Construction: Build a Talking Morse Code Reader

0601
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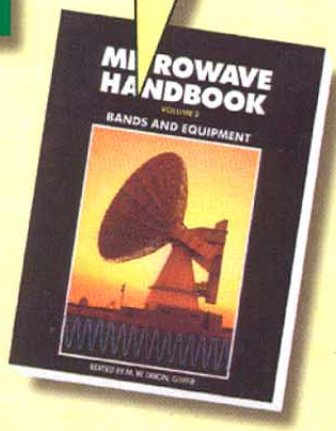
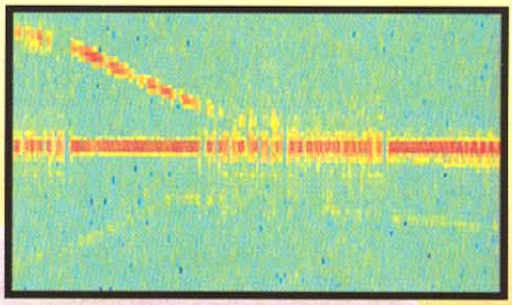
RadCom

This Month's Special Offers See Page 9

£3.95 Vol 77 No 6 ♦ June 2001 The Radio Society of Great Britain Members' Magazine

Get Ready for the RSGB IOTA Contest





Using DSP Software to Monitor VHF Beacons

Peter Hart Reviews Yaesu's Latest All-Band All-Mode Miniature Marvel

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MON-SAT: 9am-5.30pm
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WATERS & STANTON

VISA

ORDERS ONLY: 080

New Z-11 QRP Auto ATU 100mW - 30W

All Bands from 160m to 10m and very low current drain!

Perfect for your FT-817

As little as £169.95

Here's an ATU that is the perfect answer for those wishing to travel around with their FT-817 or similar low power radio. With an impedance matching capability of 6 Ohms to 850 Ohms, it will match coax and some long wires. Latching relays means it holds its setting with power removed and zero current drain once tuned. Average current drawn is just 75mA and this for only around 3 seconds - the normal time taken for it to tune. LED's indicate SWR status and you can even fine tune it with electronic "nudge" switches. RF driven, it will work down to around 100mW and its small dimensions make it a natural portable choice. Available ready built at **£199.95** or as a kit at **£169.95**. Carriage is £6.50 extra. Limited stocks available now.

New PBX-100 Antenna

80m - 6m Portable
or use it at home where you can Forget Planning Permission!

£99.95

The PBX-100 is the perfect answer for portable operation. Capable of handling 100W, it stands around 2.75m tall when erected. Yet in a couple of minutes it will pack down to a package of around 1m long. Coverage includes the WARC bands. A ground spike is included together with ground radial wires. It will also assemble as a slim single band vertical if you wish. Designed for use with 50 Ohm coax cable, an SO-239 socket is provided.

YAESU FT-1000MP MK-V 200W HF ALL MODE TRANSCEIVER

£2899 Plus £7.50 Carr.

The New Industry Standard ..... Would a Serious DXer accept anything else ?

In choosing the FT-1000MP Mk V, you will be proud to own a rig with an impressive specification, reputation and lineage. Its outstanding performance and attention to detail, makes this the premier HF transceiver for the 21st Century. This radio is a class leader.

19.4% APR: Deposit £299 and 36 months at £90.27.

YAESU FT-1000MP AC

160 - 10M ALL MODE

£1799 Plus £7.50 Carr.

19.4% APR Available

SAVE

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.

19.4% APR: Deposit £199 and 36 months at £57.77.

ICOM IC-746

160M - 2M ALL-MODE

£1395 Plus £7.50 Carr.

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

19.4% APR: Deposit £145 and 36 months at £45.13.

ICOM IC-756PRO

1.8 - 52MHZ 100W

£1895 Plus £7.50 Carr.

Free desk/mic

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.

19.4% APR: Deposit £229 and 36 months at £71.13.

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.

19.4% APR: Deposit £129 and 36 months at £35.02.

YAESU FT-847

160M - 70CM ALL MODE

SAVE

£1199 Plus £7.50 Carr.

SCOOP!

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!!

19.4% APR: Deposit £129 and 36 months at £38.63.

KENWOOD TS-570DG

160 - 10M ALL MODE

£849 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.

19.4% APR: Deposit £89 and 36 months at £27.43.

CARRIAGE CHARGES
A= £2 C= £7.50
B= £6 D= 8.50

VISA

WATERS &

YAESU VX-5R

Plus Freebies!

£269 Plus £6.00 Carr.

Free Case, SU1 and SPM-102 speaker mic.

* 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 VX-1R

Plus Freebies!

Free Case, CN-3 and SPM-102 speaker mic.

* 2m /& 70cm Handheld
* 500mW or 1W Output
* CTCSS Encode / Decode
* 25 / 12.5kHz Steps
* Wideband receive
* AM Airband Receive
* 290 Memories

£165 Plus £6.00 Carr.

YAESU FT-50R

Super Price!

* 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

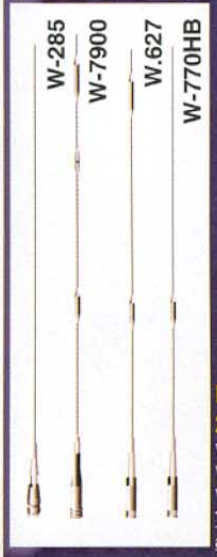
£169 Plus £6.00 Carr.

KENWOOD TM-D700E 2M / 70CM DATA MOBILE

SAVE

£449 Plus £7.50 Carr.

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!



WATSON

Great value mobile antennas

W-285	2m 5/8th whip with PL-259 base	£14.95
W-7900	2m/70cm 5 & 7.5dB length 1.58m	£32.95
W-627	6m / 2m / 70cm 2 / 4.5 7.2dB length 1.6m	£34.95
W-770HB	2m/70cm whip 3dB / 5.5dB length 1.1m	£24.95

All with tiltover bases.

Base Co-linears 2m/70cms Fibre Glass

W-30	3/6dB L1.15m	£39.95
W-50	4.5/7.2dB L 1.8m	£49.95
W-300	6.5/9dB L3.1m	£59.95

These antennas are pretuned and have short base radials

IC-910 VHF/UHF TRANSCEIVER

£1299 Plus £7.50 Carr.

IC-910 VHF/UHF Transceiver - The new IC-910 from Icom with 100W on 2m and 75W on 70cms, plus the option of 1.2GHz. Well placed to take advantage of satellite operation, you can simultaneously operate 2 bands at once.

Optional 23cms + £400

YAESU FT-11R 2-METRE HANDHELD

SCOOP!

Another find in a warehouse! Brand new, boxed with AC chargers and ni-cad packs. 75 Alphanumeric memories, AM airband rx mod possible. Last selling price £249! Very limited stocks.

£119 Plus £6.00 Carr.

ICOM IC-2800H

In Full Colour!

FREE 3 YEARS WARRANTY

£419 Plus £7.50 Carr.

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

Includes FREE Remote head cable.

KENWOOD TH-D7E

£299 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

WMM-3 DATA MODES

£69.95 Plus £6.00 Carr.

If you want to receive data, then connect the audio output of your receiver to the WMM-3 and the output of the modem to your PC serial socket. A CD-ROM is provided with lots of software, this will get you started.

ICOM IC-R3 PICTURE THE DIFFERENCE

* Full UK TV coverage
* 0.495-2450 MHz
* Advanced Lithium battery
* ALL DAY battery life
* 450 Memories
* FM / WFM & AM
* 2" TFT colour display
* Bandscope & automatic squelch
* 8 background colour choices
* Size 61 x 120 x 33mm

also receives 23 & 13cm amateur FM-TV 900-1300MHz 2250-2450MHz

ICOM IC-207H

£279 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

£289 Plus £7.50 Carr.

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

YAESU FT-8100R

£369 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

£359 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

WATSON DUAL BAND VHF YAGI

This is a fabulously well-built dual band 2m/70cm Yagi with dual gamma matching. 5 el. on 2m and 9 el on 70cms gives you 7dB and 12.5dB gain. Fitted with SO-239 and rated to 100 Watts FM. £79.95 Carriage £7.50

Order Details on inside Front Cover

ALL THESE ITEMS IN STOCK AT OUR MATLOCK SHOP AS WELL !!

& STANTON

MasterCard

MORSE TUITION & TESTS

Waters & Stanton are now holding Morse classes at their Hockley premises every Saturday morning at 11am.

Sessions are expected to last between 30 minutes to an hour. All equipment will be provided, but only limited numbers may attend.

Morse tests are available with an official examiner, but an application form is required. Application forms are available from the RSGB HQ, candidates should bear in mind that there is a closing date for entries.

For more information or to book for Morse tuitions please contact Mark Francis.

MFJ-269 ANALYSER

180m - 70cm On-site Antenna Analyser.

£299.95 Plus £6.00 Carr.

MFJ-259B 1.8 - 170MHz £229.95

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!

KH-WSI WORLD SPACE DIGITAL RECEIVER

KH-ANT external antenna kit in stock £49.95

£99.95 Plus £6.00 Carr.

This radio has its own mini satellite dish and receives digital WorldSpace broadcast signals via the AfriStar satellite. As well as all the normal VHF FM programmes, you can switch to satellite broadcast signals from CNN, BBC, Bloomberg (multi language), World Radio networks 1 & 2, and lots more. High quality mono via the internal speaker and stereo via the headphone socket. Runs from AC, 4 x D cells (not supplied), or external 6V.

NEW MFJ-CUB ORDERS

The MFJ Cub single band transceivers are small enough to sit in the palm of the hand. They provide up to 2 Watts CW output (variable to mWs), have full break-in and on-air sidetone. Available ready built or as a half kit. The kit version has all the surface mounted components installed. You only need to add the larger items, knobs and case.

Kit £89.95 Built £139.95
Models available for 80m, 40m, 30m, 20m and 15m.
Includes cabinet and controls.
Postage £6.00

HEIL AUDIO

Appointed by Heil as UK Distributor

Proset-4	H'phone/boom mic	£129.95
Proset-5	H'phone/boom mic	£129.95
Micro-4	Lightweight ver.	£99.95
Micro-5	Lightweight ver.	£99.95
AD-1	Cables Y. K. or I	£14.95
HM-10-4	Stick mic	£69.95
HM-10-5	Stick mic	£69.96
CC-1	Cables Y. K. or I.	£25.95
HC-4	Spare insert	£32.95
HC-5	Spare insertt	£32.95

You can convert your mic to Heil by simply pur chasing HC-4 or HC-5 insert.

AVAIR AV-600

£59.95 Plus £6.00 Carr.

1.8 - 525MHz VSWR Meter 5/20/200W scales. Dual sensors, PEP reading. More accurate than built-in meters.

SGC-230 SMART TUNER

£359.95 Plus £7.50 Carr.

Covers 1.6 - 30MHz and handles 3 - 200W. Designed for end fed wires, just connect to 12V and feed with RF via coax. Can be mounted outside or at top of mast.

MICROSET AMPLIFIERS

All FM/SSB with GaAsFET preamps and RF switched. 13.8V DC powered.

R-25	2m 1-4W in / 30W max out	£84.95 B
RV-45	2m 3-15W in / 45W max out	£95.95 B
R-50	2m 1-7W in / 50W max out	£89.95 B
SR-100	2m 4-25W in / 100W out	£169.95 B
SR-200	2m 10-50w in / 200W max out	£299.95 B
VUR-30	2m/70cms 1-5W in / 20/30W out	£199.95 B
RU-20	70cms 3-15W in / 20W max out	£119.95 B
RU-45	70cms 3-15W in / 45W max out	£165.95 B
RU-432-95	70cms 6-12W in / 95W max out	£499.95 C

WCN-3 Adaptor. For all transceivers using SMA connector. Converts to BNC £3.95 A

SPEAKER MICS.

Including Yaesu and Icom 4-way jack.

QS-112-Y Yaesu £16.95
QS-112-K Kenwood £16.95
QS-112-Y4 4-way £16.95
Phone if in doubt about suitable model.

£16.95 Plus £2.00 Carr.

HANDS-FREE MOBILE MICS.

£42.95 Plus £2.20 Carr.

Comes complete with PTT switch box for mounting on gear lever. Head/shoulder band makes for easy wear. Models for almost every transceiver. Phone for confirmation of model number to suit your rig.

THE TOUGHEST JAPANESE ROTATORS

These are tough rotators that weigh almost twice as much as similar priced units and have great turning capacity. Made by Create of Japn, they will handle 4 element HF yagis with ease. Our own Create model has been on our roof for 12 years turning a 4-element HF beam. We wouldn't use anything else!

RC5-1 Standard control box, OK for 4-el Yagis - needs 7-core cable £349.95C

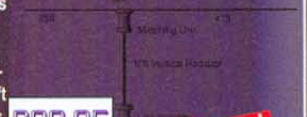
RC5-3 Control box features pre-set or manual control. Otherwise the same as RC5-1 above £449.95 C

MC-2 Lower mast clamps £49.95 B

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



£89.95 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.

80-40-20M MINI DIPOLE

The "80 plus 2" Mini - Dipole was designed by our Director, Peter Waters, G3OJV. Just 52ft long, it uses linear loading - no tuned traps. It can be directly fed without ATU and also operates at 2.5:1 VSWR on 15m. Amazingly efficient, it handles 400 Watts and is balun fed. Erect it as an inverted V and it takes up less than 40ft of space. If you have a small garden, don't miss out on the LF bands anymore. £79.95 Carr. £6.00

POWER SUPPLIES

SEC-1223
13.8V PSU
23 Amps - 3.2lbs!

£99.95 Plus £6.00 Carr.

Back In Stock

Beware of cheap noisy supplies that have poor filtering & construction!

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

LINEAR AMP UK AMPLIFIERS

British made Amplifiers with a Pedigree

Full Range Stocked

Challenger	HF 2 x 3CX800 AT 1.5kW out	£2095 D
Explorer	HF 2 x 3-500ZG 1.3kW out	£1595 C
Hunter	HF 1 x 3-500ZG 750W out	£1195 C
Hunter	6m 1 x 3-500ZG 800W out	£895 C
Ranger	HF 4 x 811A 800W out	£895 C
Discovery	2m 1 3CX800 400 - 1KW out	£1395 C

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 B
W-5A	5 Amp fixed supply	£29.95 B
W-10AM	10 Amp variable supply	£59.95 C
W-25AM	25 Amp variable supply	£89.95 C
W-30AM	30 Amp variable supply	£119.95 C

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.

NEW W-40SM 40 AMP SWITCH MODE

£149.95 Plus £6.00 Carr.

Digital display, 3 - 15V rated at 40 Amps continuous. Fully protected and very low noise. Ideal for a wide variety of ham applications. Light weight of 3.5kg and measuring 220 x 110 x 300mm Fixed 13.8V switch.

CUSHCRAFT HAM RADIO ANTENNAS

MA5B MINI-BEAM

£299 Plus £7.50 Carr.

2 El. on:	20m, 15m 10m
Gain:	3.6dB, 4.8dB, 5.3dB
F/B	10dB, 12dB, 22dB
Dipole:	17m and 12m (0dB)
Power	1.2kW (2:1VSWR)
Boom:	2.2m
Element	5.2m
Radious	2.7m

A3-S	10-15-20m 8dB 2kW 3 el. 4.27m boom	£389.95 D
A-743	10/7MHz kit	£129.95 C
A4-S	10-15-20m 9dB 2kW 4 el. 5.84m boom	£469.95 D
X7	10-15-20m 13dB 2kW 7 el 5.48m boom	£549.95 D
X9	10-15-20m 14dB 2kW 9 el 8.5m boom	£799.95 D
R-6000	6 - 20m vert.	£299.95 D
R8	6-40m vert 8.7m	£399.95 D
TEN-3	10m 3 el.	£159.95 D
D4	10-40m 10.92m 2kW rotary dipole	£259.95 D
D3	10 - 20m 7.86m 2kW rotary dipole	£189.95 D
XM240	40m 2 el	£569.95 D
XM520	5el 20m	£629.95 D
XM515	5 el 15m	£359.95 D

Phone for catalogue.

MARTIN LYNCH & SONS HAVE DONE IT AGAIN - THIS MUST BE THE BARGAIN OF THE CENTURY!

"This is the VERY LAST BATCH of this beautifully engineered masterpiece - a give away at an UNBELIEVABLE £1999! The last RRP on these machines was £3999 - don't miss it at this AMAZING PRICE!"

YAESU FT-1000

"The Best of the Best"

200W HF ALL MODE TRANSCEIVER

SPECIFICATION

RX Frequency Range:	100 kHz ~ 30 MHz
TX Frequency ranges:	160 ~ 10m amateur bands only
Freq. Accuracy:	<±5 ppm (except FM <±100 Hz)
Freq. Stability:	<±2 ppm (0 °C ~ 50°C) (except FM <±200 Hz) <±0.5 ppm (-10°C ~ 60°C) w/TCXO-1 (FM <±150 Hz 0°C ~ 50°C)
Emission Modes:	LSB, USB (J3E), CW (A1A), FSK (J1D, J2D), AM (A3E), FM (F3E)
Basic Frequency Steps:	10 Hz for J3E, A1A and J1D 100 Hz for AM and FMA3E, F3E and J2D
Antenna Impedance:	16.5 to 150 Ohm, 50 Ohm nominal
Supply Voltage:	100, 110, 117, 200, 220 or 234 VAC, 50/60 Hz
Power Consumption (approx.):	95 VA Receive, 1050 VA for 200 watts transmit
Dimensions (WHD):	420 x 150 x 375 mm
Weight (approx.):	51 lbs. (25.5 kg.)
TRANSMITTER	
Power Output:	adjustable up to 200 watts (50 watts AM Carrier)
Duty Cycle:	100% @ 100 watts, 50% @ 200 watts (FM & RTTY, 3-minute TX)
Modulation Types:	SSB: Balanced, Filtered Carrier AM: Low level (early stage) FM: Variable Reactance
FSK:	Audio Frequency Shift Keying
Maximum FM Deviation:	±2.5 kHz
FSK Shift Frequencies:	170, 425 and 850 Hz
Packet Shift Frequencies:	200, 1000 Hz
Harmonic radiation:	at least 50dB below peak output
SSB carrier suppression:	at least 40dB below peak output
Undesired sideband suppression:	at least 50dB below peak output
Audio response (SSB):	not more than -6dB from 400 to 2800 Hz
3rd-order IMD:	-36 dB @ 150 watts PEP, -31 dB @ 200 watts PEP, or better
Microphone impedance:	500 to 600 Ohm
RECEIVER	
Circuit type:	quad-conversion superheterodyne (triple conversion for FM)
Intermediate Frequencies:	73.62 and 8.215 MHz and 455 and 100 kHz

Sensitivity (For 10 dB S/N):

Frequency	100 ~ 250 kHz	250 ~ 500 kHz	0.5 ~ 1.8 MHz	1.8 ~ 30 MHz
Mode				
SSB, CW (2.4 kHz)	1.25 uV	1 uV	2 uV	0.25 uV
AM (6 kHz)	10 uV	8 uV	16 uV	1 uV
29 MHz FM (12 dB SINAD)				0.5 uV

Selectivity (-6 / -60 dB):

Button	Modes	Min -6dB BW	Max -60 dB BW
2.4 kHz	all except FM	2.2 kHz	3.8 kHz
2.0 kHz	all exc. AM, FM	1.8 kHz	3.6 kHz
500 Hz	CW, RTTY, Packet	500 Hz	1.2 kHz
250 Hz	CW, RTTY	240 Hz	700 Hz
-	AM (Wide)	6 kHz	14 kHz

Sensitivity (For 10 dB S/N):

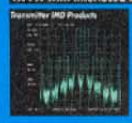
Frequency	100 ~ 250 kHz	250 ~ 500 kHz	0.5 ~ 1.8 MHz	1.8 ~ 30 MHz
Mode				
SSB, CW (2.4 kHz)	1.25 uV	1 uV	2 uV	0.25 uV
AM (6 kHz)	10 uV	8 uV	16 uV	1 uV
29 MHz FM (12 dB SINAD)	-	-	-	0.5 uV

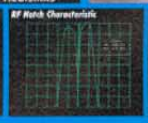
Dynamic Range:	108 dB (@ 50 kHz, 500 Hz BW, RF amp off)
Squelch sensitivity:	1.8 ~ 30 MHz: (CW, SSB, AM): <2.0uV 28 ~ 30 MHz: (FM): <0.32uV
IF rejection (1.8 ~ 30 MHz):	80 dB or better (Main RX)
Image rejection:	(1.8 ~ 30 MHz): 80 dB or better (Main)
IF shift range:	±1.12 kHz
Max audio output:	2W into 4 Ohms with < 10% THD
Audio output impedance:	4 to 8 Ohm 0

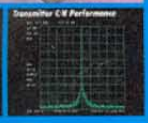
Designed with no spared effort or expense for optimum performance and operability, the FT-1000D is the fruit of over 25,000 man-hours of intensive research and development by Yaesu's top design engineers. Instead of merely offering incremental improvements on existing designs or adding bells and whistles to an old model, the FT-1000D project involves a wholly new approach to the application of the latest digital and RF technologies to today's most demanding needs on the HF bands. Extensive surface-mount component technology allowed six microprocessors and five Direct Digital Synthesizers to be harmoniously integrated with a simple operator interface into a highly reliable full-featured transceiver optimized for serious HF applications.

RRP £3999

£1999







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Front Cover:

One of the most talked-about transceivers for many years, the Yaesu FT-817, is reviewed by Peter Hart, G3SJX, on page 41 this month. Also: How to win the RSGB IOTA contest, and monitoring beacons using the latest digital technology.

RadCom
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WANTED!
Your simple projects - see page 22 for details

June2001

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RADIO SOCIETY OF GREAT BRITAIN

THE NATIONAL SOCIETY WHICH REPRESENTS UK RADIO AMATEURS

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PRAISE FOR THE SOCIETY ON PLC ISSUES

AT A RECENT meeting in Paris of the European Conference of Postal and Telecommunications Administrations (CEPT), the CEPT project team, which is responsible for HF matters, asked that thanks be passed to the Society for the most detailed work and in-depth research into the proposed introduction of Power Line Communications and its effect on HF communications.

Special mention was made of the position paper produced by the Society's EMC Committee which was presented to a PLC Workshop in Brussels in March by the Chairman of the EMC Committee, Hilary Claytonsmith, G4JKS, on behalf of IARU Region 1.

The Society has been at the forefront for the past four years in making the HF community within the UK and Europe aware of the damage that the introduction of PLC will have on the HF spectrum. From being almost a lone voice in the early years the Society has been joined by the likes of NATO and the broadcasting community in its opposition to the introduction of PLC.

NATIONAL COUNCIL MEETS FOR THE FIRST TIME

HISTORY WAS MADE on Saturday 12 May when the Society's National Council met for the first time at the Society's Headquarters in Potters Bar. The National Council, which is made up of the Society's Board of Directors and the new Regional Managers under the Chairmanship of the Society's President Don Beattie, G3BJ, discussed a range of subjects including the future of amateur radio licensing, the threat to amateur radio from the introduction of Power Line Communications, as well as regional issues and the future support of the membership. A fuller report of the meeting will appear in the July edition of *RadCom*.

LATEST TEACHERS' COURSE A GREAT SUCCESS

OVER THE Easter holidays the Society, on behalf of STELAR, ran a week-long RAE course for science teachers at Harrogate Ladies' College. The course was sponsored by the Society and the RA. Nineteen teachers attended from a range of schools across the UK. For the first time the RA and City & Guilds agreed to the teachers sitting a special one-off RAE examination and it is pleasing to note that 18 of the 19 teachers attending passed the RAE at the first attempt. Special praise must go to the volunteer tutors who held the course and to Harrogate Ladies' College for the excellent facilities it provided.

PLANNING IN BARNET

THE SOCIETY has been consulted by the London Borough of Barnet about future policies in their Unitary Development Plan. One of these, as originally proposed by the council, could have been quite detrimental to radio amateurs. The Society has responded to the effect that central government Planning Policy suggests (at paragraph 34 of PPG8) that amateur masts usually present few potential planning problems in terms of their visual impact. Furthermore, such masts are often only temporary and are usually removed after the licensee leaves the property. The council has accepted the Society's opinion and the intended policy has been amended in our favour. It is to be hoped that members' planning applications in Barnet will have a smoother ride as a result.

CALLING ALL G4Ys!

WILFRID Storace-Rutter, G0WLF, the RSGB QSL Bureau sub-manager for the G4Y series of callsigns, has been holding over 1300 QSL Cards for which he has no envelopes for almost 18 months. A visit to Wilfrid's web page at www.ncroad.freeserve.co.uk will give a list of those amateurs for whom he is holding cards. Wilfrid says that if envelopes are not received soon he will have no choice but to dispose of *all unclaimed cards*, as he is in need of the storage space.

RSGB DX VOICEBANK

MEMBERS OUTSIDE the coverage area of a packet radio DX Cluster node may be interested to know that the RSGB still runs its DX 'Voicebank' system. This is a telephone voice messaging system that can be listened to by ringing 07626 925 240. This number plays back tips recorded by DXers over the last three days. Messages of up to one minute duration can be recorded in the Voicebank by dialling 07626 910 240.

NEW RSGB COMMITTEE CHAIRMEN

TWO RSGB committees have new chairmen. They are TAPAC, the Technical & Publications Advisory Committee (chairman Tony Plant, G3NXC, who takes over from Dick Biddulph, M0CGN), and the EMC Committee (Hilary Claytonsmith, G4JKS, who takes over, *pro tem*, from Robin Page-Jones, G3JWI). Dick and Robin are thanked for their invaluable work on behalf of members.

BOARD ON THE MARCH IN JUNE

RSGB Board member Bob Whelan, G3PJT, will be giving a talk to the Farnborough and District Radio Society on Wednesday 13 June. For further details please contact Norman, G0VYR, on tel: 01483 835320.

VHF CONTEST COMMITTEE JUNE UPDATE

THE RSGB VHF Contest Committee has announced that the following sections will apply in the 50MHz Trophy contest on 2 / 3 June: Single Fixed (SF), Multi Fixed (MF), Single Fixed 6 Hour (6SF) and Multi Fixed 6 Hour (6MF). The Six Metre (SMC) Cup will be awarded to the leading Single Fixed entry and the Telford Trophy will be awarded to the leading Multi Fixed entry. This event will count towards the VHF Championship.

No decision had yet been made by the VHF Contest Committee about the fate of VHF National Field Day. The committee is trying to assess the likelihood of this event taking place as scheduled on 7 / 8 July. If it is postponed, the contest will provisionally move to 1 / 2 September. However, the VHF Contest Committee asks groups please to register *as normal* for this event, until a ruling is made. The full rules for VHF National Field Day were published in the May *RadCom*.

The first 144MHz Backpackers contest, scheduled for 20 May, was cancelled. The Committee says that it will try to react as close as possible to each event, in order to ensure that the latest foot and mouth position is reflected.

WIA CHALLENGES MEMBERS TO RECRUIT MORE WOMEN.

THE WIRELESS Institute of Australia, recognising the need to attract more newcomers into the hobby if amateur radio is to survive and prosper into this century, has issued a challenge to its membership. In a recent edition of *Amateur Radio*, the WIA magazine, WIA's education columnist Brenda M Edmonds, VK3KT, wrote "There is no reason why the number of female amateurs should not equal that of males unless our predominantly male members have a biased outlook". She went on to challenge all current amateurs to go out and recruit one new female licensee! This is a sentiment reciprocated by the Society to its own members.

THANKS TO MKARS

Following the club's sterling efforts in helping to organise the RSGB Spring Show and VHF Convention at Bletchley in April, the RSGB presented the Milton Keynes ARS with a plaque to commemorate their efforts. Mark Allgar (left), the RSGB Commercial Manager, presented the plaque and a donation to club funds to the club's president at a recent meeting of MKARS.

THIS MONTH'S SPECIAL OFFERS

ONCE AGAIN we have four special offers this month. Featured on the cover is Vol III of the *Microwave Handbook* which is available for a limited period at 40% off the standard price! See the ads on pages 11, 13, 17 and 19 for full details of all four special offers.

MEMBERS ADS ON THE WEBSITE

AS OF THE July issue of *RadCom*, the published 'Members Ads' will also be advertised on WebPlus - the RSGB's 'Members Only' website. The adverts will appear three days after *RadCom* has been posted and will run until the end of the calendar month. We regret that we cannot add, delete or alter adverts during the month of publication.

TALK ON AROS

RSGB AMATEUR Radio Observation Service coordinator Barry Scarisbrick, G4ACK, will be giving a talk to the Sutton and Cheam Radio Society on Thursday 21 June. For further details please contact John Puttock, G0BWV, tel: 020 8644 9945.

TAILOR-MADE MORSE PRACTICE TAPES

THIS IS AN RSGB service for the student or experienced operator. You can have 90 minutes of intensive Morse receive practice at the speed of your choice. Simply send a blank cassette tape to the Morse Practice Co-ordinator, specify the speed (anything from 5 to 55WPM) and the format (eg QSO-type as used in the Morse test, plain language - with or without signals - callsigns only, numbers only, old GB2RS scripts and so on) as would suit your own personal needs. All you need do is mail a blank C90 cassette, include a return-addressed envelope or a label and stamps together with a note of the speed and format required to: George M Allan, 22, Tynwald Avenue, High Burnside, Rutherglen, Glasgow G73 4RN. If you need more information please tel: 0141 634 4567 or e-mail: george@allan99.freeserve.co.uk

RSGB WEB SITES ENHANCED

THERE HAVE been several improvements to the RSGB web sites recently.

Main RSGB site: **www.rsgb.org**

Additions include a full calendar of events, updated bandplans, 'How Do I Become a Licensed Radio Amateur', detailed reports on Science Week activities, a callsign prefix list, and a youth page.

Added in Acrobat format are broadcast schedules for the GB2RS news and GB2CW slow Morse transmissions. The 'What is Amateur Radio?; page has also been totally redesigned.

RSGB WebPlus, the Members Only site: **www.rsgb.org/membersonly** (see opposite for how to access this):

New items include an article per month from the last year of *Radio Today*, the booklet *Planning Permission - Advice to Members* in PDF format, IARU Region 1, 2 and 3 newsletters, RSGB Memorandum & Articles of Association, and *RadCom Plus*, a web supplement to your monthly magazine.

The site is being constantly updated and improved. The latest changes can be found at www.rsgb.org/whatsnew Suggestions and comments are welcomed by Website Administrator Lynnette Ranger, website@rsgb.org.uk

FREE LICENSING FOR OVER-75s

RSGB HQ has received a number of queries about how to apply for the free amateur radio licences now available to anyone over the age of 75. The Deputy Manager, Radio Licensing Centre, says, "The procedure for the renewal of a licence for somebody who is over 75 is to tick the necessary box on the reverse side of the remittance advice note, and return it to us in the reply paid envelope." In other words, it *is* still necessary to renew the licence, even though no fee is to be paid.

RadCom NEWS

Aurora on 23cm?

WHAT LOOKS LIKELY to be confirmed as the world's first auroral contact in the 23cm band took place on 11 April. Carl Mohlin, SM3AKW, had the contact with SM5QA at 1650UTC and exchanged '33A' reports. Carl comments that the signal sounded like auroral signals on the lower bands. Both stations transmitted on 1296.200MHz, but a plus-5kHz Doppler shift each way meant signals were received on 1296.205MHz. Both stations were running 500 watts to high-gain antennas.

Coast Wireless Station Centenary

THE CENTENARY of the first Coast Wireless Stations will be celebrated on **30 June**. It was in 1901 that 10 sites around the coast of the UK and Ireland were set up as wireless stations by the Marconi Wireless Telegraph Co Ltd. The 10 wireless station sites will be activated during the day on 30 June on 80m and 40m. One such station will be GB100HD, operated by members of the Dragon Amateur Radio Club on Anglesey from the site of the Holyhead coast wireless station. The 10 stations will QSL only on request but a special certificate will be available as a permanent record of this unique centenary event. It will be available for those who submit at least four QSLs (SWLs certified log extract) and a minimum £4 donation to the RNLI. Further details on the event and the certificate can be obtained from Martin Snow, GW3PRL (QTHR), tel: 01248 430 848.

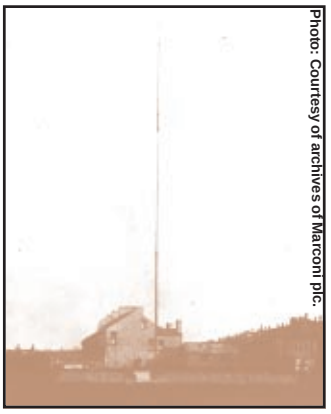

Photo: Courtesy of archives of Marconi plc.

Holyhead Coast Wireless station in 1901, showing the house where the station was located and 150ft mast in adjacent grounds.

Yugoslav Ham is New Envoy

WELL-KNOWN contester and DXpeditioner Radivoje 'Rasa' Lazarevic, YU1RL, has been named as Yugoslav ambassador to Brazil. The 39-year-old has operated many times from Brazil and Fernando de Noronha. He is a founding member, and vice-president, of New Democracy, a pro-European party in Yugoslavia. [*The ARRL Letter*]

Wandering Lead

AN ERROR crept into Fig 2 of the 'Door Loop Receiving Antenna' on p24 of the May *RadCom*. The lower end of R4 should be connected to the drain of TR2 and not as shown. The component layout of Fig 3 is correct, however.

WRTC 2002 in Finland

THE NEXT World Radiosport Team Championship (WRTC) - sometimes described as 'the Olympics of Amateur Radio' - will take place in Finland between 9 and 16 July 2002.

WRTC is a competition among two-person teams of some of the top amateur radio contest operators in the world. By bringing these competitors together in one geographic area and providing equal operating conditions, the variables normally associated with radio contesting are minimised, and the individual team's operating skills are emphasised.

WRTC 2002 will coincide with the popular Finnish amateur radio 'summer camp', and visitors are invited, whether or not they will be participating in the WRTC competition. WRTC 2002 will be organised jointly by the Finnish Amateur Radio League (SRAL) and Contest Club of Finland (CCF). Nokia (which employs more than 10% of the amateur population of Finland) and the other main sponsors will be contributing 50% of the US$400,000 budget.

For further details please take a look at the WRTC 2002 web site at www.wrtc2002.org/

Brits Taking Over in Oz?

THE WIRELESS Institute of Australia held its Federal Conference and AGM on 28 April. Ernest Hocking, VK1LK (ex-G4LNK), was installed as President. Ernest succeeds Peter Naish, VK2BPN (ex-G3EIX), who has been in the chair for the past three years and has now taken over as President of IARU Region 3. The Executive Directors of the Federal WIA are David A Pilley, VK2AYD (ex-G3HLW), Don Wilschefski, VK4BY, and Brenda Edmonds, VK3KT.

Ernest Hocking, VK1LK, the new President of the WIA.

Each of the six States (VK2 - 7) and two Territories (VK1 and VK8) in Australia has its own WIA President and Directors, together with a Divisional Councillor who acts as the liaison between Division and Federal. At the AGM each Councillor has one vote, giving all Divisions an equal voice.

Air Ambulances in Action

THE ESSEX Air Ambulance Support Group will be operating special event station GB0EAA over the weekend of 16 / 17 June. It costs £60,000 a month to run the Essex Air Ambulance and the station hopes to raise some funds for this very worthwhile cause. GB0EAA will be located at Boreham Airfield, Boreham, near Chelmsford and will operate on all HF bands plus 6m, 2m and 70cm on SSB and FM. Further details from Brian Jopson, G0UKP, tel: 01702 346826 or Brian Hall, G7MHK, tel: 01621 782825; e-mail g7mhk@m1cro.crg.uk

● ICOM (UK) Ltd of Herne Bay, Kent, recently donated an aviation radio transceiver to the Kent Air Ambulance Trust. The radio will be used to relay important information such as patient details, general and technical advice and flight details from the helicopter to ground control.

The Essex (left) and Kent air ambulances.

VHF Award News for April 2001

APRIL PRODUCED the grand total of two claims, both for 50MHz. The first was from regular claimant John Ridd, G8BQX (TN), who updates his Squares award to 450 and his countries to 110. The other successful claim was from Roy White, G6XCY (CM), who gains a certificate and sticker for 10 countries (2-way).

Congratulations to both recipients.

Details of all VHF / UHF Awards can be found in the current *RSGB Yearbook* and are available via the RSGB web site at www.rsgb.org/awards Information may also be obtained on receipt of an A4 SASE from the Awards Manager, Tony Jarvis, G6TTL (QTHR).

Summary of Award Recipients for April

50MHz: 450 Squares: G8BQX.

10 Countries (2-way): G6XCY. 110c: G8BQX.

Successful QSO via Oscar 40

THE FIRST two-way contacts have taken place through AMSAT Oscar 40. John Crabbe, G3WFM, was possibly one of the first UK amateurs to make a two-way QSO through AO-40 when he had a contact with W3PM at 0815UTC on Saturday 5 May. The satellite's transponders were switched on experimentally and John made the contact on mode 'U/S': 70cm uplink and 13cm down.

DXpedition Video

A PROFESSIONALLY prepared video of the East Timor DXpedition by K7BV and N6FF was introduced to DXers at the International DX Convention in Visalia, California, in April. The 32-minute video is titled: *4W/K7BV 4W/N6FF Timor Lorosae DXpedition - Memories Beyond the Pileups*. It is available in VHS tape format (NTSC for USA) or on a CD for $15US + $5 handling (enquire about PAL standard VHS video). Details from Dennis Motschenbacher, K7BV, 4357 Appollonio Way, Washoe Valley, NV 89704, USA, e-mail: k7bv@aol.com

Pioneering Work on 76GHz Band Recognised

G3BNL Microwave Trophy Presented to Wessex Group

THE G3BNL Microwave Trophy was awarded to amateur microwavers G3PYB, G3FYX, G8BKE and G8ACE, known as the 'Wessex Group', during the annual Microwave Round Table meeting held at the Rutherford Appleton Laboratory on 8 April this year.

The Trophy, in memory of amateur microwave pioneer Les Sharrock, G3BNL, was awarded to the four amateurs for their recent work, as a group, on 76GHz.

Their work involved constructing equipment from scratch, designing highly stable oscillators for SSB / CW use and investigating propagation on this high microwave frequency, culminating in a new UK distance record for the 76GHz band, at 52km, on 28 January this year.

More information is available on the website of Peter Day, G3PHO, (Editor of the RSGB Microwave Newsletter) at www.g3pho.free-online.co.uk/microwaves/ral2001.html

Left to right: Members of the 'Wessex Group' Roy Emery, G3FYX; Chris Towns, G8BKE and Peter Blakeborough, G3PYB, receive the G3BNL Trophy from RSGB Microwave Chairman Julian Gannaway, G3YGF (far right). The fourth member of the group, John Hazell, G8ACE, was unable to be present.

Space Tourist is New Ham

THE AMERICAN multi-millionaire Dennis Tito, who reportedly paid $20 million to become the first space tourist, is now licensed as KG6FZX. He took and passed the American Technician exam in April after a volunteer examination session was set up for him in Russia, where he was undergoing training to go into space. NASA sources have said that Dennis Tito will have access to the ARISS amateur radio equipment on board the International Space Station on a "non-interference basis" - meaning that he must not interfere with the crew's work or sleep schedules.

MaxPak Web Site

THE MAXPAK (Midlands AX25 Packet Group) web site has been relocated to Freeserve, to overcome rising charges from the previous ISP. Freeserve does not allow password access to pages, therefore MaxPak has renamed the Members page to 'Downloads', and a password is no longer required. All the usual facilities will continue for software downloads and nothing else should change in the foreseeable future. The two MaxPak domain names, www.maxpak.org and www.maxpak.org.uk will access the web site irrespective of which ISP is providing the service.

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Windermere Special Event Station

The Windermere Steamboat Museum Amateur Radio Society (WSM-ARS) is organising a special event over the weekend of 9 / 10 June to celebrate the museum's early connections with mobile radio. In 1904 the steam launch Bat was steamed around the north end of the lake under radio control from the shore, the only person aboard being the 'stoker'. Very little is now known about this set of trials but Bat remains preserved in the museum, although today she shows no signs of huge battery installations, nor the erection of the 1904 equivalent of a Tennamast! The mobile radio theme of the event will be displayed on the Sunday by exhibits from the Cumbria Constabulary, including their waterborne element, the RAF Leeming and Ambleside Mountain Rescue teams, a detachment and command post of the Territorial Army and the National Park Ranger service. The Model Steamboat Club will be steaming around the boating pool and Bat will be on the lake and probably equipped with an amateur radio station.

The WSM-ARS will be activating its permanent special callsign GB2WSM throughout the weekend and especially looking for world-wide contacts with stations with 'WSM', 'BAT', and 'WSC' (Windermere Steamboat Centre) in the callsign. The club plans to have PMR-446 equipment available to enable visitors to have 'hands-on' experience of mobile radio in a modern context. Further details from Roy Walker, G0TAK, e-mail: g0tak@thersgb.net

"I Just Sawed the Front off a Yaesu FT-8100 . . ."

WACRAL MEMBERS were recently received a presentation by member Dr David Palmer, G4PFX, on the development of his remarkable satellite e-mail system. Designed and manufactured as an affordable, self-contained unit for use in remote areas of the developing world by unskilled relief and mission workers, David has already installed systems in the Sahara, Tanzania, Zimbabwe, Zambia, Uganda and Ghana at an average cost of around £2000 - a small fraction of the amount of conventional commercial systems.

Working under the name 'PGS Christian Communications', David's equipment is built into a standard waterproof NATO container and weighs only 6kg. The self-contained unit has a built-in 4.5Ah battery and solar charger. Plug in the accompanying antenna and Psion Palmtop PC, and the worker is able to type up his reports and correspondence to his regional or overseas head office, ready for unattended 'collection' by a satellite when it sweeps overhead.

"I just sawed the front off a standard Yaesu FT-8100", explained David, "stuck it in a box with a KPC9612 TNC, a 'home-brewed' interface, a battery and, with a bit of programming for the Psion, got it on the air." This understatement extends to the clever portable antenna with dedicated circuitry built into "a bit of plastic drainpipe".

More information on this innovative system is available direct from Dr David Palmer, G4PFX, tel: 01737 772391. Details about WACRAL activities can be obtained from Derek Chilvers, G3XNX, tel: 01803 854504.

David Palmer, G4PFX, with his low-cost satellite e-mail system.

Logo Design Competition

AMSAT-UK has announced a competition to design a new logo for Oscar 40 to supersede the existing Phase 3-D logo. The competition is open to allcomers and requires the design of a badge that can be employed as a visual tag for Oscar 40 in print and on web sites, ties, patches etc. Entries should be submitted by electronic means in GIF or JPEG format to g3vzv@amsat.org The closing date of the competition is **15 July** and the winner will be announced at the AMSAT-UK Colloquium on 29 July. The winner will be selected by a panel comprising all attendees at the AMSAT-UK Colloquium, with the senior AMSAT officer present having overall right of acceptance. The prize for the winner is one year's free membership of AMSAT-UK - plus the accolades of fellow amateurs around the world! There is also a prize for the P3D fund (or its successor) of an anonymous donation of £250 sent via AMSAT-UK.

G3PLX Honoured

CONGRATULATIONS to Peter Martinez, G3PLX, who has been chosen to receive the Dayton Hamvention Technical Excellence Award for 2001. Peter, active on RTTY since the 1960s, is recognised as the father of PSK31, an increasingly popular mode of digital communication. PSK31's elegant and effective design has helped to revitalise interest in HF digital modes. The award is to be formally presented at the Dayton Hamvention banquet on 19 May.

G3XBE is No Pirate!

WE ARE ASSURED that the above callsign is currently and validly held by Mr H Walton of 9 Melbourne Court, Nottingham NG8 5DE and was omitted from the current *RSGB Yearbook* by reason only of an administrative error.

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ALINCO DR-430 ..... 70CMS MOBILE 155
ALINCO DR 510E .... 2M/70CM MOBILE TRANS 179
ALINCO DR MO6 ..... 10W 6M MOBILE TRANSCEIVER 149
ICOM IC2100H ..... 2M FM MOBILE TRANSCEIVER .. 169
ICOM IC2500E ..... 70/23CM MOBILE TRANSCEIVER 329
KENWOOD TH 79E .. 2M/70CM HANDIE TX 159
KENWOOD TM 231E .. 2M MOBILE 139
STANDARD C8900 .. 2M FM MOBILE 125
TRIO 751E ..... ALL MODE 2M MOBILE 325
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YAESU FT2200 ..... 2M FM MOBILE TRANSCEIVER .. 139
YAESU FT221R ..... 2M MULTIMODE TRANSCEIVER 199
YAESU FT225RD ..... 2M MULTIMODE TRANS 359
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GRUNDIG YB400 .... SHORTWAVE RECEIVER 79
GRUNDIG SATELLIT 800 MULTIBAND RECEIVER 399
ICOM R10 189
ICOM ICR72 ..... HF RECEIVER 399
JRC NRD345 ..... HF RECEIVER 325
LOWE HF150 ..... HF RECEIVER 199
SONY ICF-SW7600G .. SHORTWAVE RECEIVER 119
YAESU VR500 ..... HANDHELD SCANNER 149

ACCESSORIES

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HI-MOUND HK802 .. BRASS HAND KEY 49
KENWOOD AT250 .... AUTO TUNER 175
KENWOOD VS2 ..... VOICE BOARD 40
KENWOOD MC85 .... BASE MICROPHONE 69
KENWOOD SP31 ..... EXTENSION LOUDSPEAKER 59
MFJ 784B ..... DIGITAL FILTER 139
MW MODULES 432/144 .... 2M/70CM TVTR 59
OSCAR SWR-200 .... SWR POWER METER 35
SYMEK TNC 2H+RF DECK .. 9.6K TNC +10W RADIO 179
SWAN WM6200 ..... 50-150MHZ PWR/SWR M 30
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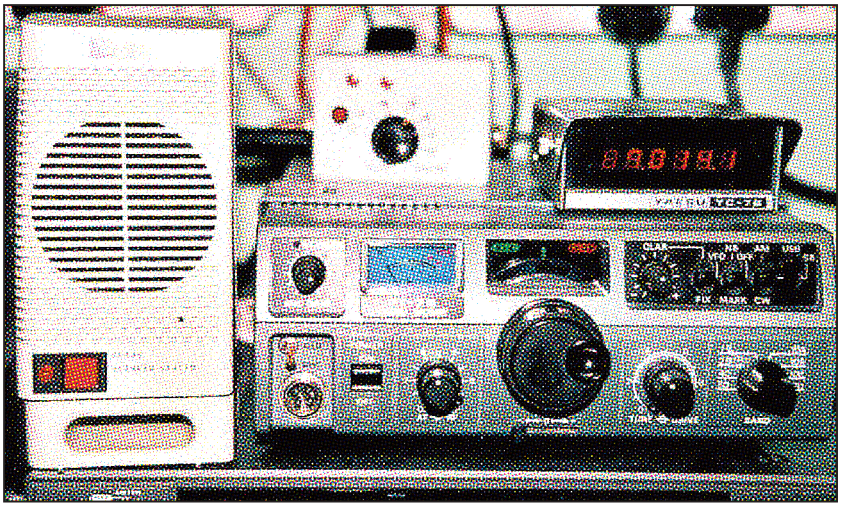
A Talking Morse Code Reader

A PIC-based project by Jonathan Gudgeon, G4MDU *

IMAGINE THE delight of tuning into Morse code, which is then spoken from a loudspeaker character by character; this project does just that. In the June 1999 edition of *RadCom* I described a simple low-component-count PIC Morse code decoder [1] that decoded Morse characters which were subsequently displayed on a two-line LCD module (1). A natural progression from that project was to interface the decoder to a speech recorder chip that would read aloud each character as it was decoded.



It speaks your language: the reader in action.

The first question to ask is "how fast would you need to speak if you wanted to say each character as it was received?". I set out to record the length of time required to say a standard five-character word and found that I could comfortably speak at two characters a second, which is 120 characters per minute or 24 words per minute (WPM). With this simple calculation appearing to be in order, the next question was to discover whether a speech recorder chip existed that would record individual messages as short as 0.5s duration that could be selected for playback.

There are several speech recorder devices available to suit all manner of purposes [1]. The device chosen was the ISD2540 (2). This is capable of recording 40 seconds of audio continuously or broken down into 320 individual messages. The ISD2540 includes an on-chip oscillator, automatic gain control for the microphone input, an anti-aliasing filter, smoothing filter and speaker amplifier. The chip records the sound in on-chip non-volatile memory that will retain the recorded messages for 100 years with no power applied. Indeed, the chip may be thought of as an analogue tape recorder with the capability of positioning the record / playback head anywhere on the tape to an accuracy of 125ms.

This resolution does, however, require a 9-bit address and, because I wish to interface the chip to a single 8-bit port on a PIC, this reduces the resolution and number of messages possible by half. This still provides 160 individual messages each of 250ms duration. This easily meets my requirement for 26 characters of the alphabet, 10 for the numerals, and a further dozen or so for punctuation, thus totalling 25 of the 40 seconds available in the chip, leaving spare capacity for the future.

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CIRCUIT DESCRIPTION

THERE ARE four sections to the decoder - audio AGC, tone decoder, microprocessor control and the speech chip (see **Fig 1**). Audio at a level of 50mV to 5V RMS from the head-phone socket of a receiver is applied to the input capacitor C1. The op-amp IC1 is used in an input differential mode, and its output is rectified by a voltage doubler comprising C3, D1, D2 and C4, produc-

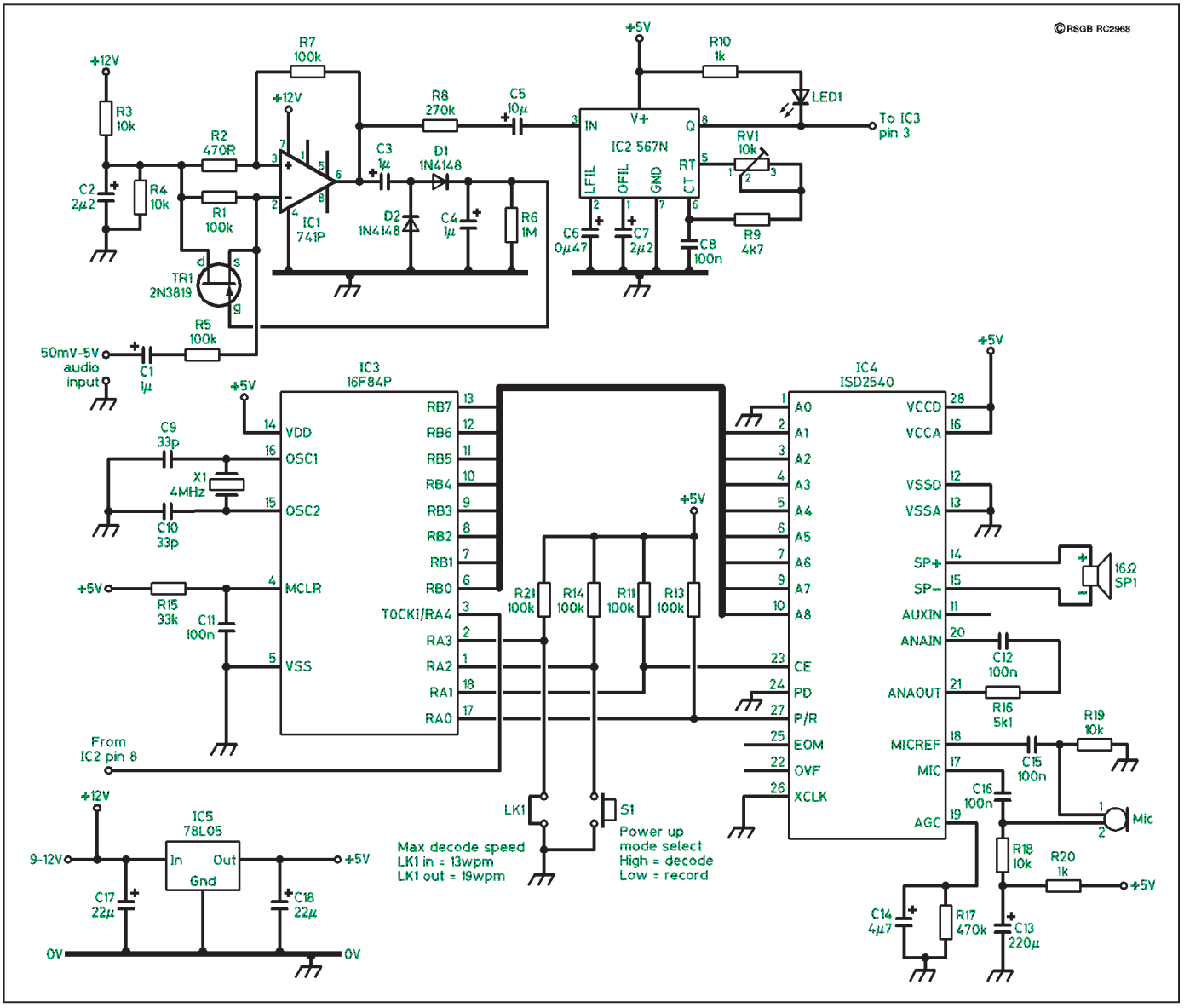

Fig 1: The complete circuit diagram of the Talking Morse Code Reader.

ing a 0 to 5V DC voltage proportional to the input signal. The lower the input signal, the lower the DC voltage on the gate of the JFET TR1. This results in a low resistance between the drain and source of TR1, thus providing a signal path through it; the signal is then amplified by the higher gain input pin 2 of the op-amp. Larger signal inputs result in the FET 'pinching off' and producing a high resistance, resulting in the input signal being applied to the lower gain op-amp input of pin 3. The overall effect is an audio gain control that produces a constant output for a very large range of input signals. Those readers who constructed the LCD Morse decoder from the original *RadCom* article [1] may like to consider building this AGC circuit as an add-on. It negates the problems of setting the correct amplitude for the decoder as the output is set at a fixed value suitable for input to the tone decoder. This AGC circuit must, however, operate from a supply of 12V or certainly greater than 8.5V, or it will lose its ability to handle such a broad input range of voltages.

Next, the audio is applied to IC2, a highly stable phase-locked-loop (PLL) tone decoder. Component selection provides a narrow detection bandwidth for a tone of about 800Hz. The variable resistor R12 allows a preferred tone frequency to be selected. When a tone of the correct frequency is present, the output pin 8 of IC2 goes low and is indicated by an illuminated LED. Careful tuning will make the LED illuminate in time with the received Morse code.

If you wanted to make a Morse code practice unit, you could omit these first two sections and just key IC3 pin 3 down to ground with your Morse key.

This signal from IC2 pin 8 is applied to a 16F84P microchip, IC3, operating with a clock frequency of 4MHz. The compiled PicBASICPro (3) program within this microcomputer automatically decodes the Morse code after about five characters. These first few characters are required for the decoder to calculate how fast the code is being received by determining the length of a dot. For a full description of the operation of this program please refer to the original *RadCom* article [1]. The decoded character is used to access a 'look-up table' and set the 8-bit message address of the speech chip, IC4. Within IC4 the complete character set of the decoder is recorded during the initial set up. These are recorded with a sampling rate of 6.4kHz and a 2.7kHz filter passband, producing good-quality recorded speech. The speech chip is instructed to play the contents of each memory address presented to the chip as each character is decoded. When an end-of-message marker is reached, the chip automatically stops playing. The audio output of IC4 is applied directly to a loudspeaker from which the spoken Morse character can be heard. The on-chip differential speaker driver is capable of dissipating 50mW in a 16Ω load, which is amply loud enough for shack operation.

CONSTRUCTION

THIS IS straightforward with no hard-to-get components. IC4 was purchased from Farnell (4) with the remaining components obtained virtually anywhere. The total cost of all the components is approximately £25.

The component overlays on the printed circuit board are given in **Fig 2**. Care should be taken first to insert eight wire links on the board. Don't forget the wire link under the socket of IC4. There is no reason why the unit could not be built on Veroboard as layout is not critical. Pay careful attention to the polarities of the electrolytic capacitors, as these must be inserted the correct way round for the unit to operate.

I found an old computer-type loudspeaker to be an ideal enclosure for the PCB as it had a convenient shelf within it to mount the board. There was also plenty of room on the front panel to mount the mode switch with a built-in LED. On the back of the enclosure I mounted a 3.5mm audio connector to allow the audio to be looped through the unit to accommodate a second speaker.

Once the unit is complete, apply a constant tone to the input and check that with a frequency of about 800Hz the LED illuminates. I found the crystal calibrator within the transceiver to be an easy way of producing a suitable tone.

Adjust R12 to set your preferred Morse code audio frequency. There are no other adjustments.

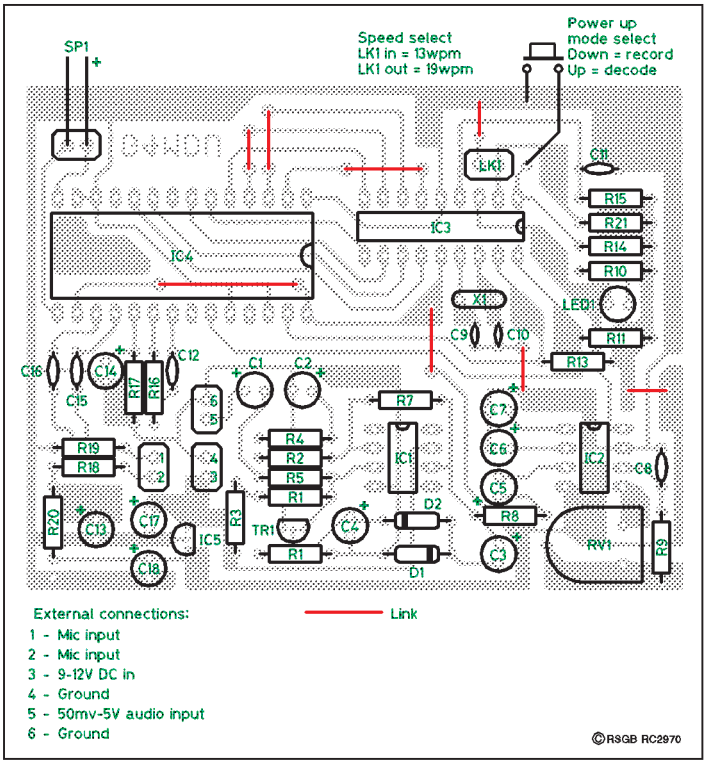

Fig 2: Positioning the components on the PCB.

OPERATION

THE FLOW CHART of **Fig 3** illustrates the operation of the program within the decoder. When the unit is first built it is necessary to record the complete character set that the decoder can decode, one character after another. First, make sure the speed link is in place to put the unit into the slower decode function (speeds up to 13WPM). Now, while 12V power is applied to the PCB use a push button switch to make the Mode pin low. This instructs the PIC to begin a record routine. There is no need to hold the record push switch down as it only needs to be pushed while power is applied. The tuning indication LED provides the user with feedback by illuminating for three seconds to indicate that recording is about to commence. The LED then illuminates again for about 0.4 second, during which time the first character must be spoken into the microphone (see **Table 1** for the sequence of characters). This process is repeated until the complete character set has been recorded in the speech chip.

Once the recording cycle is complete the unit plays back the entire character set one by one. This process is not easy and does take a little bit of practice to get the recording process right. It requires you to speak into the microphone at exactly the same time that the LED illuminates, otherwise the character is chopped and incomplete. After a couple of attempts, I had something quite pleasing. I found that it was important to exaggerate the characters, so that characters such as V, E or P did not all sound the same. How the punctuation is spoken is left to the individual to decide, but remember that you only have a fraction of a second to say the character. If you decide not to record the punctuation characters then the decoder will simply remain silent should it encounter any of these.

The next time the unit is powered up, make sure that the mode select switch is *not* down to ground and the decoder will say "CQ DX", and then be ready to begin decoding any Morse, once tuned in.

For those constructors wishing to fabricate the PCB, a track-pattern (to the same scale as Fig 2) is shown in **Fig 4**.

HOW FAST?

THE DECODER WILL read up to a speed of 13WPM with the LK1 option link in position (slow mode) and up to 19WPM with it removed (fast mode). The difference between the speed

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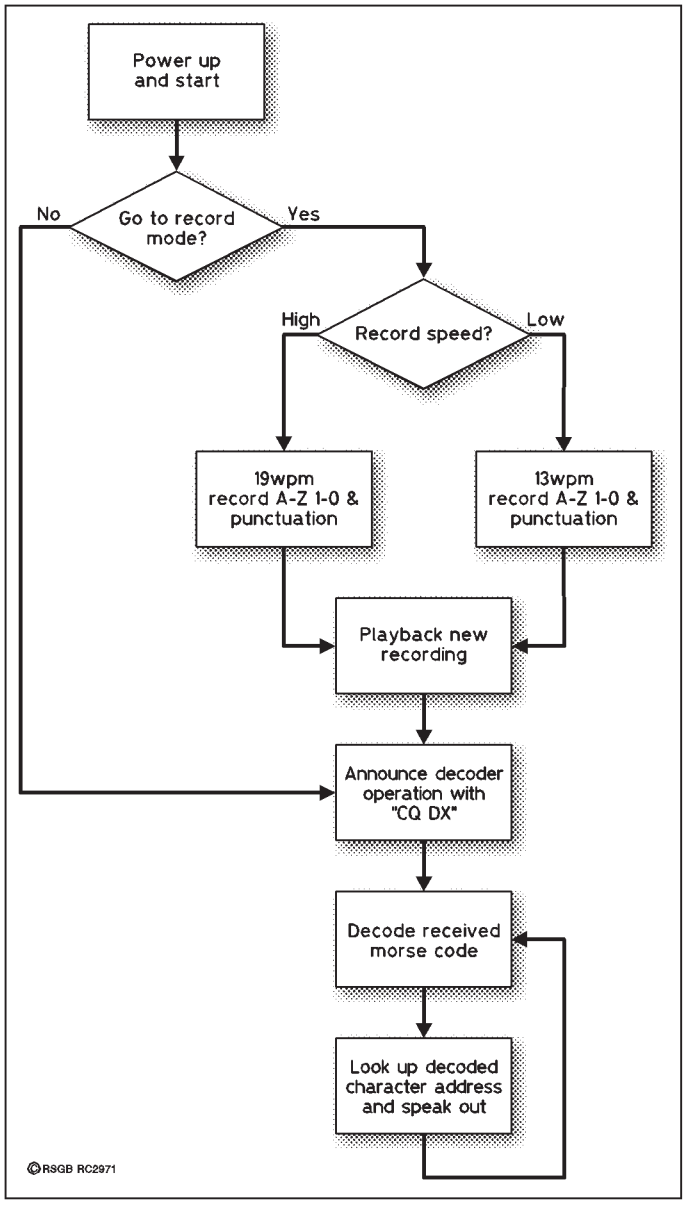
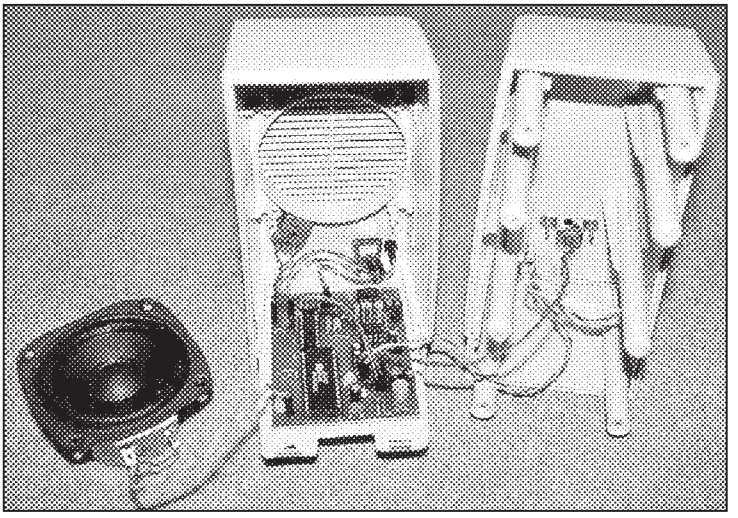
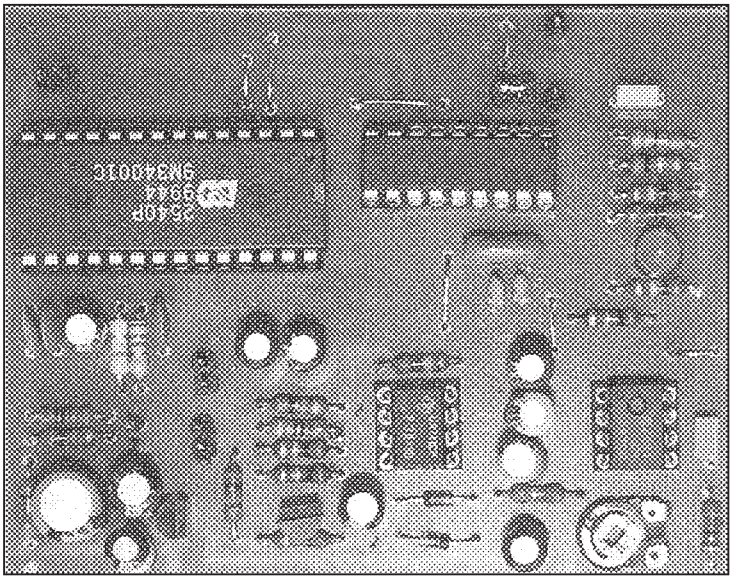


Fig 3: Flow diagram of decoder operation.



The completed unit, showing how the major components fit inside a gutted computer speaker. The presence of the socket on the back is explained in the text.



The completed PCB, shown from the component side. This should be compared directly with Fig 2.

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modes is the length of time available for the recording of the characters. The slower speed provides more time for a longer spoken character but, consequently, carries a time overhead resulting in a slower decode speed. I suggest that you begin with the decoder in the slow mode then, after some practice, move the link and re-record the character set to provide decoding at higher speeds. The decoder will perform easily up to 25WPM, with the exception of the character E. So, if you can live without your E, the decoder will go faster! This is because a single dot length is so short that it gets sent to the speech chip before the chip has finished speaking the last character. Despite hours of tweaking, 19WPM is the best I could achieve.

COMPONENTS LIST

Resistors

R1, 5, 7, 11, 13, 14, 21	100k
R2	470R
R3, 4, 18, 19	10k
R6	1M
R8	270k
R9	4k7
R10, 20	1k
R15	33k
R16	5k1
R17	470k
RV1	10k preset

Capacitors

C1, 3, 4	1µF
C2, 7	2.2µF
C5	10µF
C6	470nF
C8, 11, 12, 15, 16	100nF
C9, 10	33pF
C13	220µF
C14	4.7µF
C17, 18	22µF

Semiconductors, etc

IC1	LM741P
IC2	NE567
IC3	16F84P, available programmed from the author for £8 (inc p&p). PicBASICPro source and hex code available for £5
IC4	ISD2540P
IC5	78L05
D1, 2	1N4148
LED1	LED - any colour
TR1	2N3819 JFET
X1	4MHz resonator or crystal

Additional Items

SP1	16Ω loudspeaker
Mic	any electret microphone
LK1	2-pin link
S1	single-pole push-to-make switch
PCB	(*not* available from the author) see Fig 2 and Fig 3.

Any suitable case

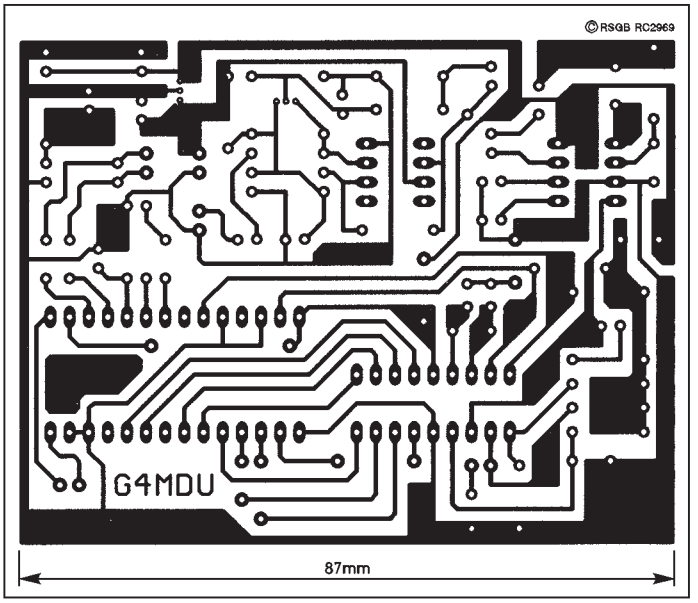


Fig 4: The track pattern for the PCB.

THE FUTURE

THE ISD2540P IS AVAILABLE as a pre-recorded device, but the programmer required was simply too expensive for my amateur budget, which is a shame, as I had thought of recruiting a celebrity for the voice! This does, however, mean that the decoder is multi-lingual and able to reproduce regional accents. One way to perfect the character recording would be to use a computer's sound card to record the character set and then adjust the timing of individual characters until perfection. Then play the recording to the decoder.

Those of you who decode Morse in your heads will find this project a real mind-scrambler. As with the previous decoder, the characters are heard after a small delay, which is more than enough for your brain to have decoded the character and be waiting in anticipation. You must make your mind up weather you are going to listen to the incoming Morse code or the voice! ♦

1	A	11	K	21	U	31	5	41	)
2	B	12	L	22	V	32	6	42	>
3	C	13	M	23	W	33	7	43	?
4	D	14	N	24	X	34	8	44	"
5	E	15	O	25	Y	35	9	45	.
6	F	16	P	26	Z	36	0	46	,
7	G	17	Q	27	1	37	*	47	-
8	H	18	R	28	2	38	=	48	;
9	I	19	S	29	3	39	/	49	'
10	J	20	T	30	4	40	(		

Table 1: The 49 characters used by the decoder.

REFERENCES

[1] 'A PIC-Based Morse Decoder', G4MDU, *RadCom* June 1999, p14ff.
[2] 'The 'Polly' Audio Store', G3TTC, *RadCom* February 2001, p17ff.

WWW.

(1) User support www.g4mdu.thersgb.net
(2) Chip information ..... www.isd.com
(3) Information on PicBASICPro compiler ..... www.picbasic.co.uk
(4) Farnell Electronic Components Ltd ..... www.farnell.com/uk/index.htm
Tel: 0113 263 6311.
ISD2540 order code 140-090

Helplines

RadCom FOR MEMBERS

● Charles, Z21GQ, is looking for circuit diagrams for two News Service receivers, the **Telefunken E-1503** and **RFT E-315**, the latter made in the former East Berlin. He would also like to correspond with anyone who is interested in HF transceiver and synthesiser design and construction. Charles Frizell, PO Box UA 483, Union Avenue, Harare, Zimbabwe. E-mail: granite@africaonline.co.zw

● Tony, G3ICB, is looking for several things. He would like a circuit and parts list for the **AVO DA116**, a source of **drive belts** for obsolescent record players, and a source of **EHT components** for microwave ovens. G3ICB, QTHR. Tel: 01635 848 783, fax 01635 872 762. E-mail: tony.bull@ntlworld.com

● Can anyone help a 96-year-old constructor by steering him through the construction of the **G3XJP PicATUne** in a series of 10-minute weekly QSOs on 80m? R J Leeves, G2LV, QTHR.

● Frans, PA3DDN, would like a copy of **Plessey Application Notes AN1007** and **AN1009** on mixers and intermodulation. He will reimburse all costs. PA3DDN, Prof ter Veenstraat 66, 8302GD Emmeloord, the Netherlands. E-mail: pa3ddn@amsat.org

● Paul, G3NJV, is looking for the circuit diagram or handbook for the **Racal RA1217**, together with any information on modifications to improve its performance. G3NJV, QTHR. E-mail: prandall@connectica.freeserve.co.uk

● D Griggs, G0IPT, requires circuit diagrams for the following: **Telequipment D31 oscilloscope**; **National Monitor WV5310EB**; **Nombrex-42 RF generator**; **Heathkit sine/square generator 1682V**; **Advance RF generator SG62**; **oscilloscope tube 3RP1A**. G0IPT, QTHR.

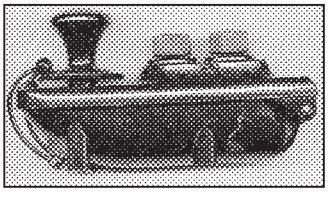
● Alwyn, G0TPE, needs information (manual, circuit diagram, etc) for a **Yaesu FP-757GX** switched power supply. He will cover any costs incurred. G0TPE, QTHR. Tel/fax: 01254 201 455 or e-mail alwyn.davies@mcmail.com

● Gerry, G3OGK, is looking for any **Plessey IC** in the type number range **SP8634 to 8637** (a divide-by-10 with BCD output). G3OGK, QTHR. Tel: 01885 482 929, or e-mail gerry@g3ogk.freeserve.co.uk

● Jack, G2BCY, is looking for information or circuit-placement of components for a **BC221/T**. Photocopies or originals will be welcomed, and all expenses will be paid. G2BCY, QTHR. Tel: 0191 265 4780 or e-mail g2bcy@cwcom.net

● Geoff, G4DED, is searching for information on the **FDK Multi-750E**. The circuit diagram and a copy of the handbook would be much appreciated. He also needs the circuit diagram of the **Icom IC-471A**. All costs refunded. G4DED, QTHR. Tel: 07931 528 269.

● Mike, G0VVA, would like to know if anyone recognises this Morse key? G0VVA, QTHR. Packet: G0VVA@GB7NOT or e-mail: g0vva@thersgb.net



● Calling bereaved or divorced lady radio amateurs and listeners. We have many interests in common. I'm a listener. Would you like to ring me, please, on 01244 815 681? Samuel Owen Hesketh, Queensferry, Deeside.

● Richard, who is still seeking to exchange Polish QSL cards for British QSL cards, is also looking for copies of the **January, February and March 2001 issues of *RadCom***. Richard Pilewski, Broniewsk 12, 09-200 Sierpc, Woy Mazowieckie, Poland.

● John, G4BYV, is looking for an **FV-301**, the external VFO for the **FT-301**. Can anyone help? G4BYV, QTHR. Tel: 01362 638 142 or e-mail g4byv@woodgate73.freeserve.co.uk

● Alan, G3MBL, has a **Kenwood TS-440S** transceiver on which the notch filter does not work on CW. He notices a slight rise in pitch at both ends of the control. Although he has a new front control, not yet fitted, he is wondering if the fault could be in the notch circuit itself. Can anyone help? G3MBL, QTHR. Tel: 01284 827 379.

● John, G4AXO, requires any information regarding a signal **generator covering AF and RF** up to about 340MHz, as supplied by **Nombrex Ltd**, Exmouth, Devon. The serial number of his unit is 01772. G4AXO, QTHR. Tel: 01962 860 807.

● Bob, RS46829, is looking for a manual for the **BC348Q** or **348R**, together with assistance in locating an **AR88** gearbox. All expenses will be met. RS46829, 245 Sandy Lane, Hindley, Wigan, Lancs WN2 4ER.

● Dave, BRS30365, would like to borrow or photocopy the owner's manual for the **AOR AR-2001 scanner**. He will refund all expenses. BRS30365. Tel:0776 994 1243.

● Peter, G4EVY, needs a microphone and manual for an Icom **IC-27E**. He also needs a manual for the model **SSb125T** Pye HF transceiver, having four preset channels in the ATC HF range. Are any other ATC squadrons using this equipment? Peter is the civilian radio instructor for an ATC squadron and has five cadets with Novice licences and four taking the NRAE in June, so any help is in a good cause. G4EVY, QTHR. Tel: 01634 716 463.

● Joe, G3MLQ, urgently requires information (manual, circuit diagram, etc) for the **Gold Star Oscilloscope OS9020A** (or another of that series), and will refund all expenses. G3MLQ, QTHR. Tel: 01664 857 359.

● Alan, G4EXF, is trying to locate a fellow amateur in the Gloucester area who was on 2m during the evening of 7 April, and who mentioned having a particular jaw condition. Alan was the first patient in Europe to be fitted with a new type of titanium jaw in March this year, and would be interested to meet this other person. G4EXF, QTHR. Tel: 01453 822 698.

● Bob, G0HVX, needs to find a couple of **NE602** RF mixers and a **Plessey SL1612** IF amplifier. He is willing to cover any costs incurred. G0HVX, QTHR. Tel: 01707 335 627 or e-mail bob1188@yahoo.com

● George, G4XSM, is desperately seeking a service manual or service data (photocopies would do) for the **Azden PCS-2800** 10m FM transceiver. All expenses, including postage, will be refunded. G4XSM, QTHR. Tel: 01284 768 084.

● Tony, G3ICB, would like a circuit and parts list for the **Avometer DA116**. He also seeks a source of **drive-belts** for obsolescent record players and tape recorders, and a source of **EHT components** for microwave ovens. G3ICB, QTHR. Tel: 01635 848 783; fax: 01635 872 762, or e-mail tony.bull@ntlworld.com

● Jonathan, G0DVJ, urgently requires a circuit diagram or other information about the **Telequipment Oscilloscope DM64** on behalf of a Polish amateur colleague. G0DVJ, QTHR. E-mail: g0dvj@amsat.org

● Stef, PA0SJM, has a **Kokusai 455kHz mechanical filter type MF-455-150 G 4**. It has six connections: on the left N, =B, C=20; on the right 1, 2, 3=20. He wants to build it into a Yaesu FRG-7 receiver, and would like to know how to do it. He believes that this type of filter was used in the KW2000. Can you help him? PA0SJM, H Dirckszstr 18, 1135 HL Edam, The Netherlands. E-mail: stefmac@zonnet.nl

● John, M5JVW, is looking for the circuit diagram and any other information on the **SOTA 144MHz linear amplifier**. It is about 6in square and has switches for Tx, Rx and SSB/FM. All expenses covered. M5JVW, QTHR. Tel: 01925 229 350.

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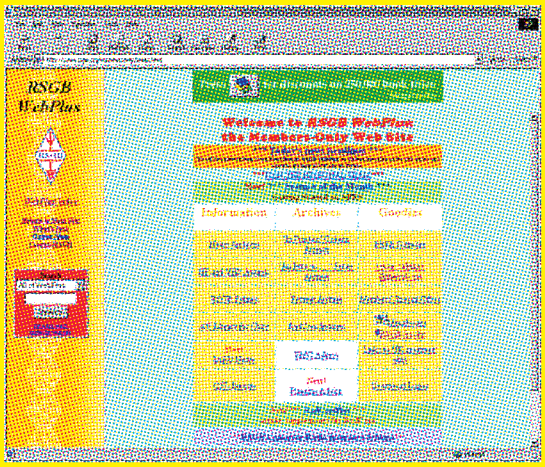

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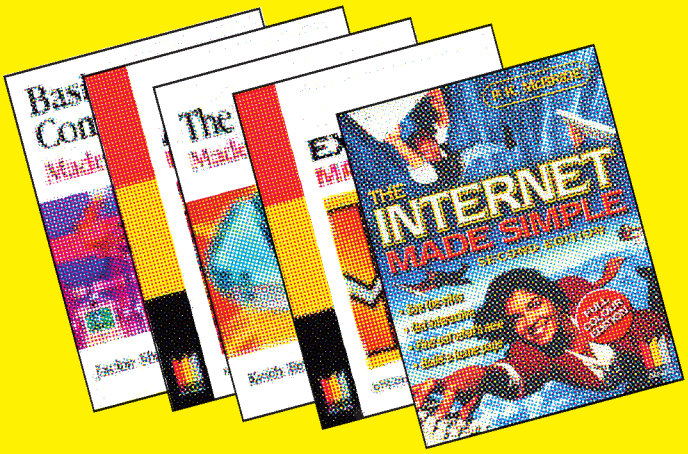

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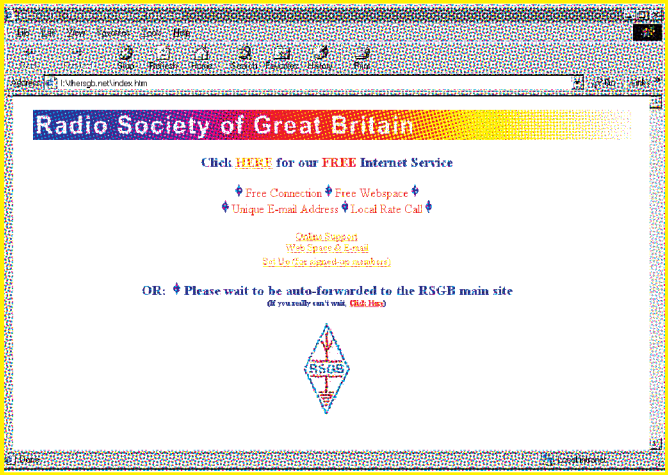

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Technical Feature

Using DSP Software for VHF Beacon Monitoring

by Tim Kirby, G4VXE*

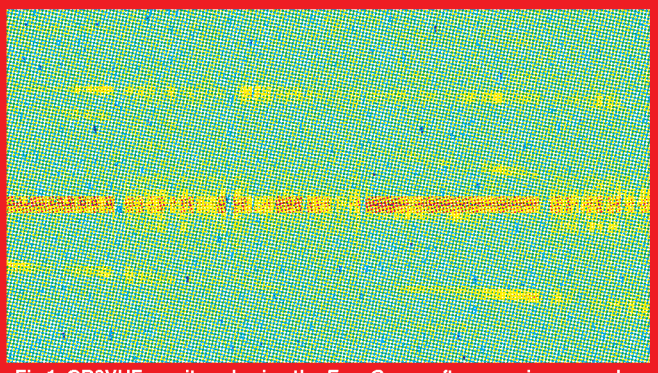


Fig 1: GB3VHF monitored using the *EasyGram* software, using around 300Hz bandwidth.

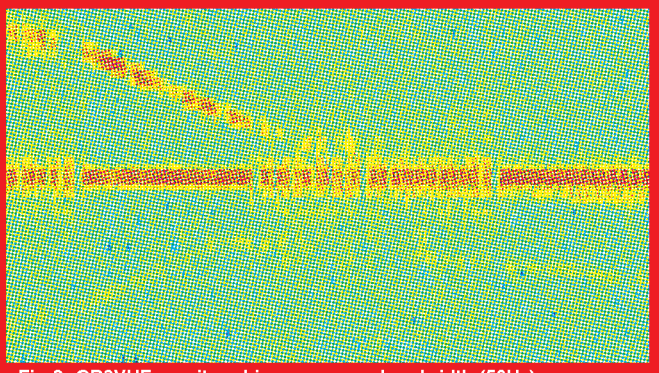


Fig 2: GB3VHF monitored in a narrower bandwidth (50Hz).

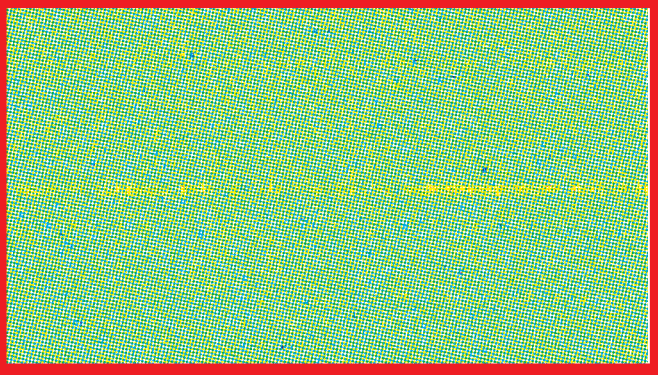


Fig 3: GB3ANG monitored in 100Hz bandwidth.

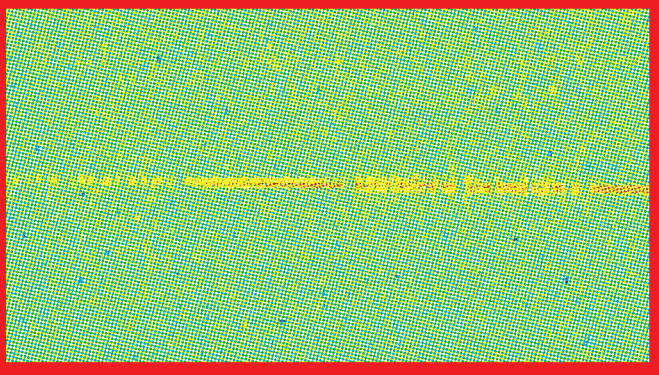


Fig 4: GB3ANG monitored via aircraft scatter.

THIS ARTICLE is intended as a very simple introduction to DSP software and techniques in a practical sense on the VHF bands. It is also intended to show that the techniques used by 'big' stations are just as applicable in a more modest environment.

Here at my home QTH, a small flat in Windsor (IO91QL), I do not have the room to erect a large 144MHz antenna. Pretty much the best I can do is an HB9CV on a small pole on the balcony. However, I am blessed with a good take-off from the south all the way around to the north. Another feature of interest is the frequent arrival and departure of aircraft from London's Heathrow airport.

USING DSP SOFTWARE

OVER THE LAST few months, I casually monitored various VHF beacons, mostly GB3VHF, situated in Wrotham (JO01DH), some 65km from home. Of course, this is simple, even with a small antenna such as mine. However, I was able to notice the effects of aircraft, tropo and other propagation modes creating a significant variation in signal strengths over the path.

I wondered whether it would be possible for me to hear the GB3ANG beacon, situated at Angus in Scotland (IO86MN), some 600km away, with my simple station. I knew that with exceptional propagation it should be possible, but several attempts to hear anything in a few casual listening sessions in 'ordinary' conditions were abortive.

I thought DSP techniques could be useful for me. I was aware that 'large' VHF stations were using them for meteor scatter (MS) and ionoscatter tests. Why not, then, apply the same techniques to a small station? During the course of looking for some information on the world wide web, I came across Johan's, ON4ANT, pages [1]. There was a

*11a Vansittart Road, Windsor, Berkshire SL4 5BZ.

wealth of information there about the subject and his experiences of using a number of packages. I decided to try it out!

In order to do so, you will need:

- VHF station: in my case, an FT-847 connected to an HB9CV antenna. You can probably do better.
- Computer, preferably Pentium or higher spec, with a soundcard.
- Connecting lead between the rig's audio output and the computer line-in jack.
- DSP software.

EASYGRAM

WHEN YOU'RE experimenting with software, at least in a hobby context, you probably don't want to pay for it! At least, I don't. So I selected some software called *EasyGram*, which Johan had mentioned on his web page. This is freeware and may be downloaded from the web [2].

Installation was simple and consisted of unzipping a few files into a directory and then running the *EasyGram* program.

The program provides a 'waterfall' display of what you are listening to: this concept will be very familiar to those that have used the excellent *DigiPan* software for decoding PSK31. In any event, it shows a graphical representation of what is in your receiver's bandwidth. Signals will show up as lines, which can be horizontal or vertical, depending on your preference. I decided horizontal lines were better. *EasyGram* also shows the strength of the signal. No signal or band noise shows up as green, weak signals as yellow and strong signals as red.

You can also save the waterfall display as an image file, which is nice if you want to show other people what you have heard, or keep records. I've used this feature to provide the examples in **Figs 1 - 4**.

The program can be configured to take an image picture on a timer basis, which may prove useful for monitoring signals on a more scientific footing, allowing the build up of history of propagation over a path.

The Scan tab allows you to configure the DSP parameters. They seem to be defaulted to values which might be more appropriate for LF working, which is, I think, where the program has been used primarily.

Just to get started, I suggest using the following settings: Gain 3db, Centre 680Hz and Width 300Hz, FFT 16384, Sample 44100 and Scale 90db. Once you become more familiar with the program, you will probably want to experiment with the settings, but use these for now.

TIME TO START LISTENING . . .

WHAT I SUGGEST to start with is to pick a beacon that you can detect 'audibly', at least most of the time. I used GB3VHF. An indication of the results is shown in Fig 1. Here you can see the main body of signal in red. The solid line is the steady carrier of the beacon. Where it is broken, CW characters are being sent. What is interesting is the faint yellow lines going diagonally. These, I think, show the Doppler shift on the signal due to aircraft coming in above me to land at Heathrow.

Having identified your beacon signal, let's play with the DSP a bit. Select the signal by placing the mouse on the line and then click. This will zoom into the centre frequency and narrow the bandwidth right down to about 30Hz. You'll see your received signal get wider - and if there's much in the way of strength, it'll probably go red. In Fig 2, the Doppler shift resulting from aircraft scatter is very clearly discernible, with the line coming from the top left-hand corner converging on the centre.

The other requirement at this stage is to calibrate your receiver. The reason that this is important is that if you are going to listen for a beacon that you can't easily hear, you'll need to be confident of your receiver's calibration. Again, I used GB3VHF, which I believe is quite accurate.

That was the easy bit. Now I moved my receiver VFO to the GB3ANG frequency, 144.453MHz. It was not 'audible'. To start with, I set the bandwidth on the DSP fairly wide. After a few seconds, I was able to see a weak but tell-tale line emerging across the screen (see Fig 3). The line was broken, rather than solid. This was good news, because it suggested that it was the beacon keying, rather than a spurious in my receiver or a 'birdie' in the locality. I was then able to centre on the frequency and move the bandwidth down to around 100Hz and the tell-tale line became clearer. The steady line across the screen showed me where the beacon is. Intriguingly, for most of the period of this sample, the beacon was inaudible to my ears. Signals were going up and down and I could occasionally copy the beacon audibly although rarely sufficiently to decode the CW identification, but the DSP was getting good copy of the beacon, probably approaching 50% of the time.

In Fig 4, you can clearly see the solid line showing the steady carrier of the beacon followed by the two periods of keying, once giving the callsign and the second giving the locator, before sending the carrier again. Note also, the slight downward slope of the signal from left to right, a difference of 7 or 8Hz over a beacon cycle. I concluded that this was because I was hearing the beacon via aircraft scatter as aircraft took off to the north, moving away from me.

FURTHER EXPERIMENTATION

THE WHOLE EXERCISE proved an excellent introduction to the field of DSP and a thought-provoking one in terms of what the term 'weak-signal' VHF working means today. Truly, there are times when our computers can hear better than we can. These techniques are being very effectively exploited by a small number of VHF / UHF specialists, but perhaps they may be of interest to the more average DXer.

DSP is being used in many facets of amateur radio. At LF, it can be used in conjunction with very slow speed Morse techniques. I highly recommend a look at Mike Dennison's, G3XDV, web pages [3] for a description of some of the experiments that he has made, along with images and sound clips of some of the LF signals. There are also links to other pieces of software such as *Spectrogram*.

If, like me, you used to enjoy meteor scatter contacts on 144MHz using high-speed CW you may be interested to read that variable speed tape recorders and keyers are no longer the norm. Instead, all this functionality can be achieved in software. Take a look at *MS-DSP* from 9A4GL [4]. There are some sound clips of high-speed CW that you can play with and decode. It's interesting stuff!

I encourage you to experiment with DSP techniques for weak signals if you have not already done so. It is very simple but the results are fascinating. The experiments I described are suitable for those of us with a small VHF station. If you have a larger antenna, such as a 9-element or bigger, then you may be able to set your sights higher in terms of an even more distant beacon to monitor. ♦

WWW.

[1] Johan's, ON4ANT, pages: http://www.qsl.net/on4ant
[2] *EasyGram* software: http://mujweb.atlas.cz/www/ok1fig/easygram.htm
[3] Mike's G3XDV, LF pages: http://www.lf.thersgb.net/
[4] 9A4GL pages (*MS-DSP*): http://ham2.irb.hr/9a4gl/

FURTHER READING

The VHF / UHF DX Book, edited by Ian White, G3SEK
Guide to VHF / UHF Amateur Radio, by Ian Poole, G3YWX
The VHF / UHF Handbook, edited by Dick Biddulph, G8DPS (M0CGN).

WHATEVER NEXT

STEVE WHITE, G3ZVW
31 Amberley Road, London N13 4BH.
e-mail: steve.white@rsgb.org.uk

RADIO AMATEURS have a long and proud tradition of making communication equipment do things it was never intended to do, sometimes saving themselves plenty of money in the process. For example, after WWII government surplus equipment found its way into many a shack (some of it still being there today!); and I'm sure we all know someone who has re-used the aluminium tubing and fittings from an old TV or FM broadcast antenna on 50, 70 or 144MHz.

These days one of the greatest areas of equipment re-use is the PMR (formerly 'Private Mobile Radio', now 'Professional Mobile Radio') transceiver. First came valve-based models, then hybrid models such as the Pye Westminster (the 'Wessie', as it is affectionately known) and the Pye Cambridge. Next came a plethora of fully solid-state models from manufacturers such as Cleartone, Storno and Burndept. Pretty much all of these were crystal controlled, making them ideal for packet radio or a local net where only one or two frequencies are required. The early models were mainly AM, but FM became more common after a while.

In more recent times a number of FM synthesised PMRs have become available as surplus, although some of them have not been easy to convert for amateur use. Finally, who could forget all the CB transceivers that were pressed into service on 10m FM?

THE NEXT GENERATION

JUST LIKE amateur radio transceivers, the production runs of PMR transceivers don't go on for ever. For radio amateurs this is a good thing, because it means current models eventually become surplus models. One particular PMR that should be of interest to radio amateurs is pictured below. It is the Motorola GP300, which has now been superseded by newer models. Although GP300s are likely to remain in service for quite a while yet, it is only a matter of time before some of them find their way into the hands of radio amateurs. Initially, at least, they are likely to cost more than a few pennies, because they are quite well specified (see **Table 1**).

The beauty of the GP300 is that it is programmed externally, which means it is unnecessary to remove the covers or plug in the soldering iron to convert it. However, the fact that the transceiver is programmed externally also presents a problem, because a special connector and programming software are required. Fortunately, programming can be via a computer, and many radio amateurs are - if nothing else - extremely innovative when it comes to making gadgets to interface equipment.

One radio that should definitely become available as surplus quite soon is the Motorola 'Handicom'. The frequency band on which these license-free UHF radios work (approximately 465MHz) is being withdrawn, PMR-446 being the new standard. Incidentally, if anyone has experience of converting Handicoms (or PMR-446 radios) to 70cm operation, I would imagine others would also be very interested to know.

Two versions of the Motorola GP300. Eventually there should be some on the surplus market, and they can be re-programmed for the 144 and 432MHz amateur bands.

HOWLING SUCCESS

AS ANYONE who is active on 136kHz will tell you, working DX on that band isn't simple. Until now this has been mainly done using QRSS (*very* slow Morse). Dot lengths of several seconds are the norm, and reception is accomplished by connecting the audio output from the receiver into the sound card of a computer running Fourier Transform software. Even when the signal that the operator is listening for is completely inaudible to the human ear, the machine can pick it out and display it on the screen. Up to a couple of thousand kilometres this method of communication works fine, but QRSS CW contacts take quite a while and some 'openings' don't last long enough for a QSO to be completed. A recent LF transatlantic QSO took place over a period of weeks, causing some to compare it to the mutual reception of beacons, rather than a true QSO. However, these delays are to be expected using QRSS(S) on LF – and by QRSS(S) I mean *extremely* slow Morse, with dot lengths of over one minute!

News of a somewhat speedier transatlantic crossing broke in late March, when John Andrews, W1TAG, copied a 136kHz transmission from Jim Moritz, M0BMU, using 'WOLF' (Weak-signal Operation for Low Frequencies). Developed by Stewart Nelson, KK7KA, WOLF is a new signal format and pro-

	VHF	UHF
Frequency	136-162MHz	403-433MHz 465-495MHz 490-520MHz
Model No.	P93YPC	P94YPC
Channels	2, 8 or 16	2, 8 or 16
Size	140 x 59 x 42mm	140 x 59 x 42mm
Weight	509g	509g
Battery Life		
(High Capacity)	10.5hrs low power, 8hrs high power	
(Low Capacity)	5.2hrs low power, 4hrs high power	
Power Output	1-5W	1-4W
Channel Spacing	12.5kHz 20/25/30kHz	12.5kHz 20/25kHz
Sensitivity		
(12dB SINAD)	0.22µV	0.22µV
Selectivity		
(EIA SINAD)	60dB 70dB	60dB 70dB
Audio Output	500mW	500mW

Table 1: Specifications for the Motorola GP300 series of transceivers.

If there is an item of new technology you would like to know more about - or one that you know about and think ought to be mentioned here - drop a line to the author, or e-mail him at the address at the start of the feature.

tocol designed specifically for the LF bands. It is a variation on the theme of BPSK (Binary Phase Shift Keying).

As KK7KA says, "It can be used for beacons and for two-way communication. Unlike existing formats, which are optimised for a particular S/N (and corresponding speed), WOLF can operate over a wide range of signal levels. For example, a WOLF beacon transmits a 15-character message repeatedly. If the received signal would be adequate for conventional CW, copy will be displayed in 24 seconds. At a level barely enough for 0.4WPM QRSS, copy will appear within two minutes. Even if the signal is another 10dB weaker, the message can still be received. It will take from 20 minutes to several hours, depending on the stability of the transmitter and receiver. Of course, it is also necessary that the propagation path remain open over the required interval.

"I hope that WOLF will permit a QSO to be completed in an hour, if one station receives a signal that is 10dB weaker than would be needed for QRSS and the other station's signal is 6dB below the QRSS threshold."

For transmitting, a carrier generator with a frequency accuracy and stability better than 1Hz is required, plus a means to apply binary phase-shift modulation. A drift of only 3 milliHertz per minute results in a 3dB loss, while 10mHz per minute will probably make communication impossible. Similar frequency accuracy is required at the receiving end. The only other equipment required is a computer with a sound card.

WOLF software is still at an early stage of development, but several options are provided for keying an XOR gate modulator. One option lets you send a wolfx.txt file to the serial port of a computer, which could key the XOR gate directly. Another technique generates a special type of wolfx.wav file that is on-off keyed, so that you can use a diode detector circuit to drive a keying transistor while the file is played back in continuous loop mode.

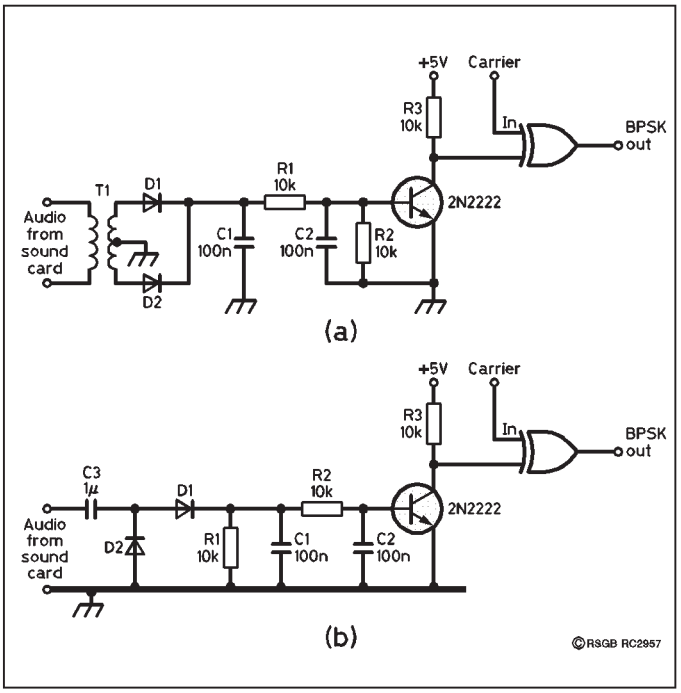


Fig 1: WOLF hardware for using the on-off keyed wolfx.wav file to key a BPSK modulator, (a) using a transformer input, and (b) a voltage-doubler detector circui substituted for the transformer.

Fig 1 shows two circuits that Kyle Kohler, K0LR, employed for using the on-off keyed wolfx.wav file to key a BPSK modulator that consists of an XOR gate such as a 74HC86. Fig 1a uses a transformer input (in his case T1 was a Mouser 42TL026, 16Ω to 500Ω centre tapped transformer that he happened to have on hand). As he says, "Other impedance ratios could be used; the value is not terribly critical as long as it does not put excessive loading on the sound card output and there is sufficient audio voltage at the output so the diode rectification circuit is able to turn on keying transistor TR1." In Fig 1b, the transformer is substituted by a voltage-doubler type of detector circuit. Diodes D1 and D2 in either circuit can be almost any kind of rectifier. K0LR used 1N4148 silicon switching diodes, but mentions that if the audio is a bit weak it might help to use germanium devices such as the 1N34.

Both circuits work with his sound card, which is an old Soundblaster™ that has an on-board amplifier capable of driving loudspeakers directly. Some modern sound cards have only a line output, so may require an external amplifier to provide sufficient drive for these circuits. He also says "It helps to have a 'scope to check the waveform at the collector of TR1 while adjusting the sound card output with the Windows® volume controls. Too much drive will cause the transistor to conduct longer than it should, and too little drive will result in no keying or erratic keying with audio 'ripple' evident during the key-down cycle. A dual-channel 'scope with one trace showing the sound card output and the other trace displaying the collector voltage on TR1 will allow easy adjustment. Lacking a 'scope, you can listen to the keyed signal in your receiver to detect any obvious modulation problems. If you key a CW transmitter from the collector of TR1, the resulting keying should have the same 'weighting' as the on-off keyed audio waveform that is used to generate it.

The WOLF signal itself is very similar to BPSK. In fact it *is* BPSK at MS100, but with a specially constructed bitstream. After each data bit a reference bit is transmitted, so you can think of the signal as having a data channel and a reference channel. The reference part of the bitstream is a long pseudo-random sequence that is known in advance by the receiver. The purpose of this is to enable recovery of carrier frequency and phase, bit timing and message timing, even when the signal is very weak. The message to be transmitted is broken into packets of up to 15 characters each, then source coded into 80 bits. Forward Error Correction coding with a 1/6 rate is then applied, resulting in a 480-bit data stream. After adding reference bits, the final packet is 960 bits long. Consequently, it takes 96 seconds to send. A beacon just repeats this frame. For two-way use, a special protocol allows efficient use of the half-duplex channel.

Although it may seem to be extremely wasteful to devote half the transmitted energy to a signal with no 'information', it is planned that future versions of software will use this for accurate path characterisation. K0LR believes that it will more than recover the 3dB loss, because it will then be possible to combine multiple frames intelligently rather than simply summing them. The effect this will have is that during QSB dips useless noise will be ignored, but data received during QSB peaks will be weighted heavily.

When it comes to receiving WOLF, at the moment the only software available is of the offline variety. Basically, you need to record a .WAV file of the signal, preferably at least 10 minutes long. The file needs to be either 8-bit or 16-bit resolution. K0LR reports that he hasn't actually tested the difference between the two, but would recommend 16-bit sampling in order that there be enough dynamic range to detect a very weak signal in the noise. To get full sensitivity, the audio frequency from the receiver should be known to an accuracy of 1Hz or better, and *you* must make whatever adjustments are necessary to your receiver's main frequency and BFO pitch settings to produce the precisely defined audio output frequency. ♦

WWW.

WOLF: http://www.scgroup.com/ham/wolf.html

Newcomers' News

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

WHAT A mail bag this month! Up until now it has been construction items that have resulted in extra work for my postman and the e-mail server but the response to my question about the Q-code 'QSLL' has been phenomenal.

As I write this column responses are still coming in, the latest from Pete, N5KD, who is also licensed as G4DVP but is now living in Dallas, Texas, and Mike, EI2CL, in Dublin. Many thanks to all who responded, but what did you say?

QSLL MEANS . . .

WHEN BRIAN DAVIS, 2E0BGD, asked me if I knew what QSLL meant, I thought I might be able to find one kind soul to provide an answer through this column. Not so, a whole host of helpers were only too pleased to provide the answer. I was a bit taken aback by one or two letters that took me to task for not knowing! What a pity we do not all know everything.

The general consensus is that QSLL means "I will send you a QSL card when I receive yours". One or two responses said that the abbreviation is also being used, incorrectly, in a slightly different way to mean "I will QSL for sure". Denzil Roden, G3KXF, says that a number of Morse code (CW) abbreviations vanished from the RSGB operating manuals and that more accurate and thorough explanations might be found in pre-1960s books. Any librarians out there?

Alan Williams, G3KSU, points out that if we all sent QSLL no-one would ever receive a QSL card and even if one side of the contact starts the process the return card could be a long time coming via the bureau system.

The most comprehensive response came from Mike Whitaker, G3IGW. He starts off by pointing out that after 50 years with his own callsign and an interest in radio going back to short trousers he still doesn't know all the answers! "We are all on a learning curve and we Old Timers have to be tolerant of errors made by 'Newcomers' and should always be prepared to correct politely and encourage, encourage, encourage". I can't argue with that! Mike goes on to remind us that "the Q-code was originally a professional code and radio amateurs adopted and adapted parts of it for use in the hobby. It evolved slowly". Mike is not too fussed about QSL cards so he often sends 'QSLL' when asked if he will send a card. He says this means "yes, old man, you will get a card, but only on receipt of one from you. Both stations know where they stand and it prevents the bureau being bogged down with unwanted cards".

I have passed on the answer to Brian, 2E0BGD, and I hope others have learned something from this, I know I certainly have. Thanks again to all those who wrote, or e-mailed, including Bob, 2E0ATZ; Des, G3LCS; Colin, MU0FAL; Godfrey, G4GLM; Terry, G0TBD; Allan, G3RDC; Les G8PP / VO2PP / VK3GFO; Tony G4UZN, and Phil, G3SWH.

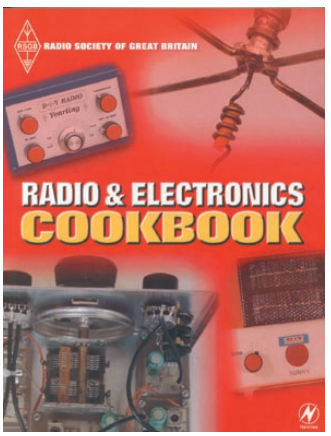
DIY COLLECTION

BEFORE I STARTED writing this column I often exchanged correspondence with Esde Tyler, G0AEC, my predecessor. Following the demise of *DIY Radio* magazine in 1997 I wrote to Esde and suggested that the many excellent articles from the magazine should be brought together in a book. I am not sure if that letter was the catalyst, but it has now happened. The latest addition to my radio bookshelf is the *Radio and Electronics Cookbook* published by the RSGB and Newnes and edited by none other than *RadCom* Technical Editor George Brown, M5ACN.

The book contains no fewer than 88 articles from *DIY Radio*, most of them construction projects. There are receivers, transmitters, aerials, tuning units, pieces of test equipment and one or two 'novelty' projects. I showed my copy to the Design and Technology teacher at the local school where we run our Novice and Radio Amateurs' Exam classes and I had a job to get it back! He now has a copy of his own.

One of the projects, the 'Colt' receiver, is currently coming together on my bench but the original kit is no longer available. John Fletcher, G4EDX, who now runs Kanga Products, says that he does not stock the printed circuit boards but could resurrect them if there were sufficient demand. I will keep you posted.

John asked me to mention his new 'Add-on Amplifier' kit which he says is ideal for newcomers. A small LM386 audio amplifier, mounted on the back of a potentiometer (volume control) which can be used to boost the audio from a crystal receiver, Morse practice oscillator or even to form a homebrew intercom. Details can be found on the Kanga web site [1] or by sending an SASE to Kanga Products, Sandford Works, Cobden Street, Long Eaton, Nottingham NG10 1BL.



The *Radio & Electronics Cookbook*, available from RSGB Bookshop (see 'DIY Collection').

MORE NOVICE RESULTS

ONCE AGAIN David Pratt has published the examiners' report from another successful Novice Radio Amateurs' Exam. The overall performance of the candidates was well above average, with almost 88% of those taking the exam gaining a pass. The report says that the candidates and their tutors are to be commended. As always commiserations to those who did not quite make it, you will have another chance on 10 September. Good luck to those sitting the June exam any day now.

The examiners' reports are a good revision tool as they point out which questions have not been answered well, giving a hint at what might crop up in the future. For example, if 60% of candidates thought that an RF power control would be found on a receiver, rather than on a CW transmitter, you can bet that the examiners will be trying that one again soon!

Past reports for both RAE and NRAE can be found on the web [2] or can be obtained by sending an SASE to RSGB Headquarters and a note stating which report(s) you would like. ♦

WWW.

[1] Kanga Products: www.kanga.demon.co.uk
[2] RAE / NRAE past reports: www.kippax.demon.co.uk/c-and-g/

* *5 Sydenham Buildings, Lower Bristol Road, Bath BA23BS; e-mail: newcomers.radcom@rsgb.org.uk*

Down To Earth

Whatever Happened to Cycle 23?

The second and concluding part, by Gwyn Williams, G4FKH *
Vice Chairman, RSGB Propagation Studies Committee

MANY communication systems use the ionosphere to reflect radio signals over long distances. Ionospheric storms affect radio communications at all latitudes. Some radio frequencies are absorbed and others are reflected, leading to rapidly fluctuating signals and unexpected propagation paths.

CORONAL HOLES AND FLARES

SOME OF THE sun's phenomena that affect radio propagation can be witnessed with the aid of the Internet. For instance, with a little practice one can see the coronal holes that produce high speed solar winds and disturbed ionospheric conditions. **Fig 4** is from the Big Bear Solar Observatory site and the coronal hole is clearly seen in the centre of the picture, just to the right and stretching far to the north of sunspot group 9365. Features like these tend to move across the sun at the speed of about 11° degrees per day, in these pictures with heliographic latitude and longitude shown it is a simple thing to visualise. Only coronal holes that are within about 30° latitude of the equator of the sun will have any effect on earth. When the edge of the coronal hole passes the central meridian point, it takes on average three days for the effects to reach earth. It is then a simple mathematical task to work out how long the effects should last. For instance, because of the shape and size of this coronal hole the effects may last up to three days. Disturbed ionospheric conditions will be expected during this period.

The situation is somewhat different with the next example, shown in **Fig 5**. The two figures were taken about 12 hours apart so are really showing the sun at the same time. This time, however, I wish to point out solar filaments. There are several visible but there is one rather long one that is quite easy to spot. It starts about 44° south and 10° west and extends in a broken line up to 10° south and 42° west (east is on the *left*-hand side of these pictures.) Filaments sometimes disappear back into the sun and at other times they erupt, but usually when they do erupt their effect is minimal. However, on occasions they can produce strong geomagnetic and ionospheric storms in our ionosphere. Unfortunately the mechanisms producing this phenomenon are not well understood and cannot be predicted with any accuracy.

There is one other phenomenon worthy of note, and that is the sometimes mighty solar flare. Flares can sometimes be observed on the limbs of the sun, at these positions their appearances are termed prominences. A small prominence can be seen in the four o'clock position in Fig 5. Flares are the larger prominences that erupt and are best viewed in the same light as Fig 5 (all these views can be obtained from the Big Bear Solar Observatory). Flares are the most common source of ionospheric disturbances but, in the next year or so, that privilege will be shared with coronal holes.

Flares (X-ray flares) are graded according to the amount of energy with which they erupt. The lowest reported X-ray flare will probably be a 'B' class (there is also an 'A'-class flare but this category does not produce any effects on earth). It is only when we get up to 'C'-class flares that the effects are felt in the earth's ionosphere, and not always then. After 'C'-class, flares are graded 'M' and lastly 'X'. Each class is a magnitude of 10 higher than the previous one. Conveniently they are also reported as 'M5' or 'M6' etc. For a better understanding of the flare rating system see my article in the January 2000 *RadCom* [1]. Extremely large flares may well be more energetic than this scale suggests. However, it is these very large flares that cause the most interruption to long distance radio communications via the ionosphere. At least one of these larger flares is expected within the next year or so.

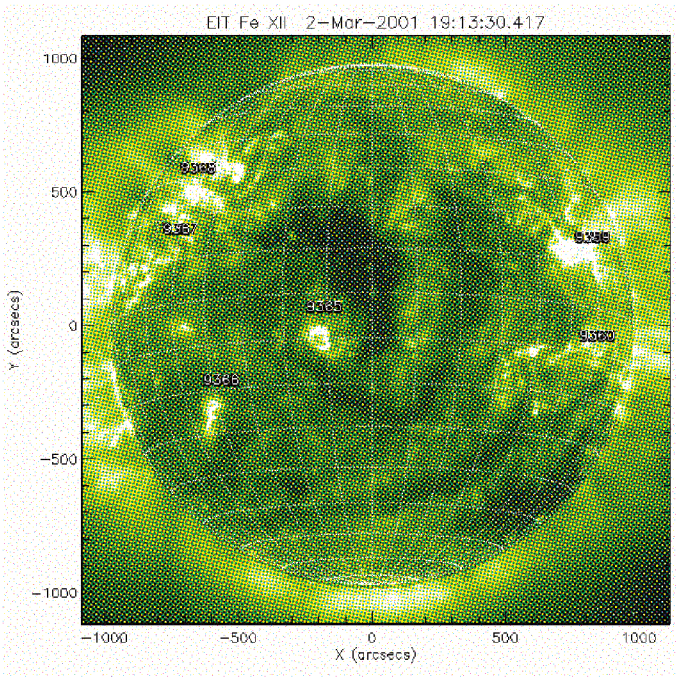


Fig 4: Solar view in FE XII at a wavelength of 19.5nm, showing a large central coronal hole and sunspot areas.

FINALE

LOOKING BACK AT Fig 1 on page 36 last month we can see that the trough of this cycle is expected some time in 2006 or in the early part of 2007. It can also quite easily be seen that the run-off part of the cycle is more gradual and will take more years than the upward part. At the time of writing the sunspot numbers are fluctuating daily, sometimes considerably, from 59 one day to 138 two days later. To put this in better perspective, it is the *smoothed sunspot numbers* that need to be analysed. However, these are not published until about six months later and it is for this reason that the peak of this cycle has not yet been officially announced.

The last couple of cycles, and the majority since 1940, have produced a kind of *double peak* in smoothed sunspot numbers. This cycle is expected to mimic this trend. If this supposition is correct we are presently in a kind of trough, which will recover to almost the same magnitude as July 2000; this can also be seen in Fig 1.

Other phenomena that have been predicted for the years 2001 and 2002 are: nine Coronal Mass Ejection events capable of producing VHF Auroral Backscatter,

* 21 Borda Cl, Chelmsford CM1 4JY.

25 'X'-class and up to 500 'M'-class X-ray events. However, as the cycle so far has not reached the expected magnitude in any phenomenon, the figures for the phenomena just discussed must be approached with some scepticism. Some of these events will undoubtedly occur, but not nearly as many as previously predicted. Solar scientists are working to understand better the flare mechanism. It is hoped that within a relatively short time that a prediction system will be in place similar to that for coronal holes; not necessarily the same kind of determinism, but one giving a similar warning period.

When preparing computer propagation forecasts or longer-term predictions it is still better to stick with the old adage: use the last five to seven days' *average* solar flux figures for short-term forecasts, and perhaps the 90-day average solar flux figure - or preferably the 12-months' smoothed sunspot number - for longer-term predictions. In the next couple of years and with perhaps less than the expected number of ionospheric disturbances, propagation conditions should at least be fairly stable. I believe we will begin to see a lengthening of the windows of opportunity presented on the HF bands, with 20m in particular giving more DX opportunities over longer periods.

Looking even further forward, one of the most currently respected theories of predicting the magnitude of the next solar cycle is to measure the magnitude and number of ionospheric disturbances in the current cycle, at the period between solar maximum and solar minimum. This theory was applied to this cycle and it was predicted to be more or less in line with experiences to-date.

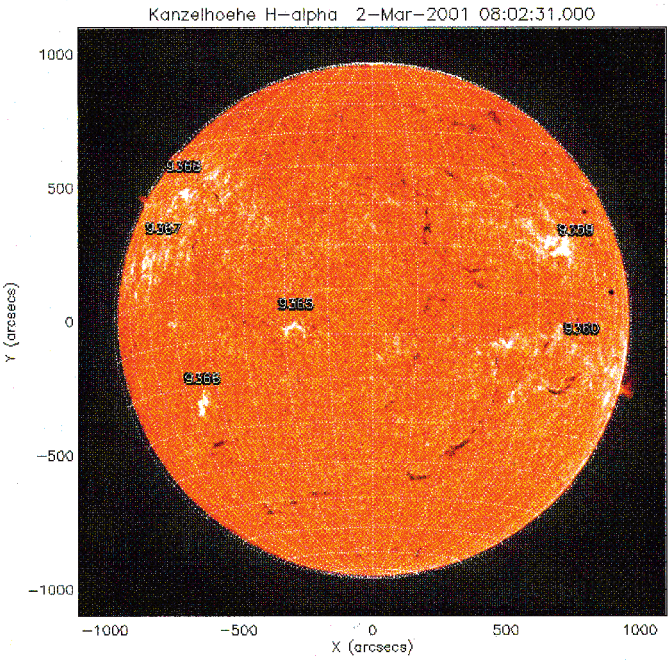


Fig 5: Solar view in Hydrogen Alpha at a wavelength of 656.2nm, showing solar filaments and sunspot areas. The phenomena on the limbs are prominences.

REFERENCE

[1] 'Propagation at Solar Maximum', Gwyn Williams, G4FKH, *RadCom* January 2000. ♦

WWW.

Big Bear Solar Observatory:
www.bbso.njit.edu/arm/
RSGB Propagation Studies Committee:
www.keele.ac.uk/depts/por/psc.htm

FURTHER READING

Your Guide to Propagation, by Ian Poole, G3YWX (RSGB)
Radio Auroras, by Charlie Newton, G2FKZ (RSGB)
The NEW Shortwave Propagation Handbook, by George Jacobs, W3ASK, Theodore J Cohen, N4XX, and Robert B Rose, K6GKU (*CQ*).

Down To Earth

The Voices

Part Twelve, by Gordon L Adams, G3LEQ *

IN PART Six of 'The Voices', which appeared in the December 2000 edition of *RadCom*, I described the 'Cobra Mist' project. This concerned the Over-the-Horizon Radar (OTHR) system that was set up, with joint American and British funding, at Orford Ness on the Suffolk coast during 1972 / 73. I mentioned that this extremely costly system was closed down suddenly at midnight on 30 June 1973. No clear reason for the closure was given by either of the governments at the time. Nevertheless, the then British Defence Secretary, Lord Carrington, had hinted that the Russians were able to jam successfully the West's latest military radio equipment.

US FREEDOM OF INFORMATION ACT

BY 1974, the BBC - under the aegis of the Foreign Office - was broadcasting its European Service on medium waves from a transmitter located on the Orford Ness ex-OTHR site. For almost 20 years virtually nothing has reached the public domain about the reason for the Orford Ness OTHR closure. However, between 1991 and 1993 an American body called the Defense Advanced Research Projects Agency (DARPA) did release details of an article about the 'Cobra Mist' radar type AN/FPS-95 via a classified research journal, *JDR* (*Journal of Defense Research*). This apparently became officially declassified at the end of 1991, under the provisions of the US Freedom of Information Act. There is not sufficient space in *RadCom* to detail the problems that arose at Orford Ness, but more information will be given in a book version of 'The Voices' that is due to be published before Christmas.

RUSSIAN 'CLUTTER'?

SUFFICE IT TO say that the 'Cobra Mist' radar system, which was directed towards the Soviet Union, was suffering from a form of 'clutter' interference. This appeared to emanate from the targeted landmass, and the possibility of Electronic Countermeasures (ECM) was not ruled out. The system was intended, of course, to detect Inter-Regional and Inter-Continental Ballistic Missiles. In January 1973 a joint Scientific Assessment Committee of US and UK experts was set up, and they met between February and May of that year to try and solve the performance degradation problem. Amongst other things, they suggested that a pulse compression system using a pulse length of 100 microseconds should be installed. The Orford Ness OTHR was using pulse widths of 250 to 3000 microseconds. Furthermore, the intended power output of 10 Megawatts peak, and 600 kilowatts average, had never been achieved due to operating difficulties. These included electrical breakdown, or arcing, from the log-periodic antenna arrays. The equipment was capable of frequency hopping in the range from 6 to 40MHz, but hunted around the Maximum Usable Frequency (MUF) when in full operational mode. In fact, the power output level attained was never greater than 3.5MW peak or 300kW average. The total power of the Russian 'Woodpecker' from its four locations in the Ukraine was claimed to be 400MW with pulse intervals of 100 milliseconds. Perhaps wisely, the US Air Force and the UK Ministry of Defence decided not to continue with the Orford Ness OTHR on 'economic' grounds.

For those not familiar with radar systems, the recent case of the downed US Lockheed EP-3E Aries II spy plane, which was forced to land on Hainan Island in China, comes to mind. Besides their operating frequencies, radar systems have very distinct operating characteristics, or 'voices', which need to be recognised instantly if appropriate Electronic Countemeasures are to be taken. Hence the need for spy planes to provoke 'enemy' systems into action, and then record their details for later technical analysis. There are four basic categories of radar system:

Continuous Wave (CW) radar, where the transmitter output is a continuous, unmodulated, RF oscillation. Providing adequate screening between the transmitter and the receiver is the main problem with this system, and moving - rather than static - targets make the best quarries by detecting the Doppler shift in the reflected signals or echoes.

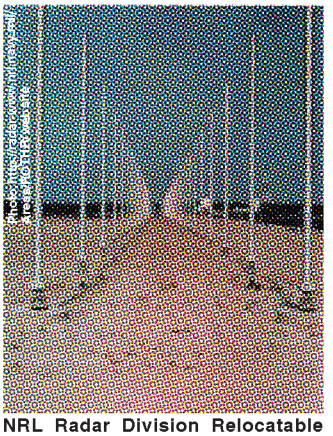
Frequency Modulated Continuous Wave (FM-CW) radar, where the carrier is modulated with a sinusoidal or triangular waveform. By measuring the 'beat' or difference frequency between the transmission and the echo, the range of the target can be determined.

Basic Pulse radar, as used in a 'Plan Position Indicator' (PPI) for air traffic control and marine operations, where a 'bird's eye view' of the area covered appears on the radar display (see **Fig 7**). In this type of system the 'Pulse Repetition Frequency' (PRF) is particularly important, and this is normally made as high as possible in order to avoid second time scan-around echoes. Practical systems use pulse lengths of 0.1 to 5 microseconds and often employ pulse compression. Doppler shift measurements can only be made during the period of the extremely short received pulse, but some very effective 'Moving Target Indication' (MTI) systems have been developed which discriminate between aircraft and other moving objects.

Pulse Doppler radar is a development of the *Basic Pulse* radar, which eliminates speed assessment ambiguities, by operating at much higher PRFs.

Most radio amateurs will associate radar systems with UHF and Microwave frequencies (see **Fig 8**), and the UK amateur licence does permit the use of pulse emissions above 1GHz (1000MHz). Incidentally, I have not met any radio amateurs who have made use of this facility. However, a new range of commercial Personal Radars, using Ultra Wide Band (UWB) technology is currently under development in Huntsville, Alabama. Use of the HF (short wave) portion of the radio frequency (RF) spectrum for radar has the added feature of allowing propagation substantially beyond the horizon. This occurs because the ionosphere reflects or refracts the radar beam. The resultant sky waves provide the basis of the over-the-horizon radars, which can achieve ranges of thousands of kilometres. The American Naval

Map of Cyprus, showing places of interest to 'Voices' readers.


NRL Radar Division Relocatable Over-the-Horizon Radar system.

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

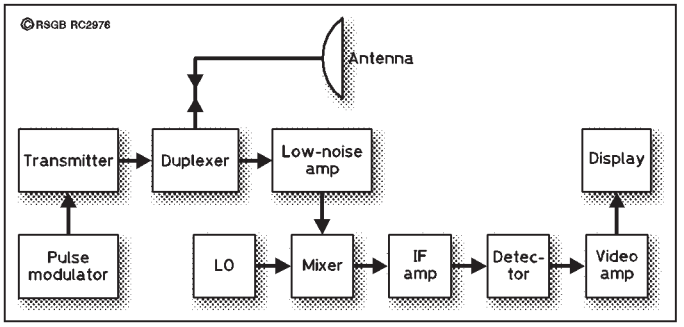


Fig 7: Block diagram of Basic Pulse radar, as used for air traffic control and marine operations.

Research Laboratory (NRL) has developed a Relocatable Over-the-Horizon Radar (ROHTR) surface-to-surface HF system (AN/TPS-71), which operates typically over some 1900km (see photo opposite).

HMS CYPRUS?

DURING THE LAST war, on 28 March 1941, a formidable naval battle took place between the Italians and British off the western end of Crete and to the south of the Greek Cape Matapan - now called Cape Tainaron. The outcome was a major success for the Royal Navy, and this also settled the primacy of aircraft carriers over battleships in future naval engagements. However, aircraft carriers are extremely expensive, and can never be built large enough to carry all the modern weapons of war. In Part Seven of 'The Voices' (January 2001 *RadCom*) I described the sudden conversion of the undercover British radio station 'Sharq al-Adna', located at Polemidia to the north-west of Limassol in Cyprus, to the 'Voice of Britain'. This took place during the somewhat ill-fated Suez campaign against Egypt in November 1956. However, by April 1957 Britain's new Prime Minister, Harold Macmillan, was claiming that the island of Cyprus would decline in strategic importance during the next 10 years. It rapidly became apparent that he was wrong. Greece and Turkey, who were supposed to be NATO allies, were constantly at odds with each other over Cyprus, and at midnight on 15 August 1960 the British officially handed over their responsibilities for much of the island to the new Cypriot state. The UK government retained a number of Sovereign Base Areas and various other facilities outside these areas such as Cape Greko, Dhekelia-Pergamos and Akrotiri-Episkopi (see map opposite).

Throughout the Cold War, and right up to the present day, Cyprus has proved to be a most important base for top secret intelligence gathering. Since 1947 the UK has had an intelligence agreement with the USA, Australia, Canada and New Zealand, and the Americans operate all kinds of electronic eavesdropping equipment on the island at Mia Milia and Karavas. This involves radar, radio and other electronic systems to intercept both Russian and Middle Eastern signals. They can also track the heat emissions of aircraft and missiles as they take off. These operations are manned by the Joint Service Signal Unit (JSSU Agios Nikolaos), which now embodies the 2nd Special Wireless Regiment and the 9th Signal Regiment of the Royal Signals and the 33 Signal Unit RAF. Much of the intercepted encrypted traffic is sent back by microwave link to GCHQ in Cheltenham. At the peak of the Cold War British signals intelligence involved some 20,000 people world-wide, daily handling tens of thousands of classified documents, with a tidy proportion emanating from Cyprus.

The facilities on Cyprus include OTHR radar installations, currently to be heard on HF operating between about 10MHz and 27MHz, and always close to the local MUF. During the major outbreak of fighting on Cyprus in 1974, heavy military protection had to be given to the RAF radar installations on Mount Olympos in the Troodos mountain range. This system operates over a span of 1500 to 3000 kilometres, and can reach twice that distance via double-hop ionospheric propagation. Other similar systems are to be found in Turkey, in and around the large military base at Incirlik, protecting NATO'S south-eastern flank.

Cyprus has been likened to an unsinkable aircraft carrier. Sadly, it has been divided across the middle since 1974 by the Attila or Green Line, which separates the Turkish-Cypriot community in the north and the Greek-Cypriot community in the south. On the eastern side of the island, the British base of Agios Nikolaos accommodates a massive aerial farm - overlooking the largely deserted town of Famagusta. Tourist boats from the Greek side take holiday-makers into Ammochostos Bay, but they are not allowed to land. Who knows, they might even end up glowing in the dark if they approach too close!

OMINOUS THREATS

OTHERS ARE, of course, interested in all this technology. In April 1998 the Israeli air force was accused of sending spy planes into Cypriot 'radar airspace'. The following month a suggestion was made in the press that the Russians would be able to control the region using a type S-300PMU-1 TMD strategic air defence system that they were selling to the government of Cyprus.

APRIL COMPETITION RESULT

'THE VOICES' part 10 contained an unusual decoding and coding competition (see page 38 of *RadCom* April 2001). The Key Word for the giant wheel is **LONDONEYE**. Examine *The Secret Hope* cartoon where the man standing has his left hand. Under the shelf are some unusually straight shading lines. Some of the lines are three rows of bricks in length, whilst the shorter lines only cover one row of bricks. Radio amateurs should spot that these represent Morse code, which reads from left to right **MEFMATTTQ**. These decode from the alphabet matrix as **APRILFOUL**. Clearly the agent Nodrog Smadaski (Gordon Adams: get it?) has made his deliberate error in the eighth letter, which should be an **'O'**. The most prolific *RadCom* writer is **PATHAWKER**, which when encoded with **THEVOICES** produces the coded message **JIYDPFN?K**, where **'?'** can be any letter except the correct one **'J'** (sending the letter **'J'** would indicate that Nodrog had come under the control of the evil SMIRSCH organisation!) 'RECHEPODOBNY' refers to the jumbled words jamming technique employed by the Russians, and described in 'The Voices' part 3, *RadCom* August 2000. George Brown works in the *RadCom* Editorial Department at RSGB HQ, where the Brookmans Park radio station is just across the fields.

Less than 30 entrants submitted an acceptable coded message. However, the effort put into the tie-breakers was also very imaginative, and we have decided to award two equal value book vouchers. We received entries from as far away as the USA, Australia and New Zealand. We declare the winners to be Graham Beesley, G8CRU, of Winchester, and Roger Crofts, VK4YB, of Moorina, Queensland. Obviously some G8s recognise Morse code! We congratulate both of them, and also commiserate with Ken Cheetham, G4RWD; Ian Braithwaite, G4COL, and Fred Johnson, ZL2AMJ, who were close runners up.

Next month Gordon discusses more unusual radio 'Voices'. ♦

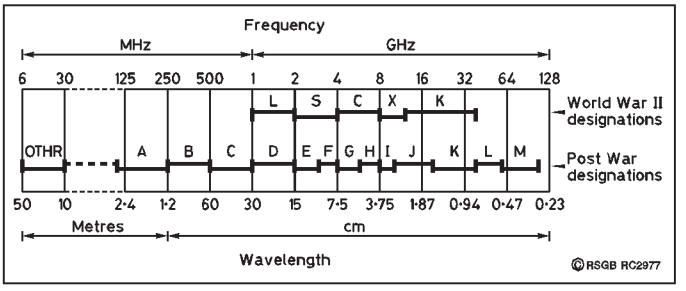


Fig 8: WWII and current radar band designations.

The Puckeridge Experiment

*By Walter Blanchard, FRIN, G3JKV **

THIS IS THE STORY of how one particular mast in the 21-station UK Decca Navigator chain was used to test some theories relating to LF propagation in the 73 and 136kHz amateur bands. When the mast at Puckeridge, Hertfordshire, had ceased its primary function, its owners, Racal, allowed a team of radio amateurs brief access to the site. The article was written shortly afterwards and, although the LF technology and expertise have since advanced to permit several trans-Atlantic contacts in less than 10Hz bandwidth, the story is no less intriguing.

THE DECCA NAVIGATOR was a system for providing a ship or aircraft with its position by measuring the difference in time of arrival of radio transmissions from several transmitters, using their phases. It took its name from the Decca Record Company, famous for its 'ffrr' (Full Frequency Range Recording) LP records of the 40s and 50s, and still perpetuated in re-releases of its landmark recordings.

Transmissions were in the low-frequency band between 70 and 127kHz and could be heard on AM as a series of periodically-interrupted melodic tones centred around 71, 85, 112 and 127kHz - no doubt many amateurs heard it while they were tuning around. At its peak in the 60s and 70s it was used by more than 35,000 ships and 10,000 aircraft but, like many other radio-navigational systems, it was overtaken by satellite technology in the form of the American Global Positioning System (GPS).

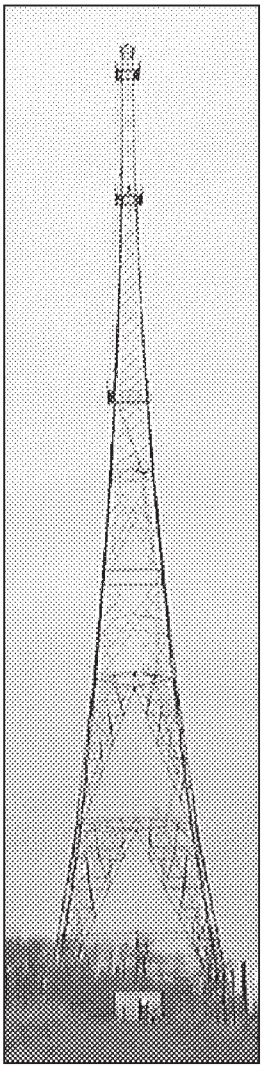
Latterly, it was operated by the Racal company (who bought Decca in 1981) on behalf of the Department of Transport and, in the face of an almost complete turnover by navigators to GPS, it was decided to close it down. The closure of the British transmitters occurred at midnight on 31 March 2000, followed shortly by the shutdown of the Irish transmitters. Since all other European transmitters had already closed, that left only the Japanese still running Decca chains, but even these were due to close at the end of 2000.

THE CHAIN

DECCA HAD 21 transmitting sites in the UK using an assortment of antennas. The original Decca chain covered the English east and south coasts. The 'English' Chain was built in 1946 and, as often happens with the first of anything, no expense was spared to ensure it worked properly. It used self-supporting vertical masts 325ft (100m) high with an extensive ground plane of copper radials also 100m long fanning out every 10° around it. It had an efficiency of around 10% at the lowest frequency (71kHz) and as a transmitter output of 1.2kW radiated 120W easily enough, it was thought possible to cover the whole of the UK with just one chain. Unfortunately, it was found that the skywave destroyed accurate phasing at much shorter ranges than had been anticipated, and the only answer was to use more chains with restricted range. So, from 1 April 2000, there were 21 excellent LF masts and sites throughout the UK doing nothing for a short period until they were either demolished or turned to other uses.

ENTER THE ENTHUSIASTS

AMATEURS ON THE 73kHz and 136kHz bands have always been handicapped by their inability to erect aerials of a decent size - at 73kHz a half-wave is over 2km long - so aerial efficiencies were very low and, even for the permitted 1W ERP, needed kilowatt amplifiers. In spite of this, considerable distances were worked on both bands; at the time of writing, the record stood at 2200km - OH1TN to IK1ODO. But the matter of big versus small aerials became a subject of hot debate within the LF group and many opinions were aired on whether they were worthwhile. Did a big antenna have a different radiation pattern from a small one? Should it be very high vertically, or would it be much the same if it were very long horizontally? It seemed to be rather a sterile debate until it became known that the Decca antennas might be available for a few weeks and thoughts turned to seeing whether one could be used for a comparison test. At one time it seemed a forlorn hope because of legal and insurance problems but, eventually, these were overcome with the result that Racal granted temporary permission to use the 325ft antenna at Puckeridge, Hertfordshire, for a time slot of only three weeks! This slot being only two weeks away, the next hurdle was to find out whether authorisation could be obtained to radiate a power higher than just 1W. Thanks to the RA and considerable assistance from the RSGB, this was cleared in the record time of only one week, permission being obtained for the Crawley ARC station, G3WSC, operating at Puckeridge, to radiate up to 100W on 136kHz and for G3GRO, also at Puckeridge, to do so on 73kHz.



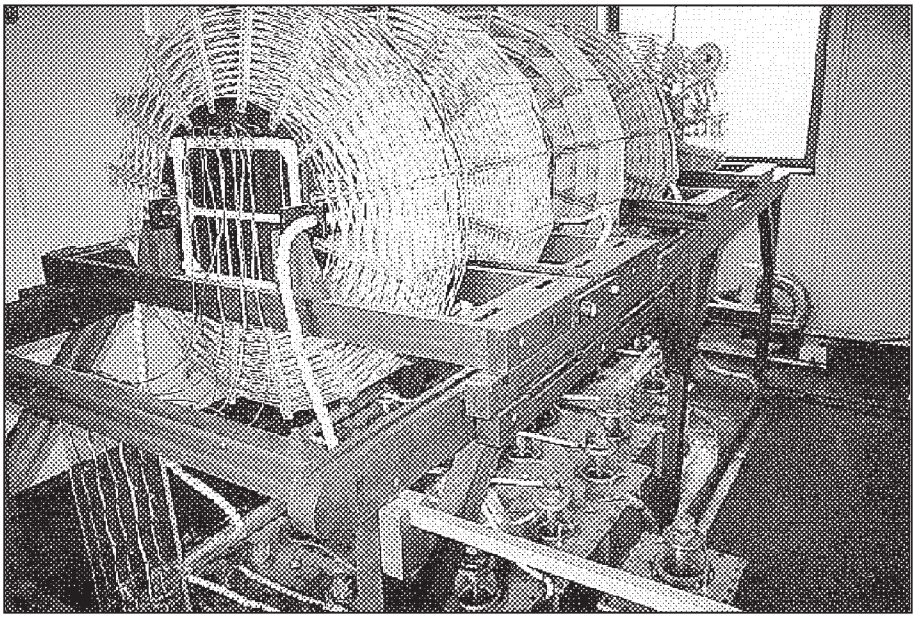
"Herts: des res with planning permission for small antenna..."

RESTRICTIONS

RACAL required that use of its site was to be handled through the author only and, to help with this, I had the invaluable assistance of Derek, G3GRO, Peter, G3LDO, and Lech, G3KAU, all well-known on the LF bands. A request on the LF Reflector brought in a number of other amateurs who were interested in transmitting from this mast and a suitable roster was devised. G3GRO and G3KAU wanted to get going as soon as possible and so made a reconnoitring trip up to Puckeridge. No Racal/Decca equipment could be used and everything needed had to be brought on site. Puckeridge was a manned station (the others were re-

* *The Trundle, Tower Hill, Dorking RH4 2AN.*

motely-controlled) and the team had considerable assistance from the resident engineer, Dick Caddy. Directly under the mast there was a coil-house that had once housed the Decca antenna tuning unit coils (see the photo). This was big enough to hold the amateur transmitters, receivers and other gear. Fortunately, it had mains power laid on and even had heaters, very welcome in the cold evenings of early April. The electrical characteristics of the antenna were obtained from Racal (3750pF in series with 5Ω and 12μH), thus enabling the re-design of Derek's ATU once he was back home so that, when he returned, he could just plug it in and go.



The original ATU coils at the Puckeridge transmitter. Litz wire in abundance!

COMMENTS

DEREK, G3GRO, REPORTED on the first weekend (14 - 16 April 2000): "Apart from the Decca mast and an RF thermocouple ammeter, none of the original equipment, such as loading coils etc, was used. For 136kHz operation, a relatively small variometer (about 500μH maximum) and a tapped toroidal auto transformer were connected to ground from the copper pipe lead-in to the base of the mast, which itself is supported on four massive ceramic insulators. The exploratory visit earlier in the week (11 April) allowed a purpose-built additional loading coil for 73kHz to be built by Lech, G3KAU, back at base, in time for the main exercise at the weekend. On 136kHz we did not need an additional loading coil; in fact, to start with, we had to insert in series with the antenna one of the very large 500pF 25kV capacitors we found lying outside the hut. Later on during the weekend we discovered that, by moving the input/output taps down the auto transformer to reduce the base inductance but keeping the same ratio, we avoided the need for the series capacitor in the antenna lead.

"Three transmitters were employed at various times; the G3GRO 300W much-modified BKE linear amplifier was used for the 1W ERP tests on 73/136kHz earlier in the week, and then again on Friday and Saturday, for running between 1 and 5W ERP. Additionally, we used the well-tried G0MRF 500W set-up and the G3YXM 1kW class-D rig used previously on many /P expeditions. The BKE linear was driven from an FT-990 transceiver via a 100:1 digital divider and bandpass filter from either 136kHz or 7.3MHz. During the overnight sessions on Friday in beacon mode, the ERP was 50W and 100W ERP overnight on Saturday. We had a few problems to start with in getting the variometer to handle the 500W RF, and we had a few cracks and sparks resulting in VSWR trips, before we realised that the capacitive voltage divider in the forward/reflected power meter in the variometer was arcing over. This was then by-passed. Fortunately, we had another SWR meter in line. We also found that an RF sampler unit brought along by Jim, M0BMU, was very useful in setting up the matching and tuning in conjunction with an oscilloscope. We realised on Saturday that the range of our RF ammeter was too small for high-power operation and rescued the original very-large 30A RF ammeter from the pile of redundant scrap units outside in the rain and pressed it into service. During the beacon sessions it was reading 14A into the base of the mast. That represented an RF power of 1kW into the antenna - about 100W ERP, allowing for an overall antenna efficiency of 10% on 136kHz. One modification we made between the early session and later was to change to keying the emitter of the buffer amplifier following the divide-by-100 stage with added keying shaping to minimise key clicks which had been reported. That seemed to clear the problem completely, although we found out later it was also present on at least one of the class-D transmitters used for the higher-power and night-time beacon sessions.

"The receive system was a home-brew up-converter with an input bandpass filter about 3kHz wide on both 73 and 136kHz, followed by a Mini-Circuits MAR6 preamp and MC1496 mixer IC to a 10MHz IF feeding FT-990 and IC-756 transceivers for most of the time. The FT-990 and converter stood up remarkably well to the very large antenna input with no sign of cross-modulation. We had a switched attenuator at the input to the converter but, for most of the time, it was switched out. We had two operator positions side by side, one handling the 136 and 73kHz traffic with the second operator also monitoring 136/73kHz in parallel, but also handling the HF crossband input mainly from 7MHz.

"I think one of the nice things about the operation was that, with such a big signal, we could easily be heard by stations with a very simple antenna not specifically tuned to LF and give quite a few crossband stations their first QSO with an LF station. I think the other memory was of having to make several journeys humping all the gear a couple of hundred metres through the pouring rain and climb over a low fence with the gear and through all the grazing sheep in the compound."

G3XDV had a few memories too: "The continuous rain that soaked through my coat and made it weigh a ton, then went on to soak the rest of my clothes. I remember thinking that I had spent my school days avoiding sporting activities involving getting cold and wet, but this was by no means the first radio expedition that had resulted in just that.

"I also had an agonising hip problem that started to get better from that day on - must be the healing powers of low-frequency RF (RF gets a bad press these days!).

"On the arrival of reinforcements, YXM, XTZ, MRF, BMU and myself went to the local pub for a warm-up and refreshments only to be told that there was a wedding reception on and thus no food. They eventually took pity on us dripping into our crisps and offered 'something and chips', which went down *very* well.

"Also, at one point, it occurred to us that there wasn't much point in going on the 73kHz band, because 90% of the active licensees were in the same room at Puckeridge..."

G3GRO summarised the results of the first weekend: "There were about 65 QSOs in total, including those during the initial setting up period on Tuesday 11 April. Two-way contacts were made on both bands and crossband contacts from 136kHz to 73kHz and to 7MHz. There has not been a reception report from across the pond from VE or W (which was always going to be a long shot), but the longest contact was crossband to 7MHz with Alex, UB5WF, in KN58JQ - about 200km north of Odessa on the Black Sea - who gave us RST429 with normal CW at a distance of 2225km. This was over a *daylight*

path at 1232 UTC on Sunday 16th. It is not known yet what receiving antenna Alex had for 136kHz, but it is highly unlikely that it was a dedicated LF antenna since there is as yet no LF activity in the Ukraine as far as is known. Other long-distance QSOs were to Valerio, IK5ZPV, 2-way on 136kHz, who gave us RST589; IK7HSS, crossband to 7MHz, and Neils, OZ8NJ, (2-way on 136kHz) who relayed to us that IK5ZPV was hearing us and would call us shortly. We also got an RST 599 on 136kHz from SM6PXJ, OZ5N and HB9ASB. Two QSOs were also made on both 136kHz and 73kHz to Finbar, EI0CF, and Ray, GI3PDN. Reports on 73kHz were about two S-points down with Ray and Finbar in comparison with 136kHz. We also worked GJ4CBQ and GU3SQX crossband 136kHz/7MHz, which was pleasing since, due to Loran QRM from Lessay, they normally have difficulty in hearing stations on 136kHz.

"Perhaps one of the most unusual QSOs was with Graham, G3XTZ/M, operating mobile on 136kHz CW whilst driving to the site to have a spell of operating! We also had a report via e-mail from Marc, F5MAF, in Toulouse, JN03PP, who was hearing us at 599+ on a 2m diameter loop at a distance of 900km, and bemoaning the fact that there is no LF activity in his neck of the woods. Later, e-mail reports on the 71.8kHz signals were received from Walter, DJ2LF (569 in JN59NO), and Geri, DK8KW (579 in JO52BH - 697km).

"Thanks to all those who took part despite the very wet and freezing cold weather and also to those who took the trouble to give us reports which have yet to be analysed. At one point on Saturday, as the shifts changed over, there were 12 people in the ATU shack at the base of the mast, representing a large slice of the active UK LF operators! They were: G3KAU, G3XDV, M0BMU, G0MRF, G3XYM, G3XTZ, G3YSX, G4GVC, G4JAI (G4GVC's XYL), G4TSH, G3LHZ, G3GRO, and not forgetting Peter, G3LDO, holding the fort back home, and Walter, G3JKV, whose efforts made it all possible."

IN RETROSPECT

THE REPORT of reception by UB5WF at 2225km, in daylight and over a predominantly land path, was especially interesting. This is about two-thirds of the way to Canada; Newfoundland is 3520km from Puckeridge and has a predominantly sea path, so the signal would only have had to travel another 1300km to make it all the way to Canada. Unfortunately at these ranges, the 136kHz groundwave signal is falling off very rapidly and, according to the CCIR propagation curves, another 35dB would be needed, even over sea water. *Just possibly*, it could be done at a very low-noise site using one of the FFT programs for reception. Larry, VA3LK, is already taking steps to set up an LF station for this purpose, although it is not known whether Puckeridge will be available in winter, when skywave might help.

Overnight on 15 April 2000, G3WSC was left on-air running continuously as a beacon with an estimated radiated power of 100W. This generated a number of listener reports and, according to Vaiski, OH2LX, who has some very accurate measuring receivers, the signal strength was not far below those of some of the commercial stations near the band.

SMALL(ER) ANTENNAS

APART FROM this DX work, as already mentioned, a long-standing discussion within the LF group has been about the differences between large and small antennas. Given the same radiated power, is there any difference in signal strength between them? After all, both are very small in terms of one wavelength. To try to resolve this Jim, M0BMU, decided to set up a 'small' antenna at Puckeridge, fairly near the 'big stick'; he aimed to radiate the same power from both alternately, and see what reports he got. **Fig 1** shows his layout. Surprisingly, the small one got slightly better reports, by about 4dB, and Jim's remarks on this were as follows.

COUPLING BETWEEN ANTENNAS

"Several people raised concerns about the coupling effects that might exist between the two antennas. If sufficient power was being coupled into the big antenna materially to affect the overall radiated signal, one would expect significant current to be flowing in the big antenna while transmitting from the small antenna - but there was none. Even with the big antenna resonant, the current induced in it by the small antenna was too small to contribute a significant fraction of the radiated power.

RADIATION RESISTANCE

"The radiation resistance (20mΩ) of the small antenna was easy to calculate due to its simple geometry. The Decca mast was much more complicated - the exact radiation resistance depends on how thick you make the various conductors - however, the variation is not that great. I settled on a value of 650mΩ. If we assume that the 4dB difference in signal strengths was due entirely to the 650mΩ value being in error, the correct R_{rad} would have to be about 260mΩ to make the figures work out. I can't see how it would be as low as this, however.

In summary, I chose the values of 20mΩ and 650mΩ for small and big antennas as the consensus of several estimates, and would be surprised had the errors in the values been large enough to explain the differences observed in field strengths.

POSSIBLE CAUSES

"My money is on the increased field strengths being due to fields and currents under the ground surface, resulting in a greater effective height of the small antenna. Obviously, this needs more investigation, which I hope to try later.

CONCLUSIONS

"The main point about this experiment was that, provided sufficient transmitter power is available, a small antenna can be made to produce a given value of ERP just as well as a big one. This was borne out by the comparative signal reports. Of course, the big antenna will require much lower transmitter power, and will be much more stable electrically - a Decca requirement for complete phase stability. This is borne out by theory, fortunately. What is more surprising is that the small antenna seemed to be more efficient (less inefficient!) than would be expected from theory. What is more directly important is to discover the different factors affecting the power radiated by small antennas, so that this information can be used by LF amateurs to generate better signals. It is already clear that field strengths (and therefore ERP) depend on many more things than are taken into account in much antenna theory. Perhaps professionals have never had to use such small antennas! We hope soon to do some more experiments with different antenna environments in the hope of throwing some light on this."

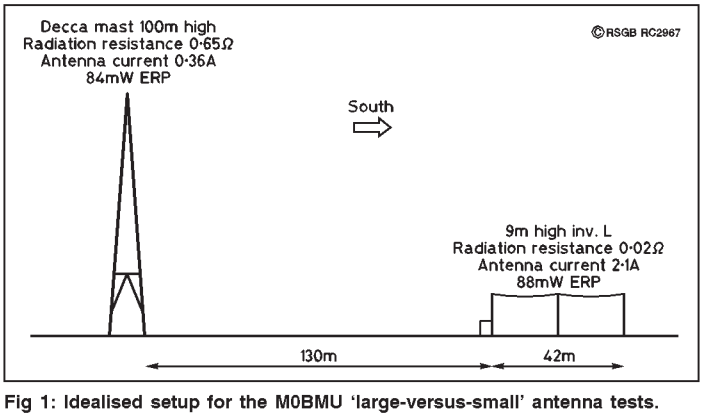


Fig 1: Idealised setup for the M0BMU 'large-versus-small' antenna tests.

FINALLY

THIS WAS A MOST interesting experiment and should give encouragement to those who can only erect small antennas for the LF bands (most of us). The powerful LF signal radiated by G3WSC enabled many who had never heard anything on the LF bands to do so; this, together with the straightforward DX aspects, must have been one of the most successful amateur radio experiments of recent times. ♦

THE YAESU FT-817

Peter Hart, G3SJX*, reviews Yaesu's latest mini marvel

YAESU RECENTLY launched the FT-817 in the UK, a novel and truly portable HF to 70cm transceiver covering all modes. The radio has already been available in the US for a while and has attracted much interest. Of obvious appeal to the QRP enthusiast, this 5W radio with its self-contained batteries is small and light enough to carry anywhere. Take it on holiday or a business trip and you are in touch with the bands at all times. A lightweight wire antenna takes up little extra luggage space and, with the current excellent state of the higher HF bands, 5W will give plenty of contacts including DX with relative ease given the right conditions. As an added bonus the radio also includes all the features of a 2m / 70cm portable and a broadcast receiver. The FT-817 is, in many respects, the portable companion to the FT-100 mobile transceiver which was introduced by Yaesu a couple of years ago.

BASIC FUNCTIONS

The FT-817 measures only 135 x 38 x 165mm and weighs a little over 1kg. It is supplied with a shoulder carrying strap, hand microphone (MH-31 as used on most Yaesu radios) and a three-piece 'rubber duck'-style whip antenna for 6m / 2m / 70cm. There are two antenna sockets, a BNC on the front panel and an SO239 on the rear and it is possible to select either front or rear separately for the four band-groups,HF, 6m, 2m and 70cm. The rear panel socket is used with the radio horizontal, for example on a table top, and the front panel socket for a whip antenna with the radio carried vertically.

The radio can be powered using 9.6V to 13.8V either from an external DC supply or from internal batteries. These batteries can be either 8 AA size alkaline cells or the Yaesu FNB-72 Ni-Cd rechargeable battery pack which supplies 9.6V at 1000mAh capacity. Models supplied from UK dealers include the rechargeable battery as standard, together with a mains wall charger. Although the manual states that this charger can only be used when the radio is switched off, it is rated at 500mA which is just sufficient to power the radio on receive as well as charging the battery, although insufficient to provide power on transmit. A higher power external 13.8V supply (rated at 2.5A) will allow the batteries to be charged also whilst using the radio to the full. The charging time can be set to 6, 8 or 10 hours and the remaining time to full charge is displayed when the radio is switched off. This is reset if the charging current is interrupted for any reason.

The receiver in the FT-817 tunes from 100kHz to 56MHz, 76 to 108MHz (wideband FM mode only), 108 to 154MHz and 420 to 470MHz. The transmitter is enabled only within the exact amateur allocations with variants for different regions. Up / down keys scroll through the various amateur bands, general coverage and broadcast bands, and another pair of up / down keys scrolls through the modes - LSB, USB, CW, CW-R, AM, FM, Digital and Packet. Digital mode uses AFSK on SSB modes and is intended for RTTY, PSK31, SSTV etc. Packet mode uses FM and has settings for both 1200 and 9600 baud operation.

There are four transmit power output settings - 5W, 2.5W, 1W and 0.5W with 2.5W as the default setting on internal batteries.

The radio is solidly constructed on a diecast aluminium chassis with controls on the front and top edge, a 55mm diameter speaker in the top, microphone and headphone sockets on the side, access to the batteries underneath and sockets on the rear for key, data terminals and PC control. The radio is fully controllable from a PC, but needs a special interface cable available as an option which includes a built-in RS-232 level converter. Electrically, the radio uses a double conversion superhet receiver with IFs of 68.33MHz and 455kHz. The transmitter PA and drivers and receiver front-end mixer are all wideband covering a remarkably wide frequency range from 160m to 70cm.

Under the top cover of the FT-817.

PRINCIPAL FEATURES

THE FT-817 IS packed with features, indeed virtually the full feature set as found on most larger radios is provided. It is always a challenge with a small radio, and hence limited panel area, to provide a simple and user-friendly access to its many functions. Some dedicated controls are essential, such as tuning, band and mode change, volume etc, but other functions are accessible through context and menus. Three buttons below the display select most of the functions of the radio. A quick press of the 'F' key displays the function associated with these buttons and a small click-step rotary control 'Select' scrolls through 12 sets of button allocations. In addition the menu system allows some 57 parameters of the radio to be set. This is accessed also with the 'F' key and the 'Select' control with the rotary tuning control to set the parameter.

Tuning makes use of a small rotary control in conjunction with the detented 'Select' control mentioned above. Tuning is in 10Hz steps at 2kHz per revolution or 20Hz steps at 4kHz per revolution on SSB / CW, which is rather slow and tedious with the small 25mm diameter knob and so the 'Select' control which tunes in 1, 2.5 or 5kHz steps is used for coarse navigation. This also provides 1MHz stepping for large frequency excursions. AM or FM tuning is normally achieved via the 'Select' control with a selection of separate mode-dependent step sizes, although rotary control tuning at 10 times the SSB rates can be selected for this purpose.

Despite its compact size, the FT-817 provides comprehensive memory features. 200 regular memories are included which may be partitioned into 10 groups of 20 channels and each channel may have an eight-character alphanumeric label attached for easy identification. A one-touch quick

*The Willows, Paice Lane, Medstead, Alton GU34 5PR.

memory store allows one frequency to be rapidly stored and recalled and a separate home channel for each of the four band-groups may be selected at the push of a button.

The radio includes a number of power-saving features. Auto power-off will automatically turn off the radio if there has been no control activity for a period (1 - 6h) and the transmit time can be limited (1 - 20min). The display backlighting can be turned on or off or set to auto (default) where the backlighting is on for only 5s after any key presses. The backlighting colour can be set to blue or amber, I preferred amber in most situations. The LCD indicates frequency to 10Hz resolution, memory channels or labels, mode and VFO status and a number of small icons. The battery voltage can be permanently displayed and there is a bargraph type S-meter which indicates power, SWR, ALC level or modulation on transmit. One of the menu settings shows DSP as a label for one of the buttons. Don't be misled, this selects double display height for clearer frequency indication: the radio is not fitted with Digital Signal Processing.

MAINLY HF FEATURES

TWIN VFOs are incorporated each with separate band stores. These can be used separately for CW and SSB segments or used together for split frequency operation. A clarifier (receiver incremental tuning) covers ±10kHz and functions on receive only, IF shift helps in reducing adjacent channel interference and an IF noise blanker is included for reduction of ignition and other impulse noise. The radio is provided with a 2.4kHz ceramic IF filter for SSB and CW modes but space is provided to install a 10-pole Collins mechanical filter, either a 500Hz filter for CW and digital modes or a 2.3kHz filter with improved shape factor for SSB.

Other receive features include fast / slow AGC, RF gain control / squelch and variable CW pitch over the range 300 - 1000Hz. For strong signal situations, the receive preamp may be switched out (IPO) and a 10dB attenuator may also be switched in. On 2m and 70cm the receive preamp is permanently in circuit.

VOX is provided, functioning on all voice modes, but there is no speech processor. A semi break-in system is included for CW with recovery delay times separately adjustable for CW and VOX. Although not specifically designed for full break-in, the minimum recovery delay time of 10ms effectively emulates QSK operation. A built-in CW electronic keyer is adjustable in speed over the range 4 - 60WPM and has adjustable dot:dash weighting but does not include any memories or contest-related features. For occasional or emergency use it is possible to assign the up / down keys on the microphone for generation of dots and dashes.

FT-817 rear panel connectors.

The FT-817 is well equipped with facilities to handle digital and packet modes. Audio input levels are separately adjustable for each data mode as are display and passband offsets. As well as the predefined modes of PSK31, RTTY and Packet, two user-definable modes (USB and LSB) are also included. These can be used for SSTV or a future new digital mode. The FT-817 with a small laptop PC makes an effective and very lightweight station for PSK31 given the excellent low-power performance of that mode.

MAINLY VHF / UHF FEATURES

THE FT-817 includes all the features which are available on a modern FM hand portable. Both wide and narrow FM modes are provided, covering 25 / 12.5kHz channelling on VHF / UHF or 10kHz on 29 / 50MHz. Both the receiver bandwidth and transmitter deviation levels are set appropriately.

For repeater operation, the shift is separately programmable on 10m, 6m, 2m and 70cm and can be automatically selected according to the bandplan in use in the relevant region on 2m and 70cm. The transmit and receive frequencies can be reversed by a single key press to check for activity on a repeater input channel. Both a 1750Hz tone burst and a CTCSS tone encoder are provided for repeater access and a CTCSS decoder provides Tone Search to detect and store the CTCSS tone transmitted by a received station or repeater.

A Digital Code Squelch (DCS) system is also built-in. This uses one of 104 selectable codes to implement a squelch controlled link and is more robust and less prone to false triggering than CTCSS. A Code Search feature allows the DCS code transmitted by a received station to be detected and stored.

The display can be set to blue or amber

Complementary to the DCS system is the ARTS (Auto Range Transponder System) also fitted. This uses DCS signalling to inform when you and another ARTS-equipped station are within communications range.

Several scanning-related features are provided. Scanning can be initiated in VFO mode, up or down from any start frequency or between programmed limits with user-programmable pause / resume status. In memory mode, memory channels can be scanned sequentially up or down and channels can be selected for skipping. Dual Watch allows VFO-B to be checked every 5s whilst using VFO-A for normal communication purposes. In a similar way, Priority Channel Checking lets you operate on a memory channel while checking memory channel 1 every 5s. Smart Search is a useful feature when travelling in a new area and functions on AM and FM. A scan is initiated in VFO mode and the first 50 active channels are loaded into special memory.

The FT-817 also includes a spectrum scope monitor which monitors activity five channels on either side of the receive frequency and displays relative signal strength as a bargraph on the LCD. Normal receiver operation is disabled whilst the spectrum monitor is functioning. Although operational on all modes, the result is only really meaningful for monitoring FM channels. The IF bandwidth for the spectrum scan is set to the FM bandwidth and channels are scanned according to the step size set for the 'Select' channel stepper. This step size needs to be set appropriately to get the desired result, normally the operational channel step size.

MEASUREMENTS

MEASUREMENTS MADE on the review radio are summarised in the tables on page 45. The current consumption on receive measured some 300 - 380mA depending on band and the receive audio level with an additional 30mA for the LCD backlight. On transmit, the current consumption was 2A at 5W output reducing to 0.5A at 0.5W output. The current consumption at 9.6V and 13.8V is similar. This gives around 2 - 3 hours maximum usage on receive-only between battery charges, reducing of course according to the amount of transmit time. When charging the internal batteries, the external current consumption rises by about 170mA, the battery charge current, and takes about 6 - 8 hours to charge the battery fully. Note that when switched off, the radio still draws 25mA from an external 13.8V supply.

The overall receive performance was very creditable considering the size and nature of the radio. Significantly better than

most other QRP radios available and comparable with many much bigger transceivers. The sensitivity was entirely adequate on all bands and generally well maintained outside the amateur bands except at LF. Below 1MHz the sensitivity reduced markedly with lowering frequency, yielding 5μV at 200kHz and 50μV at 136kHz. The S-meter range was significantly compressed, similar to most FM receivers rather than SSB receivers, and the AGC recovery set rather too fast. This was very noticeable in listening tests. The slow recovery setting was similar to the fast setting in most other radios. The image and IF rejection was quite respectable (70 - 100dB) with second image around 55dB. The strong signal performance measured up very well for a portable, the overall selectivity and adjacent channel results are shown in **Fig 1**.

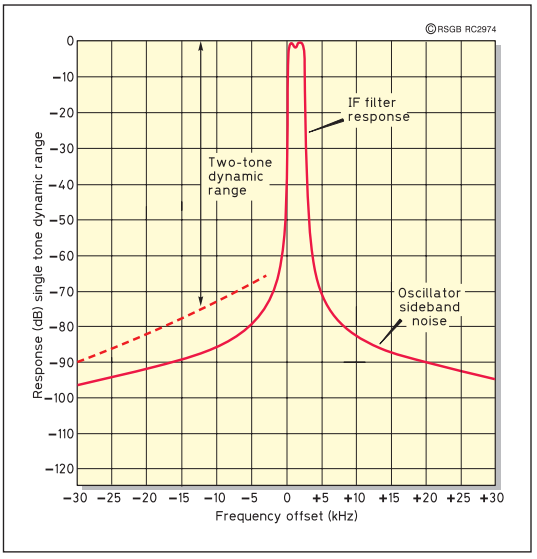


Fig 1: FT-817 measured overall selectivity.

On transmit the various power levels were close to specification but there was a tendency for the power output levels to drop substantially when hot, with 5W reducing to 3W or less in some cases. SSB distortion levels were quite reasonable and CW keying was low distortion with no difference between semi break-in and 'quasi' full break-in. The rise time was well rounded but the fall time was a little sharp. Transmit / receive switching times showed a somewhat longer than average time for the receiver to recover and reach full sensitivity (36ms).

ON THE AIR

THE RECEIVER in the FT-817 really performed very well. In tests on my home station antennas, there were very few signals which couldn't be copied as well on the FT-817 as on my FT-1000MP. On the low bands with large antennas the preamp needed to be switched out (IPO) in most cases to avoid overload, but rarely was it necessary to switch in the attenuator. The receive audio was fairly 'toppy', but good communications quality and with plenty of punch. I used the AGC slow setting on all modes, in the fast setting background noise would return to full level between Morse characters and speech symbols in a disconcerting way. Surprisingly the S-meter decay was much slower to respond. The filters were good and the narrow CW filter well recommended. Broadcast AM and wideband FM both gave excellent results and quality. The transmit audio was clear and punchy and good quality and the CW break-in system was effective. I worked a number of DX stations with remarkable ease.

For table-top use the radio is best propped to angle the front panel for convenient access. I found the rotary tuning knob too small for easy use and the finger detent ineffective for adult fingers, but this is the price which must be paid for a radio of this compact size. Also I found the tuning knob very easy to knock and move frequency, but there is a lock button to prevent this. The control ergonomics for most functions are quite cleverly arranged and easily mastered after a brief learning period. I would have preferred the button legends to be displayed continuously, they share the same display area as the S-meter and revert back to the S-meter display a second or so after each key press. Although there is a low battery icon, it is not very attention-grabbing. When the battery voltage drops, there reaches a point when the radio just switches off with no prior warning.

The FT-817 with supplied YHA-63 antenna.

CONCLUSIONS

THE FT-817 IS a remarkable little radio with a performance and feature set which matches many of its bigger brothers. It really is a radio you can take anywhere and there is nothing else similar to compare it with. It has a list price of £799 inc VAT, but deals are available by shopping around.

Thanks to Yaesu (UK) for the loan of the model reviewed.

ANTENNA APPENDIX

WATERS & STANTON market a range of base-loaded telescopic whip antennas intended for use with the FT-817 and these plug into the front panel BNC connector (see photo at top of p45). Each comprises a 4ft telescopic whip section in conjunction with a loading inductor moulded into the base. The AT series are monoband antennas with separate models covering all bands from 80m to 70cm. Fully extended the length is 1.4m collapsing to about 26cm. The ATX-Walkabout is a novel multiband antenna with a tapped loading inductor and a jumper lead which shorts out various sections of the inductor. This single antenna is adjustable on all bands from 80m to 6m, 1.65m fully extended and only 32cm dismantled.

The antennas are tuned by adjusting the length of the telescopic section whilst observing the VSWR display on the FT-817. As the antennas are very short compared with the operating wavelength, the bandwidth is quite narrow and tuning is fairly sharp, particularly on the lower frequency bands. A ground plane wire or earth lead must be connected to the ground terminal on the back of the radio to obtain any reasonable performance on receive and is a must on transmit. As these are fairly rigid antennas, care should be taken to avoid any knocks which may damage the BNC socket. However, the socket is is quite strong as it is mounted on a metal sub panel and not directly on to a PCB as is the case with some radios. 'Rubber duck' VHF antennas, being flexible, present less strain on the antenna socket.

The antennas certainly work and I found them quite effective particularly on receive for monitoring band activity. The AT-xx monoband antennas are priced between £39.95 and £9.95 depending on band with most of the HF range at £24.95. The ATX Walkabout is priced at £69.95. ♦

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FT-817
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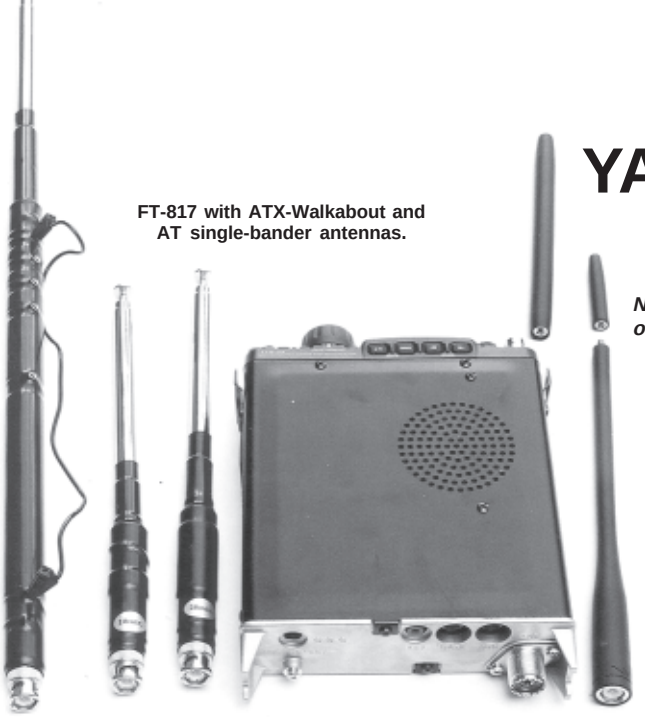
YAESU FT-817 MEASURED PERFORMANCE



FT-817 with ATX-Walkabout and AT single-bander antennas.

NOTE: All signal input voltages given as PD across antenna terminal. Unless stated otherwise, all measurements made on SSB with the receiver preamp switched in.

RECEIVER MEASUREMENTS

	SENSITIVITY SSB 10dBs+n:n		INPUT FOR S9	
FREQ	PREAMP IN	IPO	PREAMP IN	IPO
1.8MHz	0.32μV (-117dBm)	1.0μV (-107dBm)	28μV	110μV
3.5MHz	0.28μV (-118dBm)	0.8μV (-109dBm)	32μV	110μV
7MHz	0.25μV (-119dBm)	0.7μV (-110dBm)	28μV	100μV
10MHz	0.22μV (-120dBm)	0.63μV (-111dBm)	25μV	90μV
14MHz	0.22μV (-120dBm)	0.56μV (-112dBm)	20μV	60μV
18MHz	0.20μV (-121dBm)	0.56μV (-112dBm)	18μV	70μV
21MHz	0.22μV (-120dBm)	0.63μV (-111dBm)	20μV	70μV
24MHz	0.20μV (-121dBm)	0.63μV (-111dBm)	20μV	70μV
28MHz	0.20μV (-121dBm)	0.56μV (-112dBm)	20μV	70μV
50MHz	0.13μV (-125dBm)	0.35μV (-116dBm)	14μV	60μV
144MHz	0.13μV (-125dBm)	-	13μV	-
432MHz	0.13μV (-125dBm)	-	13μV	-

AM sensitivity (28MHz): 1.1μV for 10dBs+n:n at 30% mod depth
FM sensitivity (144MHz): 0.18μV for 12dB SINAD 3kHz pk deviation
AGC threshold: 2.2μV
100dB above AGC threshold for +1.5dB audio output
AGC attack time: 3 - 10ms
AGC decay time: 20ms (fast), 200ms (slow)
Max audio before clipping: 8Ω - 1.0W, 4Ω - 1.7W at 2% distortion

	INTERMODULATION (50kHz Tone Spacing)			
	PREAMP IN		IPO	
Freq	3rd order intercept	2 tone dynamic range	3rd order intercept	2 tone dynamic range
1.8MHz	+4.5dBm	88dB	+2.5dBm	80dB
3.5MHz	+4dBm	88dB	+9dBm	85dB
7MHz	+5dBm	89dB	+16dBm	91dB
14MHz	+8dBm	92dB	+18dBm	93dB
21MHz	+10.5dBm	94dB	+20dBm	94dB
28MHz	+9.5dBm	94dB	+25dBm	98dB
50MHz	-1dBm	89dB	+13dBm	93dB
144MHz	-12dBm	82dB	-	-
432MHz	-6.5dBm	86dB	-	-

	CLOSE-IN INTERMODULATION ON 7MHz BAND			
	PREAMP IN		IPO	
Spacing	3rd order intercept	2 tone dynamic range	3rd order intercept	2 tone dynamic range
3kHz	-32dBm	65dB	-21dBm	66dB
5kHz	-29dBm	67dB	-18dBm	68dB
7kHz	-26dBm	69dB	-15dBm	70dB
10kHz	-22dBm	72dB	-10dBm	73dB
15kHz	-14dBm	77dB	-3dBm	78dB
20kHz	-8dBm	81dB	+3dBm	82dB
30kHz	+3dBm	88dB	+14.5dBm	90dB
40kHz	+5dBm	89dB	+16dBm	91dB
50kHz	+5dBm	89dB	+16dBm	91dB

FREQUENCY OFFSET	RECIPROCAL MIXING FOR 3dB NOISE	BLOCKING PREAMP IN	BLOCKING IPO
3kHz	69dB	-45dBm	-32dBm
5kHz	76dB	-44dBm	-31dBm
10kHz	85dB	-43dBm	-29dBm
15kHz	88dB	-39dBm	-25dBm
20kHz	91dB	-35dBm	-22dBm
30kHz	96dB	-30dBm	-16dBm
50kHz	101dB	-18dBm	-6dBm
100kHz	104dB	-18dBm	-6dBm
200kHz	101dB	-18dBm	-6dBm

S-READING (7MHz)	INPUT LEVEL SSB	
	PREAMP IN	IPO
S1	2.8μV	10μV
S3	3.2μV	11μV
S5	4μV	14μV
S7	5μV	18μV
S9	28μV	100μV
S9+	70μV	250μV

MODE	IF BANDWIDTH		
	-6dB	-50dB	-60dB
SSB, CW	2400Hz	3520Hz	4870Hz
CW(N)	555Hz	1640Hz	2375Hz
AM	7590Hz	12.7kHz	14kHz
FM	15.3kHz	24.3kHz	25.3kHz
FM(N)	10.4kHz	16.2kHz	16.6kHz

TRANSMITTER MEASUREMENTS

FREQUENCY	CW POWER OUTPUT	SSB(PEP) POWER OUTPUT	HARMONICS	INTERMODULATION PRODUCTS 3rd order	5th order
1.8MHz	5.1W	5.4W	-55dB	-32 (-26)dB	-41 (-35)dB
3.5MHz	5.4W	5.7W	-66dB	-31 (-25)dB	-43 (-37)dB
7MHz	5.3W	5.5W	-75dB	-31 (-25)dB	-42 (-36)dB
10MHz	5.2W	5.4W	-56dB	-30 (-24)dB	-43 (-37)dB
14MHz	4.9W	5.2W	-62dB	-31 (-25)dB	-42 (-36)dB
18MHz	4.9W	5.2W	-60dB	-30 (-24)dB	-42 (-36)dB
21MHz	4.9W	5.2W	-65dB	-29 (-23)dB	-42 (-36)dB
24MHz	5.0W	5.2W	-67dB	-28 (-22)dB	-41 (-35)dB
28MHz	5.0W	5.3W	-62dB	-28 (-22)dB	-41 (-35)dB
50MHz	4.9W	5.2W	-68dB	-28 (-22)dB	-42 (-36)dB
144MHz	4.8W	5.0W	-65dB	-25 (-19)dB	-37 (-31)dB
432MHz	4.4W	4.6W	-63dB	-26 (-20)dB	-37 (-31)dB

Two-tone transmitter intermodulation product levels are quoted with respect to PEP, figures in brackets are with respect to either tone.

Carrier suppression: 60dB
Sideband suppression: >60dB @ 1kHz
FM deviation: 4.3kHz (wide) 2.0kHz (narrow)
SSB T/R switch speed: mute-TX 20ms, TX-mute 6ms, mute-RX 36ms, RX-mute 1ms

FT-817 with supplied accessories.

in practice

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HORIZONTAL DIPOLE, VERTICAL POLARISATION?

I'VE HEARD IT said that the radiation from the ends of a horizontal dipole is vertically polarised. How can this be?

AS OFTEN HAPPENS, hearsay brings only part of the story. The missing part is that we're talking about non-zero wave angles (wave angle is the angle of the transmitted wave above horizontal). **Fig 1** tells a more complete story; it's drawn using 'perspective' paper to help give a three-dimensional impression. **Fig 1(a)** is looking at the dipole broadside-on, but from a positive wave angle, ie from a viewpoint above ground, ie at some positive wave angle. The direction of polarisation of the radio waves transmitted towards that wave angle is the direction of the wire *as seen from your viewpoint*. That is exactly the same as saying 'the direction of polarisation is the direction as projected on to this 2-dimensional page'. So, clearly, the direction of polarisation in Fig 1(a) is horizontal.

Fig 1(b) is a diagonal view, again from above ground at a positive wave angle. If you don't believe that the plane of polarisation transmitted towards this viewpoint is diagonal, move straight on to **Fig 1(c)**. Now we are looking at the dipole end-on from above ground. The plane of polarisation transmitted towards this viewpoint is *vertical* - because the line on the page is vertical. Note also that the length of the dipole is foreshortened in this view, which indicates that the vertically-polarised component will be reduced in strength. If we move the end-on viewpoint to lower angles, the projected length of the dipole will become ever shorter, but it will still look vertical. Therefore we would expect a weaker signal, but still vertically polarised.

Now what else *don't* we see? We see no vertically-polarised component from the viewpoint of Fig 1(a) because the dipole appears absolutely horizontal. On the other hand, we see no horizontally-polarised component in Fig 1(c) because the projected view of the dipole appears only vertical, and has no horizontal extent. Returning to Fig 2(b), the projected view of the dipole is slanting - it has both height and width - so therefore we expect slant polarisation which is a mixture of horizontal and vertical.

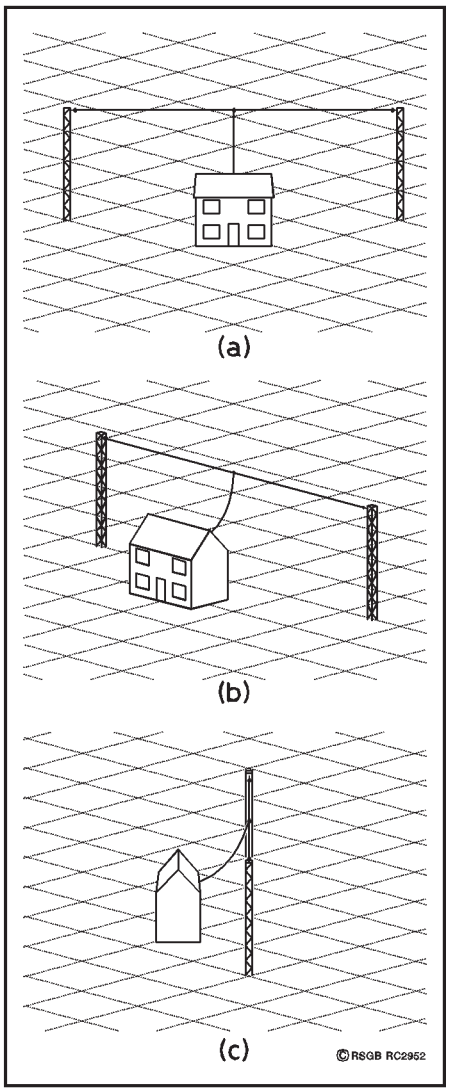

Fig 1: The angle of polarisation transmitted from a horizontal dipole towards a particular viewpoint in 3-dimensional space is the same as the angle you see on these 2-dimensional perspective drawings. (a) Broadside-on receives only horizontal polarisation. (b) A diagonal viewpoint receives diagonal (slant) polarisation. (c) An end-on viewpoint receives only vertical polarisation, made weaker by the foreshortening of the projected view of the dipole.

Reflection from real (imperfect) ground will somewhat affect the plane of slant-polarised waves. If you resolve a slant-polarised wave into its horizontal and vertical components (**Fig 2**), each of those pure horizontally- or vertically-polarised waves will be reflected with the same polarisation, but only the vertical component experiences Brewster-angle effects which reduce the efficiency of reflection at certain angles [1]. Therefore when you recombine the reflected components, you find that the relative values have changed and thus the plane of polarisation has rotated.

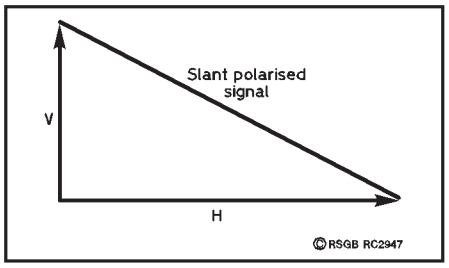

Fig 2: A slant-polarised signal con be resolved into separate horizontal and vertical components - and the two separate components can be re-combined.

'NOISELESS' RF FEEDBACK

WHAT IS 'NOISELESS' RF feedback? For that matter, what is the 'noisy' kind?

'NOISELESS FEEDBACK' is engineers' shorthand for RF negative feedback that is not achieved by using resistive components. Negative feedback is frequently used in all kinds of RF amplifiers, from receiver input stages to transmitter power amplifiers, because it brings some combination of three benefits: (1) a reduction in unwanted gain; (2) an improvement in linearity; and (3) better input and/or output impedance matching. I'll take these one by one, and then we'll see where the effect upon noise comes in.

If driven hard enough, any amplifier will reach an output level where either the output voltage swings to one of the supply rails, or else the output current swings down to zero or up to the maximum that the DC supply can provide. Under these conditions - known as *saturation*, *limiting* or *clipping* - the amplifier cannot provide any more power output, and any increase in input signal generally causes a rapid increase in distortion. If saturation is being caused by excessive gain, designers will often consider using negative feedback to reduce the gain to a controlled and manageable level. A typical example would be to reduce the gain of a receiver's RF amplifier, to avoid saturation in that stage and also to avoid overdriving the stages that follow.

Negative feedback is used in a very different way in audio amplifiers and a wide range of circuits involving operational amplifiers. Here the designer deliberately builds in a very high level of gain (voltage gains of many thousands are typical) and then applies heavy negative feedback to bring the overall gain back to the required level. **Fig 3(a)** shows a typical op-amp circuit in which R2 applies a negative feedback signal from the output to the inverting input. If you analyse such a system in more detail, the more open-loop gain you have before applying negative feedback, the more closely the gain approaches the simple ratio -R2/R1 (the minus sign implying a phase inversion). In other words, the more open-loop gain the amplifier has, the less the characteristics of the whole system

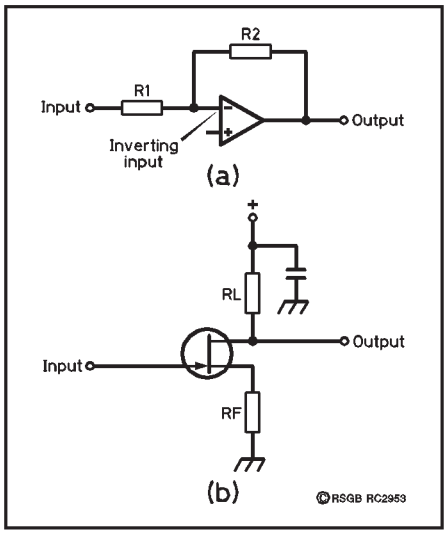

Fig 3: (a) Typical op-amp circuit using shunt negative feedback. With very high 'open-loop' gain within the op-amp, the gain becomes independent of the amplifier characteristics. (b) Negative feedback in series with the common connection, in this case the source of the FET.

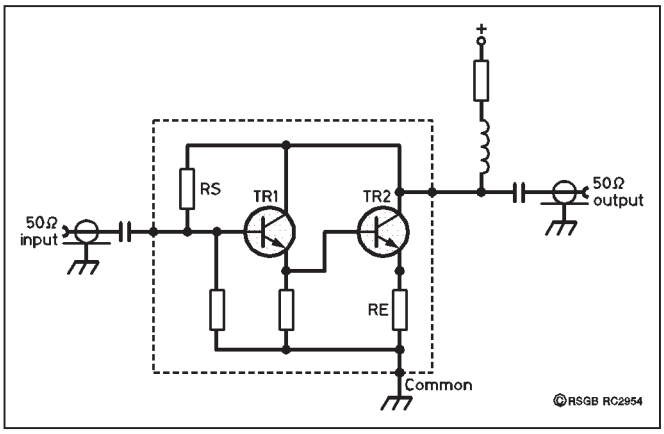

Fig 4: Simplified internal circuit of an MMIC, showing combined shunt feedback (RS) and series feedback (RE) to achieve 50Ω matching at both input and output.

depend on the actual value of that gain. This means that in 'open-loop' mode the amplifier can have significant non-linearity - in other words, significant changes of gain with drive level - but closing the loop by negative feedback tends to oppose such effects and thus makes the system much more linear.

The next use of negative feedback is to improve input/output matching. The input and output impedances of any amplifier will change when negative feedback is applied. At this point we have to distinguish between shunt and series feedback. Shunt feedback is the kind already shown for an op-amp in Fig 3(a), where the input and feedback signals are summed in parallel at the amplifier's input. The negative feedback through R2 opposes the effect of the input signal, so the input impedance tends to fall towards a lower limit established by R1. At the same time the output more closely approximates a perfect voltage source so its impedance falls too. Series negative feedback is shown in **Fig 3(b)**. Here the feedback resistor RF is placed in the common connection (in this case the source) and appears in series with both the input and the output circuits. If you raise the input voltage to the gate of the FET, the source voltage will tend to follow it upwards, and this both increases the input impedance and decreases the gain. The gain of this amplifier tends towards the ratio (RL/RF), so the larger value of RF you use, the smaller the gain becomes. The output impedance is determined almost entirely by the value of the load, RL.

Since shunt negative feedback reduces input impedance and series feedback increases it, you can use both in combination to transform any device input impedance into a near-perfect match to 50Ω or any other system impedance. At the same time, you can change the resistors in the output circuit to get a near-perfect output match as well. **Fig 4** shows how this is done in a typical MMIC (microwave monolithic integrated circuit) amplifier. TR1 and TR2 form a 'Darlington pair' which inherently has a high current gain and high input impedance, but the series emitter resistor RE and the shunt feedback resistor RS modify these characteristics. The other resistors are mainly for DC biasing. By juggling with all the resistor values it is possible to create a good match to 50Ω at both input and output, all the way from near-DC to microwave frequencies where TR1-TR2 starts to run out of gain, and parasitic inductances and capacitances become significant.

MMICs have transformed amateur microwave construction by solving the problems of achieving high, stable and reproducible gain. This makes them ideal for transmitter driver stages but, for receivers, noise can be a problem. For an amplifier that achieves a perfect input match by resistive feedback alone, thermal noise generated in the resistors [2] will impose a minimum possible noise figure of 3dB for the complete amplifier [3]. Check the noise figure data for older generations of MMICs and you will see this very clearly.

Fortunately there are non-resistive ways to achieve feedback, using inductance, capacitance or transformers, which - at least in the ideal case - will not contribute noise like resistors do. These are the so-called 'noiseless' feedback methods. One of the classic circuits (**Fig 5**) is inductive source feedback for GaAsFET RF amplifiers, which have a high natural input impedance. Series negative feedback from a small amount of source inductance can reduce the input impedance to close to 50Ω without significantly affecting the noise performance. This is a widely-favoured technique, originally developed for radio astronomy preamplifiers.

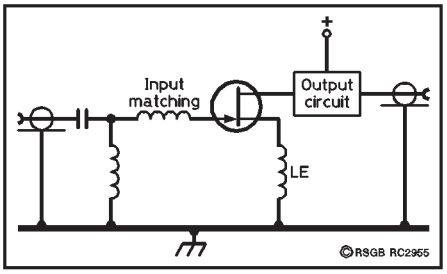

Fig 5: Examples of 'Noiseless' (non-resistive) negative RF feedback .

The main difficulty with all of these 'noiseless' feedback circuits is that no RF component is perfect, so negative feedback at one frequency tends to transform itself to positive feedback at other frequencies. At any frequency where positive feedback is possible, modern-day active devices will provide generous amounts of gain to turn positive feedback into oscillation! With typical VHF/UHF/microwave amplifiers, the design challenge is to use lossless negative feedback to the operating frequency, yet also to kill the gain wherever else that feedback might turn positive. Almost inevitably this means deliberately adding resistive losses, so the further challenge is to minimise their effect on the noise performance at the operating frequency. It isn't easy, but MMIC designers have been able to apply a combination of resistive and 'noiseless' feedback to produce GaAsFET MMICs with noise figures as low as 1.4dB. ♦

REFERENCES

[1] *HF Antennas for All Locations*, by Les Moxon, G6XN (RSGB), gives a thorough discussion of ground reflection and Brewster-angle effects at HF.
[2] 'In Practice', February 2001.
[3] *Introduction to Radio Frequency Design*, by Wes Hayward, W7ZOI (ARRL).

WWW.

RSGB web site	www.rsgb.org
ARRL web site	www.arrl.org
'In Practice' web site	www.ifwtech.com/g3sek/in-prac/index.htm

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. Please remember that I can only answer questions through this column, so they need to be on topics of general interest.

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Winning the IOTA Contest from EU-008

Photo: Tom, GM4YMA

It's time to start the planning for the RSGB's most popular HF contest - the RSGB IOTA Contest, which this year takes place on 28 / 29 July. Tom Wylie, GM4FDM* reveals some of the secrets which allowed the GM5V team to clinch top place in the 2000 event

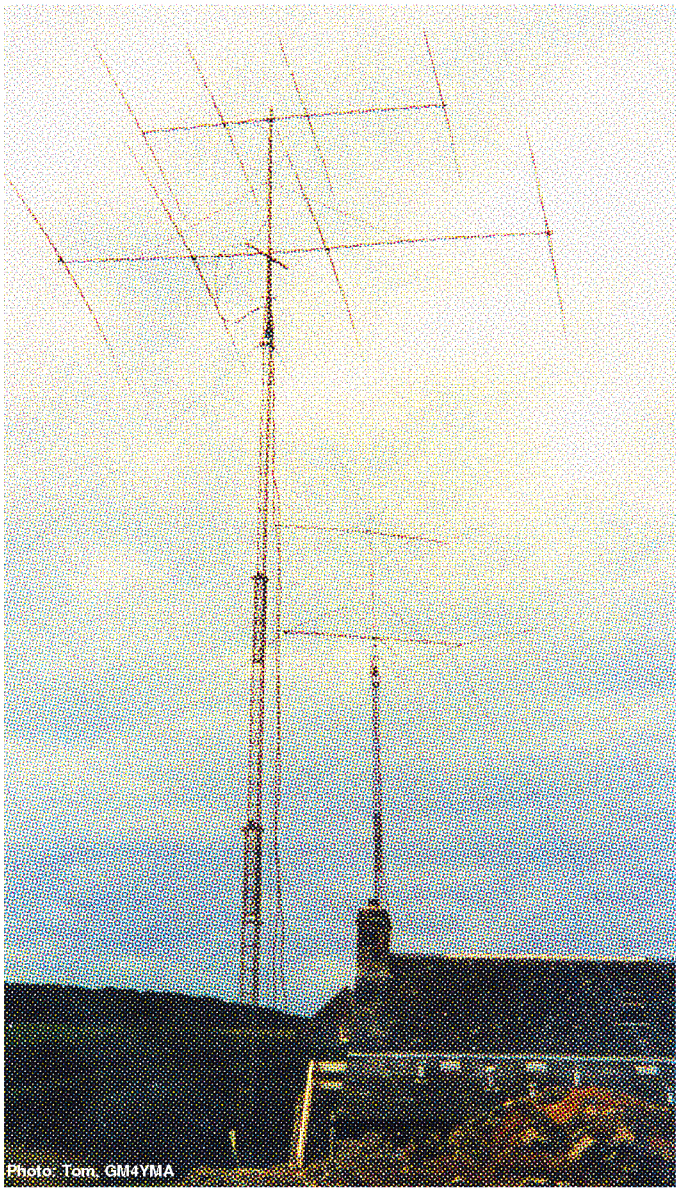


Photo: Tom, GM4YMA

GM5V's antennas: 4-element monobanders on 20m and 10m, and (far tower) 4-elements on 15m and 2-elements on 40m.

THE WINDY YETTS Contest Group, GM5VG, has been taking part in the RSGB IOTA Contest for the past six years. This contest is one of the more difficult in the calendar as it's not just a battle of brawn, but also a battle of brains. Contest strategy is the all-important factor. Since 2000 was the Millennium year, we decided to make a serious effort to improve on our best previous performance, which was fourth in the Multi-Operator Island Section. The first step was to shorten our call to GM5V.

We started going to Gigha through our friends in HM Coastguard. We are allowed to use the Coastguard shed as a shack and the area around the shed to set up our antenna farm. The only down side of Gigha is that is has a poor Sunday ferry service and it is really very expensive.

THE MULTIPLIER IS KING

JIM, GM0NAI, WAS appointed 'RF King' in 2000, designing and setting up the RF side of things. The most significant change from the past was the introduction of the *PacketCluster* network by Gavin, GM0GAV. Gavin allowed us to connect to the Internet *PacketCluster* for the duration of the contest and this single factor allowed us to maximise our performance. There are no 2m or 70cm Cluster access ports audible in Gigha. Someone, somewhere (actually I think it was Don Field, G3XTT) said, "the multiplier is King!" and nowhere is this more true than in this particular contest. You can rack up a vast QSO total but, if you don't have the multipliers to back it up, then all is lost.

A multiplier in this particular contest is a new IOTA island reference worked for the first time on both SSB and CW on each band (10 - 80m, excluding the WARC bands). So it is important to search for, and pounce on, *any* new unworked island groups. The rules allow two transmitters, one for calling CQ (the 'run' station) and the other for working new multipliers (or the 'mult' station).

GM5V Operators 2000
Dennis, GM3NIG; Tom, GM4YMA; Chris, GM0UKZ; Jim, GM0NAI; Gavin, GM0GAV; Ian, GM3UTQ; Tom, GM4FDM

*3 Kings Crescent, Elderslie, Johnstone, Strathclyde PA5 9AD.

HARDWARE & SOFTWARE

IN 2000 WE decided to make use of three towers - all of which had to be transported to, and returned from, the island. This in itself is quite a logistical problem as not everybody has a tow hitch fitted to his or her car. With Caledonian MacBrayne duly placated we made our way to Gigha on the Wednesday prior to the contest. Everybody was on site by the Wednesday evening. Aerial erection began and we finished off the evening with a meal and a few drinks in the only hotel on the island.

The weather was glorious and after a good day's work on the Thursday the antenna farm was almost complete. We did have a wee bit of head scratching when we were left with a load of bits of aluminium for the 10m beam, which did not seem to fit together. Disaster - Jim and I had accidentally taken parts for another beam. A quick telephone call was made and we arranged for the proper bits to be brought to the island on the Friday.

By Friday night we had more or less completed our farm. For 80m we had a ground-mounted Chelcom vertical, with eight radials and a low dipole. For 40m we had a Cushcraft 2-element beam mounted about 60ft on a mobile tower. Also on this tower we had the 4-element monoband Yagi for 10m mounted just underneath it. The second mobile tower, also a 60-footer, held a 4-element monobander for 20m and a 4-element monobander for 15m. The third and smallest tower supported a Jaybeam TB3 tribander for 10, 15 and 20m for the multiplier station. We also had a Butternut HF2 vertical and an HF6 vertical to allow for a bit of flexibility on the lower bands. All antennas were fed with Andrew's Heliax. All antennas were fed back to two six-way antenna switches.

	CW			SSB		
Band	**QSOs**	**Points**	**Mults**	**QSOs**	**Points**	**Mults**
80	97	795	37	145	1275	43
40	119	897	39	282	2154	56
20	168	1260	54	946	6054	106
15	158	1278	53	554	3522	75
10	28	372	24	109	819	38
Totals:	**570**	**4602**	**207**	**2036**	**13824**	**318**

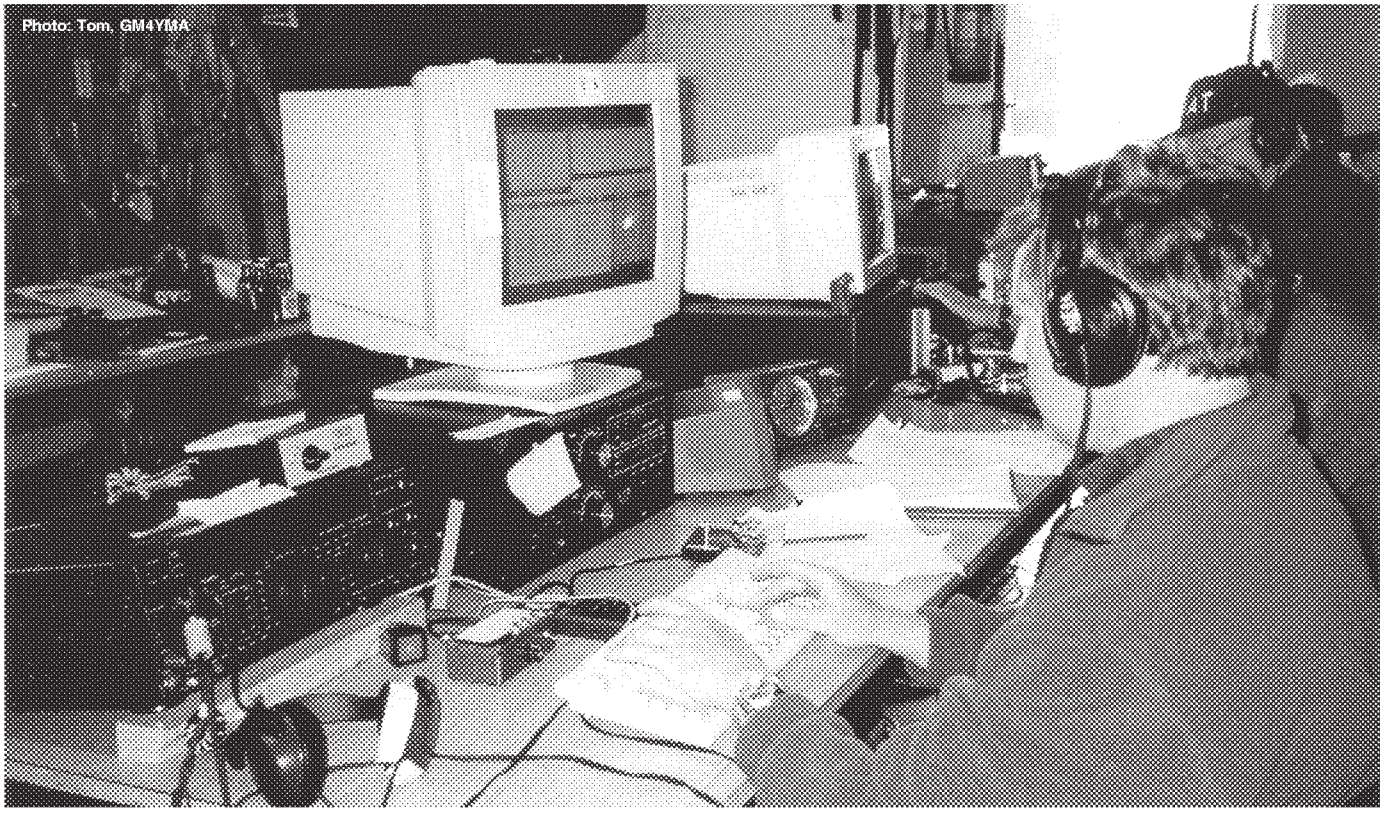
Final score: (18426) QSO points x (525) multipliers = 9,673,650 points.

Table 1: GM5V band and mode score breakdown.

The radios were a Yaesu FT-1000MP on the 'run' station with an Alpha 89 linear amplifier, and an FT-1000D with GM0GAV's auto-switching Alpha 87a on the 'mult' station. A computer network was set up using laptops. We used *NA* as our software as we have used this program for three years and have now got used to it I guess. Dunestar bandpass filters were fitted between each radio and its amplifier to reduce inter-station interference. Filter switching is achieved through a device called a band decoder, which takes an output from the transceiver and controls the filters and the antenna changeover switches. They are also linked to the computers so that a simple key sequence on the keyboard switches band on the radio, automatically switches the bandpass filters and the antenna changeover switch. A CW keyer is also built into the system. Band changing can be done quickly on the run station, just involving a retune of the amplifier, but with the Alpha 87a on the multiplier station, band changing and tune up was both automatic and instant. A new multiplier came up either on the receiver or the Internet and click - you were on the frequency *and* fully tuned. Many new multipliers came back first call and it was all down to the slickness of the operator.

CONTEST TACTICS

THE BENEFIT OF networking computers is that it allows each operator to see what the other is doing and it is our rule that the operator on the multiplier station has to 'give way' to the run operator as far as serial numbers are concerned. The run operator is calling CQ and working stations on a roll as quickly as he is able. The multi operator



GM5V in action: Jim, GM0NAI, in the foreground and Tom, GM4FDM, in the coastguard shed on Gigha.

has to 'slot in' a QSO with a new multiplier and make sure the run operator does *not* re-issue that serial number. In truth everybody has to keep his wits about him and watch the screen. With a good run operator things are moving at a fairly fast pace, and the mult operator has to work his mult as quickly as possible so that not too much time is lost by the run operator who has to pause whilst this QSO is taking place. Sounds difficult, but comes with practice.

The FT-1000D was split into two 'operating' positions. This transceiver has two independent built-in receivers whilst the FT-1000MP is constrained by inbuilt bandpass filters and is only able to operate on the same band as the main receiver. By the use of two operators on the '1000D, one listening on SSB and the other on CW, we were able to maximise our multiplier potential. In fact quite often it was a race between the mult station operators to press the button and work their mult. By tuning the bands and by using the Internet Cluster, we eventually made 525 multipliers, a total never before achieved by any station in the IOTA Contest.

The breakdown of band and mode contacts and points is given in **Table 1**.

Conditions were just a little above average. It would appear that we in Scotland were able to work more Japanese stations that our counterparts down south and there were over 140 JAs in our logs. Each JA is worth 15 points (being an island nation) so it is important to maximise openings on the various bands as they occur. We took this to the extreme after a run of JAs on SSB by going to CW and working another batch on the key. This proved to be a worthwhile strategy. It is also important, for example, to work 80m intra-UK in the evening, instead of running North America for hours on another band. The path to North America is open on one band or another for most of the duration of the contest, but it is important to remember the fact that the vast majority are non-island stations and so each QSO is only worth 3 points. Each UK station is worth 15 points because they are island stations. GU8D, our nearest rivals, worked comparatively few JAs, even although overall they had almost 300 QSOs more than us. They also worked fewer multipliers than we did, but even so still also beat the previous record.

Studying propagation and making up propagation charts for different parts of the world *before* the contest is also a useful strategy, a bit like going on a major DXpedition. An operating plan for band changes is a must and one member of the group was appointed to carry out this function.

The combination of brain and brawn, as well as the fact that IOTA is a multi-mode event, makes this one of the most enjoyable contests around. The thrill of QSYing a rare DX station from band to band and between modes is exhilarating. One minor fly in the ointment is the fact that we couldn't get a GI station to QSY to CW. It's amazing the different excuses we got for being unable to QSY to CW. Whilst we appreciate some stations might have entered the SSB-only section of the contest, it was still frustrating not being able to work our friends in Northern Ireland on the key.

SEE YOU THIS YEAR?

WE HAD GREAT weather this year, for a change. This was the high point - normally it rains a lot and the wind blows, but this year was wall-to-wall sunshine, which caused a little sunstroke and increased our 'fluid' intake. The low point was when GM0UKZ went sleep-walking at his bed and breakfast in the middle of Friday night and plunged down a flight of stairs. Fortunately being asleep saved him from serious injury and apart from some bruising and a leg gash, Chris suffered little further injury. The B&B was owned by Mr and Mrs McSporran (yes, that's their real name). Mr McSporran has since retired but at the time held the record for having the largest number of jobs in Scotland. He was postmaster, shopkeeper, pier master, harbourmaster, part-time fire man, special constable, ambulance driver, coastguard etc. He was quite a character and now that he is retired he will be sorely missed.

We would like to thank and pay tribute to our friends in Gigha for all their help over the years. It's truly amazing how they can come up with 10 stainless steel nuts and bolts at the drop of a hat.

We are now looking forward to this year's contest. It will be a challenge for us to see if we can do it again now that the sunspots are declining. ♦

FURTHER READING

RSGB IOTA Directory 2000, edited by Roger Balister, G3KMA. Essential guide to the RSGB IOTA programme and certainly necessary if you wish to compete in this year's IOTA Contest.

Amateur Radio Operating Manual (5th edition), edited by Ray Eckersley, G4FTJ. The fifth edition includes a completely new section on organising a DXpedition which provides useful tips if you plan to operate the IOTA Contest from an island.

www.

RSGB (operating):
http://www.rsgb.org/operating/index.htm
RSGB IOTA (external site):
http://www.rsgbiota.org/
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http://www.g4tsh.demon.co.uk/HFCC/
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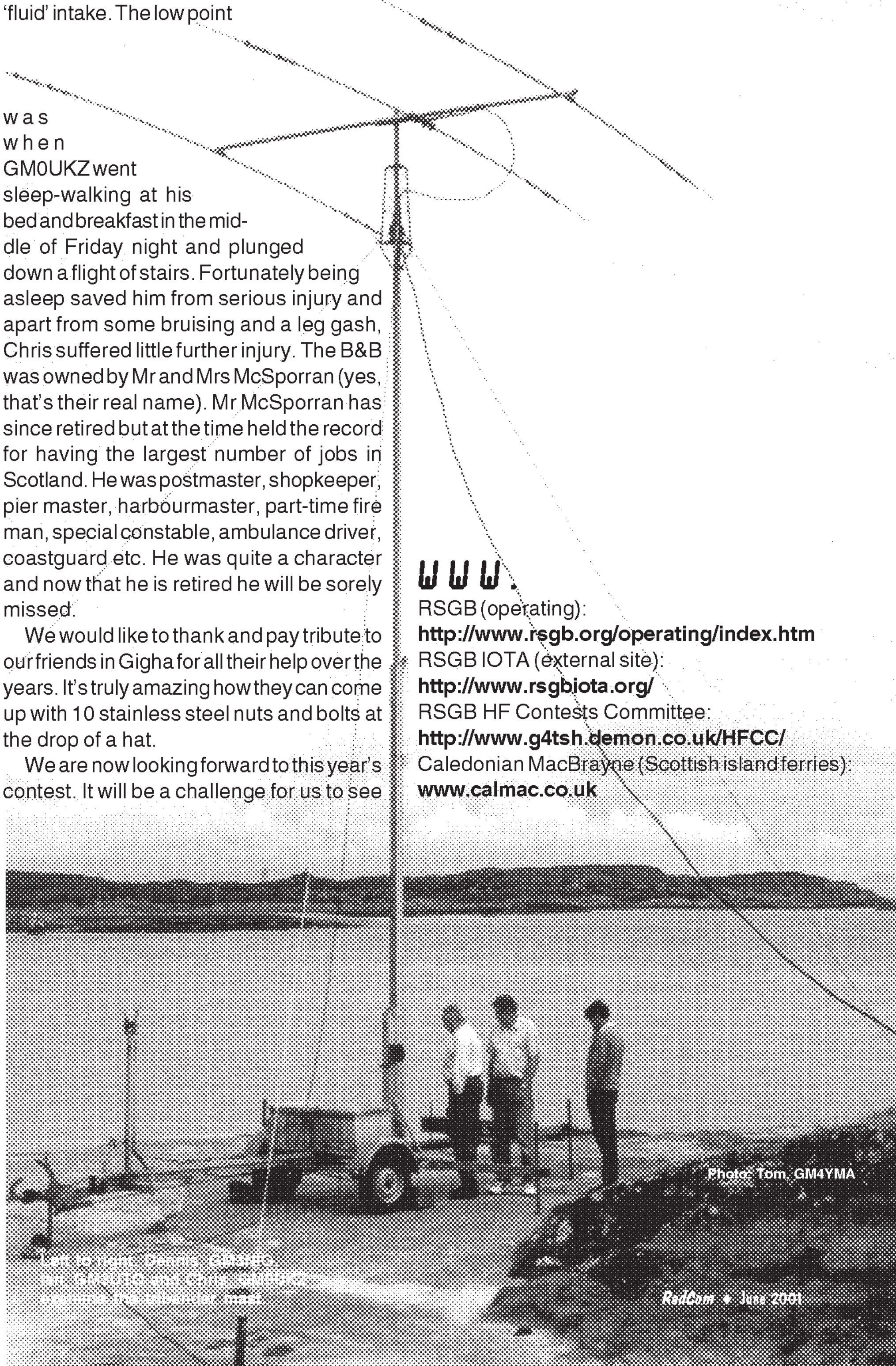

Photo: Tom, GM4YMA

Left to right: Dennis, [illegible]

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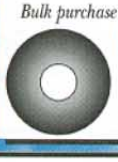

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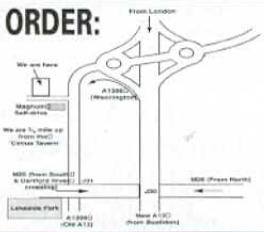

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Technical Topics

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1kHz TO 30MHz IC OSCILLATOR

ACCORDING TO a news item in *Electronics World* (May 2001, p328), Linear Technology has announced a new IC device - LCT1799 - that can provide a handy oscillator with an output between 1kHz and 30MHz: **Fig 1**. With a five-pin SOT-23 package, the

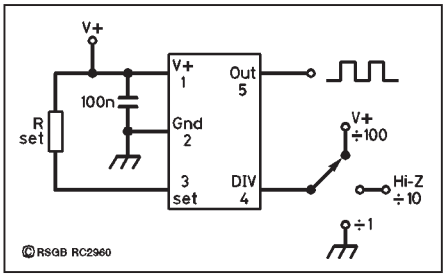

Fig 1: Simple 1kHz to 30MHz oscillator using the LCT1799 chip. Frequency set by R with three-position divider switch.

frequency is set within the range 100kHz to 30MHz by the value of a single resistor R, with the frequency and the value of the resistor having a linear relationship. The square-wave output is then divided in the ratio of 1, 10 (10kHz to 3MHz) or 100 (1kHz to 300kHz) with an external switch. Claimed frequency error is ±2% or less between 5kHz and 20MHz (0°C to 70°C) with stabilisations of 40ppm/°C and 0.05%/V for temperature and supply. The chip runs from a supply voltage from 2.7 to 5.5V, although it will not reach 30MHz on the lower voltage. Typically, it draws 1mA and has an output impedance of 100Ω. Linear Technology suggests that the chip is suitable for driving charge pumps, clocking switched capacitor filters and replacing crystal and ceramic oscillators.

MORE ON POLYPHASE FILTERS

I FEEL NO apology is needed for returning once again to the topic of the Gingell polyphase filter and its potential importance to amateur radio receiver design. The combination by Harold Wilson, G3OGW, of the Tayloe switching mixer (product detector) with a sixth-order polyphase filter ('TT' March/April 2001) confirms a major breakthrough in the design of communications receivers. Thanks to G3BJC, I have been reminded that an experimental polyphase D-C receiver using the N7VE 3253 product detector was developed in 1999 by Jan Verduyn, G0BBL (with Steve, G0XAR, and Alan, G7PUB), and described with circuit details as 'The QRP2001' in *Sprat* No 101, Winter 1999/00. This had completely slipped my aged memory and was unknown to G3OGW.

The concept offers a linearity and dynamic range potentially better than currently available models within the budget and within the constructional ability of many amateurs. It could also offer a new opportunity for manufacturers wishing to cater for a market that has become somewhat disillusioned with designs in which emphasis has for several decades been more on gimmicks than on achieving a performance that holds up in the severe European EMC conditions (see 'Receivers for Y2k-Plus' in 'TT', February 2000).

It provides an innovative approach that caters for those not convinced that we have yet arrived at the era of all-digital software radios, even if these will eventually take over. As a D-C zero-IF receiver it could be implemented in a wide range of configurations, from the reasonably simple, to a more complex design capable of a dynamic range significantly ahead of currently-available factory models, free of many of the vices (and costs) of superhet designs.

It is worth emphasising the excellent performance of the 3253 device as a switched quad-FET product detector/mixer developed by Dan Tayloe, N7VE, as reported in 'TT', February 1999 by Colin Horrabin, G3SBI, and Steven Weber, KD1JV. In a two-path R2 D-C receiver the sensitivity was measured as -138dBm with a third-order intermodulation product (IP3) of +30dBm. The sensitivity is as good as the following audio amplifier permits. The maximum RF signal input is limited mainly by the point at which the post-mixer audio amplifier saturates. No requirement for an advanced IF amplifier, no need to worry about saturation (or costs) of several crystal filters. The polyphase network requires a lot of discrete components, but these can be of relatively low cost.

A +30dBm (or better) IP3 is specified for the professional Rohde & Schwarz XK2100 hybrid digital 'software' transceiver (see 'TT', November 2000), probably the most-advanced HF transceiver yet to appear on the market. The DERA nearly-all-digital prototype transceiver ('TT', November 2000), when fitted with the latest 14-bit chips, was predicted as achieving +26dBm, with an SFDR no better than a high-quality (professional) conventional HF transceiver.

The audio-image suppression provided by a Gingell four-path network depends, as in any phasing system, upon the number of sections, the path amplitude imbalance and upon the path phase difference. Macario showed in his 1980 article that the four-path network reduces the effect of errors by an order of magnitude but, nevertheless, care still needs to be taken to reduce the path phase and amplitude errors. In 1976, HA5WH suggested that components of ±5 or 10% tolerance could be used, and this appeared as 10% in many editions of the ARRL's *Radio Amateurs' Handbook*. W9CF (see below) later pointed out that an unlucky constructor using 10% tolerance components might have individual values differing by up to 20% and this would seriously degrade the network performance.

Figs 2 and **3** are from Dr Macario's EBU article and show what can and cannot be achieved with phasing networks. JA1KO suggests that the 'ripple' affecting the centre/edge suppression (noted by G3OGW) can be overcome by making the resistors in each column differ in value according to the ratio of the time constants of the two columns. In practice, this refinement is probably of secondary importance. Gingell reported constructing and testing a passive RC network modem giving 70dB single-sideband suppression at 100kHz and suitable for frequency division multiplex systems.

The first person to provide a detailed analysis of a Gingell network was Leonard Anderson, then a senior member of RCA Electromagnetic and Aviation Systems Division in California ('TT', May 1975) who sent me a computer analysis of G3PLX's polyphase network as published in the December 1973 'TT'. Some of his results were published in the same May 1975 issue as the report that Peter Martinez, G3PLX, had put an SSB polyphase generator on the air on 144MHz (10.7MHz generator) - thus (to the best of my knowledge) becoming the first person to use a four-path polyphase system operationally.

Although the Anderson analysis showed that G3PLX's values provided an output

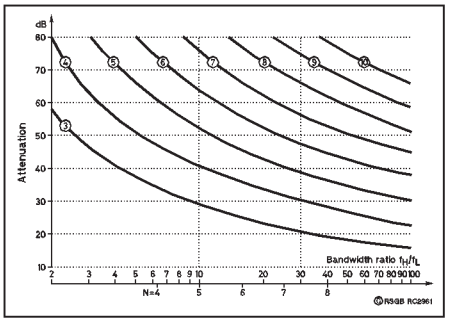

Fig 2: Maximum achievable sideband discrimination as a function of the band-edge frequency (F_H/F_L) for networks of various orders. The numbers in the circles indicate the sections (source: Dr Macario, *EBU Review*).

remaining within ±1° of quadrature from 450Hz to 5600Hz, he suggested that changing all 24 resistors from 5.6k to 8.2k or to 10k would bring the effective range much closer

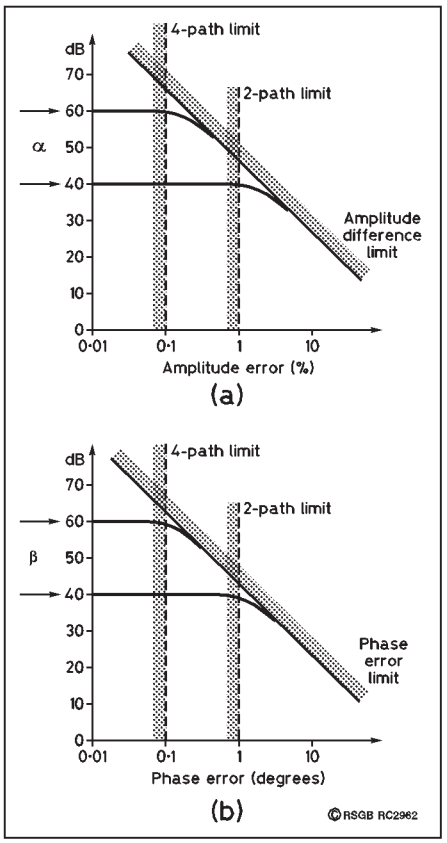

Fig 3: Discrimination degradation due to errors in the phasing networks. (a) Due to path amplitude unbalance. (b) Due to path phase difference errors. (Source Dr Macario, *EBU Review*)

to the preferred 300 to 3300Hz. His analysis was based on 1% tolerances.

G3PLX wrote: "For my polyphase network, I had selected components to within 2%, but it should be noted that the components have only to be matched to each other in groups of four, and the absolute values are less important. I suspect that, for most amateur applications, groups of 5% tolerance components, if bought from the same batch, would most probably match each other better than 5% and would give acceptable results."

He added "Checking the performance of the generator (**Fig 4**) on professional equipment, I found that sideband suppression could be adjusted to greater than 50dB (limit of my measurements) and the preset potentiometers (amplitude balance controls) all seemed to be at the same point on their tracks; this seemed to imply that it might be possible to use 1% resistors and obtain some 40dB suppression in an SSB generator *with no adjustments required!*"

It seems unfortunate that the ARRL's *Radio Amateurs' Handbook* incorporated HA5WH's suggestion that 10% tolerance components (without careful matching by selection) could be used, and would provide 60dB sideband suppression. No mention was made of amplitude imbalance and no reference to the prior work of Michael Gingell, Peter Martinez, Leonard Anderson or Dr Macario, or to the use of the network as a demodulator. In reality, Gingell's invention of the four-path polyphase SSB modulator was first disclosed in UK Patents 1,174,709

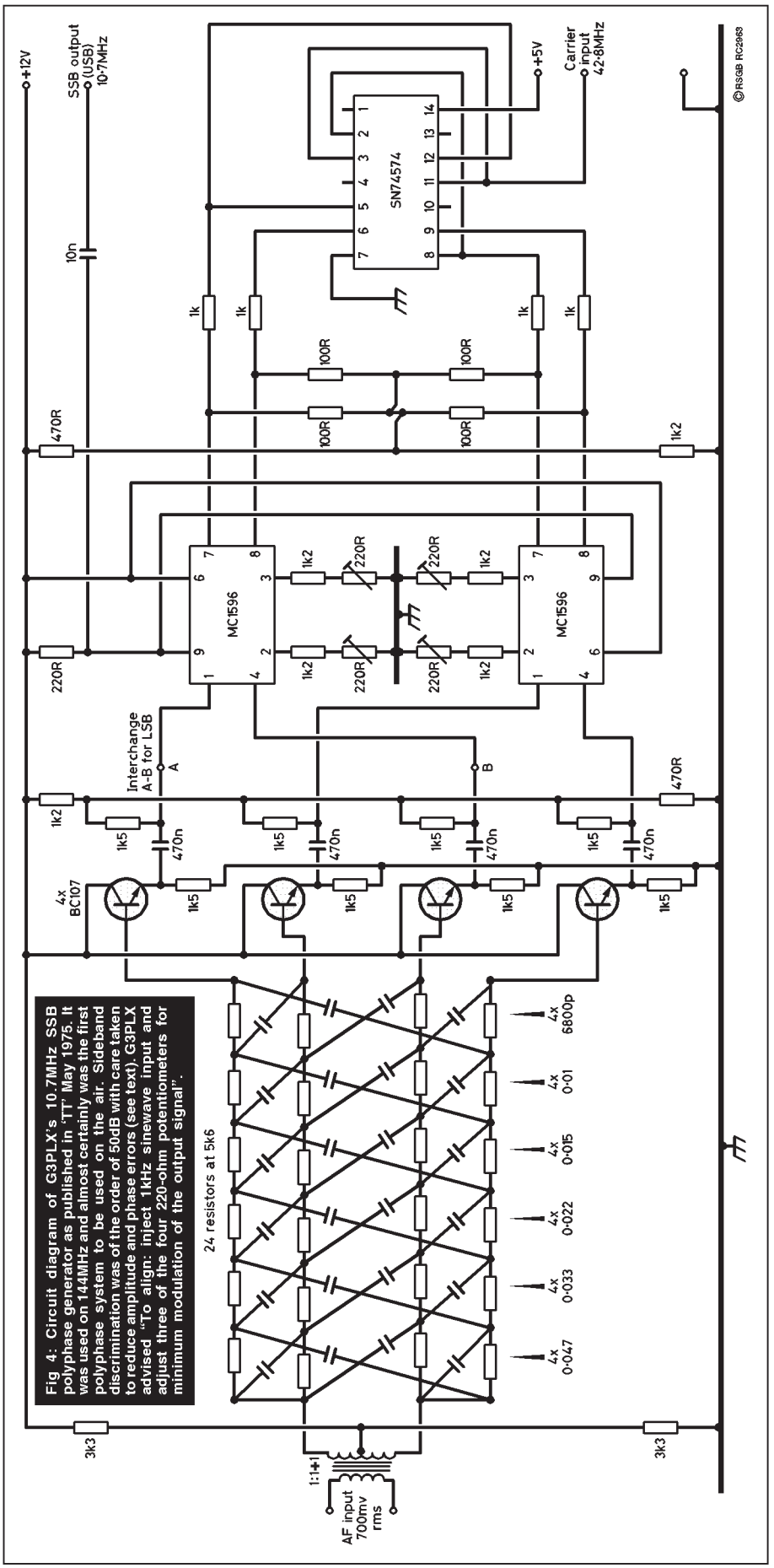

Fig 4: Circuit diagram of G3PLX's 10.7MHz SSB polyphase generator as published in 'T' May 1975. It was used on 144MHz and almost certainly was the first polyphase system to be used on the air. Sideband discrimination was of the order of 50dB with care taken to reduce amplitude and phase errors (see text). G3PLX advised "To align: inject 1kHz sinewave input and adjust three of the four 220-ohm potentiometers for minimum modulation of the output signal".

and 1,174,710 of June 1968 granted to STC (US Patents 3,559,042 and 3 618 133). One wonders how many *Handbook* readers attempted to build a polyphase SSB generator only to be disappointed with the results they achieved?

It was apparently not until 1994 and 1995 that detailed analyses of the polyphase network were published in the ARRL's *QEX* (photocopies kindly provided by André Jamet, F9HX, following the publication of the April 'TT'): [1] 'Phase-Shift Network Analysis and Optimization', by Kevin Schmidt, W9CF, April 1994, pp17-23; [2] 'Polyphase Network Calculation using a Vector Analysis Method', by Tetsuo Yoshida, JA1KO, June 1995, pp9-15. [1] is highly mathematical, but also contains some useful, readily understandable comments. [2] is less rigorous in providing advice on the performance of four-path networks, although both articles are basically theoretical studies. Both show the importance of achieving a good match of component values.

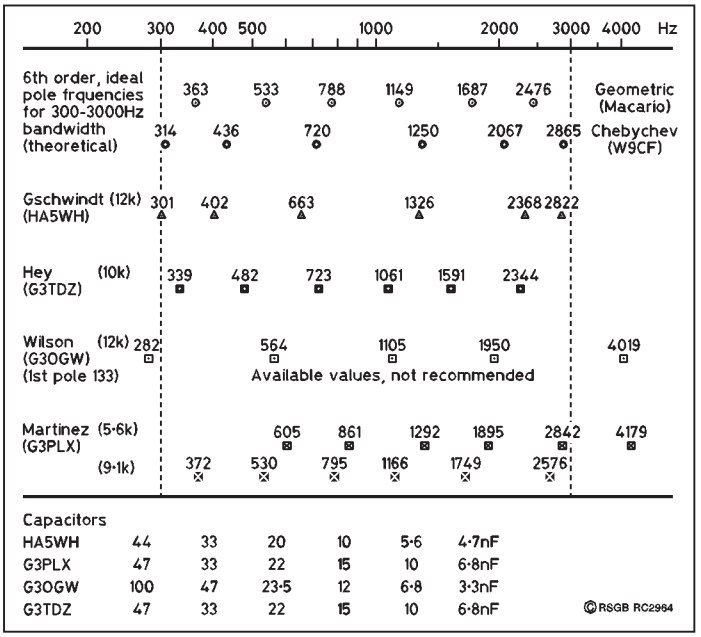

Fig 5: G3OGW's appraisal of polyphase network values showing audio pole frequencies on a logarithmic scale. Ideally for 300 – 3000Hz the six frequencies should appear equally-spaced on the log scale. The diagram shows the pole frequencies and component values for the Gschwindt (HA5WH); Martinez (G3PLX); Hey (G3TDZ), *RadCom* September 1976; and as implemented by Wilson (G3OGW) from available stock components. It has been shown that the Martinez network could be brought closer to the desired audio range by increasing the resistor values from 5.6k to 10k which should give an audio bandwidth of 280 to 2912Hz for 0.5° error (or 8.2k for 340 to 3550Hz). G3OGW suggests that 9.1k would be the most reasonable choice, but believes that careful matching of components in each section is the important factor in obtaining maximum discrimination. W9CF provides optimal Chebychev values for 4-, 5-, 6-, 7- and 8-section 300-3000Hz filters. For a 6-section filter he gives the pole frequencies shown, with a minimum sideband suppression of 63.7dB.

What degree of sideband suppression should an amateur constructor expect to achieve? Dr Macario showed that, with a six-section four-path filter and a 10:1 bandwidth ratio (eg 300-3000Hz), 60dB is practicable with a theoretical limit of about 65-70dB. The 50dB achieved by G3OGW is probably typical of what is more likely in practice *without* very close matching of components and careful adjustment of amplitude balance, etc. Dr Macario noted that, with practical phasing circuits, it is difficult to reduce the phase errors below 1° and amplitude imbalance to less than 1% without very careful adjustment. However, with two-path quadrature networks it is impractical to expect sideband discrimination in excess of 40dB, no matter how the phasing circuit is arranged. With a four-path six-section network, even with 5%-tolerance components randomly selected and with no amplitude balancing pre-set controls, it would seem that about 30dB of sideband discrimination is likely. G0BBL, with standard 1% resistors and 5% capacitors, achieved 50dB discrimination using G3TDZ values.

Harold Wilson, G3OGW, believes that he can improve on his near-50dB discrimination. He writes: "**Fig 5** shows the various values that I have seen suggested for six-section polyphase networks. As can be seen, the values I actually used are far from ideal, being 'knocked up' from available components. This is why I suggested (Fig 1, May 'TT') the HA5WH values, which look nearer the ideal, and also why I think my results can be improved upon, although I feel sure that the precise pole frequencies are less important than matching across the network at each step. The fact that they are already so good demonstrates the inherent latitude of the design. The polyphase network imposes very little insertion loss. As it needs to be fed from a low-impedance source and into a high load impedance this would seem to indicate that its resistive and reactive values are of little consequence and I noticed no need for any additional circuit gain. There remain plenty of opportunities for further work and many questions still to answer, but I have no doubt that the Gingell system holds out much more promise for the amateur than the original Dome and Norgaard two-path phasing systems."

On the construction of his experimental receiver ('TT', April), G3OGW writes: "The FST3253 is available only in surface mount packaging and not so easy for the amateur to handle, but I managed the SOIC form on a home-cut pad outline on a small piece of copper-clad board". Generally, he used a mixture of construction techniques, commenting: "I rarely bother with PCB construction. If required for RF circuitry I can cut a pad pattern (with a small electric hand drill and milling head) by hand much more speedily than by preparing a pattern and chemical etching. I generally use single or double-sided copper-clad board as appropriate. For DIL sockets, Veroboard is useful, particularly for the audio sections where track capacities are not so important, which is the case for most of the D-C receiver circuitry."

MOBILE/PORTABLE POWER SOURCES

AN ARTICLE 'Future Power Sources for Mobile Communications', by K Green and J C Wilson of the Defence Evaluation and Research Agency (DERA) in *Electronics & Communication Engineering Journal*, (February 2001, pp43-47) notes that, as the encroachment of portable electronics into everyday life continues, the demand for improved power sources is continuing to increase. New technologies such as nickel metal hydride and lithium ion batteries have largely replaced nickel cadmium systems because of their superior performance. [Many amateurs are already replacing nickel cadmium batteries with nickel metal hydride units - G3VA]

The authors show how the specific energy (Wh/kg) of lithium ion cells, first introduced by Sony in 1990, has already improved by some 50% and is predicted to have doubled to about 200Wh/kg by the year 2008; it is then likely to plateau as limits on the cell chemistry are approached: **Fig 6**, next page. New technologies need to be developed (such as compact fuel cells), "but most manufacturers have been concentrating on joining the lithium ion and lithium polymer battery markets".

The article provides an extensive review of fuel cell developments including hydrogen storage and direct methanol cells, revealing that "fuel cells are being developed by DERA with the objective of replacing even the most advanced battery technology with a lighter weight alternative. Among the designs that DERA is developing is a new tubular design that obviates the need for end plates. The fuel source can be stored within the tubular stack so that the internal volume of the stack is fully utilised. DERA is also evaluating novel electrodes such as Supergraf and titanium, which is being investigated in collaboration with Advanced Power Sources Ltd, a spin-off company from Loughborough University". However, it is

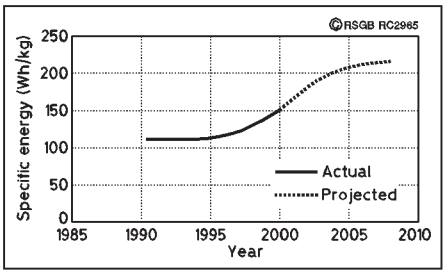

Fig 6: Progress in lithium ion cell technology, actual and predicted. (Source: *Electronics & Communication Engineering Journal*)

claimed that there are several more hurdles to be overcome before the introduction of fuel cell technology for mobile/portable communications.

Another developing technology is the electrochemical double-layer capacitor (EDLC), sometimes called the 'supercapacitor', to form an energy-storage device "though in view of its very poor energy density it might better be termed a power-storage device". EDLCs have superior energy densities compared with the familiar electrolytic capacitors. In the EDLC, "the energy is stored electrochemically; although no reactions take place, ions are trapped at the surface of high-surface-area carbon electrodes. Lack of chemical reactions probably accounts for their prolonged cycle life - 100,000 cycles or more, 100 times that of the best batteries. The power density of the EDLC is higher than that of most batteries, although the high power lead-acid battery offers similar performance".

The main application of the ELDC is to supply very high short peaks of power. The energy stored is typically in the range 1 - 10Wh/kg, but the specific peak power can be as high as 4kW/kg.

PASSING OF THE 'BIT' MAN

CLAUDE SHANNON, who died February 24, aged 84, was the eccentric mathematician and cryptographer who established the intellectual framework for the packaging and transmission of data. As inventor of 'communication theory', he originated the term 'bit' (binary digit). His classic 1948 paper 'The Mathematical Theory of Communication' has been called the *Magna Carta* of the communications age, both analogue and digital. But he also treasured his motorised pogo-stick and a hundred-bladed jack-knife. He was obsessed with juggling, for which he devised a unified field theory, though he remained unable to juggle more than four balls at once. In WWII at Bell Laboratories, as a young mathematician versed in Boolean algebra, he helped devise (along with Turing and Nyquist) the digital cryptography of Project X (also known as Sigsaly and Green Hornet) the first unbreakable on-line speech coding system). This digital system, the first implemented use of pulse code modulation (invented in the 1930s by Englishman Alec Reeves), had a one-time digital key provided on gramophone discs which had to be played in accurate synchronism in Washington and London. The London terminal (used by Churchill to speak to Roosevelt in the later years of the war) was located off Oxford Street and comprised umpteen racks of equipment. It consumed some 30kW of electric power to provide a few milliwatts of audio!

On a more personal note, I mourn the passing of William I Orr, W6SAI, who died in his sleep on 24 January, aged 81. Bill Orr was a prolific writer for the American amateur radio magazines, post-war editor of *The Radio Handbook* and author of many books on antennas, etc. He was a mine of information on RF power valve operation, stemming from his work with Eimac. A one-time successful DXer and DXpedition participant, he had a keen and deep interest in the history of our hobby, its equipment and the curiosities of HF propagation, all reflected in the interesting articles he wrote for *Ham Radio* and *CQ*. Several of his ideas have appeared in 'TT' stemming, not only from digests of his published material, but also from the occasional airmail letter.

MAJOR CHANGE TO CAR ELECTRICS COMING

JESPER FOGH BANG, OZ1XB, points out that automobile magazines are predicting that, within two years, many of the leading car manufactures are planning to change the electrical system of their vehicles to a new standard of 42V DC for the generator and the main electrical accessories. The battery voltage will be increased from 12V to 36V and this will be connected to the 42V system via a DC/DC converter. This follows protracted negotiations for a new international standard required to meet the still-increasing power demands in modern cars which is making the 12V standard insufficient.

According to announcements by BMW, Ford, Mercedes and Renault, the first 42/36V systems are due to be launched in the year 2003.

OZ1XB stresses that much solid-state amateur radio equipment (both for mobile and fixed operation) has been designed for a 13.8V supply voltage only because it makes it easy to connect them directly to the 12V system in a car for mobile operation.

He believes that it is now time to encourage the leading manufacturers of amateur-band transceivers to consider introducing new designs based on a 36V DC [or 42V? - G3VA] supply. This will have the advantage of the higher voltage making it easier to design more efficient PA stages and increase power levels. When and whether all cars will change to the new system is not clear, but it seems likely that all models will in time fit 36/42V systems, as happened some 50 years ago when car electrics changed from 6V to 12V.

HERE & THERE

MOLECULAR ELECTRONICS is now being seen as the future successor to the microchip. Although it is not proving easy to find a worthy successor to the existing highly-refined microchip technologies, 'Nanowires begin to shine' by David J Cobden of the Univerity of Warwick (*Nature*, 4 January 2001, pp32-33) suggests that electronic devices built from molecular-scale components are fast becoming a good bet. An initial development has been the perfection of techniques for growing nanometre-scale semiconductor wires; more recently these nanowires have been used to produce tiny transistors and the world's smallest light-emitting-diodes [1 nanometre = 10^{-9} metre, 1 micrometre (1 micron) = 10^{-6} metre - *Ed*]. Strong competitors for the same jobs as nanowires are single-walled carbon nanotubes, which are seamless hollow cylinders rather than solid rods. Both nanowires and nanotubes can be many microns long, making them far easier to work with than other popular molecular toys, such as conjugated molecules and nanocrystals, which are a thousand times shorter. Previously, molecular field-effect transistors have been made only from nanotubes, but most recently also from nanowires. It looks as though we shall soon need powerful microscopes even to see a new generation of components!

DAVID LONG, G3PTU writes: "In some varieties of BS1362A plug tops (British 13A plugs) the fuse-end holders consist of little more than a piece of stamped-out 'V'-shaped flat metal (better class products use a three-dimensional true clip for the fuse ends). The live side cable piece of this cheaper set-up has a brass grub-screw-equipped piece of brass attached to the 'V' that will slip over the end of a soldering iron bit and provide a suitable hot device to strip cable without kinking or nicking the conductor."

ALASDAIR FRASER, GM3AXX, believes in the continued value of simple valve transmitters and advocates ignoring the call by G7BPO (February, 'Last Word', p95) to "forget Morse". He writes: "In the two weeks before the West of Scotland's annual construction contest I designed and built on a 6in by 4in metal chassis, a mains-driven, one valve, CW CO-PA (crystal oscillator-power amplifier) 5W transmitter at a cost of new parts, including the crystal, of just under £10. Using my TS-440 as a receiver and a very bent trap dipole, in two weeks I worked 12 European countries and one across the Atlantic, receiving reports of from 549 to 599. G7PBO would consider this a waste of time, when I could have been sitting at a computer, trying to persuade some bit of software to function!" ♦

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ZX6-2	50MHz	2	0.60m	1.53	6.2	-18	2.20	£48.95
ZX6-3	50MHz	3	1.75m	1.74	9.1	-25	3.00	£81.95
ZX6-4	50MHz	4	2.75m	2.03	11.4	-28	4.30	£99.95
ZX6-5	50MHz	5	4.35m	2.64	12.1	-28	6.50	£114.95
10m Band								
ZX10-2	28MHz	2	0.90m	2.63	6.3	-18	3.90	£98.00
ZX10-3CL	28MHz	3	3.00m	3.00	9.1	-25	6.00	£115.95
ZX10-3DX	28MHz	3	3.35m	3.35	10.3	-20	6.50	£129.00
ZX10-4CL	28MHz	4	5.00m	3.60	11.4	-28	10.20	£149.00
ZX10-4DX	28MHz	4	5.80m	3.90	12	-26	10.80	£156.00
ZX10-5CL	28MHz	5	7.50m	4.6	12.1	-28	13.20	£181.50
ZX10-5DX	28MHz	5	8.00m	4.8	12.7	-35	13.40	£215.00
ZX10-6CL	28MHz	6	11.40m	6.3	12.5	-35	16.30	£255.00
ZX10-7	28MHz	7	14.00m	7.46	14.1	-42	18.00	£280.00
ZX10-8	28MHz	8	18.00m	9.30	18.0	-44	21.00	£CALL
12m Band								
ZX12-2	24MHz	2	1.10m	2.85	6.3	-18	4.20	£99.95
ZX12-3	24MHz	3	3.50m	3.30	9.1	-25	6.90	£123.95
ZX12-4	24MHz	4	5.50m	3.92	11.4	-28	3.70	£156.95
ZX12-5	24MHz	5	8.60m	5.13	12.1	-28	14.80	£215.00
ZX12-6	24MHz	6	14.50m	7.78	12.7	-35	19.59	£229.00
15m Band								
ZX15-2	21MHz	2	1.30m	3.36	6.3	-18	6.60	£112.00
ZX15-3	21MHz	3	4.15m	3.98	9.1	-25	10.90	£149.00
ZX15-4	21MHz	4	6.40m	4.67	11.4	-28	15.40	£185.00
ZX15-5	21MHz	5	10.20m	6.13	12.1	-28	20.20	£218.00
ZX15-6	21MHz	6	14.70m	8.09	12.7	-35	23.00	£266.00
17m Band								
ZX17-2	18MHz	2	1.45m	4.26	6.3	-18	6.80	£123.95
ZX17-3	18MHz	3	4.90m	4.85	9.1	-25	11.58	£156.95
ZX17-4	18MHz	4	7.50m	5.63	11.4	-28	16.80	£189.95
ZX17-5	18MHz	5	11.20m	7.10	12.1	-28	22.30	£229.00
ZX17-6	18MHz	6	17.40m	9.57	12.7	-35	25.60	£275.00
20m Band								
ZX20-2	14MHz	2	1.70m	4.57	6.3	-18	10.00	£146.40
ZX20-3	14MHz	3	6.20m	5.60	9.1	-25	13.50	£197.95
ZX20-4	14MHz	4	9.40m	6.58	11.4	-28	21.00	£255.95
ZX20-5	14MHz	5	14.40m	8.54	12.1	-28	25.90	£320.00
ZX20-6	14MHz	6	16.20m	9.60	12	-35	28.60	£395.00
30m Band								
ZX30-2	10MHz	2	2.35m	2.63	6.3	-18	15.60	£165.00
ZX30-3	10MHz	3	8.55m	8.10	9.1	-25	27.50	£184.50
ZX30-4	10MHz	4	13.60m	9.70	11.4	-28	38.00	£CALL
ZX30-5	10MHz	5	19.80m	12.10	12.1	-28	51.00	£CALL
ZX30-6	10MHz	6	22.80m	12.00	12.0	-35	60.00	£CALL
40m Band								
ZX40-2	7MHz	2	3.35m		6.3	-18	26.6	£225
ZX40-3	7MHz	3	10.70m		9.1	-25		£299
ZX40-4	7MHz	4	18.80m		11.4	-28		£CALL

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ICOM	IC-706MK11G (AS NEW!!)	£799.00
ICOM	IC-725 HF MOBILE 100w	£400.00
ICOM	IC-728 HF MOBILE 100w	£425.00
ICOM	IC-729 TRANSCEIVER HF/ 50MHz	£425.00
ICOM	IC-735 HF 100W	£450.00
ICOM	IC-740 HF/50/2M 100w	£999.00
ICOM	IC-756 HF/6M BASE TRANSCEIVER	£1,050.00
ICOM	IC-W31E DUAL BAND HANDY	£175.00
ICOM	PCR-1000 PC RECEIVER SSB/FM/AM	£200.00
ICOM	PS-15 POWER SUPPLY	£100.00
ICOM	PS-55 PSU 20 amp	£120.00
ICOM	PS-85 POWER SUPPLY	£175.00
ICOM	R10 HANDY SCANNER	£199.00
ICOM	R2 HANDY RECEIVER	£110.00
ICOM	R-7000 25-2000MHz ALL MODE RECEIVER	£575.00
ICOM	R-72 RECEIVER AC	£450.00
ICOM	R-72 RECEIVER DC	£400.00
ICOM	R-75 RECEIVER	£450.00
ICOM	SP-21 EXTENTION SPEAKER FOR IC-706 etc	£45.00
ICOM	T8E HANDY 2/70/6m	£195.00
ICOM	W-21E DUAL BAND HANDY	£199.00
JRC	JR-535 RECEIVER	£675.00
JRC	JR-545 DSP RECEIVER	£999.00
KANTRONICS	KAM PLUS TNC	£220.00
KENWOOD	AT-200 ATU	£125.00
KENWOOD	AT-230 ATU	£140.00
KENWOOD	AT-300 ATU	£225.00
KENWOOD	BC-15 RAPID CHARGER	£40.00
KENWOOD	DFC-230 FREQUENCY CONTROLLER	£89.00
KENWOOD	PS-50 PSU	£130.00
KENWOOD	PS-52 HEAVY DUTY POWER SUPPLY	£175.00
KENWOOD	R-5000 RECEIVER Inc Converter	£595.00
KENWOOD	SP-950 SPEAKER	£90.00
KENWOOD	TH-22E HANDY 2M	£89.00
KENWOOD	TH-46 UHF HANDY	£100.00
KENWOOD	TL-922 LAST SERIAL No. (MINT!)	£999.00
KENWOOD	TM-455E 70CM MOBILE MULTI MODE TRANS	£495.00
KENWOOD	TM-751E 2M 25W MULTI MODE	£325.00
KENWOOD	TM-V7E DUAL BAND TRANSCEIVER	£250.00
KENWOOD	TR-851E 70cm Multi-Mode	£325.00
KENWOOD	TS-140S HF 100W BASE MOBILE	£399.00
KENWOOD	TS-680 HF 6M BASE/MOBILE	£395.00
KENWOOD	TS-680 SAT TRANSCEIVER HF 6M	£695.00
KENWOOD	TS-811E 70cm MULTI MODE TRANSCEIVER	£400.00
KENWOOD	TS-850 SAT 100w HF BASE TRANSCEIVER	£850.00
KENWOOD	TS-870 DSP HF BASE TRANSCEIVER	£999.00
KENWOOD	TS-940SAT HF BUILT IN ATU BASE	£750.00
KENWOOD	TS-950 SD DIGITAL 150W TRANSCEIVER	£1,250.00
KENWOOD	TS-950S HF 150W BASE BUILT IN ATU	£999.00
KENWOOD	TS-950SDX HF 150w TRANS (FLAG SHIP!)	£1,799.00
KENWOOD	VFO-180 VFO	£80.00
LINEAR AMP	EXPLORER AMP	£999.00
LOWE	HF-225 RECEIVER	£225.00
MAYCOM	AR-108 AIRBAND HANDY	£50.00
MFJ	1278 TNC Incl SSTV	£225.00
MFJ	MFJ-259B ANTENNA ANALYZER	£175.00
MFJ	MFJ-784B DSP FILTER	£150.00
MFJ	MFJ-962 1.5KW ATU	£175.00
MFJ	MFJ-989 ATU 3KW INPUT	£220.00
MICRO MOD	Microwave mod's 144/100-100w 2m	£120.00
MIRAGE	D3010 420-450MHz AMPLIFIER 100W	£200.00
NAG	144XL 2M BASE AMPLIFIER 400W	£325.00
PACCOM	320 TNC	£99.00
PACCOM	TINY II PACKET TNC	£99.00
PAKRATT	PK-232 MODEM	£140.00
REALISTIC	PRO-2005 25-1300MHz BASE SCANNER	£110.00
REALISTIC	PRO-2026 SCANNER	£89.00
S.E.M	TRANSMATCH	£90.00
SONY	CRF-V21 World band radio built-in punter MINT!	£999.00
SSB ELECTRON	LT 23-S 23CM TRANSVERTER	£499.00
SUMMERKAMP	FT-680MK1 6M MULTIMODE	£210.00
TARGET	0-30MHz HF RECEIVER	£100.00
TIMEWAVE	DSP-59+ DSP FILTER	£150.00
TOKYO	HT-180 80m HF SSB TRANSCEIVER	£200.00
TOKYO	HY-POWER HL-160V 6m 160w	£195.00
TRIO	TR-9130 2S Multi-mode 2m	£225.00
WATSON	DPS-2012 PSU	£70.00
YAESU	SP-6 SPEAKER	£85.00
YAESU	FL-110 AMP 100w HF	£120.00
YAESU	FL-2025 25AMP FOR FT-290R MK11	£100.00
YAESU	FP-107 PSU	£120.00
YAESU	FP-757GX Power Supply (Heavy Duty)	£140.00
YAESU	FP-757GX SWITCH MODE	£95.00
YAESU	FRG-100	£295.00
YAESU	FRG-7700 RECEIVER	£250.00
YAESU	FRG-9600	£199.00
YAESU	FT-100 HF/6M/2M/70CM MOBILE DSP	£975.00
YAESU	FT-1000 D 200watt TRANSCEIVER	£1,499.00
YAESU	FT-1000MP AC LATEST SERIAL No.!	£1,399.00
YAESU	FT-101ZD HF TRANSCEIVER	£275.00
YAESU	FT-101ZD MK111 FM HF TRANSCEIVER	£325.00
YAESU	FT-225RD 2M BASE MULTIMODE	£325.00
YAESU	FT-2500M 50w 2m MOBILE	£220.00
YAESU	FT-290MK1 2M Multi-mode	£195.00
YAESU	FT-290R MK11	£275.00
YAESU	FT-3000M 70w 2m MOBILE TRANS	£225.00
YAESU	FT-480R 2M MULTIMODE	£220.00
YAESU	FT-530 2/70cm HANDY	£175.00
YAESU	FT-690MK11 6M MULTI-MODE TRANSCEIVER	£295.00
YAESU	FT-726R 2/70/6M TRANSCEIVER	£599.00
YAESU	FT-736R AC 2M,6M,70CM BASE	£799.00
YAESU	FT-736R AC 2M/70CM BASE	£599.00
YAESU	FT-757GX	£395.00
YAESU	FT-757GX11	£425.00
YAESU	FT-840 HF MOBILE-BASE TRANSCEIVER	£450.00
YAESU	FT-847 HF/6M/2M/70cm/4m	£999.00
YAESU	FT-8500 DUAL BAND MOBILE TRANS 50w	£295.00
YAESU	FT-900 HF MOBILE BASE FACE OFF	£525.00
YAESU	FT-900AT BOXED	£695.00
YAESU	FT-901 Delux model Transceiver	£300.00
YAESU	FT-902 Delux model Transceiver	£300.00
YAESU	FT-920 AF HF- 50 MHz BASE TRANSCEIVER	£899.00
YAESU	FT-990 TRANSCEIVER AC HF BASE	£795.00
YAESU	FT-990 TRANSCEIVER DC HF BASE	£695.00
YAESU	FT-ONE BASE HF	£425.00
YAESU	FV-707DM DIGITAL VFO + MEMORIES	£99.00
YAESU	MD-1 DESK MICROPHONE (MINT!)	£80.00
YAESU	MD-100 DESK MICROPHONE	£70.00
YAESU	QUADRA AMPLIFIER HF/6M 1KW	£2,999.00
YAESU	SP-980 EXT SPEAKER	£75.00
YAESU	VX-1R MICRO 2/70 WIDE RECEIVER	£109.00
YUPITERU	MVT-125MK11 AIRBAND SCANNER	£125.00
YUPITERU	MVT-8000 BASE	£240.00

ICOM IC-756 PRO

160m to 6m 100 Watts output SSB CW FM RTTY

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Great news. Waters & Stanton have brought the price down by a massive £500 on this high performance transceiver. Brimming with features and already earning itself an enviable reputation with HF DXers, the IC-756 now offers unbeatable value at our new low price. The lovely 5-inch TFT colour display forms the central control panel, providing large clear digital readout. Switch on the real-time spectrum scope to check for band activity or home into a narrow 25kHz and check other stations' signal properties. You can even change the colour and font properties to suit your preferences. Comprehensive metering offers analogue and digital readouts, and for the contest operator, there's both voice and CW recorders included as standard, the latter capable of displaying its contents on the control screen. And when it comes to selectivity, you have no worries about buying extra filters. The IC-756 PRO's amazing digital IF filter offers 51 pass bands down to 50Hz, more than adequate for whatever mode you operate. SSB operators will love the adjustable microphone equaliser with 121 combinations, and when noise becomes a problem, Icom's advanced 32-bit DSP will come to your aid, offering unrivalled signal recovery properties. There are many more features contained in the 8-page colour brochure, free on request. But the inescapable fact is, there has never been a better time to buy.

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Also at Chesterfield Rd. Matlock. Derbyshire Tel: 01629 582380

Members' Advertisements

RSGB Members wishing to place an advertisement in this section must use the official form incorporated on the label carrier of Radio Communication. This will prove membership and must be for the current month. No acknowledgment will be sent. Ads not clearly worded, or which do not comply with these conditions will be returned. If an ad is cancelled no refund will be due. An advertisement longer than 60 words will be charged pro rata. Trade or business ads, even from members, will not be accepted. Traders who wish to use this facility must send a signed declaration that the items for sale are part of, or intended for, their own personal amateur station. The RSGB reserves the right to refuse ads, and accepts no responsibility for errors or omissions, or for the quality of goods for sale or exchange. Each advertisement must be accompanied by the correct remittance, as a credit card payment, cheque or postal order made payable to the Radio Society of Great Britain. Please note that because this is a subsidised service to members, no correspondence can be entered into. Licensed members are asked to use their callsign and QTHR, provided their address in the current edition of the RSGB Yearbook is correct. RS members will have to provide their name and address or telephone number. Please include your town and phone number in the free boxes provided to assist readers. Advertisements will be placed in the first available edition of *RadCom*.

The closing date for copy is the first day of the month prior to publication, eg the deadline for the March issue is 1 February.

Warning: *Members are advised to ensure that the equipment they intend to purchase is not subject to a current hire purchase agreement. The 'purchase' of goods legally owned by a finance company could result in the 'purchaser' losing both the goods and the cash paid.*

EXCHANGE

SWAP my guitar amplifier and 8mm movie camera with case, for scanner or SW rx. 2E1GYN, QTHR. 01255 436 118 (Clacton-on-Sea).

FOR SALE

14 years QRT. FT-225RD, Mutek F/E, 'N' relay antenna to F/E on receive. Memory, man, exc cond, £350. Mutek GMFA 144E mast-head amplifier, £20. Astatic desk mic, D104, pristine, offers? Swedish key No 3128, £75 ono. Tempo 2002 linear with 3 brand new spare 115N060T valve relays. Serious offers only, buyer must collect. G8GEA, QTHR. 01323 423 330 (Eastbourne).

EDDYSTONE 830 rcvr, 15 valves double superhet 300kHz - 30MHz, tunable first IF, vgc and gwo with homebrew plinth speaker with man, prefer buyer collect, inspect or RV by arrangement due to weight. Jim McGowan, M5AIP. 01708 340 304 (Romford, Essex).

FT-902DM, £200. FL-2100Z, £200. Ham IV antenna rotor system, £200. Buyer collects. 01538 754 214 (Staffs).

ICOM 751A 160-10m all-mode with gen coverage rcvr. Fault with PLL on 20m, otherwise OK, hence cheap at £150. IBM Thinkpad laptop, runs Windows 3.11 with mains PSU, no battery. Ideal for standalone RTTY or logbook, £100. 01244 536 753 (Nr Chester).

KENWOOD 440, fitted internal tuner plus filters, full HF. Recent W & S overhaul. Little heard brand now, but still a little jewel. FWO, unlike its owner, as ill health forces reluctant sale. Deliver if within 25km M25 or carriage extra, £229. Benefits if MFJ-948 ATU is used too, £59. Colin, G0POS. 01634 379 140 (Gillingham).

SILENT key sale, (G3GWU). Kenwood TS-850S, £695. Kenwood TS-570D, £595. Kenwood AT-230 ATU, £125. Watson SWR/PWR meter, £30. Kenwood DM-81 GDO, £10. Kenwood LF-30A LPF, £10. Capco SP-300 Hi-power ATU, £125. MFJ-931 artificial ground, £45. Kenwood MC-80 mic, £40. Cushcraft R-7000 vertical antenna, 10 - 40m, dismantled, £125. Watson W-30 VHF/UHF colinear antenna, £20. Most equipment is near-mint and boxed, with mans. Carriage extra at cost. 01332 812 957 (Derbyshire).

YAESU FV-901DM dig VFO, £130. FC-902 ATU, £110. SP-901, £30. Exc cond, boxed, mans. No offers, need space, buyer collects. G0DIC, Dick. (Boston, Lincs).
E-mail: rafixter@lineone.net

90ft tower, nine sections, vgc, self-supporting, £250. 45ft extendable mast, 3 sections, tiltover, £175. 50ft tiltover mast, 5 x 10ft sections, £175. Latter two items can be bolted together. Tailtwister rotor and cage, as new, £375. All guides for latter two items and tensioners, etc. All HD galvanised, £95. 01267 222 445 (Carmarthen).

ALBRECHT 28MHz SSB/FM h/held, £100. Standard C156A 2m h/held DC lead, spkr/mic, £60. Mutek 28/144 tvtr, £75. G4ILO. 01900 821 192 (Cumbria).
E-mail: g4ilo@qsl.net

ALINCO DX-70T compact HF plus 6m mobile tcvr, vgc, boxed, £400. Icom IC-T81E quad band h/held, vgc, boxed with batts, charger, aerial, £200. 4m linear tvtr from 2m, 10W output, £70. Ross, G0WJR. 0117 973 8794 (Bristol).
E-mail: g0wjr@qsl.net

ALTRON pigmy telescopic tilt-over tower with hinged base and winch, extended height 33ft c/w KR-400 and G-500 rotator, £250, also available rotator control and software, £100, used for satellite tracking, included 1-metre horn, buyer collects. 01707 326 058 (Welwyn Garden City).
E-mail: les.currington@talk21.com

ANTENNA HF multi-band Force 12 C3 proven DX antenna. House move forces sale, £150 ono. 01425 672 927 (nr Christchurch).

AOR AR-8000 h/held scanner, as new, boxed, NiCads, mains charger, DC power lead, mans, other accessories, £150 ovno. G0OED, QTHR. 01884 841 069 (Uffculme, Devon).
E-mail: andy.mardo@metron.co.uk

BNOS PSU 13.8V, 10A, £110. Icom dual-band 3220E radio £320. Beckman industrial 9020 20MHz dual-trace oscilloscope, £300. MFJ-493 super memory keyer, £90. Datong FL3 audio filter, £100. Thandar TC-200 LCR meter, £52. Kent twin-paddle Morse key, £50. Thandar h/held frequency meter, PFM1300, £70. All exc cond, ono. 01902 843 447 after 6pm (Shifnal, Salop).

BUNGALOW for sale. Quite rural Suffolk location 5 miles from coast. Three bedrooms, garage and large workshop set in approx one acre. Dedicated radio shack, 35ft Altron motorized mast with planning, supporting Tribander at 40ft, £198,000. 01728 604 621 (Saxmundham).
E-mail: john@bramble-corner.freeserve.co.uk

CUSHCRAFT A3S 3-ele tri-band beam, purchased new August 1999, £150. 01392 215 487 (Exeter).

CUSHCRAFT R7000 vertical antenna, 10-40m gc, £175. Also Cushcraft A50-55 5-ele 6m antenna, £75. G0SRX, QTHR. 01202 873 895 (Ferndown).

DUPLEXER 1.3-170MHz, 350-540MHz, £12. Bird Thruline inserts 50-125MHz 50W, 100-250MHz 50W, 25-160MHz 10W, 1.1-1.8GHz 5W, £30 each. Television filters 67A tunable 70-90MHz 130-170MHz, 68A 71-88MHz, 69B 130-165MHz, 73A notch filter tunable 400-850MHz, & 72A HP 470MHz, £5 each. Braid breakers – TV, £5 each. Ferrite cores 103A 1½in diameter, £1 each, p&p extra. Please telephone evenings. 01865 464 263 (Oxford).

EDDYSTONE 1837-2 LSB-USB-AM, 5 filters, table model vgc, £350. FRG-8800 + VHF, like new, £220. Trio R-600 vgc, £120. Sony 2001D, mains/batt, £150. 020 8813 9193 (Middlesex).

FL-200B SSB and CW , Sommerkamp/Yaesu, instruction & tech mans, £50 ono - collect if possible. G2PT, QTHR. 01923 822 181 (Northwood).

FT-101ZD Mk3, WARC and FM, 444 mic, FV-101Z, SP-901, Collins 30LI linear - complete station £400, buyer collects. GW3IEQ. 01286 831 340 (Caernarfon).

FT-102 Yaesu, £200 ono. Kenwood TH-28E with extras, boxed, £125 ono. ATU KW107 Supermatch, £75 ono. Sell all for £350, buyer collects. 01635 299 285 (nr Newbury).

FT-290R Mk2 2m multimode tcvr, £200. FT-790R 70cm multimode tcvr, £175. Microwave Modules 2m linear amplifier with pre-amp, 100W output, 10W drive, £100. All items in gc with mans, mic, leads etc. Shaun, G8VPG, QTHR. 01225 873 098 (Bristol).

FT-2FB classic 2m 'black box'. FT-500, another classic.
E-mail or phone for details. G4CCA. 01403 263 396 (Horsham).
E-mail: fadil@compuserve.com

FT-757GXII hamband with gen coverage rcvr, 100%, £350 ono. Wanted TS-50, must be mint cond. Ted, G4TLY, QTHR. 01666 822 935 (Malmesbury).
E-mail: g4tly.ted@virgin.net

FT-990, mint cond, AC-DC, fully filtered, very little use, boxed, mans, a real bargain, £650 plus postage. G0KEP, QTHR. 01483 481 358 (Woking).

FTV-107R tvtr, 4m, 2m, 10m IF, 10W output. 2m linear 2-100 model AJH, £80. 4m linear MM 10-50W, £55. Tvtr has attenuator fitted to match valve driver, this can be removed. Tvtr £100. GW4HBK, QTHR. 01495 228 516 (Blackwood).

GENT 'free pendulum' clock type 360AA 1-, 6- and 30-second pulses available, £150. Pashley Princess, 20 years old, 12 miles from new, £100. 01634 253 056 (Medway).

HANDSPRING visor h/held computer, £75. Icom IC-W2E, speaker/mic, 3 batts, £100. Trio TS-711E, as new, £350. BATC Multyterm, £2.50. G3GRX. 01768 864 890 (Penrith, Cumb).

HI-MOUND paddle key HK-701, £20. Straight key ex-WD, £7. Sigma halfwave antenna, 28MHz new, £5. Books: Bennett *College Electricity* Vols 1-5, offers? Morse practice records, offers? Helipot 1k wooden case lab type, offers? TS-820 service man, £8.50. Eddystone S-640 instruction booklet, £2.50. I need VFO-230 for TS-830S, preferably with leads, but not essential. Don, G4KXW. 01246 291 076 (Dronfield, Derbys).
E-mail: g4kxw@hotmail

IC-746, absolutely immaculate, boxed, £795. IC-290E 144MHz multimode mobile, superb cond, boxed, £160. IC-24ET dual band h/held, vgc, £150. IC-R1 h/held comms rcvr 0.1-1000MHz vgc, £100. MFJ-246 ATU, average cond, £70. Carriage costs negotiable. G4RNI. 0191 438 4066 (Gateshead).
E-mail: nordsee220@ntlworld.com

IC-756PRO, HF, 50MHz, DSP tcvr, auto ATU, as new, £1650. 01732 882 473 (Sevenoaks).
E-mail: stevek@camelcom.com

IC-761 HF rig, vgc, boxed with mans, £450. KW Ezmatch ATU, offers? G4XRV, QTHR. 01494 778 686 (Chesham, Bucks).

IC765 tcvr HF base station, built-in PSU, ATU, El-keyer, immaculate and in perfect working order, £625 ono. 01745 890 646 (Denbigh).

ICOM IC-32E h/held, 2m/70cm FM, man, empty 'AA' case, but no batts, £50. G4KDB, QTHR. 01635 34971 (Newbury).

ICOM 271E 2m base station multimode, AC and 13.8V DC, Mutek board, just checked at Icom UK, matching Icom L/S, £300. Ferrograph reel-to-reel half-track stereo series five, all valves, gc, 7-8in aluminium spools, plenty of new tape, £80. Quad FM4 tuner, boxed, exc, £165. Call after 10.30am. 01273 454 108 (Brighton).

ICOM 32E 2m/70cm h/held, 3 batts, charger, £150 ono. BNOS CLX144-25-180 linear, hardly used, £140 ono. Spectrum RP10S, 10m preamp, £15. All carriage extra. 01788 843 224 (Rugby).
E-mail: malcolm.hall2@ntlworld.com

ICOM 735 HF tcvr, £450. Lowe EP925 30A PSU, £60. Kenwood TM-241E 2m mobile, £140. Icom 229E 2m mobile, £140. MFJ-704 LPF, £20. Kenwood SP-430 speaker, £40. All items boxed with mans and exc cond. G0OPG, QTHR. 01625 531 154 (Wilmslow).
E-mail: chrisrvk@cwcom.net

ICOM IC-449E 70cm FM mobile tcvr, 35W, boxed as new c/w mobile bracket, mic, h/book, circuit, £100. G3VOO, QTHR. 01258 837 648 (Blandford, Dorset).

ICOM IC-706 Mk2, unmarked as new, minimal use, £494. Yaesu 50R, £100 including 2xNiCads, case etc. 01926 651 772 (Leamington Spa).

ICOM IC-R8500 communications rcvr (0.1-1300MHz) with UH-102 and remote software (under two hours' use), as new, £695. Sony Playstation2, unused, £195, all boxed with mans etc. Outbacker 'Outreach' mobile HF aerial, as new, £95. Ken. 01582 670 592 (Dunstable).

JR-500S rcvr (non WARC), vgc, £40. Collectors item: Class D wavemeter, offers? GW3YTL. 01824 7040 eve (Ruthin).
E-mail: gw@3ytl.freeserve.co.uk

KENWOOD narrow SSB crystal filter unit, 1.8kHz, YK-885N-1, 8830kHz. IF for TS-570D etc, brand new, £35. Timewave DSP-59+ digital audio filter, as new, boxed, with man, £75. Variac, 0-280V 7A, cased, metered, £35. All plus postage. Ian, GM3LGU, QTHR. 01620 825 639 (Haddington).

KENWOOD TS-430S, fitted FM and narrow CW with matching PS-430 PSU, £350. Kenwood TM-702 dual-band mobile, £150. See www.hammart.co.uk 01225 763 923 (Trowbridge).
E-mail: g0has@hammart.co.uk

SILENT KEYS

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

G0GLK	Mr G E Scott	09/03/01
G0IUT	Mr L Swann	00
G3ABH	Mr B E Crane	02/04/01
G3EFE	Mr A R Bryant	31/03/01
G3EPK	Mr R L S Harrison	24/03/01
G3JZG	Mr R J Riding	01/01
G3KMH	Mr W H Ferguson	04/01
G3MEK	Mr N Gaunt	12/03/01
G3OFK	Mr N P Henry	03/04/01
G3TII	Mr J Burgon	04/04/01
G4WWX	Mr I G Mant	07/04/01
G8DX	Mr R G Lavis	07/04/01
G8HPD	Mr G W Black	09/04/01
GI0NMV	Mr S McClurg	05/04/01
GI3OMQ	Mr J Sterritt	05/04/01

KENWOOD TS-440S HF all-band tcvr with internal auto-ATU, 270Hz filter, 1.8kHz filter, matching PSU, immaculate, £430. G4JTR, QTHR. 0118 947 6873 (Reading).
E-mail: g4jtr@thersgb.net

KENWOOD TS-450S HF tcvr, £450. Kenwood filters YK-88C-1, 8,830kHz IF, 500Hz, £40; YG-455C-1, 455kHz IF, 500Hz, £80. Katsumi EK-150 iambic keyer with integral paddles, £40. TR-7200G 2m tcvr, R0-R7, S18-S23, £30. MFJ-949E Versatuner HF ATU, £50. All exc cond with original mans and packaging, buyer collects or carriage extra. G4FAL. 0114 255 2893 (Sheffield).
E-mail: ntotterdell@riverauto.co.uk

KENWOOD TS-450SAT exc cond, c/w mans, mic, leads and packaging, £550. 01529 461 537 (Sleaford).
E-mail: gzerorhm@tesco.net

KENWOOD TS-520SE HF tcvr with CW filter plus JR-310 HF rcvr, £100. Cash, no offers, buyer collects. 020 8650 9694 (Beckenham, Kent).

KENWOOD TS-570D tcvr, £600. Sony SW-100E rcvr, £90. Alinco DJ-C1 144MHz, £50. Kenwood SW-2100 SWR/PWR meter, £25. Yaesu YD-844A desk mic, £20. Heathkit GDO, £20. Motion picture image capture card, £20. G3ZJF, QTHR. 01727 811 851 (St Albans).

KENWOOD TS-790E 144/432/1296MHz multi-mode tcvr, c/w spare UT-10 23cm module. Immaculate, boxed, with user and workshop mans, £750 ovno. 07973 111 350 (Ripley, Derbys).
E-mail: mis@zycomm.co.uk

KENWOOD TS-850SAT plus speaker SP-31, boxed with mic, mans, leads and connectors, as originally supplied, exc cond, £650. Barry, GM4GIF. 01436 678 646 (Helensburgh).

KENWOOD TS-870S, £950, boxed as new, also shack oddments. Genuine reason for sale. 01772 741 089 (nr Preston, Lancs).

MARCONI HF ATU, ex-MOD, but new. Huge components 1kW-plus, tunes whip or long wire up to 30MHz, £50. JIL SX-200 scanner, £30. Shure 444D, £30. Lowe LSA1300 discone, new, £30. Hi-mound HK708 key, £10. Yaesu SP-401 speaker, £10. Mag-mount, cable, 2m and airband whips, £6. Creed 444 teleprinter free! All exc cond and ono. G4OEE, QTHR. 0115 972 8064 (Nottingham).

MBM-46 70cm antenna, damaged driven element and reflector, hence only £4.50. Steve, GW0EZB, QTHR. 01492 593 343 (Llandudno).
MICROMASTER 1000 Universal EPROM/PAL/microcontroller programmer, £50. Farnell FG-1 function generator, £25. Racal/Dana 9902A counter, £20. G3VZG, QTHR. 01743 356 195 (Shrewsbury).
E-mail: rngolding@aol.com
MICROVITEC and Sampo 19in SVGA monitors, gc, tested, working, £60 each. G1RLD. 01386 793 175 (Inkberrow).
E-mail: dgrb@bowlers-end.co.uk
MICROWAVE Modules MML144/100S linear, 10W in for 100W out, built-in pre-amp, very seldom used, with man, £95 + postage. 01383 721 523 (Dunfermline).
E-mail: j.hilton1@ntlworld.com
MOBILE masts 1 x 30ft, £250. 1 x 40ft, £450. Buyer collects. 01754 811 592 (Irby in the Marsh).
E-mail: stevehodgson@callnetuk.com
NATIONAL HRO with b/spread coils, h/book, one owner since 1954, exc cond, £70. LG300 Tx with matching modulator and PSU, with 2 unused 813 valves, £70. BC221-M freq meter, 1944 vintage, £25. Levell broadband voltmeter type TM6B 1mV to 500V with HF probe, type 62A, 0dB to + 40dB att, exc cond, £15. Levell RC oscillator type TG200DM 1Hz to 1MHz, 0V to 7V sine or square wave, 600-ohm output good cond. Bob, GM3PSJ, QTHR. 01750 21641 (Selkirk).
PK-232MBX, £60. R470, £5. T470, £5. W9GR DSP, £50. RA17, £65. 6600 sweep osc, £25. MFJ-202 noise bridge, £10. Valves EBL1, ARTH2, AZ1, L63, £5 each. Various HT transformers. WG16 bits. 01409 231 301 (nr Okehampton).
E-mail: engineman@ntlworld.com
PROPERTY of the late G1EYL. Yaesu FT-736R 2m-6m-70cm exc cond, £400. FT-470 dual-band h/held, £60. G8YVW. 01142 375 790 (Sheffield).
PYE MX294 low-band 294, hi band MX296 UHF all programmed for packet channels. Tait T196 on 432.675MHz, 2 KPC4 dual-port TNCs, 1 4-port USCC card with 2 1200-band modems, 1 USCC card, 2 1200-baud and 1 9K6 on board, offers please. 01304 379 580 (Deal).
E-mail: gordon.johnston@tesco.net
RACAL RA17 HF rcvr, £120. Various PSUs 13.8V 4-12A. Palstar KH6 6m h/portable with accessories, £65. 01980 624 725 (Amesbury).
RACAL RA17L general coverage rcvr, vgc with man, £125. Various old valve equipment, KW2000 Vanguard, Trio TS-510, spares or repairs. 01379 740 117 (Diss)
E-mail: asl@alockton.demon.co.uk
RECEIVERS, FRG-100, nearly new, c/w PSU, £330. AKD HF3, c/w PSU & active antenna, £125. Both in perfect working order. 01803 865 406 (Totnes).
SCOUT 40 frequency recorder with case, aerial charger, as new, cost £369, bargain £250. Icom FA-420T aerial, £8. Racal mod meter 9008, £115. Racal frequency meter, UHF, £115. Icom ICR-7000 rcvr, £550. Mobile 07752 338 892 (Newbury).
SCS PTC-11e DSP multimode controller. Supports PacTOR 1, PacTOR 2, AmTOR, RTTY, PSK31, Navtex, Packet, CW, SSTV, Fax, £275 post paid. G3RDG. 020 8455 8831 (NW London).
E-mail: kennethb@btinternet.com
SGC SG-2020, £350. SGC SG-231 auto-tuner HF-6m, £200. FT-690 with NiCads, £200. Icom IC-211E, £180, buyer collects or carriage extra. John, M5AAH, QTHR. 07836 244 584 (nr Bedford).
E-mail: john@moyle.demon.co.uk
SHACK clearance: Icom IC-32E VHF/UHF FM h/held tcvr, boxed, £100 plus postage. Icom IC-32E VHF/UHF FM h/held tcvr, no charger, £60 plus postage. Icom CM-3S rapid charger pod, £20 plus postage. Icom CM-60A 6 pod-style rapid charger for IC-32E sets, £40 plus postage. Icom IC-290D 144MHz all-mode mobile, no mount, tatty, £125. Richard, G8ITB. 01689 602 948 (Bromley, Kent).
SILENT key sale; Yaesu FRG-9600, £200. AR2001, £25. Kenwood TS-440S, £400. Yaesu FT-5100, £200. FT-5200, £210. Icom IC-W2E, £100. List available of other items. 01628 628 463 (Maidenhead).
E-mail: mclacr@compuserve.com
SILENT key sale - late G4YQU. Yaesu FTV-707 HF SSB tcvr, £250. Offers for following. Eddystone rcvr models 840C, 990S, Rohde & Schwarz rcvr 180 - 235MHz, Yaesu FV-707DM, FP-700, FC-707 ATU, Yaesu FCC data rcvr, Yaesu FT-227RB with condenser mic, Yaesu FTV-707 optional unit, AEA PK-232. All c/w mans. 0117 976 0980 (Bristol).
SM-220 monitor scope, fitted pan adapter exc unscratched cond, instruction book, original carton, patch leads, £200. G3RHM, QTHR. 01404 850 461.

CONGRATULATIONS

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

60 years

G2HIX Mr GGP Holden
G3CLL Mr J Willy

50 years

G8HLE REW Marshall
GW3INW A Davies

STAR-MASTERKEY MkII electronic keyer, £20. Kenwood AT-230 antenna tuner (inc WARC), £100. 01283 534 515 (Burton on Trent).
E-mail: g0hio@btinternet.com
SUBSTANTIAL QTH for sale. Beautiful 5-bedroom 15/16th century traditional Welsh farmhouse with yard & buildings, one partially converted to dwelling in aprox 15 acres incl 4 acres bluebell wood, further 40 acres available near fast-growing town of Carmarthen, 1½h to Severn Bridge. Right of access to trig point on adjoining land, possible employment opportunities in the electrical/generator field. Offers around £235,000. Estate Agents Bob Jones SA32 7ER, Tel 01267 236 363. GW0ALR, 01267 222 445 (Carmarthen).
TRIO 130V QRP tcvr. Two Vibroplex keys, one in presentation case. Laboratory valve voltmeter. Reasonable offers accepted. G2CYN, QTHR. 01234 711 538 (Olney, Bucks).
TRIO JR599 rcvr, CW filter, HF & WARC + 2m matching TX-599 transmitter, nice cond, £160. Kenwood VFO-240 less VFO unit, build your own TS-830/TS-530 matching accessory, £10. Icom IC-22A 2m FM tcvr, £40. Pye Cambridge crystals for 2m, all plus carriage. Steve, G4EDG. 01392 216 579 (Exeter).
E-mail: steve.p.taylor@btinternet.com
TRIO TS-830S HF SSB tcvr, full instruction man, boxed, immaculate, mic, £300. Yaesu G-450C rotator, unused, 25m cable, boxed, £300. 01584 861 680 (Ludlow).
TS-850S, £650. AT-230 tuner, £90. FT-225RD, £250. MFJ multi-reader MFJ-462B, £45. Microset PT135 35A 13.8V power supply, £100. Also Kenwood MC-60 mic, £40. HS5 h/phones, £30. All items ono, property of the late GI0EZS. 028 6632 4993 (Enniskillen).
E-mail: asammon@aol.com
TS-940S with auto ATU, £650, Ranger 811H linear, £600. Cushcraft AP8A, never used, £150. G2DYM antenna, £100. Kenwood 1kW LPF, £30, or sell complete for £1,400. 01788 331 804 (Rugby).
E-mail: m0asd1@ntlworld.com
VINE Antennas 6m 3-ele Yagi, unused due to neighbour problem, £50 including carriage. G4FAB, QTHR. 01949 831 558 (Bingham, Notts).
E-mail: sjfox@btinternet.com
YAESU FT-1000MP AC/DC, SP-8 extension speaker, MD-100 base mic and hand mic, also SGC-2020 QRP tcvr. Both rigs used once, mint cond, phone for details. M0BXU. 01672 564 734 (Pewsey, Wilts).
E-mail: info@sentinelsecuritysystems.co.uk
YAESU FT-1000MP MkV, one week old. New, £2600 ono. 024 7631 3109 (Nuneaton).
YAESU FT-101ZD FM board fitted, FV-101DM remote VFO, gc, £250. Trio TR-9130 with PSU, needs attention, £50. Tektronix 468 storage scope, £75. Racal 9301 true RMS millivoltmeter, £25, all above plus carriage. Please call after 6pm. 01270 522 369 (Crewe).
E-mail: stubbslj@hotmail.com
YAESU FT-201 HF tcvr, 10-160m, £125, buyer collects. G4XKQ. 01256 762 943 (Hook, Hants).
E-mail: reg.janes@ntlworld.com
YAESU FT290R + mounting bracket, gc £125.00. Also FT221R, also in gc £225.00. 0161 7473882 (Manchester).
E-mail: mancat-entwistl@mcr1.opotel.org.uk
YAESU FT-470 c/w external speaker mic, battery charger etc, £80. GM0HNV, QTHR. 01360 312 954 (Glasgow).
YAESU FT-767GX all-mode tcvr, c/w 2m and 70cm modules, vgc, boxed, cct diagrams & man, £475. G0IHY. 01925 82141 (Warrington).
YAESU FT-8000 2m/70cm mobile tcvr 35/50W o/p as new, boxed & man, £150. Yaesu FT-50R 2m h/held, speaker mic, spare dry cell battery holder, boxed with man, £110. MFJ-16010 ATU for QRP, £10. Army Morse key, strap on leg with send & receive switch, offers? Terry, G4OXD. After 6pm. 01462 435 248 (Hitchin).
E-mail: terryrose@thersgb.net
YAESU FT-817 new, unused, complete, £595. 01926 651 772 (Ieamington Spa).
YAESU FT-990, mint cond, inc Palstar PSU, MH-1 mic, man, boxed, £750 + p&p. M0AHU, QTHR. 01423 868 823 (Knaresborough).
YAESU VX-5R triple-band h/held, SU-1 chip fitted, mint cond, boxed, complete, £255 ono. 01604 891 258 (Northampton).
E-mail: bobhu.14@virgin.net

WANTED

AR88D in wkg cond, also Heathkit 'Mohican' rcvr, in any cond. Roger, G8NHG. 01635 49484 (Newbury).
E-mail: wilkinsrl@aol.com

BOOKS wanted h/book or antenna design – Rudge, TV & other receiving antennas – Bailey shortwave links – Braun antenna tests and measurement – Hooton. Any other books Proceedings AGARD reports, telecoms etc. RSGB & *QST* CD-ROMS. G3REP. 01903 879 083 (West Sussex).
E-mail: reparkes@iee.org.uk

CRYSTAL sets and early valve radios wanted; all old equipment, valves, horn speakers, Morse keys, spark Tx. Spy sets are of interest; keen to find Hallicrafters SX42 or similar rcvr, also Meccano and Bassett Lowke crystal sets. Jim, G4ERU, QTHR. 01202 510 400 (Bournemouth).

WANTED QTH with planning for tower, 2 beds, large plot, £95,000 max.
E-mail: mw5zzr@aol.com

ANY information on radio-friendly QTHs for possible multi-multi DX contests? Any location in Scotland (mainland or islands). 01786 850 377 (Stirling).
E-mail: gm0egi@borrodale.demon.co.uk
CONTROLLER for Yaesu G-600/400 rotator and man (or copy). G4FQH. 01453 545 206 (Dursley).
E-mail: bruce@bnelmes.fsnet.co.uk
CW filter YG-455-C1 for Trio TS-140S tcvr. G0UAU, QTHR. 0121 358 3639 (Birmingham).
DISABLED fan of old days seeks QSL cards, log books etc, also *CQ* 1945 to 1970, *PW* and *Wireless World*. Your price. Mike, 8 Windsor Road, Reydon, Southwold, Suffolk IP18 6PQ.
EDDYSTONE EC958/7 or 7E; would consider other variants. Also required Drake RV7 and RV75.Tony. Telephone evenings 01494 778 352 (Chesham, Bucks).
FOR Eddystone EC964/7 rcvr, plug-in coil packs LP3318 1 to 6 in any cond. G3GPG, QTHR. 01732 458 346 (Sevenoaks).
FT-102 in any cond for spares, needed urgently to repair main rig. Also needed FM board for 102. Peter, MI0APE. 028 2074 2167 (Dervock).
E-mail: petermi0ape@cs.com
IMR54. I am looking for one of these ship's main rcvrs. Very large and recognisable by its white, star-shaped knobs. Can anyone help please? I am prepared to travel (nearly) anywhere! Please contact Richard, G0OGN. 01789 293 375 (Stratford-on-Avon).
E-mail: g0ogn@aol.com
MONOBAND Yagis for 10m 15m 20m and 40m for club project, homebrew considered. GM0EGI, QTHR. 01786 850 377 (Stirling).
E-mail: gm0egi@borrodale.demon.co.uk
MORSE key, GPO, H White, 1918 or similar large double-current key, with or without the metal or glass cover. Letters to: David A Johnson 15514 Ensenada Drive, Houston, Texas 77083, USA.
E-mail: fullerphone@yahoo.com
RACAL Speedrace MA275 oscillator coupling unit. Racal MA79 drive unit and unused spares. Plessey PV213A telegraph signalling current converter. Mans foe Plessey TSG20 and PV318 RTTY equipment. Siemens T100 teleprinter toolset. Nigel, G0UGD. 01327 357 824 (W) & 01323 486 822 (H) (Eastbourne).
SILENT key clearout or just not needed. Wanted for research project, QSL accumulations, old call books etc, can collect. 0113 269 3892 (Leeds).
E-mail: g4uzn@qsl.net
VLF rcvr 15-600kHz. Wilson, 30 Glencoe Avenue, Ilford, Essex IG2 7AN.
WANTED 2m pre-amp, in-shack type. John, G2FXS. 0191 257 2852 (Tyneside).
WANTED Datong D70 Morse Tutor, reasonable price paid. 0116 277 8279 (Blaby, Leics).
WANTED for FT-101ZD, 2 off CW filters, not complete rigs! Apologies for ambiguous ad in April 2001 *RadCom*. GM4FDT, QTHR. 01349 852 332 (Invergordon).
WARTIME Gee rcvr for aircraft restoration project. Any cond, working or not. G3FOZ, QTHR. 01536 742 288 (Kettering).
E-mail: molehill@clara.net
YG-455C 500Hz filter for TS-830. Nigel, G4CLY. 01372 279 532. (Ashtead).
E-mail: g4cly@btinternet.com

Rallies & Events

26 - 28 MAY 2001

MEDWAY AR & TS & BREDHURST R & TS - Chatham Navy Days (GB0CHD) - Chatham Historic Dockyard. P Carey, G3UXH, QTHR or 01634 250 562.

27 MAY 2001

STIRLING & DARS Radio Rally - Menstrie Scout Hall. Jaycee Electronics and Tennamast will be attending. Brendan, GM0BWR, 01259 761 299, e-mail gm0bwr@btinternet.com

3 JUNE 2001

MID-LANARK ARS Ham Radio Tram Ride - Summerlee Heritage Park, Heritage Road, Coatbridge. OT 10am, free. RSGB, LEC, TS, B&B, FAM, TI on S22, C, CP, etc. John, GM0XFK, 01698 822 860.
SPALDING & DARS Spalding Radio Rally - Springfields Gardens, accessible from the A16/A151 roundabout. TI on S22. OT 10am, £2. CBS, C, CS by prior arrangement. John, 07946 302 815.
WEST MANCHESTER RC Red Rose QRP Festival - Formby Hall, Alder Street, Atherton, Manchester. OT 11am, £1. CP, DF, C, LB, TS, SIG, RSGB, G QRP, FISTS, B&B. Les, G4HZJ, 01942 870 634.

10 JUNE 2001

NUNSFIELD HOUSE ARG Elvaston Castle National Radio Rally - Elvaston Castle Country Park, Elvaston, Derby, on the B5010 between the A6 and the A52, five miles SW of Derby. £3 per car (car park opens 9am), TS, SIG, FM, B&B, FAM, C, MT (two photos required). Les, G4CWD, 01332 559 965 or e-mail rally@g4cwd.demon.co.uk
WINDERMERE STEAMBOAT MUSEUM ARS Mobile Radio Meeting - Windermere Steamboat Centre, Rayrigg Road, Windermere. OT 10am. A new event centred on the uses of mobile radio in the Lake District. Exhibits by the Army, RAF, Police, Fire, Mountain Rescue Teams and Park Wardens on land

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.

and on the lake, all set against the attractions of the museum's exhibits of working steam launches. A great family event. Roy, g0tak@thersgb.net

17 JUNE 2001

EAST SUFFOLK WIRELESS REVIVAL - The Hollies, Bucklesham, Ipswich. CBS, B&B, TI on 2m (GB4SWR), SIG, RSGB, C. Jason Flynn, 01473 606 060.

LEEDS & DARS Outdoor Rally & Car Boot Sale - Yarnbury Rugby Club, Brownberrie Lane, Hosforth, Leeds. CP free. J A Mortimer, M0JAM, 01943 874 650.

NEWBURY & DARS 15th Annual Boot Sale - Acland Hall & Recreation Field, Cold Ash, Newbury. OT 9am, TI on S22. George, 01488 682 814 or www.nadars.org.uk

NORFOLK ARC Barford Radio Rally - POSTPONED until 24 June.

23 JUNE 2001

RADIO VEHICLE WEEKEND - Blandford Forum, Dorset. Displays of modern equipment and working radios using amateur and cadet frequencies. White Helmets motor cycle display team, pipes and drums of Scottish Signal Regiment and the Corps Band. The museum will also be open. Mike Buckley, 020 8654 2582.

24 JUNE 2001

BANGOR & DARS Summer Radio Rally - Crawfordsburn Country Club, near Bangor, County Down. OT 12 noon, £2. TS, B&B. Club website http://welcome.to/bdars or Norman, GI3YMY, 028 9146 6557 or email normannewell@beeb.net

CITY OF BRISTOL RSGB GROUP Longleat Amateur Radio & Computer Rally - Longleat House, Warminster, Wiltshire. Ron, G4GTD, 0117 9856 253 or www.longleatrally.co.uk

24 JUNE 2001

NORFOLK ARC Barford Radio Rally - Barford Village Hall, off the B1108, Barford Village, 9 miles west of Norwich. OT 10am, £1 (under 16s free). CP free, SIG, CBS, TS, Novice, Raynet, C, etc. John, G0VZD, 01953 604 769. NB: This rally has been moved from 17 June.

29 JUNE - 1 JULY 2001

HAM RADIO 2001 EXHIBITION - Friedrichshafen, Germany. Coach trip organised by Ernie, G4LUE, 01226 716 339 or 07787 546 515, or www.syrg.co.uk

1 JULY 2001

YORK RADIO CLUB 11th Radio Rally - Knavesmire Building, York Racecourse. OT 10.30am, £2 under 14s free. CP, TI on S22, SIG, LB, C, MT (two photos required). Pat, G0DRF, 01904 628 036 or pat.trask@lineone.net

5 - 8 JULY 2001

FINNISH RADIO AMATEUR LEAGUE Annual Summer Camp - 'Hietahami 2001', hosted by the University of Oulu Radio Club, OH8TA. The camp site is located close to the centre of Oulu, which can be reached by train, plane or bus. http://oh8ta.oulu.fi/hietahami/en/ or e-mail hietahami@sik.oulu.fi

8 JULY 2001

FENLAND REPEATER GROUP Horncastle Amateur Radio Rally - Horncastle Youth Centre, The Old School, Cagthorpe, Horncastle (near Horncastle Police Station). OT 10.30am, £1. TS, MT (two photos required), C, WIN. 01526 860 320 or 07778 274 535. Web site www.fenlandrepeater.org.uk

SUSSEX Amateur Radio & Computer Fair – Brighton Racecourse, East Sussex. OT 10.30am. Ron, G8VEH, 01903 763 978 or 01273 417 756 (office hours).

14 JULY 2001

CORNISH RAC Radio Rally & Computer Fair - Penair School, Truro. OT 10.30am. B&B, TI, CP. Robin, 01209 820 118.

15 JULY 2001

HULL & DARS 8th Humber Bridge Radio Rally - Hessle High School, Hessle. OT 10.30. TS, C, MT (two photos required), TI on S22. Phil, M1BLO, 01482 879 396 or www.sydney.karoo.net/hadars

McMICHAEL RALLY & CAR BOOT SALE - Reading Rugby Football Club, Sonning Lane (B4446, just off A4) near Reading, Berkshire. OT 9am, £1.50, under-18s free. CP, CBS, C, LB, TS, TI on S22 by GB6MMR. First Aid post. Dave, G4XDU, 01628 625 720 or g4xdu@amsat.org Web site http://come.to/mcmichaelrally

27 - 29 JULY 2001

AMSAT-UK COLLOQUIUM - University of Surrey, Guildford. www.uk.amsat.org/colloquium.htm

29 JULY 2001

COLCHESTER AMATEUR RADIO SOCIETY 33rd Annual Radio Rally & Computer Fair - St Helena School, Sheepen Road, Colchester. OT 10am. TI, TS, CBS, C, LB, CP free, DF, B&B. Richard, 01376 571 239 (evenings) or www.g3co.ccom. co.uk

RUGBY ATS Annual Rally - BP truckstop on A5, 3 miles east of Rugby, 2 miles from M1 jn 18. OT 10am, £1. CP free, TI on S22 (GB1RRR), C, DF. Peter, G0JEW, 01455 552 449 (eve) or e-mail rally@g0jew.fsnet.co.uk

5 AUGUST 2001

LORN ARS Radio Rally - Benderloch Hall (north of Connel). C. Shirley, GM0ERV, 01631 566 518 or s.mclennan@freeuk.com, or John, GM8MLH, 01838 200 304.

5 - 10 AUGUST 2001

NORTH WALES RRC DXpedition to Bardsey Island - from Bardsey lighthouse and Plas Bach. All bands from 160 - 6m. Edward, GW0DSJ, 01745 336 939. Web page www.nwrrcw.org.uk

10 AUGUST 2001

COCKENZIE & PORT SETON ARC 8th Annual Radio Junk Night - Cockenzie & Port Seton Community Centre, South Seton Park, Port Seton. OT 6.30pm, £1. Bring your own junk and sell it yourself. C, DF, WIN. Bob, GM4UYZ, 01875 811 723 or GM4UYZ@GB7EDN or e-mail bob.gm4uyz@btinternet.com

12 AUGUST 2001

KING'S LYNN ARC 12th Great Eastern Radio & Computer Fair - Park High School, Queen Mary Road, King's Lynn. OT 9.45/10am, TI on S22 and SU22, B&B, CBS, C. No dogs. Derk, G0MQL, 01553 841 189, e-mail Derk.Fraklin@tesco.net or Fred, G0KZI, 01760 440 570.

LORN ARS Village Fun Day - Dalavich, Argyll. Callsign GS0LRA (Lorn Radio Amateurs). Shirley, GM0ERV, 01631 566 518 or s.mclennan@freeuk.com, or John, GM8MLH, 01838 200 304.

19 AUGUST 2001

LEEDS & DARS Outdoor Rally & Car Boot Sale - Yarnbury Rugby Club, Brownberrie Lane, Horsforth, Leeds. CP free. J A Mortimer, M0JAM, 01943 874 650.

26 AUGUST 2001

TORBAY ARS Mobile Rally - Churston Grammar School, Greenway Road, Churston, Torbay. OT 10am, £1. TI, CP, C, TS, WIN, B&B, MT (two photos needed). John, G4VUD, 01626 205 514 or e-mail rally@tars.org.uk

27 AUGUST 2001

HUNTINGDONSHIRE ARS Radio Rally - Ernulf Community School, St Neots (near Tesco on A428). OT 10am, £1.50. C, CBS on hard standing, TI on S22. Peter, M5ABN, 01480 457 347 (1800 - 2200).

2 SEPTEMBER 2001

TELFORD ARRG Telford Radio Rally - Dave, M0VZT, 01952 222 101. Web site www.TelfordRally.org.uk or e-mail bob@somrob.u-net.com

9 SEPTEMBER 2001

LINCOLN SWC Hamfest - John, G8VGF, 01522 525 760 or 07968 050 318.

15/16 SEPTEMBER 2001

TRANSMISSION 2001 - 9th annual event to raise money for British Wireless for the Blind Fund. John 01634 832 501.

16 SEPTEMBER

BARRY ARS Welsh Amateur Radio Exhibition - Brian, 029 2083 2253.

21/22 SEPTEMBER 2001

LEICESTER Amateur Radio Show - Geoff, G4AFJ, 01455 823 344, fax 01455 828 273 or e-mail g4afj@argonet.co.uk

7 OCTOBER 2001

MANSFIELD ARS Radio, Computer & Electronics Rally - New Venue. David, G0RDP, 01623 631 931 or david.g0rdp@lineone.net or web site www.andange.btinternet.co.uk/rally.htm

12 - 14 OCTOBER 2001

RSGB International HF and IOTA Convention HFC 2001 - RSGB, 0780 904 7373.

WACRAL 2001 Conference - G4EZU, QTHR or 01474 533 686.

13 OCTOBER 2001

THE G QRP CLUB MINI-CONVENTION - George, G3RJV, g3rjv@gqrp.com

14 OCTOBER 2001

NORTH WAKEFIELD RC 18th Amateur Radio & Computer Rally - 01924 824 451 or www.nwrc.mcmail.com

21 OCTOBER 2001

BLACKWOOD & DARS Radio, Computer and Electronics Rally - Dave, GW4HBK, 01495 228 516 (eve).

28 OCTOBER 2001

GALASHIELS & DARS Annual Rally - Jim, GM7LUN, 01896 850 245 or e-mail jimk@gm7lun.freeserve.co.uk

3/4 NOVEMBER 2001

NORTH WALES RRC Rally 2001 - Muriel, GW7NFY, 01745 591 704 or www.nwrrcw.org.uk

6/7 NOVEMBER 2001

LOW POWER RADIO ASSOCIATION Radio Solutions 2001 - 01422 886 463 or www.lpra.org or e-mail info@lpra.org

18 NOVEMBER 2001

COULSDON ATS Bazaar - Andy, G0KZT, or coulsdon_ats@hotmail.com

MIDLAND AMATEUR RADIO SOCIETY 12th Radio & Computer Rally - New venue. Peter, G6DRN, 0121 443 1189.

WEST MANCHESTER RC Red Rose Rally - Don, G3BSA, phone/fax 01942 871 620 or e-mail don@g3bsa.freeserve.co.uk

24 NOVEMBER 2001

ROCHDALE & DARS Traditional Radio Rally - John, G7OAI, 01706 376 204 (eve), or e-mail radars@mbc.co.uk Please note that this is a *Saturday*!

24/25 NOVEMBER 2001

LONDON AMATEUR RADIO & COMPUTER SHOW - Lee Valley Leisure Centre, Pickett's Lock Lane, Edmonton, London N9. 01923 893 929, www.radiosport.co.uk

25 NOVEMBER 2001

BISHOP AUCKLAND RAC Rally - Mark, G0GFG, 01388 745 353 or Brian, G7OCK, 01388 762 678.

3 FEBRUARY 2002

SOUTH ESSEX ARS Rally - Brian, G7IIO, 01268 756 331 or www.southessex.ars.btinternet.co.uk

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; 7 = 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.
The QSL Bureau Sub-Managers for special event station callsigns are as follows:
GBxAAA-MZZ - Mike Evans, 322 Heol Gwyrosydd, Penlan, Swansea SA5 7BR, e-mail mw0cna@ntlworld.com
GBxNAA-ZZZ - Graham Ridgeway, 6 Rosewood Avenue, Blackburn BB1 9SZ, e-mail m5aav@zetnet.co.uk
Will organisers of special event stations please ensure that they lodge plenty of envelopes with their sub-managers?

2 Jun	GB0AC: Arctic Corsair. The River Hull, Hull. LH27 (G0VVP) GB2GTM: Grampian Transport Museum. Alford, Aberdeenshire. LHV27 (GM4BKV) GB2HVM: Horsforth Village Museum. Horsforth, Leeds. L2 (G0WRT) GB2MOF: Museum of Flight. East Lothian. LH (GM4UYZ) GB2PPS: Papplewick Pumping Station. Ravenshead, Notts. LH27 (G0UYQ) GB2RAM: Royal Armouries Museum. Leeds, W.Yorkshire. LH2 (M0BGS) GB2WHO: Dr Who. Llangollen, Denbighshire. LHV2 (GW0VML) GB2YAM: Yorkshire Air Museum. Elvington, York. LH2 (M0CSD)
8 Jun	GB0RAF: Royal Air Force. Derby. LH27 (M0CBN) GB2CC: Clanfield Carnival. Clanfield, Hants. TLHV27 (G4PRG)
9 Jun	GB2WSR: Whitwell Steam Rally. Hitchin, Herts. LH2P (M0AZZ) GB60ATC: Air Training Corps. Derbys. TLHV27P (M5EHG)
10 Jun	GB2ECR: Elvaston Castle Rally. Elvaston, Derby. LH27P (G0IYZ)
16 Jun	GB0EAA: Essex Air Ambulance. Boreham, Essex. LHV27 (G0UKP) GB6VR: Valve Radio. Ipswich, Suffolk. LH (M0AWS)
17 Jun	GB4PC: Pontefract Castle. Pontefract. LH2 (G0NQE) GB4SWR: Suffolk Wireless Revivial. Bucklesham, Ipswich. 2 (G4YQC)
18 Jun	GB4YOU: Youlbury Scout & Guide Radio. Boars Hill, Oxford. TLH27P (G0REL) GB4YOU: Youlbury Scout & Guide Radio. Boars Hill, Oxford. TLH27P (G0RJX)
23 Jun	GB2VSC: Vallance& Southern Counties. Charlwood, Surrey. LH27 (G3KAU) GB2WMF: Whitehaven Maritime Festival. Whitehaven. LH2 (M0FWM) GB4BPM: Bromley Pageant of Motoring. Bromley, Kent. (G0CRH) GB4FOL: Festival of Leisure. Swadlincote, Derbyshire. LH27 (G4CRT)
28 Jun	GB4BOB: Borough of Broxbourne. Cheshunt, Herts. H2 (M5AJK)
30 Jun	GB2SJS: St John's Sidcup. Sidcup, Kent. LH27P (M0BGR)

Regional and Club News

Club NEWS

Scotland West and the Islands Region

No club details submitted.

Scotland East and the Highlands Region

ABERDEEN ARS
8, Talk TBA, Adam, MW1KZV. 15, Visit to new lifeboat. 22, 'All about QRP', George Burt, GM3OXX. 29, Radio topics. Robert, 01224 896142.

BANFF AND DARC
29, Build a computer with George, MM1CNA, & Colin, MM0AOQ. George, MM1CNA, 01346 518251.

COCKENZIE AND PORT SETON ARC
1, Normal club night. 17, *PW* 144MHz QRP contest (TBC). 20, C&PSARC 10m contest. Bob, GM4UYZ, 01875 811723.

LOTHIANS RS
13, AGM. 27, Caledonian Brewery visit. John, GM7REG (no contact details provided).

North West Region

MID CHESHIRE ARS
6, 50MHz on air. 13, Activity night. 27, 'DX addiction, it could happen to you too', Niall, G0VOK. Niall, G0VOK, 01606 871413.

STOCKPORT RS
13, Surplus equipment sale. 27, SRS on the road at Marple Ridge. David, M1ANT, 0161 4567832.

THORNTON CLEVELEYS ARS
5, Computer / radio interfacing. 12, VHF field planning, on air. 19, Quiz. 26, VHF NFD preparations (TBC). Jack, G4BFH, jack@jduddington.fsnet.co.uk

WHITEHAVEN ARC
14, 'Magnetic Loop Aerials', G0ORO. 21, Final preparations for GB2WMF. 23 / 24, Special event station GB2WMF at Whitehaven Maritime Festival. 28, QSL cards etc for special event station. Norman, M0CRM, 01946 692462.

North East Region

GOOLE RES
1, Fund raising night at the Barnes Wallis. 8, Satellite demo at G0SWL QTH. 15, Contest equipment check at Lionel Winder. 22, Midsummer BBQ at Barmby Tidal Barrage. 29, Talk at Courtyard Centre. Richard, G0GLZ, 07867 862169.

HALIFAX & DARS
19, Annual BBQ at Rishworth School. Ray, G0PMU, 01274 600297.

HAMBLETON ARS
13, Talk. 27, On air. John, G0VXH, 01845 537547.

HULL & DARS
1, Inter-club quiz. 3, 2m 'foxhunt'. 8, APRS, G0VRM. 15, Field weekend preparation. 16, Field weekend. 22, Batteries. 24, 2m 'foxhunt'. Leigh, G0UBY, leigh@sydney.karoo.co.uk

KEIGHLEY ARS
2/3, National Museums special event at National Museum of Photography, Film & TV, Bradford. 7, On air. 21, Pool, darts & dominoes for Children in Need. Ian, M1BGY, 01274 723951.

NORTH WAKEFIELD RC
8, NWRC reunion evening, meet old friends. 21, Talk TBA by Gerald, G3SDY. Jim, G3YDL, 01924 824451.

WAKEFIELD & DARS
5, Crystal set competition judging. 12, On air, DF hunt tutorial. 19, DF 'foxhunt'. 26, 'QRP', George Dobbs, G3RJV. John, G7JTH, 01924 251822

Midlands Region

ARC OF NOTTINGHAM
7, No meeting. 14, Forum. 21, DF hunt no 3. 28, 'What is a Balun and where do you put it?', Ron, G4XOU. Trevor, G0IXR, 0115 9212967.

BROMSGROVE ARS
12, On air. DF hunt 3 planning. 26, DF hunt 3 (quite difficult). Angus, G8DEC, 01257 875573.

CAMBRIDGE & DARC
1, ATV operating on 1.3GHz. 8, Designing the Az/El antenna controller. 15, Building the Az/El satellite tracker. 22, International Space Station antenna test night. 29, Video evening, Backup ISS test night. Clive, G8BOU / M5CHH, 01223 573705.

COVENTRY ARS
1, Datacomms evening (RTTY, Packet, PSK). 8, On air, Novice class, CW practice. 15, HF portable evening (TBC). 22, On air, Novice class, CW practice. 29, Preparation for VHF NFD (TBC). John, G8SEQ, 024 76273190.

GLOUCESTER AR & ES
4, 'Book browsing'. 11, On air 160/80m. 18, Midsummer outdoors social event. 25, On air 160/80m. Tony, 01452 618930.

KIDDERMINSTER & DARS
5, DF competition. Phil, G4SPZ, 01299 403025.

LEICESTER RS AND COMPUTER CLUB
4, Bingo and usual activities. 11, 25, Activities HF, VHF & computers. Stan, G3HYH, 0116 2242598.

LINCOLN SW CLUB
6, On air. 13, Committee meeting. 20, BBQ. John Riddoch, 01522 793751.

LOUGHBOROUGH & DARC
5, On air. 12, Open forum: amateur radio now and yesterday. 19, 3rd DF of year, 2m, BBQ (bring guests). 26, Junk sale. Chris, G1ETZ, 01509 504319.

MID-WARWICKSHIRE ARS
12, Pub night. 26, Technical topics night. Bernard, M1AUK, 01926 420913.

OXFORD & DARS
14, Social evening with 'Aunt Sally' and buffet. 28 Jun, Computer clinic, Ray, G4FON. Dave, G3BLS, 01865 247311.

RAF WADDINGTON ARC
7, RAE course. 14, 'Astro Photography', D Swaby. 21, 28, RAE courses. Bob, G3VCA, 01522 528708.
SOUTH NORMANTON, ALFRETON AND DARC
4, Talk by Radio Interference Service. 11, DF 'foxhunt'. 18, Junk sale. 25, On air. Dave Warren, M5RST (no contact details provided).
STOURBRIDGE & DARC
25, 'Painting with light', Graham Hodgkis. John, M1EJG, 01562 700513.
STRATFORD UPON AVON AND DRS
11, VHF DF 'foxhunt'. 25, BBQ and night on air. David, G6FEO, 07970 148204.
TELFORD & DARS
6, On air. 13, 2nd DF hunt on 2m & 70cm. 20, Refurbished antennas to get burned in. 27, Mapping GB3TF & microwave beacon coverage. Mike, G3JKX, 01952 299677.

North Wales Region

DRAGON ARC
4, Status of Anglesey as IOTA entity, Don Beattie, G3BJ. 18, 'QRP and construction', Rev George Dobbs, G3RJV. Stewart, GW0ETF, 01248 362229.

South Wales Region

SWANSEA ARS
21, Car treasure hunt. Roger, GW4HSH, 01792 404422.

Northern Ireland Region

BANGOR & DARS
6, Chairman's evening: debate on future of amateur radio hosted by Jeff Smith, MI0AEX. 13, BBQ, celebrity chef Keith Burnside, GI4IYO. 24, Summer radio rally at Crawfordsburn Country Club (12 noon). Mike, GI4XSF, 028 42772383.

London and Central Region

CHESHUNT & DARC
6, Local Area Networks (LANS), Jon, G8DJU. 13, Open air meeting, Bass Hill Common, Broxbourne. 20, Members' forum. John, G3WFM, 01707 651532.
COULSDON ATS
11, 2m DF hunt (TBC). Steve, G7SYO, 01737 354271.

Region	RSGB Regional Manager
Scotland West & the Islands Region	John Martindale, GM4VPA
Scotland East & the Highlands Region	Tommy Menzies, GM1GEQ
North West Region	Kath Wilson, M1CNY
North East Region	Peter R Sheppard, G4EJP
Midlands Region	John Layton, G4AAL
North Wales Region	Vacant
South Wales Region	Simon Lloyd Hughes, GW0NVN
Northern Ireland Region	Jeff Smith, MI0AEX
London & Central Region	Roger Piper, G3MEH
South & South East Region	Ivan Rosevear, G3GKC
South West & Channel Islands Region	Richard Atterbury, G4NQI
East & East Anglia Region	Vacant

RSGB Regional Managers (as of 1 May).

CRAY VALLEY RS
21, DF hunt. 30, Special event station GB3SJS. Bob Treacher, BRS32525, 020 82657735 after 8.00pm / weekends.
CRYSTAL PALACE & DRS
6, Club construction projects, computing and Internet. Bob, G3OOU, 01737 552170 or Victor, 020 86532946.
DACORUM ARTS
19, 'The role of the radio ham and the Internet'. Jean, 2E1FOX, 01582 620507.
EDGWARE & DARS
14, Surplus equipment sale. 28, VHF NFD briefing (TBC). David Wilkins, G5HY, 01923 655284 (day) / 020 89549180 (eves).
HODDESDON RC
5, 'Time and frequency', Dick Rennie, G0WDL. 19, Open forum & Morse practice. Don, G3JNJ, 020 82923678.
RADIO SOCIETY OF HARROW
22, Midsummer kites evening: bring your kites and enjoy picnic. Jim Ballard, G0AOT, 01895 476933 / 020 7 2786421.
SURREY RADIO CONTACT CLUB
4, Construction contest & short talks. Berni, G8TB, 020 86607517.
VERULAM ARC
2, Visit to Mullard Radio Observatory (starts 1430). 25, RSGB Regional Manager Roger Piper, G3MEH. Walter, G3PMF, 01923 262180.
WELWYN-HATFIELD ARC
4, 'D68C Comoros DXpedition', Neville Cheadle, G3NUG. 18, Lightweight quad antenna and other products by Sycom. 25, Construction evening at Lakeside school. Contact Dean, dean@g3wgc.freeserve.co.uk

South and South East Region

FARNBOROUGH & DARS
13, Talk by RSGB General Manager Peter Kirby, G0TWW. Norman, G0VYR, 01483 835320.
HORNDEAN & DARC
9 / 10, Special event station GB2CC at Clanfield Carnival. Stuart, G0FYX, 023 9247 2846.

DISTRICT 14 OPEN REGIONAL MEETING

UNDER THE RSGB 2001 Regional Representational Scheme each district will have an opportunity of holding regular meetings. The first of these Regional Meetings was the District 14 (North & East Yorkshire and NE Lincs) meeting held in April at Goole, East Yorkshire. These meetings are held specifically to discuss regional issues and to allow the membership access to the RSGB at regional level. The open forum meeting discussed the constitution and implementation of the North East RSGB Group, the regional structure and web site and some interesting views were developed. The next scheduled ORM will be held in District 13 (Northumberland, Tyne and Wear, Cleveland and County Durham) in September, although other group meetings are planned before then.

The NE RSGB Team: Geoff Darby, G7GJU (DRRM 13); Peter Sheppard, G4EJP (RRM); Andy Russell, G0VRM (DRRM 14); Derek Allan, G3WYP (DRRM 15) and Des Critchlow, G3PTV (DRRM 16).

HASTINGS ELECTRONICS AND RC
20, TBA. R C Gornall, G7DME, 01424 444466.
HORSHAM ARC
7, 'Loop Antenna Update', G3LHZ. David, G4JHI, 01403 750228.
MAIDENHEAD & DARC
7, 'D68C Comoros DXpedition', Don Field, G3XTT. 19, 'Repairing Consumer Electronics', Dave, G3YMC. John, G3TWG, 01628 525275.
MID SUSSEX ARS
1, HF shack ops, plus table-top sale. 8, 'Foxhunt'. 15, VHF shack ops. 22, MSARS Windmills anniversary evening. Sue, G6YPY, 01273 845103.
QRZ AR GROUP OF SUSSEX
8, Development of WWII rocketry, John Becklake, former curator of Space Technology at Science Museum, London. 10, Trophy 'foxhunt', Alan Hobden, G3YNN. 22, Club project evening. Stuart, M0CHW, 01435 863020.
READING & DARC
14, 'Techniques of Home Brewing', E Searle, G3VMY. Pete Milton, G8FRC, 0118 969 5697, Peterw.Milton@btinternet.com
SILVERTHORN RC
23, On air. David, G0KHC, 020 8504 2831.
SOUTHDOWN ARS
4, 'Short History of Timekeeping', Bob Monroe. 17, PW QRP contest (TBC). Glynn, M0CHO, 01323 765731.
SWINDON & DARC
7, DF exercise. 14, AGM. 21, Members' equipment & junk sale. Den, M0ACM, no contact details provided.
TROWBRIDGE & DARC
6, Restoration of vintage wireless equipment, Bob Woolridge, G7LNJ. 23, Southwick & North Bradley Scout Fete. 24, Longleat rally talk-in/working party. Ian, G0GRI, 01225 864698 (eves / weekends).
WATERSIDE (NEW FOREST) ARS
5, The Falkland Islands, Francis, G7POS (bring guests invited). A Horton, G0LKG, 02380 844316.
WORTHING & DARC
6, Slide show, G3REP. 13, Buses, M1DTB. 20, DF hunt. 27, Discussion evening. Roy, G4GPX, 01903 753893.

THE REGIONS AND DISTRICTS

Scotland West and the Islands Region
- District 1 – Argyle & Bute
- District 2 – Ayrshire, Lanarkshire
- District 3 – Dumfries & Galloway
- District 4 – Borders

Scotland East and the Highlands Region
- District 5 – Highlands
- District 6 – Moray, Aberdeenshire
- District 7 – Perth & Kinross, Angus
- District 8 – Fife, Lothian, Borders

North West Region
- District 9 – Cumbria, Lancashire
- District 10 – Isle of Man
- District 11 – Greater Manchester
- District 12 – Cheshire, Merseyside

North East Region
- District 13 – Northumberland, Tyne and Wear, Cleveland, County Durham
- District 14 – North Yorkshire, East Yorkshire, NE Lincs
- District 15 – West Yorkshire
- District 16 – South Yorkshire

Midlands Region
- District 17 – Shropshire, Staffordshire, West Midlands
- District 18 – Derbyshire, Lincolnshire, Nottinghamshire. Rutland
- District 19 – Bedfordshire, Cambridgeshire. Leicestershire, Northamptonshire
- District 20 – Gloucestershire, Herefordshire, Warwickshire, Worcestershire

North Wales Region
- District 21 – Wrexham, Denbighshire, Flintshire.
- District 22 – Conwy
- District 23 – Gwynedd
- District 24 – Powys

South Wales Region
- District 25 – Pembrokeshire
- District 26 – Ceredigion
- District 27 – Carmarthenshire
- District 28 – Vale of Glamorgan, Cardiff, Newport

Northern Ireland Region
- District 29 – North Belfast, Co Antrim
- District 30 – South Belfast, Co Down
- District 31 – Co Armagh, Co Fermanagh
- District 32 – Co Londonderry, Co Tyrone

London & Central Region
- District 33 – London
- District 34 – Buckinghamshire, Berkshire
- District 35 – Hertfordshire
- District 36 – Surrey

South & South East Region
- District 37 – Oxfordshire
- District 38 – Wiltshire
- District 39 – East Sussex, West Sussex
- District 40 – Hampshire

South West & Channel Islands Region
- District 41 – Cornwall & Channel Islands
- District 42 – Devon
- District 43 – Somerset & Bristol
- District 44 – Dorset

East & East Anglia Region
- District 45 – Norfolk
- District 46 – Suffolk
- District 47 – Essex
- District 48 – Kent

Overseas Regions
- District 49 - IARU Region 1
- District 50 - IARU Region 2
- District 51 - IARU Region 3

The RSGB Regional Representation Scheme is designed to allow changes to the district boundaries as required in order to support the membership most effectively, therefore some changes to the districts shown above may take place in the future.

Breakdown of the RSGB Regions and Districts.

South West & Channel Islands Region

APPLEDORE & DARC
18, 'Vintage communications receivers', John Wilson, G3PCY. Brian Jewell, M0BRB, 01237 473251.

BLACKMORE VALE ARS
5, VHF on air, CW classes. 12, Talk TBA, Ray, G3TPH. 19, HF on air, CW classes. 26, Project night. Stewart, M5SLC, 01747 821186.

POLDHU ARC
12, Marconi Centre update. Keith, G0WYS, 01326 574441.

POOLE RS
1, Operating (shack). 8, 'The D68C Comoros Islands DXpedition' Mike, G3SED. Phil Mayer, G0KKL, 01202 700903.

SOUTH BRISTOL ARC
6, Bring & buy sale, Len, G4RZY. 13, On air. 20, Preparation for Longleat Rally, Len, G4RZY. 27, 5WPM Morse practice, Peter, G0DRX. Len, G4RZY, 01275 834282.

TORBAY ARS
22, Police air support at Highweek Family and Social Club. Anna (SWL) tel: 07747 000875.

WEST SOMERSET ARC
5, Annual 'foxhunt'. Alan, M0AOJ, 01643 707207.

YEOVIL ARC
7, D-Day reminiscences by club members. 14, 'Pick and Mix', Colin, G3TSK. 21, 'Hints and Kinks 4', Joe, G3KSK. Roger, M1SAN, 01963 362934

East and East Anglia Region

BRAINTREE & DARS
4, Kit/operating evening. Keith, M0CLO, 01376 347736.

CHELMSFORD ARS
5, Constructors' competition. David Bradley, M0BQC, 01245 602838.

COLCHESTER RA
7, Talk TBA, Tony Dagnall. 9 / 10, Exhibition stations at Aldham Olde Tyme Rally. 21, 'So is it Hi-Fi?', Kevin, M0BCK. Kevin, M0BCK, 01206 561117.

FELIXSTOWE & DARS
4, Novice RAE Exam. 11, Aurora and other spectaculars, Paul G4YQC. 25, Scrap heap challenge, Mark, M1BOP. Paul, G4YQC, 01394 273507.

GREAT YARMOUTH RC
8, Demo of old equipment. 22, VHF NFD preparations (TBC). Tony, G3NHU, 01493 721173.

HARWICH ARI GROUP
13, 'The B2 Spy Radio', John, G0FSP. Eugene, G4FTP, 01206 826633.

IPSWICH RADIO CLUB
20, 2m DF hunt. 27, Morse practice with John, G4BAV. Keith, G7CIY, 01394 420226.

LEISTON ARC
5, '*PW*: origins, past, present and future', Rob, G3XFD. Lisa, 2E1HBF, 01728 833202.

MAIDSTONE YMCA ARS
1, AGM. 8, Next year's calendar. 15, TBA. 22, Handheld radios, Howard Vicary, G0RJN. 29, TBA. John, G0RHO, 01622 832259.

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 between *RadCom* 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 only be included if space permits. Basic, unchanged details about RSGB-affiliated clubs are published annually in the *RSGB Yearbook*.

MFJ WIDEST RANGE OF AMATEUR RADIO accessories

Waters & Stanton PLC. **Freephone order line 08000 73 73 88**

For address and technical enquiries see inside front cover of magazine.
Also available at Chesterfield Rd, Matlock, Derbyshire Tel: 01629 582380

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Single band QRP Rigs

OUR PRICE £89.95 (KITS)
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Case etc. included.

MFJ's exciting new range of QRP rigs will open up an exciting new world. With outputs from 1W to 2W(depending upon model), you can adjust it down to milliwatts. These VFO CW rigs are available ready built or as a kit. Measure just 90 x 47 x 98mm and requires 12v DC. Models for 80m, 40m, 30m, 20m & 15m. Order 9380, 9340, 9330, 9320 or 9315 (plus "K" for kit).

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Experience the thrill of short wave listening on this regenerative receiver that has amazing sensitivity. Brand new solid state design. Just a short length of wire will bring good signals in. Covers all the major short wave general and ham bands. Simple to build and operate.

MFJ-269 and MFJ-259B

The most advanced antenna analysers

MFJ-259 £229.95 carr. £6.00
MFJ-269 £299.95

Connect it to your antenna and get all the information you need to optimise it for best performance including resonance, VSWR and impedance. Totally portable (using AA cells), you can work right up by the antenna. The MFJ-259 is the basic design covering 1.8 - 170MHz. The MFJ-269 has extended coverage up to 470MHz and gives an extremely wide range of measurements, even indicating where a break is in a coax cable.

MFJ-989C ATU OUR PRICE £329.95

3kW 1.8 - 30MHz "T" Match carr. £7.50

This standard "T" match design has a roller coaster coil for critical adjustment and a 4:1 balun to match balanced line. No matter what your antenna, this will give you a perfect match. Ideal for coax, end fed wires and open wire feeder. Features PEP or RMS power measurement (200 or 2kW max), VSWR, antenna switch, bypass, built-in dummy load (time restricted) 12v dial illumination etc. Size 270 x 375 x 115mm.

MFJ-986 ATU OUR PRICE £299.95

3kW Differential 1.8 - 30MHz carr. £7.50

This differential tuning design does away with one control, making it quick to adjust with just the roller coaster and the tune control. Rugged enough to cope with any amateur radio linear, it can be used with coax, end fed wire or balance line. You get PEP/RMS/VSWR metering, antenna switching, bypass etc. One of our most popular models, it measures 278 x 375 x 115mm.

MFJ-962D ATU OUR PRICE £239.95

1.8 - 30MHz 1.5kW "T" Match carr. £7.50

For use with medium linears. Using the famous "T" Match design, this ATU will cope with any antenna whether it be coax, end fed wire or balanced feed. You can monitor your power (average or PEP 200W or 2kW max))and VSWR. Antenna switch selector is included for two antennas. Size 270 x 375 x 115mm.

MFJ-949E ATU OUR PRICE £139.95

1.8 - 30MHz 300W "T" Match ATU carr. £6.00

Our most popular ATU because it covers all HF bands and matches anything from coax to long wire to balanced feed. Take a look at the price and then consider that it even includes a dummy load plus power and VSWR meter. Measuring 260 x 190 x 83mm, it really is great value.

MFJ-948 ATU OUR PRICE £119.95 carr. £6.00

The same as the MFJ-949 above, but without internal dummy load.

MFJ-969 ATU OUR PRICE £169.95

HF + 6m! 300W "T" Match ATU carr. £6.00

Here's the ATU for those who have an HF transceiver with 6m coverage. Now you can even use your HF antenna on 6m! This "T" Match design has a very accurate PEP meter built-in, though you'll need to install a PP3 battery to get optimum results. There's a built-in VSWR cross needle meter, dummy load and lovely roller coaster for critical adjustment. Size 268 x 242 x 95mm.

MFJ-1786 & 1788 Loops.

MFJ-1786 £349.95
MFJ-1788 £389.95
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Here's the answer to those who have severe space problems. This loop antenna works as well as a full-size dipole but can be fitted in the smallest of situations. Model MFJ-1786 covers 10MHz - 30MHz and model MFJ-1788 covers 22MHz - 7.1MHz. Each one comers with remote tuning box. box. Maximum power is 100W. Loop diameter is 36 ins and can be mounted horizontal or vertical with the kit provided.

Remote tuning box.

MFJ-934 & MFJ-931 Artificial Grounds

OUR PRICE MFJ-934 £139.95
MFJ-931 £79.95 carr. £6.00

Removes RF hot spots and offers a true ground, even when operating upstairs.

If you operate upstairs or well away from an earth, you will know that trying to use an end fed long wire is a problem!

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VHF/UHF

NORMAN FITCH, G3FPK
40 Eskdale Gardens,
Purley, Surrey CR8 1EZ.
E-mail: g3fpk@compuserve.com

THE MAIN excitement this month was several extensive auroras, which provided some excellent DX on the VHF bands. By contrast, QSOs via tropospheric propagation seem to have been a rarity. All times are in UTC, ODX indicates best DX and QTHR signifies that the operator's address is in the current *RSGB Yearbook.* An asterisk (*) after a callsign denotes a CW contact, (SN), (FK) etc refers to the postcode area and (IO93), for example, is the Maidenhead grid.

CONTEST NOTES

A REMINDER THAT due to the foot and mouth crisis there are no portable sections for any RSGB VHF/UHF contests for the present. Whether VHF NFD will take place on the scheduled weekend of 7/8 July is uncertain at the time of writing, so listen for the latest news in the weekly GB2RS News Broadcasts and/or check on the web site - see the list. The rules were published on page 53 of the May issue of *RadCom* with advice on alternative dates *if* the event is postponed. The *Practical Wireless* 144MHz QRP Contest scheduled for 17 June has been cancelled.

For 6m enthusiasts looking to work French *departements*, the French national society, REF, is running its DDFM contest on 16 June, 0400 - 1600. The modes are SSB and CW and the two sections are French stations and the Rest of Europe. French stations will give their calls followed by their department number eg F5XYZ/71, others should send the RS(T) / serial number followed by their four-figure grid, eg 579001 IO91. Scoring is one point per QSO multiplied by the number of different grids worked.

Soliciting QSOs via packet or cluster is not allowed. Note that QSOs below 50.200MHz are *not* valid. This event is being organised by F1PUX and F8OP. If you want a map of the French *departements*, send an e-mail request to f8op@wanadoo.fr and I'll forward a copy of the rules via e-mail if you need them.

Derek Gilbert, G0NFA, has received a copy of the results of the 2000 Marconi Memorial Contest from Claudio, IW3RI. He has included them in his April Newsletter *QUA* which is on his website - see the list. Claudio comments that he cannot understand why so many of the participants did not send in their logs, but hopes it will be better this year. Derek says that if anyone wants the .XLS file that Claudio sent him, send him an e-mail to g0nfa@aol.com

PUBLICATION

THE APRIL EDITION of the Rochester VHF Group's monthly journal has a new title, *Rovin' Stone* and this 24-page publication is described as a 'Battle of the Bands' issue. As might be expected there are some April Fool pieces. I liked the 'Comprehending Engineers' contribution, especially the one, "Normal people believe that if it ain't broke, don't fix it. Engineers believe that if it ain't broke, it doesn't have enough features yet."

Articles include 'An introduction to the wonders of the six metre band' by Dana Shtun, VE3DSS, 'What's to do on 432?' by Frank Pollino, K2OS, 'EME on 222MHz - an update' by Peter Shilton, VE3AX, 'An EME primer' by Scott Olitsky, AC3A, '1296 EME for beginners' by Dave Hallidy, K2DH, and 'My favourite band, 2m' by Mark Hoffman, K2AXX. Tom Richmond, VE3IEY, edits *Rovin' Stone* and the group's mail address is PO Box 92122, Rochester, NY-14692, USA.

SOLAR SAGA

JUST WHEN MANY were beginning to think that the peak of Sunspot Cycle 23 had passed, along came sunspot area 9393. The message from the Space Weather News website on 29 March read, "Huge Sunspot: The largest sunspot in ten years is crossing the solar disk. The fast-growing spot, called AR9393, covers an area of the Sun equivalent to the total surface area of 13 Earths!"

On the 28th there was a coronal mass ejection (CME) nearby which started a severe geomagnetic storm as the 2.8GHz solar flux peaked at 274 units and the SESC sunspot number (SSN) reached 352. The next day, the sunspot area was recorded as 3940 millionths of the Sun's visible disk.

A severe geomagnetic storm began around 0100 on the 31st as the A-index at Fredericksburg reached 115: the three-hourly K-indices for that day were 6, 8, 7, 5, 6, 5, 8 and 5. In North America the accompanying aurora was visible as far south as Texas, Arizona and southern California.

A Space Weather News posting on 3 April read, "The biggest sunspot of the current solar cycle unleashed the most powerful solar flare in at least 12 years yesterday. The 'X17' class eruption blasted a coronal mass ejection into space and triggered an ongoing solar radiation storm around our planet." However, this CME was not in the plane of the ecliptic so most of the particles passed by Earth.

The next event was on the 10th when a powerful X-class flare erupted triggering radio blackouts and a radiation storm as another CME headed our way. By the night of 11 / 12 April the Fredericksburg A-index was 50 as the K-index peaked at 7. As recorded at College in Alaska, the respective A and K-indices were 100 and 8.

After the peak in solar flux on 28 March, it declined daily to a minimum value of 123 on 16 April. The SSN dropped from the high of 352 to a low of 89 on 17 April when the sunspot area was a mere 160 millionths.

THE AURORAS

WHEN SUCH SOLAR events occur, auroral propagation is

The world's top 50MHz DX operator, Peter Sprengel, PY5CC, visited the UK in April to give a presentation at the RSGB VHF Convention at Bletchley. While visiting RSGB HQ he took the opportunity of monitoring the 6m band to make sure he wasn't missing anything!

inevitable: we weren't disappointed. In updating his Squares Table scores, Ian McCabe, G0FYD (FY), writes that he missed the morning session on 2m on 31 March but caught the later phase. He reported good signals from DL, I, HA, LA, LY, OE, OK, OM, ON, OZ, PA, SM, YL and 9A stations, but heard nothing new. ODX grids were JN54, 55, 65, KN06, 07 and KO26.

David Butler, G4ASR (HR), completed 70 CW and one SSB QSOs on 2m on 31 March starting at 1515, ending at 2346. The 15 countries worked were DL, F, G, HA, HB9, I, OE, OK, OM, ON, PA, S5, SP, YL and 9A. ODX were YL3AG (KO26 at 1816km), HA8CE (KN06/1787km), 9A2SB (JN95/1724km), OM3NA (JN98/1651km) and 9A3PA (JN85/1600km). The SSB contact was with DG9YIH (JO32) at 2019. For the most part the optimum beam headings (QTE) were between 45º and 70º.

He operated (was QRV) on 6m completing with GI6ATZ (IO74) at 0830, a couple of GMs in the early afternoon and with stations in EI, G, GM, OZ, PA and SP6ASD (JO81) in the late evening, a total of 11 contacts. QTEs were 0º at first and 45º towards the end.

David was QRV on 2m on 11 April, 1614 - 1850, completing 61 CW QSOs with stations in 16 countries. The event started very quickly with some good DX in the first 25 minutes. QTEs were between 50º and 75º, but from 1805 - 1815, LA, LY and SM stations were strongest at 30º to 50º. ODX were LY2WR (KO16/1798km), LY2SA (KO14/1737km), HA6NY (JN98/1698km), HA6NQ (JN98/1683km) and 9A1CAL (JN86/1525km).

From 1905 he was QRV on 6m until 2302 but only made six CW contacts with EI7GL (IO51), MM0AMW (IO75), GD0TEP (IO74), SM7FJE (JO65), OZ1DJJ (JO65 and ODX at 1098km) and F2YT (JO10). There were very strong TV signals from 2100 at 90º but no activity. He called 'CQA' from 2100, but although spotted by SP6ASD on the cluster, no QSOs resulted, so he wonders why?

LOCATOR SQUARES TABLE

Starting date 1-1-1979

Callsign	50	70	144	430	1296	Total
G4RGK	409	-	345	233	78	1065
G3XDY	-	33	246	170	120	569
G3IMV	659	20	616	125	53	1473
GJ4ICD	780	1	267	121	79	1248
G4YTL	-	51	511	101	-	663
G0FIG	460	-	385	94		939
G6TTL	220	-	133	90	27	470
G4DEZ	489	19	258	81	67	914
G0EV	416	14	292	77	16	815
G8TOK	329	31	133	55	29	577
G3FIJ	236	29	105	50	23	443
MM5AJN	316	-	76	32	-	424
G4ZHI	39	-	238	32	-	309
G0ISW	182	-	79	22	-	283
G0FYD	538	1	276	20	-	835
G4APJ	155	-	44	20	-	219
G8GNI	139	15	46	18	-	218
G7CLY	244	-	248	16	-	508
G1UGH	270	-	130	16	-	416
GU7DHI	415	-	85	14	-	514
M0CNP	-	1	31	12	-	44
GW6VZW	488	-	146	6	-	640
G0JHC	797	25	48	4	-	874
G4FUJ	57	17	19	4	5	102
MM0BQI	44	-	18	1	-	63
GW7SMV	500	-	190	-	-	690
GU6AJE	311	13	32	-	-	356
G4OBK	298	-	57	-	-	355
G1EFL	219	-	66	-	-	285
G3FPK	30	-	246	-	-	276
GW3EJR	252	-		-	-	252
GM1ZVJ	235	-	-	-	-	235
M1DUD	153	-	27	-	-	180
GM4VVX	62	-	70	-	-	132
G4OU	-	23	107	-	-	130
EA7I	-	-	101	-	-	101

No satellite, repeater or packet radio QSOs. If no updates received for a year entries will be deleted. Band of the month is 430MHz. Next deadline is 19 June.

John Lemay, G4ZTR (CO), was QRV on 2m between 0658 and 0817 on 31 March completing 21 CW QSOs with stations in D, ES, F, GM, HB9, LA, OH, OK and SM. ODX were SM2CEW (KP15/1949km), OH5LK (KP30/1875km) and OH2BNH (KP20/1747km) but no QTE was mentioned.

In the second phase he was QRV on the band 1605 - 1800, and made a further 43 CW contacts. All were with stations in the JN and JO fields except for his ODX, HA8CE (KN06/1534km). Countries worked were DL (17), F (2), HA (2), HB9 (1), I(6), OE (2), OK (6), S5 (4) and 9A (2), but again no QTE quoted.

Dave Edwards, G7RAU (PO), did well on 2m CW on 31 March and listed his 20 ODX contacts. In the morning session they were LY2BAW (KO25/1808km), LY2YC (KO14/1744km) and OK2STK (JN99/1398km). Top three in the afternoon/evening phase were YL3AG (1787km), LY2SA (KO14/1681km) and HA8CE (1651km).

From IO87, Clive O'Hennessey, GM4VVX (IV), found an aurora in full swing on 2m at 1329 on 20 March. Strangely, SSB signals didn't seem to suffer much distortion so he made 30 QSOs with stations in DL, G, ON, OZ and PD (Dutch Novices). Later on the pile-ups and increasing distortion forced him on to CW where he completed about 30 more contacts until fade-out at 1830.

On the 23rd, beacons were auroral from 1445 but no QSOs were made till 1516 into DL, G, GM, PA and SM on CW and SSB. The pattern was similar on the 28th from 1428 when CW contacts were completed with DL, G, GD, GI, GM, LA, ON, OZ, PA and SM stations. He caught the afternoon phase on the 31st from 1520. QSOs were completed on CW and SSB with DL, EI, F, G, GM, LA, OH, ON, PA and SM stations until fade-out at 1805. The Doppler shift was 500 - 600Hz high but in the third phase from 2013 till 0011 it was 400 - 500Hz lower. Countries worked on CW were DL, F, G, GM, LA, ON, OZ, PA and SM.

Jamie Ashford, GW7SMV (NP), reckons the 31 March event was one of the best auroras he has yet experienced. On 2m, 1547 - 1645, he worked 30 stations and they *all* answered his CQ calls on 144.340MHz. His tally was 10 PAs, 13 DLs, 6 Fs and an ON. DG3GAG/P (JN47) was a new grid. The 11 April event was visual in South Wales and in the 1612 - 1802 period he contacted 16 stations in DL, G, ON and OZ.

David Whitaker, BRS25429 (HG), listened on 6m on 31 March from 0757 for half an hour and heard stations in JN38 and 39, JO10, 31, 33, 41 and 43 as well as GMs in IO67, 75 and 88. ODX was SP4MPB (KO03). In the second phase from 1613 he copied British Isles stations in EI, G, GD, GI, GM and GW and on the continent some Fs, OZ1DPR (JO45) and LA9VFA (JO28).

Welcome to Robin Burrows-Ellis, M1DUD (IP), who has a QRP station on 6m running about 2W to a 3-element Yagi 5.6m AGL. Up to 31 March he had only worked three stations this year on the band, then came the aurora. Around 1545 he heard GW6VZW calling but it took him a while to find the optimum QTE, which was 30º. His first QSO was with MM0AMW at 1600. In the following two hours he made 12 more contacts with EI, G, GD, GI, GM and PA stations. He was impressed with the way that stations spread out, making QSOs that much easier.

On 6m Ted Collins, G4UPS (EX), heard beacon GB3RMK (IO77) at RST44A at 1738 on 19 March after which he completed three CW QSOs with GM and G stations till fade-out at 2005. Next day at 1344 EI3IO* (IO63) was 59A and worked at 1358. Thereafter he made 17 CW and four SSB QSOs with stations in EI, G, GD, GI, GM, GW, LA and ON. ODX was SP4MPB* at 1646km and the event faded out by 1820.

In the morning session of the 31 March event he made eight CW and three SSB contacts with DL, EI, G, GM, LX1NO* (JN39), OK, ON, SP6ASD (1414km) and SP4MPB* again until fade-out at 0830. The first signal heard in the second phase was SP9DSD* at 1555 and Ted made 25 CW QSOs with DL, EI, F, G, GM, GW, ON and PA stations, plus SP6GWB (JO80), S51UF (JN76/1467km) and SM7AED (JO65). The mode changed to Auroral-E at the end when YL2KA (KO26) and YL3AG (1901km) were contacted with T9 reports each way from 1826 until fade-out at 1845. An hour later the aurora returned for about 45 minutes.

Another event started at 1755 on 11 April when 6 QSOs were made with EI, G and PA stations till fade-out at 1940. Another phase started at 2114 with signals from GM and OZ. At 2122 he worked SM7FJE again with 57A / 559 reports exchanged: Ted's QTE was 30º and Bo's was 310º. The final contacts were with SP6ASD, DL1UU* (JO62) and GW4VEQ (IO73) before fade-out at 2300.

MOONBOUNCE

APOLOGIES ARE DUE to Howard Ling, G4CCH (IO93), due to my misreading a report on his activity on 23cm on 6 January as reported on page 77 in the April *RadCom*. In fact only *one* station was called with

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CONTEST

TIM KIRBY, G4VXE
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THIS MONTH we have a great number of contest results to report. However, there is also space to include a couple of important news items.

You will have no doubt read elsewhere about the cancellation of HF National Field Day (scheduled for 2 / 3 June) as a result of the Foot and Mouth Disease epidemic. As of 25 April, no decision had yet been made by the VHF Contest Committee about the fate of VHF NFD [see the full rules published on page 53 of last month's *RadCom - Ed.*] The committee is trying to assess the current likelihood of this event taking place as scheduled on 7 / 8 July. If it is postponed, the contest will provisionally move to 1 / 2 September. The VHFCC asks groups please to register as normal for this event until a ruling is made.

These are difficult decisions for both the contest committees and I know that the cancellation or postponement of any contest will cause a lot of disappointment to contesters. Personally, I am completely behind the decision, as I feel that to do otherwise risks the possibility, however small, that someone could inadvertently spread the infection to a farm. Leaving aside the repercussions for the farmer and the animals involved, this could result in an extreme amount of negative publicity for amateur radio. We have enough challenges in presenting our hobby in a positive light in the media without incurring any home goals!

On a much more positive note, news now of the next World Radio Team Championship (WRTC) in 2002. The organising committee has decided that it will be held around Helsinki in Finland in July next year. This is tremendous news, as the Finnish contest community has been a great supporter of the contest scene for years and we can rest assured that it will be a great event. We'll cover much more about this important event in the coming months, including news about who will be taking part and how they are selected, along with the details of the event itself and how it will be structured. In the meantime, you can find some further information at the following URL: http://www.wrtc2002.org/

Not much room this month for anything else, except to thank those of you who have written with some very interesting letters regarding some of the topics that we've touched on recently, the number of contests in our calendar, omitting giving your callsign and so on. Please don't think you're being ignored! We'll come back to those topics again soon.

Martin, G4XUM, operating at G4UJS during the *CQ* WPX SSB contest in March.

432MHz Trophy, 2000

A DISAPPOINTINGLY quiet contest in the UK. 'With flat conditions', was pretty much how this contest got billed. The Parallel Lines CG emerged as fairly clear winners of the Trophy ahead of the Villa CG, and G4PIQ operating G0KPW takes the single operator honours.

Andy Cook, G4PIQ

432MHz Trophy, 2000

Single Operator Section

Pos	Call	Points	QSO	Loc	Pwr	Ant	Best DX	km
1*	G0KPW	38907	125	02CD	400	4 x 31Y	DL0DV	761
2*	G3XDY	14657	56	02GB	250	28Y	DL2LSM/P	707
3	G3MEH	12681	73	91QS	250	2 x 23Y	DL2DAO/P	551
4	G4AEQ	11548	55	93PE	200	2 x 19Y	DL5KCI	547
5	G6FQZ	6020	36	91JR	100	21Y	DL1EAP/P	513
6	GW1ATZ/P	5273	35	83LC	50	21Y	G4LIP/P	372
7*	PE1EWR	4472	20	11SL	13	2 x 21Y	GD0EMG	623
8	G6DER	4456	17	93GN	400	21Y	DH5HV	572
9*	GM4WLL/P	3391	10	85NR	20	23Y	PI4GN	677
10*	2E1GHA	3215	24	01HS	10	21Y	GD0EMG	431
11	G4HGI	3198	25	83PL	25	19Y	PA6NL	489
12	G1HIA	3154	15	81QL	30	48Y	PA6NL	468
13	G4LRT	1484	10	92LJ	250	2 x 18Y	ON4CP	429
14	G4KNZ/P	1173	8	02ID	10	10Y	DH5HV	334

Multi Operator Section

Pos	Call	Points	QSO	Loc	Pwr	Ant	Best DX	km
1*	G4LIP/P	68247	191	01QD	400	8x21Y + 8Y	DL0SP/P	821
2*	M1CRO/P	51638	150	01PU	400	4 x 21Y	GK2KKW	818
3	G4SIV/P	34616	102	03CE	400	8x28Y + 4x21Y	DL0GTH	778
4	GD0EMG	29882	83	74QD	400	4x26Y + 4x28Y	F8KTH/P	850
5	G4LCO/P	9806	66	91RU	200	3 x 3GY	GM4LBV	553
6	G8OHM/P	8853	52	92GB	400	4 x 19Y	DL1ELY	571
7	G1WAC	5515	27	92BI	75	21Y	DK0MU	632

144MHz Backpackers Championship, 2000

COMPETITION for the Backpackers Trophy was fierce this year but remained friendly at all times. Over the five sessions, 10 different stations managed to win a section. After the three best scores had been calculated, two stations (M0AFC/P and G8NWM/P) emerged with 3000 points each. The winner of the 144MHz Backpackers Championship was only finally decided after the scores from all five of the sessions were taken into account.

Congratulations to Tim Boon, M0AFC/P [see photo on page 39, *RadCom* May 2001 - *Ed*], for claiming the 144MHz Backpackers Trophy by winning his section in each session. The One Man and His Dog Contest Group, G8NWM/P, claims second place by winning their section in four of the sessions.

Ian Pawson, G0FCT

144MHz Backpackers Championship, 2000

Pos	Group	Callsign	Total	bp1	bp2	bp3	bp4	bp5
1*	Tim Boon	M0AFC/P	3000	1000	1000	1000	1000	1000
2*	One Man & His Dog CG	G8NWM/P	3000	1000	842	1000	1000	1000
3		GW5NF/P	2896	0	890	1000	1000	896
4	Malvern Hills ARC "B"	GW4IDE/P	2851	1000	416	851	662	1000
5		GW0PZO/P	2470	362	793	561	1000	683
6		GW8ZRE/P	2361	372	803	502	682	876
7	Oldham RC	G1ORC/P	2143	755	1000	240	0	388
8		G0HDV/P	2043	465	339	446	819	759
9		G1WKS/P	2008	293	83	1000	191	712
10	Barpackers CG	M1BAR/P	1967	679	584	86	652	636
11		G4ERP/P	1746	306	1000	0	350	0
12		G8IAY/P	1732	889	244	0	599	0
13	Wythall CG	G1WAC/P	1615	485	116	0	670	460
14		G0BVW/P	1520	765	147	608	101	0
15		G4HLX/P	1427	0	240	790	397	0
16		GM4IGS/P	1327	1000	111	216	0	0
17		G0GRI/P	1211	146	425	0	197	389
18		G0PQF/P	1165	133	0	430	122	522
19		G4RQI/P	1119	196	923	0	0	0
20	Stockport RS	G8SRS/P	1114	588	101	168	352	174
21		G8ORG/P	1014	0	560	18	163	291
22		GW7LQD/P	1000	0	0	0	0	1000
23		G0KYS/P	1000	0	1000	0	0	0
24		G(W)1ATZ/P	905	0	55	0	500	350
25	Red Dragon CG	GW8GT/P	898	898	0	0	0	0
26		M1ACB/P	897	0	0	261	0	636
27		M0BAO/P	715	109	200	231	221	264
28	Secret Weapon CG	GW7JYK/P	678	0	678	0	0	0
29		G0NFO/P	667	216	48	192	196	254
30		G4EDR/P	658	65	340	0	0	252
31	Wigan Douglas Valley RC	G3BPK/P	611	494	117	0	0	0
32		G0WRT/P	491	477	14	0	0	0
33		G7VHW/P	447	0	37	0	0	410
34		GW0TPH/P	320	0	320	0	0	0
35		G0WJR/P	273	0	52	0	38	183
36		G0VOK/P	254	0	12	0	0	242
37		GW4KVJ/P	247	0	247	0	0	0
38	Cockenzie & Port Seton ARC	MM0CCC/P	126	0	126	0	0	0
39	Coulsdon ATS	M1EUR/P	97	97	0	0	0	0
40		G1OUM/P	58	13	29	16	0	0
41		G3NKS/P	50	0	50	0	0	0
42		G4WVD/P	47	0	0	0	0	47
43		M0BHE/P	46	46	0	0	0	0
44		G0QJW/P	45	0	0	0	0	45
45		G1GYM/P	44	0	0	0	44	0

*Certificate winner

21 / 28MHz CW Contest, 2000

THE CW contest saw much better propagation and activity than the SSB contest, and indeed than the previous year. Entries were up almost 50%: 148 logs were received in total, and many more hundreds of stations appeared in the entrants' logs despite the unfortunate clash with the RSGB HF Convention. Some overseas entrants did manage to get the unique convention special event call MB2HFC in their logs.

Many QRP contacts were made between the UK and JA, VK, ZL, W6 etc and this was echoed in the comments received: "28 was a dream", "thoroughly enjoyable day" etc.

Clive Penna, GM3POI, was this year's UK Open section winner by a clear margin. Clive's station comprised a total of 19 elements from four antennas and two towers! Clive Whelan, GW3NJW, was successful in winning the Restricted section, and Darren Collins, G0TSM, repeated his success in the QRP section.

The Overseas section was very well supported this year, and congratulations are due to Jeff, 9H1EL; Zakhar, 4Z5AX; Rumen, LZ2RS, and Alik, UA9-084-172, for their section wins.

Over both the CW and SSB contests there were a few gaffs spotted from UK entrants – blank summary sheets, no serial numbers, wrong times, last year's log sent in by accident, 5B5/G0DEZ (!) logged etc. Please remember to check your entries for obvious errors when you send them in.

Lee Volante, G0MTN

21 / 28MHz CW Contest, 2000
UK section

	Callsign	Overall Score	Section	21Q	21M	28Q	28M	Multi-Op
1*	GM3POI	272097	O	344	78	279	69	
2*	G3VHB	247833	O	398	77	217	61	
3*	G4WGI	225216	O	308	73	247	67	M
4	G3MXJ	218592	O	334	72	222	60	
5	G4RCG	203181	O	338	72	190	59	
6	GM3JKS	144144	O	272	64	162	48	
7	G0MTN/P	121862	O	239	67	124	46	
8	M0BIL	118260	O	239	60	137	48	
9	G2QT	116739	O	243	66	123	43	
10*	GW3NJW	115362	R	267	63	126	39	
11*	G4IIY	104442	R	241	64	98	30	
12*	GM3CPS	100686	R	253	64	97	33	
13	GM4SID	91908	O	214	64	90	38	
14	G3KNU	83700	O	183	54	127	39	
15*	G0TSM	69390	Q	155	53	105	37	
16	G3YEC	61005	O	168	51	85	32	
17	G4OGB	59511	R	188	56	59	27	
18	G4AZN	53823	O	153	45	80	32	
19	G3GLL	50547	O	147	56	56	27	
20	MM0CPS/P	50175	R	161	49	70	26	
21	G3RSD	47250	R	190	55	36	15	
22	G3KZR	37830	O	139	49	36	16	
23	G3VYL	36720	R	146	47	37	21	
24	G3MPB	32178	R	139	45	36	19	
25	G4BIM	31950	O	94	42	36	20	
26	G2HLU	30621	Q	127	40	46	19	
27	GW3HGJ	30408	R	131	36	52	20	
28	G2AFV	28260	R	133	50	24	10	
29	G3UIZ	25620	R	98	38	43	23	
30	G0VQR	21204	R	75	36	50	21	
31	G3ZDD	21060	O	111	40	25	13	
32	G3GMS	13029	R	62	27	41	16	
33	G6QQ	11856	R	79	27	26	11	
34	MU0FAL	11124	R	101	33	3	3	
35	G3GMM	8715	R	65	25	18	11	
36	G3VQO	8610	R	60	23	23	12	
37	G4XPE	7326	R	62	26	12	7	
38	G4FDC	6240	Q	34	18	31	14	
39	G0GJP	5508	R	47	27	7	7	
40	G0MRH	4836	R	46	34	8	7	
41	G3UFY	4536	O	11	11	43	17	
42	G4ZME	3354	R	29	15	14	11	
43	G3WRR	2394	R	24	14	14	7	
44	G3ZRJ	2079	R	29	16	7	5	
45	GW3SB	1350	R	26	12	4	3	
46	GW3KJN	420	R	0	0	14	10	
47	G3ZGC	192	R	4	4	4	4	

Notes
OH1-688 SWL entry was reclassified as a check log.
O = Open, R = Restricted, Q = QRP, S = SWL, M = Multi-operator entry
*certificate winners

21 / 28MHz CW Contest, 2000
Overseas section

	Callsign	Overall Score	Section	21Q	21M	28Q	28M	Multi-Op
1*	9H1EL	65360	O	94	62	89	58	
2*	UZ7U	50220	O	81	56	76	52	
3*	UT4FI	46935	O	90	58	62	47	
4*	LZ2RS	37830	Q	71	52	59	45	
5	9H2BO	36195	O	46	40	83	55	
6	HA8TP	33642	O	92	59	54	30	
7	RV6YY	33306	O	71	55	53	38	
8	UT1FA	31590	O	52	43	70	50	
9*	4Z5AX	29754	R	64	48	51	39	
10	UA4LU	28476	O	70	49	46	37	
11*	UA1ZZ	25122	R	54	41	52	39	
12*	YU1AAX	23038	R	80	55	32	26	
13	K3ZO	24720	O	58	44	46	36	
14	LZ1CW	24570	O	53	42	55	39	
15	YO4PX	23634	R	54	43	47	35	
16*	UA3DNR	21600	Q	50	38	47	37	
17*	UA0ZDA/6	18144	Q	52	37	33	25	
18	ES6PZ	17802	O	65	51	21	18	
19	SB4/G0DEZ	16683	R	49	39	35	28	
20	RX9FB	15438	O	55	40	28	22	
21	LZ2MP	14625	Q	45	38	30	27	
22	YO4AAC	14322	Q	41	33	36	29	
23	UT3QT	13629	O	52	39	29	22	
24	UA9OA	12960	R	36	29	36	31	
25	RX9WN	12876	R	51	38	23	20	
26	LZ3YY	12702	O	40	32	34	29	
27	UA0KCL/3	10800	Q	40	34	26	21	
28	VE3MQW	10812	O	42	32	26	21	
29	RA9OM	10335	O	46	37	20	17	
30	N4AF	9792	O	40	31	25	20	
31	LZ1IQ	9180	R	27	24	33	27	
32	VE1KB	8526	O	41	32	21	17	
33	EA8CN	8418	R	41	30	22	17	
34	LY2FE	7965	Q	52	42	7	7	
35	LY3BA	7656	O	55	41	3	3	
36	OK2KRT	7392	R	55	43	1	1	
37	EX2A	7353	O	44	32	13	13	
38	Z32AF	7128	Q	23	19	32	26	
39	OK2ZT	6732	O	40	35	11	9	
40	RU3RQ	6708	R	32	27	20	16	
41	RX3AEX	6000	O	25	20	27	21	
42	SP5CGN	5880	R	30	40	0	0	
43	UR5FCM	5830	R	30	23	22	17	
44	OK2XA	5760	R	30	40	0	0	
45	OM3KFV	5586	Q	30	39	0	0	
46	N7DR	5382	O	34	27	13	12	
47	OM7VF	5358	R	38	29	12	12	
48	OH1UP	5130	R	45	38	0	0	
49	LZ2FM	5031	R	26	23	18	16	
50	YU7SF	4968	R	28	24	18	12	
51	9A3CY	4664	R	27	23	16	13	
52	OH1BOI	4410	R	30	32	3	3	
53	VK8HA	4305	O	20	18	21	17	
54	OK2AJ	3627	R	41	33	0	0	
55	JI4IPQ	3456	O	24	20	13	12	
56	VK8AV	3045	O	25	21	10	8	
57	JK1PLZ	3024	O	36	29	0	0	
58	JM4WUZ	871	O	16	13	17	16	
59	OM7AG	2673	R	33	27	0	0	
60	RN3FT	2652	Q	18	12	18	14	
61	EU6DX	2496	R	32	26	0	0	
62	9A3SM	2430	O	26	23	4	4	
63	UA9XC	2175	R	21	18	8	7	
64	JH1AZO	130	O	36	27	0	0	
65	JA3YPL	1863	O	23	20	6	5	
66	JA3WKE	710	O	27	23	0	0	
67	YL2PP	1512	R	25	21	0	0	
68	RX3AP	440	R	24	20	0	0	
69	UX8IXX	1386	O	13	12	11	10	M
70	DL3ZAL	1386	R	22	21	0	0	
71	DL5FCO	1260	R	10	9	11	11	
72	OZ1AA	1254	O	19	17	4	3	
73	VA3TTT	1254	O	23	19	0	0	
74	OM3TU	1254	R	22	19	0	0	
75	EI5IY	1254	R	21	18	1	1	
76	OH3HTR	1083	R	19	18	1	1	
77	JR9NVB	855	R	19	15	0	0	
78	EA2CR	675	Q	15	15	0	0	
79	SP9ADV	624	R	17	13	0	0	
80	JA6BGA	468	O	4	4	9	8	
81	JH3JYS	468	O	14	12	0	0	
82	SM7BIW	432	O	9	8	4	4	
83	JH5OXF	432	O	11	11	2	2	
84	LY2FN	428	O	40	35	1	1	
85	K4BAI	396	O	8	8	4	3	
86	DF2HL	270	R	10	10	2	2	
87	SP3AZO	168	Q	0	0	8	7	
88	JA2KKA	162	O	9	6	0	0	
89	JF2FIU	108	O	7	7	0	0	
90	JE2SOY	48	R	0	0	4	4	
91	JK2VOC	3	R	1	1	0	0	

SWL section

1*	UA9-084-172	13140	S	30	38	24	22	
2	UA3-170-847	10608	S	42	32	26	20	
3	OKL329	1140	S	20	19	0	0	

*certificate winners

2nd 1.8MHz Contest, 2000

THERE WAS A good response to this year's contest with many excellent foreign entries which were generally well presented. The overall winner was once again Clive Penna, GM3POI, with an excellent score and some good DX contacts. Second place is G4CXT, up from sixth place last year. Third place is G4BJM, up from 31st place last year and in fourth place is GM3JKS, up from 17th last year.

In the Overseas section, first place goes to LY3BA, while second and third places go to RV1CC and SP2DX respectively.

Derek Stanners, G3HEJ

The 2000 2nd 1.8MHz Contest results tables can be found over the page.

21 / 28MHz SSB Contest, 2000

AFTER LAST year's disappointment with poor conditions, everyone was hoping for some better luck. Once again the propagation gods did not favour 21 / 28 SSB – almost universally entrants complained about the poor conditions, especially on 28MHz.

Many-times winner Brian Otter, 9J2BO, was again the Overseas Open section champion with another commanding victory from Lusaka using a TH6 antenna. Brian was missing only a handful of postcode multipliers on 28MHz. The well-travelled Dez, now 5B4/G0DEZ in Cypus, won the Overseas Restricted section with a pair of dipoles just 12 feet high.

Back in the UK, Andy, G4PIQ, repeated last year's win from Martlesham, his extra multipliers on 28 MHz leaving Chris, G3VHB, to settle for second place. The Wisbech group, M5ARC/P, with a five-strong team, were runaway leaders in the UK Restricted Section with just a dipole. Following them was Kevin, G4AES/M, using just a helical G-Whip. Bob Treacher, BRS32525, again wins the Powditch Receiving Trophy.

The closest battle was for the Powditch Transmitting Trophy on 28 MHz, where Steve, G0AEV, beat Darren, G0TSM, by a very narrow margin. After scoring their logs, a couple of QSOs, a single multiplier, and a log error were all that separated them. My commiserations to Darren!

Congratulations to all of the winners.

Lee Volante, G0MTN

21 / 28MHz SSB Contest, 2000

UK section

	Callsign	Overall Score	Section	21Q	21M	28Q	28M	Multi-Op
1*	G4PIQ/P	292962	O	528	88	110	69	
2*	G3VHB	270864	O	632	91	68	41	
3*	GM4YXI	223045	O	480	85	91	48	
4*	G4NOK	213360	O	518	96	53	32	M
5	G4IRC/P	153387	O	366	74	77	43	M
6	G3WGI/P	131040	O	376	73	36	32	M
7	GW4CT	129381	O	377	79	31	30	M
8	G4RCG	99750	O	308	69	54	28	
9	G3VAO	96915	O	333	74	32	19	
10	G0VSN	63990	O	181	58	57	32	
11*	M5ARC/P	62118	R	199	62	42	25	M
12	M0BIL	57780	O	172	62	43	28	
13	GW4BLE	39934	O	184	49	24	14	
14	G0MTN/P	32538	O	159	44	29	14	
15*	G0AEV	28275	O	0	0	146	65	
16	G0TSM	27840	O	0	0	148	64	
17*	G4AES/M	27081	R	122	41	31	18	
18*	G0AJH	26082	R	137	41	26	13	
19	G0VQR	24534	R	107	38	39	20	
20	MW5EPA	16950	R	89	36	25	14	
21	G0GFQ	12285	O	81	28	24	11	
22	G0FHT	10647	R	77	32	14	7	
23	MU0EAL	9870	R	81	30	14	5	
24	MM0CPS/P	9516	O	56	47	6	6	M
25	G0WIH	9126	R	62	30	16	9	M
26	G4IIY	8856	R	68	27	14	9	
27	M0CNP	5580	R	50	24	12	6	
28	M0BAO/P	5202	O	51	21	13	7	
29	G4KNQ	4950	R	58	18	9	7	
30	G0ATG	3864	R	40	14	16	6	
31	GM4OBK	2340	R	27	12	14	8	
32	G0MRH	2268	R	37	16	5	2	
33	G3IIZ	2160	R	30	12	12	6	
34	G4XPE	2142	R	38	15	4	2	
35	M5AEO	1536	R	22	7	11	8	
36	MM0BQI	891	R	26	10	1	1	
37	G6QQ	825	R	23	9	2	2	
38	G3ZGC	504	R	6	5	8	8	
39	G3VYT	486	R	14	5	4	4	
40	G3UFY	75	O	0	0	6	5	

Notes: OH1-688 was reclassified as a check log.
O = Open, R = Restricted, Q = QRP, S = SWL, M = Multi-operator entry
*certificate winner

21 / 28 MHz SSB Contest, 2000

Overseas section

	Callsign	Overall Score	Section	21Q	21M	28Q	28M	Multi-Op
1*	9J2BO	216780	O	159	82	266	88	
2*	UX4MM	129105	O	196	94	89	58	
3*	UW7I	91332	O	101	62	142	74	
4	UT5UGR	80400	O	273	105	0	0	
5	UT7U	70266	O	237	96	2	2	
6	LZ3YY	67116	O	132	78	69	44	
7	UA4RC	67032	O	55	37	145	77	
8*	5B4/G0DEZ	58464	R	75	55	101	57	
9	RA6AZ	55449	O	45	31	144	70	
10*	SZ4IC	53010	R	21	19	165	79	
11	UA9CBQ	50730	O	155	79	23	19	
12	LZ2PL	47748	O	164	85	12	9	
13	UT7QL	41919	O	33	25	127	66	
14	N4UH	39312	O	169	77	1	1	
15	HA1ZH	25488	O	108	61	14	12	
16*	YO5OEF	19392	R	103	67	0	0	
17	HA8ITP	16740	O	79	53	11	9	
18	OM5RW	15576	O	86	56	3	3	
19	VE3XAP	13338	O	78	36	2	1	
20	K3ZO	11130	O	64	48	6	5	
21	UX8IX	9702	O	52	38	20	17	
22	RN3RQ	9588	R	69	47	0	0	
23*	LZ2RS	9336	Q	66	44	16	13	
24	YO4PX	8001	R	46	35	15	13	
25	ES6PZ	7392	O	41	33	15	11	
26	OM4KK	6966	O	36	28	18	15	
27*	Z32AF	6240	Q	52	40	1	1	
28	OK2KRT	5181	R	49	35	4	3	M
29	UA6NZ	4998	O	24	20	27	15	
30	LW7EGO	4935	O	0	0	48	36	
31	US8IDV	4416	O	0	0	50	36	
32	RX9WN	4410	R	25	21	19	15	
33	EX2T	4256	O	50	36	20	20	
34	YL2NK	4080	O	32	27	8	7	
35	RN1AO	3876	R	40	34	0	0	
36*	LZ2MP	3741	Q	44	29	0	0	
37	HA9MDP	3069	R	29	24	9	7	
38	YL2MF	2871	R	26	22	7	7	
39	VE3MQW	2754	O	34	27	0	0	
39	EU6DX	2754	R	33	26	2	2	
41	OK1GW	2376	Q	32	23	1	1	
42	N4MM	2088	O	30	24	0	0	
43	RA3DGH	2046	Q	31	22	0	0	
44	OZ4O	1782	O	22	17	6	5	
45	RA9OM	1764	O	26	22	4	4	
46	OH6CS	1716	Q	26	22	0	0	
47	W6/G3MBV	1575	O	25	21	0	0	
48	YL2PP	1500	R	25	20	0	0	
49	OH1BOI	1311	R	21	17	2	2	
50	SM7BJW	1197	O	16	14	6	6	
51	UR5CQS	969	R	19	17	0	0	
52	LU4DJC	864	O	0	0	20	16	
53	SV2AEL	840	R	20	14	0	0	
54	LZ1DM	720	R	17	15	0	0	
55	9A3CY	714	R	16	13	1	1	
56	JG2KKG	588	O	17	14	0	0	
57	OH1UP	507	R	13	6	0	0	
58	JK1PLZ	297	O	11	9	0	0	
59	HA5ORK	243	Q	8	8	1	1	
60	JA6AVT	216	O	10	8	0	0	
61	UA0KCL/3	210	R	10	7	0	0	
62	9A2GA	147	R	7	7	0	0	
63	PT2ND	126	R	0	0	7	6	
64	JG2REU	105	O	7	5	0	0	
65	OK1DVK	75	R	5	5	0	0	
66	KB9IIF	45	O	5	5	0	0	
67	PY2DBU	27	O	0	0	4	4	
68	W7/IR1NKN	3	Q	1	1	0	0	
69	JI8GZS/QRP	3	Q	1	1	0	0	

SWL section

	Callsign	Overall Score	Section	21Q	21M	28Q	28M	Multi-Op
1*	UA3-170-847	33210	O	116	67	20	18	
2*	BRS32525	21735	U	94	45	21	18	

2nd 1.8MHz Contest, 2000 (Continued from page 79)

UK section

1	GM3POI 958
2	G4CXT 933
3	G4BIM 932
4	GM3IKS 908
5	G3MXJ 780
6	G3GLL 773
7	G3WYJ 745
8	G0IQN 694
9	G4CZB 665
10	G3YEC 651
11	G4RCG 638
12	GM4SID 634
13	G3YAJ 622
14	G3KNU 602
15	G3HZL 545
15	GW3NTW 545
17	G7HLU 542
18	G4OBK 501
19	G3KKP 499
20	G0IVZ 471
21	G3ZGC 458
22	G3LIK 455
23	G3HJF 416
24	G3IIZ 376
25	G3GMS 370
26	G3IZD 354
27	G3AWR 347
28	G3GMM 320
29	G4TSH 289
30	G3RSD 283
31	G4IIY 240
32	G0MTN 184
33	M0BYJ 166
34	G0IGP 155
35	G0VQR 89

Overseas section

1	LY3BA 350
2	RV1CC 236
3	SP7DX 228
4	OK1DCS 204
5	RN1AO 198
6	EI7GY 195
7	EA1WX 172
8	EA6ACC 163
9	OH5PT 155
10	OZ4O 144
11	OM7AG 106
12	HP9KRT 83
12	LA8LA 83
14	OM1AW 80
15	ZB2CN 74
16	SP9GFI 56
17	RX3AEX 53
18	F6IEU # 0

(# No UK stations worked)

CONTEST CALENDAR

HF Contests

Date	Time	Mode	Contest
2-3 June	*0000-1600*	*CW*	*South American WW CW*
2-3 June	*1500-1500*	*CW*	*IARU Region 1 Field Day*
9-10 June	*0000-2400*	*RTTY*	*ANARTS WW RTTY*
9 June	*0000-2400*	*SSB*	*Portugal Day*
9-10 June	*1200-1200*	*SSB*	*TOEC WW Grid*
16-17 June	*0000-2400*	*CW*	*All Asia DX CW*
23-24 June	*1400-1400*	*CW*	*Marconi Memorial*
23-24 June	*1800-2100*	*ALL*	*ARRL Field Day*

VHF Contests

Date	Time	Mode	Contest
2-3 June	**1400-1400**	**ALL**	**RSGB 50MHz Trophy**
5 June	**1900-2200**	**ALL**	**RSGB 144MHz Activity**
10 June	**1800-2200**	**FM**	**RSGB 432MHz Fixed**

(Please note that the 50 and 144MHz Backpackers events have not been shown owing to the suspension of the portable sections of VHF Contests.)

Microwave Contests

Date	Time	Mode	Contest
10 June	**0900-2100**	**ALL**	**RSGB 24GHz and Up**
24 June	**0900-2100**	**ALL**	**RSGB All Microwave Bands**

The full rules of RSGB HF and VHF/UHF contests were published in the RSGB Contesting Guide in October 2000 *RadCom*. Brief rules for non-RSGB contests, which are listed in italics above, can often be found in the 'HF' and 'VHF/UHF' columns. The HF and VHF Contest Committees both have web sites from which comprehensive details are available. These are www.g4tsh.demon.co.uk/HFCC/index.htm and www.blacksheep.org/vhfcc

no reply (CWNR) and he actually made 31 QSOs in a very successful weekend.

In a note dated 7 April on his website - see the list - he remarks, "Not much activity this month. I guess some stations were active on other bands in the first leg of the *DUBUS* EME Contest." On 23cm on 30 March he completed with OZ6OL (559/559) and next day with JA6CZD (559/559), HA5SHF (539/569), HB9BBD (599/579), IK2MMB (559/559), F1PYR (559/559), DJ5QX (549/559), K9BCT (549/559) and W7QX (539/449). On 1 April, he completed with SM6CKU (529/559) and W2UHI (569/569).

Stuart Jones, GW3XYW (IO71), is QRV on 13cm. On 31 March he worked OE9XXI (559/559), OK1CA (339/339), DL6LAU (O/O), OZ4MM (549/549) and SM3AKW (549/549). Next day brought G3LQR (339/339) and SM3AKW (549/549). Transmitter output power was 40 - 60W. As the beam width is quite narrow at 2.3GHz, he uses lunar thermal noise as a signal and the G4PMK Receiver and Alignment Test Set (RATS) - see *RadCom* July 1995 - as an indicator on SS mode off the system 144MHz IF.

The best weekend for June skeds will be 23 / 24 when there will be about 32.2 hours of Moon time for London latitude stations. The declination varies from +22.75º to +18.05º and the signal degradation range, referred to perigee, is -0.11dB to 0dB. The 144 / 432MHz sky temperature range is 309/22K to 210/15K and the Sun offset at Saturday midnight is +34º.

METEOR SCATTER

THERE ARE A couple of useful meteor showers in June. The first is the Arietids, active for about five days, with a zenithal hourly rate (ZHR) of about 55. The OH5IY software suggests a peak around 0930 on the 7th. The radiant is above a mid-UK horizon 0100 - 1730. The second is the Zeta Perseids, ZHR around 40, expected peak around 0930 on the 9th. The radiant is above the horizon 0200 - 1930.

Misca Sic, YU7MS, advises that the results of the 2000 BCC Meteor Scatter contest have been placed on the YZ7UN home page - see the list.

THE REST

WERE IT NOT for the auroral activity, there would be little to report this month. However, 6m did open to Africa now and then. On 19 March, G4UPS heard weak signals from ZS6AVP and ZS6VR* at 1722. At 1329 on 2 April Ted heard G0KZG/MM working GWs as the ZS6TWB beacon was peaking to S8. At 1344 he worked ZS6AXT (KG33) and at 1403 ZS6AVP (KG33). At 1304 next day ZS6AXT was heard at S5 working OK stations. On the 13th, several ZS6s were working Europeans and at 1353 V5/ZS4NS had a huge pile-up of mainly DL stations. C91CF was QRV from Mozambique but his signal was inaudible under a ZR1 station.

GW7SMV also enjoyed the 2 April opening, 1302 - 1420, working ZS4NS (KG32), ZS6AXT, ZS6AVP and ZS6DX (KG44) with best DX G0KZG/MM (JG28) for a new grid. On the 9th Jamie worked V5/ZS4NS (JG77) for another new grid and DXCC country bringing his total to 118. He has now applied for his DXCC and WAC on 6m. Well done, Jamie.

DEADLINES

THE COPY DATE for August is **19 June** and for September it is **17 July** by which time there ought to be some Es to report. I'd like to have some pictures of people and/or shacks, so send them along. My telephone answering and fax machine is on 020 8763 9457 and my CompuServe ID is g3fpk ♦

FURTHER READING

The VHF / UHF DX Book, edited by Ian White, G3SEK.

WWW.

VHF Contest information	http://www.blacksheep.org/vhfcc
Marconi Memorial 2000	http://members.aol.com/g0nfa/144news.html
G4CCH Home Page	http://www.g4cch.co.uk
BCC MS Contest results	http://www.geocities.com/yz7un/ms.htm

HF HF HF HF

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

EDDY, ON6HE; Dirk, ON5CT; and Frank, ON4AAC, will be active (on CW and SSB, hopefully with a special callsign) from Thassos Island, Greece (IOTA EU-174), between 27 May and 3 June. QSL via ON4AAC.

Laurent, F8BBL, will be on the island of Crete (EU-015), as SV9/F8BBL, from 25 June to 2 July. Activity will be on 160 to 6m, CW and SSB using an IC-706MkII and long wire. QSL via his home call.

Carl, GW0VSW, will be active as SV5/GW0VSW from the island of Rhodes (EU-001) from 16 to 30 June. Activity will be mainly CW on all bands from 40 to 10m. Operation should be around 0500 and 1600, family permitting. The rig will be an IC-706 with dipole antennas. Look for Carl on the IOTA and QRP frequencies and QSL via home call.

The special callsign TM6JUN will be on the air from 'Utah Beach' from 1 to 10 June. Suggested frequencies are: CW - 3526, 7026, 14026, 21026, 28026; SSB - 3644, 7074, 14174, 21174, 28574. QSL via F8LDX (preferably via the bureau).

A large multi-national team will sign JW0PK from Prins Karls Forland Is (EU-063) from 1 to 9 June, all bands and modes (though as there will be 24-hour daylight, they do not expect much propagation on the low bands).

Martin Pierre, HB9AMO, is active as 9Q5BQ from the Democratic Republic of Congo (formerly Zaire), probably until around the end of June. He is active on 40 through 10, CW only. 3C5J is operating from an oil platform. This operation will not, therefore, count for DXCC. However, he may try to do some operating from the mainland while he is there.

A Japanese team consisting of JJ6VOV and JR6XIW will be in Mozambique this month and hope to be active between 9 and 20 June. They will then be in Malawi, active from 29 June to 9 July. Activity is expected on 6 through 80m on CW, SSB, RTTY and PSK31. They will use an IC-706MkIIG and an FT-100.

Andy, DJ7IK, reports on several new stations from Tunisia: 3V8ST in Tunis with TS-440 and 3-element beam; 3V8CB in Borj Cedria with IC-706 and 3-element beam; 3V8SQ in Monastir with FT-757 and G5RV antenna; 3V8SF in Sfax with FT-747 and G5RV; 3V8SM in Djerba with FT-277 and GP antenna. Some of these have already been active. Many of these stations were sponsored by the TS7N DXpedition. The stations in Djerba and Monastir are open for guest operations.

Frank, G3IFB, writes that he is receiving direct requests for ZD7WT QSLs. Frank has never been QSL manager for that station and recommends sending cards direct to Tom Moyce, ZD8TM.

Italian operators Nicola, I0SNY; Gianni, I8KGZ, and possibly others will be in Mongolia from 29 May. They will use JT1Y from Ulaan Baatar and will also be QRV from the 7th call area.

Phil Whitchurch, G3SWH, and his wife Jan will be in the Maldives between 4 and 11 June. He has been allocated the callsign 8Q7WH. This will be the usual holiday type of operation and Phil will have an IC-706 and R-7000. He will be active on all bands from 10 to 40m, CW only, as time allows. QSL to his home call, either direct or via the RSGB bureau.

Bob, G3REP, writes to tell me I assigned the wrong name to S21YV in my April column! The operator is John and his QSL information is via his home call KX7YT. See the photos below.

Scarborough Reef (Huang Yan Dao), BS7H, ranks second on the ARRL DXCC most wanted list and the possibilities of a future operation may be in jeopardy. *Gulf News* reports as follows, "The Philippines have sent a gunboat to a disputed South China Sea shoal to ward off any attempt by China to erect structures on the rock. This move comes as Manila said it will follow China's example by imposing a moratorium on fishing in the Spratly Islands and Scarborough Shoal to assert the country's territorial claim over the disputed islands off South China Sea."

Fred, K2FRD, will sign VO2/K2FRD from rare Zone 2 (ITU Zone 9) from about 6 June until 31 August. He expects to be active on all bands.

Andre, GM3VLB, will be leaving Aberdeen on 1 June for a round-the-world trip. This is a holiday, but he will take a TS-50S and hopes to be active in his spare time. First stop will be from Beachcomber Island, Fiji (OC-121) as 3D2LB/P from 6 to 8 June. Next he will active from Fiji's main islands (OC-016) between 8 and 10 June. Last stop will be Hawaii (OC-019) as KH6/GM3VLB from 10 to 12 June.

Dan, VK8AN, has decided to take his equipment back to Troughton Island (OC-154) for his next few tours. He was due to be there until 22 May, and again from 5 to 19 June. Besides his 3-element tribander and IC-738, he will have an FL-2100 linear amplifier.

Victor, ZK1CG, is back on the air after 10 years thanks to equipment donated by Roger, W7VV. He operates on 10 - 160m from Rarotonga (OC-013) in the South Cooks. Victor is currently clearing his backlog; if you worked him from South or North Cooks and did not receive a QSL card, please send your request again to the address in QTH Corner.

Husband and wife team Jim, KC7OKZ, and Carol Todd will be active from various islands in the Micronesian and Marshall Islands over the next year. They were due to set sail from Hawaii in mid-May on their 36ft cutter, *Morning Wings*, and expect to arrive in the Marshall Islands around the second week of June. They plan to spend at least one week from each of the following islands: Marshall Islands Ratak Chain OC-029, Ralik Chain OC-028, Enewetak Atoll OC-087, Ujelang Atoll OC-NEW, Micronesia Mwokil and Pingelap OC-226, Kosrae OC-059, Pohnpei OC-010, Oroluk Atoll OC-NEW, Nukuoro Atoll


Photo: Bob, G3REP

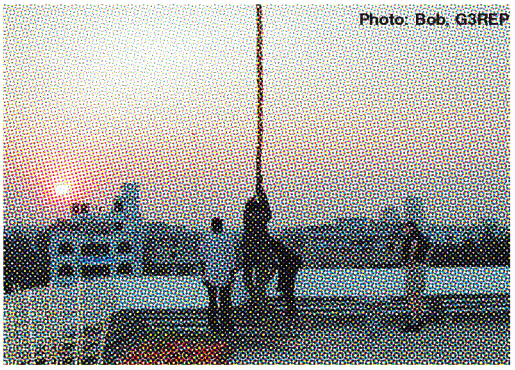
Photo: Bob, G3REP

John Crore, S21YV, at his Dhaka, Bangladesh, station (left) and S21YV rooftop antennas (above).

OC-NEW, Kapingamarangi OC-167, Mortlock Islands OC-NEW, Chuuk Islands OC-011, Hall Islands OC-NEW. They expect to pick up their calls in the Marshall Islands and have obtained V63JT and V63JB from Micronesia. For equipment they will have an Icom IC-735, Honda 1000 watt generator and long wires. The plan is to operate on 6 through 80m SSB, CW and PSK31. They hope to have a web site up in the near future.

Dennis, K7BV, will be active from Fernando de Noronha, PY0F, 24 May to 1 June. This is mainly for the *CQ* WPX CW Contest, but he'll be active on all bands (mainly CW) both before and after the contest. QSL via KU9C (see May QTH Corner).

ST0P

JEFF, G4KIB, HAS sent a report of his operation last June and July as ST0P from the Sudan. It is too long to reproduce in full here, so this is a (very shortened) summary. Jeff reports that it took him some two years, over several business trips to the Sudan, before his licence was issued, the turning point coming after Sudanese officials had been at an ITU conference where they met representatives from the ARRL. Once the Sudanese authorities agreed in principle to issuing a licence, it became a matter of choosing a suitable call. Jeff was unaware that the ST0 prefix had previously been used for Southern Sudan, which led to a certain amount of confusion when he finally appeared on the bands. However, armed with his new call he erected a G5RV and quad loop and started activity, with SSB, PSK31 and some CW. Jeff made 1225 QSOs, which have all been confirmed either direct or via the bureau. Since his visit, other ST calls have been issued (see Sudan Amateur Radio Association web page). This is welcome news as Dr Sid, ST2SA, has been the only resident amateur over a period of many years. Jeff invites anyone wishing to contribute to the development of amateur radio in the Sudan, by way of donating equipment, to contact Dr Sid.

WPX CW Contest, 2000

QRP			
M0O (opG4JZO)	A	169,672	
GM4HQF	A	138,516	
G4FDC	A	41,942	
G3LHJ	14	140,448	
GW0VSW	14	82,894	
Single-Op			
M5X (op G4TSH)	A	5,221,820	
G5LP	A	1,840,360	
G3ZPJ	A	822,206	
G3TXF	A	725,424	
G3TMA	A	223,146	
G3UFY	A	171,351	
G4BJM	A	97,465	
G5G (op G0LII)	14	1,879,471	
*G3KKQ	A	602,531	
*G3JJZ	A	536,137	
*GI4SNC	A	336,539	
*MU0FAL	A	294,752	
*G0OOU	A	259,974	
*G3VQO	A	127,866	
*G6QQ	A	126,492	
*G4ZME	A	46,041	
*G3ECS	A	39,116	
*G0MTN	28	343,387	
GI0KOW (op GI0NWG)	21	4,141,600	
*M7W (op G4IIY)	21	714,844	
*GW3NJW	21	609,771	
*GM3CFS	21	308,775	
*M4T (op G0VQR)	14	398,860	
Tribander/Single Element Ant			
G5LP	A	1,840,360	
G3ZRJ	A	822,206	
*GI4SNC	A	336,539	
G3UFY	A	171,351	
*M7W	21	714,844	
*GW3NJW	21	609,771	
G5G	14	1,879,471	

* denotes low power

CONTESTS

IN THE YU DX Contest 2000, there were just two UK entrants, both in the single-op CW category. Of 43 entries, G4OGB was 5th with 38136 points, and G0VQR 10th with 13797.

In the ES (Estonia) Open Contest 2000, G4OGB was 14th with 182 points and G0VQR 15th with 144 points. There were 21 entries. In the EUCW Fraternising Party, UK results were: Class A (35 entries) G3TVI 15th 2806, G4LHI 18th 2622, G3VQO 20th 1273, G4ZME 22nd 616, G4XPE 27th 378, G0MRH 32nd 168; Class B (15 entries) G0WHO 8th 1764, G4FAI 10th 260.

In the 2000 TOEC GRID Contest G0IVZ was 9th and G3UFY 14th in the single-op all-band category (22 entries) while G4OGB was 5th, GW3NJW 9th and G5LP 12th (27 entries) in the single-op low-power category.

In last year's Holyland Contest, GM3CFS was first in Europe in the mixed mode category with 415 points. Listener RS177448 took 20th place with 268.

Results of last year's *CQ* WPX CW Contest are shown in the table above left. Remarkably, there appear to have been no multi-operator entrants from the UK. My thanks to Les, G4OGB, for forwarding many of these results.

9 BAND TABLES No 38

MIXED MODE

CALL	1.8	3.5	7	10	14	18	21	24	28	TOTAL
G3KMA	249	300	327	315	333	328	332	317	329	2830
G4BWP	240	304	332	316	333	327	332	307	319	2810
G3XTT	230	275	316	279	332	306	328	288	306	2660
G3GIQ	148	245	302	260	333	314	330	289	322	2543
GW3JXN	176	250	287	277	325	309	305	279	288	2496
G4OBK	153	208	265	262	324	292	309	282	287	2382
G3TXF	127	227	287	267	323	277	321	244	297	2370
G3TBK	119	231	271	238	323	284	308	263	281	2318
G3SED	227	249	276	259	289	261	248	230	253	2292
G3YVH	124	152	253	274	318	308	300	266	271	2266
G3IFB	62	221	286	220	324	238	304	229	283	2167
G3WGV	106	183	250	267	295	272	283	249	254	2159
G3LAS	92	180	218	227	302	283	300	275	273	2150
GM3PPE	148	210	246	261	311	244	268	218	224	2130
G3KMQ	59	209	264	204	323	233	279	243	242	2056
G3IGW	129	197	314	233	282	240	250	124	233	2002
G3NOF	5	126	131	0	331	297	330	262	304	1786
G0JHC	1	29	148	218	241	277	293	260	301	1768
G4PTJ	32	155	186	104	311	209	313	177	277	1764
G3VKW	43	156	206	86	319	169	314	168	295	1756
G5LP	63	215	277	187	304	101	268	30	219	1664
G4XRX	7	67	168	143	292	225	296	192	255	1645
G4NXG/M	24	58	137	0	287	188	271	168	246	1379
G4UCJ	33	87	178	139	221	173	198	161	186	1376
M0AWX	43	109	109	0	238	154	200	148	157	1158
GM4OBK	40	96	131	68	161	114	150	119	181	1060
G0LRX	1	92	123	0	226	44	245	37	220	988
G4FVK	40	75	102	54	181	103	180	63	159	957
MM0BQI	39	53	96	41	145	65	126	49	107	721
M0CNP	4	43	58	5	106	27	101	15	75	434
AVERAGE	**92**	**167**	**218**	**173**	**281**	**222**	**269**	**198**	**248**	**1870**

CW ONLY

G3KMA	243	279	324	315	332	321	330	302	318	2764
G3XTT	220	244	303	279	303	276	298	254	275	2452
G4BWP	210	217	284	315	269	294	265	266	225	2345
GW3JXN	173	218	270	277	300	297	290	255	259	2339
G3TXF	127	220	285	267	318	275	315	243	282	2332
G0NXX	168	228	273	278	289	278	264	250	256	2284
G4OBK	140	185	254	262	292	280	272	266	262	2213
G3WGV	108	185	254	271	302	279	295	255	261	2210
G3YVH	123	148	249	274	309	293	282	249	254	2181
G3SXW	96	198	255	247	312	264	298	233	271	2174
G3SED	225	229	273	259	264	232	214	189	201	2086
G3NOH	48	124	204	254	301	284	289	243	248	1995
G3LAS	90	92	191	227	248	243	257	232	252	1832
G5LP	63	209	276	187	287	100	256	29	201	1608
G3VKW	35	81	150	85	217	128	231	121	173	1221
G4PTJ	31	80	130	104	179	155	193	149	198	1219
GM4OBK	32	78	114	68	133	96	129	99	130	879
AVERAGE	**125**	**177**	**241**	**233**	**274**	**241**	**263**	**214**	**239**	**2008**

Next deadline 8 April 2001, prepared by G3GIQ 9 April 2001.

TABLES

SEVERAL NEW ENTRANTS join the table this month. Competition at the top is fierce, with Colin, M0CTQ, and Rob, M0BIB,

QTH Corner

HC2/UA4WAE	bureau to UA4WA or direct Alex Otto Ogorodov Rafalsky, Correo Central, Salinas, Provincia Guayas, Ecuador.
JW0PK	Jacek Kubiak, SP5DRH, P.O.Box 4, 00-957 Warszawa, Poland.
ON4AAC	Frank Pletinck, Potaardestraat 72, B-9190 Stekene, Belgium.
TX0C	Kan Mizoguchi, JA1BK, 5-3 Sakuragaoka 4 Chome, Tama-City, Tokyo 206-0013, Japan.
ZK1CG	Victor Rivera, PO Box 618, Rarotonga, Cook Islands.
3D2AG	Antoine de Ramon N'Yeurt, PO Box 14633, Suva, Fiji Islands.
5A24PA	Alex van Hengel, PA1KW, Schoener 85, 2991JK Barendrecht, The Netherlands.
9Q5BQ	Pierre Petry, HB9AMO, 3 Hutins-des-Bois, 1225 Chene-Bourg, Switzerland.

COUNTRIES WORKED, 2001

CALL	CW	SSB	RTTY	MIX
M0BIB	-	-	-	231
M0CTQ	-	-	-	231
G4DUW	91	192	0	204
M0BZQ	-	-	-	204
G4OBK	158	79	55	201
G0VHI	0	190	0	190
G3IGW	173	0	0	173
G3SXW	161	0	0	161
M0LLW	0	149	0	149
G3YVH	114	54	1	142
G0CAS	-	-	-	142
MU0FAL	83	115	0	115
MM0BQI	21	68	78	110
G0TSM	75	54	7	107
G3TXF	105	0	0	105
GM4FAM	-	-	-	102
M0CAL	0	93	0	93
G3MDH	0	84	0	84
GW4SKA	0	0	66	66
M5AEF	14	61	0	63
G4FVK	7	60	0	60
GM4OBK	46	12	0	57
G4YWY/M	0	54	0	54
G4MUW	0	51	0	51
GI0NQC	0	6	41	47
G3WP	46	0	0	46
G4DDL	27	28	10	41
M0ASJ	-	-	-	21
M0CNP	0	4	0	4

both at 231 countries worked. Rob already has 215 countries on 28MHz, so the high bands obviously continue to deliver, at least for those with the time, the experience and the antennas!

MINPROP

FOR SOME TIME now W6EL's *MiniProp* propagation prediction program has been unavailable. W6EL has just released a new free version of his software, this time for Windows, which can be downloaded from his web page. It works with all recent versions of Windows, including 95, 98, ME, NT and 2000.

HALL OF FAME

CQ MAGAZINE HAS announced this year's inductees into the CQ DX and Contest Halls of Fame. Selection committee Chairman Bob Cox, K3EST, announced that Robert Allphin, K4UEE, and Robert Eshleman, W4DR, were named to the *CQ* DX Hall of Fame. Algis Kregzde, LY2NK, and Ron Sigismonti, N3RS, will be added to the roster of the *CQ* Contest Hall of Fame.

THANKS

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 **August** issue by **23 June.** ♦

Ratko Novakovic, YU1NR, and Mome Dimovski, Z32ZM, at 3D2CI on Conway Reef (February 2001).

WWW.

All Asia 2001 Contest rules:
http://www.jarl.or.jp/English/4_Library/A-4-3_Contests/AA_Rule.htm
All Asia 2000 Contest results:
http://www.jarl.or.jp/English/4_Library/A-4-3_Contests/2000/2000index.htm
3C5J: http://www.cleddau.com/3c5j/cw.html
CQ Magazine Hall of Fame: http://www.cq-amateur-radio.com
Sudan Amateur Radio Association: http://www.sudanham.bizland.com
VO2/K2FRD: http://sites.netscape.net/thefred3/labr1
Miniprop: http://www.qsl.net/w6elprop/

HF F-Layer **Propagation Predictions** for **June 2001**

	7.0MHz	10.1MHz	14.0MHz	18.1MHz	21.0MHz	24.9MHz	28.0MHz
Time	000011111220	000011111220	000011111220	000011111220	000011111220	000011111220	000011111220
(UTC)	246802468020	246802468020	246802468020	246802468020	246802468020	246802468020	246802468020
*** Europe							
Moscow	999876779984	999999999399	999999999999	999999999999	899999999998	.999988899984	.9988889986.
*** Asia							
Yakutsk	....	4552	887612478888	775688888787	563577776666	34.366664444	.2..5454323.
Tokyo	....	.....87..	.....89998.	7889987	.....788888.	.....788..	....
Singapore	.....589.	29997	289998	2....1689987	3678875	....2346774.	.....466..
Hyderabad	577	3.....6889	72....179999	665223689998	456656789986	235665577763	.2334335664.
Tel Aviv	85.....2777	763....26887	215322346784	1..111112322	...11112.111	.....1.	....
*** Oceania							
Wellington	....	....	....	....	....	....	....
Perth	5878	7869	.....56.9	7	6	....	....
Sydney	.....78..	.....2893.	.....6777.	.....4.7.	.....6.	....	....
Honolulu	....	....	....	....	....	....	....
W. Samoa	....	....	....	....	....	....	....
*** Africa							
Mauritius	9.....9999	9.....69999	98....99999	.8....899998	.88..789999.	.7888889998.	..87788999..
Johannesburg	99.....7999	88.....9999	69998	..8...58997.	..87667998..	..8777788...	..7767787...
Ibadan	99.....999	995.....6999	9999878999999	889999999999	679999999998	..9988889986	..898888986.
Nairobi	....	1.....11	41.....1233	23....13455	..11...24553	..22212452..	.....1.23...
Canary Isles	999....7999	6697...49999	999997899749	999999999199	999999999999	999999999999	999999999999
*** S. America							
Buenos Aires	998.....69	9991.....99	9995.....799	999242113999	888.55556999	656.36667888	2.3..6657887
Rio de Janeiro	999.....99	999.....999	9999.....999	999.9...9999	99..99999999	99..99999999	99999999
Lima	998.....29	9994.....89	99981.....99	888842...399	767834323688	3.46.4334677	...4.33.3564
Caracas	33.....3	776.....47	8887.....78	87887...5688	6.6876666787	.....66.	....
*** N. America							
Guatemala	999.....9	9999.....9	99999.....99	999999..9999	999999999999	.....9..9999	.....99.
New Orleans	87.....	998.....6	998662...279	765..7656788	43...4467787	3564	.....4.
Washington	87.....3	971.....38	99981...1299	887687778999	775466667998	64..544.6787	776
Quebec	73.....7	986.....58	756754347888	212333226764	22124642	.....24..	.....2..
Anchorage	....	.53.....	788776556777	87865.778885	767...66777.	.....66.	....
Vancouver	....	.4.....	6765.21.1235	344.....5655	222.....3422	....	....
San Francisco	.8.....	5972.....	788622...26	6774..233456	555....23445	3	....

Key: Each number in the table represents the expected *circuit reliability*, eg '1' represents reliability between 1 and 19% of days, '2' between 20 and 29% of days etc. No signal is expected when a '.' is shown. **Black** is shown when the signal strength is expected to be low to very low; **blue** when it is expected to be fair and **red** when the signal is expected to be strong.

The RSGB Propagation Studies Committee provides propagation predictions on the Internet at www.g4fkh.demon.co.uk. The page is updated monthly. The provisional mean sunspot number for April 2001 issued by the Sunspot Data Centre, Brussels, was 108.2. The maximum daily sunspot number was 186 on 1 April and the minimum was 28 on 17 April. The predicted smoothed sunspot numbers for June, July and August 2001 are respectively: (SIDC classical method – Waldmeier's standard) 94, 92, 91 (combined method) 120, 122, 124.

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SWL

IT WAS GOOD to meet a few SWLs at the Society's Spring Show at Bletchley this year. I made the trip by train with Simon, RS177448, and Clare, RS102891, mainly to attend the UK Six Metre Group AGM and to hear the OX2K DXpedition talk. Between these events there was plenty of time to trawl the many stands for a bargain and meet and greet people.

Seeing SWLs at the show has led me to believe that there might be SWL volunteers to man the SWL stand at this year's RSGB HF Convention on 13/14 October. Mick, BRS31976, and I are likely to be elsewhere during this year's event. October is not that far off, so give some thought to your availability over the HF Convention weekend and let me know by e-mail if you might be available to man the stand for a part of the weekend.

CRAY VALLEY SWL CONTEST

THE CRAY VALLEY Radio Society was delighted to be asked to take over the organisation and running of the LF bands contest that has run for over 20 years. The club was pleased to receive nine logs from six DXCC countries (EA, G, GM, GW, OE and PA0). The results are shown in **Table 1**.

Band conditions were not very good with a high noise level until the final hours of the contest. There were four categories. Congratulations to Arthur Miller, GW-5218, who took the contest very seriously. He logged 391 stations, found 127 multipliers and posted a score of 123,000 points. Philip Davies, RS95258, was second with a score of 38,000. Bill McConachie, BRS88921, won the CW category. He heard 740 stations and heard 132 multipliers for a score of 209,000 points. The London SWL Contest team, RS178500, submitted a log for the SSB multi-operator section. They logged 255 stations and found 90 multipliers for a score of 45,000.

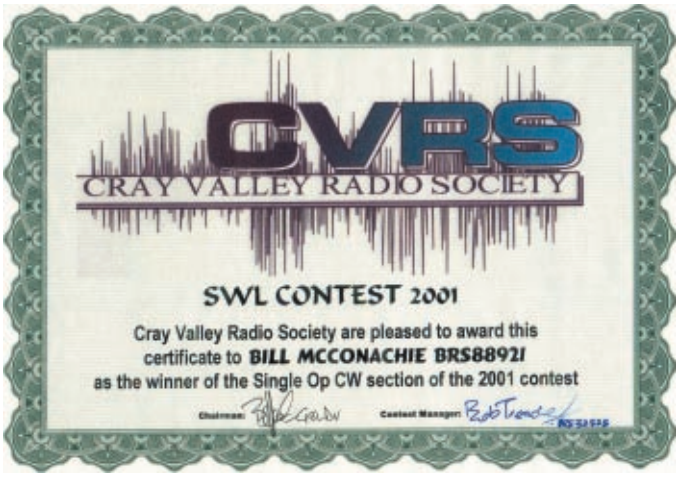
It was interesting to see how listeners tackled the contest, but most spent a lot of time on 3.5MHz - Bill McConachie amassed 777 points, Arthur Miller claimed 606, and Philip Davies scored 430 points. All three listeners logged over 40 multipliers on 3.5MHz: Arthur 57, Philip 46 and Bill 41. Best DX was on CW, where Bill heard A52GJ, VQ9QM and ZB2/K4ZLE. On SSB, best DX was HJ3JSF, HL3IUA, HP1XVH, JO1DZA, VK3DZM, VK4WW, VP5/K4ISV, VU2WAP, ZL1ANJ (both long and short path), ZL3FOX and ZL3RE.

The club awarded certificates to Arthur Miller, GW-5218; Philip Davies, RS95258; Ruud Ivens, NL-290; Moises Martinez Castano, EA-1871-URE; Ewald Bartunek, OE1-0140; The London SWL Contest team, RS178500, and Bill McConachie, BRS88921.

SWL	QSO	Mults	Score
Single Operator, SSB			
1 GW-5218	391	127	123,317
2 RS95258	178	73	38,398
3 NL-290	172	81	29,079
4 EA-1871-URE	191	61	12,749
5 OE1-0140	31	15	495
6 RS102891	23	7	322
Multi Operator, SSB			
1 RS178500	255	90	45,090
Single Operator, CW			
1 BRS88921	740	132	209,880
Check log: BRS25429			

Table 1: Results of the Cray Valley Radio Society SWL Contest.

There are some rule changes for the 2002 contest. The rules and a full write-up of the contest are on the Cray Valley Radio Society's website (see below).



Certificates have been sent out to the winners of the Cray Valley Radio Society's SWL contest.

AROUND THE BANDS

GOOD TO HAVE some DX news from David Whitaker, BRS25429, this month. He switched on the receiver one day in March to check on auroral conditions on 50MHz and, with the beam pointing north-east, heard ZS6WB at 57. Turning the antenna to the south, Hal only came up another S-point. There were other ZSs on the band, but they were mostly unreadable. On HF David caught up with 3D2AG/P (Rotuma) on 28MHz, VK9EHH on 21MHz and ZK1JD on 14MHz. The only new one in March was FJ5DX on 24MHz. David fared particularly well on 50MHz on 31 March. From IO93FX he heard the tail-end of an early morning aurora: from 0757 - 0820UTC he heard signals from JO31, JO33, JO41, JO43, JO10, JN38, JN49, IO67, IO75 and IO88. Best DX was SP4MPB in KO03 square. I felt that most of the continental stations he heard were 'Es assisted'. He caught another aurora from 1613 - 1708UTC. He heard EI4IX in IO53, EI3EBB in IO51 and EI3IO in IO63, MI0AYR in IO64 and MI1BSK and GI6IXD in IO74 squares. He also heard GW3EJR in IO72, GM7PBB in IO68, MM0CDW in IO75, GM0EFT in IO86. Europeans heard were F1DVO and F5IL in JN09, F6HRP in IN88, OZ1DPR in JO45 and LA9VFA in JO28.

The main HF news this month comes from Robert Small, BRS8841. As April dawned, the bands had been badly affected by solar disturbances and a couple of big solar flares. Robert reported that the only DX of note heard on the LF bands was 5U3T on 7MHz CW. MJ/K8PT provided a new one on 10MHz and VP8SGK (South Georgia) was logged on 14MHz CW on CW. 18MHz gave Robert a new one in the shape of ZK1CG from the South Cooks on SSB. He was also pleased to log JW/DL3NRV, VP6CW and 3G0Y (Easter Island). Conditions on 21MHz seem to have been a little better and he logged HI9/DJ7ZG, EP3SMH, YC6LYS/P (OC-245), HR6SI (Swan Is), 3V8CB, CC4A, UE1RCV/1 (EU-188) and AP2IA.

Simon, RS177448, reported two further contest certificates, from the 2000 Holyland and SP DX contests. His best DX of the period can be taken from these: FM/IV3JVJ, ZD8K, 3V8DJ, 9M6BAA, 3W2KF and PJ6/PA3GIO/P.

It was good to hear from Colin McGowan, RS93781, for the first time. Colin does his listening from Stirlingshire in Scotland. He has been an SWL for 12 years and has 312 DXCC entities heard. He uses an FRG-7700 into a 75ft long wire with an ATU. He confirmed Robert's view of the bands, but felt that 24MHz survived the solar disturbances better. He has heard a great deal of DX recently; his list is far too long to publish here, but notable loggings are A35DX, EP3SMH, FW5ZL, 3B8FR and 3Y0C.

Colin asked about deadlines for this column. I'm pleased to hear from any SWL or anyone else with news of interest to SWLs by about the 4th of each month, either by post or e-mail. ♦

WWW.
Cray Valley Radio Society: www.cvrs.org
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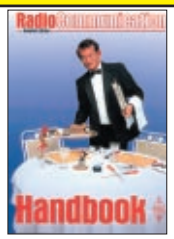

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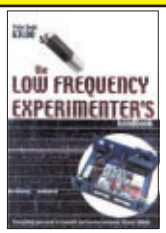

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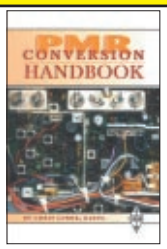

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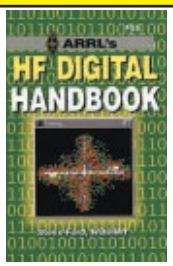

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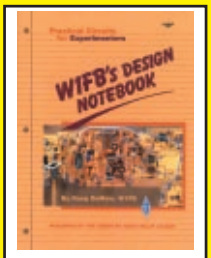

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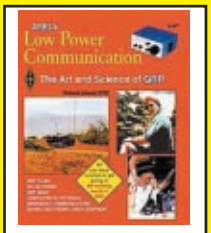

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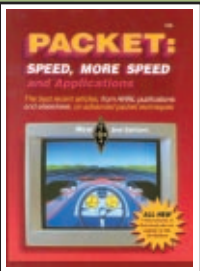

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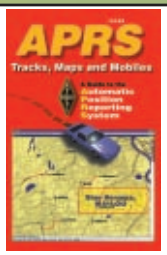

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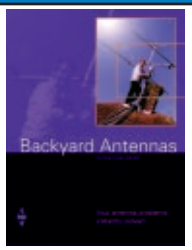

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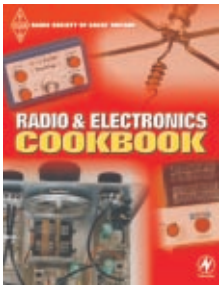

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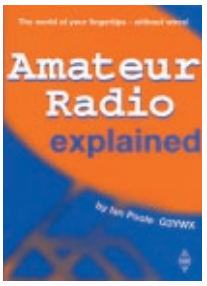

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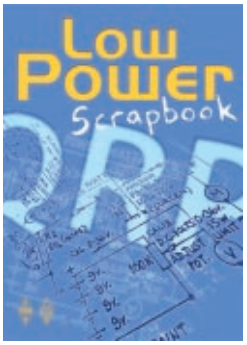

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REPEATERS

MARK LEWIS, GW7KDU

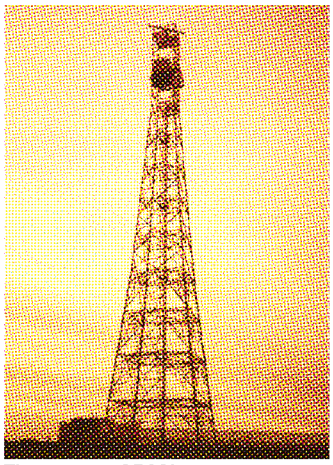
14 Hornbeam Close, St Mellons, Cardiff CF3 0JA. E-mail: rmc-wales@net.ntl.com

IT WAS WITH great sadness that we heard that the previous author of this column, Roger Jones, G3YMK, became a Silent Key in February. An obituary to Roger appeared in the April issue of *RadCom*. Roger was a much-valued member of the RSGB Repeater Management Committee and we would like once more to express the loss that we feel and extend our thoughts to Roger's widow and children.

GB3CL INTERNET LINKING PROJECT

TONY, G0MBA (RMC Zonal Manager Southeast England), has provided some details of an interesting project in Clacton. Early in April this year, the Clacton CLPK group decided to step forward with the trend in technology and link the 70cm Voice Repeater GB3CL to the Internet. The main reason for the project was to generate interest and offer something new in the hobby. There are other so-called Internet linked repeaters but this one has a few important differences.

The repeater keeper, Richard, G7HJK, decided with the backing of a small group of users, to fund a repeater Internet gateway. The original idea was conceived listening to the simplex Internet gateways that have popped up around the Kent area.



The mast at GB3CL.

The main difference of using a voice repeater would be that the unit would run 24 hours a day, seven days a week. This will be the first true repeater in the United Kingdom to have an on-site link to the Internet. Also as the repeater runs full duplex, the radio operation of the repeater would not be affected.

HOW IT WORKS

A telephone line is connected to the repeater site to link the dedicated PC (that has the repeater logic installed) to the Internet. An interface was designed and built by Mike Stevens, G8CUL, to connect the PC Internet gateway to the CUL logic. The computer is configured to connect to the Internet 24 hours a day and log on using the Iphone software. This provides the gateway.

Whilst the repeater is idle, the Iphone software streams a camera picture, showing the view from the repeater site overlooking the adjacent country park. This can be viewed via the Clacton radio club website. When the repeater is accessed by radio, the camera picture is dropped (to save bandwidth) and the audio is streamed to the website. The project is still undergoing tests and once these have been completed the URL for the repeater will be published in a later edition of this column.

If you have the Iphone or similar software loaded on your PC, you will be able to join QSOs on GB3CL. By entering the repeater chatroom, you can join in at any time, just as if you were using radio within the coverage area of the repeater.

As the software allows duplex operation, when you talk via the Internet, the audio is fed from the PC soundcard and into the receiver of the repeater. Therefore you are using the repeater just as if you were a local user on 70cm. When you are listening on the Internet, the transmitted audio of the repeater is also fed into the soundcard, allowing the PC to feed this via the Internet to the web page for anyone to hear.

This is to run as a 12-month experiment, with the hope that other Internet repeaters around the world will link to GB3CL. This should allow a continuous and seamless link that will generate more traffic and encourage more local use of a generally quiet repeater.

Hopefully by the time you read this, the licence will have been granted by the Radiocommunications Agency and the repeater gateway operational.

Mike, G8CUL, can be contacted on tel: 01235 816379 about the CUL logic and / or Internet linking modules for PC.

LATEST CLEARED REPEATERS

The following voice repeaters were cleared by the Radiocommunications Agency on 9 February:

Callsign	Type	Channel	Keeper
GB3AB	Site Change, Aberdeen	RB14	GM0GIB
GB3NA	Site Change, Barnsley, S Yorks	RV54	G4LUE
GB3PZ	New repeater Dukinfield, Chesh	Wide space 70cm Input 438.500MHz Output 430.900MHz	G4ZPZ
GB3UO	Re-site and frequency change, Wrexham, North Wales	Wide Space 70cm Input 438.425MHz Output 430.825MHz	G4UDE

Outstanding voice repeater proposals submitted for licensing are:

Callsign	Type	Process Stage	Proposed Keeper
GB3CQ	New 2m, Corby Northants	RIS	G1DIW
GB3CK	Site change 2m, Charing, Kent	NFAP	G6ZAA
GB3WF	Site change 70cm, Otley, W Yorks	RIS	G0NIG
GB3FJ	New 70cm, Spilsby, Lincs	Submitted to RA	G8LXI
GB3MC	Re-site 23cm, Blackrod, Lancs	Submitted to RA	G8NSS
GB3MT	Re-site 70cm, Blackrod, Lancs	Submitted to RA	G8NSS
GB3UK	Re-site 6m, Blackrod, Lancs	Submitted to RA	G8NSS

COMMITTEE CHANGES

LEN BADDELEY, G8LXI, has been appointed as the RMC Zone Manager for the East Midlands.

Len has much experience with radio both professionally and as an amateur. He has been employed by some of the major companies in the radio and telecoms industry since the 70s and has been the keeper of a number of repeaters in Lincolnshire. He is currently building a new 70cm repeater to serve the Wash and East Lincolnshire area. Len can be contacted via RSGB HQ or by e-mail at g8lxi@aol.com

With the loss of Roger, G3YMK, there is a vacancy on the RMC for a Zonal Manager, South and Southwest England (Zone D). Applications from those with a background in the running of amateur repeaters and / or PMR networks should be sent to the Committee Chairman, Carlos Eavis, G0AKI (QTHR), or via RSGB HQ.

TV REPEATER NEWS

AS WELL AS the existing application for a 13cm ATV repeater, GB3VW in East Yorkshire, the Worthing Video Repeater Group has submitted one for GB3VV to be located in the Brighton / Worthing area. The Worthing Group already operates GB3VR on 13cm and GB3RV on 3cm. We hope to hear soon about these applications which both propose to use 2335MHz inputs and 2345MHz outputs.

The RMC is also expecting to receive two 3cm ATV repeater applications in the near future. One is intended to be co-sited with GB3VL on Lincoln Cathedral and the other, GB3YX, co-sited with GB3YT in West Yorkshire. Both of these units are planning to use 10,425MHz inputs and 10,245MHz outputs.

Also expected soon is a new application for a 23cm ATV repeater unit to be located near Martlesham in Suffolk.

So there is a lot of upcoming new activity on ATV on our microwave bands and, as always, full up-to-date details of these and all repeaters, including predicted coverage maps, keeper details etc can be found on the excellent RMC website.

Finally, I would like to ask all repeater groups in the UK to send me any newsletters, articles or other information that they would like to have mentioned in the 'Repeaters' column. ♦

WWW.

RMCWEB www.coldal.org.uk/rmc

Regular Feature

EMC

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HILARY Claytonsmith, G4JKS, has agreed to take over as Chair of the RSGB EMC Committee in place of Robin Page-Jones, G3JWI, who has served several terms of office totalling 10 years and would like a break. We are particularly fortunate to have Hilary back for campaigning against the continuing threat of Power Line (Tele)Communications (PLC/PLT).

EC PLC WORKSHOP

GASTON BERTELS, ON4WF, Chairman of the IARU Region 1 Eurocom Working Group arranged for Hilary, G4JKS, to present a paper on behalf of IARU to a PLC Forum at the European Commission in Brussels on 5 March. Presentations were given by advocates of PLC and also by users of the HF radio spectrum, including NATO and the BBC.

Mark Bogers, of DG Enterprise in the European Commission, chaired the forum which centred around three main issues. These were telecommunications liberalisation and competition, the conflicting views of PLC advocates and radio users and confusion over who has authority to set standards.

Hilary's presentation was well received by radio users and brought home to some proponents of PLC just how much opposition there is from radio users.

Following this forum, Hilary has re-formed a UK HF Radio Users' Group to establish what the HF noise floor really is, what effect the proposed emission levels would have and what cumulative effects there may be.

GERMAN PLC TRIAL

ALTHOUGH SIEMENS has recently pulled out of PLC, the Swiss company Ascom is still active, and a fairly large-scale PLC trial has been announced in Germany. Emissions will be subject to the German RegTP NB30 limits, which do not provide sufficient protection for weak signal radio services, but are substantially lower than designers of PLC systems would like.

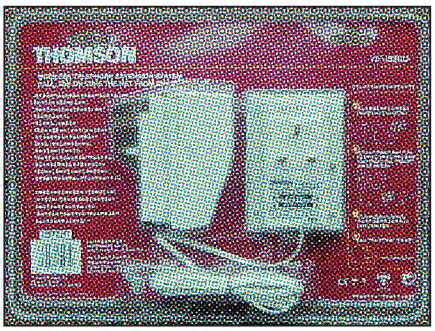
The German National Society, DARC, is watching this issue closely in Germany. Meanwhile Falk, DL3DAZ, has set up an independent group called 'Save-Shortwave'.

HF WIRELESS PHONE JACKS

FURTHER TO the item in April 2001 EMC, I have now tested some HF wireless phone jacks. The model tested was the Thomson Multimedia 'Wireless Telephone and Web Extension System', WPJ530U. These are on sale in various shops including Currys, PC World, and Argos, price £79.99 a pair.

They are CE-marked, which indicates compliance with all applicable European Directives, including the EMC Directive. Products must either comply with the relevant harmonised European standard, or where no applicable standard exists, a Technical Construction File (TCF) is produced.

I tested the WPJ530U against the EN 55022 standard for Information Technology equipment, using a Hewlett Packard 8591EM EMC Analyser and an EMCO Line Impedance Stabilisation Network (LISN). This is 'pre-compliance' EMC test equipment, and the results may not be identical with those obtained by a certified EMC test laboratory.



The Thomson Wireless Phone Socket System, model WPJ530U.

The master socket transmits at around 8.247MHz and the slave around 3.339MHz, although there is some frequency drift. The carriers are only present when the extension telephone is in use or ringing. Modulation is FM and the deviation can be as wide as +120kHz, -70kHz, if driven hard.

Fig 1 shows the 1 - 10MHz section of the 150kHz - 30MHz conducted emission plot. There can be little doubt that the carrier at 3.339MHz exceeds the EN 55022 Class 'B' average limit by something like 54dB, while the carrier at 8.247MHz appears to exceed the limit by about 47dB.

It therefore appears likely that this product was CE marked using the TCF route. The TCF is not available for public inspection, but it would be interesting to see the justification for intentional emissions that exceed existing conducted emission standards.

The 3.339MHz carrier is quite close to the 3.5MHz amateur band, which raises the question of possible breakthrough of amateur 80m transmissions. I did not find a problem with this, but was testing the units close together so that they were receiving strong signals from each other. It is likely that the immunity would be reduced if they were operating near the limit of their range.

Although these devices do not operate in amateur bands, the fact that they are CE-marked and on sale in the UK represents the 'thin end of the wedge'. If this is allowed to continue, it could lead to a 'free-for-all' for products such as home networking to use the HF bands for broad-band data communication via mains wiring.

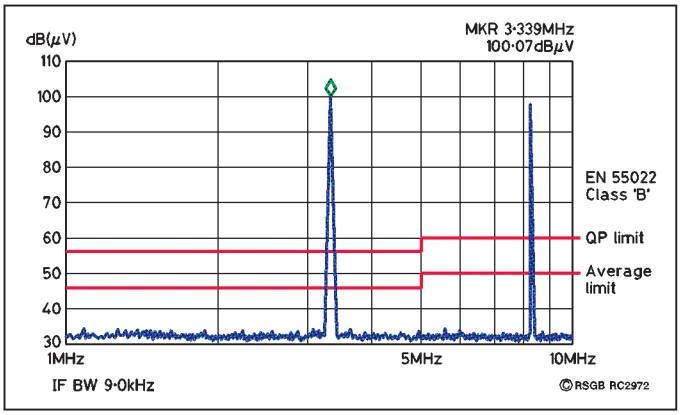


Fig 1: Conducted emissions in the 1 - 10MHz range from the WPJ530U wireless phone socket system.

TELEPHONE 'SAVER SOCKETS'

SINCE THE ITEM was written in April 2001 'EMC' about a 'Phone.Pal' box from 'One.Tel', British Gas Communications has been advertising cut-price telephone calls using a similar device which they call a 'Saver Socket', so I decided to try one.

When plugged into a BT phone socket, the Saver Socket first dials into a server to register itself. It appears to have three modes of operation. In 'dial tone' mode, it waits for the user to dial the first digit (using DTMF tone dialling). After detecting the first digit, it goes into 'dialling mode', storing from one to four dialled digits while it decides whether to send the prefix code. It then forwards the stored digits and switches to 'connected mode' when the green light goes out.

I tried plugging the Saver Socket into several different phone sockets in the house, and I noticed that in the upstairs bedroom (radio shack) the dial tone had Capital Gold 1548kHz AM playing in the background. The phone was a BT 'Relate 250', and did not suffer this type

of breakthrough without the Saver Socket. When I started to dial, the music got louder while the box was in 'dialling mode'. When it switched to 'connected mode', the music stopped.

I also found that if I transmitted 100W SSB on 3.5MHz with a wire aerial over the roof, the 'Relate 250' phone did not suffer breakthrough if connected directly to the phone line, although it was less immune on higher bands such as 21MHz. If the phone was connected via the Saver Socket, however, it did suffer breakthrough on 3.5MHz when in 'dial tone' mode and more so in 'dialling' mode.

I also had two other phones in the house, a BT 'Relate 250' and a 'Relate 200', connected directly, not via 'Saver Sockets'. Even when the saver socket in the shack was not in use, but had a phone connected via a 3m extension cable, it could still rectify RF and I could hear Capital Gold faintly in the background on the other phones in the house.

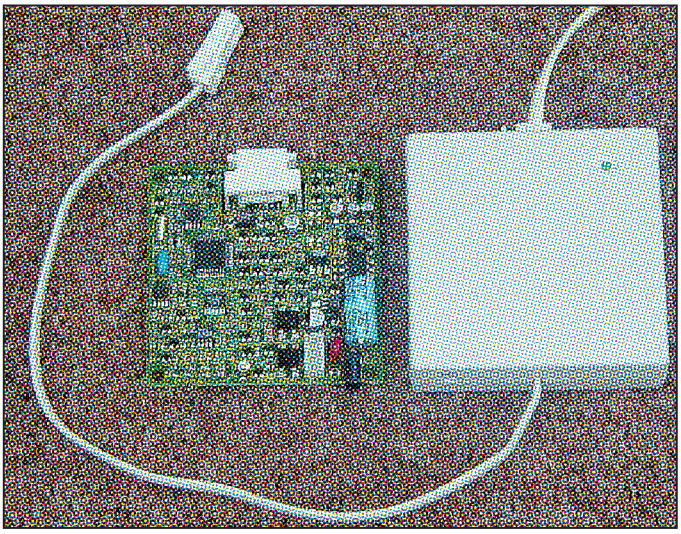
I phoned British Gas Communications (BGC) Customer Services and asked why I could hear radio programmes on my Saver Socket. This took four separate calls with different people and I did not get a satisfactory answer, although BGC admitted that this effect was known and they were looking into it.

I was asked to try each phone in turn, pressing the '5' key to prove that they were all set to tone dialling. I noticed that, when two phones were off-hook, one via the Saver Socket and one not, the music was louder and could also be heard at the other end.

I was asked to leave the box unplugged all day to reset it, then plug it in again. Then I was told that the Saver Socket contains an amplifier which "brings up the interference that is already there but is suppressed by the BT line". I was not convinced. The man then advised me to buy a "ferrite line suppressor from any hardware store and clip it on the line". I have never seen these on sale in any hardware store and even the Maplin Electronics catalogue no longer lists them. Fortunately, I had one but it made no difference, even when using up to four turns.

One thing BGC didn't suggest was a BT 'Freelance' plug-in RFI filter, LJU 10/14A (BT Item Code 877596). These seem to be very difficult to obtain nowadays, but I happened to have one and it *did* work.

I then spoke to a lady who explained that "The Saver Socket works on radio waves". I told her that it did not. Then a man from the 'Technical Department' asked whether I had asked BT to check the line. I said that I hadn't and, in any case, it only happens when the box is connected. He asked whether I was using a cordless phone. I said that I wasn't. Was the box plugged in near radiator pipes? I wondered whether I should move the phone socket or the radiator or put ferrite line suppressors on the pipes!



The Dataflex 'SmartGem' line-powered telephone dialler, as used by British Gas Communications and others.

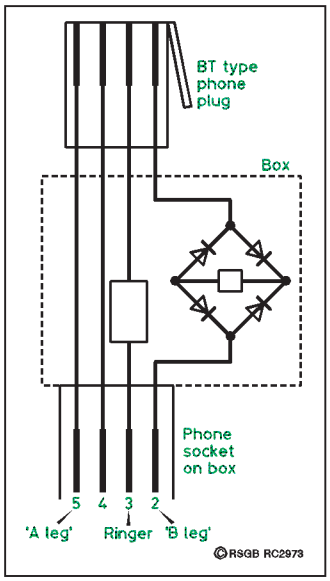


Fig 2: Simplified block diagram of British Gas Communications 'Saver Socket' and similar devices.

BGC then sent a new box in case the first one was faulty, but it was no different.

FIELD TESTS

The Capital Gold 1548kHz transmitter at Saffron Green near Barnet is 4.72km away with an Effective Mean Radiated Power of 97.5kW. The calculated field strength at my QTH is 0.46V/m although, in practice, it may be less, as the aerial is directional and I am slightly off-beam.

First, I unplugged all the extension wiring from the BT master socket and measured the RF on the incoming line which comes via an overhead 'drop wire'. I measured about 7.5V RMS of common-mode RF at 1548kHz on the line relative to mains earth, AC-coupled into a 10kΩ load. That was the estimated level that the RF carrier would be if unmodulated. The source impedance was relatively high, about 1kΩ. The differential-mode RF voltage between the line pair was much less, about 45mV RMS carrier level with a lower source impedance.

With the Saver Socket plugged directly into the BT master socket and no extension wiring connected, there was clearly audible breakthrough in 'dialling mode', but not when the call was connected. Reconnecting all the extension wiring reduced the common mode RF to 0.7V RMS, but doubled the differential-mode voltage. The breakthrough disappeared at the master socket.

Upstairs in the radio shack, there was 3.5V RMS common carrier level on the line relative to mains earth. This reduced to 1.75V when I disconnected the loft aerial feeder from the portable TV in the shack (all amateur radio aerial feeders were already disconnected).

Fig 2 shows a simplified block diagram of the Saver Socket. There appears to be some sort of bridge rectifier in series with the 'B leg' line path through the box (socket pin 2). There are no RF bypass capacitors to prevent RF from being rectified by these diodes. The box therefore introduces an unbalanced non-linear impedance at RF. I found that a 10nF capacitor, across pins 2 - 5 each side of the box, greatly improves the immunity.

It is tested to EN 50082-1, the Generic immunity standard. Meanwhile, the new EN 55024 standard for telephone equipment has been weakened so that equipment can pass the test while exhibiting a level of audible breakthrough that is high enough to make it unusable. It is claimed that there are very few complaints, but it seems that complaints are being 'filtered out' by companies such as BGC.

If you get a report of your transmissions breaking through on a telephone, find out whether the customer is using a 'Saver Socket' or similar from British Gas, One.Tel, Woolwich Telecommunications and others. Also find out whether the breakthrough is present only before and during dialling. ♦

FURTHER READING

The RSGB Guide to EMC **(RSGB Shop).**

WWW.

PLT Newsgroup
www.egroups.de/group/save-shortwave/

IARU

TIM HUGHES, G3GVV
10 Farm Lane, Tonbridge TN10 3DG.

THE LATEST edition of *ITU News* reports that an agreement was signed on 9 November 2000 by Yoshi Utsumi, ITU Secretary-General, and Larry Price, W4RA, President of the International Amateur Radio Union. The agreement covers the publication of a handbook of basic texts on the amateur service as defined in the Radio Regulations up-dated by the World Radiocommunication Conference (WRC-2000) in Istanbul in May - June 2000.

Also attending the ceremony were Roberto Blois, ITU Deputy Secretary-General, Robert W Jones, VE3CTM, Director of the Radiocommunication Bureau (BR) and Philippe Capitaine, BR Administrator and President of the International Amateur Radio Club.

The handbook will be of great interest not only to the many radio amateurs in the world but also to the national administrations and frequency management agencies and to national radio amateur associations.

ITU MEETINGS

W4RA ATTENDED two meetings in March 2001, the first being the ITU-D Rapporteur's Group. IARU had submitted a written report in which it announced jointly with the United Nations organisation UN-OCHA, that all three parts of the *Disaster Communications Handbook* had been completed and submitted. The Rapporteur's Group was pleased with this progress and took a decision to arrange for its publication as soon as possible.

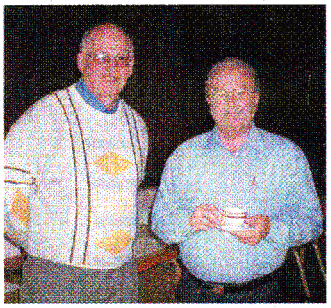
Larry Price has also accepted an invitation to attend the planning sessions on a proposed handbook on third generation mobile phone systems, in order to comment on any relationship to disaster communications. He attended, too, a five-day meeting of the Radiocommunication Advisory Group (RAG), under its newly-selected Chairman Bruce Gracie (Canada). The latter is well known to IARU, especially in Region 2, where he was a colleague of Bob Jones, VE3CTM, at the Canadian Department of Communications (now Industry Canada). Bruce Gracie replaces Michael Goddard of the UK, who was chairman of RAG since its inception. IARU had submitted a document entitled *Role of Sector Members at World Radio Conferences - a review of the experience at WRC-2000*. W4RA summarises thus: "The meeting was useful, took up a variety of subjects of interest, and was an opportunity to discuss relevant topics with ITU-R leaders".

CEPT - WGRR Meeting

TOGETHER WITH representatives of more than 20 European countries, ERO, the European Commission, ETSI and Ofcom, John Bazley, G3HCT, represented IARU at this Working Group which deals with Radio Regulations. The meeting took place in the Hague in February. A major topic of discussion was Electronic Licensing, a system to which many administrations are moving.

Two more administrations, Germany and Belgium, have reduced their Morse requirements from 12 to 5WPM. The latter has also changed its policy regarding reciprocal licences. Providing a visiting amateur produces a valid licence, clearly showing the class of licence together with a copy of the relevant syllabus in English, they will examine it and if they consider the standard is comparable will issue a licence without any formal reciprocal agreement being in place.

Further topics were discussed, concerned with planning for the future. Other meetings have been taking place this year, but these two indicate that the interests of all radio amateurs are being protected and extended, through the voluntary work of fellow amateurs.



Hans v d Groenendaal, ZS6AKV, Rapporteur for the Publications and Exhibition Committee of IARU Region1, and (right) Louis van de Nadort, PA0LOU, Chairman IARU Region 1.

Keigo Komuro, KA1KAB, Secretary IARU Region 3.

Fred Johnson, ZL2AMJ, Chairman IARU Region 3.

IARU HF WORLD CHAMPIONSHIP

ONCE A YEAR the IARU HF World Championship contest takes place, this year on **14 / 15 July**. The full rules appear in the April 2001 issue of *QST*. The multipliers are ITU zones but there are additional multipliers for working IARU officials: Administrative Council (AC) and the Executive Committee (EC) of Regions 1, 2 and 3. ♦

DATA DATA DATA

ANDY TALBOT, G4JNT
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E-mail: data.radcom@rsgb.org.uk

THE SPRING EDITION of the British Amateur Radio Teledata Group's magazine, *Datacom*, arrived before the deadline for this column. BARTG is urgently seeking a new editor for the magazine, published four times a year. If no new editor is forthcoming, *Datacom* could well cease to be! Articles in the Spring edition include surveys of data communications and logging software by GU0SUP and G3URA, a simple RF wattmeter, and a (rather nostalgic) look at how mechanical teleprinters work. There would appear to be a few operators out there who still like to use teleprinters for their RTTY QSOs! All the usual contest, operating news and reviews are there too.

WOLF

OPERATORS ON the 136kHz band have recently being trying out a new version of BPSK coding - *WOLF*, (**W**eak-signal **O**peration on **L**ow **F**requencies). This uses 10b/s PSK like the VE2IQ *Coherent* format covered in detail in the February column. Developed by Stuart Nelson, KK7KA, it makes use of error correction coding, data interleaving and repetition to give a very robust medium for repeatedly sending short messages of up to 15 characters. While being designed primarily for LF beacon and propagation monitoring, transmissions from M0BMU using the mode have been successfully copied in the US and Canada, and it appears to compare favourably in performance with the very slow CW techniques now in widespread use on LF. More information on *WOLF* is available (see below).

At the moment *WOLF* can only be used off-line. Several minutes of incoming audio have to be recorded by a PC into a *wav* file, then subsequently post-processed in order to decode the data. Hopefully a real-time version will eventually appear. It is very susceptible to the inaccuracies of soundcard sampling rates and requires the user to perform a calibration of the soundcard beforehand.

HF E-MAIL

I HAVE RECENTLY been conducting some tests with Charles, G4GUO, of a medium- to high-speed data mode primarily used hitherto by the military, although its details are now in the public domain. The mode, STANAG 4285 ['STANAG' is a NATO term derived from 'Standardisation Agreement' - *Ed*], is an 8-phase PSK signal, transmitted in a 3kHz bandwidth at 2400 baud. Depending on channel conditions, it can operate at any data rate from 2400 right down to 75b/s. At its slowest 75b/s rate, the mode is extremely robust, being able to cope with chronically-severe HF multipath interference at negative signal-to-noise ratios. The downside is that it uses very long interleaving, so it can take over 20 seconds before data emerges after being entered. Definitely *not* a ragchewing keyboard-to-keyboard mode! The other disadvantage is that at all data rates, it still occupies 3kHz bandwidth - it is this feature that makes it so resistant to multipath, unlike narrow-band modes such as PSK31 and narrow-shift RTTY. It is not a mode designed for widespread amateur use on our crowded bands, but one potential use would be to bring the Internet into local communities in developing countries and for general HF e-mail applications. Charles's implementation employs TCP/IP using a soundcard on a PC running the Linux operating system. Linux is a much easier environment than Windows in which to programme for applications such as this.

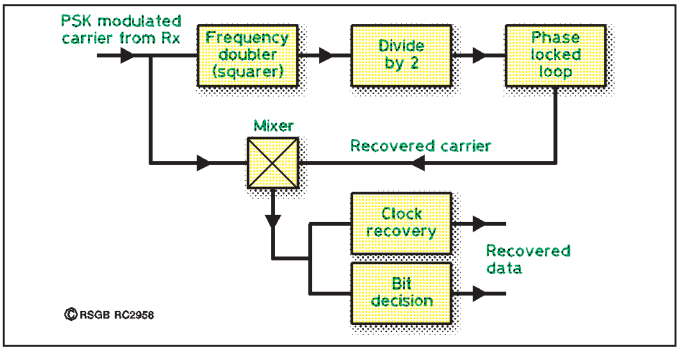

Fig 1: The first of two decoding schemes for PSK modulation. Suitable for non-differentially-coded signals, it uses a frequency-doubler to resolve the 0° / 180° ambiguity before regenerating the carrier via a phase-locked loop.

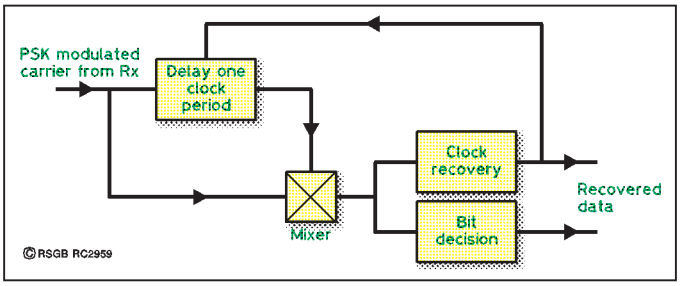

Fig 2: The second scheme is used for differentially-coded modulation where the data is coded as a change from one bit to the next. Note the need for recovery of the bit clock in order to make the phase comparison accurately. In both cases the demodulation can be done completely within DSP software or by a hardware solution. A hardware demodulator is always needed for high-data-rate signalling.

FUNDAMENTALS

TO DEMODULATE a PSK signal, it is necessary to generate a local oscillator - equivalent to the BFO in an SSB receiver - to mix with the incoming signal and recover the phase shift information. Unlike SSB, it has to be phase-locked to the incoming waveform, otherwise the recovered phase would drift at a rate set by the difference frequency, making resolution of the 0° / 180° phase shift impossible to achieve. One way of doing this is to use a special phase-locked loop (PLL) which can lock to the signal when it is in either of its two phase states. The simplest method is to square (frequency double) the incoming waveform, which has the result of generating a constant-phase continuous carrier at twice the input frequency (**Fig 1**). This can then be divided by two and used to lock the PLL to recover the transmitted phase information. Alternatively, a variant of the 'third-method' SSB generator, called a Costas loop, is possible. Here a PLL works on the in-phase and quadrature components of the signal and maintains lock, with the added bonus of demodulation as an inherent part of the carrier recovery.

For differentially-coded PSK, demodulation of the binary data is made slightly easier without having to resort to a PLL, as **Fig 2** shows. If the incoming frequency is known with sufficient accuracy, the differentially-modulated code can be extracted by comparing the signal with that received exactly one bit interval earlier. With a small frequency error, the phase drift during a bit interval is much less than the 180° data change, and errors are minimised. To detect a 180° phase shift, an error of less than 90° is needed. To achieve this phase shift during a bit interval, the frequency needs to be set to within 90° / 360° of the signalling rate. So, for a 300b/s DPSK waveform, the frequency has to be known to within 75Hz. For noisy signals, higher accuracy is needed, and a figure of one-tenth of the bit rate is usually taken. For PSK31, for example, a frequency accuracy of around 3 to 4Hz is necessary to avoid adding demodulation errors.

The delay and comparison needed for DPSK has to be made at the bit transition point, where the phase may or may not have changed, so the data clock needs to be recovered for optimal decoding. ♦

WWW.

Information on *WOLF*
www.highnoonfilm.com/xmgr/updates/wolf.htm

NOTICE TO READERS

Although the staff of *RadCom* take reasonable precautions to protect the interests of readers by ensuring as far as practicable that advertisements in our pages are bona fide, the magazine and its publisher, The Radio Society of Great Britain, cannot accept any undertaking in respect of claims made by advertisers whether these advertisements are printed as part of the magazine, or are in the form of inserts.

The publishers make no representation, express or implied, that equipment advertised conforms with any legal requirements of the Electro Magnetic Compatiblility Regulations 1992. Readers should note that prices advertised may not be accurate due to currency exchange rate fluctuations, or tax changes.

While the publishers will give whatever assistance they can to readers having complaints, under no circumstances will the magazine accept liability for non-receipt of goods ordered, late delivery, or faults in manufacture. Legal remedies are available in respect of some of these circumstances, and readers who have complaints should address them to the advertiser or should consult a local Trading Standards Office, or a Citizens Advice Bureau, or their own solicitor.

Readers are also reminded that the use of radio transmission and reception equipment (including scanning) is subject to licencing and the erection of external aerials may be subject to local authority planning regulations.

the last Word

On My Retirement . . .

I would like, through your columns, to express my heartfelt thanks to all those numerous participants in the RSGB IOTA programme, both in the UK and overseas, who have sent extremely kind messages to me on my retirement as an IOTA checkpoint. I am quite overwhelmed with the volume of e-mails, letters, telephone calls etc all of which have been very much appreciated.

Over the past 11 years I have, at various times, checked QSLs for up-dates and IOTA awards from 24 different DXCC entities and have enjoyed the most excellent cooperation from all my 'customers'. In wishing them continued success with their island-hunting activities I would also like to convey my grateful thanks to Phil, G4WFZ; John, SM5DJZ; and Igor, UR5LCV, who have taken over my more recent portfolio. Meantime, I have a lot of catching-up to do where island operations are concerned, so I look forward to meeting up with you all in the pile-ups!

John Hall, G3TOK

Size Matters

Why are Japanese manufacturers so intent on reducing the size of complex transceivers to the point where I scream in frustration at the absurdly small size of the buttons and knobs?

The logic inherent in my part-Gallic ancestry suggests that an expensive box should be larger than an inexpensive one. I would willingly pay £50 more for the additional cost of the plastic, steel, alloy and packaging materials needed to make a bigger case and transit box. The inside might well be taken up with a substantial element of empty space, but so what? Most QTHs could cope with a few more inches of width and height.

With a decent-sized rig I would be able to handle ergonomically-acceptable controls and inspect and / or repair the innards without the current requirement to have the fingers of a child and sometimes a magnifying lens as well.

Michael O'Beirne, G8MOB

Planning Success

I have just received full planning permission from my local council, the London Borough of Hounslow, for the "Retention of 3 No. antenna masts for the establishment of antennas (aerials) for amateur radio transmission". This would not have come about if it hadn't been for the good offices of the RSGB's Planning Advisory Committee.

It all began in July 1999, when I erected two 30ft aluminium masts 72ft apart. Mast 'A' was bolted to the side of the house and supported a 1.8m high 2m / 70cm collinear and one end of a long wire antenna stretching to the other mast at the bottom of the garden. A few months later a third mast was bolted to the back of the house with which to support a rotator and VHF / UHF antennas. Fellow club members expressed the opinion that I might have gone too far, so I contacted the RSGB and received a copy of the *Planning Permission* booklet. I was also assigned a 'liaison officer': Tom Dawson, 2E1GHD, now M1DQT.

It proved a wise move, for a neighbour had complained and in May 2000 I received a letter from the council's enforcement officer giving me two options: either take down the offending masts or make a retrospective application for planning permission. Planning permission was refused. I contacted my three local councillors who were less than useless.

On Tom's advice I met the council's case officer and suggested a compromise. Mast 'A' was to move back 4.5m, away from the front of the house, and the 1.8m collinear was to be replaced with a 1.1m-high collinear. The re-application was favourably received but one neighbour had reservations over her TV reception. I tried telling the case officer that TVI was not within the jurisdiction of the local council but was that of the Radiocommunications Agency. Tom Dawson sent a strong letter of support as did RSGB General Manager Peter Kirby, G0TWW. Nevertheless, the council's case officer demanded a written assurance from my 'professional body' (he meant the RSGB) that that person's TV would not be affected by my amateur radio transmissions. Robin Page-Jones, G3JWI, of the RSGB EMC Committee, duly wrote in on my behalf.

Planning permission was granted and as from 15 March 2001 I am legal.

I am indebted to the RSGB and particularly Tom and the Planning Advisory Committee for making my second application a successful one. The best advice I can give any applicant is to join the RSGB and avail yourself of the expertise of their planning liaison officers.

It is also gratifying to know that in the opinion of at least one London Borough Council the RSGB is the 'professional body' of UK radio amateurs - rather a contradiction in terms!

Maurice de Silva, G0WMD

Radio, not Computer, Shows, Please

Until yesterday, I regarded the London Amateur Radio Show as one of the best in the country. The number of exhibitors at Picketts Lock used to be incredible. This year the show moved to Alexandra Palace, I was expecting the show to be even better. To my surprise, the show was a complete washout! If Waters & Stanton had not turned up it would have been impossible to purchase a radio! Where were the other dealers?

The Bristol Radio Rally has already gone in that direction. How many more radio rallies are we likely to lose? I doubt if I will bother with the London show in future as there are much better computer fairs locally in Bristol and Oxford. Could rally organisers please try to get the balance right? If they are going to call the show an 'Amateur Radio and Computer Show', please make the balance equal. Let's hope Longleat and Leicester are better. If you are organising a rally, try to keep radio rallies and computer fairs separate. There are enough computer fairs around every weekend. Let's have a *radio* show please!

Pete Bown, M5AHJ

Morse a Hit with Brownies

My friend Charles, G4UJW, thought you might like to publish the letter of thanks which I have received from one of the eight groups under the banner callsign GB4MHD:

"Dear Arthur, 9th Maidenhead Brownies would like to thank you for organising Thinking Day on the Air. We all really enjoyed the Morse code, speaking over the radio and making those cards with pictures and various things. 100% enjoyed the Morse code the best. Thank you again and we wish you all the best. From Katherine, Lauren, Olivia, Megan, Fiona Walker."

Arthur Baker, G3UXY

IOTA Contest: Dragon Responds

I write on behalf of the Dragon ARC concerning the article in the March *RadCom* on the RSGB IOTA Contest 2000. The author criticised members of GW6J for "giving the reference so fast that it was almost indistinguishable". The GW6J team contained a majority of Dragon ARC members plus a guest from the North of Scotland Contest Group. For the record, the operators at GW6J had very few requests for repeats, and no complaints were received, either during or after the contest, that operators were speaking too fast. The club members in the team included several Novice contesters, who helped put the station together and were shown how to use the software, run pile-ups etc. It was devastating for them to see the team criticised in print, with no form of redress.

Stewart Rolfe, GW0ETF
Secretary, Dragon Amateur Radio Club

[*We are happy to allow GW6J the right of reply. See also page 52 for a detailed account of this event from the winning team, GM5V* - Ed.]

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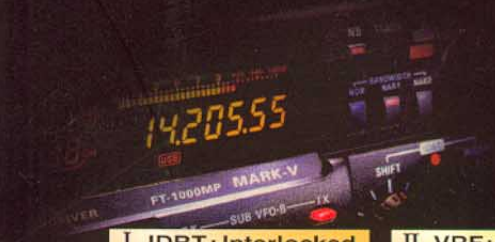

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VRF Features Large, High-Q Coils and High-Quality Relays


VRF Typical Bandpass Response (3.5 MHz)

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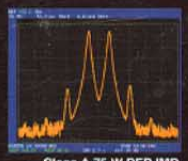
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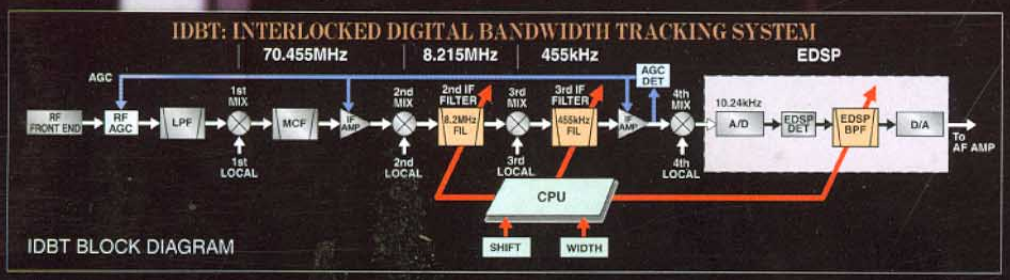

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