1960 saw the first TIROS (Television Infra-Red Observation Satellite) launched from Cape Canaveral. Currently, several types of weather satellite give a very detailed picture of the world's weather and supply a search and rescue facility for aviators and mariners in distress. ♦

µWAVE

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E-mail: uwave.radcom@rsgb.org.uk

WELCOME TO the July issue of the 'Microwave' column. The weather in GM has certainly been suitable for portable operations, but has been less than helpful in the rest of the UK. Temperatures over one May weekend reached an amazing 28°C in Scotland. A move of QTH is on the cards in the next few weeks for me, so once that is complete I will be a lot more active on the bands. The new QTH is located near Ayr (IO75TL), and covers some 24 acres. Big enough for some large antenna arrays (I have to get there first before the XYL covers it in horses!). I plan to be active on 23cm and up, EME and already have a 28ft mesh dish and 4.1m solid dish donated to the cause. More info on the new QTH and my activities later.

NEW SHF AMPLIFIERS

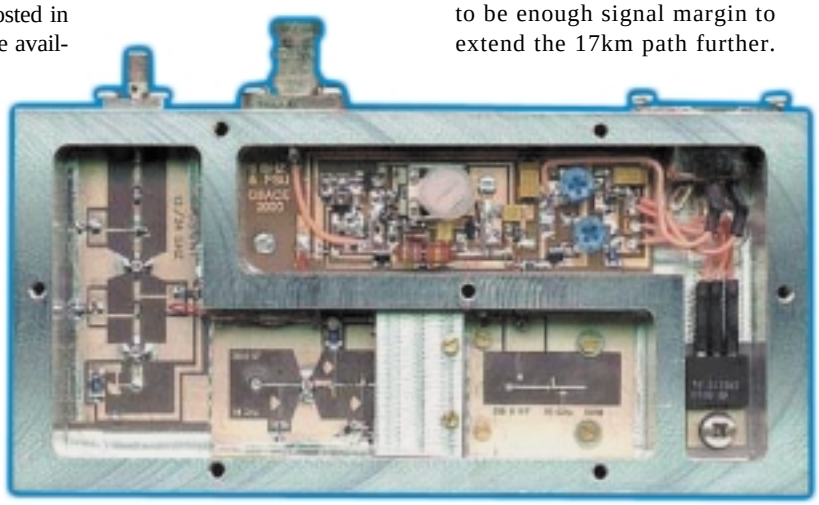
NEWS FROM Bernhard Korte, proprietor of BEKO amplifiers, a German company specialising in high-performance, high-power, solid-state PAs. Bernhard's new amplifier range includes the HLV-500, a 500W solid-state PA available either as a complete unit or as an RF module mounted on a heatsink, which requires a housing and power supply. This should be available by the time you read this and costs 3480 Euro (around £2000) for a complete unit. The one thing I should mention about these amplifiers is that they are quality personified. They are hand-built, professional-grade units. A smaller unit (HLV-130) is also available, and costs 1400 Euro (around £800). It comes in a desktop or mast-mounted version (28-32V supply required). More information on these and the other amplifiers in the BEKO range can be found at www.beko.cc

SURPLUS MIKOM 5.7GHz AMPLIFIERS

REGULAR READERS will remember the Mikom 10GHz 10W PAs mentioned in this column a short while ago. These have become quite popular on the band since I covered them, with a number of well-known UK amateurs using them on-air. I was very happy to hear from Jochen Zilig, the German source of the amplifiers, that he now has a 5.7GHz version available at the same price. The 6cm version is slightly smaller in size and requires the same power supply requirements as its 10GHz partner. Gain and power outputs are the same, giving 10W out for less than 1mW drive. These amplifiers are well built and are supplied as 'surplus', but are unused new items. I am sure these amplifiers will be just as popular as the 10GHz versions. Further information can be obtained from mmwave.zilg@t-online.de

BAND FOCUS

THIS MONTH WE take a look at the most popular of UK microwave allocations; 10GHz. The UK microwave allocation at 10GHz is, without a doubt, the most popular microwave band. There are a number of reasons why this has occurred, mostly historical. Some of the first UK 3cm operation was using surplus valve technology after the second World War. The band's popularity was boosted in the 1970s and1980s by the availability of 10GHz Doppler transceiver units used for door openers, etc. These were pressed into service as wideband FM transceivers and, using these with a tunable IF such as a broadcast FM receiver, the distances worked were extended again and again. With the large number of stations using these transceivers, the band became very popular and it was not uncommon to have around 100 stations out during a 10GHz Cumulative. With the large number of people on the band, previously unknown propagation modes started to be discovered. In the late 1980s, a number of experimenters started to investigate the use of narrow-band modes, which instantly increased distances. These initial experiments used a waveguide-based 144MHz to 10GHz transverter, usually based around a design by G3JVL. In the early 1990s, 10GHz took a massive leap forward when a new breed of transverter appeared on the market. Designed by Charlie Suckling, G3WDG, these new units utilised the availability of surplus components from the satellite TV boom. Charlie's new design utilized modern GaAsFET transistors and increased the performance of a typical 10GHz station tenfold. Over the following years, hundreds of these units were built world-wide. Today, things are pretty similar on the band. No commercial technology is available, so it requires equipment to be homebrewed. With the availability of modern components, it is now possible to construct a 10W portable station that is capable of working well into the 500-1000km range under flat band conditions. Activity is high from both fixed and portable stations and is supported by a range of contest and activity days throughout the year. Propagation is via a variety of modes from scattering through to tropospheric ducting. 10GHz is an active band and is likely to remain the mainstay of the UK microwave scene for some time.



Homebrew 76GHz transverter by G8ACE.

IN BRIEF

THE AUSTRALIAN Communications Authority has withdrawn Australian amateur radio access to the range of frequencies between 2.302 and 2.400GHz. This had been shared on a secondary basis with pay-TV distribution systems, among others. This part of the spectrum will now be allocated by spectrum licensing. In addition, frequencies between 3.425 and 3.4425GHz and between 3.475 and 3.4925GHz have been withdrawn in some of the major Australian capitals and regional areas, again for spectrum-licensing purposes.

The 'Microwave' column reported 76GHz activity recently. Well, they have been at it again! Peter, G3PYB/P on Butser Hill, near Portsmouth and Chris, G8BKE/P with John, G8ACE/P at Lane End, south-east of Winchester, made a 17km path around midday on Saturday, 6 May 2000. Conditions were very variable, with almost total loss of signal while a rain shower passed through the path. Mist was also present the whole time, with visibility never better than 5km. This test followed a 'first' QSO between Peter and John on the previous afternoon from the latter's back garden in Winchester to Bridgetts Farm, a site near to that used by G8BKE on a previous test. They were able to line up directly on this 6km path without using a lower frequency first. There appeared to be enough signal margin to extend the 17km path further. Congratulations to both and thanks to Peter, G3PHO, for the news item.

FINALLY

A REMINDER that the RSGB publishes a monthly newsletter edited by Peter Day, G3PHO, and is excellent reading for all UK and EU microwave operators. Call publications sales on 01707 660888 for a sample copy and subscription information. ♦

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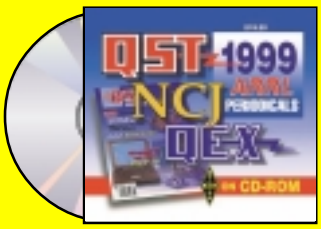

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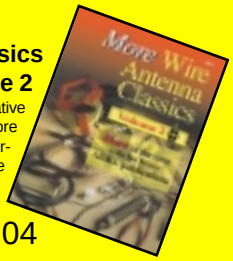

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the last Word

QRP is Such Fun

Pat Hawker may doubt that QRP operating is a growing aspect of the hobby, but I don't. I have no information on numbers, but there is no doubting that QRPers have the enthusiasm this hobby needs.

My first contact with the QRP community came when I decided to build the Elecraft K2 QRP CW/SSB transceiver kit. It was through the Internet mail reflector set up by Elecraft to help kit builders. Unlike other Internet forums and magazine letters pages, there was no whinging about licence classes, the state of the hobby and other operators. No, here was a bunch of people positively enjoying the hobby. Moreover, despite the low power they used, most of them were routinely claiming DX I'd give my eye teeth to work. The fact that many of these contacts were made using CW may have had something to do with it.

Plenty of column inches have been written about the future of the hobby and how it can hope to hold people's interest when you can have instant, reliable worldwide communication via the Internet. I say there is one facet of the hobby that the Internet can never take away: the sheer magic of making a contact with someone hundreds or thousands of miles away using equipment you built yourself. The great thing about QRP is that the equipment is easy to build, and it needn't even cost very much!

Julian V Moss, G4ILO

Absent Friends

I refer to the equipment survey, *RadCom*, June 2000, page 21. I feel that this result is a very unrepresentative outcome, as there is no mention of three of the biggest names in amateur radio equipment since the war, namely Heathkit, Collins and our own British firm of KW Electronics.

My first rig was a Heathkit DX40 and VF1U VFO, but I have also built and used Heathkit SB series which must have been one of the finest ranges of equipment available to the amateur ever. And who could forget Collins – a firm that has done so much for the radio amateur. I have owned and used Collins 'S' line equipment, which couldn't be faulted. And how many thousands of KW2000 transceivers were in use around the world, and many still are. KW were also responsible for pioneering the UK market, with UK-built equipment in the 'new' SSB era with their KW Viceroy and KW77 receiver (one of the few commercially produced triple conversion receivers around).

I did not take part in the original survey, as it slipped my mind at the time (problems of old age!), but I am very disappointed at the outcome, as I am sure lots of others will be too. Even my present rig (secondhand Icom IC751A) didn't get a mention. This is a first class rig, no faults or quirks, and I would recommend it to anyone. Even the DX mans 'dream' rig, the Trio TS930, came 15th, so what sort of people answered the survey?

K J Randall, G3RFH

[If you had voted the results might have been different, but its too late to complain now. – *Ed*]

Not so World-Wide Web

Why oh why do people who are on the Internet assume everyone else is also on the net?

The June issue of *RadCom* had a very interesting article reviewing a 23cm transverter, but when I looked for the address for further details and prices all I found was the address of a web-site. This is fine if you are connected to the Internet, but of no use to those of us who rely on snail mail. Though I have a friend on the net who was willing to download the information, there is a limit to how often I can ask him for help.

The government recently expressed concern that the UK was lagging behind in information technology, due to the fact that only one person in five was on the World Wide Web. There was talk of giving (!) away computers, but until that day comes the majority of people will *not* be on the net.

Please remember that 80% of amateurs are not on the net and do not want to be excluded from aspects of the hobby just because they do not own the latest piece of technological hardware.

Michael Wright, G0GCI

[80% of the population *as a whole* might not have Internet access, but the percentage of radio amateurs who don't have access to the Internet must surely be a lot smaller. After all, they are more technologically-aware than Mr Average. –*Ed*]

Grateful Recognition

Having attended the Morse Campaign at Harrogate during the last two days - and having thoroughly enjoyed the experience - will you please pass on my heartfelt thanks to all those involved, either directly or through the pages of *RadCom*, perhaps in order that others may get the message and have a go. I feel that far too many volunteers in all fields get not enough recognition for the amount of time they devote to the benefit of others.

I found myself at 67 years of age being persuaded, cajoled, and even bullied (in the nicest possible way) into eventually taking the 12 WPM test which, at the onset, I had no intention of doing. I would recommend the experience to anyone of any age who is teetering on the edge of a decision as to whether to take the test or not, to use this method of achieving a final polish.

May I suggest that the self-assessment tape be advertised more widely by the RSGB, so any prospective users have more time to prepare themselves. I feel that some of my fellow attendees would have gained much more from the event had they been a little more prepared beforehand, although I am very much aware that no-one who did attend failed to benefit.

Finally, may I record my thanks to the examiners, who I found to be very much aware of the stress of the moment and who went out of their way to ensure that candidates were as settled and relaxed as possible before the examining began. If it will be of any assistance to future candidates for the Morse test, at whatever level, can I assure them that they need have no fear of the examiners

Once again, thank you all for helping me to achieve a lifetimes' ambition. I now watch the mat under my letterbox with anticipation each morning.

Frank Mifflin, M1DAQ
(for the moment)

Disabled Operators

Amateur radio provides an interest for people with a disability. I am wheelchair-bound and live in a home for the young disabled in Bingley, West Yorkshire. I have had many years of happy enjoyment throughout my time in amateur radio and never know who I may talk to next, but the difficulties involved are not always appreciated by other operators on the bands. However, I do my best to operate within my capabilities. Operators, please take note when in contact with disabled amateurs, give them time to answer.

L S J Ham, M0ATN
(for Simon Harrison, G4JJS)

[May's 'Last Word' letter from Richard Neale-Gardner brought forth several offers of help, plus some books. Everything received has been forwarded. - *Ed*]

Unwelcome Politics

In the June 2000 edition of *RadCom*, page 10, the news article 'Twinned Radio Clubs' shows a blue flag with stars, which is the political flag of the European Union. I am not anti international friendship, but I am not a Euro Unionist and I find this picture disturbing as it brings politics into amateur radio. National flags of those involved would have been correct.

L J Osbourne, G4LKZ

You Dirty Lot!

My husband asked me today to accompany him to a radio show in Drayton Manor, where he wanted to purchase some equipment. It was my first visit to a radio show and I would like to share my impressions with your readers.

The event itself, although I'm no expert, was well organised and provided plenty of choice for every taste. It was the visitors that surprised me. Frankly, I have never seen so many badly groomed people in one place, with the odd exception here and there. That's not to say that I was expecting them to be dressed in suit and tie, it was after all an outdoor event, but surely one would expect some essential hygiene and a clean shirt. Instead, I was surrounded by people who might as well have lived before the Roman Baths.

Sadly, I understand now why the word 'nerdish' is associated with amateur radio. No wonder people come up with terrible statements such as 'people who spend their time on the radio are unable to form proper relationships in public'. I truly wish radio amateurs would take as much pride in their public image at such a gathering as they take in what they do.

This is not a personal attack on anyone or a snobbish opinion, but a very genuine observation that so many seem to ignore or rather not talk about.

Fay Mutlak Hamdan

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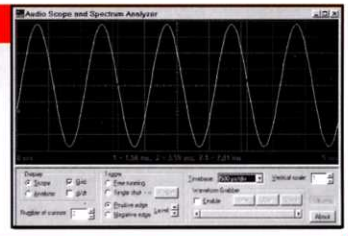

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Available as either an internal ISA card that slips inside your PC, or as an external (portable) unit. WiNRADiO combines the power of your PC with the very latest in synthesised receivers.

YOU CAN USE WiNRADiO™ SCANNiNG PC COMMUNiCATION RECEiVERS FOR:
Broadcast, media monitoring, professional & amateur radio communications, scanning, spot frequency, whole spectrum monitoring, instrumentation surveillance and recording.

If you're after the ultimate receiver-in-a-PC with full DSP then smile and say, "Hello" to the new **WR3100i-DSP** with its hardware for real-time recording, signal conditioning and decoding applications. It's all you need.

NEW EXTERNAL MODELS

EXTERNAL WiNRADiO™
We are now able to offer you a complete range of stand-alone WiNRADiO comms systems:

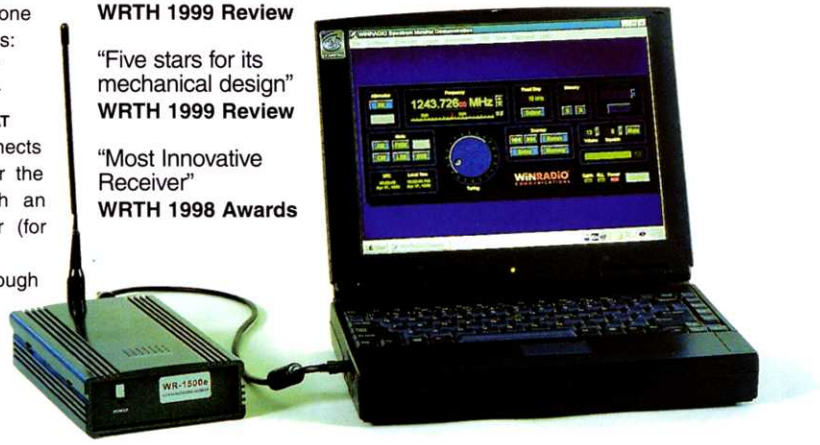
- **WR1000e - £359 INC VAT**
- **WR1550e - £429 INC VAT**
- **WR3100e - £1169 INC VAT**

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 (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-1000i & WR-1000e	WR-1550i & WR-1550e	WR-3100i & WR-3100e
Construction of internals	WR-1000i/WR-1550i-3100iDSP- Internal full length ISA cards		
Construction of externals	WR-1000e/WR-1550e - 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 resolution	100 Hz (5 Hz BFO)	10 Hz (1Hz for SSB and CW)	10 Hz (1Hz for SSB and CW)
IF bandwidths	6 kHz (AM/SSB), 17 kHz (FM-N), 230 kHz (W)	2.5 kHz(SSB/CW), 6 kHz (AM) 17 kHz (FM-N), 230 kHz (W)	2.5 kHz(SSB/CW), 6 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	6-8 cards (please ask)
Dynamic range	65 dB	70 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 vat when bought with 'e' series unit (otherwise: £99 inc vat)
PPS NiMH 12v Battery Pack & Chrgr:	£99 inc vat when purchased with 'e' series unit (otherwise: £139 inc vat)
The WiNRADiO Digital Suite:	£74.99 inc vat when purchased with a WiNRADiO receiver (otherwise: £81.05 inc vat)

For your free (no obligation) info pack & WiNRADiO demo disk go to: http://www.broadercasting.com. If you don't have access to the internet then by all means feel free to phone/fax us. *Trunked radio transmissions should only be received & decoded with permission of the originator of the transmission.

Please send all your enquiries to: info@broadercasting.com or Telephone: 0800 0746 263 or +44 (0)1245 348000 - Fax: +44 (0)1245 287057
Broadercasting Communication Systems, Unit B, Chelford Court, Robjohns Road, Chelmsford, Essex, CM1 3AG, United Kingdom

EARTH STATION FT-847

HF/50/144/430 MHz All Mode Transceiver

"Compact, too--great for our next 'rover' operation."

"HF, VHF/UHF, and satellite, all-in-one!"

"Looks like Yaesu did it again!"

"And the DSP helped me hear my first moonbounce signal ever!"

The FT-847 changes base station operation forever. Now, three radios in one--HF, VHF/UHF, satellite; technology in its finest application, from the world leader in amateur communication.

With its unequaled combination of features, like DSP filters—notch, NR and BPF, built-in 6-meter, voice monitor, separate sub-band dial, Shuttle Jog dial, Smart Search, and digital meter, the FT-847 is the only radio of its kind! Exclusively for satellite work, 19 memories exceed any other radio. For performance, power-up with 100W for HF/6-meter, and 50W for 2-meter and 430 MHz. Additional "must-haves" include cross-band full duplex, normal/reverse tracking, CTCSS and DCS encode/decode, and direct keypad frequency entry. Plus, the FT-847 is 1200/9600 bps packet-ready.

Take the next step in all-band performance and take home the FT-847 today!

Only one transceiver gives you all mode operations on HF/50/144/430 MHz with full Satellite capability.

NEW Yaesu Patented Design

ATAS-100

Active Tuning Antenna System

Designed for the FT-847. Works on //14/21/28/50/144/430 MHz Amateur Bands for mobile operation.

YAESU

Choice of the World's top DX'ers

http://www.yaesu.co.uk

Specifications subject to change without notice. Specifications guaranteed only within amateur bands.
Some accessories and/or options are standard in certainareas. Check with your local Yaesu dealer for specific details.

YAESU UK LTD. Unit 12, Sun Valley Business Park, Winnall Close Winchester, Hampshire, SO23 0LB, U.K.